

offline net 2

This is a bonus to the printed offline Internet. Made by drummyfish in February 2024.

Table of Contents

offline net 2.....	1
https://codegolf.stackexchange.com/questions/69189/build-a-compiler-bomb.....	1
https://codegolf.stackexchange.com/questions/28672/code-that-will-only-execute-once.....	12
https://en.wikisource.org/wiki/1911_Encyclop%C3%A6dia_Britannica/Calculating_Machines.....	17
https://en.wikisource.org/wiki/1911_Encyclop%C3%A6dia_Britannica/Chess.....	23
https://encyclopediadramatica.online/The_Elder_Scrolls_IV:_Oblivion.....	31
https://encyclopediadramatica.online/Pok%C3%A9mon.....	33
https://encyclopediadramatica.online/World_of_Warcraft.....	37
https://en.uncyclopedia.co/wiki/World_of_Warcraft.....	45
https://encyclopediadramatica.online/Vandal/How-to.....	46
http://textfiles.com/100/adventur.txt.....	55
http://textfiles.com/100/famous.bug.....	56
https://pantsuprophet.xyz/writings/life-story.html.....	61
https://incels.wiki/w/Adolf_Hitler.....	67
https://en.citizendium.org/wiki/Life.....	68
https://citizendium.org/wiki/EVE_Online.....	80
https://www.gutenberg.org/cache/epub/97/pg97.txt (Flatland).....	81
http://lolwut.info/*.....	97

<https://codegolf.stackexchange.com/questions/69189/build-a-compiler-bomb>

Build a Compiler BombAsk Question

Asked 8 years, 1 month ago

Modified 11 months ago

Viewed 148k times

429

Introduction

You're probably familiar with zip bombs, XML bombs, etc. Put simply, they are (relatively) small files which produce enormous output when interpreted by naïve software. The challenge here is to abuse a compiler in the same way.

Challenge

Write some source code which occupies 512 bytes or less and which compiles into a file which occupies the most possible space. Largest output file wins!

Rules

OK, so there are a few important clarifications, definitions and restrictions;

- The output of the compilation must be an ELF file, a Windows Portable Executable (.exe), or virtual bytecode for the JVM or .Net's CLR (other types of virtual bytecode are also likely to be OK if asked for). Update: Python's .pyc / .pyo output also counts.
- If your language-of-choice can't be compiled directly into one of those formats, transpilation followed by compilation is also allowed (Update: you can transpile multiple times, just so long as you never use the same language more than once).
- Your source code can consist of multiple files, and even resource files, but the summed size of all these files must not exceed 512 bytes.
- You cannot use any other input than your source file(s) and the standard library of your language-of-choice. Static linking standard libraries is OK when it's supported. Specifically, no third party libraries or OS libraries.
- It must be possible to invoke your compilation using a command or series of commands. If you require specific flags when compiling, these count towards your byte limit (e.g. if your compile line is gcc bomb.c -o bomb -O3 -lm, the -O3 -lm part (7 bytes) will be counted (note the initial leading space isn't counted).
- Preprocessors are permitted only if they are a standard compilation option for your language.
- The environment is up to you, but in the interests of making this verifiable, please stick to recent (i.e. available) compiler versions and operating systems (and obviously specify which you're using).
- It must compile without errors (warnings are OK), and crashing the compiler doesn't count for anything.
- What your program actually does is irrelevant, though it can't be anything malicious. It doesn't even have to be able to start.

Example 1

The C program

```
main(){return 1;}
```

Compiled with Apple LLVM version 7.0.2 (clang-700.1.81) on OS X 10.11 (64-bit):

```
clang bomb.c -o bomb -pg
```

Produces a file of 9228 bytes. The total source size is 17+3 (for the -pg) = 20 bytes, which is easily within size limit.

Example 2

The Brainfuck program:

$$\begin{aligned} &+++++[->++++++<]>.-.-[-<+++>]<-.+++++.+++. [->+<]>-----.- \\ &-[-<+++>]<.-.-[->++++<]>..+++.-----.-. [-<+>]<.[-->+<]>-. \end{aligned}$$

Transpiled with awib to c with:

```
./awib < bomb.bf > bomb.c
```

Then compiled with Apple LLVM version 7.0.2 (clang-700.1.81) on OS X 10.11 (64-bit):

clang bomb.c

Produces a file of 8464 bytes. The total input here is 143 bytes (since @lang_c is the default for awib it didn't need to be added to the source file, and there are no special flags on either command).

Also note that in this case, the temporary bomb.c file is 802 bytes, but this counts towards neither the source size nor the output size.

Final Note

If an output of more than 4GB is achieved (perhaps if somebody finds a turing complete preprocessor), the competition will be for the smallest source which produces a file of at least that size (it's just not practical to test submissions which get too big).

code-challengebusy-beavercompile-time

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edited Jan 12, 2016 at 1:09

asked Jan 11, 2016 at 23:50

Dave's user avatar

Dave

8,43944 gold badges1818 silver badges38 38 bronze badges

If using a transpiler, does the output source code need to be under 512 bytes as well as the input source code? – trichoplax is on Codidact nowJan 11, 2016 at 23:57

3

Is repeated transpilation allowed? – orlpJan 12, 2016 at 0:02

3

@LegionMammal978 yes it has to produce one of the file types I specified. But if you think you've found something which is more virtual-machine than interpreted-language, ask about it specifically and it's possible I'll allow it (it's a bit subjective so I wanted to be very restrictive to begin, with the option of opening it up) – DaveJan 12, 2016 at 0:21

3

@trichoplax I wasn't aware of that, but from some reading it looks like yes; compiling to Python bytecode absolutely counts. So for python, the output size would be the sum total size of all your pyc/pyo files. I'll update the question soon with these comment-based updates. – DaveJan 12, 2016 at 0:58

2

@MartinRosenau - WGroleau already asked a similar question; it's standard in coding challenges that you can use anything which already existed when the challenge began. – DaveJan 17, 2016 at 17:09

Show 22 more comments

23 Answers Sorted by: Highest score (default)

500 +50

C, (14 + 15) = 29 byte source, 17,179,875,837 (16 GB) byte executable

Thanks to @viraptor for 6 bytes off.

Thanks to @hvd for 2 bytes off and executable size x4.

This defines the main function as a large array and initialises its first element. This causes GCC to store the entire array in the resulting executable.

Because this array is bigger than 2GB, we need to provide the -mmodel=medium flag to GCC. The extra 15 bytes are included in the score, as per the rules.

main[-1u]={1};

Don't expect this code to do anything nice when run.

Compile with:

gcc -mmodel=medium cbomb.c -o cbomb

It took me a while to get round to testing @hvd's suggestion - and to find a machine with enough juice to handle it. Eventually I found a old non-production RedHat 5.6 VM with 10GB RAM, 12GB swap, and /tmp set to a large local partition. GCC version is 4.1.2. Total compile time about 27 minutes.

Due to the CPU and RAM load, I recommend against doing this compile on any remotely production-related machine.

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edited Jun 17, 2020 at 9:04

Community's user avatar

Community Bot

1

answered Jan 12, 2016 at 0:16

Digital Trauma's user avatar

Digital Trauma

71.9k99 gold badges110110 silver badges261 261 bronze badges

12

@Sparr Elements with missing values will be initialized to 0 – Digital TraumaJan 12, 2016 at 1:19

14

I'm playing against my solution here, but... you don't need a. You can just use main[1<<30]={1}; – viraptorJan 12, 2016 at 1:41

40

Oh my. This is evil. X froze for several minutes trying to compile that code. I was starting to look for another computer to possibly ssh back in and kill the gcc process before it finally came back to life. Btw. If you want a larger value than 1<<30 then 7<<28 could be an option. – kasperdJan 12, 2016 at 19:55

37

>4gb? That escalated quickly – Wayne WernerJan 13, 2016 at 1:28

21

In case anyone else is wondering why this compiles: stackoverflow.com/questions/34764796/... – T. C.Jan 13, 2016 at 11:40

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2, <https://codegolf.stackexchange.com/questions/69189/build-a-compiler-bomb>

225

Python 3, 13 byte source, 9,057,900,463 byte (8.5GiB) .pyc-file

```
(1<<19**8,)*2
```

Edit: Changed the code to the version above after I realized the rules say output size beyond 4GiB doesn't matter, and the code for this one is ever so slightly shorter; The previous code - and more importantly the explanation - can be found below.

Python 3, 16 byte source, >32TB .pyc-file (if you have enough memory, disk space and patience)

```
(1<<19**8,)*4**7
```

Explanation: Python 3 does constant folding, and you get big numbers fast with exponentiation. The format used by .pyc files stores the length of the integer representation using 4 bytes, though, and in reality the limit seems to be more like 2^{31} , so using just exponentiation to generate one big number, the limit seems to be generating a 2GB .pyc file from an 8 byte source. (19^{**8} is a bit shy of $8 \cdot 2^{31}$, so $1<<19^{**8}$ has a binary representation just under 2GB; the multiplication by eight is because we want bytes, not bits)

However, tuples are also immutable and multiplying a tuple is also constant folded, so we can duplicate that 2GB blob as many times as we want, up to at least 2^{31} times, probably. The 4^{**7} to get to 32TB was chosen just because it was the first exponent I could find that beat the previous 16TB answer.

Unfortunately, with the memory I have on my own computer, I could test this only up to a multiplier of 2, ie. $(1<<19^{**8,})*2$, which generated a 8.5GB file, which I hope demonstrates that the answer is realistic (ie. the file size isn't limited to $2^{32}=4GB$).

Also, I have no idea why the file size I got when testing was 8.5GB instead of the 4GB-ish I expected, and the file is big enough that I don't feel like poking around it at the moment.

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edited Jun 17, 2020 at 9:04

Community's user avatar

Community Bot

1

answered Jan 14, 2016 at 8:58

Aleksi Torhamo's user avatar

Aleksi Torhamo

2,49111 gold badge1010 silver badges8 8 bronze badges

3

+1, but why don't $(1<<19^{**8,})*2$? 4GB is enough. – XwtekJan 14, 2016 at 10:38

2

@ChristianIrwan: Yeah, I'd forgotten that rule, only realized it a few minutes ago and haven't figured out what kind of edit I should make yet. :-) – Aleksi TorhamoJan 14, 2016 at 10:46

1

Nice. Since this is only 13 bytes, we finally have a challenger to the first-posted answer! I was only able to confirm $1<<18$ on my machine (1.5GB) but I'll test it on linux later, where I expect it will work with the full 8GB (not going to try the 32TB version!) – DaveJan 17, 2016 at 17:22

3

IIIRC, python uses 30 bits per 32-bit word in its integer representation – user16488 Oct 6, 2016 at 23:34

4

@AnshumanKumar: In Python interactive shell? If you put it into a variable (so eg. $v = (1<<19^{**8,})*4^{**7}$), and you have enough free memory (a bit over 2GB), nothing much - it'll take a second or two to complete, and the process will use that much more memory. If you don't put it into a variable, Python will try to display the number, which means it needs to convert it to decimal first - which will take some time (and more memory) with a number that big. How long? Depends on the computer, but on the order of a year. But after that, it should finally print the multi-gigabyte output for you! – Aleksi TorhamoFeb 17, 2021 at 19:58

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222

C#, about 1 min to compile, 28MB output binary:

```
class X<A,B,C,D,E>{class Y:X<Y,Y,Y,Y,Y>{Y.Y.Y.Y.Y.Y.Y.Y y;}}
```

Adding more Y's will increase the size exponentially.

An explanation by Pharap as per @Odomontois' request:

This answer is abusing inheritance and type parameters to create recursion. To understand what's happening, it's easier to first simplify the problem. Consider class $X<A>$ { class Y : X<Y> { Y y; } }, which generates the generic class $X<A>$, which has an inner class Y. $X<A>.Y$ inherits $X<Y>$, hence $X<A>.Y$ also has an inner class Y, which is then $X<A>.Y.Y$. This then also has an inner class Y, and that inner class Y has an inner class Y etc. This means that you can use scope resolution (.) ad infinitum, and every time you use it, the compiler has to deduce another level of inheritance and type parameterisation.

By adding additional type parameters, the work the compiler has to do at each stage is further increased.

Consider the following cases:

In class $X<A>$ { class Y : X<Y> { Y y; } } type param A has a type of $X<A>.Y$.

In class $X<A>$ { class Y : X<Y> { Y.Y y; } } type param A has a type of $X<X<A>.Y>.Y$.

In class $X<A>$ { class Y : X<Y> { Y.Y.Y y; } } type param A has a type of $X<X<X<A>.Y>.Y>.Y$.

In class $X<A,B>$ { class Y : X<Y,Y> { Y y; } } type param A is $X<A,B>.Y$ and B is $X<A,B>.Y$.

In class $X<A>$ { class Y : X<Y> { Y.Y y; } } type param A is $X<X<A,B>.Y, X<A,B>.Y>.Y$ and B is $X<X<A,B>.Y, X<A,B>.Y>.Y$.

In class $X<A>$ { class Y : X<Y> { Y.Y.Y y; } } type param A is $X<X<X<A,B>.Y, X<A,B>.Y>.Y, X<X<A,B>.Y, X<A,B>.Y>.Y>.Y$ and B is $X<X<X<A,B>.Y, X<A,B>.Y>.Y, X<X<A,B>.Y, X<A,B>.Y>.Y>.Y$.

Following this pattern, one can only imagine the work the compiler would have to do to deduce what A to E are in $Y.Y.Y.Y.Y.Y.Y.Y$ in the definition class $X<A,B,C,D,E>{class Y:X<Y,Y,Y,Y,Y>{Y.Y.Y.Y.Y.Y.Y.Y y;}}$.

1 You could figure it out, but you'd need a lot of patience, and intellisense won't help you out here.

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edited Jan 15, 2016 at 12:09

Pharap's user avatar

Pharap

20522 silver badges8 8 bronze badges

3, <https://codegolf.stackexchange.com/questions/69189/build-a-compiler-bomb>

answered Jan 12, 2016 at 1:39
Vladimir Reshetnikov's user avatar
Vladimir Reshetnikov
2,52311 gold badge1212 silver badges17 17 bronze badges
19

This is more like the sort of insanity I was expecting! Looks like I'm off to reinstall Mono... – DaveJan 12, 2016 at 2:00
31

Can you provide an explanation of such notorious effect? – OdontoisJan 12, 2016 at 8:58
16

+1 for doing more than just initializing a large array. – Stig HemmerJan 12, 2016 at 9:18
6

Here's an example using Try Roslyn and just 3 Ys. – KobiJan 12, 2016 at 12:21
10

I saw this question and immediately thought of you. Nice! – Eric LippertJan 13, 2016 at 16:14
Show 10 more comments
144

If an output of more than 4GB is achieved (perhaps if somebody finds a turing complete preprocessor), the competition will be for the smallest source which produces a file of at least that size (it's just not practical to test submissions which get too big).

"Template Haskell" allows Haskell code to be generated at compile-time using Haskell, and is hence a turing complete pre-processor.

Here's my attempt, parameterised by an arbitrary numerical expression FOO:

```
import Language.Haskell.TH;main=print $(ListE .replicate FOO<$>[0])
```

The magic is the code inside the "splice" \$(...). This will be executed at compile time, to generate a Haskell AST, which is grafted on to the program's AST in place of the splice.

In this case, we make a simple AST representing the literal 0, we replicate this FOO times to make a list, then we use ListE from the Language.Haskell.TH module to turn this list of ASTs into one big AST, representing the literal [0, 0, 0, 0, ...].

The resulting program is equivalent to `main = print [0, 0, 0, ...]` with FOO repetitions of 0.

To compile to ELF:

```
$ ghc -XTemplateHaskell big.hs  
[1 of 1] Compiling Main          ( big.hs, big.o )  
Linking big ...  
$ file big  
big: ELF 32-bit LSB executable, Intel 80386, version 1 (SYSV), dynamically linked, interpreter /nix/store/mibabdfiaznqaxqiy4bqhj3m9gaj45km-glibc-2.21/lib/ld-linux.so.2, for GNU/Linux 2.6.32, not stripped
```

This weighs in at 83 bytes (66 for the Haskell code and 17 for the -XTemplateHaskell argument), plus the length of FOO.

We can avoid the compiler argument and just compile with ghc, but we have to put `{-# LANGUAGE TemplateHaskell#-}` at the beginning, which bumps the code up to 97 bytes.

Here are a few example expressions for FOO, and the size of the resulting binary:

FOO	FOO size	Total size	Binary size
(2^10)	6B	89B	1.1MB
(2^15)	6B	89B	3.6MB
(2^17)	6B	89B	12MB
(2^18)	6B	89B	23MB
(2^19)	6B	89B	44MB

I ran out of RAM compiling with (2^20).

We can also make an infinite list, using repeat instead of replicate FOO, but that prevents the compiler from halting ;)

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answered Jan 12, 2016 at 16:50
Warbo's user avatar
Warbo
1,52911 gold badge88 silver badges5 5 bronze badges
53

Welcome to Programming Puzzles and Code Golf. This is a brilliant answer, especially for a new user to this site. If you need any help (which I doubt), feel free to ask. – wizzwizz4Jan 12, 2016 at 17:05
3

@wizzwizz4: Yeah, it is a brilliant answer. It's essentially the same as mine, except that in Haskell it requires a special compiler directive to make the metaprogramming work. ;) – Mason WheelerJan 12, 2016 at 17:14
2

When I compile with GHC 7.8.3 I get "Not in scope: '<\$>'" (I set the code to [...].replicate (2^10)<\$>[0])). I'm not experienced with Haskell; any hints on how to make this compile? – DaveJan 12, 2016 at 23:36
45

Too bad template haskell isn't lazy enough to stream out an infinite executable. – Christopher KingJan 13, 2016 at 1:46
2

I came here to post something exactly like this. Well done. – MathematicalOrchidJan 13, 2016 at 12:15
Show 7 more comments
4, <https://codegolf.stackexchange.com/questions/69189/build-a-compiler-bomb>

92

C++, 250 + 26 = 276 bytes

```
template<int A,int B>struct a{static const int n;};
template<int A,int B>const int a<A,B>::n=a<A-1,a<A,B-1>::n>::n;
template<int A>struct a<A,0>{static const int n=a<A-1,1>::n;};
template<int B>struct a<0,B>{static const int n=B+1;};
int h=a<4,2>::n;
```

This is the Ackermann function implemented in templates. I'm not able to compile with `h=a<4,2>::n`; on my little (6GB) machine, but I did manage `h=a<3,14>` for a 26M output file. You can tune the constants to hit your platform's limits - see the linked Wikipedia article for guidance.

Requires `-g` flag to GCC (because it's all the debug symbols that actually consume any space), and a larger-than-default template depth. My compile line ended up as

```
g++ -ftemplate-depth=999999 -g -c -o 69189.o 69189.cpp
```

Platform information

g++ (Ubuntu 4.8.2-19ubuntu1) 4.8.2

Linux 3.13.0-46-generic #79-Ubuntu SMP x86_64 GNU/Linux

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edited Jan 13, 2016 at 10:29

answered Jan 12, 2016 at 17:50

Toby Speight's user avatar

Toby Speight

6,23811 gold badge2323 silver badges41 41 bronze badges

I really like this one, but I'm not sure I can accept a `.o` output, since I did say `ELF/.exe/etc.` (and compiling this fully optimises it all out!). Still, `+1` (and confirmed) - DaveJan 12, 2016 at 23:01

4

Update: As Ben Voigt points out on his answer, GCC on Linux does generate ELF files as `.o` output, and I've been able to confirm the `<3,14>` variant with it, so yup - this is valid. - DaveJan 13, 2016 at 0:34

23

I was expecting something absurd to come out of C++ templates. I wasn't expecting the Ackermann function. - MarkJan 13, 2016 at 9:42

won't Fibonacci give you a smaller code and better output size control? - Will NessJan 14, 2016 at 21:45

1

But we want bigger code! Fibonacci gives almost the same size as pure linear code (but longer compile time than the linear). You could certainly have fun with a static array of size `A+B` in each class, now I think of it... - Toby SpeightJan 15, 2016 at 13:40

Show 1 more comment

68

Here's my C answer from 2005. Would produce a 16TB binary if you had 16TB RAM (you don't).

```
struct indblock{ uint32_t blocks[4096];
};
struct dindblock { struct indblock blocks[4096];
};
struct tindblock { struct dindblock blocks[4096];
};
struct inode { char data[52]; /* not bothering to retype the details */ struct indblock ind; struct dindblock dint; struct tindblock tind;
};
struct inode bbtinode;
int main(){}
```

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edited Jan 14, 2016 at 19:40

user45941

answered Jan 12, 2016 at 20:27

Joshua's user avatar

Joshua

3,45611 gold badge2020 silver badges22 22 bronze badges

26

"Would produce a 16TB binary if you had 16TB RAM (you don't)." - neither do I have a 16TB hard drive! I can't really verify this one, but it's cool nonetheless. - DaveJan 12, 2016 at 23:45

7

I discovered this one by accident and watched the compiler topple over when it ran out of address space. - JoshuaJan 12, 2016 at 23:57

12

Please do NOT attempt to golf this entry; golfing defeats the intent of the code sample and there are no score benefits to doing so anyway. Code is already GPL'd as of 2005. - JoshuaJan 13, 2016 at 2:23

6

@BenVoigt Regardless, editing other people's code is never acceptable here. Leave a comment if there's an issue. Relevant meta post: meta.codegolf.stackexchange.com/questions/1615/... - user45941 Jan 14, 2016 at 20:27

3

5, <https://codegolf.stackexchange.com/questions/69189/build-a-compiler-bomb>

I would assume that the 16TB of data is very very repetitive, therefor you should be able to put both a swapfile and the output file on a compressed FS and then be able to do this, but I'm not sure. – ShelvacuJan 15, 2016 at 18:08

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67

ASM, 61 bytes (29 bytes source, 32 bytes for flags), 4,294,975,320 bytes executable

.globl main

main:

.zero 1<<32

Compile with gcc the_file.s -mcmodel=large -Wl,-fuse-ld=gold

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edited Jan 12, 2016 at 21:54

user45941

answered Jan 12, 2016 at 1:40

viraptor's user avatar

viraptor

75144 silver badges8 8 bronze badges

6

1<<30 is good enough for C. Since this is assembler, the size is in bytes. – viraptorJan 12, 2016 at 2:00

2

@viraptor My system has 32GB of RAM and for kicks I tried to build your code. as manages to hand off to ld, but ld fails with this. Not even -mcmodel=medium seems to help. – Iwillnotexist I donotexistJan 12, 2016 at 2:49

2

try forcing use of gold linker: gcc -fuse-ld=gold ... compiles/links... eek! Finished in 1:29 (89 seconds) and size of 1,073,748,000 bytes. – IornixJan 12, 2016 at 7:47

3

I finally got this to assemble on 64-bit Ubuntu 15.10, with invocation gcc -o g.g.s -mcmodel=large -Wl,-fuse-ld=gold. Final tally: 4,294,975,320 bytes, with 32 extra bytes added to the program length for -mcmodel=large -Wl,-fuse-ld=gold. Worth noting that the header is incorrect; the source is 29 bytes (without the extra flags added). – user45941 Jan 12, 2016 at 18:24

3

By bumping the allocation up to 1<<33, I ended up with a 8,589,942,616 byte executable. – user45941 Jan 12, 2016 at 18:37

Show 12 more comments

34

Plain old C preprocessor: 214 bytes input, 5MB output

Inspired by my real-world preprocessor fail here.

```
#define A B+B+B+B+B+B+B+B+B
```

```
#define B C+C+C+C+C+C+C+C+C
```

```
#define C D+D+D+D+D+D+D+D+D
```

```
#define D E+E+E+E+E+E+E+E+E
```

```
#define E F+F+F+F+F+F+F+F+F
```

```
#define F x+x+x+x+x+x+x+x+x
```

```
int main(void) { int x, y = A; }
```

Experiments show that each level of #defines will (as expected) make the output approximately ten times larger. But since this example took more than an hour to compile, I never went on to "G".

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edited Jun 17, 2020 at 9:04

Community's user avatar

Community Bot

1

answered Jan 14, 2016 at 7:52

Thomas Padron-McCarthy's user avatar

Thomas Padron-McCarthy

59133 silver badges8 8 bronze badges

15

This is kinda like an xml bomb – an earwigJan 14, 2016 at 19:24

15

Specifically it is an implementation of the original "Billion Laughs". – user42643 Jan 15, 2016 at 10:11

3

Wow, this actually causes a segfault in GCC 4.9 and Clang. Which compiler did you use? – DaveJan 17, 2016 at 17:26

1

@Dave: Strange. When I compile using make, it compiles, but if I type in the exact same command that make uses, it crashes. And it doesn't seem to be related to environment variables. – Thomas Padron-McCarthyJan 18, 2016 at 1:45

1

Ironically, the Tiny C Compiler (which you would expect to fail even faster than other compilers) actually compiles this successfully in 0.131 seconds on Linux Mint 20.1 Cinnamon. – In Hoc SignoFeb 17, 2021 at 15:28

6, <https://codegolf.stackexchange.com/questions/69189/build-a-compiler-bomb>

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30

Java, 450 + 22 = 472 bytes source, ~1GB class file

B.java (golfed version, warning during compilation)

```
import javax.annotation.processing.*;@SupportedAnnotationTypes("java.lang.Override")public class B extends AbstractProcessor{@Override public boolean process(Set<? extends TypeElement> annotations, RoundEnvironment roundEnv) { if (annotations.size() > 0) { try (Writer writer = processingEnv.getFiler().createSourceFile("C").openWriter()) { writer.write("class C{int "); for (int i=0;i<16380;++i){for (int j=0;j<65500;++j){w.write("i");w.write(i+";int ");w.write("i");}catch (Exception e){})return true;}}
```

B.java (ungolfed version)

```
import java.io.Writer;
```

```
import java.util.Set;
```

```
import javax.annotation.processing.AbstractProcessor;
```

```
import javax.annotation.processing.RoundEnvironment;
```

```
import javax.annotation.processing.SupportedAnnotationTypes;
```

```
import javax.annotation.processing.SupportedSourceVersion;
```

```
import javax.lang.model.SourceVersion;
```

```
import javax.lang.model.element.TypeElement;
```

```
@SupportedAnnotationTypes("java.lang.Override")
```

```
@SupportedSourceVersion(SourceVersion.RELEASE_8)
```

```
public class B extends AbstractProcessor { @Override public boolean process(Set<? extends TypeElement> annotations, RoundEnvironment roundEnv) { if (annotations.size() > 0) { try (Writer writer = processingEnv.getFiler().createSourceFile("C").openWriter()) { writer.write("class C{int "); for (int i = 0; i < 16380; ++i) { for (int j = 0; j < 65500; ++j) { writer.write("i"); } writer.write(i + ";int "); } writer.write("i"); } catch (Exception e) { } } return true; } }
```

Compilation

```
javac B.java
```

```
javac -J-Xmx16G -processor B B.java
```

Explanation

This bomb uses Annotation Processors. It needs 2 compile passes. The first pass builds the processor class B. During the second pass the processor creates a new source file C.java, and compiles it to a C.class with a size of 1,073,141,162 bytes.

There are several limitations when trying to create a big class file:

- Creating identifiers longer than about 64k results in: error: UTF8 representation for string "iiiiiiiiiiiiiiii..." is too long for the constant pool.
- Creating more than about 64k variables/functions results in: error: too many constants
- There is also a limit of about 64k for the code size of a function.
- There seems to be a general limit (bug?) in the java compiler of about 1GB for the .class file. If I increase 16380 to 16390 in the above code the compiler never returns.
- There is also a limit of about 1GB for the .java file. Increasing 16380 to 16400 in the above code results in: An exception has occurred in the compiler (1.8.0_66). Please file a bug ... followed by a java.lang.IllegalArgumentException.

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edited Jan 16, 2016 at 16:21

answered Jan 13, 2016 at 22:21

Sleafar's user avatar

Sleafar

2,9121212 silver badges16 16 bronze badges

15

Neat; you've essentially made your own preprocessor, within the size limit, in a language with a compiler which natively supports custom preprocessors. It's within the rules. The final class was only 0.5GB for me, but I can confirm the method. – DaveJan 14, 2016 at 0:17

Another example in Java habrahabr.ru/post/245333 - it uses nested try..finally (code in finally block is duplicated for normal and exceptional cases) and initializer block (code from initializer block is appended to each constructor) – VictorJan 14, 2016 at 10:37

I replaced the ä by an i and adjusted the numbers. Now the bomb should create a 1GB class on any system without any encoding issues. However, it now needs a lot more memory. – SleafarJan 16, 2016 at 16:23

? extends TypeElement?!? – catOct 9, 2016 at 14:54

1

@cat See here: angelikalanger.com/GenericsFAQ/FAQSections/... – SleafarOct 9, 2016 at 15:15

Show 4 more comments

27

C, 26 byte source, 2,139,103,367 byte output, valid program

```
const main[255<<21]={195};
```

Compiled using: gcc cbomb.c -o cbomb (gcc version 4.6.3, Ubuntu 12.04, ~77 seconds)

I thought I'd try to see how large I could make a valid program without using any command line options. I got the idea from this answer:

<https://codegolf.stackexchange.com/a/69193/44946> by Digital Trauma. See the comments there as to why this compiles.

How it works: The const removes the write flag from the pages in the segment, so main can be executed. The 195 is the Intel machine code for a return. And since the Intel architecture is little-endian, this is the first byte. The program will exit with whatever the start up code put in the eax register, likely 0.

It's only about 2 gig because the linker is using 32 bit signed values for offsets. It's 8 meg smaller than 2 gig because the compiler/linker needs some space to work and this is the largest I could get it without linker errors - ymmv.

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edited Apr 13, 2017 at 12:39

7, <https://codegolf.stackexchange.com/questions/69189/build-a-compiler-bomb>

Improve this answer Follow

edited Jun 17, 2020 at 9:04

Community's user avatar

Community Bot

1

answered Jan 12, 2016 at 18:26

Ben Voigt's user avatar

Ben Voigt

45622 silver badges9 9 bronze badges

Confirmed (in fact, it's 2.56GB with clang), but it needs a `-c` compile flag to stop the linker (2 extra bytes), and I'm not sure I can accept `.o` output (not one of the ones I listed). Still, I like it, so +1. – DaveJan 12, 2016 at 23:29

@Dave: gcc `.o` files are ELF format aren't they? – Ben VoigtJan 12, 2016 at 23:49

Not sure. They don't start with an ELF magic number when I generate them... I'll investigate later. – DaveJan 13, 2016 at 0:01

@Dave: Well, cygwin gcc isn't generating an ELF file. Linux gcc seems to (although I'm looking at one from a different piece of code) – Ben VoigtJan 13, 2016 at 0:17

Yes, GCC 5.2.1 on Kubuntu is indeed generating an ELF file, but it's only 9MB! Not sure how it's managed to compress it so much compared to the other compilers. Maybe GCC 4.9 would make a 2GB ELF file. – DaveJan 13, 2016 at 0:28

Show 4 more comments

6

Scala - 70 byte source, 22980842 byte result (after jar)

```
import scala.{specialized => s}
```

```
class X[@s A, @s B, @s C, @s D, @s E]
```

This produces 95 (about 59,000) specialized class files, which pack into a jar of about 23 MB. You can in principle keep going if you have a filesystem that can handle that many files and enough memory.

(If the `jar` command must be included, it's 82 bytes.)

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answered Jan 17, 2016 at 1:35

Rex Kerr's user avatar

Rex Kerr

91355 silver badges9 9 bronze badges

I could not compile it: error: java.lang.OutOfMemoryError: GC overhead limit exceeded. Could you also document the required command for compilation? – P.PéterJan 18, 2016 at 16:14

@P.Péter - You need to give the compiler more memory, e.g. `scalac -J-Xmx12G X.scala` is what I used. I didn't test how much it actually needs. – Rex KerrJan 18, 2016 at 21:16

still not compiling, sadly :(error: error while loading AnnotatedElement, class file '/usr/lib/jvm/java-8-openjdk-amd64/jre/lib/rt.jar(java/lang/reflect/AnnotatedElement.class)' is broken (bad constant pool tag 18 at byte 76) one error found Can you specify the scala and java version (maybe platform, too)? I used `scalac 2.9.2` and `OpenJDK 1.8.0_66-internal-b17`, on debian 8 x86-64. – P.PéterFeb 1, 2016 at 12:41

Ubuntu 15.10, java version "1.8.0_72-ea" Java(TM) SE Runtime Environment (build 1.8.0_72-ea-b05) Java HotSpot(TM) 64-Bit Server VM (build 25.72-b05, mixed mode) , \$ `scala -version` Scala code runner version 2.11.7 -- Copyright 2002-2013, LAMP/EPFL – Rex KerrFeb 1, 2016 at 14:20

Add a comment

5

C, 284 bytes + 2 for the `-c` in `gcc bomb.c -o bomb.o -c`; output: 2 147 484 052 bytes

```
#define a 1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1
```

```
#define b a,a,a,a,a,a,a,a,a,a,a,a,a,a,a
```

```
#define c b,b,b,b,b,b,b,b,b,b,b,b,b,b,b
```

```
#define d c,c,c,c,c,c,c,c,c,c,c,c,c,c,c
```

```
#define e d,d,d,d,d,d,d,d,d,d,d,d,d,d,d
```

```
#define f e,e,e,e,e,e,e,e,e,e,e,e,e,e,e
```

```
__int128 x[]={f,f,f,f,f,f,f,f};
```

Share

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edited Jun 17, 2020 at 9:04

Community's user avatar

Community Bot

1

answered Feb 25, 2017 at 11:39

H2CO3's user avatar

H2CO3

27133 silver badges7 7 bronze badges

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4

Julia, 22 bytes (in memory)

```
0:9^9 .|>i->@eval 2^$i
```

Try it online!

It's quite easy to make a compilation bomb in Julia, it can easily happen accidentally. Here we use the fact that `a^i` has some trickery when `i` is a literal integer, that allows `a^2` to be turned into `a*a`, and `a^-1` into `inv(a)`. It means that there is a new compiled method of `litteral_pow` being compiled for each `i`. I'm pretty sure this would be at least 4GB but I don't know how to check it. This is only compiled in memory and not saved in a file though

Julia, 114 bytes (output in a .jl file)

using Pkg

pkg"generate A"

write("A/src/A.jl","module A

! (::Val{x}) where x=x

.!Val.(1:9^9)end")

pkg"dev A"

using A

(can't) Try it online! Try A online!

To save compiled code to a file, the function must be in a package, therefore we create a package A that has the culprit (the function `!`). `Val(i)` is of type `Val{i}`, so a new method is compiled for each `i`. The output file will be in `~/.julia/compiled/<version>/A/xxx.ji` In my testing, each additional method adds at least 150 bytes (and growing, 182MB for 1M methods), which means 25M would be enough

in Julia 1.7, +2 bytes because `pkg"dev .A"` is needed

Julia, 117 bytes (without writing files)

this is basically the same as the above, but with the files already there. This is slightly longer because of the uuid needed in Project.toml (this is taken care of in `pkg"generate A"`)

file structure

A

|—— src

| |—— A.jl

|—— Project.toml

|—— a.jl

Project.toml, 52 bytes

name="A"

uuid="8945f399-ba5e-44d3-9e17-ab2f7e467331"

src/A.jl, 47 bytes

module A

! (::Val{x}) where x=x

.!Val.(0:9^9)end

Try it online!

a.jl, 7 bytes

using A

command line options (in the A folder), +11 bytes

julia --project=. a.jl

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edited Nov 26, 2021 at 12:40

answered Nov 24, 2021 at 16:54

MarcMush's user avatar

MarcMush

6,4251111 silver badges16 16 bronze badges

Interesting that Julia won't produce output for a single file. Does it help that "Your source code can consist of multiple files, and even resource files, but the summed size of all these files must not exceed 512 bytes."? Looks like a chunk of the second example is just writing a file, which isn't necessary (no answers so far have needed it but the rule has been there since the start) – DaveNov 25, 2021 at 20:40

Add a comment

4

Myxal 0.7.1, 46 source bytes + 2 bytes flag = 48 bytes, 2.042 MB compiled

~~~~~ycaaaaçbbbçccccçdddddçeeecfffcgggçgh

Simple node alias recursion bomb. Adding more aliases make the JVM complain of a too large main method.

~~~~~y # A bunch of filter modifiers on the element 'y'

ça # Alias that to 'a'

aaaçb # 3 'a's = 'b' and so on...

bbbçc

cccçd

dddçe

eeecf

fffcg

gggçh

h # Run that final 'h'

Compiled with the -O flag to disable optimization, which also disables shrinking for some reason.

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answered May 28, 2022 at 21:43

10, <https://codegolf.stackexchange.com/questions/69189/build-a-compiler-bomb>

Seggan's user avatar

Seggan

5,2872121 silver badges47 47 bronze badges

Add a comment

4

C, 54 bytes, ridiculously large executable

```
#include <inttypes.h>
```

```
uint64_t main[(uint64_t)~0]={~0};
```

Not exactly original, but much more devastating.

Inline but not portable version

```
unsigned long long main[~0ull]={~0};
```

I am NOT going to sacrifice my laptop just for this.

Explanation

uint64_t, unsigned long long, they're both unsigned 64-bit integers.

The tilde (~) is the bitwise NOT operator in C (it flips the bits of a value).

(uint64_t)0 is 00 in binary.

By applying the bitwise NOT operator, we get a... big number ($2^{64}-1$).

Credits

Big thanks to user Digital Trauma for his original implementation. This answer is really just an expansion from that.

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edited Aug 12, 2022 at 1:08

answered Nov 24, 2021 at 6:47

Random Hoovy's user avatar

Random Hoovy

413 3 bronze badges

1

Welcome to Code Golf, and nice first answer! – Aaroneous MillerNov 24, 2021 at 13:28

1

Thank you so much for the remark @AaroneousMiller ! – Random HoovyNov 24, 2021 at 13:29

1

I don't really know much about C, but I'm curious how this works. – Aaroneous MillerNov 24, 2021 at 13:30

1

@AaroneousMiller I've updated the post with the explanation! Feel free to ask anything about this. – Random HoovyNov 24, 2021 at 13:41

1

how large is the output file? – thejonymysterNov 24, 2021 at 14:05

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4

Swift for wasm, 7 byte source, 6326162 byte (6.3MB) wasm file

Not winning, but I'm adding this answer for its sheer absurdity:

```
print()
```

The Swift compiler does almost no dead code stripping (at least when compiling for wasm), so you get the entire standard library. The arguments to the print statement, any loops or recursion I added, etc barely seemed to matter. However, removing the print statement entirely shrunk the code size by a noticeable amount.

For reference, I used the wasm file generated by <https://swiftwasm.org/>, which seems to be using Swift 5.6 at the time of writing.

Share

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answered Mar 3, 2023 at 20:26

Bbrk24's user avatar

Bbrk24

2,7751313 silver badges18 18 bronze badges

Add a comment

3

Boo, way more than you can expect from this

```
macro R(e as int):for i in range(9**e):yield R.Body
```

```
x = 0
```

```
R 99:++x
```

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edited Jun 17, 2020 at 9:04

Community's user avatar

Community Bot

1

answered Oct 24, 2017 at 16:14

11, <https://codegolf.stackexchange.com/questions/69189/build-a-compiler-bomb>

user75200's user avatar

user75200

1814 4 bronze badges

This looks like Mason Wheeler's answer with a few small changes (??). Did you reach the same answer independently or is there something important in the values you changed (if so, please edit the answer to explain why they are important). – DaveOct 24, 2017 at 17:20

Add a comment

...

<https://codegolf.stackexchange.com/questions/28672/code-that-will-only-execute-once>

Code that will only execute onceAsk Question

Asked 9 years, 8 months ago

Modified 6 months ago

Viewed 82k times

251

Goal

The goal of this challenge is to write code that will execute once and only once. This means basically that it damages the program, script, or environment in some way. If rebooting the system allows the code to run again that is permitted.

Scoring

Number of votes. All assumptions must be clearly listed. Any answers just initiating a reboot or halt will be disqualified.

Additional Rules because Greg Hewgill is a demi-god

No root access is permitted.

End Date

The contest will close on May 31, 2014.

Edit

This contest has been changed to popularity contest.

popularity-conteststateful

Share

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edited Jan 5, 2018 at 21:46

Wheat Wizard's user avatar

Wheat Wizard♦

97.6k2020 gold badges276276 silver badges644 644 bronze badges

asked May 28, 2014 at 3:40

ojblass's user avatar

ojblass

2,83722 gold badges1313 silver badges15 15 bronze badges

8

possible duplicate of A program that deletes itself – Peter TaylorMay 28, 2014 at 7:04

7

@PeterTaylor a possible Solution would be the a self delete but as the result are showing it isn't the only one. – LukeiMay 28, 2014 at 7:21

118

To a lot of people calling vi in a single terminal environment has this effect, no escape from it unless you reboot :) Just a joke here. – orionMay 28, 2014 at 20:41

24

echo "If you try to execute me again, it means you are an idiot."; <-- Nobody will execute more than once :P – user3459110Jun 5, 2014 at 12:45

35

Would missile-related software have qualified? ;) – rsegaJun 8, 2014 at 4:28

Show 12 more comments

82 Answers Sorted by: Highest score (default)

12 3 Next

549

Vigil

Finally a usecase for Vigil!

def main(): raise Exception()

Excerpt from the "language specification":

It goes without saying that any function that throws an exception which isn't caught is wrong and must be punished.

...

If an oath is broken, the offending function [...] will be duly punished.

How?

Simple: it will be deleted from your source code.

The only way to ensure your program meets its requirements to absolutely forbid code that fails to do so. With Vigil, it will do this for you automatically.

There are other ways to do this, because Vigil provides the keywords implore and swear which are basically oaths to adhere to certain pre- and post-conditions:

def main(): swear 0 > 1

Share

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edited Jun 17, 2020 at 9:04

Community's user avatar

Community Bot

1

answered May 28, 2014 at 9:30

Martin Ender's user avatar

Martin Ender

196k6565 gold badges443443 silver badges967 967 bronze badges

126

No doubt, this deserves to win. – Matteo ItaliaMay 28, 2014 at 10:44

89

Finally, a sufficiently vigilant language for the modern age! I'm going to start using it in production. All bugs must be purged. – ClaudiuMay 28, 2014 at 15:55

15

To me it seems that it is not necessarily the fault of the function that throws an uncaught exception, it could also be that the functions on the call stack are negligent for failing to catch it. It could even suggest the architecture of the whole application is flawed (Because perhaps there is no way to properly handle that exception without restructuring the code?) In short, the whole program should be deleted. – Jonathan PullanoMay 28, 2014 at 18:23

12

@JonathanPullano you're not the first one to notice that ;) – Martin EnderMay 28, 2014 at 18:24

37

Additional points for swearing. A program making a confident false statement no doubt needs to be eliminated. – orionMay 28, 2014 at 20:49

Show 6 more comments

317

Pretty much any Linux distro, 9 chars

This one is a classic!

```
#!/bin/rm
```

Put this in a file and run it:

```
> ed
```

```
a
```

```
#!/bin/rm
```

```
.
```

```
wq foo
```

```
> ls
```

```
Mail mbox foo
```

```
> chmod 777 foo
```

```
> ./foo
```

```
> ls
```

```
Mail mbox
```

Aaand it's gone!

As to what is going on: I'm really just running `rm`! `#!/` is called a shebang. And if you put one of these followed by a path to some executable as the first line in your script, the program loader will execute your script file with whatever you wrote there - the default is usually `#!/bin/bash` or `#!/bin/sh` (Bourne-again shell / Bourne shell). The first argument passed to this script will be the filename itself (which is why you see so many solutions including `%0` or `$0` and the likes in here); so by making my file contain `#!/bin/rm` and running it, all I'm doing is passing the filename of my file to `rm`.

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edited May 28, 2014 at 12:02

answered May 28, 2014 at 6:30

Flonk's user avatar

Flonk

7,90122 gold badges2222 silver badges26 26 bronze badges

12

Without ever having used Linux myself, I think it deletes the script file. – OurousMay 28, 2014 at 11:23

65

@NateKerkhofs the `#!/` sequence starts a shebang, which identifies what interpreter you are going to use for the script - normally `/bin/bash`. Here, Flonk has used `/bin/rm` as an "interpreter". `rm` is a program which deletes files. because Linux thinks that we want `rm` to be an interpreter, it passes the filename as an argument to it. therefore, the file deletes itself – user16402 May 28, 2014 at 11:27

21

This is hysterical – ojbllassMay 28, 2014 at 13:13

27

@user80551 I don't need root access for this. – FlonkMay 28, 2014 at 13:38

12

hmm... `./foo mbox` – IzkataMay 28, 2014 at 16:06

Show 18 more comments

263

x86 binary, 4 bytes

F0 0F C7 C8

13, <https://codegolf.stackexchange.com/questions/28672/code-that-will-only-execute-once>

Assumption: Must be run on a P5 Pentium CPU.

The above instruction is commonly known as the F00F bug. It attempts to execute an invalid instruction, prefixed with lock.

This freezes the CPU up completely (not a halt nor a reboot) and it doesn't even require root access.

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answered May 28, 2014 at 4:44

Dennis's user avatar

Dennis

210k4141 gold badges370370 silver badges819 819 bronze badges

5

Wow... that is really interesting. – ojblassMay 28, 2014 at 4:55

33

@JackM: It will, but that's explicitly allowed in the question. – DennisMay 28, 2014 at 19:46

36

@JackM, that seems like a great way to stop the "script" from running. – Paul DraperJun 1, 2014 at 2:21

8

I remember when this bug was making the rounds. A kernelside workaround was found almost immediately -- it won't crash the computer unless you're running an OS without the patch. – zwolJun 2, 2014 at 2:28

6

@RosLuP 209 different users, apparently. If you disagree, downvote and move on. – DennisMay 30, 2017 at 17:41

Show 4 more comments

159

Bash, 5

>"\$0"

Truncates itself to zero length.

If the filename doesn't contain spaces, >\$0 works for 3 chars!

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answered May 28, 2014 at 9:36

user16402

2

Actually, the quotes are never needed for a variable used in a redirect filename like this, even if the program or path to the program contains spaces, due to a special case in shell parsing rules. So you can always do it in 3 chars! – apenwarrJun 8, 2014 at 5:30

3

@apenwarr it says "\$0: ambiguous redirect" when without quotes and the filename contains spaces – user16402 Jun 8, 2014 at 6:34

3

@apenwarr, it is needed if the shell that interprets that script is based on ksh88 or is bash not in posix mode. It's not about space, it's about any character of \$IFS for bash and wildcard characters for bash and ksh88. A she-bang less script will usually be interpreted by the system's sh, but some shells including bash and ksh88 will interpret them in a child of themselves instead. – schMay 4, 2016 at 12:55

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155

gzip

#!/bin/gzip

To much annoyance to people used to nondestructive commandline tools, gzip by default ruins the original file, replacing it with a gzipped version (adding a suffix).

This is a variation on the #!/bin/rm option, except this one is recoverable by manual human intervention (call gunzip on it). As a special bonus, the resulting file is much longer than the original (the difference depends on the filename length).

Warning: location of gzip may vary.

EDIT: as pointed out by WChargin, this is more portable:

#!/usr/bin/env gzip

The rest of the file can have any content. It's essentially a file that, when called, hides itself in a box and refuses to come out until you forcibly unpack it.

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edited Jun 5, 2014 at 5:42

answered May 28, 2014 at 20:36

orion's user avatar

orion

3,24611 gold badge1313 silver badges16 16 bronze badges

8

I never thought of it before but you are absolutely correct. – ojblassMay 29, 2014 at 1:34

very interesting – Grijesh ChauhanMay 29, 2014 at 7:54

12

"Warning: location of gzip may vary" — this isn't code-golf, so you can use #!/usr/bin/env gzip – wcharginJun 1, 2014 at 4:39

47

+1 just for It's essentially a file that, when called, hides itself in a box and refuses to come out until you forcibly unpack it. You made my day, and it's 1am. – clappJul 22, 2015 at 8:19

1

It's essentially a file that, when called, hides itself in a box and refuses to come out until you forcibly unpack it. made me laughing. :D – MischaJul 26, 2017 at 15:31

Add a comment

126

Bash, 13 12

Not the shortest, but it doesn't actually delete the file or make the system unusable.

`chmod 0 "$0"`

If the filename doesn't contain spaces, you can remove the quotes to save 2 chars.

Explanation

It removes all permissions (rwx) from itself. When you attempt to run it, or even view its code, a second time, without manually restoring the permissions, it will say something like

bash: <FILENAME>: Permission denied

Restore the permissions with

`chmod +rwx <FILENAME>`

Old version

Only removes execute permissions, but one char longer (this was a code-golfquestion before it got changed to popularity-contest):

`chmod -x "$0"`

Sneaky version by Łukasz Niemier

`#!/bin/chmod 0`

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edited Jun 6, 2014 at 10:37

answered May 28, 2014 at 8:36

user16402

4

`chmod 0` works too – gnibblerMay 28, 2014 at 11:06

@gnibbler thnx, added – user16402 May 28, 2014 at 11:09

I think you can call the program a and save yet 3 chars: `chmod 0 a` – yo'Jun 3, 2014 at 11:54

7

Even nicer `#!/bin/chmod 0` – HaulethJun 5, 2014 at 23:28

1

Take `chmod 0 *` for 9 bytes. – TitusNov 21, 2016 at 14:06

Show 1 more comment

120

6800 machine code - 1 byte

0xDD

This is known as HCF or Halt and Catch Fire

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answered May 28, 2014 at 11:11

gnibbler's user avatar

gnibbler

15.1k44 gold badges4848 silver badges75 75 bronze badges

84

Well, the rules say "Any answers just initiating a reboot or halt will be disqualified", but this doesn't just initiate a halt, because it also catches fire. Thus, +1! – HakanaiJun 2, 2014 at 13:01

Catch fire and no more cpu, so code will run once :)) – raspiduinoJun 10, 2021 at 7:10

Add a comment

101

Shell + sed, 16 bytes

Not quite as destructive as some of the other answers ;-)

This script inserts a comment # at the beginning of every line of itself:

`sed -i s/^/#/ $0`

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edited Jun 17, 2020 at 9:04

Community's user avatar

Community Bot

1

answered May 28, 2014 at 5:14

Digital Trauma's user avatar

Digital Trauma

71.9k99 gold badges110110 silver badges261 261 bronze badges

15, <https://codegolf.stackexchange.com/questions/28672/code-that-will-only-execute-once>

3

How about sed -i g \$0? – seshoumaraSep 3, 2016 at 12:19

Add a comment

97

Commodore 64 BASIC

This one doesn't delete the program.

1 POKE 2048,1

Self-destruct

According to the Commodore 64 memory map, address2048is unused, but it must contain a value of 0 so that the BASIC program can be RUN.

Share

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answered May 28, 2014 at 11:09

Danko Durbić's user avatar

Danko Durbić

10.8k55 gold badges2727 silver badges32 32 bronze badges

1

Does poke simply move a variable to a location? – ojbllassMay 29, 2014 at 1:30

15

@ojbllass yes, effectively. poke a, b is equivalent to the C code *((unsigned char *)a) = b;. – JulesMay 29, 2014 at 5:54

4

I'd like to visualise my FaceBook pokes that way! – Sunny R GuptaJun 6, 2014 at 9:58

3

Oh wow... I remember PEEK and POKE from C64 BASIC! I was writing this stuff around 1977. – FixeeJul 5, 2014 at 19:34

side note: A 0 byte is used to mark the end of code lines; so address 0x800 probably needs one to mark the beginning of the first code line. – TitusMar 13, 2018 at 15:41

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96

Assumption: Running Solaris, logged in as root

killall

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answered May 28, 2014 at 4:00

Greg Hewgill's user avatar

Greg Hewgill

2,7391111 silver badges21 21 bronze badges

3

does solaris really have such a thing? – ojbllassMay 28, 2014 at 4:00

24

Yes, it does just what it says on the tin and kills all running processes. – Greg HewgillMay 28, 2014 at 4:01

one upvote for you! – ojbllassMay 28, 2014 at 4:01

11

1, The question mentions no root access is permitted. – user80551May 28, 2014 at 13:36

131

@user80551 he's the reason for that rule. – SeiyriaMay 28, 2014 at 14:58

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75

Batch: 5 Bytes

%0|%0

It is basically the forkbomb for Windows.

The app starts its first argument twice. Don't run it in a productive environment ;)

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edited Jun 4, 2014 at 14:19

answered May 28, 2014 at 8:24

Knerd's user avatar

Knerd

1,36188 silver badges10 10 bronze badges

93

Is there a productive windows environment? (I'm joking of course). – orionMay 28, 2014 at 20:25

17

it looks so innocent! – ojbllassMay 29, 2014 at 13:01

18

Ok, definitely don't try that. It didn't go well. – rmobisJun 3, 2014 at 15:14

81

16, <https://codegolf.stackexchange.com/questions/28672/code-that-will-only-execute-once>

Don't have the rep to downvote, but it violates "runs only once" in the most severe way possible. – XanJun 6, 2014 at 9:53

18

I believe a human only executes it once and that it qualifies. – ojblassJun 6, 2014 at 12:17

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73

Python, 18

```
open(__file__, 'w')
```

Truncates the file by opening it in write-only mode.

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Calcium

1911 Encyclopædia Britannica, Volume 4

Calculating Machines by Olaus Magnus Friedrich Henrici

Calcutta

See also Calculating machine and Planimeter on Wikipedia; Slide rule on Wikipedia; and our 1911 Encyclopædia Britannica disclaimer.

CALCULATING MACHINES. Instruments for the mechanical performance of numerical calculations, have in modern times come into ever-increasing use, not merely for dealing with large masses of figures in banks, insurance offices, &c., but also, as cash registers, for use on the counters of retail shops. They may be classified as follows:—(i.) Addition machines; the first invented by Blaise Pascal (1642). (ii.) Addition machines modified to facilitate multiplication; the first by G. W. Leibnitz (1671). (iii.) True multiplication machines; Léon Bollés (1888), Steiger (1894). (iv.) Difference machines; Johann Helfrich von Müller (1786), Charles Babbage (1822). (v.) Analytical machines; Babbage (1834). The number of distinct machines of the first three kinds is remarkable and is being constantly added to, old machines being improved and new ones invented; Professor R. Mehmke has counted over eighty distinct machines of this type. The fullest published account of the subject is given by Mehmke in the *Encyclopädie der mathematischen Wissenschaften*, article "Numerisches Rechnen," vol. i., Heft 6 (1901). It contains historical notes and full references. Walther von Dyck's Catalogue also contains descriptions of various machines. We shall confine ourselves to explaining the principles of some leading types, without giving an exact description of any particular one.

Fig. 1. Practically all calculating machines contain a "counting work," a series of "figure disks" consisting in the original form of horizontal circular disks (fig. 1), on which the figures 0, 1, 2, to 9 are marked. Each disk can turn about its vertical axis, and is covered by a fixed plate with a hole or "window" in it through which one figure can be seen. On turning the disk through one-tenth of a revolution this figure will be changed into the next higher or lower. Such turning may be called a "step," positive

if the next higher and negative if the next lower figure appears. Each positive step therefore adds one unit to the figure under the window, while two steps add two, and so on. If a series, say six, of such figure disks be placed side by side, their windows lying in a row, then any number of six places can be made to appear, for instance 000373. In order to add 6425 to this number, the disks, counting from right to left, have to be turned 5, 2, 4 and 6 steps respectively. If this is done the sum 006798 will appear. In case the sum of the two figures at any disk is greater than 9, if for instance the last figure to be added is 8 instead of 5, the sum for this disk is 11 and the 1 only will appear. Hence an arrangement for "carrying" has to be introduced. This may be done as follows. The axis of a figure disk contains a wheel with ten teeth. Each figure disk has, besides, one long tooth which when its 0 passes the window turns the next wheel to the left, one tooth forward, and hence the figure disk one step. The actual mechanism is not quite so simple, because the long teeth as described would gear also into the wheel to the right, and besides would interfere with each other. They must therefore be replaced by a somewhat more complicated arrangement, which has been done in various ways not necessary to describe more fully. On the way in which this is done, however, depends to a great extent the durability and trustworthiness of any arithmometer; in fact, it is often its weakest point. If to the series of figure disks arrangements are added for turning each disk through a required number of steps, we have an addition machine, essentially of Pascal's type. In it each disk had to be turned by hand. This operation has been simplified in various ways by mechanical means. For pure addition machines key-boards have been added, say for each disk nine keys marked 1 to 9. On pressing the key marked 6 the disk turns six steps and so on. These have been introduced by Stettner (1882), Max Mayer (1887), and in the comptometer by Dorr Z. Felt of Chicago. In the comptograph by Felt and also in "Burrough's Registering Accountant" the result is printed.

These machines can be used for multiplication, as repeated addition, but the process is laborious, depending for rapid execution essentially on the skill of the operator.[1] To adapt an addition machine, as described, to rapid multiplication the turnings of the separate figure disks are

Modified addition machines replaced by one motion, commonly the turning of a handle. As, however, the different disks have to be turned through different steps, a contrivance has to be inserted which can be "set" in such a way that by one turn of the handle each disk is moved through a number of steps equal to the number of units which is to be added on that disk. This may be done by making each of the figure disks receive on its axis a ten-toothed wheel, called hereafter the A-wheel, which is acted on either directly or indirectly by another wheel (called the B-wheel) in which the number of teeth can be varied from 0 to 9. This variation of the teeth has been effected in different ways. Theoretically the simplest seems to be to have on the B-wheel nine teeth which can be drawn back into the body of the wheel, so that at will any number from 0 to 9 can be made to project. This idea, previously mentioned by Leibnitz, has been realized by Bohdner in the "Brunsviga." Another way, also due to Leibnitz, consists in inserting between the axis of the handle bar and the A-wheel a "stepped" cylinder. This may be considered as being made up of ten wheels large enough to contain about twenty teeth each; but most of these teeth are cut away so that these wheels retain in succession 9, 8, . . . 1, 0 teeth. If these are made as one piece they form a cylinder with teeth of lengths from 9, 8 . . . times the length of a tooth on a single wheel.

In the diagrammatic vertical section of such a machine (fig. 2) FF is a figure disk with a conical wheel A on its axis. In the covering plate HK is the window W. A stepped cylinder is shown at B. The axis Z, which runs along the whole machine, is turned by a handle, and itself turns the cylinder B by aid of conical wheels. Above this cylinder lies an axis EE with square section along which a wheel D can be moved. The same axis carries at E' a pair of conical wheels C and C', which can also slide on the axis so that either can be made to drive the A-wheel. The covering plate MK has a slot above the axis EE allowing a rod LL' to be moved by aid of a button L, carrying the wheel D with it. Along the slot is a scale of numbers 0 1 2 . . . 9 corresponding with the number of teeth on the cylinder B, with which the wheel D will gear in any given position. A series of such slots is shown in the top middle part of Steiger's machine (fig. 3). Let now the handle driving the axis Z be turned once round, the button being set to 4. Then four teeth of the B-wheel will turn D and with it the A-wheel, and consequently the figure disk will be moved four steps. These steps will be positive or forward if the wheel C gears in A, and consequently four will be added to the figure showing at the window W. But if the wheels CC' are moved to the right, C' will gear with A moving backwards, with the result that four is subtracted at the window. This motion of all the wheels C is done simultaneously by the push of a lever which appears at the top plate of the machine, its two positions being marked "addition" and "subtraction." The B-wheels are in fixed positions below the plate MK. Level with this, but separate, is the plate KH with the window. On it the figure disks are mounted.

This plate is hinged at the back at H and can be lifted up, thereby throwing the A-wheels out of gear. When thus raised the figure disks can be set to any figures; at the same time it can slide to and fro so that an A-wheel can be put in gear with any C-wheel forming with it one "element." The number of these varies with the size of the machine. Suppose there are six B-wheels and twelve figure disks. Let these be all set to zero with the exception of the last four to the right, these showing 1 4 3 2, and let these be placed opposite the last B-wheels to the right. If now the buttons belonging to the latter be set to 3 2 5 6, then on turning the B-wheels all once round the latter figures will be added to the former, thus showing 4 6 8 8 at the windows. By aid of the axis Z, this turning of the B-wheels is performed simultaneously by the movement of one handle. We have thus an addition machine. If it be required to multiply a number, say 725, by any number up to six figures, say 357, the buttons are set to the figures 725, the windows all showing zero. The handle is then turned, 725 appears at the windows, and successive turns add this number to the first. Hence seven turns show the product seven times 725. Now the plate with the A-wheels is lifted and moved one step to the right, then lowered and the handle turned five times, thus adding fifty times 725 to the product obtained. Finally, by moving the plate again, and turning the handle three times, the required product is obtained. If the machine has six B-wheels and twelve disks the product of two six-figure numbers can be obtained. Division is performed by repeated subtraction. The lever regulating the C-wheel is set to subtraction, producing negative steps at the disks. The dividend is set up at the windows and the divisor at the buttons. Each turn of the handle subtracts the divisor once. To count the number of turns of the handle a second set of windows is arranged with number disks below. These have no carrying arrangement, but one is turned one step for each turn of the handle. The machine described is essentially that of Thomas of Colmar, which was the first that came into practical use. Of earlier machines those of Leibnitz, Müller (1782), and Hahn (1809)

deserve to be mentioned (see Dyck, Catalogue). Thomas's machine has had many imitations, both in England and on the Continent, with more or less important alterations. Joseph Edmondson of Halifax has given it a circular form, which has many advantages.

The accuracy and durability of any machine depend to a great extent on the manner in which the carrying mechanism is constructed. Besides, no wheel must be capable of moving in any other way than that required; hence every part must be locked and be released only when required to move. Further, any disk must carry to the next only after the carrying to itself has been completed. If all were to carry at the same time a considerable force would be required to turn the handle, and serious strains would be introduced. It is for this reason that the B-wheels or cylinders have the greater part of the circumference free from teeth. Again, the carrying acts generally as in the machine described, in one sense only, and this involves that the handle be turned always in the same direction. Subtraction therefore cannot be done by turning it in the opposite way, hence the two wheels C and C' are introduced. These are moved all at once by one lever acting on a bar shown at R in section (fig. 2).

In the Brunsviga, the figure disks are all mounted on a common horizontal axis, the figures being placed on the rim. On the side of each disk and rigidly connected with it lies its A-wheel with which it can turn independent of the others. The B-wheels, all fixed on another horizontal axis, gear directly on the A-wheels. By an ingenious contrivance the teeth are made to appear from out of the rim to any desired number. The carrying mechanism, too, is different, and so arranged that the handle can be turned either way, no special setting being required for subtraction or division. It is extremely handy, taking up much less room than the others. Professor Eduard Selling of Wurzburg has invented an altogether different machine, which has been made by Max Ott, of Munich. The B-wheels are replaced by lazy-tongs. To the joints of these the ends of racks are pinned; and as they are stretched out the racks are moved forward 0 to 9 steps, according to the joints they are pinned to. The racks gear directly in the A-wheels, and the figures are placed on cylinders as in the Brunsviga. The carrying is done continuously by a train of epicycloidal wheels. The working is thus rendered very smooth, without the jerks which the ordinary carrying tooth produces; but the arrangement has the disadvantage that the resulting figures do not appear in a straight line, a figure followed by a 5, for instance, being already carried half a step forward. This is not a serious matter in the hands of a mathematician or an operator using the machine constantly, but it is serious for casual work. Anyhow, it has prevented the machine from being a commercial success, and it is not any longer made. For ease and rapidity of working it surpasses all others. Since the lazy-tongs allow of an extension equivalent to five turnings of the handle, if the multiplier is 5 or under, one push forward will do the same as five (or less) turns of the handle, and more than two pushes are never required.

The Steiger-Egli machine is a multiplication machine, of which fig. 3 gives a picture as it appears to the manipulator. The lower part of the figure contains, under the covering plate, a carriage with two rows of windows for the figures marked ff and gg. On pressing down the button W the carriage

Multiplication machines can be moved to right or left. Under each window is a figure disk, as in the Thomas machine. The upper part has three sections. The one to the right contains the handle K for working the machine, and a button U for setting the machine for addition, multiplication, division, or subtraction. In the middle section a number of parallel slots are seen, with indices which can each be set to one of the numbers 0 to 9. Below each slot, and parallel to it, lies a shaft of square section on which a toothed wheel, the A-wheel, slides to and fro with the index in the slot. Below these wheels again lie 9 toothed racks at right angles to the slots. By setting the index in any slot the wheel below it comes into gear with one of these racks. On moving the rack, the wheels turn their shafts and the figure disks gg opposite to them. The dimensions are such that a motion of a rack through 1 cm. turns the figure disk through one "step" or adds 1 to the figure under the window. The racks are moved by an arrangement contained in the section to the left of the slots. There is a vertical plate called the multiplication table block, or more shortly, the block. From it project rows of horizontal rods of lengths varying from 0 to 9 centimetres. If one of these rows is brought opposite the row of racks and then pushed forward to the right through 9 cm., each rack will move and add to its figure disk a number of units equal to the number of centimetres of the rod which operates on it. The block has a square face divided into a hundred squares. Looking at its face from the right—i.e. from the side where the racks lie—suppose the horizontal rows of these squares numbered from 0 to 9, beginning at the top, and the columns numbered similarly, the 0 being to the right; then the multiplication table for numbers 0 to 9 can be placed on these squares. The row 7 will therefore contain the numbers 63, 56, . . . 7, 0. Instead of these numbers, each square receives two "rods" perpendicular to the plate, which may be called the units-rod and the tens-rod. Instead of the number 63 we have thus a tens-rod 6 cm. and a units-rod 3 cm. long. By aid of a lever H the block can be raised or lowered so that any row of the block comes to the level of the racks, the units-rods being opposite the ends of the racks.

The action of the machine will be understood by considering an example. Let it be required to form the product 7 times 385. The indices of three consecutive slots are set to the numbers 3, 8, 5 respectively. Let the windows gg opposite these slots be called a, b, c. Then to the figures shown at these windows we have to add 21, 56, 35 respectively. This is the same thing as adding first the number 165, formed by the units of each place, and next 2530 corresponding to the tens; or again, as adding first 165, and then moving the carriage one step to the right, and adding 253. The first is done by moving the block with the units-rods opposite the racks forward. The racks are then put out of gear, and together with the block brought back to their normal position; the block is moved sideways to bring the tens-rods opposite the racks, and again moved forward, adding the tens, the carriage having also been moved forward as required. This complicated movement, together with the necessary carrying, is actually performed by one turn of the handle. During the first quarter-turn the block moves forward, the units-rods coming into operation. During the second quarter-turn the carriage is put out of gear, and moved one step to the right while the necessary carrying is performed; at the same time the block and the racks are moved back, and the block is shifted so as to bring the tens-rods opposite the racks. During the next two quarter-turns the process is repeated, the block ultimately returning to its original position. Multiplication by a number with more places is performed as in the Thomas. The advantage of this machine over the Thomas in saving time is obvious. Multiplying by 817 requires in the Thomas 16 turns of the handle, but in the Steiger-Egli only 3 turns, with 3 settings of the lever H. If the lever H is set to 1 we have a simple addition machine like the Thomas or the Brunsviga. The inventors state that the product of two 8-figure numbers can be got in 6–7 seconds, the quotient of a 6-figure number by one of 3 figures in the same time, while the square root to 5 places of a 9-figure number requires 18 seconds.

Machines of far greater powers than the arithmometers mentioned have been invented by Babbage and by Scheutz. A description is impossible without elaborate drawings. The following account will afford some idea of the working of Babbage's difference machine. Imagine a number of striking clocks placed in a row, each with only an hour hand, and with only the striking apparatus retained. Let the hand of the first clock be turned. As it comes opposite a number on the dial the clock strikes that number of times. Let this clock be connected with the second in such a manner that by each stroke of the first the hand of the second is moved from one number to the next, but can only strike when the first comes to rest. If the second hand stands at 5 and the first strikes 3, then when this is done the second will strike 8; the second will act similarly on the third, and so on. Let there be four such clocks with hands set to the numbers 6, 6, 1, 0 respectively. Now set the third clock striking 1, this sets the hand of the fourth clock to 1; strike the second (6), this puts the third to 7 and the fourth to 8. Next strike the first (6); this moves the other hands to 12, 19, 27 respectively, and now repeat the striking of the first. The hand of the fourth clock will then give in succession the numbers 1, 8, 27, 64, &c., being the cubes of the natural numbers. The numbers thus obtained on the last dial will have the differences given by those shown in succession on the dial before it, their differences by the next, and so on till we come to the constant difference on the first dial. A function

$$y = a + bx + cx^2 + dx^3 + ex^4$$

gives, on increasing x always by unity, a set of values for which the fourth difference is constant. We can, by an arrangement like the above, with five clocks calculate y for $x = 1, 2, 3, \dots$ to any extent. This is the principle of Babbage's difference machine. The clock dials have to be replaced by a series of dials as in the arithmometers described, and an arrangement has to be made to drive the whole by turning one handle by hand or some other power. Imagine further that with the last clock is connected a kind of typewriter which prints the number, or, better, impresses the number in a soft substance from which a stereotype casting can be taken, and we have a machine which, when once set for a given formula like the above, will automatically print, or prepare stereotype plates for the printing of, tables of the function without any copying or typesetting, thus excluding all possibility of errors. Of this "Difference engine," as Babbage called it, a part was finished in 1834, the government having contributed £17,000 towards the cost. This great expense was chiefly due to the want of proper machine tools.

Meanwhile Babbage had conceived the idea of a much more powerful machine, the "analytical engine," intended to perform any series of possible arithmetical operations. Each of these was to be communicated to the machine by aid of cards with holes punched in them into which levers could drop. It was long taken for granted that Babbage left complete plans; the committee of the British Association appointed to consider this question came, however, to the conclusion (Brit. Assoc. Report, 1878, pp. 92–102) that no detailed working drawings existed at all; that the drawings left were only diagrammatic and not nearly sufficient to put into the hands of a draftsman for making working plans; and "that in the present state of the design it is not more than a theoretical possibility." A full account of the work done by Babbage in connexion with calculating machines, and much else published by others in connexion therewith, is contained in a work published by his son, General Babbage.

Slide rules are instruments for performing logarithmic calculations mechanically, and are extensively used, especially where only rough approximations are required. They are almost as old as logarithms themselves. Edmund Gunter drew a "logarithmic line" on his "Scales"

Slide rules as follows (fig. 4):—On a line AB lengths are set off to scale to represent the common logarithms of the numbers 1 2 3 . . . 10, and the points thus obtained are marked with these numbers. As $\log 1 = 0$, the beginning A has the number 1 and B the number 10, hence the unit of length is AB, as $\log 10 = 1$. The same division is repeated from B to C. The distance 1,2 thus represents $\log 2$, 1,3 gives $\log 3$, the distance between 4 and 5 gives $\log 5 - \log 4 = \log 5/4$, and so for others. In order to multiply two numbers, say 2 and 3, we have $\log 2 + \log 3 = \log 2 \times 3 = \log 6$. Hence, setting off the distance 1,2 from 3 forward by the aid of a pair of compasses will give the distance $\log 2 + \log 3$, and will bring us to 6 as the required product. Again, if it is required to find $4/5$ of 7, set off the distance between 4 and 5 from 7 backwards, and the required number will be obtained. In the actual scales the spaces between the numbers are subdivided into 10 or even more parts, so that from two to three figures may be read. The numbers 2, 3 . . . in the interval BC give the logarithms of 10 times the same numbers in the interval AB; hence, if the 2 in the latter means 2 or .2, then the 2 in the former means 20 or 2.

Soon after Gunter's publication (1620) of these "logarithmic lines," Edmund Wingate (1672) constructed the slide rule by repeating the logarithmic scale on a tongue or "slide," which could be moved along the first scale, thus avoiding the use of a pair of compasses. A clear idea of this device can be formed if the scale in

fig. 4 be copied on the edge of a strip of paper placed against the line A C. If this is now moved to the right till its 1 comes opposite the 2 on the first scale, then the 3 of the second will be opposite 6 on the top scale, this being the product of 2 and 3; and in this position every number on the top scale will be twice that on the lower. For every position of the lower scale the ratio of the numbers on the two scales which coincide will be the same. Therefore multiplications, divisions, and simple proportions can be solved at once.

Dr John Perry added log log scales to the ordinary slide rule in order to facilitate the calculation of ax or ex according to the formula $\log \log ax = \log \log a + \log x$. These rules are manufactured by A. G. Thornton of Manchester.

Many different forms of slide rules are now on the market. The handiest for general use is the Gravet rule made by Tavernier-Gravet in Paris, according to instructions of the mathematician V. M. A. Mannheim of the Ecole Polytechnique in Paris. It contains at the back of the slide scales for the logarithms of sines and tangents so arranged that they can be worked with the scale on the front. An improved form is now made by Davis and Son of Derby, who engrave the scales on white celluloid instead of on box-wood, thus greatly facilitating the readings. These scales have the distance from one to ten about twice that in fig. 4. Tavernier-Gravet makes them of that size and longer, even

2metre long. But they then become somewhat unwieldy, though they allow of reading to more figures. To get a handy long scale Professor G. Fuller has constructed a spiral slide rule drawn on a cylinder, which admits of reading to three and four figures. The handiest of all is perhaps the "Calculating Circle" by Boucher, made in the form of a watch. For various purposes special adaptations of the slide rules are met with—for instance, in various exposure meters for photographic purposes. General Strachey introduced slide rules into the Meteorological Office for performing special calculations. At some blast furnaces a slide rule has been used for determining the amount of coke and flux required for any weight of ore. Near the balance a large logarithmic scale is fixed with a slide which has three indices only. A load of ore is put on the scales, and the first index of the slide is put to the number giving the weight, when the second and third point to the weights of coke and flux required.

By placing a number of slides side by side, drawn if need be to different scales of length, more complicated calculations may be performed. It is then convenient to make the scales circular. A number of rings or disks are mounted side by side on a cylinder, each having on its rim a log-scale.

The "Callendar Cable Calculator," invented by Harold Hastings and manufactured by Robert W. Paul, is of this kind. In it a number of disks are mounted on a common shaft, on which each turns freely unless a button is pressed down whereby the disk is clamped to the shaft. Another disk is fixed to the shaft. In front of the disks lies a fixed zero line. Let all disks be set to zero and the shaft be turned, with the first disk clamped, till a desired number appears on the zero line; let then the first disk be released and the second clamped and so on; then the fixed disk will add up all the turnings and thus give the product of the numbers shown on the several disks. If the division on the disks is drawn to different scales, more or less complicated calculations may be rapidly performed. Thus if for some purpose the value of say ab^3c is required for many different values of a , b , c , three movable disks would be needed with divisions drawn to scales of lengths in the proportion 1: 3:

2. The instrument now on sale contains six movable disks.

Continuous Calculating Machines or Integrators.—In order to measure the length of a curve, such as the road on a map, a wheel is rolled along it. For one revolution of the wheel the path described by its point of contact is equal to the circumference of the wheel. Thus, if

Curvometers: a cyclist counts the number of revolutions of his front wheel he can calculate the distance ridden by multiplying that number by the circumference of the wheel. An ordinary cyclometer is nothing but an arrangement for counting these revolutions, but it is graduated in such a manner that it gives at once the distance in miles. On the same principle depend a number of instruments which, under various fancy names, serve to measure the length of any curve; they are in the shape of a small meter chiefly for the use of cyclists. They all have a small wheel which is rolled along the curve to be measured, and this sets a hand in motion which gives the reading on a dial. Their accuracy is not very great, because it is difficult to place the wheel so on the paper that the point of contact lies exactly over a given point; the beginning and end of the readings are therefore badly defined. Besides, it is not easy to guide the wheel along the curve to which it should always lie tangentially. To obviate this defect more complicated curvometers or kartometers have been devised. The handiest seems to be that of G. Coradi. He uses two wheels; the tracing-point, halfway between them, is guided along the curve, the line joining the wheels being kept normal to the curve. This is pretty easily done by eye; a constant deviation of 8° from this direction produces an error of only 1%. The sum of the two readings gives the length. E. Fleischhauer uses three, five or more wheels arranged symmetrically round a tracer whose point is guided along the curve; the planes of the wheels all pass through the tracer, and the wheels can only turn in one direction. The sum of the readings of all the wheels gives approximately the length of the curve, the approximation increasing with the number of the wheels used. It is stated that with three wheels practically useful results can be obtained, although in this case the error, if the instrument is consistently handled so as always to produce the greatest inaccuracy, may be as much as 5%.

Planimeters are instruments for the determination by mechanical means of the area of any figure. A pointer, generally called the "tracer," is guided round the boundary of the figure, and then the area is read off on the recording apparatus of the instrument. The simplest and most useful is

Planimeters: Amsler's (fig. 5). It consists of two bars of metal OQ and QT, which are hinged together at Q. At O is a needle-point which is driven into the drawing-board, and at T is the tracer. As this is guided round the boundary of the figure a wheel W mounted on QT rolls on the paper, and the turning of this wheel measures, to some known scale, the area. We shall give the theory of this instrument fully in an elementary manner by aid of geometry. The theory of other planimeters can then be easily understood.

Consider the rod QT with the wheel W, without the arm OQ. Let it be placed with the wheel on the paper, and now moved perpendicular to itself from AC to BD (fig. 6). The rod sweeps over, or generates, the area of the rectangle ACDB = lp , where l denotes the length of the rod and p the distance AB through which it has been moved. This distance, as measured by the rolling of the wheel, which acts as a curvometer, will be called the "roll" of the wheel and be denoted by w . In this case $p = w$, and the area P is given by $P = wl$. Let the circumference of the wheel be divided into say a hundred equal parts u ; then w registers the number of u 's rolled over, and w therefore gives the number of areas lu contained in the rectangle. By suitably selecting the radius of the wheel and the length l , this area lu may be any convenient unit, say a square inch or square centimetre. By changing l the unit will be changed.

Again, suppose the rod to turn (fig. 7) about the end Q, then it will describe an arc of a circle, and the rod will generate an area

$2l\theta$, where θ is the angle AQB through which the rod has turned. The wheel will roll over an arc $c\theta$, where c is the distance of the wheel from Q. The "roll" is now $w = c\theta$; hence the area generated is

...

and is again determined by w .

Next let the rod be moved parallel to itself, but in a direction not perpendicular to itself (fig. 8). The wheel will now not simply roll. Consider a small motion of the rod from QT to Q'T'. This may be resolved into the motion to RR' perpendicular to the rod, whereby the rectangle QTR'R is generated, and the sliding of the rod along itself from RR' to Q'T'. During this second step no area will be generated. During the first step the roll of the wheel will be QR, whilst during the second step there will be no roll at all. The roll of the wheel will therefore measure the area of the rectangle which equals the parallelogram QTT'Q'. If the whole motion of the rod be considered as made up of a very great number of small steps, each resolved as stated, it will be seen that the roll again measures the area generated. But it has to be noticed that now the wheel does not only roll, but also slips, over the paper. This, as will be pointed out later, may introduce an error in the reading.

We can now investigate the most general motion of the rod. We again resolve the motion into a number of small steps. Let (fig. 9) AB be one position, CD the next after a step so small that the arcs AC and BD over which the ends have passed may be considered as straight lines. The area generated is ABDC. This motion we resolve into a step from AB to CB', parallel to AB and a turning about C from CB' to CD, steps such as have been investigated. During the first, the "roll" will be p the altitude of the parallelogram; during the second will be $c\theta$. Therefore

$$w = p + c\theta.$$

The area generated is $lp +$

...

$2l(2 - lc)\theta$. For a finite motion we get the area equal to the sum of the areas generated during the different steps. But the wheel will continue rolling, and give the whole roll as the sum of the rolls for the successive steps. Let then w denote the whole roll (in fig. 10), and let α denote the sum of all the small turnings θ ; then the area is

...

Here α is the angle which the last position of the rod makes with the first. In all applications of the planimeter the rod is brought back to its original position. Then the angle α is either zero, or it is 2π if the rod has been once turned quite round.

Hence in the first case we have

$$P = lw \quad (2a)$$

and w gives the area as in case of a rectangle.

In the other case

19, https://en.wikisource.org/wiki/1911_Encyclop%C3%A6dia_Britannica/Calculating_Machines

...

2l-c)2π, if the rod has once turned round. The number C will be seen to be always the same, as it depends only on the dimensions of the instrument. Hence now again the area is determined by w if C is known.

Thus it is seen that the area generated by the motion of the rod can be measured by the roll of the wheel; it remains to show how any given area can be generated by the rod. Let the rod move in any manner but return to its original position. Q and T then describe closed curves. Such motion may be called cyclical. Here the theorem holds:—If a rod QT performs a cyclical motion, then the area generated equals the difference of the areas enclosed by the paths of T and Q respectively. The truth of this proposition will be seen from a figure. In fig. 11 different positions of the moving rod QT have been marked, and its motion can be easily followed. It will be seen that every part of the area TT'BB' will be passed over once and always by a forward motion of the rod, whereby the wheel will increase its roll. The area AA'QQ' will also be swept over once, but with a backward roll; it must therefore be counted as negative. The area between the curves is passed over twice, once with a forward and once with a backward roll; it therefore counts once positive and once negative; hence not at all. In more complicated figures it may happen that the area within one of the curves, say TT'BB', is passed over several times, but then it will be passed over once more in the forward direction than in the backward one, and thus the theorem will still hold.

To use Amsler's planimeter, place the pole O on the paper outside the figure to be measured. Then the area generated by QT is that of the figure, because the point Q moves on an arc of a circle to and fro enclosing no area. At the same time the rod comes back without making a complete rotation. We have therefore in formula (1), α = 0; and hence

$$P = lw,$$

which is read off.

Fig. 13. But if the area is too large the pole O may be placed within the area. The rod describes the area between the boundary of the figure and the circle with radius r = OQ, whilst the rod turns once completely round, making α = 2π. The area measured by the wheel is by formula (1), lw + (

2l2-lc) 2π. To this the area of the circle πr² must be added, so that now

...

is a constant, as it depends on the dimensions of the instrument alone. This constant is given with each instrument.

Amsler's planimeters are made either with a rod QT of fixed length, which gives the area therefore in terms of a fixed unit, say in square inches, or else the rod can be moved in a sleeve to which the arm OQ is hinged (fig. 13). This makes it possible to change the unit lu, which is proportional to l.

In the planimeters described the recording or integrating apparatus is a smooth wheel rolling on the paper or on some other surface. Amsler has described another recorder, viz. a wheel with a sharp edge. This will roll on the paper but not slip. Let the rod QT carry with it an arm CD perpendicular to it. Let there be mounted on it a wheel W, which can slip along and turn about it.

Fig. 15. If now QT is moved parallel to itself to Q'T', then W will roll without slipping parallel to QT, and slip along CD. This amount of slipping will equal the perpendicular distance between QT and Q'T', and therefore serve to measure the area swept over like the wheel in the machine already described. The turning of the rod will also produce slipping of the wheel, but it will be seen without difficulty that this will cancel during a cyclical motion of the rod, provided the rod does not perform a whole rotation.

The first planimeter was made on the following principles:—A frame FF (fig. 15) can move parallel to OX. It carries a rod TT movable along its own length, hence the tracer T can be guided along any curve ATB. When the rod has been pushed back to Q'Q, the tracer moves

Early forms along the axis OX. On the frame a cone VCC' is mounted with its axis sloping so that its top edge is horizontal and parallel to TT', whilst its vertex V is opposite Q'. As the frame moves it turns the cone. A wheel W is mounted on the rod at T', or on an axis parallel to and rigidly connected with it. This wheel rests on the top edge of the cone. If now the tracer T, when pulled out through a distance y above Q, be moved parallel to OX through a distance dx, the frame moves through an equal distance, and the cone turns through an angle dθ proportional to dx. The wheel W rolls on the cone to an amount again proportional to dx, and also proportional to y, its distance from V. Hence the roll of the wheel is proportional to the area ydx described by the rod QT. As T is moved from A to B along the curve the roll of the wheel will therefore be proportional to the area AA'B'B. If the curve is closed, and the tracer moved round it, the roll will measure the area independent of the position of the axis OX, as will be seen by drawing a figure. The cone may with advantage be replaced by a horizontal disk, with its centre at V; this allows of y being negative. It may be noticed at once that the roll of the wheel gives at every moment the area A'ATQ. It will therefore allow of registering a set of values of $\int_a^x y \, dx$ for any values of x, and thus of tabulating the values of any indefinite integral. In this it differs from Amsler's planimeter. Planimeters of this type were first invented in 1814 by the Bavarian engineer Hermann, who, however, published nothing. They were reinvented by Prof. Tito Gonnella of Florence in 1824, and by the Swiss engineer Oppikofer, and improved by Ernst in Paris, the astronomer Hansen in Gotha, and others (see Henrici, British Association Report, 1894). But all were driven out of the field by Amsler's simpler planimeter.

Fig. 16.

Fig. 17. Altogether different from the planimeters described is the hatchet planimeter, invented by Captain Prytz, a Dane, and made by Herr Cornelius Knudson in Copenhagen. It consists of a single rigid piece like fig. 16. The one end T is the tracer, the other Q has a sharp

Hatchet planimeters. hatchet-like edge. If this is placed with QT on the paper and T is moved along any curve, Q will follow, describing a "curve of pursuit." In consequence of the sharp edge, Q can only move in the direction of QT, but the whole can turn about Q. Any small step forward can therefore be considered as made up of a motion along QT, together with a turning about Q. The latter motion alone generates an area. If therefore a line OA = QT is turning about a fixed point O, always keeping parallel to QT, it will sweep over an area equal to that generated by the more general motion of QT. Let now (fig. 17) QT be placed on OA, and T be guided round the closed curve in the sense of the arrow. Q will describe a curve OSB. It may be made visible by putting a piece of "copying paper" under the hatchet. When T has returned to A the hatchet has the position BA. A line turning from OA about O kept parallel to QT will describe the circular sector OAC, which is equal in magnitude and sense to AOB. This therefore measures the area generated by the motion of QT. To make this motion cyclical, suppose the hatchet turned about A till Q comes from B to O. Hereby the sector AOB is again described, and again in the positive sense, if it is remembered that it turns about the tracer T fixed at A. The whole area now generated is therefore twice the area of this sector, or equal to OA. OB, where OB is measured along the arc. According to the theorem given above, this area also equals the area of the given curve less the area OSBO. To make this area disappear, a slight modification of the motion of QT is required. Let the tracer T be moved, both from the first position OA and the last BA of the rod, along some straight line AX. Q describes curves OF and BH respectively. Now begin the motion with T at some point R on AX, and move it along this line to A, round the curve and back to R. Q will describe the curve DOSBED, if the motion is again made cyclical by turning QT with T fixed at A. If R is properly selected, the path of Q will cut itself, and parts of the area will be positive, parts negative, as marked in the figure, and may therefore be made to vanish. When this is done the area of the curve will equal twice the area of the sector RDE. It is therefore equal to the arc DE multiplied by the length QT; if the latter equals 10 in., then 10 times the number of inches contained in the arc DE gives the number of square inches contained within the given figure. If the area is not too large, the arc DE may be replaced by the straight line DE.

To use this simple instrument as a planimeter requires the possibility of selecting the point R. The geometrical theory here given has so far failed to give any rule. In fact, every line through any point in the curve contains such a point. The analytical theory of the inventor, which is very similar to that given by F. W. Hill (Phil. Mag. 1894), is too complicated to repeat here. The integrals expressing the area generated by QT have to be expanded in a series. By retaining only the most important terms a result is obtained which comes to this, that if the mass-centre of the area be taken as R, then A may be any point on the curve. This is only approximate. Captain Prytz gives the following instructions:—Take a point R as near as you can guess to the mass-centre, put the tracer T on it, the knife-edge Q outside; make a mark on the paper by pressing the knife-edge into it; guide the tracer from R along a straight line to a point A on the boundary, round the boundary, and back from A to R; lastly, make again a mark with the knife-edge, and measure the distance c between the marks; then the area is nearly cl, where l = QT. A nearer approximation is obtained by repeating the operation after turning QT through 180° from the original position, and using the mean of the two values of c thus obtained. The greatest dimension of the area should not exceed

2l, otherwise the area must be divided into parts which are determined separately. This condition being fulfilled, the instrument gives very satisfactory results, especially if the figures to be measured, as in the case of indicator diagrams, are much of the same shape, for in this case the operator soon learns where to put the point R.

Integrators serve to evaluate a definite integral $\int_a^b f(x) \, dx$. If we plot out the curve whose equation is y = f(x), the integral $\int_a^b f(x) \, dx$ between the proper limits represents the area of a figure bounded by the curve, the axis of x, and the ordinates at x=a, x=b. Hence if the curve is drawn, any planimeter may be used

Integrators for finding the value of the integral. In this sense planimeters are integrators. In fact, a planimeter may often be used with advantage to solve problems more complicated than the determination of a mere area, by converting the one problem graphically into the other. We give an example:—

Let the problem be to determine for the figure ABG (fig. 18), not only the area, but also the first and second moment with regard to the axis XX. At a distance a draw a line, C'D', parallel to XX. In the figure draw a number of lines parallel to AB. Let CD be one of them. Draw C and D vertically upwards to C'D', join these points to some point O in XX, and mark the points C1D1 where OC' and OD' cut CD. Do this for a sufficient number of lines, and join the points C1D1 thus obtained. This gives a new curve, which may be called the first derived curve. By the same process get a new curve from this, the second derived curve. By aid of a planimeter determine the areas P, P1, P2, of these three curves. Then, if x is the distance of the mass-centre of the given area from XX; x1 the same quantity for 20, https://en.wikisource.org/wiki/1911_Encyclop%C3%A6dia_Britannica/Calculating_Machines

the first derived figure, and $I = Ak^2$ the moment of inertia of the first figure, k its radius of gyration, with regard to XX as axis, the following relations are easily proved:—

$$P_x = aP_1; P_1x_1 = aP_2; I = aP_1x_1 = a^2P_1P_2; k^2 = xx_1,$$

which determine P , x and I or k . Amsler has constructed an integrator which serves to determine these quantities by guiding a tracer once round the boundary of the given figure (see below). Again, it may be required to find the value of an integral $\int y\phi(x)dx$ between given limits where $\phi(x)$ is a simple function like $\sin nx$, and where y is given as the ordinate of a curve. The harmonic analysers described below are examples of instruments for evaluating such integrals.

Fig. 19. Fig. 20.

Amsler has modified his planimeter in such a manner that instead of the area it gives the first or second moment of a figure about an axis in its plane. An instrument giving all three quantities simultaneously is known as Amsler's integrator or moment-planimeter. It has one tracer, but three recording wheels. It is mounted on a

Amsler's Integrator carriage which runs on a straight rail (fig. 19). This carries a horizontal disk A , movable about a vertical axis Q . Slightly more than half the circumference is circular with radius $2a$, the other part with radius $3a$. Against these gear two disks, B and C , with radii a ; their axes are fixed in the carriage. From the disk A extends to the left a rod OT of length l , on which a recording wheel W is mounted. The disks B and C have also recording wheels, W_1 and W_2 , the axis of W_1 being perpendicular, that of W_2 parallel to OT . If now T is guided round a figure F , O will move to and fro in a straight line. This part is therefore a simple planimeter, in which the one end of the arm moves in a straight line instead of in a circular arc. Consequently, the "roll" of W will record the area of the figure. Imagine now that the disks B and C also receive arms of length l from the centres of the disks to points T_1 and T_2 , and in the direction of the axes of the wheels. Then these arms with their wheels will again be planimeters. As T is guided round the given figure F , these points T_1 and T_2 will describe closed curves, F_1 and F_2 , and the "rolls" of W_1 and W_2 will give their areas A_1 and A_2 . Let XX (fig. 20) denote the line, parallel to the rail, on which O moves; then when T lies on this line, the arm BT_1 is perpendicular to XX , and CT_2 parallel to it. If OT is turned through an angle θ , clockwise, BT_1 will turn counter-clockwise through an angle 2θ , and CT_2 through an angle 3θ , also counter-clockwise. If in this position T is moved through a distance x parallel to the axis XX , the points T_1 and T_2 will move parallel to it through an equal distance. If now the first arm is turned through a small angle $d\theta$, moved back through a distance x , and lastly turned back through the angle $d\theta$, the tracer T will have described the boundary of a small strip of area. We divide the given figure into such strips. Then to every such strip will correspond a strip of equal length x of the figures described by T_1 and T_2 .

The distances of the points, T , T_1 , T_2 , from the axis XX may be called y , y_1 , y_2 . They have the values

$$y = l \sin \theta, y_1 = l \cos 2\theta, y_2 = -l \sin 3\theta,$$

from which

$$dy = l \cos \theta d\theta, dy_1 = -2l \sin 2\theta d\theta, dy_2 = -3l \cos 3\theta d\theta.$$

The areas of the three strips are respectively

$$dA = xdy, dA_1 = xdy_1, dA_2 = xdy_2.$$

Now dy_1 can be written $dy_1 = -4l \sin \theta \cos \theta d\theta = -4 \sin \theta dy$; therefore

$$dA_1 = -4 \sin \theta dA = -4l \int \frac{1}{l} dA \quad \left\{ \frac{1}{l} \right\} y dA;$$

whence

$$A_1 = -4l \int \frac{1}{l} dA \quad \left\{ \frac{1}{l} \right\} y dA = -4l \int \frac{1}{l} dA \quad \left\{ \frac{1}{l} \right\} y dA,$$

where A is the area of the given figure, and y the distance of its mass-centre from the axis XX . But A_1 is the area of the second figure F_1 , which is proportional to the reading of W_1 . Hence we may say

$$A_1 = C_1 w_1,$$

where C_1 is a constant depending on the dimensions of the instrument. The negative sign in the expression for A_1 is got rid of by numbering the wheel W_1 the other way round.

Again

$$dy_2 = -3l \cos \theta \{4 \cos^2 \theta - 3\} d\theta = -3 \{4 \cos^2 \theta - 3\} dy = -3 \left\{ \frac{4}{l^2} \right\} y^2 - 3 dy,$$

which gives

$$dA_2 = -12l \int \frac{1}{l^2} y^2 dy = -12l \int \frac{1}{l^2} y^2 dy + 9dA,$$

and

$$A_2 = -12l \int \frac{1}{l^2} y^2 dy = -12l \int \frac{1}{l^2} y^2 dy + 9A.$$

But the integral gives the moment of inertia I of the area A about the axis XX . As A_2 is proportional to the roll of W_2 , A to that of W , we can write

$$I = Cw - C_2 w^2,$$

$$A_1 = C_1 w_1,$$

$$A = Cc w.$$

If a line be drawn parallel to the axis XX at the distance y , it will pass through the mass-centre of the given figure. If this represents the section of a beam subject to bending, this line gives for a proper choice of XX the neutral fibre. The moment of inertia for it will be $I + Ay^2$. Thus the instrument gives at once all those quantities which are required for calculating the strength of the beam under bending. One chief use of this integrator is for the calculation of the displacement and stability of a ship from the drawings of a number of sections. It will be noticed that the length of the figure in the direction of XX is only limited by the length of the rail.

This integrator is also made in a simplified form without the wheel W_2 . It then gives the area and first moment of any figure.

While an integrator determines the value of a definite integral, hence a mere constant, an integraph gives the value of an indefinite integral, which is a function of x . Analytically if y is a given function $f(x)$ of x

Integrals and

$$Y = \int c x \quad \left\{ \text{int } c^x \right\} \quad \left\{ \text{int } c^x \right\} y dx \text{ or } Y = \int y dx + \text{const.}$$

the function Y has to be determined from the condition

$$dY/dx = y.$$

Graphically $y = f(x)$ is either given by a curve, or the graph of the equation is drawn: y , therefore, and similarly Y , is a length. But

$$dY$$

dx is in this case a mere number, and cannot equal a length y . Hence we introduce an arbitrary constant length a , the unit to which the integraph draws the curve, and write

$$dY/dx = y/a$$

$$a dY = y dx$$

Now for the Y -curve

$$dY$$

$dx = \tan \phi$, where ϕ is the angle between the tangent to the curve, and the axis of x . Our condition therefore becomes

$$dY$$

This ϕ is easily constructed for any given point on the y -curve:—From the foot B' (fig. 21) of the ordinate $y = B'B$ set off, as in the figure, $B'D = a$, then angle $BDB' = \phi$. Let now DB' with a perpendicular $B'B$ move along the axis of x , whilst B follows the y -curve, then a pen P on $B'B$ will describe the Y -curve provided it moves at every moment in a direction parallel to BD . The object of the integraph is to draw this new curve when the tracer of the instrument is guided along the y -curve.

The first to describe such instruments was Abdank-Abakanowicz, who in 1889 published a book in which a variety of mechanisms to obtain the object in question are described. Some years later G. Coradi, in Zürich, carried out his ideas. Before this was done, C. V. Boys, without knowing of Abdank-Abakanowicz's work, actually made an integrator which was exhibited at the Physical Society in 1881. Both make use of a sharp edge wheel. Such a wheel will not slip sideways; it will roll forwards along the line in which its plane intersects the plane of the paper, and while rolling will be able to turn gradually about its point of contact. If then the angle between its direction of rolling and the x-axis be always equal to ϕ , the wheel will roll along the Y-curve required. The axis of x is fixed only in direction; shifting it parallel to itself adds a constant to Y, and this gives the arbitrary constant of integration.

In fact, if Y shall vanish for $x = c$, or if

$$Y = \int c \, dx \quad \{\textstyle \int c \, dx\} \quad \{\textstyle \int c \, dx\}$$

then the axis of x has to be drawn through that point on the y-curve which corresponds to $x = c$.

Fig. 22.

In Coradi's integrator a rectangular frame F1F2F3F4 (fig. 22) rests with four rollers R on the drawing board, and can roll freely in the direction OX, which will be called the axis of the instrument. On the front edge F1F2 travels a carriage AA' supported at A' on another rail. A bar DB can turn about D, fixed to the frame in its axis, and slide through a point B fixed in the carriage AA'. Along it a block K can slide. On the back edge F3F4 of the frame another carriage C travels. It holds a vertical spindle with the knife-edge wheel at the bottom. At right angles to the plane of the wheel, the spindle has an arm GH, which is kept parallel to a similar arm attached to K perpendicular to DB. The plane of the knife-edge wheel r is therefore always parallel to DB. If now the point B is made to follow a curve whose y is measured from OX, we have in the triangle BDB', with the angle ϕ at D,

$$\tan \phi = y/a,$$

where $a = DB'$ is the constant base to which the instrument works. The point of contact of the wheel r or any point of the carriage C will therefore always move in a direction making an angle ϕ with the axis of x, whilst it moves in the x-direction through the same distance as the point B on the y-curve—that is to say, it will trace out the integral curve required, and so will any point rigidly connected with the carriage C. A pen P attached to this carriage will therefore draw the integral curve. Instead of moving B along the y-curve, a tracer T fixed to the carriage A is guided along it. For using the instrument the carriage is placed on the drawing-board with the front edge parallel to the axis of y, the carriage A being clamped in the central position with A at E and B at B' on the axis of x. The tracer is then placed on the x-axis of the y-curve and clamped to the carriage, and the instrument is ready for use. As it is convenient to have the integral curve placed directly opposite to the y-curve so that corresponding values of y or Y are drawn on the same line, a pen P' is fixed to C in a line with the tracer.

Boys' integrator was invented during a sleepless night, and during the following days carried out as a working model, which gives highly satisfactory results. It is ingenious in its simplicity, and a direct realization as a mechanism of the principles explained in connexion with fig. 21. The line B'B is represented by the edge of an ordinary T-square sliding against the edge of a drawing-board. The points B and P are connected by two rods BE and EP, jointed at E. At B, E and P are small pulleys of equal diameters. Over these an endless string runs, ensuring that the pulleys at B and P always turn through equal angles. The pulley at B is fixed to a rod which passes through the point D, which itself is fixed in the T-square. The pulley at P carries the knife-edge wheel. If then B and P are kept on the edge of the T-square, and B is guided along the curve, the wheel at P will roll along the Y-curve, it having been originally set parallel to BD. To give the wheel at P sufficient grip on the paper, a small loaded three-wheeled carriage, the knife-edge wheel P being one of its wheels, is added. If a piece of copying paper is inserted between the wheel P and the drawing paper the Y-curve is drawn very sharply.

Integrators have also been constructed, by aid of which ordinary differential equations, especially linear ones, can be solved, the solution being given as a curve. The first suggestion in this direction was made by Lord Kelvin. So far no really useful instrument has been made, although the ideas seem sufficiently developed to enable a skilful instrument-maker to produce one should there be sufficient demand for it. Sometimes a combination of graphical work with an integrator will serve the purpose. This is the case if the variables are separated, hence if the equation

$$Xdx + Ydy = 0$$

has to be integrated where $X = p(x)$, $Y = \phi(y)$ are given as curves. If we write

$$u = \int Xdx, \quad v = \int Ydy,$$

then u as a function of x, and v as a function of y can be graphically found by the integrator. The general solution is then

$$u + v = c$$

with the condition, for the determination for c, that $y = y_0$, for $x = x_0$. This determines $c = u_0 + v_0$, where u_0 and v_0 are known from the graphs of u and v. From this the solution as a curve giving y a function of x can be drawn:—For any x take u from its graph, and find the y for which $v = c - u$, plotting these y against their x gives the curve required. If a periodic function y of x is given by its graph for one period c, it can, according to the theory of Fourier's Series, be expanded in a series.

$$y = A_0 + A_1 \cos \theta + A_2 \cos 2\theta + \dots + A_n \cos n\theta + \dots \\ + B_1 \sin \theta + B_2 \sin 2\theta + \dots + B_n \sin n\theta + \dots$$

where $\theta =$

$$2\pi x/c.$$

c.

The absolute term A_0 equals the mean ordinate of the curve, and can therefore be determined by any planimeter. The other co-efficients are

$$A_n = \frac{1}{n\pi} \int_0^{2\pi} y \cos n\theta \, d\theta, \quad B_n = \frac{1}{n\pi} \int_0^{2\pi} y \sin n\theta \, d\theta.$$

A harmonic analyser is an instrument which determines these integrals, and is therefore an integrator. The first instrument of this kind is due to Lord Kelvin (Proc. Roy Soc., vol xxiv., 1876). Since then several others have been invented (see Dyck's Catalogue; Henrici, Phil. Mag.,

Harmonic analysers. July 1894; Phys. Soc., 9th March; Sharp, Phil. Mag., July 1894; Phys. Soc., 13th April). In Lord Kelvin's instrument the curve to be analysed is drawn on a cylinder whose circumference equals the period c, and the sine and cosine terms of the integral are introduced by aid of simple harmonic motion. Sommerfeld and Wiechert, of Königsberg, avoid this motion by turning the cylinder about an axis perpendicular to that of the cylinder. Both these machines are large, and practically fixtures in the room where they are used. The first has done good work in the Meteorological Office in London in the analysis of meteorological curves. Quite different and simpler constructions can be used, if the integrals determining A_n and B_n be integrated by parts. This gives

$$nA_n = - \frac{1}{\pi} \int_0^{2\pi} y \sin n\theta \, d\theta, \quad nB_n = \frac{1}{\pi} \int_0^{2\pi} y \cos n\theta \, d\theta.$$

An analyser presently to be described, based on these forms, has been constructed by Coradi in Zurich (1894). Lastly, a most powerful analyser has been invented by Michelson and Stratton (U.S.A.) (Phil Mag., 1898), which will also be described.

Fig. 23.

The Henrici-Coradi analyser has to add up the values of $dy \sin n\theta$ and $dy \cos n\theta$. But these are the components of dy in two directions perpendicular to each other, of which one makes an angle $n\theta$ with the axis of x or of θ . This decomposition can be performed by Amsler's registering wheels. Let two of these be mounted, perpendicular to each other, in one horizontal frame which can be turned about a vertical axis, the wheels resting on the paper on which the curve is drawn. When the tracer is placed on the curve at the point $\theta = 0$ the one axis is parallel to the axis of θ . As the tracer follows the curve the frame is made to turn through an angle $n\theta$. At the same time the frame moves with the tracer in the direction of y. For a small motion the two wheels will then register just the components required, and during the continued motion of the tracer along the curve the wheels will add these components, and thus give the values of nA_n and nB_n . The factors $1/\pi$ and $-1/\pi$ are taken account of in the graduation of the wheels. The readings have then to be divided by n to give the coefficients required. Coradi's realization of this idea will be understood from fig. 23. The frame PP' of the instrument rests on three rollers E, E', and D. The first two drive an axis with a disk C on it. It is placed parallel to the axis of x of the curve. The tracer is attached to a carriage WW which runs on the rail P. As it follows the curve this carriage moves through a distance x whilst the whole instrument runs forward through a distance y. The wheel C turns through an angle proportional, during each small motion, to dy. On it rests a glass sphere which will therefore also turn about its horizontal axis proportionally, to dy. The registering frame is suspended by aid of a spindle S, having a disk H. It is turned by aid of a wire connected with the carriage WW, and turns n times round as the tracer describes the whole length of the curve. The registering wheels R, R' rest against the glass sphere and give the values nA_n and nB_n . The value of n can be altered by changing the disk H into one of different diameter. It is also possible to mount on the same frame a number of spindles with registering wheels and glass spheres, each of the latter resting on a separate disk C. As many as five have been introduced. One guiding of the tracer over the curve gives then at once the ten coefficients A_n and B_n for $n = 1$ to 5.

All the calculating machines and integrators considered so far have been kinematic. We have now to describe a most remarkable instrument based on the equilibrium of a rigid body under the action of springs. The body itself for rigidity's sake is made a hollow

Michelson and Stratton analyzer. cylinder H, shown in fig. 24 in end view. It can turn about its axis, being supported on knife-edges O. To it springs are attached at the prolongation of a horizontal diameter; to the left a series of n small springs s, all alike, side by side at equal intervals at a distance a from the axis of the knife-edges; to the right a single spring S at distance b. These springs are supposed to follow Hooke's law. If the elongation beyond the natural length of a spring is λ, the force asserted by it is p = kλ. Let for the position of equilibrium l, L be respectively the elongation of a small and the large spring, k, K their constants, then

Fig. 24.

$nkla = K Lb.$

The position now obtained will be called the normal one. Now let the top ends C of the small springs be raised through distances y₁, y₂, . . . y_n. Then the body H will turn; B will move down through a distance z and A up through a distance (a/b)z. The new forces thus introduced will be in equilibrium if

$$ak \left(\sum y - n \frac{a}{b} z \right) = \sum y - n \left(\frac{a}{b} z \right) = \sum y - n \left(\frac{a}{b} z \right) = bKz.$$

Or

$$z = \frac{\sum y n \frac{a}{b} + b a K k}{n \left(\frac{a}{b} \right) + \frac{b a K k}{L}} = \frac{\sum y n \left(\frac{a}{b} + \frac{L}{L} \right)}{n \left(\frac{a}{b} + \frac{L}{L} \right)} = \frac{\sum y n}{n} = \frac{\sum y}{n}.$$

This shows that the displacement z of B is proportional to the sum of the displacements y of the tops of the small springs. The arrangement can therefore be used for the addition of a number of displacements. The instrument made has eighty small springs, and the authors state that from the experience gained there is no impossibility of increasing their number even to a thousand. The displacement z, which necessarily must be small, can be enlarged by aid of a lever OT'. To regulate the displacements y of the points C (fig. 24) each spring is attached to a lever EC, fulcrum E. To this again a long rod FG is fixed by aid of a joint at F. The lower end of this rod rests on another lever GP, fulcrum N, at a changeable distance y'' = NG from N. The elongation y of any spring s can thus be produced by a motion of P. If P be raised through a distance y', then the displacement y of C will be proportional to y'y''; it is, say, equal to μy'y'' where μ is the same for all springs. Now let the points C, and with it the springs s, the levers, &c., be numbered C₀, C₁, C₂ ... There will be a zero-position for the points P all in a straight horizontal line. When in this position the points C will also be in a line, and this we take as axis of x. On it the points C₀, C₁, C₂ ... follow at equal distances, say each equal to h. The point C_k lies at the distance kh which gives the x of this point. Suppose now that the rods FG are all set at unit distance NG from N, and that the points P be raised so as to form points in a continuous curve y' = φ(x), then the points C will lie in a curve y = μφ(x). The area of this curve is

$$\mu \int_0^c \phi(x) dx.$$

Approximately this equals Σhy = hΣy. Hence we have

$$\mu \int_0^c \phi(x) dx = \frac{h}{\mu} \sum y = \frac{h}{\mu} \sum \phi(x) h = \frac{h^2}{\mu} \sum \phi(x) = \frac{h^2}{\mu} \int_0^c \phi(x) dx,$$

where z is the displacement of the point B which can be measured. The curve y' = φ(x) may be supposed cut out as a templet. By putting this under the points P the area of the curve is thus determined—the instrument is a simple integrator.

The integral can be made more general by varying the distances NG = y''. These can be set to form another curve y'' = f(x). We have now y = μy'y'' = μf(x) φ(x), and get as before

$$\mu \int_0^c \phi(x) f(x) dx = \frac{h}{\mu} \sum y = \frac{h}{\mu} \sum \phi(x) f(x) h = \frac{h^2}{\mu} \sum \phi(x) f(x) = \frac{h^2}{\mu} \int_0^c \phi(x) f(x) dx,$$

These integrals are obtained by the addition of ordinates, and therefore by an approximate method. But the ordinates are numerous, there being 79 of them, and the results are in consequence very accurate. The displacement z of B is small, but it can be magnified by taking the reading of a point T' on the lever AB. The actual reading is done at point T connected with T' by a long vertical rod. At T either a scale can be placed or a drawing-board, on which a pen at T marks the displacement.

If the points G are set so that the distances NG on the different levers are proportional to the terms of a numerical series

$$u_0 + u_1 + u_2 + \dots$$

and if all P be moved through the same distance, then z will be proportional to the sum of this series up to 80 terms. We get an Addition Machine.

The use of the machine can, however, be still further extended. Let a templet with a curve y' = φ(ξ) be set under each point P at right angles to the axis of x hence parallel to the plane of the figure. Let these templets form sections of a continuous surface, then each section parallel to the axis of x will form a curve like the old y' = φ(x), but with a variable parameter ξ, or y' = φ(ξ, x). For each value of ξ the displacement of T will give the integral

$$Y = \int_0^c \phi(\xi, x) dx = F(\xi), \quad (1)$$

where Y equals the displacement of T to some scale dependent on the constants of the instrument.

If the whole block of templets be now pushed under the points P and if the drawing-board be moved at the same rate, then the pen T will draw the curve Y = F(ξ). The instrument now is an integrator giving the value of a definite integral as function of a variable parameter.

Having thus shown how the lever with its springs can be made to serve a variety of purposes, we return to the description of the actual instrument constructed. The machine serves first of all to sum up a series of harmonic motions or to draw the curve

$$Y = a_1 \cos x + a_2 \cos 2x + a_3 \cos 3x + \dots \quad (2)$$

The motion of the points P₁P₂ ... is here made harmonic by aid of a series of excentric disks arranged so that for one revolution of the first the other disks complete 2, 3, . . . revolutions. They are all driven by one handle. These disks take the place of the templets described before. The distances NG are made equal to the amplitudes a₁, a₂, a₃, ... The drawing-board, moved forward by the turning of the handle, now receives a curve of which (2) is the equation. If all excentrics are turned through a right angle a sine-series can be added up.

It is a remarkable fact that the same machine can be used as a harmonic analyser of a given curve. Let the curve to be analysed be set off along the levers NG so that in the old notation it is

$$y'' = f(x),$$

whilst the curves y' = φ(xξ) are replaced by the excentrics, hence ξ by the angle θ through which the first excentric is turned, so that y'k = cos kθ. But kh = x and nh = π, n being the number of springs s, and π taking the place of c. This makes

$$k\theta = \frac{n\pi}{x} \quad \text{or} \quad \theta = \frac{n\pi}{x} x.$$

Hence our instrument draws a curve which gives the integral (1) in the form

$$y = \frac{2\pi}{n} \int_0^{\frac{n\pi}{x}} f(x) \cos \left(\frac{n\pi}{x} x \right) dx = \frac{2\pi}{n} \int_0^{\frac{n\pi}{x}} f(x) \cos \left(\frac{n\pi}{x} x \right) dx$$

as a function of θ. But this integral becomes the coefficient am in the cosine expansion if we make

$$\theta n/\pi = m \quad \text{or} \quad \theta = m\pi/n.$$

The ordinates of the curve at the values θ = π/n, 2π/n, . . . give therefore all coefficients up to m = 80. The curve shows at a glance which and how many of the coefficients are of importance.

The instrument is described in Phil. Mag., vol. xlv., 1898. A number of curves drawn by it are given, and also examples of the analysis of curves for which the coefficients am are known. These indicate that a remarkable accuracy is obtained.

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1911 Encyclopædia Britannica/Chess

CHESS, once known as "checker," a game played with certain "pieces" on a special "board" described below. It takes its name from the Persian word shah, a king, the name of one of the pieces or men used in the game. Chess is the most cosmopolitan of all games, invented in the East (see History, below), introduced into the West and now domiciled in every part of the world. As a mere pastime chess is easily learnt, and a very moderate amount of study enables a man to become a fair player, but the higher ranges of chess-skill are only attained by persistent labour. The real proficient or "master" not merely must know the subtle variations in which the game abounds, but must be able to apply his knowledge in the face of the enemy and to call to his aid, as occasion demands, all that he

23, https://en.wikisource.org/wiki/1911_Encyclop%C3%A6dia_Britannica/Chess

has of foresight, brilliancy and resource, both in attack and in defence. Two chess players fighting over the board may fitly be compared to two famous generals encountering each other on the battlefield, the strategy and the tactics being not dissimilar in spirit.

The Board, Pieces and Moves.—The chessboard is divided (see accompanying diagrams) into sixty-four chequered squares. In diagram 1, the pieces, or chess-men, are arranged for the beginning of a game, while diagram 2 shows the denomination of the squares according to the English and German systems of notation. Under diagram 1 are the names of the various “pieces”—each side, White or Black, having a King, a Queen, two Rooks (or Castles), two Knights, and two Bishops. The eight men in front are called Pawns. At the beginning of the game the queen always stands upon a square of her own colour. The board is so set that each player has a white square at the right hand end of the row nearest to him. The rook, knight and bishop on the right of the king are known as King’s rook, King’s knight, and King’s bishop; the other three as Queen’s rook, Queen’s knight, and Queen’s bishop.

Diagram 1.—Showing the arrangement of the pieces at the commencement of a game.

Briefly described, the powers of the various pieces and of the pawns are as follows.

The king may move in any direction, only one square at a time, except in castling. Two kings can never be on adjacent squares.

The queen moves in any direction square or diagonal, whether forward or backward. There is no limit to her range over vacant squares; an opponent she may take; a piece of her own colour stops her. She is the most powerful piece on the board, for her action is a union of those of the rook and bishop. The rooks (from the Indian *rukh* and Persian *rokh*, meaning a soldier or warrior) move in straight lines—forward or backward—but they cannot move diagonally. Their range is like the queen’s, unlimited, with the same exceptions.

The bishops move diagonally in any direction whether backward or forward. They have an unlimited range, with the same exceptions.

The knights’ moves are of an absolutely different kind. They move from one corner of any rectangle of three squares by two to the opposite corner; thus, in diagram 3, the white knight can move to the square occupied by the black one, and vice versa, or a knight could move from C to D, or D to C. The move may be made in any direction. It is no obstacle to the knight’s move if squares A and B are occupied. It will be perceived that the knight always moves to a square of a different colour.

The king, queen, rooks and bishops may capture any foeman which stands anywhere within their respective ranges; and the knights can capture the adverse men which stand upon the squares to which they can leap. The piece which takes occupies the square of the piece which is taken, the latter being removed from the board. The king cannot capture any man which is protected by another man.

The moves and capturing powers of the pawns are as follows:—Each pawn for his first move may advance either one or two squares straight forward, but afterwards one square only, and this whether upon starting he exercised his privilege of moving two squares or not. A pawn can never move backwards. He can capture only diagonally—one square to his right or left front. A pawn moves like a rook, captures like a bishop, but only one square at a time. When a pawn arrives at an eighth square, viz. at the extreme limit of the board, he may, at the option of his owner, be exchanged for any other piece, so that a player may, e.g., have two or more queens on the board at once.

Diagram 2.—Showing English and German Methods of Notation.

“Check and Checkmate.” The king can never be captured, but when any piece or pawn attacks him, he is said to be “in check,” and the fact of his being so attacked should be announced by the adverse player saying “check,” whereupon the king must move from the square he occupies, or be screened from check by the interposition of one of his own men, or the attacking piece must be captured. If, however, when the king is in check, none of these things can be done, it is “checkmate” (Persian, *shah mat*, the king is dead), known generally as “mate,” whereupon the game terminates, the player whose king has been thus checkmated being the loser. When the adversary has only his king left, it is very easy to checkmate him with only a queen and king, or only a rook and king. The problem is less easy with king and two bishops, and still less easy with king, knight and bishop, in which case the opposing king has to be driven into a corner square whose colour corresponds with the bishop’s, mate being given with the bishop. A king and two knights cannot mate. To mate with king and rook the opposing king must be driven on to one of the four side files and kept there with the rook on the next file, till it is held by the other king, when the rook mates.

The pawn gives check in the same way as he captures, viz. diagonally. One king cannot give check to another, nor may a king be moved into check.

Knight’s move.

“Check by discovery” is given when a player, by moving one of his pieces, checks with another of them. “Double check” means attacking the king at once with two pieces—one of the pieces in this case giving check by discovery.

“Perpetual check” occurs when one player, seeing that he cannot win the game, finds the men so placed that he can give check ad infinitum, while his adversary cannot possibly avoid it. The game is then drawn. A game is also drawn “if, before touching a man, the player whose turn it is to play, claims that the game be treated as drawn, and proves that the existing position existed, in the game and at the commencement of his turn of play, twice at least before the present turn.”

“Stalemate.” When a king is not in check, but his owner has no move left save such as would place the king in check, it is “stalemate,” and the game is drawn.

“Castling.” This is a special move permitted to the king once only in the game. It is performed in combination with either rook, the king being moved two squares laterally, while the rook towards which he is moved (which must not have previously moved from its square) is placed next him on the other side; the king must be touched first. The king cannot castle after having been once moved, nor when any piece stands between him and the rook, nor if he is in check, nor when he has to cross a square commanded by an adverse piece or pawn, nor into check. It will be perceived that after castling with the king’s rook the latter will occupy the KB square, while the king stands on the KKt square, and if with the queen’s rook, the latter will occupy the queen’s square while the king stands on the QB square.

“Taking en passant.” This is a privilege possessed by any of the pawns under the following circumstances:—If a pawn, say of the white colour, stands upon a fifth square, say upon K5 counting from the white side, and a black pawn moves from Q2 or KB2 to Q4 or KB4 counting from the black side, the white pawn can take the black pawn en passant. For the purposes of such capture the latter is dealt with as though he had only moved to Q3 or KB3, and the white pawn taking him diagonally then occupies the square the captured pawn would have reached had he moved but one square. The capture can be made only on the move immediately succeeding that of the pawn to be captured.

“Drawn Game.” This arises from a stalemate (noticed above), or from either player not having sufficient force wherewith to effect checkmate, as when there are only two kings left on the board, or king and bishop against king, or king with one knight, or two knights against king, or from perpetual check. One of the players can call upon the other to give checkmate in fifty moves, the result of failure being that the game is drawn. But, if a pawn is moved, or a piece is captured, the counting must begin again.

A “minor piece” means either a knight or a bishop. “Winning the exchange” signifies capturing a rook in exchange for a minor piece. A “passed pawn” is one that has no adverse pawn either in front or on either of the adjoining files. A “file” is simply a line of squares extending vertically from one end of the board to the other. An “open file” is one on which no piece or pawn of either colour is standing. A pawn or piece is en prise when one of the enemy’s men can capture it. “Gambit” is a word derived from the Ital. *gambetto*, a tripping up of the heels; it is a term used to signify an opening in which a pawn or piece is sacrificed at the opening of a game to obtain an attack. An “opening,” or *début*, is a certain set method of commencing the game. When a player can only make one legal move, that move is called a “forced move.”

Value of the Pieces.—The relative worth of the chess-men cannot be definitely stated on account of the increase or decrease of their powers according to the position of the game and the pieces, but taking the pawn as the unit the following will be an estimate near enough for practical purposes:—pawn 1, bishop 3.25, knight 3.25, rook 5, queen 9.50. Three minor pieces may more often than not be advantageously exchanged for the queen. The knight is generally stronger than the bishop in the end game, but two bishops are usually stronger than two knights, more especially in open positions.

Laws.—The laws of chess differ, although not very materially, in different countries. Various steps have been taken, but as yet without success, to secure the adoption of a universal code. In competitions among English players the particular laws to be observed are specially agreed upon,—the regulations most generally adopted being those laid down at length in Staunton’s *Chess Praxis*, or the modification of the *Praxis* laws issued in the name of the British Chess Association in 1862.

First Move and Odds.—To decide who moves first, one player conceals a white pawn in one hand and a black pawn in the other, his adversary not seeing in which hand the different pawns are put. The other holds out his hands with the pawns concealed, and his adversary touches one. If that contains the white pawn, he takes the white men and moves first. If he draws the black pawn his adversary has the first move, since white, by convention, always plays first. Subsequently the first move is taken alternately. If one player, by way of odds, “gives” his adversary a pawn or piece, that piece is removed before play begins. If the odds are “pawn and move,” or “pawn and two,” a black pawn, namely, the king’s bishop’s pawn, is removed and white plays one move, or any two moves in succession. “Pawn and two” is generally considered to be slightly less in point of odds than to give a knight or a bishop; to give a knight and a bishop is to give rather more than a rook; a rook and bishop less than a queen; two rooks rather more than a queen. The odds of “the marked pawn” can only be given to a much weaker player. A pawn, generally KB’s pawn, is marked with a cap of paper. If the pawn is captured its owner loses the game; he can also lose by being checkmated in the usual way, but he cannot give mate to his adversary with any man except the marked pawn, which may not be moved to an eighth square and exchanged for a piece.

Rules.—If a player touch one of his men he must move it, unless he says *j’adoube* (I adjust), or words of a similar meaning, to the effect that he was only setting it straight on its square. If he cannot legally move a touched piece, he must move his king, if he can, but may not castle; if not, there is no penalty. He must say *j’adoube* before touching his piece. If a player touch an opponent’s piece, he must take it, if he can; if not, move his king. If he can do neither, no penalty. A move

is completed and cannot be taken back, as soon as a player, having moved a piece, has taken his hand off it. If a player is called upon to mate under the fifty-move rule, "fifty moves" means fifty moves and the forty-nine replies to them. A pawn that reaches an eighth square must be exchanged for some other piece, the move not being complete until this is done; a second king cannot be selected.

Modes of Notation.—The English and German methods of describing the moves made in a game are different. According to the English method each player counts from his own side of the board, and the moves are denoted by the names of the files and the numbers of the squares. Thus when a player for his first move advances the king's pawn two squares, it is described as follows:—"1. P-K4." The following moves, with the aid of diagram 2, will enable the reader to understand the principles of the British notation. The symbol × is used to express "takes"; a dash—to express "to."

White. Black.

1. P-K4 1. P-K4

2. Kk1-KB3 (i.e. King's Knight to the third square of the King's Bishop's file) 2. Qk1-QB3 (i.e. Queen's Knight to the third square of the Queen's Bishop's file)

3. KB-QB4 (King's Bishop to the fourth square of the Queen's Bishop's file) 3. KB-QB4

4. P-QB3 4. Kk1-KB3

5. P-Q4 5. P takes P (or P×P) (King's pawn takes White's Queen's pawn)

6. P takes P (or P×P) (Queen's Bishop's pawn takes pawn: no other pawn

has a pawn en prise) 6. KB-Qk15 (ch., i.e. check)

It is now usual to express the notation as concisely as possible; thus, the third moves of White and Black would be given as 3. B-B4, because it is clear that only the fourth square of the queen's bishop's file is intended.

The French names for the pieces are, King, Roi; Queen, Dame; Rook, Tour; Knight, Cavalier; Pawn, Pion; for Bishop the French substitute Fou, a jester. Chess is Les Echecs.

The German notation employs the alphabetical characters a, b, c, d, e, f, g and h, proceeding from left to right, and the numerals 1, 2, 3, 4, 5, 6, 7 and 8, running upwards, these being always calculated from the white side of the board (see diagram 2). Thus the White Queen's Rook's square is a1, the White Queen's square is d1; the Black Queen's square, d8; the White King's square, e1; the Black King's square, e8, and so with the other pieces and squares. The German names of the pieces are as follows:—King, König; Queen, Dame; Rook, Turm; Bishop, Läufer; Knight, Springer; Pawn, Bauer; Chess, Schach.

The initials only of the pieces are given, the pawns (Bauern) being understood. The Germans use the following signs in their notation, viz.:—for "check" (†); "checkmate" (‡); "takes" (:); "castles on king's side" (o-o); "castles on queen's side" (o-o-o); for "best move" a note of admiration (!); for "weak move" a note of interrogation (?). The opening moves just given in the English will now be given in the German notation:—

...

The Rice Gambit (so called after its inventor, Prof. Isaac L. Rice of New York), whether right or not, is only possible if Black plays 7. B - Q3. Paulsen's 7. B - Kt2 is better, and avoids unnecessary complications. 8. P - Q4 is the usual move. Leaving the knight en prise, followed by 9. R - K sq, constitutes the Rice Gambit. The interesting points in the game are that White subjects himself to a most violent attack with impunity, for in the end Black could not save the game by 22. P - B8 claiming a second queen with a discovered check, nor by claiming a knight with double check, as it is equally harmless to White.

Giucoco Piano.

White.

Steinitz. Black.

Bardeleben. White.

Steinitz. Black.

Bardeleben.

1. P - K4 P - K4 14. R - K sq P - KB3

2. Kt - KB3 Kt - QB3 15. Q - K2 Q - Q2

3. B - B4 B - B4 16. QR - B sq P - B3

4. P - B3 Kt - B3 17. P - Q5 P × P

5. P - Q4 P × P 18. Kt - Q4 K - B2

6. P × P B - Kt5 (ch) 19. Kt - K6 KR - QB sq

7. Kt - B3 P - Q4 20. Q - Kt4 P - Kk13

8. P × P Kk1 × P 21. Kt - Kt5 (ch) K - K sq

9. Castles B - K3 22. R × Kt (ch) K - B sq

10. B - Kk15 B - K2 23. R - B7 (ch) K - Kt sq

11. B × Kt QB × B 24. R - Kt7 (ch) K - R sq

12. Kt × B Q × Kt 25. R × P (ch) Resigns.

13. B × B Kt × B

As a matter of fact, Bardeleben left the board here, and lost the game by letting his clock run out the time-limit; but Steinitz, who remained at the board, demonstrated afterwards the following variation leading to a forced win:—

White.

Steinitz. Black.

Bardeleben. White.

Steinitz. Black.

Bardeleben.

25. K - Kt sq 31. Q - Kt8 (ch) K - K2

26. R - Kt7 (ch) K - R sq 32. Q - B7 (ch) K - Q sq

27. Q - R4 (ch) K × R 33. Q - B8 (ch) Q - K sq

28. Q - R7 (ch) K - B sq 34. Kt - B7 (ch) K - Q2

29. Q - R8 (ch) K - K2 35. Q - Q6 mate.

30. Q - Kt7 (ch) K - K sq This game was awarded the prize for "brilliance" at the Hastings tournament, 1895.

Ruy Lopez.

White.

Halprin. Black.

Pillsbury. White.

Halprin. Black.

Pillsbury.

1. P – K4 P – K4 14. P – Kt6 BP × P
2. Kt – KB3 Kt – QB3 15. Kt – Q5 P × Kt
3. B – Kt5 Kt – B3 16. KR – K sq (ch) K – B sq
4. Castles Kt × P 17. R – R3 Kt – K4
5. P – Q4 Kt – Q3 18. R × Kt P × R
6. P × P Kt × B 19. R – B3 (ch) K – Kt sq
7. P – QR4 P – Q3 20. B – R6 Q – K2
8. P – K6 P × P 21. B × P K × B
9. P × Kt Kt – K2 22. R – Kt3 (ch) K – B sq
10. Kt – B3 Kt – Kt3 23. R – B3 (ch) K – Kt2
11. Kt – Kt5 B – K2 24. R – Kt3 (ch) K – B sq
12. Q – R5 B × Kt 25. R – B3 (ch) K – Kt sq
13. B × B Q – Q2 Draw.

This brilliant game, played at the Munich tournament, 1900, would be unique had the combinations occurred spontaneously in the game. As a matter of fact, however, the whole variation had been elaborated by Maroczy and Halprin previously, on the chance of Pillsbury adopting the defence in the text. The real merit belongs to Pillsbury, who had to find the correct defence to an attack which Halprin had committed to memory and simply had to be careful to make the moves in regular order.

...

This game is most remarkable and brilliant. The coup de repos of 19. QR – Q sq is the key – move to the brilliant final combination, the depth and subtlety of which have never been equalled, except perhaps in the following game between Zukertort and Blackburne:—

English Opening.

White.

Zukertort. Black.

Blackburne. White.

Zukertort. Black.

Blackburne.

1. P – QB4 P – K3 18. P – K4 QR – QB sq
2. P – K3 Kt – KB3 19. P – K5 Kt – K sq
3. Kt – KB3 P – QKt3 20. P – B4 P – Kt3
4. B – K2 B – Kt2 21. R – K3 P – B4
5. Castles P – Q4 22. P × P e.p. Kt × P
6. P – Q4 B – Q3 23. P – B5 Kt – K5
7. Kt – B3 Castles 24. B × Kt P × B
8. P – QKt3 QKt – Q2 25. P × KtP R – B7
9. B – Kt2 Q – K2 26. P × P (ch) K – R sq
10. Kt – QKt5 Kt – K5 27. P – Q5 dis. (ch) P – K4.
11. Kt × B P × Kt 28. Q – Kt4 QR – B4
12. Kt – Q2 QKt – B3 29. R – B8 (ch) K × P
13. P – B3 Kt × Kt 30. Q × P (ch) K – Kt2
14. Q × Kt P × P 31. B × P (ch) K × R
15. B × P P – Q4 32. B – Kt7 (ch) K – Kt sq
16. B – Q3 KR – B sq 33. Q × Q Resigns.
17. QR – K sq R – B2

This game, played in the London tournament, 1883, is one of the most remarkable productions of modern times, neither surpassed nor indeed equalled hitherto.

End Games.—A game of chess consists of three branches—the opening, the middle and the end game. The openings have been analysed and are to be acquired by the study of the books on the subject. The middle game can only be acquired practically. The combinations being inexhaustible in their variety, individual ingenuity has its full scope. Those endowed with a fertile imagination will evolve plans and combinations leading to favourable issues. The less endowed player, however, is not left quite defenceless; he has necessarily to adopt a different system, namely, to try to find a weak point in the arrangement of his opponent's forces and concentrate his attack on that weak spot. As a matter of fact, in a contest between players of equal strength, finding the weak point in the opponent's armour is the only possible plan, and this may be said to be the fundamental principle of the modern school. In the good old days the battles were mostly fought in the neighbourhood of the king, each side striving for a checkmate. Nowadays the battle may be fought anywhere. It is quite immaterial where the advantage is gained be it ever so slight. Correct continuation will necessarily increase it, and the opponent may be compelled to surrender in the end game without being checkmated, or a position may be reached when the enemies, in consequence of the continual fight, are so reduced that the kings themselves have to take the field—the end game. The end game, therefore, requires a special study. It has its special laws and the value of the pieces undergoes a considerable change. The kings leave their passive rôle and become attacking forces. The pawns increase in value, whilst that of the pieces may diminish in certain cases. Two knights, for instance, without pawns, become valueless, as no checkmate can be effected with them. In the majority of cases the players must be guided by general principles, as the standard examples do not meet all-cases.

The handbooks as a rule give a sprinkling of elementary endings, such as to checkmate with queen, rook, bishop and knight, two bishops, and pawn endings pure and simple, as well as pawns in connexion with pieces in various forms. Towards the end of the 19th century a valuable work on end games was published in England by the late B. Horwitz; thus for the first time a theoretical classification of the art was given. This was followed by a more comprehensive work by Professor J. Berger of Gratz, which was translated a few years later by the late Mr Freeborough.

A few specimens of the less accessible positions are given below:—

Position from a Game played by the late J. G. Campbell in 1863.

Obviously White has to lose the game, not being able to prevent the pawns from queening. By a remarkably ingenious device White averts the loss of the game by stalemating himself as follows:—

1. B Q2, P – Kt7; 2. B – R5, P – Kt8 = Q; 3. P – Kt4 stalemate.

Position by Sarratt, 1808 . White wins as follows:—

1. P – Kt6, RP × P; 2. P – B6, P(Kt2) × P; 3. P – R6 and wins by queening the pawn. If 1. . . . BP × P then 2. P – R6, KtP × P; 3. P–B6 and queens the pawn.

Problems.—A chess problem[1] has been described as “merely a position supposed to have occurred in a game of chess, being none other than the critical point where your antagonist announces checkmate in a given number of moves, no matter what defence you play,” but the above description conveys no idea of the degree to which problem-composing has become a specialized study. Owing its inception, doubtless, to the practice of recording critical phases from actual play, the art of problem composition has so grown in favour as to earn the title of the “poetry” of the game.

26, https://en.wikisource.org/wiki/1911_Encyclop%C3%A6dia_Britannica/Chess

Position by B. Horwitz.

As a rule the game should be drawn. Supposing by a series of checks White were to compel Black to abandon the pawn, he would move K – R8; Q × P and Black is stale-mate. Therefore the ingenious way to win is:—

1. K – B4, P – B8 = Q ch; K – Kt3 and wins. Or 1. . . . K – R8 (threatening P – B8 = Kt); then 2. Q – Q2 preliminary to K – Kt3 now wins.

Position by B. Horwitz.

Without Black's pawn White could only draw. The pawn being on the board, White wins as follows:—

1. Kt – B4, K – Kt sq; 2. Kt (B4) – K3, K – R sq; 3. K – Kt4, K – Kt sq; 4. K – R3, K – R sq; 5. Kt – B4, K – Kt sq; 6. Kt (B4) – Q2, K – R sq; 7. Kt – Kt3 ch, K – Kt sq; 8. Kt – B3 mate.

Position by B. Horwitz.

White wins with two pieces against one—a rare occurrence.

1. Kt – K6, B – R3; 2. B – Q4 ch, K – R2; 3. B – B3, B moves anywhere not en prise; 4. B – Kt7 and Kt mates.

Position by O. Schubert.

White wins as follows:—

1. P – Kt5, Kt – Kt5; 2. K – B3, Kt – K6; 3. B – K6, Kt – B8; 4. B × P, Kt – Q7 ch; 5. K – Kt4, Kt × P; 6. P – Kt6, Kt – B3, ch; 7. K – Kt5, P – K5; 8. K × Kt, P – K6; 9. B – B4, K × B; 10. P – Kt7, P – K7; 11. P – Kt8 = Q ch, and wins by the simple process of a series of checks so timed that the king may approach systematically. The fine points in this instructive ending are the two bishop's moves, 3. B – K6, and 9. B – B4, the latter move enabling White to queen the pawn with a check.

Position by F. Amelung.

White with the inferior position saves the game as follows:—

1. P – R6, P × P; 2. K – B3 dis. ch, K moves; 3. R – R2, or Kt2 ch, K × R; 4. K – Kt2 and draw, as Black has to give up the rook, and the RP cannot be queened, the Black bishop having no power on the White diagonal. Extremely subtle.

Position by B. Horwitz.

The main idea being to checkmate with the bishop, this is accomplished thus:—1. B – K4 ch, K – R4; 2. Q × R, Q × Q; 3. K – B7, Q – B sq ch; 4. K × Q, BXP; 5. K – B7, B × P; 6. B – Kt6 mate.

Position by A. Troitzky.

White wins as follows:—

1. P – R8=Q, R – R7ch; 2. K – Kt5, R × Q; 3. Kt – Q7 ch, K – Kt2; 4. P – B6 ch, K – R2; 5. QP × Kt, R – R sq; 6. Kt – B8 ch, R × Kt; 7. P × R=Kt mate.

Position by Hoffer.

A position from actual play. White plays 1. R – B5 threatening to win a piece. Black replies with the powerful Kt – Kt5, threatening two mates, and finally White (Mr Hoffer) finds an ingenious sacrifice of the Queen—the saving clause.

The following are the moves:—

1. R – B5, Kt – Kt5; 2. Q – Kt8 ch, K – Kt3; 3. Q – K6 ch, K – R2; 4. Q – Kt8 ch, and drawn by perpetual check, as Black cannot capture the Queen with K or R without losing the game.

A good chess problem exemplifies chess strategy idealized and concentrated. In examples of actual play there will necessarily remain on the board pieces immaterial to the issue (checkmate), whereas in problems the composer employs only indispensable force so as to focus attention on the idea, avoiding all material which would tend to "obscure the issue." Hence the first object in a problem is to extract the maximum of finesse with a sparing use of the pieces, but "economy of force" must be combined with "purity of the mate." A very common mistake, until comparatively recent years, was that of appraising the "economy" of a position according to the slenderness of the force used, but economy is not a question of absolute values. The true criterion is the ratio of the force employed to the skill demanded. The earliest composers strove to give their productions every appearance of real play, and indeed their compositions partook of the nature of ingenious end-games, in which it was usual to give Black a predominance of force, and to leave the White king in apparent jeopardy. From this predicament he was extricated by a series of checking moves, usually involving a number of brilliant sacrifices. The number of moves was rarely less than five. In the course of time the solutions were reduced to shorter limits and the beauty of quiet (non-checking) moves began to make itself felt. The early transition school, as it has been called, was the first to recognize the importance of economy, i.e. the representation of the main strategic point without any extraneous force. The mode of illustrating single-theme problems, often of depth and beauty, was being constantly improved, and the problems of C. Bayer, R. Willmers, S. Loyd, J. G. Campbell, F. Healey, "J. B." of Bridport, and W. Grimshaw are, of their kind, unsurpassed. In the year 1845 the "Indian" problem attracted much notice, and in 1861 appeared Healey's famous "Bristol" problem. To this period must be ascribed the discovery of most of those clever ideas which have been turned to such good account by the later school. In an article written in 1899 F. M. Teed mentions the fact that his incomplete collection of "Indians" totalled over three hundred.

In 1870 or thereabouts, the later transition period, a more general tendency was manifest to illustrate two or more finished ideas in a single problem with strict regard to purity and economy, the theory of the art received greater attention than before and the essays of C. Schwede, Kohtz and Kockelkorn, Lehner and Gelbfuss, helped to codify hitherto unwritten rules of taste. The last quarter of the 19th century, and its last decade especially, saw a marked advance in technique, until it became a common thing to find as much deep and quiet play embodied in a single first-class problem as in three or four of the old-time problems, and hence arose the practice of blending several distinct ideas in one elaborate whole.

In the composition of "two-movers" it is customary to allow greater elasticity and a less rigorous application of the principles of purity and economy. By this means a greater superficial complexity is attained; but the Teutonic and Bohemian schools, and even English and American two-move specialists, recognize that complexity, if it involves the sacrifice of first principles, is liable to abuse. The blind master, A. F. Mackenzie of Jamaica, however, with a few others (notably T. Taverner, W. Gleave, H. and E. Bettman and P. F. Blake) have won some of their greatest successes with problems which, under stricter ruling, would not be allowed.

Bohemian (Czech) composers have long stood unrivalled as exponents of that blending of ideas which is the distinguishing trait of the later problem. Such is their skill in construction that it is rare to find in a problem of the Bohemian school fewer than three or four lines of play which, in economy and purity, are unimpeachable. Amongst the earliest composers of this class Anton König, the founder of the school, Makovsky, Drtina, Palct and Pilnacek deserve to be honourably mentioned, but it was not until the starting of a chess column in the weekly journal Svetozor that the merits of the new school were fully asserted. It was in 1871 that Jan Dobrusky contributed his first composition to that paper: he was followed by G. Chocholous, C. Kondelik, Pospisil, Dr Mazel, Kviciala, Kesl, Tuzar, Musil and J. Kotrc; and later still, Havel, Traxler and Z. Mach were no unworthy followers of Dobrusky.

The faculty for blending variations is not without "the defects of its qualities," and consequently among the less able composers a certain tendency to repeat combinations of similar companion ideas is discernible at times, while the danger that facile construction might usurp the place of originality and strategy was already apparent to Chocholous when, in an article on the classification of chess problems (Deutsche Schachzeitung, 1890), he warned the younger practitioners of the Bohemian school against what has been dubbed by H. Von Gottschall Varianten-leierei, or "the grinding out of variations." When this one reservation is made few will be inclined to dispute the pre-eminence of the Bohemian school. To some tastes, however, a greater appeal is made by the deeper play of the older German school, the quaint fancy of the American composer Samuel Loyd, or the severity and freedom from "duals" which mark the English composers.

The idea of holding a problem competition open to the world was first mooted in connexion with the chess congress of 1851, but it was in 1854 that a tourney (confined to British composers) was first held. Since then a number of important problem tournaments have been held.

History of Chess.

The origin of chess is lost in obscurity. Its invention has been variously ascribed to the Greeks, Romans, Babylonians, Scythians, Egyptians, Jews, Persians, Chinese, Hindus, Arabians, Araucarians, Castilians, Irish and Welsh. Some have endeavoured to fix upon particular individuals as the originators of the game; amongst others upon Japheth, Shem, King Solomon, the wife of Ravan, king of Ceylon, the philosopher Xerxes, the Greek chieftain Palamedes, Hermes, Aristotle, the brothers Lydo and Tyrrhene, Semiramis, Zenobia, Attalus (d. c. 200 B.C.), the mandarin Hansing, the Brahman Sissa and Shatrenschka, stated to be a celebrated Persian astronomer. Many of these ascriptions are fabulous, others rest upon little authority, and some of them proceed from easily traceable errors, as where the Roman games of Ludus Latruncularum and Ludus Calculatorum, the Welsh recreation of Tawlbwrdd (throw-board) and the ancient Irish pastime of Fithcheall are assumed to be identical with chess; so far as the Romans and Welsh are concerned, the contrary can be proved, while from what little is known of the Irish game it appears not to have been a sedentary game at all. The claims of the Chinese were advocated in a letter addressed by Mr Eyles Irwin in 1793 to the earl Charlemont. This paper was published in the Transactions of the Royal Irish Academy, and its purport was that chess, called in the Chinese tongue chong-ki (the "royal game") was invented in the reign of Kao-Tsu, otherwise Lin-Pang, then king, but afterwards emperor of Kiang-Nang, by a mandarin named Han-sing, who was in command of an army invading the Shen-Si country, and who wanted to amuse his soldiers when in winter quarters. This invasion of the

Shen-Si country by Han-Sing took place about 174 B.C. Capt. Hiram Cox states that the game is called by the Chinese choke-choo-hong ki, "the play of the science of war." (See also a paper published by the Hon. Daines Barrington in the 9th vol. of the *Archaeologia*.) Mr N. Bland, M.R.A.S., in his *Persian Chess* (London, 1850), endeavours to prove that the Persians were the inventors of chess, and maintains that the game, born in Persia, found a home in India, whence after a series of ages it was brought back to its birthplace. The view, however, which has obtained the most credence, is that which attributes the origin of chess to the Hindus. Dr Thomas Hyde of Oxford, writing in 1694 (*De Ludis Orientalibus*), seems to have been the first to propound this theory, but he appears to have been ignorant of the game itself, and the Sanskrit records were not accessible in his time. About 1783–1789 Sir William Jones, in an essay published in the 2nd vol. of *Asiatic Researches*, argued that Hindustan was the cradle of chess, the game having been known there from time immemorial by the name of *chaturanga*, that is, the four angas, or members of an army, which are said in the *Amarakosha* to be elephants, horses, chariots and foot soldiers. As applicable to real armies, the term *chaturanga* is frequently used by the epic poets of India. Sir William Jones's essay is substantially a translation of the *Bhawishya Purana*, in which is given a description of a four-handed game of chess played with dice. A pundit named Rhadhakant informed him that this was mentioned in the oldest law books, and also that it was invented by the wife of Ravan, king of Lanka (Ceylon), in the second age of the world in order to amuse that monarch while Rama was besieging his metropolis. This account claims for chess an existence of 4000 or 5000 years. Sir William, however, grounds his opinions as to the Hindu origin of chess upon the testimony of the Persians and not upon the above manuscript, while he considers the game described therein to be more modern than the Persian game. Though sure that the latter came from India and was invented there, he admits that he could not find any account of it in the classical writings of the Brahmans. He lays it down that chess, under the Sanskrit name *chaturanga*, was exported from India into Persia in the 6th century of our era; that by a natural corruption the old Persians changed the name into *chatrang*, but when their country was soon afterwards taken possession of by the Arabs, who had neither the initial nor final letter of the word in their alphabet, they altered it further into *shatranj*, which name found its way presently into modern Persian and ultimately into the dialects of India.

Capt. Hiram Cox, in a letter upon Burmese chess, written in 1799 and published in the 7th vol. of *Asiatic Researches*, refers to the above essay, and considers the four-handed game described in the Sanskrit manuscript to be the most ancient form of chess, the Burmese and Persian games being second and third in order of precedence. Later, in the 11th and 24th vols. of the *Archaeologia*, Mr Francis Douce and Sir Frederick Madden expressed themselves in favour of the views held by Hyde and his followers.

In Professor Duncan Forbes's *History of Chess* (1860) Capt. Cox's views, as founded upon Sir William Jones's Sanskrit manuscript, are upheld and are developed into an elaborate theory. Professor Forbes holds that the four-handed game of *chaturanga* described in the *Bhawishya Purana* was the primeval form of chess; that it was invented by a people whose language was Sanskrit (the Hindus); and that it was known and practised in India from a time lost in the depths of a remote antiquity, but for a period the duration of which may have been from 3000 to 4000 years before the 6th century of the Christian era. He endeavours to show, but adduces no proof, how the four armies commanded by four kings in Sir William Jones's manuscript became converted into two opposing armies, and how two of the kings were reduced to a subordinate position, and became "monitors" or "counsellors," one standing by the side of the White and the other of the Black king, these counsellors being the *farzins* from which we derive our "queens." Among other points he argues, apparently with justice, that *chaturanga* was evidently the root of *shatranj*, the latter word being a mere exotic in the language of the inhabitants of Persia.

Van der Linde, in his exhaustive work, *Geschichte und Litteratur des Schachspiels* (Berlin, 1874), has much to say of the origin-theories, nearly all of which he treats as so many myths. He agrees with those who consider that the Persians received the game from the Hindus; but the elaborate *chaturanga* theories of Forbes receive but scant mercy. Van der Linde argues that *chaturanga* is always used by the old Indian poets of an army and never of a game, that all Sanskrit scholars are agreed that chess is not mentioned in really ancient Hindu records; that the *Puranas* generally, though formerly considered to be extremely old, are held in the light of modern research to reach no farther back than the 10th century—while the copies of the *Bhawishya Purana* in the British Museum and the Berlin Library do not contain the extract relied upon by Forbes, though it is to be found in the *Raghnandana*, which was translated by Weber in 1872, and is stated by Bühler to date from the 16th century. The outcome of van der Linde's studies appears to be that chess certainly existed in Hindustan in the 8th century, and that probably that country is the land of its birth. He inclines to the idea that the game originated among the Buddhists, whose religion was prevalent in India from the 3rd to the 9th century. According to their ideas, war and the slaying of one's fellow-men, for any purposes whatever, is criminal, and the punishment of the warrior in the next world will be much worse than that of the simple murderer; hence chess was invented as a substitute for war. In opposition to Forbes, therefore, and in agreement with Sir William Jones, van der Linde takes the view that the four-handed game of the original manuscript is a comparatively modern adaptation of the Hindu chess, and he altogether denies that there is any proof that any form of the game has the antiquity attributed to it. Internal evidence certainly seems to contradict the theory that Sir William Jones's manuscript is very ancient testimony; for it mentions two great sages, Vyasa and Gotama, the former as teaching *chaturanga* to Prince Yudhishthira, and the other as giving an opinion upon certain principles of the game; but this could not well be, seeing that it was played with dice, and that all games of hazard were positively forbidden by Manu. It would appear also that Indian manuscripts are not absolutely trustworthy as evidence of the antiquity of their contents; for the climate has the effect of destroying such writings in a period of 300 or 400 years. They must, therefore, be recopied from time to time and in this way later interpolations may easily creep in.

Von der Lasa, who had, in an article prefixed to the *Handbuch* in 1864, accepted Forbes's views, withdrew his support in a review of the work just noticed, published in the September and November numbers of the *Deutsche Schachzeitung*, 1874, and expressed his adherence to the opinions of van der Linde.

Altogether, therefore, we find the best authorities agreeing that chess existed in India before it is known to have been played anywhere else. In this supposition they are strengthened by the names of the game and of some of the pieces. *Shatranj*, as Forbes has pointed out, is a foreign word among the Persians and Arabians, whereas its natural derivation from the term *chaturanga* is obvious. Again *al-fil*, the Arabic name of the bishop, means the elephant, otherwise *alepphind*, the Indian ox. Our earliest authority on chess is Masudi, an Arabic author who wrote about A.D. 950. According to him, *shatranj* had existed long before his time; and though he may speak not only for his own generation but for a couple of centuries before, that will give to chess an existence of over a thousand years.

Early and Medieval Times.—The dimness which shrouds the origin of chess naturally obscures also its early history. We have seen that chess crossed over from India into Persia, and became known in the latter country by the name of *shatranj*. Some have understood that word to mean "the play of the king"; but undoubtedly Sir William Jones's derivation carries with it the most plausibility. How and when the game was introduced into Persia we have no means of knowing. The Persian poet Firdusi, in his historical poem, the *Shahnama*, gives an account of the introduction of *shatranj* into Persia in the reign of Chosroes I. Anushirwan, to whom came ambassadors from the sovereign of Hind (India), with a chessboard and men asking him to solve the secrets of the game, if he could, or pay tribute. Chosroes I. was the contemporary of Justinian, and reigned in the 6th century A.D. Professor Forbes seems to think that this poem may be looked upon as an authentic history. This appears, however, to be somewhat dangerous, especially as Firdusi lived some 450 years after the supposed event took place; but since other Persian and Arabian writers state that *shatranj* came into Persia from India, there appears to be a consensus of opinion that may be considered to settle the question. Thus we have the game passing from the Hindus to the Persians and thence to the Arabians, after the capture of Persia by the Caliphs in the 7th century, and from them, directly or indirectly, to various parts of Europe, at a time which cannot be definitely fixed, but either in or before the 11th century. That the source of the European game is Arabic is clear enough, not merely from the words "check" and "mate," which are evidently from Shah mat ("the king is dead"), but also from the names of some of the pieces. There are various chess legends having reference to the 7th and 8th centuries, but these may be neglected as historically useless; and equally useless appear the many oriental and occidental romances which revolve around those two great central figures, Harun al-Rashid and Charlemagne. There is no proof that either of them knew anything of chess or, so far as the latter is concerned, that it had been introduced into Europe in his time. True, there is an account given in Gustavus Selenus, taken from various old chronicles, as to the son of Prince Okar or Otkar of Bavaria having been killed by a blow on the temple, struck by a son of Pippin after a game of chess; and there is another well-known tradition as to the magnificent chess-board and set of men said to have been sent over as a present by the empress Irene to Charlemagne. But both tales are not less mythical than the romance which relates how the great Frankish monarch lost his kingdom over a game of chess to Guérin de Montglave; for van der Linde shows that there was no Bavarian prince of the name of Okar or Otkar at the period alluded to, and as ruthlessly shatters the tradition about Irene's chessmen. With respect to Harun al-Rashid, among the various stories told which connect him with chess, there is one that at first sight may seem entitled to some degree of credit. In the annals of the Moslems by Abulfeda (*Abu'l Fida*), there is given a copy of a letter stated to be "From Nicephorus, emperor of the Romans, to Harun, sovereign of the Arabs," which (using Professor Forbes's translation) after the usual compliments runs thus:—"The empress (Irene) into whose place I have succeeded, looked upon you as a Rukh and herself as a mere Pawn; therefore she submitted to pay you a tribute more than the double of which she ought to have exacted from you. All this has been owing to female weakness and timidity. Now, however, I insist that you, immediately on reading this letter, repay to me all the sums of money you ever received from her. If you hesitate, the sword shall settle our accounts." Harun's reply, written on the back of the Byzantine emperor's letter, was terse and to the point. "In the name of God the merciful and gracious. From Harun, the commander of the faithful, to the Roman dog Nicephorus. I have read thine epistle, thou son of an infidel mother; my answer to it thou shalt see, not hear." Harun was as good as his word, for he marched immediately as far as Heraclea, devastating the Roman territories with fire and sword, and soon compelled Nicephorus to sue for peace. Now the points which give authority to this narrative and the alleged correspondence are that the relations which they assume between Irene and Nicephorus on the one hand and the warlike caliph on the other are confirmed by the history of those times, while, also, the straightforward brevity of Harun's reply commends itself as what one might expect from his soldier-like character. Still, the fact must be remembered that Abulfeda lived about five centuries after the time to which he refers. Perhaps we may assume that it is not improbable that the correspondence is genuine; but that the words *rukhs* and *pawn* may have been substituted for other terms of comparison originally used.

As to how chess was introduced into western and central Europe nothing is really known. The Spaniards very likely received it from their Moslem conquerors, the Italians not improbably from the Byzantines, and in either case it would pass northwards to France, going on thence to Scandinavia and England. Some say that chess was introduced into Europe at the time of the Crusades, the theory being that the Christian warriors learned to play it at Constantinople. This is negated by a curious epistle of St Peter Damian, cardinal bishop of Ostia, to Pope Alexander II., written about A.D. 1061, which, assuming its authenticity, shows that chess was known in Italy before the date of the first crusade. The cardinal, as it seems, had imposed a penance upon a bishop whom he had found diverting himself at chess; and in his letter to the pope he repeats the language he had held to the erring prelate, viz. "Was it right, I say, and consistent with thy duty, to sport away thy evenings amidst the vanity of chess, and defile the hand which offers up the body of the Lord, and the tongue that mediates between God and man, with the pollution of a sacrilegious game?" Following up the same idea that statutes of the church of Elna, in the 3rd vol. of the *Councils of Spain*, say, "Clerks playing at dice or chess shall be ipso facto excommunicated." Eudes de Sully, bishop of Paris under Philip Augustus, is stated in the *Ordonn. des Rois de France* to have forbidden clerks to play the game, and according to the *Hist. Eccles. of Fleury*, St Louis, king of France, imposed a fine on all who should play it. Ecclesiastical authorities, however, seemed to have differed among themselves upon the question whether chess was or was not a lawful game according to the canons, and 28, https://en.wikisource.org/wiki/1911_Encyclop%C3%A6dia_Britannica/Chess

Peirino (De Proelat. chap. 1) holds that it was permissible for ecclesiastics to play thereat. Among those who have taken an unfavourable view of the game may be mentioned John Huss, who, when in prison, deplored his having played at chess, whereby he had lost time and run the risk of being subject to violent passions. Among authentic records of the game may be quoted the Alexiad of the princess Anna Comnena, in which she relates how her father, the emperor Alexius, used to divert his mind from the cares of state by playing at chess with his relatives. This emperor died in 1118.

Concerning chess in England there is the usual confusion between legend and truth. Snorre Sturleson relates that as Canute was playing at chess with Earl Ulf, a quarrel arose, which resulted in the upsetting of the board by the latter, with the further consequence of his being murdered in church a few days afterwards by Canute's orders. Carlyle, in *The Early Kings of Norway*, repeats this tale, but van der Linde treats it as a myth. The Ramsey Chronicle relates how bishop Utheric, coming to Canute at night upon urgent business, found the monarch and his courtiers amusing themselves at dice and chess. There is nothing intrinsically improbable in this last narrative; but Canute died about 1035, and the date, therefore, is suspiciously early. Moreover, allowance must be made for the ease with which chroniclers described other games as chess. William the Conqueror, Henry I., John and Edward I. are variously stated to have played at chess. It is generally supposed that the English court of exchequer took its name from the cloth, figured with squares like a chess-board, which covered the table in it (see *Exchequer*). An old writer says that at the coronation of Richard I. in 1189, six earls and barons carried a chess-board with the royal insignia to represent the exchequer court. According to Edmonson's *Heraldry*, twenty-six English families bore chess rooks in their coats of arms.

As regards the individual pieces, the king seems to have had the same move as at present; but it is said he could formerly be captured. His "castling" privilege is a European invention; but he formerly leaped two and even three squares, and also to his Kt 2nd. Castling dates no farther back than the first half of the 16th century. The queen has suffered curious changes in name, sex and power. In shatranj the piece was called farz or firz (also farzan, farzin and farzi), signifying a "counsellor," "minister" or "general." This was latinized into farzia or fercia. The French slightly altered the latter form into fierce, fierge, and as some say, vierge, which, if true, might explain its becoming a female. Another and much more probable account has it that whereas formerly a pawn on reaching an eighth square became a farzin, and not any other piece, which promotion was of the same kind as at draughts (in French, dames), so she became a dame or queen as in the latter game, and thence dama, donna, &c. There are old Latin manuscripts in which the terms ferzia and regina are used indifferently. The queen formerly moved only one square diagonally and was consequently the weakest piece on the board. The immense power she now possesses seems to have been conferred upon her so late as about the middle of the 15th century. It will be noticed that under the old system the queens could never meet each other, for they operated on diagonals of different colours. The bishop's scope of action was also very limited formerly; he could only move two squares diagonally, and had no power over the intermediate square, which he could leap over whether it was occupied or not. This limitation of their powers prevailed in Europe until the 15th century. This piece, according to Forbes, was called among the Persians pil, an elephant, but the Arabs, not having the letter p in their alphabet, wrote it fil, or with their definite article al-fil, whence alphilus, alfinus, alfiere, the latter being the word used by the Italians; while the French perhaps get their fol and fou from the same source. The pawns formerly could move only one square at starting; their powers in this respect were increased about the early part of the 16th century. It was customary for them on arriving at an eighth square to be exchanged only for a farzin (queen), and not any other piece; the rooks (so called from the Indian rukh and Persian rokh, meaning "a soldier") and the knights appear to have always had the same powers as at present. As to the chessboards, they were formerly uncoloured, and it is not until the 13th century that we hear of checkered boards being used in Europe.

Development in Play.—The change of shatranj into modern chess took place most probably first in France, and thence made its way into Spain early in the 15th century, where the new game was called Axedrez de la dama, being also adopted by the Italians under the name of scacchi alla rabiosa. The time of the first important writer on modern chess, the Spaniard Ruy Lopez de Segura (1561), is also the period when the latest improvement, castling, was introduced, for his book (*Libra de la invention liberal y arte del juego del Axedrez*), though treating of it as already in use, also gives the old mode of play, which allowed the king a leap of two or three squares. Shortly afterwards the old shatranj disappears altogether. Lopez was the first who merits the name of chess analyst. At this time flourished the flower of the Spanish and Italian schools of chess—the former represented by Lopez, Ceron, Santa Maria, Busnardo and Avalos; the latter by Giovanni Leonardo da Cutri (il Puttino) and Paolo Boi (il Syracusano). In the years 1562–1575 both Italian masters visited Spain and defeated their Spanish antagonists. During the whole 17th century we find but one worthy to be mentioned, Giachino Greco (il Calabrese). The middle of the 18th century inaugurates a new era in chess. The leading man of this time was François André Danican Philidor. He was born in 1726 and was trained by M. de Kermur, Sire de Légal, the star of the Café de la Régence in Paris, which has been the centre of French chess ever since the commencement of the 18th century. In 1747 Philidor visited England, and defeated the Arabian player, Phillip Stamma, by 8 games to 1 and 1 draw. In 1749 he published his *Analyse des échecs*, a book which went through more editions and was more translated than any other work upon the game. During more than half a century Philidor travelled much, but never went to Italy, the only country where he could have found opponents of first-rate skill. Italy was represented in Philidor's time by Ercole del Rio, Lolli and Ponziani. Their style was less sound than that of Philidor, but certainly a much finer and in principle a better one. As an analyst the Frenchman was in many points refuted by Ercole del Rio ("the anonymous Modenese"). Blindfold chess-play, already exhibited in the 11th century by Arabian and Persian experts, was taken up afresh by Philidor, who played on many occasions three games simultaneously without sight of board or men. These exhibitions were given in London, at the Chess Club in St James's Street, and Philidor died in that city in 1795. As eminent players of this period must be mentioned Count Ph. J. van Zuylen van Nyevelt (1743–1826), and the German player, J. Allgaier (1763–1823), after whom a well-known brilliant variation of the King's Gambit is named. Philidor was succeeded by Alexandre Louis Honoré Lebreton Deschapelles (1780–1847), who was also a famous whist player. The only player who is known to have fought Deschapelles not unsuccessfully on even terms is John Cochrane. He also lost a match (1821) to W. Lewis, to whom he conceded the odds of "pawn and move," the Englishman winning one and drawing the two others. Deschapelles' greatest pupil, and the strongest player France ever possessed, was Louis Charles Mahé de la Bourdonnais, who was born in 1797 and died in 1840. His most memorable achievement was his contest with the English champion, Alexander Macdonnell, the French player winning in the proportion of three to two.

The English school of chess began about the beginning of the 19th century, and Sarratt was its first leader. He flourished from 1808 to 1821, and was followed by his great pupil, W. Lewis, who will be principally remembered for his writings. His literary career belongs to the period from 1818 to 1848 and he died in 1869. A. Macdonnell (1798–1835) has been already mentioned. To the same period belong also Captain Evans, the inventor of the celebrated "Evans Gambit" (1828), who died at a very advanced age in 1873; Perigal, who participated in the correspondence matches against Edinburgh and Paris; George Walker, for thirty years chess editor of *Bell's Life* in London; and John Cochrane, who met every strong player from Deschapelles downwards. In the same period Germany possessed but one good player, J. Mendheim of Berlin. The fifth decade of the 19th century is marked by the fact that the leadership passed from the French school to the English. After the death of la Bourdonnais, Fournié de Saint-Amant became the leading player in France; he visited England in the early part of 1843, and successfully met the best English players, including Howard Staunton (q.v.); but the latter soon took his revenge, for in November and December 1843 a great match between Staunton and Saint-Amant took place in Paris, the English champion winning by 11 games to 6 with 4 draws. During the succeeding eight years Staunton maintained his reputation by defeating Popert, Horwitz and Harrwitz. Staunton was defeated by Anderssen at the London tournament in 1851, and this concluded his match-playing career. Among the contemporaries of Staunton may be mentioned Henry Thomas Buckle, author of the *History of Civilization*, who defeated Kieseritzki, Anderssen and Löwenthal.

In the ten years 1830–1840 a new school arose in Berlin, the seven leaders of which have been called "The Pleiades." These were Bledow (1795–1846), Bilguer (1815–1840), Hanstein (1810–1850), Mayet (1810–1868), Schorn (1802–1850), B. Horwitz (b. 1809) and von Heydebrandt und der Lasa, once German ambassador at Copenhagen. As belonging to the same period must be mentioned the three Hungarian players, Grimm, Szen and J. Löwenthal.

Among the great masters since the middle of the 19th century Paul Morphy (1837–1884), an American, has seldom been surpassed as a chess player. His career was short but brilliant. Born in New Orleans in 1837, he was taught chess by his father when only ten years of age, and in two years' time became a strong player. When not quite thirteen he played three games with Löwenthal, and won two of them, the other being drawn. He was twenty years of age when he competed in the New York congress of 1857, where he won the first prize. In 1858 he visited England, and there defeated Boden, Medley, Mongrédien, Owen, Bird and others. He also beat Löwenthal by 9 games to 3 and 2 drawn. In the same year he played a match at Paris with Harrwitz, winning by 5 to 2 and 1 drawn; and later on he obtained a victory over Anderssen. On two or three occasions he played blindfold against eight strong players simultaneously, each time with great success. He returned to America in 1859 and continued to play, but with decreasing interest in the game, until 1866. He died in 1884.

Wilhelm Steinitz (b. 1836) took the sixth prize at the London congress of 1862. He defeated Blackburne in a match by 7 to 1 and 2 drawn. In 1866 he beat Anderssen in a match by 8 games to 6. In 1868 he carried off the first prize in the British Chess Association handicap, and in 1872 in the London grand tourney, also defeating Zukertort in a match by 7 games to 1 and 4 drawn. In 1873 he carried off the first prize at the Vienna congress; and in 1876 he defeated Blackburne, winning 7 games right off. In 1872–1874, in conjunction with W. N. Potter, he conducted and won a telegraphic correspondence match for London against Vienna. In Philidor's age it was considered almost incredible that he should be able to play three simultaneous games without seeing board or men, but Paulsen, Blackburne and Zukertort often played 10 or 12 such games, while as many as 14 and 15 have been so played.

In 1876 England was in the van of the world's chess army. English-born players then were Boden, Burn, Macdonnell, Bird, Blackburne and Potter; whilst among naturalized English players were Löwenthal, Steinitz, Zukertort, who died in 1888, and Horwitz. This illustrious contingent was reinforced in 1878 by Mason, an Irish-American, who came over for the Paris tournament; by Gunsberg, a Hungarian; and later by Teichmann, who also made England his home. English chess flourished under the leadership of these masters, the chief prizes in tournaments being consistently carried off by the English representatives.

To gauge the progress made by the game since about 1875 it will suffice to give the following statistics. In London Simpson's Divan was formerly the chief resort of chess players; the St George's Chess Club was the principal chess club in the West End, and the City of London Chess Club in the east. About a hundred or more clubs are now scattered all over the city. Formerly only the British Chess Association existed; after its dissolution the now defunct Counties' Chess Association took its place, and this was superseded by the re-establishment by Mr Hoffer of the British Chess Association, which again fell into abeyance after having organized three international tournaments—London, 1886; Bradford, 1888; and Manchester, 1890—and four national tournaments. There were various reasons why the British Chess Association ceased to exercise its functions, one being that minor associations did not feel inclined to merge their identity in a central association. The London League was established, besides the Northern Chess Union, the Southern Counties' Chess Union, the Midland Counties' Union, the Kent County Association; and there are associations in Surrey, Sussex, Essex, Hampshire, Wiltshire, Gloucestershire, Somersetshire, Cambridgeshire, Herefordshire, Leicestershire, Northamptonshire, Staffordshire, Worcestershire and Lancashire. All these associations are supported by the affiliated chess clubs of the respective counties. Scotland (which has its own association), Wales and Ireland have also numerous clubs.

Still, England did not produce one new eminent player between 1875 and 1905. First-class chess remained in the hands of the veterans Burn, Blackburne, Mason and Bird. The old amateurs passed away, their place being taken by a new generation of powerful amateurs, so well equipped that Great Britain could hold its own in an amateur contest against the combined forces of Germany, Austria, Holland and Russia. The terms master and amateur are not used in any invidious sense, but simply as designating, in the former case, first-class players, and in the latter, those just on the borderland of highest excellence. The professional element as it existed in the heyday of Simpson's Divan almost disappeared, the reason being the increased number of chess clubs, where enthusiasts and students might indulge in their favourite pastime to their heart's content, tournaments with attractive prizes being arranged during the season. The former occupation of the masters vanished in consequence; the few who remained depended upon the passing visitors from the provinces who were eager to test their strength by the standard of the master. Blackburne visited the provinces annually, keeping the interest in first-class chess alive by his simultaneous play and his extraordinary skill as a blindfold player—unsurpassed until the advent of Harry Nelson Pillsbury (1872–1906), the leading American master since Morphy.

Germany has produced great chess players in Tarrasch, E. Lasker, Lipke, Fritz, Bardeleben, Walbrodt and Mieses, besides a goodly number of amateurs. Austria produced Max Weiss, Schlechter, Marco and Hruby, to say nothing of such fine players as the Fleissigs, Dr Mertner, Dr Kaufmann, Fahndrich, Jacques Schwarz and others. Hungary was worthily represented by Maroczy, Makovetz and Brody, Maroczy being the best after Charousek's death. Russia, having lost Jaenisch, Petroff and Schumoff, discovered Tchigorin, Janowsky, Schiffers, Alapin, Winawer and Taubenhau. France showed a decline for many years, having only the veteran M. Arnous de Rivière and the naturalized M. Rosenthal left, followed by Goetz and two good amateurs, MM. Didier and Billecard. Italy had only Signer Salvioli, although Signer Reggio came to the fore. Holland had a fair number of players equal to the English amateurs, but no master since the promising young van Lennep died.

The first modern International Chess Tournament held in London in 1851 was the forerunner of various similar contests of which the following is a complete table:

In the absence of any recognized authority to confer the title of chess champion of the world, it has usually been appropriated by the most successful competitor in tournaments. On this ground Tarrasch claimed the title in 1907, although Lasker, who had twice beaten Steinitz, the previous champion, in championship matches, in addition to such masters as Bird, Blackburne, Mieses and Marshall, was well qualified to assume it. Accordingly in arranging the programme for the tournament at Ostend in 1907 it was agreed that the winner of this contest should receive the title of tournament champion, and should play a match with Lasker for the championship of the world. Tarrasch having proved successful at Ostend, the match between him and Lasker was played at Munich in September 1908, and resulted in the victory of Lasker by 8 games to 3 and 5 draws.

Chess has developed various schools of play from time to time. The theory of the game, however, did not advance in proportion to the enormous strides in its popularity. Formerly the theory of play had been enriched by such enthusiasts as Dr Max Lange, Louis Paulsen, Professor Anderssen, Neumann, Dr Suhle, Falkbeer, Kieseritzki, Howard Staunton, Dr Zukertort, W. N. Potter and Steinitz, foremost amongst them being Louis Paulsen. The openings were thoroughly overhauled, new variations discovered and tested in practical play over the board. These are now things of the past. The masters who find flaws in old variations and discover new ones bring them to light only in matches or tournaments, as new discoveries have now a market value and may gain prizes in matches or tournaments. The old "romantic" school consequently became extinct, and the eliminating process resulted in the retention of a small repertoire only, sufficient for practical purposes in important contests. Gambits and kindred openings containing elements of chance were avoided, and the whole stock which a first-class player requires is a thorough knowledge of the "Ruy Lopez," the "Queen's Pawn Openings," and the "French" and "Sicilian Defences"—openings which contain the least element of chance. The repertoire being restricted it necessarily follows that the scope for grand combinations is also diminished and only strategy or position play remains. The "romantic" school invariably aimed at an attack on the king's position at any cost; nowadays the struggle is to obtain a minute advantage, and the whole plan consists in finding or creating a weak spot in the opponent's arrangement of forces; such is the theory of the modern school, conceived and advocated by Steinitz. But it is a curious fact that Steinitz founded the modern school rather late in life. He felt his powers of combination waning, and being the world's champion and eager to retain that title, he started the new theory. This novel departure revolutionized chess entirely. The attacking and combination style was sacrificed to a sound, sober and dry method; but Steinitz, strange to say, was not even the best exponent of his own theory, this position falling to younger players, Siegbert Tarrasch, Schlechter, Amos Burn and Emanuel Lasker. Pillsbury and Janowsky adhered to both styles, the former in a high degree, and so did Zukertort and Charousek; Tchigorin being a free-lance with a style of his own. The old charm of the game disappeared—in match and tournament play at least—and beauty was sacrificed to exact calculation and to scoring points. This is to be regretted, for the most beautiful games still occur when a player resorts to the gambits. One of the finest games in the Hastings tournament was played by Tchigorin against Pillsbury, and this was a "King's Gambit Declined." Charousek won a "Bishop's Gambit" against Dr Lasker in the Nuremberg tournament; and some brilliant games occur in the "Queen's Gambit Declined," if either White or Black sacrifices the KP. Another reason why gambits should be adopted by players in tournaments is that competitors would necessarily be readily prepared for the regulation openings, so that the gambits might take them by surprise. After all, the new school is a natural consequence of the progress of the game. Paulsen, Anderssen and Tchigorin devoted a lifetime to the Evans Gambit, volumes of analyses were written on it, and then Lasker revives an obsolete defence, and the Evans Gambit disappears! Zukertort achieved a great success with "1. Kt to KB3" in the London tournament, 1883, and this, or the kindred "1. P to Q4" opening, has since become the trusty weapon in serious encounters. Lasker wrote Common Sense in Chess, and gave the best defences of the Ruy Lopez (a certain form of it); but the "common sense" was demolished in the Paris and Nuremberg tournaments, and old forms of that remarkable opening have to be refurbished. These instances will suffice to show the reason for the cautious style of modern times. The Moltkes have replaced the Napoleons.

The old versatility of style could be revived if club tournaments were organized differently. The players might be compelled to adopt one single opening only in a two-round contest, each player thus having attack and defence in turn. The next season another opening would form the programme, and so on. Even in international tournaments this condition might be imposed; the theory would be enriched; full scope would be given to power of combination and ingenuity; whilst the game would be more interesting.

There are still amateurs who devote their energies to the theory of the game; but so long as innovations or new discoveries are not tested by masters in serious games, they are of no value. Steinitz used to keep a number of new discoveries ready to be produced in masters' contests, the result being that his novelties were regularly demolished when it came to a practical test. The mistake was that he did not try his novelties over the board with an opponent of equal strength, instead of trusting to his own judgment alone.

The British Chess Federation was instituted in 1904, its first congress being held at Hastings in that year, when a British championship, a ladies' championship and a first-class amateur tournament were played. These competitions have been continued annually at the congresses of the federation, with the following results:—

British Championship.

1904. Hastings. 1 H. E. Atkins and W. E. Napier, 3 J. H. Blackburne.

1905. Southport. 1 H. E. Atkins, 2 G. E. H. Bellingham and J. H. Blackburne.

1906. Shrewsbury. 1 H. E. Atkins, 2 R. P. Michell, 3 G. E. Wainwright.

1907. Crystal Palace. 1 H. E. Atkins, 2 J. H. Blackburne, R. P. Michell, E. G. Sergeant and G. E. Wainwright.

Ladies' Championship.

1904. Hastings. 1 Miss Finn, 2 Mrs Anderson and Mrs Herring.

1905. Southport. 1 Miss Finn. 2 Mrs Anderson and Mrs Houlding.

1906. Shrewsbury. 1 Mrs Herring, 2 Mrs Anderson, 3 Miss Ellis and Mrs Houlding.

1907. Crystal Palace. 1 Mrs Herring and Mrs Houlding, 3 Mrs Anderson.

First Class Amateur Tournament.

1904. Hastings { \displaystyle \scriptstyle {\left{{\begin{matrix}} \\\\ \end{matrix}}\right.}} { \displaystyle \scriptstyle {\left{{\begin{matrix}} \\\\ \end{matrix}}\right.}} Section A. 1 W. H. Gunston, 2 H. F. Cheshire and F. Brown.

Section B. 1 G. E. Wainwright and C. H. Sherrard, 3 W. P. M'Bean.

1905. Southport { \displaystyle \scriptstyle {\left{{\begin{matrix}} \\\\ \end{matrix}}\right.}} { \displaystyle \scriptstyle {\left{{\begin{matrix}} \\\\ \end{matrix}}\right.}} Section A. 1 Dr Holmes, 2 J. Mortimer, 3 H. G. Cole and J. E. Purry.

Section B. 1 F. E. Hammond, 2 F. Brown. T. J. Kelly and C. H. Wallwork.

1906. Shrewsbury. 1 G. Shories, J. F. Allcock, P. W. Fairweather and E. D. Palmer.

In 1896 and following years matches between representative players of Great Britain and the United States respectively were played by cable, with the following results

https://encyclopedia.dramatica.online/The_Elder_Scrolls_IV:_Oblivion

The Elder Scrolls IV: Oblivion

Stop hand.png STOP.

You have violated the law! Pay the court a fine or serve your sentence. Your stolen goods are now forfeit.

Breakingnews.gif BREAKING NEWS!!

OMGWTFBQB! Oblivion is over 10 years old nao!!!1

Oblivion Massive Fucking Faggot.jpg

The Elder Scrolls IV: Oblivion is yet another in the never ending line of rehashed RPGs about magic, swords, elves, and other typical fantasy faggotry. Although Oblivion is touted as an "Ackshin RPG", it can be more accurately described as a single-player MMO due to the high amounts of grinding and the hundreds of hours it will suck away from your pathetic existence.

The game has received a fair amount of praise from the gaming community (a.k.a. "Virginville"), despite the fact that it's really just Morrowind with prettier grafix and half the scenery, abilities, weapons, and fun chopped out. The main difference being is that in this game you can actually fight people, unlike Morrowind's shitty turn based combat.

The Game

The sequel fans hoped for.

It's more likely than you think.

Platforms

Oblivion is available on three platforms, with each version sucking in its own way:

PC: Unless you're a poorfag running win98, then PC is most likely the way to go. The PC version has a few noted benefits over the console versions, one being that it's much easier to h4x and cheat your way to success (just like in real life). Also, you can actually fucking move and place objects without going insane. You can download mods that fagtards use to OMG SEE THEIR CHARACTERS NAKED! We all agree, though, that this feature is totally fucking useless.

Xbox 360: If your PC happens to fail it in the performance department or you are a 360 fag, the 360 version is the next logical choice. Features of the 360 version include a \$60 price tag, then another \$50 to download all of the expansion material before your console Red Rings on you and you're forced to wait for Micro\$oft to take their sweet-ass time fixing it as you cry yourself to sleep at night. Also, it's perhaps even moar buggy than the PC version, if that's possible.

PS3: If you're a Sony fanboy then you'll likely be picking up this version of the game, which in most regards, is completely identical to the Shitbox 360 version. The difference is that you get most of the downloadable content per-included for no extra cost. Or you can just buy the GOTY edition for \$60 which is available on both consoles. Any way you look at it you're getting screwed over.

Plot

You are the only person capable of stopping a vast conspiracy that threatens the entire empire, you face enemies who have never known defeat and strive to destroy you, yet if you blow off the main quest nothing will happen. Along the way you will encounter some horrible AI and buggy graphics.

Gameplay

Here lies the OP. A testament to the very madness within this portal.

As Oblivion is an action RPG, there is none of that pansy-ass turn-based combat bullshit to get in your way. The turn-based faggotry is replaced with real time faggotry, where you attack by hitting a button over and over, occasionally stopping to chug some healing potion. The difficulty of Oblivion ranges disjointedly from crippling, insanely, Battletoads challenging to something your 3-year-old sister can beat. It all depends on where you set the difficulty meter while playing. And since you can save or change the difficulty at any time, there's never any real cause for worry. If you find yourself being out-classed by your enemies, simply crank down the difficulty to the point that it's easier than stealing candy from a dead baby. Once the difficulty's down, Oblivion plays sort of like an FPS with swords, since you don't have to worry about skill levels, casting spells, mixing potions, or any of that nerdy stuff. Just hold down the attack button until everyone in front of you dies. Or you can just make a set of full invisibility armor and run around like some sort of ninja God.

And on the topic of leveling, Oblivion's is a broken pile of AIDS. Levels are acquired by improving your primary skills, which is done by using them. So you can look forward to 85% of your playing experience being dedicated to casting the same spell 10,000 times in a row while in a dazed stupor or taping down the "Q" key to sneak in place for hours. The only downside is that every 25 levels you get a pop up with some spiritual message about how much you've advanced and what not. It all amounts to a level of grind rivaled only by World of Warcraft. But once you do actually level, most of your enemies level right along with you, so it doesn't really become any easier, making the game somewhat interesting.

Naturally, gamers will frequently draw comparisons between Oblivion and its predecessor, Morrowind. Like Morrowind, Oblivion is a life-draining waste of time and money, but there are a few key differences. Oblivion has been updated to be more user-friendly, with a more accessible player management system and fewer complications. Of course, this also means that quite a bit has been stripped out, and it is not uncommon to hear whiny forumgoers bitching about how Oblivion has been dumbed down for a new audience. The scenery in Oblivion is also a noted upgrade, with Next-Gen graphics and lots of lens flare thrown over everything, enabling near recreation of such diverse landscapes as a beautiful forest with a couple rocks or a beautiful forest with a small stream running through it. In fact, it seems that the developers were so satisfied with their piece of forest scenery that they cuntpasted it hundreds of times to cover every inch of the ridiculously huge map. So in short, the entire game looks exactly the same, with the occasional snowflake thrown in if you climb high enough up the mountains.

However, Oblivion is not strictly about combat. Players may also solve some of their problems by utilizing Oblivion's simulation of social interaction. Like in real life, threatening, then complimenting, then joking with, and then bragging to someone can increase their favor towards you.

Some other annoying grievances:

- Only like two fucking boss fights in the entire game, and they're both boring.
- Glitches out the ass, some so bad that you're forced to restart your game from scratch.
- Retardedly exploitable magicka system.
- No nudity in the console versions. Seriously, what the fuck?
- Scratch that, the horses have realistic anuses textured in on them. Think about that; some art designer had to look up pictures of a horse anus and replicate that in game.
- About 80% of your time in Oblivion is spent spelunking in the fucking dark, in one featureless cave after another, copy and pasted over 9000 times while being attacked by rats and zombies that you can't see unless you cheat by turning up the brightness, use a completely useless torch or become a Jew, which has night vision.

Modding

The entire Oblivion modding community summed up in a single image.

The niggers who made Oblivion also released a Construction Set for the game, so you can add at least 100 mods to make it be slightly less shitty. Naturally, sheeple suddenly started to release random garbage. The primary site for Oblivion's fanbase to excrete it on is called TESNexus. Having over 9000 mods, of which 99.9% are shit, the batshit insane nazi USI moderators ban anyone and everyone who so much as says they don't like something, proving that everyone on the site is a pussy.

They are AlienSlof (a woman who needs to gb2kitchen instead of making pr0n with 20 foot cocks), Buddah (the main faggot who moderates it, who has said on the official forums that he spends 16 hours on some days banning people), bben (presumably "Big Ben", who doesn't really do anything, and is an ugly basement dweller IRL), LHammonds (bans people for fucking anything like Buddah, but unlike the other nazis, he mods in the way of making shit retextures). All of them serve their god DarkOne, who sits back and watches them raep people for the lulz while cashing in from his retarded donators. Some argue that they're fair because of their "three strikes and you're out" system, but the fact is that they'll ban you for anything without a second thought, no matter how many times you've violated the law.

After a quick inspection of the armor section, you'll find that all of it is "armor" made by 13 year old boys. This "armor" is very protective, even though it all takes form in bikinis. A more rare breed of fucktard who mods armor is 16 year old girls, who suck cocks too much to make their own shit and convert the female shit to male characters.

The other modding site is Planet Elder Scrolls, but noone uses it so it's even shittier.

Oblivion Pr0ns

As you may know, this ancient, oft-proven rule of the internet has been shown to be true for just about everything. And Elder Scrolls IV: Oblivion is no exception. As with anything else in the world, Oblivion is the subject of tons of porn from around the web, and since Oblivion is a realistic videogame, this is especially true. Naturally, most of the pr0n contains Khajiits and Argonians, because furbags are usually the only ones sick enough to make this stuff. Most of this pr0nz spawned because some faggot somewhere decided it would be hawt to have the already shitty looking characters to get all naked and have seizures while performing fellatio or something.

Previous Video | Next Video

Voice Acting

Another area of glaring failure is the voice acting department. There are ten races in Oblivion, and with two genders, that means there should be at least twenty distinct character voices. In actuality, there are like five. So that means that out of the 9000+ NPC's, most if not all of them sound exactly the same. So it looks like the voice acting division spent all of their allotted money on hiring Patrick Stewart to voice all of the Emperor's three lines, so they had to hire five bums off the street to fill the remaining roles. As a result, everybody in Oblivion sounds exactly the same and has incredibly awkward transitioning between lines. Not to mention that the dialog sounds as if it was written by Peter Chimaera. With conversations like:

Orc: Any news from the other provinces?

High Elf: I saw a Mudcrab the other day. Nasty little creatures...

Orc: Bye.

And:

Dunmer: How are you?

Imperial: (Snort)

Dunmer: I've heard others say the same

You cant help but have that distinct feeling that everyone around you is schizophrenic

Addition to shitty dialogue there is also a few outtakes placed right into the game.

Downloadable Content

Speaking of mental instability, Bethesda has gone and released several downloadable one and zero combinations that, according to Bethesda's marketing department, could make a meal of many basement-dwelling Elder Scrolls Players' disposable welfare checks!

Shivering Isles

The DLC often considered the most elongated and well-processed, much like that salty log you pushed out of yourself after taco night.

You frolic about the muddy and dreary countryside of the Quivering Archipelagos, populated by many frogmen and fishpeople, as well as a congregation of mentally unstable madhouse escapees. The man and mer that inhabit this area all possess some form of dementia (or mania, hurr hurr), which can range from the most acute chronic headaches to the most elaborate genocidal rampages. The content possesses many interesting highs and lows, showcasing an array of useless items such as a knife that can heal your enemies, a ring that can make you walk and breathe on water simultaneously, and a ring that destroys all of your worn armor. However, the game boasts its fun-having potential with a staff that can control the weather and a spell that can raise people from the dead for all of your sexual pleasure.

Knights of the Nine

A game for all of the closeted Christfags out there. The meaningless figures in a chapel of the city Anvil are murdered mysteriously, and a preacher who probably belongs in the previously mentioned DLC is out and about ranting of an apocalyptic event. You have to retrieve a bunch of crappy Crusader relics that look like they were designed by the blind temple monks of the game in order to slay a big golden giant, so you can gain some well-deserved praise and a house full of monks that will do nothing but eat all of your computer-generated foodstuffs.

Mehrunes' Razor

Lousy DLC-filler where you conquer a long dungeon and collect a crappy-ass custom dagger that sucks massive balls, it has a 1 in 4 chance of killing an enemy in one hit while taking about 4 hits to actually kill someone, rendering it useless. Whee!

The Orrery

The elitist dicks of the Mages' Guild want you retrieve some mechanical parts from some thieving ruffians in order to repair a mystical device built by ancient midgets. Allows access to a telescope that can grant magical abilities, though why you wouldn't just use a readily available spellmaking altar to do just the same is a topic of debate.

Vile Lair

The player is provided with a new house in which the player can commit evil deeds and perform vampiritic rituals. Bwahaha! Also provides a new item, the chokeberry, which can kill certain players if you can convince them to eat one, much like an item that is already in the game.

Horse Armor Pack

Allows you to purchase metallic coating for your horses, therefore making your hooved quadriped buttbuddy more slick and durable, so he survives longer through the raping process. The release of the DLC caused large amounts of drama as gamers were obviously not thrilled with the idea of dishing out a few bucks for some fucking horse armor they'd literally never utilize, because the moment your character has 50+ speed, you quickly outpace a stupid ass horse.

Fighter's Stronghold

Need a place to store your slow yet strong-willed hammer-heaving peacemaker? No? Of course not, nobody wants to make a combat-oriented character! Stealth is the only worthwhile trait! This package is also a bit tedious, as you have to rescue the castle before the owners will give you their servitude and living quarters.

Wizard's Tower

Need a home to incorporate your weak yet magically-talented spellslinging dogooder into? No? Of course you don't, because magic is far too slow and monotonous of a skill to level, stealth being its clear superior! You mysteriously inherit a gargantuan tower from an unnamed family member you've never even heard of, hell you don't even know how you ended up in jail for fucks sake yet you are given access to a wide range of alchemical devices to utilize to your advantage. Also a bit tedious due to the fact that you have to buy some things to get everything to work.

Thieves Den

At last, a homely underground cavern to hone the skills of your sword-brandishing, poison-tipped creature of the night! You uncover a delightfully piraty galleon for you to store your stolen loot within. Allows you to hire trainers and vendors to raise your stats and sell your items, a croney-control center that employs pirates to gain you some booty, and a chest that you can unlock over and over and over again! Only downside is that you have to kill a load of skeletons before purchasing all of the wherewithal.

Spell Tomes

Randomly generating books that give you more useless abilities. Whoopie!

Adoring Fan

So, you find yourself beating the last contender in the arena. "Finally all of that hard work is over!" you say to yourself. When the champion falls you rejoice, and so does the crowd. Well, since there is nothing left to do you find yourself back at the front entrance to the arena, speaking to the man who takes bets. You leave feeling accomplished in your deeds. But what is this robust colored specimen blocking the way? Why is it walking toward me...What the hell is this thing!?! I didn't know Jak was in this game!!!

Adoring.jpg

"By Azura, by Azura, by Azura!.,

Adoring Fag

Choices, choices, choices...

Right after speaking to this golden-haired Jew, he gives you two options from which to choose. Both of them will produce strange, and in some cases, extremely hilarious results. They are as follows.

Choice #1: Follow Me

You can satisfy his needs by letting him follow you around everywhere. That means that everywhere you fucking go he'll be kissing the ground you walk on. It sounds just as great as it is fucking annoying. Most likely if you choose this option, you only do it so you can have him follow you to a giant cliff in the mountains and end up killing him with fire. Lulz are sure to ensue because he basically goes flying and ragdolls down the mountain for like 20 minutes thanks to the shitty physics engine that was rammed into this game's ass.

Choice #2: Stay Here

This choice in conjunction with the latter choice can produce some of the most hilarious results this game can offer, especially when you get bored with him.

For example...

Yes, right here.

Previous Video | Next Video

(This is also arguably the most satisfying way to get into the Dark Brotherhood/Occult, the only worthwhile guild in the entire fucking game. Hey, does anyone have a problem with getting paid to knock people off?) On top of that, the little fucker never really dies. You can plant an arrow right in his head and toss him in a pit of lava but there's still a good chance that he'll show up a while later, eager to suck your dick as if nothing had ever happened. He'll do it anywhere. You could be in the planes of Oblivion and all of a sudden he'll just run up to you with a huge grin on his face screaming "BY AZURA BY AZURE BY AZURA!", eager to latch on to your dick like a baby to its mother's tit.

Oblivion 2: Electric Boogaloo

Nuvola apps xmag.png Moar info: The Elder Scrolls V: Skyrim.

One fine day at the spike video game awards Bethesda decides to make all the fanboys wet with joy when they announced The Elder Scrolls V : Skyrim. Released on the 11/11/11 (omg sooooo kool WTF!!!) it will probably follow the same shitty plot of the last game because the Oblivion plane is fucking the world up again and it's about DRAGONS!!!1. Oh yeah, you can dual wield.

Skyrim Trailer

Let's Play Skyrim LEAKED Footage

"Plenty of Skyrimming in this video!.,

—Njerpez - 240p watch real men!

Cultural Revival

Over a decade after the release of this game, nostalgiafags have looked back with rose tinted glasses on the poorly programmed and unstructured mess of a game and made the game a popular meme again, kicking the fuck out of a long-decomposed horse.

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Pokémon

This page contains spoilers — important plot secrets and/or conclusions may be revealed. For example,

HOLY SHIT POKEMON SCARLET AND VIOLET ARE UNOPTIMIZED AND FULL OF BUGS AND GLITCHES!!!1

This page contains spoilers — important plot secrets and/or conclusions may be revealed. For example,

HOLY SHIT THEY'RE RETIRING ASH AFTER 25 YEARS, RUINING YOUR CHILD HOOD AGAIN!!!1

Remember kids, this once cost money to play

Leaked Game Freak concept art

Pokémon is a horrific multimedia franchise where children control a collection of horribly mutated creatures from the underworld. It was created at least 100 years ago in the magical land of Japan, by Satoshi Tajiri and his buttbuddies at Game Freak. The cancerous train wreck began its way across Japan in 1996, hitting the rest of the world shortly afterward. It is enjoyed by children, manchildren, housewives, Yakuza, and diseased cripples worldwide.

What?

It's only a matter of time.

Contrary to common belief among those who have sex and go outside, Pokémon is far more than a TV show based on a cute game 9-year-olds play on their Gaymeboys. Pokémon can best be described as the cultural equivalent of a cancerous tumor, with a multitude of grasping tentacles slithering their way into every form of entertainment known to mankind. If you can think of it, Pokémon has already had 500 official licensed versions of it. These include, but are certainly not limited to, video games, spinoff games, mobile games, cartoons, live-action TV shows, movies, magazines, comics, children's books, "adult" books, adult books, trading cards (see below), plush toys, figurines, board games, cameras, pedometers, food, clothing, jewelry, furniture, cookware, towels, Legos, Monopoly (not Nintendo's monopolization of the world's assburgers supply, the actual fucking board game Monopoly had a Pokémon spinoff. Seriously.) and many, many more.

Fandom

Being so broad and cancerous, chances are even you played a Pokémon game or watched the anime as a kid while daddy was busy beating the shit out of mommy. And while you might have grown out of it around the same time your balls began to drop, some were not so lucky. Many manchildren continue clinging to the franchise well into their 20s and 30s, and are the prime consuming demographic of all the shit listed above. These unfortunate souls are known as Pokéfags, and they continue to plague the world with their existence and faggotry.

Although not as immediately repugnant as those who paint their housepets blue or fantasize about having sex with horses, the dedicated "adult" Pokémon fandom is still notable for being a shining beacon of fuffaggotry, pedophilia and general fail for basement-dwelling permavirgins everywhere. Pokémon is so large and intrusive that its influence is virtually impossible to escape from; its faggotry overlaps with every other gatherings of overweight manchildren both OL and IRL. What's worse, said man-babies insist upon mishmashing it with all the other infantile hobbies and interests (even especially porn) they cling to in a desperate attempt to avoid growing up, thus ensuring that wherever you are on the Internet, you are only but a few clicks away from seeing the stretched-out asshole of a purple woodland creature.

Things got so bad that their faggotry clogged up /v/ and forced moot to open a specialized daycare just for their sick fetish threads.

Whenever they are not busy masturbating to their favorite underage Pokégirl being assraped by a 3-cocked pastel-colored dragon monstrosity, Pokéfags can be found online, discussing completely asinine topics such as the exact height and weight of a fictional animal. Do note that few of them actually bother playing the games, which are now universally derided for being crappy and pandering to children. The fact that the franchise has always been geared towards children rather than balding 30-something "hardcore" fans continues to elude them.

Never forget: Pokéfags are pedophiles, furies, or both.

The critters

Funny thing is, this is not an inaccurate representation of how Pokémon are designed

The central aspect of the franchise are the titular Pokémon — poorly drawn anime-esque creatures which serve as crude parodies of actual animals. The player is instructed to "catch 'em all!" like venereal diseases at a whorehouse, and then force them to battle each other in glorified cockfights. Originally there were 151 in 33, <https://encycopediadramatica.online/Pok%C3%A9mon>

total, which even most normal people have some passing familiarity with. Subsequent games gradually increased that number, to the point where there are now over 900 abominations to collect. The Pokémon fandom's predisposition towards autism is thus easily explained by the fact that being able to actually remember all hundreds of them is either a sign of mental abnormality or literal insanity.

All Pokémon fall into one of five categories:

- Retextured drawing of a real-world creature.
- Furrybait.
- Inanimate object given anime eyes.
- Nonsensical heap of shapes and colors.
- Dragon designed by an 8-year-old on coke.

Notably, in a grotesque display of vulgar blasphemy by Pokémon's azn developers, several Pokémon are described as literal gods of the world they inhabit. The theological ramifications of this, along with questions of Pokémon sentience, their exact relation to humans, the presence of real-world animals and the morality of pitching them against each other in brutal fights to the death remain unaddressed by Game Freak. Rest assured, though, that all of these are hotly contested issues in the Pokémon fandom.

As the number of Pokémon increased, so did the creative bankruptcy of the artists. As each new game release requires the addition of a few dozen more of the fuckers, Game Freak have grown visibly desperate in trying to come up with new ideas. New Pokémon designs have paradoxically grown both lazy and overly elaborate, with many ideas being recycled from older Generations for good measure. Unsurprisingly, virtually no Pokémon introduced after Generation III has had any sort of recognition outside the dedicated fandom.

Noteworthy Pokémon

"Not only is Gardevoir a formidable force on the battlefield, she is tremendously hot and is absolute eye candy. I adore her breasts, they are of perfect shape, just to be groped. I also just love her animations and her design; every time I lay my eyes on her, I am in shock. I think to myself 'Game Freak did a stellar job of designing her'. As mentioned by previous commenters, her animations are wonderful. If only they were real, it would be such a blessing for this realm. But for now, Gardevoir can only linger in our imaginations.,, —A virgin

A very partial list of "noteworthy" Pokémon includes:

- Pikachu - The infamous yellow rat whose marketable face is plastered all over the franchise.
- Charizard - Everyone's childhood favorite (unless you're lame).
- Metapod - Vaguely penis-shaped Pokémon whose only move is Harden.
- Cloyster - A Pokémon literally shaped like the female reproductive organ.
- Pidgey - The shiny variation is known to cause break-ups.
- Hypno - The brainwashing-Jew Pokémon.
- Mr. Mime - An unnervingly human-like clown creature known to give children nightmares.
- Jinx - Literal nigger whose canon skincolor has been the source of much butthurt.
- Magikarp - It's a fish out of water, and is about as useful as in reality.
- Ditto - A shapeshifter with limitless pornographic potential.
- Eevee - Cartoon fox notable for being able to evolve into almost every type.
- Vaporeon - Water Eevee. Lusted after by every sick fuck on the planet.
- Sylveon - Fairy Eevee. What if Vaporeon, but even gayer?
- Snorlax - If your mom were a Pokémon.
- Lucario - Furrybait built like a teenage boy on estrogen.
- Mewtwo - Epic and mysterious, this creature is to Lucario what precum is to cum.
- Miltank - A milk-spewing cow. The rest is left to the reader's depraved imagination.
- Lugia - Perhaps one of the most inexplicable targets for fuffagotry in the franchise.
- Mudkip - So i herd u liek mudkip?
- Gardevoir - Many lonely nights have been spent by pathetic virgins fapping to this.
- Nosepass - A Pokémon so ugly, not even the most dedicated Pokéfán managed to fap to it (not for the lack of trying).
- Aggron - Best Pokémon, bar none.
- Latias - This weird airplane-shaped monstrosity turns into a human girl in the manga. Naturally, people now masturbate to the original form.
- Lopunny - A creature scientifically engineered to turn innocent children into furies. Lola Bunny, basically.
- Garchomp - Infamously overpowered, and accordingly overused.
- Arceus - God. Literally.
- Genesect - They literally shaped a Pokémon after a car's headlights.
- Braixen - A fox lady; one of the most blatant examples of furry-baiting to have come from Game Freak.
- Zoroark - What if Braixen, but emo?
- Salazzle - The furbaiting stops being subtle. A "sexy" lizard that enchants its opponents using pheromones.
- Sinistea - It's a motherfucking teacup.
- Slowpoke - Wait, what's a Pokémon?
- Kirby - It's a Kirby, retard.

For even more retarded fantasy creatures, check out the ED Pokédex. Or better yet, don't.

The games

If only it were this awesome

You also gotta choose between two genders!

Despite all the hype surrounding them, Pokémon games are known to be boring, slow and irredeemably formulaic. The player walks around the overworld (called a region by pedantic faggots), sifting through tall grass in the hopes of being assaulted by a wild Pokémon, giving the player a chance to trap the poor animal in a little plastic cage called a Poké Ball. Occasionally they come across another person (usually much older than the player character, but occasionally even fucking toddlers) who figured out how to capture wildlife for shits and giggles, and a turn-based Pokémon battle commences.

Despite existing for over a quarter of a century, this basic overview never changes. In every game the player's basic goal is to catch Pokémon, collect eight Gym Badges, defeat an evil team, and finally beat the Elite Four and Champion of the region. To compensate for their blandness, most games will also contain some pointless gimmick such as diving underwater, farming, Pokémon Contests, massive cockfighting complexes and of course more goddamn Pokémon to catch.

Each Pokémon is categorized into a special Type, such as Fire, Water, Grass, Electric, Dark and Psychic. Each Type has a disadvantage or advantage over another, although every dumbass kid just uses Dragon-types, which ruins the entire sense of balance.

As for actual game strategy, it's pretty simple:

34, <https://encyclopedia.dramatica.online/Pok%C3%A9mon>

1. Grind your Pokémon to a really high level
2. Initiate battle
3. Mash the A button

And that's it. No really, I'm not joshin' you, that's all you have to do. After a certain point, Type advantages don't even matter because you can just one-hit everything. If you relish in repetitive bullshit, then Pokémon is the series for you.

Each series of games is collectively divided into "Generations," a term that is never used by Game Freak themselves but nobody cares. To date, our planet has been cursed with nine Generations of Pokémon. Pokéfags refer to this as the "core" series. Since its genesis, Pokémon has always released not one but two versions at a time. This is solely for Game Freak to suck out more cash from what should have been just one game. Both versions contain only pointless differences that make little to no real impact on gameplay, but thanks to Game Freak's marketing propaganda they've managed to bullshit consumers into believing the difference between both versions is akin to night and day.

Jesus Christ, how many more do we need?

Spinoffs

Pokémon types

Pokémon each have their own types and abilities. This sections lists all the single types. Pokémans can have two types; if you want serious information in finding out what's weak to what then look here, work it out for yourself and fuck off. The following were introduced in Generation I.

- Normal: The basic non-elemental type for all Pokémon too generic and/or boring for Game Freak to bother with placing into a better category. Normal-types hold no advantage over any other types and can get knuckled over by Fighting attacks and can't damage Ghost-types unless you negate its Ghost typing or use literally any other type attack. Most Normal-types don't sit well with being just a Normal-type so are able to wield other typed attacks such as Electric, Water, or Fire in an attempt to make up for their lack of any real use.

- Fire: If you have a favorite Pokémon, chances are it is a Fire-type. Despite the fact a Fire-type can get knuckled over by Water, Rock and Ground Pokémon, they are loved by all and feared by many. Fire-types generally dish out ridiculous amounts of Special Attack damage and generally have high HP and Speed, thus are even able to be competitive against their weaknesses in case you didn't see that coming.

- Water: The type with the highest number of Pokémon in the games, with at least 15 being introduced each Generation. Water-types are based off of marine creatures and seafife. Water-types are for JRPG fans who enjoyed sitting around fishing for pixels all day rather than going out and exploring the actual game. You only really use one so it can be a HM Slave for your Water-typed HM moves or for clearing caves full of Geodudes. Water-types are effective against Rock, Ground and Fire-types. Pretty much any Water-type that can learn TMs can try to be a failed Ice-type by learning at least one Ice TM move, the usual one being Ice Beam.

- Grass: If it's not an animal with plants growing out of it or an animal with shades of green on it, it's a plant with legs. Highly flammable, susceptible to Bugs eating it, easily poisoned, birds can almost literally shit on it, easily frozen by Ice, and not to mention generally fucking weak, you should only really choose the Grass-type as your starter because everyone knows that Rock, Ground and Water types bow down to their seemingly infinite tentacles all in the shape of cocks used to dominate, rape and use them as hosts for their offspring. Oh, and Smugleaf.

- Electric: The only real reason you'd want an Electric-type is because most Electric attacks can cause paralysis one way or another. The type itself is effective against both Water and Flying-types so could easily dispatch of those fucking Zubats and Tentacools that seem to appear in the thousands. An Electric-type's only weakness is the Ground-type, which can be temporarily nullified with Magnet Rise. Electric Pokémans weren't based on irl creatures that could actually shoot electricity at shit until the invention of Elektross. Some argue that Lanturn was based on an irl creature but Anglerfish don't shoot electricity, they emit light from their antenna.

- As of Generation VI, Electric-type Pokémon can no longer be paralyzed, which, when coupled with their already high Speed, make them somewhat useful.

- Ice: Ice-types normally come dual-typed, with the other type normally being Water. They became increasingly unoriginal with each inbred Generation, until all Nintendo could come up with were several scoops of ice cream and a snowflake with eyes and facial hair. Ice-types are generally shit and are weak to almost everything, so you only catch and train an Ice-type in order to defeat the mandatory Dragon-type trainer of that game, only to find that their Pokémon know Fighting and/or Fire moves that can easily fuck it over.

- Ground: Often accompanied with Rock typing, Ground is a shitty mix of Rock and Normal, which means it performs poorly at being either of them. It is the only thing Electric-types are weak to, but anything that shoots out a lightning bolt from its bell-end is piss-weak anyway.

- Fighting: Fighting-types have muscles where their brains should be and sport a nigger cock. They have lots of physical strength, but are easily mindfucked by Psychics and Fairies and birds for some reason. They can beat up on Normal, Dark, Rock, Steel and Ice Pokémon.

- Psychic: Known as the Esper-type in the Japanese version, Psychic-types have powerful Special Attack and Special Defense, but low physical Defense and Health; basically every "mage" character in any RPG in existence. Psychic-types are shit-scared of Ghosts, Dark-types and Bugs for some reason. Went from easily the best type in Generation I to one of the worst types in the most recent core games.

- Flying: Various winged creatures, lots of them based on birds, that fly. Unless they're Gyarados. They are almost all dual-typed and usually have low health despite being fast and sporting some rather nice physical strength. They are only really useful when fully evolved or to Fly around once you get that HM. Rock-types can crush them to pieces, Ice-types can serve them frozen and Electric-types can serve them fried. Only one Pokémon is a pure Flying-type without hax, and it's a fucking genie.

- Rock: Rock-types have shitloads of HP and high Defense, but next to no Special Defense and are normally slow as hell. These are what you spend most of your early gameplay struggling against if you pick the Fire starter, and almost never use in any game playthrough unless you actively decide to use one to shake things up a bit.

- Bug: Anything based off of bugs IRL which is kind of fitting since the entire franchise was based on bug catching. Generally weak and useless, these are the only type somehow worse than Ice. As you'd expect of bugs, they can be killed off by just about everything. Rocks can crush them, Flying types eat them for lunch, and Fire types cook them for the Flying types. To make up for that, they sometimes have an oddly good Special Attack, and many seem to be failed Psychic-types as they usually wield Psychic-type attacks.

- Poison: Either has fucking high Defense and HP, as well as having somewhat overpowered Poison attacks, or pathetically weak with lame Poison attacks, or were strong but had no Poison attacks at all. Until Generation VI, Poison moves were arguably the worst damage-dealing attacks, and generally avoided unless getting a STAB, but their strength against Fairies changed that somewhat. Get poisoned by one and you have to put up with the irritating long lasting poison effects which made these things a bitch to fight. Poison-types are often employed by the pathetic grunts of Team Rocket, and after a battle ended, the infected Pokémon would cause your screen to have a fucking seizure every four steps you took. Until Generation V.

- Ghost: Ghosts are completely immune to Normal and Fighting attacks, weak to other Ghosts and largely resistant to Ground-based moves in the later games thanks to the introduction of the Levitate Ability. Your only chance in hell to beat one of these is to train up a Dark-type, a Normal-type wielding anything but Normal attacks, or something else. Ghosts have the ability to naturally learn and use a move called "Curse" which makes the user die alone. Ghosts also wield and other lulzy moves like Destiny Bond and Perish Song.

- Side note: Nintendo trolled the anime followers of the original Pokémon series, claiming that Ghosts were strong against Psychics. Fanboys would find out only after they trained their Haunter for three days that it was generally useless against Sabrina, because the only damage-dealing Ghost attack in Generation I was a shitty move called Lick, and Haunter was in fact weak against Psychic Pokémon due to its dual Poison-typing. O Nintendo, u so funneh.

- Dragon: Probably the only type in the game worth a damn, at least until the introduction of the Fairy-type. Overpowered, huge amount of HP, fast, could take a lot of rape and most of them could learn at least one move of every other type in existence. They're mainly used by whiny-ass little bastards who think the world of Pokémon is real. Nearly impossible to kill and even MOAR impossible to level-up, Dragon's only weaknesses are Ice-types, Dragons and Fairies.

Because the game was accused of being "unbalanced" in Generation I, the fuckers at Game Freak added two more types in Generation II to destroy all the "strong" Pokémon. This, of course, made gamers rage even more.

- Steel: Designed to appeal to hardcore Pokémon fans and metaflags. Basically just the same as Rock, but with even MOAR Defense and HP, and in an almost cruel twist of irony it now gets shat on by Fire, and Grass Pokémon now suck its ten-foot cock. The only reason you'd ever want one is because they're completely immune to Poison and the fact that they resist pretty much everything until Generation VI, when their resistances to Dark and Ghost attacks were removed.

- Dark: Dark (or in Japseye land, Evil) was invented because Ghost just wasn't enough for the legions of faggot fanfiction writers that make up most of the Pokémon fanbase. All of the creatures in the Dark-typing are either deep and mysterious, appear at night or are natural cunts. They are one of the few types to be able to use a Psychic and Ghost-type as toilet paper with no real problems, but all Dark types have a crippling phobia of Bugs, and Fairies and Fighting types can wear them like gloves through their arseholes.

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After much whining about Dragon being overpowered, there was a new type introduced with the release of X and Y:

- Fairy: The manliest type at all. Sylveon is the figurehead for the type which has since become a waifu Pokémon for furies. A bunch of previous Pokémon have since been reclassified as Fairies, including Clefairy, Pikablu and Mr. Mime for some godawful reason. It was introduced in VI because the fucktards at Game Freak realized Dragons were overpowered and Spiritomb needed a weakness to stop people cheating in a Wondertomb.

Status conditions

During the awesome Pokémon battles which start, either when you step on a Pachirisu, a fat faggot with nothing better to do challenges you to a fight for no real reason at all, or your imaginary friend from irl challenges you and you hook up your Game Boys together so you can start fightin' your Pokémans, Status conditions are one of the things Pokémon can do to each other to piss each other off. They are as follows:

- Paralysis: A condition inflicted most commonly by Electric attacks, Body Slam, Stun Spore and Glare. Annoyingly the most common status condition you can ever fucking get. Paralysis slows the sufferer down to 25% and gives them a chance of being unable to attack on any given turn, and your Pokémon will never attack, whereas the enemy will without a problem. You can recover from paralysis with status condition healing items. Combine with Attract and Confuse Ray for EXTREME TROLLING. Any Pokémon with the Limber Ability is immune to paralysis, just Saiyan.
- Poison: A less common but equally stupid condition wherein the poisoned Pokémon gradually loses HP even when you are out of battle, shown when your game has a fucking seizure every four steps. Can be cured with an Antidote. Pokémans with the Immunity Ability, Poison-types and Steel-types are immune to it. In the first three Generations, your Pokémon could faint from being poisoned outside of battle. In Generation IV, they magically recover from poison while on the verge of death at 1HP and in Generation V they stay poisoned but don't cause the screen to seizure or lose health by walking four steps, essentially making it no different to being burned, minus shitting on the Attack stat. As of Generation VI, poisoning no longer harms Pokémon after a battle.
- Badly poisoned: Copy/paste of being poisoned, but does more damage as more turns are taken in battle. Totally fair.
- Sleep: Sleep stops your Pokémon from doing anything at all, unless you use Snore or Sleep Talk. It can either last a long time or not very long at all, essentially mind-fucking you into choosing whether to use an Awakening or not. If you're really unlucky, it could last five full turns. Any Pokémon with Dream Eater, usually the one that put you to sleep in the first place, can rape your health while healing themselves at the same time. Any Pokémon with Insomnia or Vital Spirit is immune to sleep, even if it tries to cause it on itself by using a move such as Rest.
- Burn: Burns are most often inflicted by 90% of Fire attacks. When affected by a burn, the Attack stat is shat all over similar to how paralysis shits on Speed, and you lose HP every turn. It doesn't make your game screen have a seizure every four steps outside of battle though, and can be cured with a Burn Heal. Pokémon that are Fire-types, or have the Water Veil Ability, cannot be inflicted with the burn status.
- Freeze: Caused by at least 50% of Ice attacks and works pretty much the same way as sleep, by making your Pokémon useless in that it can't fight back. It rarely lasts more than one turn though and has no attacks that instantly causes it. The Pokémon in question can be defrosted in one of five ways: It can defrost randomly on its own, can be cured with an Ice Heal, can be defrosted when Fire attacks are used against it, is immune to being frozen with the Magma Armor Ability and it can defrost itself using Flame Wheel, Sacred Fire, Flare Blitz, Fusion Flare, or Scald. A pure fail.
- Attract: Psuedo-Rule 34. Pokémans can whore themselves out to the opposite gender and your Pokémon falls in love with it. It stops at least 100% of all your attacks from doing anything when your Pokémon starts pining for dat ass and won't do anything for that turn. Unknown genders can't learn Attract, but those who can use it by other methods can't attract anyone. Combine with paralysis and/or confusion for EXTREME TROLLING! Any Pokémon with the Oblivious Ability or the same gender is immune to it.
- On another note: FUCK YOU WHITNEY AND YOUR FUCKING MILTANK, WHY COULDN'T MY STARTER POKÉMON BE A GIRL?! FUCKING CUNT BITCH!
- Confusion: Used only as a last resort or by NPCs to piss you off. The affected Pokémon can fail attacks and punch itself in the face in the process. Higher Attack power means it slaps itself harder, which is why people like the attack Swagger. Confusion lasts 500 turns for you, lasts one turn for the opponent. Invest in Confuse Ray for EXTREME TROLLING! Unless of course it has the Own Tempo Ability.
- On another note: FUCK YOU TENTACOOOL AND ZUBAT!!! YOUR ASSHOLES WILL BE MINE WHEN I FIND A WAY TO ENTER POKÉMON GOLD AND SILVER AND RED AND BLUE!!! STOP APPEARING WHEN I GO INTO CAVES AND OCEANS! YOU BITCHES RUINED A 7-YEAR-OLD'S GAMING EXPERIENCE!
- Curse: A lulzy condition inflicted by Ghost-types. The user becomes emo and sticks needles in itself using some odd voodoo shit, taking half its health to lay a curse on your Pokémon. Every turn, just less than 1/4 of your Pokémon's health will be taken until it dies of severe depression. Massive trolling and butthurt ensues from its use. Use it often and use it against real people to piss them off.
- Pokérus: Not a typical status ailment with negative effects in battle; basically your Pokémon contracted Pokérus from fighting a wild Pokémon, but you must have battled it and preferably defeated it to catch it, and the virus is really fucking rare. It can be spread to all your other Pokémon, regardless of gender or species. Hell, it can even be passed onto Eggs. It can't be cured, and it goes away over time; but the effects of the virus remain for the rest of your Pokémon's life. Pokérus is a special strand of AIDS that turns your Pokémon into the strongest fucking thing ever whenever it levels up, and is really fucking rare despite the fact that it can be spread like the common cold.

The anime

Professor Oak learned Ash's secret

What? You thought they couldn't out-gay the maid?

The NEW and PROGRESSIVE Ass Ketchup

The Pokémon cartoon (compulsively referred to as the anniemay by fanfaggots) tells the story of hermaphrodite Ash Ketchum, whose hollow life is devoted entirely to being a Pokémon fanboy. Therefore, he teams up with his best buddy and partner, the electrified rat Pikachu, and sets out to catch 'em all.

Ash is soon accompanied by Misty O'lttyBittyTitties, former underage fetish model. He is also joined by Brock Statue Tory, all around horn dog and charter member of the Nurse Joy appreciation club. A running joke involves Brock cumming in his pants whenever he sees anything with breasts, which happens with amazing frequency considering his eyes are permanently closed. However, the reason behind Brock's weird-ass behavior is his homosexuality. This is the only explanation why he has never had a girlfriend, and why he loves to cook. As the rest of the gang are major gay-bashers, he hides this with his girl "obsession."

Ash is chased around the world by Team Rocket members Jessie, James, and their annoying retarded cat. They supply 95% of this show's lulz in the form of endless attempts to steal Pikachu so that their boss would appreciate them again, not that he did anyway. They are also the subject of many shipping wars among Pokéfans who are just too dumb to realize James is gay.

Pokémon do not like you, it's a fact

Screenshot from the 9th season

Misty later leaves the show after getting knocked up and is promptly replaced by May, a jailbait whore with breasts that more than make up for Misty's lack thereof. May brings along her brother Max, an incestuous little fuckface, who seems to know more about Pokémon than Ash. In order to boost ratings, Dawn is then introduced to the show, and considering that she's a 10-year-old, is an even bigger whore than the other girls mainly due to her extremely short skirt. Having the smallest chest, she is clearly fanservice for many of the show's viewers.

The series has continued for far more years as well as seasons than it ever should have, showcasing Ash and some traveling partners going throughout the region of the games currently being promoted. We have seen Ash paired up with Iris and Cilan as they explored the Amerifat Unova region. Then he adventures of Kalos, where Ash was now accompanied by Clemont, his fuckface little sister Bonnie, and an even larger than Dawn whore Serena. Then, he's accompanied by Sophocles, Kiawe, and even worse than Serena whores, Lille, Mallow, and Lana, a legit harem of girls in the Alola Region. Sadly, Ash will never, ever see himself win an official championship as long as the show keeps going. Nor will he get any pussy, while Team Rocket will continue to be failures who stalk a kid for a rat for thousands of more episodes to come. HAAAAA DISREGARD THAT, I SUCK COCKS Ash actually won, but only because the League was so shitty, that you could probably win with a Magikarp.

The series has rebooted to appeal to nostalgiafags with Pokémon Journeys: The Series, now Ash will go through all regions without his retarded friends, and will instead be adventuring with Goh, basically another Ash.

The cartoon is solely enjoyed by people who play the games. Compulsive, autistic, fat, basement-dwelling freaks whom don't receive any love from their mommies and daddies. Watching the Pokémon cartoon is considered by many to be even lower than enjoying a Nickelodeon shit-com. That is fucking low.

4Kids and drama in the U.S.

The Pokémon anime was originally dubbed for U.S. distribution by 4Kids. Several episodes were banhammered by 4Kids for reasons varying from Brock sneezing during the SARS epidemic, to an overabundance of evil Japanese culture, to James showing off his new boobs, to Porygon-induced subliminal messages that would cause seizures and the buying of more Pokémon merchandise. This topic can cause fanboys to rant for hours on the Internet.

36, <https://encyclopedia.dramatica.online/Pok%C3%A9mon>

Eventually, Pokémon USA stepped in and yanked the anime away from 4Kids. All the "fans" who had previously bitched about how 4Kids was sodomizing the series now acted like it was the apocalypse that the voice actors had been replaced. They set up at least 100 online petitions to reinstate the old voices. Pokémon is clearly serious business. To make the lulz even better, one of their voice actors, Eric Stuart (who did James and Brock) posted about the voice actor changeover on his website, whining like a 13-year-old boy and spamming his own guestbook out of angst.

Ways to watch the anime

There are two ways to watch the anime in English:

- The shitty dub, now managed by TPCi
- Even shittier subtitled anime, managed by autistic subber groups

The dub is utter shit, because the voice actors really only put in a minimal amount of effort for a product that automatically generates money for Nintendo and all other parties, meaning the quality is a mere shadow of even the 4Kids version of the show from back in the day... which, you can imagine, is pretty pathetic. But in all honesty, the dub is still infinitely better than shit autistic shit that subber groups release, because at least the dub is internally consistent and is more focused on making shit sound more natural to English speaking people. Y'know, NORMAL people who just want to be entertained by a good (lol) cartoon show.

Example of subber's autism: Everything is in English, except for the names. Because English names is what the dub uses, and is therefore clearly shit.

On the other hand, the shit released by subber groups is just fucking awful, and no level of "hard work" justifies the amount of autism sub fans have for it. Just poke around any thread about the CARTOON on /vp/, and you'll see just how terrible sub fans are, as well as how easily triggered they are. Want to see it in action? Then just try any of the following:

- Ask for a version of the subs which replace all the Japanese names with English names... y'know, because you speak English, not Japanese
- If none are provided, take a subber's release and replace everything yourself, then post the results
- Ask why Japanese names are used at all for an English language sub to begin with
- Point out that it's impossible for Japanese to be exactly translated into English, and thus their attempts for "authenticity" with subs is pointless
- Sub-point: constantly bring up Japanese's lack of articles (like "a" and "the") and ask why any subber uses them if authenticity is the goal
- Ask why the subs aren't just pulled from the dub
- Defend the dub in any way
- For example: point out that "Satoshi" is not his real name, but that it's "Ash," as proven by "Ash's Greninja" in the Pokémon Sun/Moon demo
- Alternatively, point out that if they don't want to use anything that reminds them of the dub, then why are they using the same language as the dub?
- Defend the more liberal subs over the more literal subs, then point out how people like the liberal subs better
- Redistribute someone's subs on your own website, and if they complain, point out that what they're doing is illegal anyways and say "whaddya gonna do, arrest me?"

Yeah, so, for some reason, subbers think that using Japanese names in the subs is the more superior choice... because apparently the English names for characters is a decision made by the show's dubbers (as opposed to a decision made from the top of Game Freak itself) and is therefore inauthentic to the nature of the original Japanese show. And subfags will defend this as much as possible, despite the fact that no one (apart from the subbers themselves, and that's debatable) actually speaks Japanese and thus needs English subtitles to be written up for them.

But hey, we here at Encyclopedia Dramatica are in it for the lulz, so expect a release of the "best" subs with all of the Japanese names replaced with their English ones soon.

The comic

Suffering.jpg

The world of Pokémon is unforgiving.

As if the world didn't have enough Pokéshit, we now have fucking manga comics about it. The one most fantards give a shit about is Pokémon Adventures, known as Pokémon Special by weebz. This comic is the bastion wet dream of Deviantards, shippers, and 9-year-old children who enjoy bloody violence. Rife with violence, plundering, blood, Pokémon getting killed, people getting killed, evil Gym Leaders, evil Elite Four, Trainers being turned into stone, time travel, drama, hate, and of course nudity. Pokémon Special (or PokéSpe for short) is a fucking dream come true, even being endorsed by the original game's creator Satoshi Tajiri. The main protagonists are swapped around, which would give an air of refreshment with each new story arc - however this is a let down once you realize they are named after the games. We are left with shit like a boy named Gold and a girl named White.

In truth, it's just a shitty overblown Marvel-tier mess that only gets points above the cartoon because it doesn't star that cocksucker Ash Ketchum. Even then, the comic's version of Red (Ash's basis) is just as bad. It's all weak as shit compared to real hardcore series.

https://encyclopedia.dramatica.online/World_of_Warcraft

World of Warcraft

Police.gif Playing World of Warcraft leads to mass murder and suicide

Breakingnews.gif BREAKING NEWS!!

Blizzard dropped the banhammer on Nostalrius. That'll surely get their seven million lost subs back!

This page contains spoilers — important plot secrets and/or conclusions may be revealed. For example,

HOLY SHIT BOTH KING VARIAN WRYNN AND WARCHIEF VOL'JIN DIED IN LEGION MAKING ANDUIN WRYNN KING AND SYLVANAS WINDRUNNER WARCHIEF!!!!1

Special Edition Warcraft cover. Features two reasons to stay away from this game..

See related items.

average WoW player.

The infamous grindfest World of Warcraft, also referred to as "WoW" or "Wow, my life has gone down the toilet," was made by Blizzard after they chose to join the MMO bandwagon back in 2004. When players realized the game was the same fucking thing, over and over again, and their hard work would keep getting squandered with every new expansion, along with the dumbing down of the mechanics and assrape of the community aspect, it went from having 12 million basement dwellers subscribed to a low point of 3 million. It is "still" the biggest hub for MMO (massive male orgy) games right now. These games are played exclusively by fat, greasy furries who sit on stained lap-top chairs and "kill" internet dragons for fictitious money and experience points that enable them to kill larger internet dragons. They spend most of their time in their parents' basements playing video games, coming out only a few hours a week to brag about their latest magical weapons, ultra-lo-lo ilvl gear, and arena levels.

The people who live in the WoW forums are also among the most retarded, illiterate manbabies known to mankind. In fact, other MMO players have been known to spit on WoW players since they are regarded as being so malignant, immature, and inept. It's just the tip of the iceberg, really.

PvE

Whatever happened to the tale of reason and madness, unity and betrayal, arrogance and humility, purity and taintedness, hatred and love, passion and callousness, self sacrifice and egotism, reverence and recklessness, which was always shifting, but always the same because of one single reason: an emotional connection with the consumer in the world of... Warcraft?

This tagline title is the one good thing that remains from World of Warcraft's predecessors. No matter how many dinosaurs are being killed in the Un'Goro Crater, it will still be dinosaur infested; no matter how many billions of centaurs are killed; they are still seemingly on the verge of attacking the Orc capital of Orgrimmar; no matter how many Jamaican fantasy troll counterparts are being killed, their cult will never lose ground. Playing a quest in World of Warcraft is like fucking a

prostitute. You might slightly enjoy it, but you still get that awkward feeling that a gazillion people have done it before, that you are being unfairly milked of your money, and that in the end you didn't really achieve anything.

PvP

Yet another typical World of Warcraft player. Notice the amount of fail on the "getting laid" meter.

The only way most WoW players could ever get laid.

Although WoW faggots never engage in heterosex IRL, they often "pwn" or "gank" each other within the game when not standing around cities shouting "LFG..." or "WTS..." In the years 2004 and early 2005, World of Warcraft players engaged in outdoor PvP action. Some leveling areas, such as Hillsbrad Foothills, in effect became warzones that the local inhabitants (levelers) had to flee from. Events like these suddenly disappeared after the addition of "Battlegrounds." Battlegrounds are instanced PvP maps similar to the maps in Quake. However, unlike Quake, there are only three battlegrounds that are bound to the same mission objective. Along with the battlegrounds, Blizzard introduced an honor system. Players gain honor by killing others. The more honor they possess, the better equipment they can purchase to pwn others. The introduction of the honor system made outdoor PvP action extinct for the reason that those who play on battlegrounds started earning much more honor. Since then, the only thing major about World of Warcraft is Blizzard's profit.

One of the reasons WoW faggots abstain from sex is that they prefer to be with "their own kind", but since WoWers rarely leave their homes (busy with the srs biz raiding), this is thought to be a filthy lie. In short, it's better that they don't breed.

Gameplay

Your average in-game enemy.

What your IRL character will look like after grinding WoW for a few months straight

You must first begin by downloading 40 gigabytes of client data and 20 terabytes of patches. It will take approximately half a month to download from their shitty P2P network, during which time you may continue chronically fapping to the internet pr0n and entertaining pipe dreams that you won't die alone. (NOTE: You will die alone.)

After managing to get past the buggy software and buggy login screen, you are given a 10-page questionnaire on deciding what server you will spend the rest of your life on, how many piercings you want on your character's cock, guessing which broken/overpowered class to play on, and other mundane details of your new persona (which will all wind up being more interesting than the details of your old persona).

After that jive, you get a quick lame introduction and your first quest. By the time you turn that quest in and get the second, you'll quickly realize what you'll be doing for the majority of the game. Your virtual you gains experience by questing (killing the same ten monsters over and over for experience), grinding (killing the same ten monsters over and over for experience), or just being lazy and following someone around "leeching" ("watching") them kill the same ten monsters over and over for experience. This involves venturing through eight surreal worlds with fel-demons, demons, and fel-demon-fels.

Once you manage to get to level 110 in "EverQuest for Kids", you will probably have to join a guild if you haven't already. Guilds usually set aside a few hours each night to grab as many of their members as possible and fight some sort of demon or dragon that drops an oversized weapon. This will spark drama over who gets to loot the weapon. You know, just like in every other MMORPG? However, it is increasingly easy to get into a guild as they have bots that spam invites to every new character on the server.

After you have drained hundreds of dollars into the game and succeeded in getting every epic internet sword and shiny armor, you will be granted the awesome and ultimate privilege of standing in the middle of a city where other players may click you and inspect your armor for the entire duration of your logging on.

If you haven't died from a pulmonary embolism, stroke, or any other clot related injury by sitting in the same position for weeks on end in front of your computer, you are offered the option of changing your race for \$30, changing your appearance for \$40, enhancing your cock for \$25, doing all this for \$300, and ordering a mini version of a boss that screams the same lines over and over to follow you for \$500. You may also change servers for \$250 and an extra \$50 per month.

WoW linked to Suicide and Mass Murder

Nobody was surprised to learn that cellar-dwellers who spend their days attempting to level up so they may battle dragons are more likely to turn into mass murderers. If you are extremely successful at killing others, they reward you with even better gear, allowing you to kill even more. The game intentionally teaches users how to kill themselves and others without consequences. This served as Anders Breivik's motivation. He did develop his psychopathy and murderous prowess on Azeroth.

"He doesn't seem to be very good at separating reality from video games, such as "World of Warcraft," or other virtual realities... —Thomas Hylland Eriksen (anthropologist)

What will happen to your kids if they play WoW.

WoWtards will undoubtedly dispute this information and resume their dragon-killing spree in an effort to practice killing in real life. It's also important to note that Elliot Rodger was another mass murderer who had a serious World of Warcraft obsession. Elliot was an extremely ardent player who spent the most of his childhood using World of Warcraft to waste away his pointless existence, while not being quite as committed as Anders (who was moderating one of the top guilds on the entire European continent). Kimveer Gill, who shot up Dawson College in 2006, mentioned playing World of Warcraft on VampireFreaks. Adam Lanza, who committed the Sandy Hook Elementary Massacre and killed 20 children and six women, also participated in this game. BAN IT NOW!!!!

The faggots that don't go on to commit mass murders are suicidal and will use awful methods similar to those in World of Warcraft to terminate their own miserable existence. For instance, after the game informed "Zhang Xiaoyi" that joining his deceased heroes in the game was conceivable, the game advised him that the best approach would be to jump out of his building from the 24th floor and fly like an eagle. However, unlike in World of Warcraft, the poor boy was unable to transform into a flying mount and instead fell face first to the ground, instantly inflicting over 9000 damage. Naturally, Blizzard was ecstatic to find that their game had successfully educated kids to follow their idols to the hereafter. The attempt to kill dragons also forced "Snowly" to die from exhaustion from playing the game for multiple days. Thereafter, Nan Ren Gu Shi joined him by also being forced to die a horrible death by Blizzard. Xiao Cai tried to eat sawblades after playing WoW.

People who claim that it is only a game are not to be believed. It's a device made to turn everyone into a mass murderer who commits suicide.

"My child acted like a drug addict who was out of control.,,

—Zhang Xiaoyi's father

Winners of WoW

1. People who don't play WoW.
2. Zhang Xiaoyi for an flying mount.

Races

The Alliance

The Alliance mainly consists of children and teenagers who sit on their character jacking off rather than doing their math homework, so teamwork and gameplay on this faction is a smorgasbord of unorganized disaster and AIDS. Everyone is a goddamn Night Elf.

Race Racial Skills Description

Manboob.JPG

Humans • Pussybitchness increased by 10%

• Alcohol level increased by 0.3%

• Every man for himself The only available race where players can feel safe without having to know they aren't some retarded mutant like in IRL. The men are abnormally bulky and the women have unusually large heads.

Gief moniez plox.jpg

38, https://encyclopedia.dramatica.online/World_of_Warcraft

Dwarfs • 100% increased nose

- 50% increased backstab critical hit

- Treasure finding The dwarves may be Jewish: Huge noses, long beards, retarded dances, and a racial ability to find treasure.

Midget Porn.JPG

Gnomes • 13 year old no life passive

- 30% increased suicide by explosion

- Escape artist This race is commonly played by 13-year-old boys who spend all day PvPing instead of graduating middle school. Due to their small size, this is also a favorite race of pedophiles. In addition, they can be used as cannonballs in a pinch. Gnome players will generally use names with the word "gnome" in it because it's hilarious.

Alizee dick.gif

Night Elves • 5% increased bestiality

- Passive blueness

- Shadowmeld The whores of the Warcraft world, closely modeled off of Alizée, and the closest thing Blizzard has gotten to anime in order to increase sales due to all the stupid Naruto fanboys out there. Mostly played as female by men to get attention from other men and epic lewt under the guise of being a hot Camwhore. Also fans of Al Gore and friends of the environment. Night elves live in trees as a political statement are most likely Liberal douchebags.

Blu aardvark suit2.jpg

Draenei • 2% An hero

- increased ruby scripting

- Gift Of The Naaru The first expansion race gives the Alliance big blue Russian aliens with penis-tails for their beard. They can be found in Shattrath City, getting drugs from their dealers known as Naaru.

Worgenhomolove.jpg

Worgen • Increase your yiffing by 40%

- Passive doggystyle

- Skinning

Because so many wolfaboos bitched over how the Alliance didn't have a furry class of their own, Blizzard decided to be retarded and give them what they want. Now every user will be yiffing each other as soon as they buy the damn expansion.

The Horde

The Horde consists of a mixture of neckbeards, fat, and acne. They will always win in PvP matches and kill the dragons first. The amount of points in Internet damage they can do is directly proportional to their weight in pounds. Everyone is a goddamn Blood Elf.

Race Racial Skills Description

Gay Orc.jpg

Orcs • Fisting increased by 1%

- Passive Gay Fury

- Hardiness

Orcs are big, have an unusual skin color, and prone to anally rape small moving things with battle axes. Players who use this race are whiter than white.

Troll giant.jpg

Trolls • Red Eye

- Ganja slaying

- Da Voodoo Shuffle They talk like Rasta men and probably smoke a ton of mojo, mon.

ZombieSaveTheChildren.jpg

Undead • Touch of the child

- 5% forsaken child

- Cannibalize Goths use these, period. Just start smoking Djarum Blacks now. Also a favorite of PvPers because they're impossible to kill.

Hellbovine.gif

Tauren • Milk

- Leather

- Endurance This race is the ideal race for furies and neckbeards. Half of the Tauren userbase will have the word "moo" or "cow" in their names because they think they are clever and internet-funny, when in reality they need to cut off circulation to their dick and set themselves on fire.

Elfy2.jpg

Blood Elves • Gay Affinity

- Sperm Torrent

- Arcane Resistance (to rape) *Blood Elves: The other ridiculously faggoty elf race of the game. Joined the Horde BAWWWWWing because the Alliance wouldn't give them respect. Surprisingly, neither does the Horde. The males look like a cross between rejected Sephiroth/Dragon Ball Z fanart and the females are anorexic bitches. By law, all blood elves are named some variant of "Legolas". Any other name is unacceptable.

WoW Goblin.jpg

Goblins • Cock

- Black Cock

- Best Deals Anywhere A clever mix of gnomes, orcs, and Jews. Like gnomes, they're popular with the rest of the races for their potential use as projectiles and footballs. Unlike gnomes however, they violently explode when used as such.

The Neutral Race

Because Blizzard was too lazy, they decided to add a race for both faction on the Alliance and the Horde, and made this.

- Pandaren: Basically, you get a panda, and a man, mix them together, and you get THIS furriness of a race. They resemble to asians and are loved by many...err...half of the playerbase. This race is proven to convert non-furtag into yiffing furtag. Warning: This race resembles Kung Fu Panda, bringing in girls and kids to the game.

Be a Panda.png

Classes and Talents

After choosing a race, the player is given the choice of what class they should choose for their character. Blizzard employees insert a marble dildo halfway into their asses and type on their keyboards with the base of the dildo to make changes and balance fixes in the game with upcoming patches.

That's the World of Warcraft That You Play!

Previous Video | Next Video

A mighty Orc warrior slaying a fearsome basilisk.

Warrior

Melee fighters that use rage as a resource. They suck at dps and can't pvp for shit since all the ranged classes pwn them and they can't use any spells since they need fucking rage, causing you to generate rage irl. They are however piss easy to play as in pve since they don't need to give a shit about mana since rage generates itself in combat. The only use of this shit class is to play as a tank but you are fucked if there are no healers since you have no healing spells.

- Arms: You use your fucking arms, spin like a ballerina and die constantly.
- Fury: Grants warriors to equip a giant dong in each hand, so they have an easier time being faggots. Remember to always use raging blowjob when you have 2 charges.
- Protection: A curious name for this, as these are the biggest AIDS on this planet. Nobody knows how to play them, so expect your group to fail every time this is the tank.

Wow Paladin.jpg

Paladin

Everybody expects this class to heal, and if you do anything else, people will hate you. Because it makes perfect sense that the class in full plate should stand in the back and heal. Paladins may be mods, as they drop large hammers on other players while they hide in a bubble so that Noone can do anything to them. After they get bored, they will cast a 10 second long spell that teleports them to Japan. All paladin names are variations on "Arthas".

- Retribution: If you choose this branch, just start over. The goal of this class is to get holy power, then spend it, get holy power, spend it, get holy power, spend it, get holy power, kill yourself, spend it, get holy power...
- Protection: The tank of the game. Which is not saying much. Basically, whilst in a fight you get an extra five seconds of life. It's the kind of thing where you think you're getting the best of the best, but is really isn't much different. Only good for raids and tanking. Also enjoy your 1 million life points, and your zero real life points.
- Holy: Absolutely useless. Can't heal. Can't do any damage. Needs to do damage to heal. The damage will suck, and your teammates will scream at you because you used an offensive move, so that you could use your defensive skills.

WoW Hunter.jpeg

Hunter

Most popular class for CASUALS. You capture poor, defenseless animals and make them your slave. It's also the base of every argument on thottbot.com to dictate that every weapon is a "hunter weapon" considering ranged only classes need +Strength for their 3 melee attacks. Hunter names are unremarkable, however their pets' names are always hilarious; exempli gratia; spiders named WEBU or cats named QUIETDETH.

- Beast Mastery: These hunters have wonderful sexual experiences with their pets, which motivates their pets to fight harder. Take this if you are a furry. Your pets can fight on their, so you don't even need to be in the game, which is a plus.
- Marksmanship: Expect to do less than the other huntards if you choose this, as it absolutely blows the ass.
- Survival: LOL TRAPS ARE ABSOLUTELY USELESS.

WoW Priest.jpg

Priest

The whiny healing bitch. Played only by faggots who like to attend 80-man raids on a finicky AOL connection. Their purpose is to beat the tank in aggro to die and fuck over the raid group. All priest names are a variation of "Nohealsforyou". Blood Elf Priests LOVE the name "Priestitute" (no matter which gender is their character).

- Discipline: So I herd you liek shielding. Now you can shield while you shield while you shield in a shield.
- Holy: I died ;(Oh, np, can still heal like shit. Play Discipline instead.
- Shadow: Years of raping kids has not paid off, as this is the weakest DPS class. Expect everyone to pass you in instances.

Andersnordic

Mage

Only for making food and water for the Koreans; serves as a dispenser. All mage names are a variation of "Frostitute". This is the class that will teach you how to kill innocent people. Playing this class leads you to massmurdering.

- Arcane: Maintain your mana. Don't move, ever. Do this and you will win the DPS.
- Fire: Wait for Pyroblast to proc. Spam other abilities that don't do shit. Wait for Pyroblast.
- Frost: ICELANCEICELANCEICELANCEICELANCEICELANCEICELANCEICELANCEICELANCEICELANCEICELANCE

WoW Shaman.jpg

Shaman

The most overpowered class in the game. Shamans can plant some stupid totems that do nothing, but they can also heal themselves while dealing ridiculous amounts of damage and immediately come back to life when they are killed. Shamans are brought to raids for their ability to pass out amphetamines and speed up the raid quickly through boring content.

- Enhancement: Similar to Beast Mastery hunter, except Shamans are specific and only do it with wolves. This is for retards who still want to do high DPS.
- Restoration: Piss on everybody to heal them. Occasionally drops a magic dildo which floods the area with cum.
- Elemental: These shamans are similar to Arcane Mages, except they can move earth with their dildos. Use lava.

WoW Druid.gif

Druid

The class where you can become MOAR FURRY, or otherwise just serve as another healing bitch. They are clearly a cheap hybrid-class knockoff of the superior paladins. The previous sentence is guaranteed to cause EXTREME FUCKING RAGE in chat. All druid names are a pun on "tree" or "kitty".

- Balance (BOOMKIN): YOU TURN INTO A GIANT SPACE-CHICKEN AND SHOOT FUCKING LASERS EVERYWHERE THAT DON'T DO ANY DAMAGE
- Restoration: Giant wooden dildo that heals people by throwing leaves at them.
- Feral: Either a cute kitten that requires everything to bleed or a giant motherfucking pedobear who is only useful as a meatshield.

What a warlock looks like IRL

Warlock

Like hunters, but Satanic. If you enjoy being a huge, overpowered faggot, warlockery is for you. Requires being able to hit five buttons (four if you're Destruction spec), those wacky warlocks! Usually played by [trenchcoat-wearing goth sodomites. All lock names are puns on "DOT", and I do mean ALL lock names.

- Affliction: You specialize in giving AIDS and cancer to all fucking players while slowly sucking their cock.
- Demonology: Same as Beast Mastery hunters, except warlocks prefer demons and necrophilia over animals.
- Destruction: Set everything ablaze. Enjoy getting raped.

Rogues do it from behind.

40, https://encyclopedia.dramatica.online/World_of_Warcraft

Rogue

The bane of life on the "pvp" server. Also, the lulziest class in the game. This class is only played by 13 year-old boys. Rogues only require you to be able to hit one button. Modeled after the classic rapist, Rogues are commonly seen in PvP applying poisons and incapacitating other players to facilitate a full-on rectal assault to gather combo points and unleash a finishing move. All names include "shank", "stab", "shadowstep" or some combination of the three.

- Assassination: wanna-be-Ezio, but in reality, a shitty spec no one plays with, because why would you want to poison someone when you can sinister strike them?
- Combat: You sinister strike them.
- Subtlety: Subtlety rogues sneak upon people and give them surprise buttsecks.

WoW Death Knight.jpg

Death Knight

The first "Hero Class" in the game introduced with about an hour of quests in new locations YOU WILL NEVER FUCKING SEE OR MAKE REFERENCE TO EVER AGAIN. Introduced in the second expansion (see below), they start out evil but are soon presto-changeo'd into good guys so they can fit in with the rest of society. This is the exciting brand new class that everyone makes, but no one will bother inviting because there are TOO FUCKING MANY. They are as useless as warriors, as Blizzard was creative enough to make them exactly like such. The only new thing this class comes with is a character voice that sounds like they have semen trapped in their lungs. While the Blizzard Employee was writing code for the Death Knight, he realized that all files have completed downloading and decided to choke the chode rather than design a playable class. As a result, blizzard has promised changes to Death Knights in the next expansion so that everyone won't leave when they see a death knight in their dungeon group. Death Knight names are possibly the best thing about the game. Unfailingly hilarious; some examples that actually exist: Dethmurda, Kilraper, Dalichking (nearly every DK is named some variation of this), Bluddymrda, and the ever-suave Eaturpusi.

- Blood: GAY HOMOSEXUAL FAGGOT who can tank bosses. Can heal himself better than a raid-gearred healer could, which of course makes them very balanced in PvP.
- Frost: Enjoy doing less damage than the tank spec.
- Unholy: As a good whore DK is, unholy DKs spread all the fucking diseases from syphilis to chlamydia to their opponents while buttfucking their ghouls. Completely useless. Does even less damage than Blood and Frost.

WoW Monk.jpg

Monk

A class that completely ripped off the Kung Fu Panda movie without even trying to hide it. Basically, this class gives you a good reason to bring 8 year olds who know nothing about Jackie Chan (except that it is famous) and fuck everyone up for not learning how to grow balls. This class is featured in Mists of Pandaria so it isn't the "monk" you thought of in history, it is composed of furry chinks who wants to out populate the emo Death Knights. When the expansion comes out, don't expect to see a lot of furry fucks punching everyone else since EVERYONE is rolling a PANDA MONK.

- Brewmaster: LOLLLLLL SO FUCKING DRUNK :PPPPPPP THESE MOBS CANT EVEN HANDLE ME RIGHT NOW
- Mistweaver: Healing mist, so creative Blizzard. Oh, and some fucking orbs, too.
- Windwalker: Typical wanna-be-JackieChan.

Demon Hunter

With the launch of Legion, you can now be an Illidan fanboy and roll your Elven class as a Demon Hunter. Basically an overpowered class for noobs and edgy teenagers, if utilized effectively, Demon Hunters are pretty much god.

Expansions

Burning Crusade (BC)

Boring crusade.png

- The Burning Crusade

The first expansion for the game lets you play as a Draenei for the Alliance and a Blood Elf for the Horde. It also lets you go through the Dark Portal and fight Illidan Stormrage and Kael'thas Sunstrider. Patches later you fight Zul'jin and the final boss Kil'jaeden. You spend around \$100 for the expansion and prepaid game cards to grind your character to level 70. Nowadays nobody plays this area unless they have to. The expansion's only contribution was to make fap fodder for the horde, so the 13 year old kiddies could fap to their blood elf shooting fireballs.

Wrath Of The Lich King (WOTLK)

WoW Wrath Of The Lich King.jpg

- Wrath of the Lich King

The last time Blizzard had a distinctive idea and a following was with "Wrath of the Bitch-King." Unbeknownst to humanity, they decided to kill the most important character in World of Warcraft lore for no apparent reason, annihilating the cosmos and what was left of it in the process. The Bitch King is the traditional emo-cold-dipshit character who falls somewhere between a vampire and a zombie. Who the hell knows at this point—he may be a wizard, but he fights with a sword, and he may possibly be some sort of necromancer. You could simply call him Elric of Melniboné 2.0 and go on, but I think Elric's too avant-garde for the audience. Anyway, we get to go to Blizzard's version of Antarctica and fight against penguins, walruses, and Vikings. Why not just mix everything together? These fools speak a bizarre language that no one can comprehend. Out of nostalgia, they added a "new" class and brought back the AshBringer. Blizzard transformed into a gold-sucking-device as fans approached the stores, chanting "pop-it, lock-it, time to pick-pocket," before just sucking their wallets from their butts. With all of the cash, Blizzard had the means to start new expansions for the following 10 years. World of Warcraft's entire historical incident cemented the game's eventual collapse as a titan of the MMORPG genre. Everyone understood that after Arthas, nothing more or less existed. Feeding the stupid baboons who were still playing this game was like banging your head against a wall. This was the last thing.

After the "fall" of the Lich King, the number of subscribers began to decline. The neckbeards desired both something novel and also something familiar and comfortable. What a group of idiots. Nothing Blizzard did was sufficient since there is no way to appease these infants. People continue to play the game despite the fact that it is a pointless, monotonous piece of crap. This merely serves as proof that a company can employ apes to sell a substandard product. As a fuck you to the player, you were unable to loot Arthas's sword, the armor, the crown, or anything else because they were all broken. You receive a pathetic fucking axe that Arthas allegedly kept in his ass, perhaps to make him walk weird.

Cataclysm (Cata)

WoW Cataclysm.jpg

- Cataclysm

The addition which made mocking WoW cool. This is the latest expansion. An expansion to World of Warcraft that the dragon Deathwing woke up from the wrong side of the bed, turns Azeroth into a ruined world and it's up to former warchief Thrall to save the world from Deathwing and the Cataclysm. In this ruined expansion you can play as the new Alliance race the Worgen, a species of werewolves who owe you long time, and the Goblins to the Horde. You can spend all day grinding your characters to level 85 and you also get the same boring worlds from the original game with lava and a cult of satanics added. Not only that but you have to deal with the Horde's new warchief Garrosh Hellscream who everyone can't stand of, not even the Horde. The classes has expanded for races to play as, including a Dwarf Shaman and a Tauren Paladin. To quote Blizzard about the Taurens as Paladins, "Holy cow!"

Mists Of Pandaria (MOP)

WoW Mists Of Pandaria.jpg

- Mists of Pandaria

a.k.a. "World of Warcraft: Kung-Fu Pandas". For the first time in this expansion you play a neutral race known as Pandaren. You play through the storyline of a bunch of fat pandas and at the end you decide to go to the Alliance or the Horde. Mists of Pandaria also added the Monk as a new class, and a new southern continent Pandaria where you level your characters to 90 and protect the pandas from ancient enemies like the Mogu, the Mantid, and the main enemies the Sha. Garrosh Hellscream is the final boss of the expansion which is the least best thing to do in the expansion. After Garrosh's defeat instead of killing him, he goes to Pandaria court for shitting on everything. Thrall gives Vol'jin leadership, making him the new warchief of the Horde.

Warlords Of Draenor (WOD)

41, https://encyclopedia.dramatica.online/World_of_Warcraft

Timeline explanation.

- Warlords of Draenor

a.k.a. "Fuck It, Let's Remake Everything", is the fifth expansion that's headed back in time to the horde's original home Draenor, Outland before it was Outland. There, you'll find the usual crap like a raised level cap and new zones for faggots to explore. There are also some storylines, including going back in time, fucking your mother, player housing with NPCs that can run dungeons for you, revamped raids and inventory systems, and fucking your mother some more. The story will begin with Garrosh Hellscream, former warchief, fagging the fuck out (again) and making a new "friend", brisking into the past to prevent the Horde from getting cursed and ultimately setting the events of the original storyline in motion.

His plan involves uniting the various orc clans to form his own Horde. Basically, the ingame equivalent of the real events that happened before Genghis Khan raped the entire globe. Blizzard yet again steals real world history and pours it into their shitty pixelated concoction. I guess their playerbase is too retarded to know 8th grade level history. Blizzard explained that this new world will have new oceans, skies, and giants. HOLY FUCKING SHIT! Undoubtedly retarded, however, is the fact that now you can set up your own home base almost anywhere within the game, and while they do, in fact, occupy physical space in the game world, they are not instanced. Just so, when you're walking around killing your scorpions and unknowingly walk into an enemy "home", you now have the opportunity to get fucked beyond recognition.

For one, these "homes" are not just some glorified basements, but instead they're basically huge ass fucking fortresses with walls and towers and other typical stuff. They house NPCs that come stacked into small armies, which you can upgrade and customize for whatever reason. You'll even be able to send your personal army to run dungeons, meaning that you really don't have to do anything anymore; just throw your monitor through a window and you win. Basically, if you're too lazy to play a video game, now you have the option to make your game play itself. Your "homes" give you access to professions you wouldn't be able to use. You can now sculpt a wooden dildo while cooking a sandwich. You are a mystical hero. Also, you can pick your "home" location and move it at will.

I can't wait for luxurious villas in physically impossible spots, like in a volcano or in Bobby Kotick's soul. What the fuck will happen to the game world when every available space is crammed with walls, towers, and houses? Who gives a shit? Blizzard is bringing back an old dungeon: you've guessed it, the Vatican. Actually, it's the Upper Blackrock Spire. Who, what? Exactly. For those of you that live in the real world, this is the dungeon where some nerd faggots once did some stupid shit and it got viral, and now Blizzard will undoubtedly make an official reference to that crap somewhere inside, just so you can preemptively scratch out your eyeballs. On the PVP side, the new addition is a new sandbox map called the Assrun. Also, the "ancient" playable characters get completely remodeled so they can look even more retarded. The dwarfs get bigger noses and the orcs get thicker lips, just in case, all these years, you couldn't guess their reference.

"What kind of world forges a race like the orcs in the first place? It is a brutal place... — lore master Chris Metzen while goatseing the entire showcase.

Legion [LEG]

Expectations VS Reality

- Legion

a.k.a. "This Isn't The Burning Crusade", is the sixth expansion, which is basically a carbon copy of the first expansion, just sprinkled with different shit, including the usual plethora of gimmicks, in order to elude the morons who buy this garbage. For the more advanced cretins, they had to add some new characters that nobody cares about and the long-promised "hero" class, the Demon Hunter. Since this is enough to start a chain reaction of cringe-inducing hysteria among losers, there's a 50/50 chance other idiots will jump on the bandwagon to pre-order this crap as well. Not that it even matters, because watching a paint drying marathon with your friends, in your backyard, is more entertaining compared to this game, so after the hype dies down, nerds will slowly but surely fuck off, just like their whole community, which already started circling the drain a long time ago.

Blizzard knew from the start that at one point in time they would run low on dipshits, so they preemptively planned to release a gazillion more expansions in the future. Over a decade later, they're still hoarding fucktards. Too bad we can't simultaneously blow up their computers and rid this world of some waste. The story of the expansion starts right after killing the final boss in the last expansion. NO FUCKING SHIT! Gul'dan (some orc-wizard thing) from the second timeline (yeah, don't ask) ends up in the main timeline (seriously, don't ask) through a magical pink portal or some shit. Maybe it's a subtle hint to the player that he will never enter one. Anyway, Gul'dan plans to bring back the Burning Legion to have an even greater effect than the last time. Like this would actually fucking change anything, since there's literally no stake in this game, no matter what happens, since Blizzard will still piss out more expansions as long as they have a playerbase, so anything you do becomes instantly null and void.

Oh, also they found that purple-blind Satan looking mother fucker from the first expansion, locked in some tube, after everyone anally drilled him into submission. Ironically, he's supposedly the fan favorite, because he's all deep-voiced and filled with angst. Don't forget- GLOWING FUCKING TATTOOS. He's apparently a goody two-shoes now and teaches everyone to be a faggot. Like that needs teaching. The character models of the Demon Hunters look like scrapped Devil May Cry monsters, duct-taped one on top of the other. Also, there are female versions, with demon tits, in case bitches feel left out. Good, now people have more material to work with when they make shitty porn. "Artifacts" are introduced, if you can call a clusterfuck of sparkling pixels artifacts. Basically, some "famous" weapons from the lore that you couldn't previously obtain.

Some of them have edgy names like "Maw of the Damned" or really unpronounceable shit like "Felo'melorn" and are double the size of the player model to exude the allure that they're special, like the player. What's next? Glowing armor? Wings? The fuck is this, Mu Online? The only use these weapons would have for the world would be if they could materialize out of thin air and kill the sad shit who obtained them. You can now fuck around on "The Broken Isles" until you reach the new level cap of who gives a fuck. Broken, get it? Like the souls of the turds making and playing this game.

Battle For Azeroth [BFA]

- Battle For Azeroth

Following the climax of Legion- in which Sargeras momentarily teleports behind Azeroth and stabs the universally loathed zone Sithilous (or whatever the fuck its called) with his giant sword; resulting in the magic life force of the planet leaking out or some shit. Said life force holds extreme amounts of power which, in conjunction with Old God scheming, corrupts literally everyone and causes massive civil wars and world war 583 between the Horde and Alliance. Blizzard finally got it through their pea sized brains that people hated the casualization and faggilization that was Cataclysm, and so are attempting to appeal to their 8 million lost subs by a vanilla/WC3 styled xpac, oh and also announcing World of Warcraft: Classic, an upcoming official vanilla server. However, it is likely that they'll casualize and ruin the server anyways to appeal to the 98% of the current WoW population that consists of chads and newfags whilst all the OG players long since fucked off to private servers where community actually still exists.

Features of this expansion are 10 more tedious levels of repetitive content, some lame reskin races, another overpowered legendary system (that defeats the purpose of MMOs) and moar. Blizzard realized that having linear leveling was a pain in the ass and ruined the game for people with alts, so they will allow you to level each two expansion's content at the same level range (e.g. lv60-80 for BC/WOTLK). Still won't help the fact that the game is boring, outdated and tedious as all hell.

Guilds

Your typical World of Warcraft player. Note the mutated jawline and cosplay dress.

Like every MMORPG, in order to see the vast majority of the game, players will need to join a guild. The purpose of a guild is to enable the guild master and his best friends to get run through the high level dungeons so they can gear up their characters, so they can go into the next dungeon and get the next set of gear for themselves. It is the responsibility of the other guild members to somehow get their own gear so they can help keep their online masters clothed in the most fashionable of equipment.

Guilds tend to be a great source of drama, especially when epic loots are involved. Due to this, guilds seem to form up and dissolve every second.

Occasionally, guilds go batshit insane clearing bosses, finishing content faster than Blizzard can hammer out. Butthurt about having to produce content while basement dwellers fork out \$15 a month, Blizzard, being the Jews that they are, decided it was more cost effective and lulz inducing to drop the Banhammer on such guilds (2010) than create more content. Naturally, much drama ensued on the forums and many members threatened to stop their \$15 a month subscription if their rightful loot was given back and ban's were lifted. Blizzard's response was the Banhammer to many other instigators of drama, solving many server capacity problems.

Blizzard is also strongly opposed to debugging software, and when glitches and exploits are reported they will drop the Banhammer rather than fix anything or admit their mistake. Whenever a Guild gets a "World First Kill", they will be swiftly banned for awareness of numerous exploits. This is how the game is beta tested. This will happen repeatedly until the next 10 patches come out and no one can remember anything about it.

Guilds on RP (Roleplaying) realms

You might encounter more strict laws over guild names and their contents on roleplaying realms such as Argent Dawn (EU), where your guild name is forced to be IC (In character), otherwise the Game Masters would not hesitate to punish you if some player(s) report you. However, you might also notice some exceptional guilds on this merciless realm which shine like bright sun over all the darkness. A good example would be DEFNDERS OF HEV RP. These brave warriors are led by General Shikorodoro and his comrades; Rōman, Philippson, Mythrios and countless number of other Doro members. They are type of guys that you will fucking

hate and love at same time. They speak their own language called "Elwynnian" which is believed to be a dialect of Mongolian, but it's still quite different and unique. They mainly operate in wild Elwynn Forest, particularly in Stormwind City and Goldshire. Quite interdasting bunch.

Another interdasting example from the same realm would be The Stormguard. The Stormguard is a military roleplaying guild that basically does nothing but to walk around stormwind with big ass armor on their boosted characters. Led by a female character that has serious sexual issues and believes she's a man.

Guilds on PvP (Player versus Player) realms

PvP guilds are generally regarded as badass and cool, but extraordinary types are present.

Dara Mactire, or however the fuck it's spelled is a way too serious PvP guild located on the US realm Darkspear. I think, well they are everywhere now even on the EU. They are a bunch of nerds that think it's cool to add in way too serious dubstep intros with serious editing skills that form the word: Dara Mactire. Funnily, it was nothing until Swifty joined it and made it famous because of his fanboys wanting to be in the same guild as their hero. Yet, nobody even know who their fucking guild leader is as hes an ungreatful twat getting his guild famous without even making any kind of video to thank Swifty for promoting him from a loser to a even greater loser.

A Bunch of Gankers, formerly called The Holy Half deads, is a bunch of people that never knew how to PvP yet wanting to believe they could, gathered in one single guild. So therefore it's an army of noobs that work like a zerg unit. Overwhelming their enemies by pure numbers. Their guild leader, whose name is Fail. Has been kicked out of several servers before, as they now are somewhere only higher powers knows. They will probably keep on changing realm as they get asskicked by every single pvp orientated guilds on each server.

Guilds on PvE (Player versus Environment) realms

This type of guilds are probably most common type of guilds you can find in any fucking realm. They are usually underestimated by PvPers and viewed as pussies, losers, nerds and such.

Ensidia, or something, they change name the same often as normal people change their underwear. Is a guild filled of PvE noobs that are way too bad to even be serious and competitive PvPers so they try to look skilled and hardcore by focusing nobody else links to skill: PvElol. Their guild leader, Kungen, meaning king in Swedish has never ever even killed a player from the opposing faction. Not that he would be able too if he saw one, as mentioned, thats why he choose PvE. Because it's not enough to kill million fucking NPCs to reach the maximum level. They want to torment themselves by questing and doing worthless raids even more.

The Official WoW Forums

As with most good MMORPGs, World of Warcraft has its own public forums. Subscribers can discuss tactics, roleplay, offer up item trades and sales, and of course, bitch and moan about how the game sucks and everyone should be playing Warhammer instead. (Which they SHOULD be.) Chuck Norris jokes, horrifying roleplay, "hug a class" posts, trolling posts, worthless bug reports, really STUPID suggestions for future patches... All that and a bag of chips is what you'll find within these hallowed walls.

Additional instances cannot be launched, please try again later

"We are aware of the concerns regarding situations where players are unable to zone into an instance due to an instance limit being hit, which results in a message stating that additional instances cannot be launched. This limit was implemented as a short-term solution to preserve the gameplay for players who are already in an instance and to prevent numerous issues that can happen when too many instances are active at the same time, but we are currently working on better solutions to ensure that players can get into instances when they want to.."

—Bornakk, a concerned GM

Previous Quote | Next Quote

Some time after the release of the second expansion pack (see above), a massive "bug" was discovered in World of Warcraft wherein people could no longer gain their epic lewts. When a player tries to enter a dungeon portal, a large message will flash on their screen stating "Additional instances cannot be launched, please try again later". Most people took great offense to this as they figured since they were giving Blizzard their money, they should be entitled to do what they want when they want how they want. The truth of the matter is that Blizzard's hardware just can't keep up with all the people "raiding" at the same time. Naturally, people just don't want to believe this due to the fact that Blizzard takes in at least \$165,000,000 USD a month in revenue. (\$15.00/month x 11 million people.) What people don't seem to realize is that Blizzard also wants people to GO OUTSIDE AND GET SOME FRESH AIR YOU FUCKING LOSERS.

Porn

WoW creatures at play.

Take your pick:

- Horrific live-action WoW porn
- Horrific drawn WoW porn
- Horrific drawn, live-action and 3D WoW porn

Blizzcon, Also Where Nobody Gets Laid

Occasionally WoW players will leave their homes for what the blue names call "Blizzcon", and what WoW players call "5V/337 d00d". Here, a large number of "WoW patients" can be seen. Their complications are diverse - ranging from mild conditions such as Carpal Tunnel and Leetspeak, to a severe case of ugly.

Sometimes attractive people can be seen at a Blizzcon claiming to be WoW faggots. These are not really WoW faggots; they are models paid by Blizzard to appear at these pathetic vomit-inducing functions.

Blizzcon features a wide variety of activities;

- Class Q+A: a forum for people who play hunters to make death threats to Metzen whenever playing their class approaches any kind of difficulty, and for ret paladins to complain that every class but them is OP because they died twice in a WSG last year.
- Lore Q+A: exactly as retarded as it sounds; a bunch of chinless, manboob-sporting retards screeching at Mezten because Thrall's Jaina's left testicle is saggy in-game than it's described as being in the official novels.
- Dance Competition: an assortment of spastic, bony individuals who either do an extremely easy dance from the game or fail horribly at a more difficult one. On occasion a morbidly obese person will attempt one of the more athletic dances. The result is rather like watching a plane crash.
- Costume Contest: these deeply unattractive people are paraded in front of the crowd; the usual assortment being obese men in their twenties wearing paladin gear clearly made from cereal boxes; ugly girls who clearly worked very hard on their costumes but get no applause because they're not physically attractive, and sluts with shitty costumes who get a standing ovation because you can see their nipples, causing most of the crowd to go into a sort of feeding-frenzy.

The only reason to go to this convention is to seal the deal on finally quitting WoW, realizing that these are the horrible people you have been playing with.

Addiction

What you are doing when you buy WoW and these expansions

Nuvola apps xmag.png Moar info: MMORPG Freak Out.

Sufferers of the WoW addiction commonly refer to themselves as "WoWers", "GamerZ", or in the most severe cases as "Alliance" or "Horde".

WoW addiction goes through several phases, phases of chemical drug addictions. This should comes as no surprise, as the Blizzard employees are reportedly paid in crack. WoW takes several steps beyond mundane addictions, with increasingly unstable behavior. If you have a friend or colleague whom you suspect of being a WoW addict, it is important to carefully gauge their level of addiction before taking any other action.

- Check their room for a "WoW" box, subscription card, or wrist brace. Often early signs such as this can make all the difference, since while it's unlikely they will be cured, you can take action to prevent friends and loved ones from being infected.
- If you happen to walk in on a WoW'er during on of their sessions, (as is most likely the case since that's about all they ever do), DO NOT and I repeat DO NOT, interrupt the game. He may try to gank you with his replica sword he got at the Renfaire.
- It's entirely possible that you may catch a WoW'er during an intense masturbation session (typically mid-cyber in the tram). You have been warned.

43, https://encyclopedia.dramatica.online/World_of_Warcraft

- From bank statements, see if they're buying from Chinese gold farmers. If you find this to be the case, you can be sure their addiction has taken precedence over any other financial considerations, and should immediately remove any items of value from anywhere in the area. Don't worry, they'll be too busy grinding to stop you.

- Severe addicts will commonly be in the habit of shitting in socks so as not to leave one's seat and thus get ganked by some level 23 loser. These hopeless cases are referred to as "poopsockers", and should be terminated with extreme prejudice.

There are but four cures for WoW addiction:

- Their self extermination. Preferably through fire.
- Assisted extermination by a merciful soul. Preferably through fire.
- Having a shred of willpower, and selling your account for many real dollars to some more-addicted sucker. Then you can buy delicious cake.
- Make them play Darkfall for a week. They'll be sure to never play MMORPGs ever again!

Players spend countless hours over this game. It will be hard to break them of their addiction, but in rare cases, if they kill themselves like Shawn Woolley did with EQ, you can Lysol their PC down and sell it. Sometimes some fags kill themselves just because they get so attached to it.

- There is however a risk with breaking a WoW players addiction by force. Certain under 18 players are prone to extreme meltdowns on the scale of Chernobyl. Scientists point to this phenomenon triggering when said players parents deny access to World of Warcraft. It is highly recommended that anyone living within the vicinity of said players immediately evacuate.

Slavery

fuck dose whiteys ben racist1111

Farming is srs bzns for Azns.

Modern slavery is known as "Gold Farming" and is intended to keep the Yellow menace down. When the United States banned slavery, it was a very sad time for slave owners. Later, the black person started to demand reparations, so something simply had to be done. The Man decided that slavery had to be moved offshore, to ensure continued economic prosperity for Microsoft.

Farming has been around since before the Internet, but nobody could ever figure out how to grow money until Ultima Online was invented. It isn't known who made the initial breakthrough, but it's thought that Alan Greenspan's lackeys were primarily responsible, since only they could have conceived of such a brilliantly sick and perverse means of enriching themselves. However, the advent of the practice was probably inevitable, since despite their addiction, WoWers often find themselves unable to play 24 hours a day and must find another way to continue while they sleep, eat, or go to the bathroom. So, for \$0.50 per hour, a barely-educated commie living in a sweaty room will play WoW for them. Needless to say, the commie himself earns roughly \$0.05 per week.

Sometimes it's difficult for players to distinguish the gold-field workers from monkeys or robots. They often repeat the same mistakes and speak gibberish (like monkeys!) Work is being done to translate some of their moonspeak. Know your Chinaman by these phrases: "ni hao," "[Krol Blade] ok??" "water 1g?," "is 4 guildie," "deal giev ok??10g," and "tusoNgaMe \$5 4 2thousand free!"

Those that speak English become the "boss boss" and take all the money, while the slaves do all the work.

Trolling Techniques

Showing those fucking paladins how it's done.

These generate various effects - some bring lulz and some just fail. Experiment and find your own lulz. However, Blizzard, like most companies, disabled trade/chatroom from trial accounts, because of Chink gold farmers. A paid account is required for the best effort in lulz.

1. Set auto follow on new players; for whatever reason this really pisses people off.
2. Join parties for dungeons as a healer and then leave about halfway through without saying anything. It works very well. Bonus points if you leave while your group is fighting the last boss of the dungeon.
3. Lead a party into an instance and then randomly boot players from it.
4. Start listing the name of movies with "Murloc" in the title like Indiana Murloc and The Temple of Doom or Debbie Does Murloc.
5. If Horde, start shit with people in Barrens chat. It's a non-PvP area filled with low level players, so they can't hurt you or retaliate. You can troll to your heart's content.
6. Join battlegrounds at the lowest level possible, and start talking shit about how people have no fucking idea how to play the game.
7. Ninja any piece of loot. This will require a time investment, but if you steal the right piece of loot, you will ignite a shitstorm of drama that should keep you entertained for at least five minutes. You won't get banned as long you're not stupid enough to post loot rules in chat, GMs won't have anything to pin on you.
8. Tell people what to do, and when they say you have no idea what you're on about, retaliate with "Your such a noob, I have five level 80's and three Death Knights, I know what I'm talking about".
9. When using the auction house, be sure to put up shit people need without buyout. Then pull it off the auction house before it sells - this is essentially the closest any WoW player gets to the transfer of goods between consenting individuals.
10. Announce in trade chat that [name of player] is quitting WoW forever and is giving all their gold to the first person who whispers them!
11. Ninja a Bloody Apron as a rogue from a priest who doesn't need it but will whine to their guild to boot that rogue
12. Link any item in trade chat, and state that the last person to link the same item will receive a large sum of gold.
13. When in dungeons as a hunter or rogue, use Misdirection or Tricks of the Trade on a healer and attack a large group of enemies.
14. Play as a warlock and fear inside an instance, lulz and rage will ensue.
15. Bitch loudly about how you can't spend achievement points.
16. Spam trade chat with Anal then a spell, ability, quest, achievement etc
17. Note that RuneScape is a much superior online game.
18. As a priest, use Mind Control on other players when dueling on locations that have cliffs you can jump off and/or while waiting for zeppelins / boats to leave.
19. Accuse all Worgen and Pandaren players of being furies. This will always cause rage and lulz because it's true.
20. As a Paladin Tank, use Divine Shield and watch the enemies kill your party members.
21. Use the auction houses to rig the prices of basic items to the maximum amount of gold.
22. Roll need on as much loot as you can in groups.
23. If you duel an opposing faction member in a neutral town, hit /forfeit the moment you get hit. It may not work anymore, but when it did, it caused a lot of lulz.

Private Servers

Private servers are available for poor people and unemployed losers that can't pay \$15 per month for the retail version. The downside is that they are utterly glitched. It is not unusual that "instanced dungeons" (Special zones wherein most end game content can be found. They are fractioned into unique, temporary dimensions for each player, and can only be entered simultaneously by players with the help of Blizzard's "raid"- and "party" functions.) Private server providers compensate for their dysfunctional service by setting the experience point and item drop rate up to mega volume. There are two genres of private servers: "Funservers" where you instantly gain maximum level and can get the best gear from a vendor where you begin. Then there are the "blizzlike" servers which have a leveling rate that is five- or tenfolded. When you hit maximum level on a blizzlike server, you start roaming the world looking for some kind of glitch to gain treasure. After all, it's not a bug, it's a feature. Alternatively, you can lurk your private server's web forum to wait for the next official event. This consists of a private server admin summoning a boss which drops loot. If you get 1337 gear, you can brag to everyone in your guild, general chat and forum. Though, in the next day, the server and its data is probably gone forever.

There are pristine emulations of Blizzard's servers. However, they tend to vanish untraceable in the night. This is probably because they face Blizzard's judicial banhammer. Blizzard targeted the fuck out of private servers. Ooops. There is also this cancerous blight known as Private Role-Playing servers. Filled with shitty admins and mind-crippled community, they are easy to troll while avoiding getting banned since their masterful devs only know how to edit posts.

Je suis Nostalrius

Out of the mess of glitchy private servers out there, there is the occasional diamond in the rough. Nostalrius was that diamond.

Unlike other private servers that were made to sidestep Blizzard's jewry, Nostalrius was meant to be a legacy server that provided a vanilla experience. Run by only thirty volunteers, they worked around the clock to maintain the server like it was an official server, and for a whole year, it was fun.

What happen?: Blizzard caught wind that someone made a better service then them, and dropped the Lolsuit hard. Over a million accounts on the server were wiped, and the server was shut down. Another private server gone, so everything should be good right?

Well, except for the fact that Nostalrius was a private legacy server, running in Vanilla WoW since new WoW has become a casualized mess. The server was created since Blizzard for whatever reason, refuses to create servers for nostalgia fags.

The reaction over the shutdown was so massive, a civil war broke out in the toxic hellhole known as MMO-Champion, several Jewtubers (Including Jontron of all people) made angry rants, and another million players cancelled their future WoW subs. Great job Blizzard, that'll show those retards who just want a simple service that thirty people for free were providing.

Previous Video | Next Video

Beware, Blizzard narcs you out to the cops

A man wanted for marijuana possession fled the country. He continued playing World of Warcraft and so Blizzard Entertainment narced him out. He was caught and brought back to the USA. ArchiveToday-favicon.png Read Here

https://en.uncyclopedia.co/wiki/World_of_Warcraft

World of Warcraft

Willys-Knight1920.jpg This page has been vandalized by teh Willy on Wheels. You cannot help Uncyclopedia. There is no hope now.

Millions of players... dozens of women... join today!

World of Warcraft (often abbreviated as WoW or WhoA)[1] is a massively multiplayer online role-playing game (MMORPG) by Blizzard Entertainment.[2] It is the fourth released game set in the Warcraft fantasy universe, which was first introduced by Warcraft: Orcs & Humans: Why Can't We Be Friends? in 1994. World of Warcraft takes place within the Warcraft world of Azeroth, two years after the events at the conclusion of Blizzard's previous Warcraft release, Warcraft III: Join the Army.[3]

The main objective of World of Warcraft is to click on animals. The challenge of the game lies chiefly in the sheer volume of animals needing to be be clicked. It is estimated that players need to click on one cubic mile of animals in order to complete the game. Players seeking to take a break from monotonous animal-clicking can partake in one of the countless many sidequests such as clicking 10,000 fish one at a time, crafting 10,000 necklaces one at a time, clicking on enemy players of lower level,[4] or selling plastic daggers to n00bs for 50 gold.

Gameplay

Bouncywikilogo.gif

For those without comedic tastes, the self-proclaimed experts at Wikipedia have an article about World of Warcraft.

As with other MMORPGs, players control a character avatar within a game world in third person view, exploring the landscape, fighting various monsters, performing tedious collection quests, interacting with Non-Player Characters, completing tedious deliveries for lazy Non-Player Characters, clicking on animals, and carrying out tedious escort quests by helping excruciatingly slow Non-Player Characters travel vast distances through obvious ambushes. World of Warcraft requires players to pay for a subscription, such that one year of gameplay will cost the player around two hundred dollars.[5]

The main story behind the game focuses on two warring factions: the Alliance, made up of humanoid races, and the Horde, made up of the less attractive humanoid races, such as trolls and giant cow-people. The conflict between these two camps drives many of the events in the plot of the entire Warcraft series. In this particular installment, the Alliance and Horde must form an unlikely truce to drive off an invading zombie infestation. Blizzard has received many complaints[6] about the overall story of World of Warcraft, both for its similarities to several George Romero films and its use of the "enemies teaming up to vanquish a common foe" plotline, which gamers have found to be "just too original--please, give us more clichés!"

Starting a Character

A typical player character in WoW, shown with Tier 5 Pwnzor equipment.

To enter the game, players must select a 'realm', or server. Each realm acts as an individual copy of the game world, and falls into one of two categories: Standard and Role-Playing. The Role-Playing realms cater to those players who consider simply playing World of Warcraft to be too cool, and need a way to further enhance their nerdiness.[7] In such realms, players must remain in character or risk being branded an outcast of dorks, a fate worse than rejection by a girl. Dialogue between players is vastly different in the two realms: for example, whereas in a Standard realm a player might say "Looking to sell Murder Knife of Clickiness, 40 Gold", the same statement in a Role-Playing realm might look more like this: "Attention, fellow mortals. I, the humble wizard Radagast, seek a buyer for the Murder Knife of Clickiness, a most excellent blade truly worthy of being wielded by a heroic knight or stealthy rogue. I humbly ask for a mere forty golden pieces in exchange for this most high-quality of items. I thank you for your attention, humble folk of Stormwind, and bid you good morrow!"

Perhaps the most important decision the player faces when creating their character, other than breast size and breast shape, is the character's class. This attribute determines what sort of animal-clicking abilities and stats the character will start with.[8] From the mighty warrior to the powerful druid to the feeble hunter, there are literally several hundred classes to choose from. Some classes, such as the priest, are more useful for so-called 'grouping', where multiple players gather to support each other in the quest to rapidly click on animals. Up to sixty players can join the same group and adventure together, resulting in furious animal-clicking episodes.

Ongoing Gameplay

As characters become more developed, they gain various talents and skills, most of them exact copies of previously learned skills but with differing numbers. Professions such as animal-clicking, fish-clicking, food-clicking, building-clicking, advanced animal-clicking, emote-clicking, market-clicking, player-clicking, and rock-clicking can also be learned by characters. Players may often join or form guilds, a sort of organized animal- and player-clicking syndicate.

Much of World of Warcraft play involves "questing". This typically involves forming walking over to NPCs[9] wearing exclamation marks on their heads and clicking them until they are annoyed and offer you money in exchange for leaving them alone. Questing can also mean carrying out tasks for various in-game entities. These tasks are, again, mainly animal-clicking related, but can also involve many other types of chore, such as excruciatingly long road-clicking tasks in order to deliver inconsequential items[10] for a disproportionately small reward. So-called quest chains are punishment for focusing too much of one's time on questing; these chains must be worn around the character's hands or feet and greatly reduce stats, primarily speed and libido.

A hardcore WoW player in full Epic gear.

When a character dies in WoW, the penalty is significantly lower than in similar MMORPGs. The only adverse effects are time lost while running back to the player's mangled corpse, a high probability of resurrecting next to the very animal that mangled the player in the first place,[11], a large deduction in the quality of the player's gear requiring large sums of gold to be spent on repairs, several minutes of "resurrection sickness"[12] causing the player's statistics to suffer a temporary reduction, and, of course, the social stigma that is associated with performing so poorly at video games.[13]

Other Gameplay Aspects Warranting Mention

"Instances" are specific areas containing high-level enemies which must be clicked by groups rather than individuals. These areas often offer superior weapons and armor, and also offer unique clickable bosses and a linear progression, unlike every other aspect of World of Warcraft. An example of a typical instance would be the Dire Mall area of northern Feralas, featuring such challenges as the Dual Escalator Ambush, the Food Court Gauntlet, and the final battle against the level 120 boss Karen atop the Multi-Level Parking Structure. Instances are the main focus of the so-called "end game", meaning they are the main activity undertaken by players who have clicked a sufficient amount of animals and have advanced to the highest rank, eliminating the need for further animal-clicking. These end game raids require dozens of players to click animals together in perfect harmony, and often players will undertake instances many times consecutively in order to seek out a single rare piece of equipment that will help them click better in the next instance, which has even better equipment.

In 2008, a list of achievements was added in a direct response to similar features on console gaming systems. There are nearly one thousand possible achievements players must accomplish in WoW, ranging from the mundane (clicking bags, clicking cows, clicking every type of opposing player possible) to the intricately impossible (slaying zombie laser dragons while keeping one's fifteen pet turkeys alive and using a signature battle cry). These achievements have also highlighted the holidays that Blizzard has introduced into the game. These holidays mirror real-life occasions, such as Brewfest (Oktoberfest). Blizzard has come under fire from conservative groups for naming their December holiday "Winter Veil" instead of some direct reference to the birth of Christ.

Many ethics issues have been raised concerning various aspects of World of Warcraft. One particular event was the Corrupted Blood Plague Incident in 2005, when an in-game disease wiped out many lower-level characters. Without these players, the higher-level characters resorted to clicking on each other, which disrupted the entire game dynamic and forced Blizzard to perform a hard reset of its servers.[14] Another issue is the sale of virtual goods in the real world. Many illegitimate markets have appeared which are associated with World of Warcraft, and virtual money or even whole characters can be purchased in the darker, more sinister corners of the internet. While not strictly illegal, players of low moral fiber who buy such amenities often find that months later, their accounts have been hacked, their gold and goods stolen, and their precious pets have been set loose to fend for themselves in the wild.[15]

Expansions

Buy now, before a new one comes out rendering these obsolete!

Since its release in 2004, two expansions have been released for World of Warcraft. Both of these include several new features, such as playable races, maps, or ways to change a character's hairstyle.[16] In 2006, The Burning Crusade was released, introducing two new races to the game: Draenei and Blood Elves. The Draenei are an ancient spacefaring race that resemble blue minotaurs, with a focus on nobility and chivalry. The Blood Elves are Night Elves with a palette change. This expansion also unveiled the Eye of the Storm battleground, where players can click on each other dozens of times for increasingly small rewards, which may later be turned in for equipment that in turn helps the player click on more enemy players resulting in more small rewards.

In 2008, Blizzard released Wrath of the Lich King, the second in the series of expansions that give the player the illusion that he is purchasing a brand new game. In this installment, the class of Death Knight is introduced. Death Knights were once mindless servants of the incomprehensibly evil Lich King Arthas Menethil, but they are now free to frolic in the woods and perform other WoW tasks such as clicking on animals and players. The other feature new to this release was the playable continent of Northrend, featuring over a dozen new types of animals that are fully clickable.

The third expansion for World of Warcraft, ominously named Cataclysm, was released in 2010. Two new character races became playable: the feisty Goblin (+3 Engineering, +5 Armpit Odor) and the brooding Worgen (+2 Emo, +1 Shagginess, -4 Fresh Breath). While no new continents were introduced, several previously inaccessible locations on existing maps became reachable due to a glitch that allowed players to 'fly'. Several other aspects of the game were improved, including redesigns of older content, a new arena system, and a player grouping program that greatly increased the ease of trolling 24 other people at once by pulling the boss before anybody is ready.

Mists of Pandaria was the fourth expansion, released in 2012. After lengthy legal battles with many Asian nations, the intentionally offensive Pandaren race was allowed to be included. Pandaren abilities include Generic Oriental Marshal Arts Punch, Dragon Tiger Lotus, and Mi-So-Horny (a genital-based melee attack). Pandaren characters suffer from a -19 Driving Ability disadvantage, greatly increasing the traffic on many of WoW's servers. The new continent, Pandaria, is an exact digital replica of downtown Beijing.

The fifth[17] expansion, titled Warlords of Draenor, will be released later this year.[18] The most notable features are an increased polygon count (rendering breasts 40% more lifelike) and an increase in the level cap from 90 to 100, making click battles much more exciting.

Spin-offs

The best known spin-off of WoW is cookie clicker, created by a vegetarian WoW fan who didn't want to harm any animals while feeling the excitement (and carpal tunnel syndrome) of clicking objects repetitively. A fully vegan version, Tofu clicker, is in development and set to release when the last dairy products are removed from the source code

https://encyclopediadramatica.online/Vandal/How-to

Vandal/How-to

Do you enjoy vandalizing Wikipedia or Fandom as much as the next EDiot? Are you looking to further your vandalism to be more disruptive and cause more anger among the developmentally-impaired admins? In that case this page is probably for you. Categorized here are the tricks that the majority of successful vandals have used for years to disrupt Wikipedia and annihilate Fandom and related smaller sites.

General purpose tips for Tor using vandals

If you like using Tor to vandalize, here's a handy tip to vandalize with Tor if the wiki you want to fuck over has blocked certain IPs: keep cycling IP addresses.

Wiki software can block IP addresses, but only the ones they are configured to block. If you try to set up a vandal account or edit and you see an IP block, simply click the "Use a new identity" button on the Tor control panel and refresh the page until you find an address that is not blocked (you should be able to edit or set up an account if so). Alternatively you can hit Ctrl + Shift + L to reroute Tor traffic which refreshes your page automatically, doesn't close window and lets you cycle through exit nodes faster.

Also, don't be scared of Torblock (on MediaWiki) or wiki owners who say they are using a public blocklist on Tor exit nodes. Exit nodes change constantly, and most wiki admins are stupid enough to upload a public blacklist of Tor exit nodes and not check to see if it updated from time to time, so they can only block a selected portion of exit node addresses.

It is possible they have blocked almost all known exit nodes on sites like Wikipedia, where the anti-lulzy faggots are smart enough to constantly block proxies and Tor nodes around the clock, but most smaller, non-Wikimedia wikis shouldn't be as difficult to fuck with.

If you want to anonymously vandalize Wikipedia, use IPfuck. This will give Wikipedia or other Wikimedia wikis a totally BS IP address in place of your real one.

CSS Vandalism

Insert some code somewhere on the page that will screw up the formatting for the whole page. For example <div style="display:none">.

On some wiki-like websites CSS editor can pop up as a separate window rendered on top of the page. In this case, the best approach would be to open Inspector (Ctrl + Shift + C), select window and choose "Copy unique selector" from context menu. Adding .selectorclasshere { display: none } will effectively disable CSS editing window for any retard who is unable to modify rules in browser's inspector.

While this trick is possible only on some wiki projects, it brings metric tons of excitement from staff and editors.

Vandal Scripts

See: the trollforge wiki directory.

WikiaRape™

WikiaRape™ was originally the NCF's script that completely wrecked Fandom. It creates massive spam/vandalism from proxy lists, which means hundreds of edits pumped out in less than two minutes. The GNAA later used it to its full potential, so the only solution was Fandom staff temporary locking down every wiki that was hit for six hours. They also shut off the API thinking that would solve the problem, which did not and only made life slightly difficult for the Autistic fanboys of Fandom. Best of all, Fandom has done nothing else to combat this script, thus it is still vulnerable to massive spam attacks.

Direct Admin Attack

This guy must get this a lot.

For some epic lulz on Wikipedia, follow these steps:

Copy and paste the picture of man tits with the caption "Persian Poet Gal's Rack". Persian Poet Gal is, of course, the closet lesbian Wikipedia admin that spends all of her day reverting vandalism while raping herself with multiple cucumbers, which pickle on contact with her toxic vaj.

Go to Wikipedia and paste it on as many articles as possible.

You will get blocked, but if you do it enough, you get a ridiculously lulzy angry letter from the cucumberphile lezbo herself. Enjoy!

Hide vandalism

The best way to encourage vandalism to go around vandal hunting and when you spot vandalism, do a tiny, minor edit over the vandalism. This keeps it from being the top edit so it's harder for people to spot or remove. You also pretty much get away with this without being banned. Not only that, but the vandals get banned slower and often the vandalism never gets cleaned up.

A variation of this technique can be used on wikis where minor edits often go unnoticed or unpatrolled, but major ones are patrolled frequently. For this, have open your web browser for one account, and Tor or some other proxy vandal account open on another for the same webpage. Edit three or four articles on the "real" account, putting a subtle vandal edit on one article, then doing benign, helpful edits on two or three others. Then, with the proxy account on the proxy browser, blank or severely vandalize the page you subtly vandalized with the other account. Most of the time, the severe vandal edit with the troll account will be reverted back to your more subtle vandalism, leaving the real vandalism up while deflecting suspicion the proxy and actual account are used by the same person.

Gain Access to an Admin's Account

History shows that people are stupid, especially wiki admins. It is most likely their password is something they are interested in or involved with (also likely that it has something to do with their wiki). Go to their profile, and make a word list of their interests, name/personal info, etc. A dictionary attack should provide you with their password.

How to make Wikipedia vandalize itself

Make an account and while it's new...

For your first bunch of edits (20 or so) revert vandalism, but instead of "Reverted blah blah identified as vandalism" make the edit summary vague so it might be vandalism, or it might not--if you're unsure what to do, just use a single cuss word as the edit summary. Don't revert vandalism that's too obvious like blanking or replacing the whole article.

For your second bunch of edits (20 or so), use the same type of edit summaries as the first bunch, but this time do vandalism. It's best to do sneaky vandalism, but if that's too hard then pasting Mediawiki Goatse never grows old.

Pros:

Vandal fighters will revert your first batch of edits, thus reverting vandalism back in. Then when people will see that the last edit was an admin reverting vandalism, they will leave it alone.

Your earlier vandal fighting will confuse people and so your vandalism in your second batch of edits will stay.

Although probable, you are less likely to be banned.

Cons:

Requires a lot of time, scheming, and overall effort.

Proof it works: This account did a bit of vandalism and then reverted vandalism with blank edit summaries and then administrator Metros undid the vandalism reverts.

Get a Wiki's Images Removed or Blocked

Find a legitimate image on a wiki. Then use that image (and nothing else) to vandalize the wiki (i.e. copy and paste it everywhere). The admin will either ban or remove it entirely. Either way, you win.

Page Flood

Flood the wiki with at least 100 new articles. They don't even have to have any content, just start spamming articles with names such as "NIGGER" or "THIS WIKI SUCKS ASS". Users can't do anything until their beloved admins come to save the day, and removing all those articles is a time consuming process for them. There are several good bots written for this purpose, making your job easier. To do this on TV Tropes you will need to pick a namespace that isn't the Main namespace, because the admins have wised up to what Fast Eddie didn't notice and locked down all page creation from Main.

Note that this only works on Fandom, as Wikipedia has admins working always to assure nothing lulzy slips in.

Blatant vandalism

Most people don't know how to properly vandalize Wikipedia. They just go and randomly mention someone is gay and think they won. But they get reverted and the past revisions of the article get compressed together so they won't even have made any impact on the database and their vandalism is forgotten. Here's how to do a proper vandalism:

Make a new account so they can't wikistalk your past vandalism.

Copy the text here: <http://en.wikipedia.org/w/index.php?title=Wikipedia:Sandbox&action=edit&oldid=141543921> [DEAD LINK] (or make your own shock image in table form)

Paste it somewhere random people will see

Change IP and repeat.

Pros:

Requires very little effort.

Encompasses a large portion of Wikipedia, i.e. more people will witness it.

Cons:

Requires a dynamic IP address.

Your edits will quickly be reverted.

The Book Report

It is a well known fact that lazy high school students enjoy using Wikipedia to put together book/whatever other reports at the last minute. Why not troll them as well? Make an account on Wikipedia and use it to make subtle (yet dramatic) changes every few days. You could change the plot of a lesser known book completely and it will go unnoticed for months.

Works for TV Tropes as well -- the mistakes will stay even longer as the Troper community is semi-literate at best.

If you insist on hitting TV Tropes with this sort of vandalism, check the edit history first. They are much less likely to notice this sort of vandalism if the page is pretty much a stub, hasn't been edited in months, and your edits look legit enough they wouldn't have a fucking clue it was bullshit unless they checked out whatever the page was about.

The Page Bloater

Google Books

Some pages use Google Books as citations, sometimes many times.[1] Add lots of useless URL parameters to bloat the page:

Useless crap: http://books.google.com/books?id=-FNAAAAMAAJ&pg=PA465&lpq=PA465&dq=battle+of+peitang&source=bl&ots=Wy2UV9mUeO&sig=XNh_00GwmKJopowd4-EqR4p_TV4&hl=en&sa=X&ei=_dmKUNSGAqPU0gHAnIG4Dw&ved=0CFUQ6AEwCQ#v=onepage&q=battle%20of%20peitang&f=false

The only parts that are needed: <http://books.google.com/?id=-FNAAAAMAAJ&pg=PA465&dq=battle+of+peitang>

YouTube

Find links to sites such as YouTube where there's potential for a lot of useless crap in the URL. For example, look at this fucking thing:

http://www.youtube.com/watch?v=z8y7uwEe2qc&feature=Playlist&p=CB2E2418DDECE97B&playnext_from=PL

Now, whenever you see a plain old YouTube link, add all that useless crap on at the end. Things after the first video code don't even have to parse into a real video, so you can bloat the article a few characters more by adding more crap. Do this with every single YouTube link you see to add a couple more kilobytes to all their articles and cost them more money.

Pros:

47, <https://encyclopedia.dramatica.online/Vandal/How-to>

Unlikely to be detected since it still links to the proper video and not Rick Astley. They'd have to recognize it as useless bloat on the code level.

Cons:

It takes a long time.

Your damages to the site will total in the realm of pennies.

It's a gigantic fucking waste of your time.

Take Away Privileges From Users

Start abusing tools on a wiki (such as creating new articles, moving articles, etc.). If you persistently continue to do so, the admins will take away this privilege from regular users.

Does not work well with most parts of TV Tropes, since many functions can be disabled selectively on a user to user basis. Instead, abuse certain types of wiki markup. Alternatively, sock and proxy quite a bit and keep abusing the same features over and over again until they are locked down globally or otherwise restricted.

Deep Infiltration Sock-puppet vandalizing

Create a phony sock-puppet account every 7-14 days using proxies, and provide them with some kind of decent cover (e.g. minor edit for one article and info about self). After maybe 10+ puppets, wait a week and erase browser cookies, occasionally checking to see if there is a response. After the week, use a already pre-exposed proxy to log on for all your profiles and then begin pulling major bullshit. After all your puppets are banned, clear cookies and go back to the proxy sites you were previously using and create new puppets.

Fun with "Old Media"

This technique exploits Wikipedia's fetishism for citations and sources, whilst also exploiting most Wikipedos aversion to (and lack of access of) Old Media, such as books. Admittedly, this vandalism technique will be easier for college students or academics with access to a decent research library.

Select any not-too-watched topic, such as biographies of obscure Roman or early Medieval kings, popes, or nobles. Don't use anyone too famous, like Charlemagne, but someone lesser known, like "Aethelred of Mercia," or someone like this Pope Martin I that nobody gives a damn about anymore. Or pick your own target out of the List of Popes or Monarchs of Wessex. Of course, your target doesn't have to be a king or pope, or even a person, just any concept will do as long as it is sufficiently historical and obscure. The key here, if you haven't guessed it, is going to be a lack of internet sources.

Once you select your target article to vandalize, go to the biggest library you can find and look up some old, relatively obscure books on the topic. (But not too old, as a lot of stuff written before the 1800's tends to be unreliable.) Select two or three that you feel are the most reputable about your topic. Then cross-reference the titles on the "internets" to verify that these books are 1) out of print, and (this is very important) 2) have not been scanned in "google books" or anything similar. Bonus points for finding an obscure primary source written by the subject himself. In short, you want legitimate, reputable historical books and sources that actually exist, but you want to make it impossible for your average Wikipedo to verify the contents of these sources on the internet.

Now comes the fun part. Once you have selected a topic, found real life sources, and verified that the contents of said sources are not available on-line, then just dream up the craziest shit you can, insert it into the target article, and you guessed it, cite the real-life historical book as your source (using proper academic style of course), and pick a random page number of the book and use that for your citation. Be sure to make your hoax edit well-written and at least semi-plausible given the context of the article. (The reason that late Roman/early Medieval topics work so well for this technique is that so much "crazy batshit" actually went on during that era).

This method is just about foolproof, as everyone will be impressed that someone took the time to dig up some old historical books on a topic, and will not dare remove a cited entry. If a curious "do gooder" Wikipedo is suspicious of the seemingly far-fetched material and wishes to investigate further, he's shit out of luck, since the sources are not only unavailable on line, but really unavailable anywhere except for the best university and research libraries.

Pros:

This sort of "vandalism" lasts for a long time, e.g., years.

Since you'd be hitting serious, scholarly topics with ridiculous edits and anecdotes that will likely remain for years, you can have a good lulz about how "unreliable" Wikipedia is.

Cons:

This method takes an above-average amount of legwork and investigation.

This method requires access to a large research or university library.

Replace Images

The welcoming image replaced on Wikipedia, this stayed up for more than an hour.

Go to the file page for an image and click "upload new version of this file". Replace it with Tubgirl, Goatse, or anything lulzy. Just make sure it is the same file type as the original image. This works great for replacing logos/banners on Fandom, as well as images in highly visible templates on Wikipedia.

Use their own anti-vandalization rules to vandalize them

Way, way more powerful a method of trolling and vandalism than most of the points on this list is to instead join the OCD cabal that is Wikipedia. LOL WUT?

It's really quite simple how this works: you are going to throw Wikipedia rules left and right to prevent anything from happening. Go into controversial articles and delete all mentions of controversy because of "NPOV." Declare anything that isn't a major newspaper as "not a reliable source" and delete absolutely everything that links to it. If users complain about this, find one of the hundreds of little rules they have broken and demand they be banned. Delete fucking everything that you possibly can in the name of creating a better encyclopedia.

The beautiful part of this is if you do a good enough job, you'll be made into an admin and can start abusing the powers that gives you. Lock every single goddamned page you possibly can. Ban every last user that so much as even typos a single word. Be that fucking bureaucrat you hate so much. There is no better trolling method than this.

And if the realization that you are now The Man ever makes you consider an heroic actions, just keep saying "I did it for the lulz" over and over until you feel better.

Account Creation Vandalism

Create a new account with a name such as "AdminX touches children"

Switch proxy

Repeat

For extra lulz, get on IRC and watch the admins talk amongst themselves about the abusive user names directed at them.

Sneaky vandalism

Hit "random article" until you find a small article nobody watches.

Change something (e.g. a number) and make it look like you're correcting an inaccuracy. Claim in the edit summary that the website/source/references/etc says it's this and the article was wrong and do it in a pompous way of a regular wikipedo so they'll believe you.

Continue again using a different IP if editing on IP or username if logged in so they can't revert your work all at once.

Also:

Make sure you're editing Wikipedia as an IP, not as a logged in user. Have an account ready to log into. Choose an obscure article, and vandalize it with something that is potentially libelous to the biography of a living person, and add a reference (which should really be a goatse link). Then quickly do another edit like adding "Yeah", save it, then log in to an account and revert the second edit, with an edit summary of "Reverting vandalism". The first edit with the really critical vandalism will remain intact, as admins will assume good faith on your part. Then Google, and Answers.com and a million other web domains will scrape the content and it'll stay on the page for months on end. Daniel Brandt suggested this, and it works! Massive lulz can be achieved from seeing this vandalism stay on these pages for this long.

Pros:

Will take longer before your edits are reverted.

48, <https://encyclopedia.dramatica.online/Vandal/How-to>

Websites that scraped Wikipedia articles will expand your longer-lasting vandalism across the internets.

Cons:

Requires a lot of time, patience, and persistence.

Shotgun Blast

Create a user account, or simply use your existing IP address.

Bombard random articles (preferably less-known articles) with both vandalism and beneficial edits.

Keep going and do not falter. The more articles you affect, the better.

Pros:

Your vandalism will be seen by many, in a short period of time, across the website.

It will waste an administrator's or patroller's time in reverting all of your edits.

Some confusion will ensue if at least half of your edits were not vandalism.

Cons:

You will get banned. (But collateral damage from a ban is always a positive.)

Your vandalism will have a short lifespan.

Imitate WordBomb

Go to [2] and read his stuff. Read about Gary Weiss here. Then start spewing it onto Wikipedia. But, don't act like a fan. Rather, act like you're really him:

Mention that Gary Weiss edits his own Wikipedia article with secret sockpuppets like Mantanmoreland and Samiharris

Out the IPs of wikipedia admins and do about any and all outing.

Edit articles about Overstock.com, Gary Weiss, Naked Short Selling, Patrick Byrne, etc. how WordBomb would do. Wikipedia has an unwritten rule that these four articles and some others are not allowed to be edited by anyone but Gary_Weiss's socks and The Hasbara Fellowships due to bribes to Jimbo.

The Wikipedia Jews really hate WordBomb. Really. Acting like a WordBomb sock produces no end of lulz. You achieve victory when you get your ISP banned from Wikipedia so then complaints will pour in from innocents affected.

Pros:

It really drives the admins insane! They are so nuts about keeping anyone like WordBomb off the site that they will ban entire ISPs! Yes, you can get everyone in your city to flood Wikipedia with complaints! They really do routinely ban whole IP ranges for life associated with WordBomb and have even banned Overstock.com's entire IP range even though WordBomb no longer works there (they banned that range a year after WordBomb stopped working there, ironically).

If you have a way to dial long distance free or cheaply then you can get an entire country banned! David Gerard admitting to banning the entire country of Qatar

Cons:

This is more trolling than vandalism

Note: Don't diss Mormons when doing this. WordBomb lives in Utah supposedly and is likely a lucky Mormon having buttsecks with 10 hot wives as well as one nubile young adolescent boy in drag.

Signature Vandalism

One great method for any kind of TOW troll is creative use of the signature. For instance, there's a lot of grey area in the signature guidelines, so one can easily get away with making a signature all-too-similar to that of an admin's (try HJ Mitchell) or anything obviously obnoxious that is still technically ok according to TOW guidelines.*

Blatant vandals can have even more fun abusing the signature. For instance, the user space allows a lot of shit the main space does not - floating objects for example. Clever vandals would create their userpage with something like, `<div style="position:fixed;left:0;top:0;background-color:black;font-color:red;font-size:100px;">JIMBO<br>SUCKS<br>DICK</div>` or even `<div style="position:fixed;left:0;top:0;font-color:black;font-size:3000px;">~~~~~</div>` and then proceed to create a signature with `{{User:USERNAMEHERE}}`. This allows the vandal to avoid the edit filter by only inserting ~~~~ in order to create a vandalism shrine (it is best when done on templates). MediaWiki is currently looking into a possible way to fix this, however it is likely they will only end up revoking even more privileges from regular users which in turn feeds the trolls and allows them to find new ways of disrupting Jimbo's oh-so-great encyclopedia.

*Don't be a dick. Be a dick

The subtle method

Subtlety is an awesome way to create ongoing pseudo-vandalism and wild inaccuracies throughout Wikipedia. The method is easy, and if you do it well it's quite fun too.

Hit random article and look for articles that won't be getting a large amount of focus. Any articles with editing disputes should be kept clear of, so people don't look at your past edits if you write something that pisses them off. Then, find somewhere in the article where you can add a weasel phrase, a small inaccuracy, a lie, or a softly-softly pisstake. These edits are long term remember - the result is not in the editors getting pissed off but in the users of Wikipedia reading shitty articles. For example "as a matter of fact," "contrary to popular belief," "as an interesting aside," "actually..." and many other phrases are all good to enter wherever the hell you can fit them to make the sentence seem on any second glance completely ridiculous. Fake statistics can be entered where no-one will be checking, fake plot turns can be added into articles on lesser known books etc etc. Be creative, but be subtle.

One thing is to beware if anyone reverts more than once, replies to you on a talk page, and hasn't been to that article before. Beware especially if they do it more than once, especially if it's over a long period of time. Many wikipedians are batshit insane stalkers, for instance, Oli Filth claims to stalk many many people on Wikipedia over the long term once he thinks their edits are bad.

Username rotator

Even if you're on a static IP that doesn't change, one easy way to avoid being banned is to create a new user account for every piece of vandalism you carry out. You're unlikely to get caught unless you vandalize the same page or add the same type of content. Avoid imitating any user listed on WP:Long term abuse and don't do page move vandalism. What you should really be seeking is glorification in creating inappropriate pages and trying to get as many of them protected against creation as possible, but you have to be stealthy about it.

Edit summary vandalism

Register a new account and make lots of small, positive or neutral edits either fixing mistakes or slightly changing sentences etc. But write edit summaries which are lulzy, obscene, embarrassing to WP or potentially libelous, of Wikipedia admins or third parties. You will eventually get banned, but you can protest that every edit you made was positive. The best thing about this tactic is that it's a lot more effort by admins to change edit summaries than it is to revert normal vandalism. So if you say something lulzy it will probably stay there, and if you say something offensive about an admin or libelous they will get their panties in a bunch and have to remove it.

On MediaWiki wikis (especially on Fandom) they have the ability to remove some edit revision summaries while only leaving others behind, so a good way to make sure something stays up is to use a sock account as a decoy (or vice versa) and have one account make really vague/neutral sounding edit reasons with some lulzy vandalism, while have the other account leave the lulzy edit summaries. On a wiki with a paranoid admin who checks their recent changes list like a hawk, this is a good way to ensure something stays up.

TV Tropes is slightly different. Though they are far less attentive due to having less admins, well watched pages will have your edits suppressed quick and your edit reasons edited out by an automated system account, so having a few proxy accounts that have been legitimized ahead of time to vandalize other pages (make sure they don't have overlapping edits with your other socks), is a good way to slip something past their radar.

Reverse DOS

MediaWiki uses something called an "autoblocker," every IP address used by a banned account is also blocked at the moment the banhammer hits. The autoblocker timer lasts 24 hours and resets every time you try to edit from the pwned account. Meant to halt persistent vandals, this in fact can play directly into your hands. If you are lucky to be on an ISP that routes everyone through a single shared IP address, such as in a university or a small country, potentially thousands of people could be blocked from editing within a heartbeat. If you are ever on vacation in Qatar make sure to vandalize from the hotel, there a million people share the IP 82.148.97.69, and this can happen again.

Despite Jimbo insisting that the story was untrue, here's David Gerard admitting to banning the entire country of Qatar on the cyber-stalking mailing list.

From the Qatar blocklog:

05:56, 28 November 2007 Jmlk17 (Talk | contribs) blocked "82.148.97.69 (Talk)" (anon. only, account creation blocked) with an expiry time of 10 days (Vandalism) 03:28, 30 November 2007 John Reaves (Talk contribs) unblocked 82.148.97.69 (Talk) (This is Qatar.)

Pagemove

Moving pages is a great way to vandalize random wikis. The only thing is you need to create an account four days before your spree (and then make ten inconspicuous edits). After that, you just follow these simple steps.

- Go to a randompage and click on move on top.

- Choose a funny title.

- Then, go back to the bare page, and replace that page with Lulz.

- Repeat

In the end, it'll end up with administrators with activity logs full of things like:

- AdminX moved 'AdminX's real name is John Smith' to 'horses'

- AdminX deleted 'AdminX's real name is John Smith'

Willy on Wheels and Grawp have become famous names in the pagemove vandalism world. Unfortunately, Wikipedia's Abuse filter places heavy restrictions on page moves.

Wikia Pagemove Vandalism

On Wikia, all users have a public watchlist on their userpage. When a page on Wikia is moved, the watchlist will change to include the updated title, but will not change again if the page is moved back. So by moving Page X to "Niggershit", you have allowed that word to be publicly displayed on all user's pages who are watching that, and it will stay even when the page is moved back. This is a great way to vandalize the pages of the admins who took it upon themselves to protect their own pages.

Redirect vandalism

Redirect vandalism is a great way of destroying Wikipedia because of its shock effect on the reader.

- Go to a religious or political page.

- Find a redirect to that page. For example: something redirects to Jahiliyyah.

- Replace the words between the square brackets with the word "penis" or "anus". If you vandalize an Islamic article, "pig" is great too.

- Write "typo" or "tidyup" in the edit summary. Or preferably something smarter.

- Do not start another vandalism too quickly. You'll get pwnt

The chances are that your vandalism will last relatively long, because redirect pages are rarely watched.

Template Vandalism

Hagger's vandalised Template:EditionPoints on Wikipedia. The screenshot is of the FA of the day, which remained like that for 17 minutes

PROTIP: Goatse no longer works.

This shit stayed on uncyclopedia for over 2 hours

Template vandalism provides a more readily concealable way of vandalizing. The best article to choose is Wikipedia's Today's Featured Article. Click edit at the top of the page and then scroll down past the edit box and there will be a list of all the templates used in that article. About 90% of them will be protected or semi-protected. Pick one, which isn't protected; delete its content; insert vandalism; write "fixed typo" in the edit summary; hit Save Page. This will usually go unseen for two to twenty minutes, before they figure out what's going on. Only vandalize one template per account/IP address, because the more edits you make, the greater your chance is of getting caught via the recent changes page. The FA of the day is seen by hundreds of thousands of Wikipedians and members of the public each day, so this is a great choice for mass vandalism! For even more epic lulz try copy and pasting the template dozens or even hundreds of times, which will cause the computer to lag or if they're using Firefox... crash. The limit on Wikipedia is 2 MB per article, but if templates are too big they won't show up on the article they're included in. For extra sneakiness put the vandalism in include only tag, so the template will look untouched, therefore wikipedians will get confused. Another great thing to do is vandalize a template, get banned, switch out proxies, and revert back to your version. This will make it much less noticeable.

Pros:

- Gets seen by thousands of people

- Quick and easy (only one edit required)

Cons:

- You will get blocked without question, but don't forget to post it on your talk page afterwards!

- Goatse and most other ASCII is caught by the Abuse Filter

Triggering the Abuse Filter

Wikipedia's abuse filter not only prevents use of words such as "nigger" or "HAGGER???", it notifies the admins every time somebody trips it off. While your account may not last long, a great way to piss them off is to intentionally trigger it as much as you can. It is likely you will become unblocked if you explain that you were simply a new user and did not know what you were doing.

Huge text vandalism

Fontvandalism.PNG

Simply breaking the format can be effective.

Huge text vandalism is simple: place about 15 "big" tags on a word near the top of a page. For a super effective attack, edit a box containing text(usually listing info). The result is that the layout ends up totally fucked. Most of the text also ends up being unreadable.

Pros:

- Fucks up format

Cons:

- Very noticeable

- Huggle still works

- Fixed quick

The Video Killer

Find links to various YouTube or other user-uploaded videos. Now, download the video and re-upload it under a new account. Edit the wiki to point to this new, identical version with a comment saying "dead link, updated video" or something similar. You're more likely to get away with this if you use a video editing program to force a higher resolution upload and claim "higher resolution video".

50, <https://encyclopedia.dramatica.online/Vandal/How-to>

Let it sit for a while, then delete the video from your YouTube account. Let that broken link sit for a while as well, then go back to the wiki and delete the link altogether with a comment saying "bad link".

Provided the other users only check to make sure the updated video is relevant and that you really are deleting a dead link, you can get away with deleting videos left and right. This works best if used in conjunction with gaming the system.

Pros:

It's unlikely the users will figure out that you're intentionally vandalizing the site, so you can get away with this for a long time.

If a video is a key point to the article, removing it will make the whole thing useless.

Cons:

Not very visible.

If the video was really important, it takes all of a minute for the users to find a real version and put it back in.

Moar code

Insert the code: `<!--` to the top of an article. This code will blank the page for you, whilst only altering the byte count on Recent Changes by a very small amount. If you have an account that has made some legitimate contributions and summarize it as Typo correction, it is less likely to be checked out. This method has been known to survive for days before being noticed. What's more, wikipedia doesn't even have a fucking filter to detect this! For TV Tropes, the equivalent code is `"% %"`.

The `<nowiki>` tag on the top of a page with huge amounts of code and shit, will fuck up the page in an epic way whilst again, only changing the byte count by a tiny amount. Use it on highly used templates for epic effect.

The following bits of code also work in a great way:

`<noinclude>` - Use this on templates.

`<div style="text-decoration:blink">`

`[[/(article)/]]` (only if you create the article as a redirect to another, then put its non-slashes name in.)

MediaWiki vandalism

This will never work on Wikipedia, but smaller wikis and Fandom in general are susceptible to this method of vandalism. It's really simple

Find an unprotected template in the site notice

Upload Pain series (but any image will do)

Fix images in the template

Because its transcluded into the site notice, every user viewing the site will be affected.

????

Profit!

Caused blackout On Uncyclopedia

You can also try any templates that may be in the sidebar (more advanced wikis do this sometimes) and if the wiki is really retarded and didn't bother to protect it, upload goatse over the site logo.

The Deletionist

Nominating articles for deletion is one of the easiest ways to piss off a lot of people and waste their time.

Choose articles with the Notability, Unreferenced or Primary sources template. References are mandatory so any articles without them are deletionbait.

Nominate the article for deletion by putting the code at the top: `{{subst:prod|Not notable}}`. "Not notable" is the single most common reason why articles get deleted so leaving it at that is good enough. Also if its only sources come from the internet as opposed to Old media it'll also likely get deleted.

Results:

Either the article will get deleted, pissing off whoever spent the time to write it

Or the people who wrote the article will have to waste a lot more time looking for citations, sources, and re-writing the article

Or if you're lucky it'll start a debate and edit war in addition to the 2 points above

Also fun is nominating articles for deletion that have already been up for deletion thousands of times, such as List of lists of lists.

Pissing off your educational facility via vandalism

This method works better with smaller institutions, as pages on them are more likely to not have as high of a priority as other pages. Also, keep in mind that the educational facility may or may not have a Wikipedia page about it.

Make small, subtle edits one the page of your educational facility over a certain period of time. If the place you attend is not well known at all, then you can probably get away with making large edits unnoticed. Bonus points if you caption a picture of Hitler as being someone who works in the administration.

Make sure you don't set off the vandalism filter in the process. Also, making your edit summary something like, "Reverted Vandalism", or , "Fixed grammar errors" will make your edit seem more legit.

After the deed has been done, tell some people that someone you know edited the page on your school. It will be more than likely that your editing story will spread like wildfire due to word of mouth.

Pros:

Less likely to get removed depending on the lack of notability of your school.

You get to see live reactions.

Depending on how slanderous your edit was, the administration will likely be butthurt.

If your administration is inept with using Wikipedia, laugh at the fact they don't know how to easily revert the vandalism.

Cons:

Some retards might start making edits on your edits that are more obvious versions of vandalism, prompting Wikipedia administrators to take action against it.

Numerical Vandalizing

Main Article: Vandalize Every Equation

If you want to be really subtle, find a page on some wiki with complex mathematical formulas or lots of statistics or anything else with lots of numbers and start messing with the data, making minor edits like removing a dash or hyphen, adding fictitious crap, rearranging numbers, etc.

Don't do this on pages that are stalked by correctionist editors or OCD mathfags and make sure your edits aren't too obvious vandalizing edits. Fixing a legit error while making a vandal edit is a good way to disguise your vandalizing, and make sure your edit reasons are vague enough no one can be sure you're a vandal.

The Blitzkrieg

This tactic is primarily meant to work with Fandom (and MediaWiki wikis in general), but it can work with just about any wiki farm with loose oversight rules that's lets anyone and their mother be a fucking sysop of a wiki.

Find a wiki on the wiki farm that is infrequently or poorly maintained, if it does have a sysop/administrator/bureaucrat. If it doesn't, make sure it at least has people who edit there every so often. Make sure it has anywhere from about 50-800 pages of actual content.

The reasons for these requirements are very simple: Any wiki on Fandom with over a thousand pages is almost certainly watched by somebody, since Fandom likes to whore for ad moniez and large wikis are big money makers, so their staff will check them out more frequently than their smaller wikis. Also, if there is a sysop/administrator/bureaucrat, check them out and see if they are competent and can edit reasonably well, or just some dumbass fourteen year old hosting a fan site for his faggoty favorite cartoon who only stops by to add shit every once in awhile. If not, make sure the wiki has someone around so word can spread of your lulz in the making, but make sure it's not too frequently edited or the wiki farm staff will lock the fucker down quick and end your vandalizing spree.

Anyway, once you found a wiki that meets the above requirements, check the Special:Version page and see what extensions they have installed and figure out what security, if any, they have against proxies, Tor, bots, automated scripts, etc. Get a good idea of when people post, unless it's so sporadic there is no real pattern.

All the above takes a few days at least, and if you are just a drive by vandal, try something else for your lulz, because all this planning is the prelude to an epic attack meant for veterans at the art of bringing entire wikis to their knees.

Once you've sussed the wiki and got a good idea of it's weakpoints and the editor schedules, hit that fucking wiki with every vandal strategy on this fucking page!

Use scripts from the troll forge, spam shock images on templates, leave all sorts of shit on articles/user pages/discussion pages, use multiple socks and proxies if you can to muddy the waters for when someone tries to sort the mess out later....in short, hit like lightning and don't let the fuck up until the entire wiki is a shrine to your handiwork and someone went screaming like a bitch to the wiki farm admins about how a wiki they were trying to edit got raped.

By the way, if you're really patient, this trick can work on bigger wikis as well, and the bigger the wiki you manage to ruin, the more lulzy, right?

Some tips on how to pull this off:

Fandom has a throttle on page moves where you will be stopped for a minute or two after three or more page moves in succession, so if you are fond of page move vandalizing, go do some other vandalizing to other pages for a minute or two, then move a few more pages and repeat.

Fandom and most other wiki farms have automated blockers that block certain web addresses and file links, but they usually have somewhere you can see all the stuff you can't post without it being caught by the filter, so go look that shit up before doing any link vandalizing.

Try looking at this wiki before doing anything to Fandom.

Most wiki farms require email addresses, so establish an email account via proxy and have a large selection of throwaway email accounts if sockpuppeting most wikis that require email access. They'll still ban the accounts, but if you still have some unused throwaway email accounts, you can just switch proxies and sign up for more puppets later with a different IP.

Or just use mailinator.

Watch out for inept admins but competent regular users. Even if the admin is an idiot, some of the regular users may intercede on the admin's behalf and run to the wiki farm staff on the admin's behalf or will revert most of your edits before you can do any real damage, so while checking out the wikis, steer clear of wikis with attentive regular users even if the admin is inept.

Practice for "The Blitzkrieg"

Before you perform the Blitzkrieg on a large wiki, you may want to practice your skills on a smaller wiki. Fandom has a metric fuckton of tiny wikis with maybe 20 or so pages that have essentially been abandoned, so if you want some practice or you just want some cheap amusement, vandalize the fuck out of the "stub" wikis. Make sure you do so via a proxy (you can practice using those too) account and make sure your attacks are totally random (don't hit wikis in a series of related subjects)

It's likely you can get away with vandalizing the stub wikis for quite awhile, since Fandom's staff is fucking lazy and Fandom is such a sprawling mass of shit they will usually never realize one of their wikis has been turned into a vandal shrine unless someone tells them, and since stub wikis usually have no admins or user who give a fuck, you can amuse yourself for quite awhile shitting up the stubs.

However, bear in mind the following:

Most of the stub wikis have no barrier to text edits of any sort (except for any global spam link or text string blockers that Fandom may have in place), so put whatever text you want.

You do need a valid account to upload pictures or videos, but just use a proxy, set up a throwaway email address, then feel free to upload Goatse or shock videos.

Custom Wikis

Believe it or not, some wikis don't have quick user revert buttons, i.e. TV Tropes. Fortunately for you, this ensures that your vandalism isn't always noticeable and fixable for the average user.

Nanny Bot Lulz

"Nanny Bots" are auto censorship tools meant to keep little kids from seeing or using dirty words on the internet, but they can also be used as hilarious vandalism tools.

This works great on any wiki with lots of cursing, but works best on TV Tropes due to their lack of a quick revert feature.

Here's how you do it:

Find lots of pages with lots of profanity.

Edit those pages with the nanny bot on.

?????

PROFIT!

In all seriousness, this will piss them off like you won't believe, and if you want more lulz, hit as many pages as possible before the banhammer falls. This will frustrate the hell out of all the regular posters, especially if the nanny bot turns the curse words into such meaningless gibberish they have to look through the recent changes to figure out what half of the profanity originally was. You can even code a bot to do this!

The best part of it? You can feign innocence and ask to be given a second chance!

Word changing scripts

Similar to nanny bots, scripts that auto change words on web pages like the "cloud to butt" script piss off sites like TV Tropes or any other site with an edit function, and can be used for epic vandalism.

Warning, sites like TV Tropes have revealed they have a filter for consistent word filter vandalism, so randomize the word filter when new phrases get blocked for consistent lulz using this method.

General tips for fucking with PmWiki

These tips are primarily meant for the aspiring vandal of TV Tropes, but work on practically any PmWiki website that uses similar code.

Have a long list of proxies, several proxy addons like Stealthy or IPfuck (if you use Firefox) or Tor if you are going to dick over TV Tropes. Fast Eddie doesn't use the "Google redirect" (redirects any attempt by your IP to access his website by sending you to Google's homepage) bullshit as much as he used to (possibly because he realized he was dickering over legitimate users in the event of someone using a dynamic IP), but he and his dick sucking minions love using suspensions (you can't edit on that account anymore) and bans (they never plan to let you edit ever again). Thankfully, since PmWiki only goes by the IP on your login cookie (if you change your IP during site access, it will follow the IP change), just log out of your old account if suspended/banned, change IP, and keep going. Also, keep track of your accounts and throwaway email addresses. Especially do this if you have a long string of sockpuppet accounts.

As of April 2013, TV Tropes requires email confirmation of your account, so make you that you have some throwaway email addresses (mailinator or something similar is a good idea), and since Eddie loves throwing around IP bans, make sure you do all of your trolling/vandalism under proxies.

Eddie and his troperfag legions are PARANOID about trolls ever since they were DDoS'ed late March-early April 2013, so if you create a new account, it's pretty likely at least one troper is eagerly looking at the newly created accounts and recent changes, furiously masturbating over the chance to screw over a potential troll. The good news is that these basement dwelling anti-lulzites are easy to evade as long as you don't do blatant vandalism as your very first edit.

Speaking of evasion, while you might think it's funny to blank a page and post how much the troopers who wrote it are faggots, this shit will be reverted quickly, and since they have a throttle on page edits (which lasts about a minute), doing something this blatant will give one of Eddie's goons more than enough time to cream themselves as they lower the banhammer. Ideally, do one or two harmless edits after first signing up, wait a few minutes, then go to work.

While they are terrified of trolls learning the exact timing of the locks on page editing, posting on Ask The Troopers, the forums, and so on, here's some pointers: Once you log in, you have to pass a verification checkbox the first time you make an edit, and each edit will add sixty seconds to your time before you can make another edit to another page. You can post on Ask The Troopers without any constraints, but they aren't really needed as the moderators can very easily "Orwellian Editor" away posts they don't want up. You have wait twenty four hours before you can post on the forums,, but it's usually more lulzy to shit up the wiki, since the forums are run by assholes bigger than the jackasses who run the Something Awful forums, though instead of probations, they will "troll post crusher" any posts they don't like and ban you for repeated bad behavior.

Various Ways To Shit Up TV Tropes

Police.gif 99% of the tips used to shit up TV Tropes (including the wiki and the forums) no longer work as of \$CURRENT_YEAR. While there are some ways to fuck with the site, they aren't anywhere as lulzy as the ones that used to be. Good night, sweet prince.

Attempting anything lulzy on the forums would usually result in the post being completely nuked because of their "Troll Post Crusher". This was often a fantastic way to piss off Fast Eddie by criticizing him and his shitty wiki, because he was known to obliterate entire threads that said mean shit about him or his shitty wiki. The "Troll Post Crusher" has since been removed, and replaced with an option that hides the post outright. Great censorship, guys. PROTIP: We still recommend taking screenshots of posts if you plan to do something lulzy, since the moderators can (and still do) nuke entire threads if they spot the slightest hint of criticism.

TV Tropes used to force you to go through some warning screen bullshit before posting after you create an account, basically some lameass "are you sure you're going to follow the rules" bullshit. Once you agreed to what they said, you could start vandalizing. However, Fast Eddie had already implemented a throttle on page edits, so you couldn't just open, edit, then save thirty or so pages at once. You had to edit one page at a time, but you could keep open tabs or windows to the other pages you plan to shit on and click the edit button once you were finished. Nowadays, you have to wait until a moderator approves your account, which means that the amount of time you have to vandalize is a lot lower than it was. But it's not zero!

There are still various ways to shit up the forum and YKTTW (You Know That Thing Where) Trope Launch Pad (the new trope launching system on the site as of 2016), and most of these have not yet been fixed. If you really want to piss off TV Tropes, launch a bunch of TLPs, leave comments on other TLPs, and abuse the fuck out of them. You need to wait until a trope has 3 days and 5 hats, though, so you might as well put those Computer Science III skills to use and write a bot to do it for you. Because, as we all know, bots don't give a shit about human feelings.

Some of the methods that used to work still work just fine. For example, you can piss everyone off, including the moderators and troopers, by posting perfectly legitimate negative reviews of something that point out legitimate flaws in a work in the Reviews section, and make them as bile filled as possible to the point it annoys the moderators trying to obey the hugbox standards. (The old "Happiness Is Mandatory" hugbox from Fast Eddie's days is still around, by the way.) You can also spam the shit out of the cutlist feature, but be warned as they watch this one quite a bit.

All the problems with the "Report Content Violations" button are still around, even years later. The P5 committee, Eddie's official squad to banhammer anything offensive is still around despite being slowly removed, so feel free to report "Bambi", "Sesame Street", or any anime ever as content violations to drive them apeshit while they stick around doing nothing. This is more trolling than vandalism, but you can divert attention away from your vandalism by using this tactic. The P5 have wanted to fix this for a long time (and still do, even though Eddie's gone), but Eddie never coded a fix yet and neither did the new administration, so have fun screwing this goatsed hole in TV Tropes' armor until they finally get rid of the P5.

Making fake moderator reports is also more about trolling than vandalism, but you can do this while vandalizing to waste their time, which may provide lulz in a different way.

However, a good way to do some subtle vandalism is to find some ill attended page, add an "admin notice" (see this page for an example), then in the text field add something lulzy like an gigantic ASCII picture of Goats. Unlike certain installs of MediaWiki, PmWiki doesn't (and still doesn't) have an effective filter against this sort of thing. It will not show up on the main page, but it will be visible to anyone trying to edit the page, and since the admins get pissy about people removing admin notices, it'll be awhile before the notices are removed. You can do this to a well visited page if you want, but that'll just get it noticed quicker.

You can also do this as a form of page bloat vandalism. PmWiki was designed to be a series of text files that could be edited, and like a shitty version of Notepad, they have trouble processing the page through the database after a certain size, which is around 500KB on TV Tropes, so using the troll admin notice trick to spam an assload of useless text will hide the spam text from view, but it will make the page load like crap and it won't save properly anymore.

Yet another source of fun (take screen shots!) is posting lulzy stuff to their "Ask The Troopers" section, which basically a variation of the forum except it's basically a gigantic threadshit of troopers asking on the spot questions in a bunch of forum threads about bad editors, whining about bad editors, asking the mods to unlock locked pages, and asking questions about how to do shit they'd know about already if they read the fucking Administrivia pages.

To mess with this, simply use the same tactics you'd use to shit up the forums, but take screen shots, as the TV Tropes mods do have the ability to hose comments and even entire threads in their quest to eliminate lulz.

Also, believe it or not, Fast Eddie left an easy as fuck way to totally shit up the Categories system on his wiki (which is not the same as it is on MediaWiki). Unlike MediaWiki, where tags can be removed from individual articles, you can find `[[index]]` `[[/index]]` tags on every page, which adds the content between the tags to the Categories - basically these tags basically make the pages and categories one and the same thing, and so when you add an item between the tags (a bulletpointed article name like on the pages with trope lists is the best example), it is automatically categorized and added to the category lineup.

So, to make vandalism simple for you, find an index page that has a bunch of items between index tags, and replace all the links with lulzy stuff, like renaming all the links "Shit". This will guarantee that any other pages these links are categorized on will show "Shit" on the categories bar. Hit an index with a lot of terms in a bullet point list with index tags, like "Actors" or "Death Tropes" for best results. Hitting multiple pages is best, and all you need to do is just prepare a small text file in the same format as the source page of the page you want to vandalize, just with a bunch of lulzy stuff as bullet pointed terms between index tags.

Yet another way to piss them off is find shit they banhammered off the wiki, then resubmit the pages any way you can, circumventing their censorship bullshit. Alternatively, re-add content they censored from articles (i.e. - if an anime was based off a hentai game, they censor the "adult" content, so re-add what they deleted). This will not only troll the fuck out of the admins and the other censorbards, but will also force the moderators to mass lock pages against vandalism. Make sure to make tons of links and categories to what you added if possible, although TV Tropes has a custom revert button so your vandalism may be short-lived. You probably won't be able to force the mass locking of pages against creation, but you will force the mods to lock existing "bowdlerised" pages, which makes everyone's lives harder since the troopers have to manually ask the mods to add shit to locked pages in a forum thread.

The Epic Time Sink, Beginner Version

Find a really huge article (for example, Intercourse With You on TV Tropes). Now, every other paragraph, vandalize something. Add "FUCK SHIT COCK MOTHERFUCKER NIGGER" or a link to Goats or something. Don't repeat the same shit over and over again or it will be too easy to fix as it will compile into a single block of text.

If you do this right, the history window will show up with "Changed line(s) 12 from (block of text) to (block of vandalized text)" for half as many lines as there are in the document itself. Reverting this means having to sit there with two tabs open and manually copy each block back in its right place.

Pros:

- + Whoever decides to fix it will have to waste a lot of time in the process and devote all their focus to the task.
- + During the epic repair time, the vandalism will stay visible for all to see.

Cons:

- Takes even longer to set up than it does to repair (unless somebody codes a program to automatically do this, wink, wink, nudge, nudge).
- Repeat performances on the same page likely won't stick for long because the editor might choose to save the undamaged version on their hard drive in case it happens again. You'll have to target different pages for guaranteed results.

The Epic Time Sink, Intermediate Version

Pull up a huge article from your favorite ghetto wiki. Now, instead of vandalizing every other line, jumble things around. If this is TV Tropes, move random examples from Anime to Live Action TV, Western Animation to Film, and Music to Web Original. Be sure to leave "fixing order" in the comment field and don't add any obvious vandalism while you reorder everything.

When you finish, the person that notices the changes and chooses to revert this will have to reconstruct the article sequentially from all the out of order pieces. This will take even longer than the above method. Pros:

- + Takes even more mental effort to repair.

53, <https://encyclopedia.dramatica.com/Vandal/How-to>

+ It's very possible this will be missed and the vandalism will stay up for months.

Cons:

- Takes much longer to set up than even the above.
- Isn't as lulzy as poop sprays or FAT NIGGER FAT NIGGER FAT NIGGER.

The Epic Time Sink, Advanced Version

We hope you've been studying hard these past lessons because now, we're going to make a fruit medley of beautiful, beautiful vandalism. This will take a long time, but it will more than pay for itself in epic lulz and confusion.

Equipment Needed: A whole bunch of user names, proxies, time, and patience.

Step 1: Perform lots of sneaky vandalism. Add inaccuracies, change external links that lead to ambiguous URLs (for example, YouTube), and reorganize lists. Nothing a skimmer is likely to pick up as vandalism.

Step 2: Make a bunch of minor but constructive edits in a row using the extra accounts and proxies. No vandalism here, sneaky or otherwise. Keep doing this until the edits from step 1 are obscured from view.

Step 3: Perform the Intermediate version above.

Step 4: Quickly push that down by repeating step 2.

Step 5: Perform the Beginner version above to ignite the repair process.

Step 6: Pour yourself a hot cup of tea and break out the crumpets as they scramble to fix everything. After they "fix" the article using one of your corrupted versions, they'll have to redo everything over again to go further back. Laugh as they have to check the growing page history a hundred times to try to find everything. By the time they finish, they probably still won't catch every last bit of vandalism and that link claiming to have a video about a new sniper rifle will still go to Rick Astley for months afterward. Cheerio, mate!

Pros:

- + It will take them forever to sort out all the chaos.
- + If more than one person takes on the job of fixing the article, they might start stumbling over each other's edits and create further lulz.

Cons:

- Takes a long time to perform.

Provoke Compulsive Page Locks

Some wikis out there only have two editing modes: locked and unlocked. What you're going to do is provoke the admins to lock a popular page. This works best when there aren't many admins and they are lazy fucks (for example, TV Tropes).

Create some sock puppet accounts and make absolutely sure they can't be traced to the same person (and use multiple IPs for TV Tropes, since the moderators can deny accounts). Use one of them to bring up a controversy and let it sit up for a little. Somebody should be along to delete it and give you the target of your epic flame/edit war, but if not, supply your own! Turn it into a pissing match between two factions (even if you have to supply one or both of them) and keep that edit war going forever. Vandalize other pages to prove a point and spam the forums with complaints. Never let the flames die down.

Eventually, an admin will decide to fix all this shit by just deleting everything related to this flame war and locking the page. Great success! Now, people will start flocking to complain about how the page is locked and how they need the admins to fix this and that.

Don't just stop there, though! Keep rolling through the major pages and if they unlock anything, go back and start the war up again. Keep making new sock puppet accounts, stir up conflict everywhere, and never let the banhammer get a chance to rest. Your goal is not to leave any vandalism up, but to rob everybody else of their editing privileges and deluge the admins in an endless BAWWWWWfest that will drive them to commit suicide.

Pros:

- + You'll be making the users of the site troll on your behalf once the lock comes in.
- + You'll retard all their progress by wasting their time arguing over the locks instead of improving the articles.
- + Even if the admins don't lock the pages, they're still going to look like shit between all the e-bullets being fired by both sides.

Cons:

- Those not following behind-the-scenes won't get to fully appreciate your epic trolling.
- You're going to have to dedicate your life to this.

On TV Tropes, target pages that are prone to edit wars, troper pages, and high traffic pages (measured by "inbound count") especially. Pages will be locked almost instantly to deter persistent vandals, and the more pages get locked, the more the regular users will have to go to a forum thread for locked pages and manually request the mods add edits to the locked pages, which makes life harder on everyone since locked pages usually stay locked for a very long time, many of them pretty much forever.

Causing The Wiki To Implode

This advice works best for TV Tropes, but can work well with any wiki with easily pissed off users and moderators who are prone to doing stupid shit in response to drama and vandalism.

Anyway, the key to this strategy involves a careful combination of socks and proxies, and having more than one person working on this helps quite a bit, unless you have 133t web ninja skillz. Also, a little bit of deep penetration socking does not hurt and is highly recommended.

Now, TV Tropes is prone to moderator faggotry where they will go on page deletionism sprees, usually to remove anything that might piss off Google (whose dick they suck off of for ad moniez) or they feel makes them look like sick fucks, so you need to find the non offensive pages and use all the time sinks and page locking strategies above to hamstring the legit users.

Then, once the shitstorm has started (this is why multiple trolls working in unison is best), have the legit sounding socks (they might even be more legitimized in advance for having an above board edit history, as lurkers who wait until then to post look suspicious) start reasonably complaining about how legitimate troping is being hamstrung.

This will promote lots of butthurt and leave the wiki staggering, but that's only the first part, as new socks and other troll accounts (making a lot of these prior to the attack with lots of proxies is best) should continue their war to make every page that ISN'T under scrutiny come under fire.

But, again, just as this happens, now that the majority of the legit users are totally pissed and the forums boards are so filled with angry people the mods can't decide the honestly angry from the trolls who are feeding them, keep the war going by having the socks identify the forums that have the largest nuclei of discontent and keep calling out the moderators on how their despotism is fucking over the legitimate users (in polite language so you don't blow your cover).

The point of this exercise is to basically shit up the wiki, piss off as many legit users as possible, and make the moderators of the wiki feel completely fucking miserable. This strategy works quite well on TV Tropes, since many of the moderators (and especially Fast Eddie himself) have zero patience and are prone to throwing shiftits, nuclear spergouts, and massive tantrums when their lives as wiki mods are made harder.

Pros:

- + You'll cause some epic trolling that will entertain many, mostly because the stealthy troll(s) can masquerade as a totally pissed legit user and the mods will never catch on by the time they try to find out who the trolls are.
- + You'll retard all their progress by wasting their time arguing over the locks instead of improving the articles and you'll cause so much page edit retardation NOTHING will get done, making people either leave the wiki in droves or you will drive legit users to troll on your behalf out of utter frustration.
- + If done right, you can make the admins so fucking miserable you could literally drive them to kill the entire site in angry rage, which will cause even more epic lulz whose aftermath will be felt months afterward.

Cons:

- Takes a hell of a lot of careful planning and works best with multiple people.
- Requires a LARGE amount of effort and a ton of dedication.

Deny Your Own Unblock Request

Once you get banned for vandalism and you can only edit your talk page, make sure to make a shit ton of unblock requests, then deny/approve those under other sockpuppet accounts of yours. If you bullshit the admins with a faked signature of some sort, you might get unbanned for a bit before they smell a rat. Make sure to fuck up their pages and any templates on their pages using the codes on this page with your socks before the banhammer comes down again.

Exploiting STiki

Police.gif This vandalism method no longer works but it's being kept for historical purposes.

STiki is a program available on TOW that brings up a diff they think might be vandalism and allows the user to either mark it under 4 categories with one click:

- Vandalism - Activates Rollback and issues a warning
- Good faith - Activates Rollback and issues a custom message
- Pass - Cycles it off to another user of the program to look at
- Innocent - Takes it out of circulation and nobody using the program will see it again

Given the speed this program can operate at, it gives potential for massive lulz. You are given several options:

- Mark everything as vandalism
- Mark everything as not vandalism
- Mark vandal edits as not vandalism and helpful edits as vandalism

PROS:

- You will effect 100s of pages within minutes
- If you mark everything as vandalism, chances are when you get caught and they rollback all edits they will rollback vandalism (the odd edit that you marked as vandalism, that actually is vandalism) into articles.
- Once they do figure out what you are doing, it will be far too late.
- The "mark everything as innocent" method is not detectable.

CONS:

- 1000+ edits or rollback are needed to operate STiki, so a fair bit of effort is needed. It is recommended that you use multiple sockpuppets at once, build up their edit counts and then use them in groups. Better than a one off instance.
- You will be banned without question.
- Occasionally messages appear saying you are going too fast, whilst they don't stop you from continuing, they are annoying.

Using AutoWikiBrowser to do the same thing

They have a similar program called AutoWikiBrowser you can use, which has many of the same pros and cons, though it only requires 500 edits to be authorized to use it on Wikipedia and none whatsoever on Fandom. You can use it to make mass bot-like edits, so you can shit up hundreds of thousands of pages in a very short time, and while it will get you banned without question on both sites, being able to change your IP is your friend here, especially if you want to shit all over Fandom, so create a sock, put in a page list to vandalize, pop in whatever vandalism you want to add, then sit back and watch the chaos.

Pick a time of low activity on Fandom wikis or wikis without a lot of editing for best effect there, and be clever about what you edit on Wikipedia using this.

The Foreign Movie

This vandalism method is easy. All you have to do is find a less-known foreign movie, then go on a translator of your choice, choose a title replacement (Can be anything!) of your choice, translate it to the original language of that movie, go back to Wikipedia, edit the article, change the foreign title in the article to your new one, and you are finished.

PROS:

- Easy to do
- Very lulzy
- Stays for a while

CONS:

- You might be blocked if you do a step wrong
- This is a new method so it might not work too good, just see for yourself

http://textfiles.com/100/adventur.txt

```
*****
*
*      ADVENTURE      *
*
* Solving it in easy steps *
*
*
*****

FROM: THE ROM RAIDER
DR. DIGITAL

CALL HER MAJESTY'S SECRET SERVICE
3 0 3 - 7 5 1 - 2 0 6 3
```

WARNING: THIS WALK-THRU SHOWS HOW TO SOLVE THIS ADVENTURE STEP BY STEP, THESE ARE NOT HINTS!
SPECIFIC INSTRUCTIONS ARE ENCLOSED IN QUOTES, SO TYPE WHAT YOU SEE.

START OFF BY GOING "N". YOU ARE NOW STANDING AT THE END OF A ROAD BEFORE A SMALL BRICK BUILDING. THIS BUILDING IS THE WELLHOUSE, AND IS AN IMPORTANT PART OF THE GAME. THE OBJECT OF THIS GAME IS TO GET THE 15 TREASURES BACK TO THE WELLHOUSE.

CONTINUE WITH "IN", AND YOU ARE INSIDE THE WELL HOUSE, SO "GET FOOD", "GET LAMP", "GET KEYS", "GET BOTTLE". NOW, THERE ARE THREE MAGIC WORDS YOU NEED TO USE. THEY ARE PLUGH, XYZZY AND PLOVER. TWO OF THESE WORDS ARE USED TO GET TO AND FROM THE WELLHOUSE AND PARTS OF THE CAVE. THE THIRD, PLOVER IS USED TO GET BETWEEN TWO PARTS OF THE CAVE. ANOTHER THING TO REMEMBER IS THAT YOUR LAMP LIGHT IS LIMITED, SO TURN OFF YOUR LAMP WHEN YOU DO NOT NEED IT!

NOW ON TO THE CAVE. SAY "PLUGH", THEN "LAMP ON", "S", "GET SILVER", "DROP KEYS", "DROP FOOD", "DROP BOTTLE", "N". YOU ARE NOW BACK AT Y2. HERE IS WHERE YOU USE PLOVER. SO SAY "PLOVER", THEN "NE", "GET PYRAMID", "S", "LAMP OFF", "DROP LAMP", "DROP SILVER", "DROP PYRAMID", "GET EMERALD", "W", "DROP EMERALD", "BACK". THE REASON YOU DID ALL OF THAT WAS THAT THE ONLY WAY TO GET THE EMERALD OUT OF THE PLOVER ROOM IS OUT THROUGH THE CRACK, BUT YOU CAN NOT CARRY ANYTHING ELSE WITH YOU.

NOW "GET LAMP", "GET SILVER", "GET PYRAMID", THEN "PLOVER" AND "PLUGH". YOU ARE NOW BACK IN THE WELLHOUSE, SO DROP OFF YOUR TREASURES SO FAR. TYPE "DROP SILVER", "DROP PYRAMID", BACK TO THE CAVE WITH "XYZZY", AND "LAMP ON", "E", "GET CAGE", "W", "GET ROD", "W", "W", "DROP ROD", "GET BIRD", "GET ROD", "W", "D", "W", "WAVE ROD". THERE IS NOW A CRYSTAL BRIDGE ACROSS THE CHASM. CONTINUE WITH "DROP ROD", THEN GO "W", "GET DIAMONDS", "E", "E", "S", "GET GOLD", "N", "D". AT THIS POINT YOU WILL SEE A HUGE GREEN SNAKE BARING YOUR WAY. TO BE RID OF THE SNAKE, "DROP BIRD", AND THE SNAKE IS DRIVEN AWAY.

AT THIS POINT I NEED TO EXPLAIN SOMETHING ELSE. DURING THE COURSE OF THE GAME, A DWARF WILL SEEK YOU OUT AND THROW AN AXE AT YOU. GET THE AXE. THE NEXT TIME YOU SEE THE DWARF, THROW THE AXE AT HIM TO KILL HIM. THIS MAY HAPPEN SEVERAL TIMES, SO JUST KEEP KILLING THE DWARVES. ANOTHER PERSON TO WATCH OUT FOR IS THE PIRATE. HE WILL SHOW UP AT SOME POINT IN THE GAME, AND STEAL WHATEVER TREASURES YOU ARE CARRYING. IF THIS HAPPENS, YOU CAN GET THE TREASURES BACK WHEN YOU FIND HIS TREASURE CHEST.

CONTINUE WITH "DROP CAGE", "SW", "W". HERE IS A DRAGON SITTING ON A PERSIAN RUG. YOU NEED TO KILL THE DRAGON TO GET THE RUG SO TYPE "KILL DRAGON". THE GAME WILL RESPOND WITH "WITH WHAT? YOUR BARE HANDS?". ANSWER "YES", CONGRATULATIONS, YOU HAVE NOW KILLED THE DRAGON!. SO "GET RUG", THEN "E", "E", "S", "GET JEWELRY", "N", "W", "GET COINS", "E", "N", "LAMP OFF" AND "PLUGH". YOU ARE AGAIN BACK IN THE WELLHOUSE, SO DROP YOUR TREASURES WITH "DROP DIAMONDS", "DROP GOLD", "DROP RUG", "DROP JEWELRY", "DROP COINS". BACK TO THE CAVE WITH "PLUGH", THEN "LAMP ON", "S", "GET FOOD", "GET KEYS", "GET BOTTLE", "D", "W", "D", "W", "W", THEN SAY "ORIENTAL" TO GET TO THE ORIENTAL ROOM. THEN "GET VASE", "W", "DROP KEYS", "DROP FOOD", "BACK", "N", "W", AND YOU HAVE NOW FOUND THE EMERALD YOU PREVIOUSLY PLACED THERE. SO "GET EMERALD", "NW", "S", "SE", "E", "GET PILLOW". THE PILLOW IS USED TO PLACE THE VASE ON, SO YOU DON'T BREAK IT.

NOW GO "BACK", "W", "W", "D", "WATER PLANT", "U". THE PLANT IS CRYING FOR MORE WATER, SO NOW YOU NEED TO GO GET IT SOME WATER. BUT BEFORE YOU DO THAT DROP OFF YOUR TREASURES AT THE WELL-HOUSE BY GOING "E", "E", "NE", "E", "U", "E", "U", "N", "LAMP OFF", "PLUGH" AND YOU ARE BACK IN THE WELLHOUSE. SO "DROP PILLOW", "DROP VASE", "DROP EMERALD".

BACK TO THE CAVE WITH "PLUGH", "LAMP ON", "S", "D", "E", "D", "FILL BOTTLE". YOUR BOTTLE IS NOW FILLED WITH WATER, SO GO "U", "W", "W", "D", "W", "W", "W", "D", "WATER PLANT", "U", "E", "D", "GET OIL", "U", "W", "D". NOW YOU CAN CLIMB THE BEANSTALK SO, "CLIMB", "W", "GET EGGS", "N", "OIL DOOR", "DROP BOTTLE", "N", "GET TRIDENT", "W", "D", "DROP TRIDENT", "GET KEYS", "GET FOOD", "SW", "U". YOU ARE NOW IN FRONT OF A BRIDGE WITH A TROLL GUARDING IT. THE ONLY THING THAT WILL CAUSE THE TROLL TO LEAVE IS TO THROW HIM A TREASURE. THERE IS ONLY ONE TREASURE YOU CAN THROW HIM AND THAT IS THE EGGS. SO "THROW EGGS", THEN "CROSS".

YOU ARE NOW ACROSS THE CHASM. CONTINUE WITH "NE", "E", "NE", "E", "GET SPICES", "W", "N", (HERE IS THE VOLCANO), "S", "S", "SE", "S", "IN". YOU ARE NOW IN A ROOM WITH A FEROCIOUS BEAR, WHO IS LOCKED UP WITH A GOLD CHAIN. YOU NEED TO GET THE CHAIN, SO "FEED BEAR", THEN "UNLOCK" THE CHAIN, "GET BEAR", "GET CHAIN", "DROP KEYS" AND "OUT". THE BEAR WILL NOW FOLLOW YOU WHEREVER YOU GO. SO GO "U", "U", "W", "W", AND "CROSS". FROM NOWHERE, THE TROLL APPEARS AGAIN. JUST "DROP BEAR", AND THE TROLL WILL DISAPPEAR. NOW "CROSS" THE BRIDGE, THEN GO "SW", "D", "GET TRIDENT", "SE", "SE", "NE", "E", "N". YOU ARE IN THE CLAM ROOM, SO NOW "OPEN CLAM". (IT IS NECESSARY TO HAVE THE TRIDENT BEFORE YOU CAN OPEN THE CLAM). NOW YOU NEED TO GO AFTER THE PEARL SO GO "D", "D", "GET PEARL". THEN "U", "U", "S", "U", "E", "U", "N", "LAMP OFF", AND SAY "PLUGH". THEN "DROP CHAIN", "DROP PEARL", "DROP TRIDENT", "DROP SPICES".

BACK TO THE CAVE WITH "PLUGH", THEN "LAMP ON", "S", "D", "W", "D", "W", "W", "W", "D", "CLIMB", "W". YOU ARE NOW BACK AT THE SPOT WHERE YOU ORIGINALLY FOUND THE EGGS WHICH YOU THREW TO THE TROLL. THE REASON YOU THREW THE EGGS WAS BECAUSE YOU CAN GET THEM BACK AGAIN! JUST SAY "FEE", "FIE", "FOE", "FOO", AND THEY MAGICALLY APPEAR! SO "GET EGGS", THEN "N", "N", "W", "D", "SE", "SE", "NE", "E", "U", "E", "U", "N", "LAMP OFF", AND "PLUGH". THEN "DROP EGGS".

NOW ON TO FIND THE LAST TREASURE, THE PIRATE'S CHEST! GO THERE WITH "PLUGH", "LAMP ON", "E", "U", "W", "W", "W", "S", "E", "S", "S", "S", "N", "E", "E", "NW", "GET CHEST", "BACK", "N", "D", "E", "E", "XYZZY". YOU ARE BACK AT THE BUILDING, SO "DROP CHEST". CONGRATULATIONS, YOU NOW HAVE ALL 15 TREASURES!

AT THIS POINT YOU HAVE ONE MORE THING TO ACCOMPLISH BEFORE YOU GO THE THE GRAND FINALE. SO SAY "XYZZY", THEN GO "W", "W", "W", "D", "D", "N", "D", "W", "D", "E", "GET MAGAZINES". YOUR QUEST IS TO TAKE THE MAGAZINES, AND PLACE THEM JUST INSIDE WITT'S END. THIS ACTION IS OFTEN MISSED BY PEOPLE PLAYING THIS GAME, AND AS A RESULT, THEY DO NOT FINISH THE GAME WITH ALL 350 POINTS AND THE GRAND MASTER STATUS. NOW GO "E", THEN "DROP MAGAZINES", AND "BACK".

NOW COMES THE EASY PART. JUST WANDER AROUND THESE PASSAGES, AS YOU NOW HAVE SOME TIME TO KILL. THE GAME GIVES YOU A SET NUMBER A MOVES AFTER ALL THE TREASURES ARE IN THE WELLHOUSE, AND THEN YOU ARE TRANSPORTED TO THE GRAND FINALE. THE MESSAGE YOU WILL GET WILL START BY SAYING "THE CAVE IS NOW CLOSED", ECT. AT THIS POINT YOU ARE TRANSPORTED TO THE NORTHEAST END OF AN IMMENSE ROOM. DO THE FOLLOWING: "SW", "GET ROD", "NE", "DROP ROD", "SW". WHAT YOU HAVE DONE IS PLACED A STICK OF DYNAMITE AT THE OPPOSITE END OF THE ROOM. NOW YOU SAY THE MAGIC WORD - "BLAST". YOU HAVE NOW EXPLODED A HOLE IN THE FAR WALL, AND YOU MARCH THROUGH IT INTO THE MAIN OFFICE. YOU HAVE NOW FINISHED THE GAME OF ADVENTURE!

<http://textfiles.com/100/famous.bug>

Famous Bugs courtesy of Dave Curry (ecn.davy@purdue).

Originally From John Shore (shore@nrl-css)

Some time ago, I sent out a request for documented reports on "famous bugs", promising to summarize the results for all who contributed. This is the promised summary.

I judge the effort as a failure. People encounter bugs and fix bugs and talk about bugs, but they rarely document bugs. Those responding to my request were well meaning and helpful, but I was left feeling a little like my hair was being done by a gossip-laden ex-hacker.

I am, of course, no different. I didn't have documentation for most of the famous bugs I knew about, and I don't have sufficient time, energy, and interest to follow all the leads. I should have known better.

One strong conclusion that I've reached is that many computer system horror stories become known as bugs when in fact they are not -- they're system problems that result from hardware failures, operator mistakes, and the like. Let me mention a few examples. In his book Software Reliability, Glenford Myers mentioned a number of classical software errors. For example, he mentioned that a software error in the onboard computer of the Apollo 8 spacecraft erased part of the computer's memory. I happen to have a copy of a memo by Margaret Hamilton that summarized the conclusions of a detailed study of every Apollo bug (see below), so I looked under Apollo 8. The best I could find was this: "16. Illegal P01. P01 was selected during midcourse, illegally by the astronaut. This action destroyed W-matrix (several erasables in AGC)." The software did erase the memory, but it did so because the astronaut did something illegal, and not because the programmer goofed. This example is characteristic of the Apollo errors (see below), most of which show the need for better exception handling as part of the software specification. But weak specifications are not the same thing as bugs.

Here's another example, also from Apollo. It starts with a note to me from Kaeler.pa at Xerox (via Butler Lampson):

I heard about the MIT summer student at NASA whose Apollo program filled up memory (with logging information) and flashed the red abort light a few seconds before the first moon landing. The student was in the control room, and after a little thought, said, "Go ahead, I know what it is, I will take responsibility". Luckily, he was right. He was awarded all sorts of medals for being willing to take the responsibility.

You should get this story from the horse's mouth before distributing it. I heard it from Neil Jacobstein (212-454-0212, in new york). He heard it from his advisor at the Johnson Space Center in Houston a few years ago. It might be interesting to trace this back to someone who really knows about it.

I called Jacobstein, and after some discussion he decided that the "bug" was probably the famous "1201 descent alarm" that I mention below. Again, this was caused by an astronaut error (a radar was turned on when it should have been off).

Lot's of people mentioned to me various NORAD "bugs" that caused alerts. I got a copy of a Senate Armed Services Committee Report of 9 October, 1980, "Recent False Alerts From the Nation's Missile Attack Warning System." It deals primarily with the June 1980 alerts, but it contains the following summary:

Oct. 3, 1979 -- An SLBM radar (Mt. Hebro) picked up a low orbit rocket body that was close to decay and generated a false launch and impact report.

November 9, 1979 -- False indications of a mass raid caused by inadvertent introduction of simulated data into the NORAD Computer System.

March 15, 1980 -- Four SS-N-6 SLBMs were launched from the Kuril Islands as part of Soviet troop training. One of the launches generated an unusual threat fan.

June 3, 1980 -- False indications caused by a bad chip in a communications processor computer

According to Borning@Washington (who by the way is studying computer problems in missile warning systems), the cause of the Nov. 1979 problem was as follows:

To test the warning system, false attack data was intermixed with data from actual satellite observations, put on tape, and run through the system. On November 9, the test tape of this sort was accidentally left mounted on a secondary backup computer. This machine was left connected to the system in use. When the primary computer failed, a backup computer was activated, which also failed. Then the secondary computer came into play, causing the alert.

All of these missile alerts were caused by real flying objects, hardware failures, or human error. I'm not saying that bugs didn't cause any missile alerts, just that the ones that are reputed to have been caused by bugs in fact were not.

Perhaps computer software -- as opposed to the combination of hardware, software, and people -- is more reliable than folklore has it. I would be interested in hearing your comments on this proposition.

Despite the foregoing problems, the assembly of responses makes interesting reading. In the following, I'll mention a few well-documented bugs and then append various extracts from what I received. Thanks to all who responded. In most cases, I eliminated duplicates. Special thanks to Peter Neumann (SRI), who seems to be keeping better track of these problems than anyone else. Many of these don't qualify as bugs by anyone's definition, but they're interesting stories so I've included some of them anyway.

Space-Shuttle Bug

This may be the most famous of all -- the one that delayed at the last minute the launch of the first space shuttle. The cause was was a bug that interfered with the communication between concurrent processes -- an area of programming that is among the least well in hand. John R. Garman wrote about the problem in detail in ACM SIGSOFT Software Engineering News (SEN), vol. 6, No. 5, pp 3-10.

The First Bug

Worth mentioning for the trivia folks, it was a moth that was beaten to death by a relay in the Mark II. It was discovered by the Mark II staff, which included Grace Hopper. (Reports on this are a bit confusing. Many attribute the bug to her; in her own published account she refers to "we". I called and asked her. She said the machine operator actually pulled the moth out, and that it was found by the combined efforts of the staff.) Lots of people mentioned this bug to me; my favorite report attributed the bug to

"some little old lady who works for the Navy. She's the one who came up with Cobol, I think."

In fact, this is one of the better-documented bugs. You can even see its picture in the Annals of the History of Computing (vol. 3, July 1981, page 285). It's ironic that "modern" bugs have practically nothing in common with the first one (an exception being Dijkstra's well known remark about testing).

ARPANET Gridlock

In October 1980 the net was unusable for a period of several hours. It turned out that the routing processes in all the IMPs were consuming practically all resources as the result of processing three inconsistent routing updates. It turned out that the inconsistency arose from dropped bits in a single IMP. Whether you choose to call this a bug or not, clearly it demonstrated a design failure. The details are reported well by Eric Rosen in SEN, January 1981.

APOLLO flight experiences

When Margaret Hamilton was working at the Charles Stark Draper Laboratory in the early 1970s, she documented and analyzed in some detail the various "software anomalies" that occurred during several APOLLO flights. Apparently she did this at the request of Marty Shooman. I don't think that she ever published the results, but some years back she gave us a copy of "Shuttle Management Note #14" (23 October 1972), which summarized her analysis. It makes interesting reading.

One of her strongest conclusions was that 73% of the problems were caused by "real-time human error". Translated roughly into 1983 computer-speak, this means that the APOLLO software wasn't user friendly. (I guess they didn't have icons or something.) Apparently, there was much debate about this during the design, but the software types were told that astronauts have the right stuff or something so there was no need to make the software robust.

One example is quite widely known, as it occurred during the APOLLO 11 landing on the moon. In what was referred to as "1201-1202 Descent Alarms", the software kept restarting as the result of overloading. Turned out the radar switch was in the wrong position and used up 13% more computer time than had been anticipated.

Hamilton states that "pure software errors" were not a problem on APOLLO flights. I guess she means that the software met its specifications, which is quite an accomplishment. But the specifications apparently did not say much about error detection and recovery. Hamilton states that "all potentially catastrophic problems would have been prevented by a better and/or known philosophy of providing error detection and recovery via some mechanism."

Nuclear Reactor Design Program

I don't know when the bug was first introduced, but it transpired in 1979. From Jim Horning (Horning.pa@parc-maxc):

A belatedly-discovered bug in a stress analysis program (converting a vector into a magnitude by summing components--rather than summing absolute values; module written by a summer student) caused a number of nuclear reactors to be closed down for checks and reinforcement a about three years ago (not long after TMI). This was fairly widely discussed in the press at the time, but I never did see how the lawsuits came out (if, indeed, they have been completed).

>From br10@cmu-10a came the following newswire stories:

a023 0026 16 Mar 79 PM-Topic, Advisory, Managing Editors: Wire Editors: It all started in a tiny part of a computer program used by an engineering firm designing nuclear reactors. It ended with the shutdown of five nuclear power plants at a time when President Carter is pushing oil conservation and the world oil market is in turmoil. The computer miscalculated some safety precautions required by law. The power from the closed plants now will have to be replaced by electricity generated with oil or coal. This may cost utility customers money and throw a curve at Carter's conservation program. In Today's Topic: The Little Computer and the Big Problem, AP writer Evans Witt traces this glitch in the system, from the obscure computer to its possible effect on the nation's energy problems. The story, illustrated by Laserphoto NY7, is upcoming next. The AP

ap-ny-03-16 0328EST *****

a024 0044 16 Mar 79 PM-Topic-Glitch. Bit,950 TODAY'S TOPIC: The .yyter and the Big Problem Laserphoto NY7 By EVANS WITT Associated Press Writer WASHINGTON (AP) - Something just didn't add up. And the result is: five nuclear power plants are shut down; millions of Americans may pay higher utility bills; and a sizable blow may have been struck to President Carter's efforts to reduce the use of imported oil and to control inflation. The immediate source of all this is part of the federal bureaucracy - the Nuclear Regulatory Commission which ordered the shutdowns. But in one sense, the ultimate culprit was "Shock II," a tiny part of a computer program used by a private firm to design the power plants' reactors. Shock II was wrong and that means parts of the five reactors might not survive a massive earthquake. Shock II was the weak link that could have allowed the chain to snap. In between Shock II and the shutdowns were a public utility, a private engineering firm and the NRC staff. It was really the judgments of the dozens of scientists and engineers, not elected or appointed officials, that led to the shutdowns. Perhaps as a result, the decision's impact on the nation's energy situation was not even considered until the very last moment - when the commission itself was faced with the final decision. And at that point, the NRC said, it had no choice. It said the law was clear: serious questions about the reactors had been raised and the reactors had to be turned off until answers were found. The specific questions are arcane engineering issues, but the explanation is straightforward: Will some of the systems designed to protect the reactor survive an earthquake - or will they fail, and possibly allow radioactive death to spew into the air? The regulations say the reactors must be able to withstand a quake equal to the strongest ever recorded in their area. The regulations don't allow any consideration of the likelihood of a major quake. All four states where the reactors are located - New York, Pennsylvania, Maine and Virginia - have had minor quakes in this

decade and damaging quakes at least once in this century. The only way to test them - short of having a massive earthquake - is to test a model of the reactor. The "model" is actually a set of mathematical formulas in a computer that reflect how the reactor and its parts will behave in a quake. The model used for the five reactors came from Stone and Webster, the large Boston engineering and architectural firm that designed the plants. The Stone and Webster model indicated how strong and well supported pipes had to be and how strong valves had to be. The problem apparently cropped up after Stone and Webster suggested within the last few months more pipe supports in the secondary cooling system of the reactor at Shippingport, Pa., operated by Duquesne Light Co. in Pittsburgh. But why were the supports needed? "This was not clear to us, looking at the calculations done by the models," said Gilbert W. Moore, Duquesne's general superintendent of power stations. So Duquesne - and Stone and Webster - sent the computer models through their paces again, having them calculate and recalculate what would happen to the pipes in an earthquake. "We came out with some numbers which were not in the range we would like," Moore said. That made the problem clear - the model now said the pipes might break in an earthquake. The previous analysis indicated an adequate safety margin in the pipes, and Stone and Webster's explanation was: "One subroutine may not give uniformly conservative results." The problem was in a "subroutine," a small part of the computer model, called "Shock II," said Victor Stello, director of NRC's division of reactor operations. "The facts were that the computer code they were using was in error," said Stello. "Some of the computer runs were showing things are okay. In some cases, the piping systems were not okay. We didn't know the magnitude of the error or how many plants might be affected," he said. It was on March 1 that Duquesne told the NRC of the problem by telephone and asked for a meeting to discuss it. The same day, Energy Secretary James R. Schlesinger was telling Congress that unleaded gas might cost \$1 a gallon within a year and service stations might be ordered shut down on Sundays because of oil shortages. The meeting took place on Thursday, March 8, in Washington with NRC staff, Stone and Webster engineers and Duquesne Light people on hand. Through the weekend, Stello said, engineers from NRC, Duquesne and Stone and Webster worked at the private firm's Boston office, analyzing the severity of the problem. "By the middle of Sunday (March 10) we begin to get a pretty good idea of what it meant for the systems," Stello said. "Monday, we got the latest information from our people at the Stone and Webster offices. It became clear that there would be a number of the safety systems that would have stresses in excess of allowable limits. The magnitude of the excess was considerable." Tuesday, members of the NRC were briefed by their staff of engineers and scientists. They asked for an analysis of the economic impact of the decision, and then ordered the plants closed within 48 hours. And the five reactors shut down: Duquesne Light Co.'s Beaver Valley plant at Shippingport, Pa.; Maine Yankee in Wiscasset, Maine; the Power Authority of New York's James Fitzpatrick plant at Scriba, N.Y.; and two Virginia and Electric Power Co. reactors at Surry, Va. It may take months to finish the analysis of the potential problems and even longer to make changes to take care of the situation. Until the reactors start generating again, the utilities will have to turn to plants using oil or coal. This may cost more, and that cost may be borne by the millions of utility customers. To replace the power from these nuclear plants could require 100,000 barrels of oil a day or more. And this at a time when President Carter has promised to cut U.S. oil consumption by 5 percent - about 1 million barrels a day - and when the world's oil markets are in turmoil because of recent upheavals in Iran.

Summary of various problems from NEUMANN@SRI-AI

Review of Computer Problems -- Catastrophes and Otherwise

As a warmup for an appearance on a SOFTFAIR panel on computers and human safety (28 July 1983, Crystal City, VA), and for a new editorial on the need for high-quality systems, I decided to look back over previous issues of the ACM SIGSOFT SOFTWARE ENGINEERING NOTES [SEN] and itemize some of the most interesting computer problems recorded. The list of what I found, plus a few others from the top of the head, may be of interest to many of you. Except for the Garman and Rosen articles, most of the references to SEN [given in the form (SEN Vol No)] are to my editorials.

SYSTEM -- SF Bay Area Rapid Transit (BART) disaster [Oct 72] Three Mile Island (SEN 4 2) SAC: 50 false alerts in 1979 (SEN 5 3); simulated attack triggered a live scramble [9 Nov 79] (SEN 5 3); WWMCCS false alarms triggered scrambles [3-6 Jun 80] (SEN 5 3) Microwave therapy killed arthritic patient by racing pacemaker (SEN 5 1) Credit/debit card copying despite encryption (Metro, BART, etc.) Remote (portable) phones (lots of free calls)

SOFTWARE -- First Space Shuttle launch: backup computer synchronization (SEN 6 5 [Garman]) Second Space Shuttle operational simulation: tight loop on cancellation of early abort required manual intervention (SEN 7 1) F16 simulation: plane flipped over crossing equator (SEN 5 2) Mariner 18: abort due to missing NOT (SEN 5 2) F18: crash due to missing exception condition (SEN 6 2) El Dorado: brake computer bug causing recall (SEN 4 4) Nuclear reactor design: bug in Shock II model/program (SEN 4 2) Various system intrusions ...

HARDWARE/SOFTWARE -- ARPAnet: collapse [27 Oct 1980] (SEN 6 5 [Rosen], 6 1) FAA Air Traffic Control: many outages (e.g., SEN 5 3) SF Muni Metro: Ghost Train (SEN 8 3)

COMPUTER AS CATALYST -- Air New Zealand: crash; pilots not told of new course data (SEN 6 3 & 6 5) Human frailties: Embezzlements, e.g., Muhammed Ali swindle [\$23.2 Million], Security Pacific [\$10.2 Million], City National, Beverly Hills CA [\$1.1 Million, 23 Mar 1979] Wizards altering software or critical data (various cases)

SEE ALSO A COLLECTION OF COMPUTER ANECDOTES SUBMITTED FOR the 7th SOSP (SEN 5 1 and SEN 7 1) for some of your favorite operating system and other problems...

[Muni Metro Ghosts]

The San Francisco Muni Metro under Market Street has been plagued with problems since its inauguration. From a software engineering point of view, the most interesting is the Ghost Train problem, in which the signalling system insisted that there was a train outside the Embarcadero Station that was blocking a switch. Although in reality there was obviously no such train, operations had to be carried on manually, resulting in increasing delays and finally passengers were advised to stay above ground. This situation lasted for almost two hours during morning rush hour on 23 May 1983, at which point the nonexistent train vanished as mysteriously as it had appeared in the first place. (The usual collection of mechanical problems also has arisen, including brakes locking, sundry coupling problems, and sticky switches. There is also one particular switch that chronically causes troubles, and it unfortunately is a weakest-link single point of failure that prevents crossover at the end of the line.)

Problems mentioned in the book Software Reliability, Glen Myers

Myers mentions a variety of problems. One famous one (lot's of people seem to have heard about it) is the behavior of an early version of the ballistic missile early warning system in identifying the rising moon as an incoming missile. Myers points out that, by many definitions, this isn't a software error -- a problem I discussed a bit at the beginning of this message.

Other problems mentioned by Myers include various Apollo errors I've already mentioned, a 1963 NORAD exercise that was incapacitated because "a software error caused the incorrect routing of radar information", the loss of the first American Venus probe (mentioned below in more detail). Mentioned with citations were an Air Force command system that was averaging one software failure per day after 12 years in operation, deaths due to errors in medical software, and a crash-causing error in an aircraft design program. I was not able to follow up on any of the citations.

The rest of this message contains excerpts from things I received from all over, in most cases presented without comments.

faulk@nrl-css (who got it elsewhere)

Today, I heard good story that is a perfect example of the problems that can arise whe the assumptions that one module makes about another are not properly documented. (The story is from a system engineer here whose father got it from the Smithsonian Space people.)

Aparently, the Jupiter(?) probe to mars could have programs beamed to it which it would load in internal memory. The system engineers used this property to make mission changes and/or corrections. After the probe had been on Mars for a while, memory started getting tight. One of the engineers had the realization that they no longer needed the module that controled the landing so the space could be used for something else. The probe was sent a new program that overwrote the landing module. As soon as this was accomplished, all contact was lost to the probe.

Looking back into the code to find what had gone wrong, the programmers discovered that because the landing module had to have information on celestial navigation, some or all of the celestial navigation functions were inclded in the landing module. Unfortunately, the antenna pointing module also required celestial navigation information to keep the antenna pointed at earth. To do this, it use the navigation functions in the landing module. Overlaying the module has left the antenna pointing in some unknown direction and all contact with the craft has been lost forever.

Fortunately, all of the mission requirements had been fulfilled so it was no great loss. It can live on as a great example of bad design.

----- mo@LBL-CSAM

The folklore tells of a bug discovered during the fateful flight of Apollo 13. It seems that the orbital mechanics trajectory calculation program had a path which had never been excersiced because of the smooth, gentle orbital changes characteristic of a nominal Apollo flight. However, when the flight dynamics team was trying ways to get them home with the aid of much more creative maneuvers, the program promptly crashed with a dump (running on IBM equipment, I believe). The story goes that the fix was simple - something on the order of a missing decimal, or a zero-oh reversal, (Divide by zero!!!!) but there was much consternation and tearing of hair when this critical program bought the farm in the heat of the moment.

This was related to me by an ex-NASA employee, but I have heard it through other paths too. I guess the NASA flight investigation summary would be one place to try and verify the details.

----- jr@bbncd

One cute one was when the Multics swapper-out process swapped out the swapper-in process. (recall that all of the Multics OS was swappable)

----- dan@BBN-UNIX

Here in Massachusetts we've recently begun testing cars for emissions. All car inspections are carried out at gas stations, which in order to participate in the program had to buy a spiffy new emissions analyzer which not only told you what your emissions were, but passed judgement on you as well, and kept a record on mag tape which was sent to the Registry of Motor Vehicles so that they could monitor compliance.

Well, on June 1 the owners of the cheaper (\$8K) of the two acceptable analyzers discovered that their machines could not be used; they didn't like the month of June! The company which built them, Hamilton, had to apply a quick fix which told the machines that it was actually December (!?). Lots of people were inconvenienced.

Unfortunately all I know about this at the moment is what the Boston Globe had to say, so I don't know what the actual problem was. The article said that the quick cure involved replacing the "June" chip with the "December" chip; I don't know what that means, if anything. Electronic News or Computerworld ought to have more accurate information.

Don't forget about the rocket launch early in the space program which had to be aborted because the Fortran program controlling it believed that the number of seconds in a day was 86400 (rather than the sidereal time figure).

The recent issue of Science News with the cover story on when computers make mistakes mentioned a story about a graduate student who almost didn't get his thesis due to inaccuracies in the university computer's floating point software. Not really earthshaking, except to him, I suppose.

----- STERNLIGHT@USC-ECL

I don't have the data, but there were at least two "almost launches" of missiles. The rising moon was only one. You might try contacting Gus Weiss at the National Security Council-- he will be able to tell you quite a bit. Mention my name if you like.

[I called Weiss, who didn't have much to say. He kept repeating that the problems were fixed--js]

mark@umcp-cs

The following is probably not famous except with me, but deserves to be.

True story: Once upon a time I managed to write a check so that my bank balance went exactly to zero. This was not so unusual an occurrence, as my checking account had an automatic loan feature in case of overdraft, and I used this feature occasionally. Negative and positive balances were therefore well known in this account. Not so zero balances. Soon after writing this check I attempted to withdraw some funds using my money machine card. Unsuccessful. I attempted to DEPOSIT money via the machine. Unsuccessful. I talked to a person: they had no record of my account ever having existed. After several trips to the bank, each time up one more level in the management hierarchy, I, the bank managers and me, discovered the following: The bank's computer had been programmed so that the way to delete an account was to set the balance to zero. When I wrote my fatal zeroing check the computer promptly forgot all about me. Only my passion for paper records, and the bank's paper redundancy, enabled the true story to emerge and my account to be restored. Interestingly, no funds were ever in danger, since the account was closed with NO MONEY in it. Nonetheless, the inconvenience was considerable. Once the situation became straightened out I immediately transferred my account to another bank, writing a letter to the first bank explaining my reasons for doing so.

----- craig@umcp-cs

The most famous bug I've ever heard of was in the program which calculated the orbit for an early Mariner flight to Venus. Someone changed a + to a - in a Fortran program, and the spacecraft went so wildly off course that it had to be destroyed.

----- fred@umcp-cs

Some examples of bugs I've heard about but for which I don't have documentation: (a) bug forced a Mercury astronaut to fly a manual re-entry; . . .

There was something about this on the Unix-Wizards mailing list a while back. The way I understand it, a programmer forgot that the duration of the Mercury Capsule's orbit had been calculated in sidereal time, and left out the appropriate conversion to take into account the rotation of the Earth beneath the capsule. By the end of the mission the Earth had moved several hundred miles from where it "should" have been according to the program in question. Sorry I can't give you any definite references to this.

----- KROVETZ@NLM-MCS

I've heard of two bugs that I think are relatively famous:

1. A bug in a FORTRAN program that controlled one of the inner planet fly-bys (I think it was a fly-by of Mercury). The bug was caused because the programmer inadvertently said DO 10 I=1.5 instead of DO 10 I=1,5. FORTRAN interprets the former as "assign a value of 1.5 to the variable DO10I". I heard that as a result the fly-by went off course and never did the fly-by! A good case for using variable declarations.

2. I'm not sure where this error cropped up, but one of the earlier versions of FORTRAN a programmer passed a number as an actual argument (e.g. CALL MYPROC(2)) and within the procedure changed the formal argument. Since FORTRAN passes arguments by reference this had the result of changing the constant "2" to something else! Later versions of FORTRAN included a check for changing an argument when the actual is an expression.

----- uvictr!dparnas >From jhart Thu Jun 9 13:30:48 1983 To: parnas

San Francisco Bay Area Rapid Transit, reported in Spectrum about two years ago. "Ghost trains", trains switched to nonexistent lines, and best of all the rainy day syndrome.

uvictr!uw-beaver!allegra!watmath!watarts!geo

One of my pals told me this story. One morning, when they booted, years ago, the operators on the Math faculty's time-sharing system set the date at December 7th, 1941 (ie Pearl Harbor). Well the spouse of the director of the MFCF (ie Math Faculty Computing Facility) signed on, was annoyed by this, and changed the date to the actual date. Everyone who was signed on while this was done was charged for thirty-something years of connect time. I wouldn't know how to document this story.

Oh yes, didn't Donn Parker, self-proclaimed computer sleuth, call the fuss made over UNIX and intelligent terminals some outrageous phrase, like 'The bug of the century'? I am referring to the fuss made over the fact that some of the terminals that Berkeley had bought were sufficiently intelligent, that they would do things on the command of the central system. The danger was that if someone was signed on to one of these terminals as root, an interloper could write something to this terminal causing the terminal to silently transmit a string back to UNIX. Potentially, this string could contain a command line giving the interloper permissions to which they were not entitled.

Cordially, Geo Swan, Integrated Studies, University of Waterloo allegra!watmath!watarts!geo

----- smith@umcp-cs

John, another bug for your file. Unfortunately it is a rumor that I haven't tried to verify. Recall that FORTRAN was developed on the IBM 704. One of the 704's unusual features was that core storage used signed magnitude, the arithmetic unit used 2's complement, and the index registers used 1's complement. When FORTRAN was implemented on the IBM product that replaced the 704, 7094 etc. series, the 3 way branching if went to the wrong place when testing negative zero. (It branched negative, as opposed to branching to zero). I heard this rumor from Pat Eberlein (eberlein@buffalo). Supposedly, the bug wasn't fixed (or discovered) for two years.

----- VES@KESTREL

1. In the mid 70's in a lumber processing plant in Oregon a program was controlling the cutting of logs into boards and beams. The program included an algorithm for deciding the most efficient way to cut the log (in terms of utilizing most of the wood), but also controlled the speed with which the log was advancing.

Once the speed of a log increased to dangerous levels. All personnel was scattered and chased out of the building, the log jumped off the track, fortunately there were no casualties. This was caused by a software bug. A reference to the event would be the former director of the Computer Center at Oregon State University (prior to 1976), who at the time I heard the story (Spring 1977) was President of the company which developed the software.

2. Another rather amusing incident dates back to the mid 60's. It was not caused by a software bug but is indicative of the vulnerability of software systems particularly in those early days. It involved the Denver office of Arizona Airlines. Their reservation system was periodically getting garbage input. Software experts were dispatched but failed to identify the cause. Finally the software manager of the company which developed the system went to study the problem on the spot.

After spending a week at the site he managed to identify a pattern in the generation of garbage input: it was happening only during the shifts of a particular operator and only when coffee was served to her. Shortly afterwards the cause was pinpointed. The operator was a voluminous lady with a large belly. The coffee pot was placed behind the terminal and when she would reach for it her belly would rest on the keyboard. Unfortunately, I don't have more exact references to that event.

----- RWK at SCRC-TENEX

There's the famous phase-of-the-moon bug which struck (I believe) Gerry Sussman and Guy Steele, then both of MIT. It turned out to be due to code which wrote a comment into a file of LISP forms, that included the phase of the moon as part of the text. At certain times of the month, it would fail, due to the comment line being longer than the "page width"; they had failed to turn off automatic newlines that were being generated by MacLisp when the page width was exceeded. Thus the last part of the line would be broken onto a new line, not proceeded with a ";" (the comment character). When reading the file back in, an error would result.

----- gwyn@brl-vld

An early U.S. Venus probe (Mariner?) missed its target immensely due to a Fortran coding error of the following type:

DO 10 I=1,100

Which should have been

DO 10 I=1,100

The first form is completely legal; it default-allocates a REAL variable DO10I and assigns 1.1 to it!

----- Horning.pa@PARC-MAXC

I have heard from various sources (but never seen in print) the story that the problem with the wings of the Lockheed Electras (that caused several fatal crashes) slipped past the stress analysis program because of an undetected overflow. This one would probably be next to impossible to document.

One of my favorite bugs isn't all that famous, but is instructive. In about 1961, one of my classmates (Milton Barber) discovered that the standard integer binary-to-decimal routine provided by Bendix for the G-15D computer wasn't always exact, due to accumulated error from short multiplications. This only affected about one number in 26,000, but integer output OUGHT to be exact. The trick was to fix the problem without using any additional drum locations or drum revolutions. This occupied him for some time, but he finally accomplished it. His new routine was strictly smaller and faster. But was it accurate? Milton convinced himself by numerical analysis that it would provide the correct answer for any number of up to seven digits (one word of BCD). Just to be safe, he decided to test it exhaustively. So he wrote a loop that counted in binary and in BCD, converted the binary to BCD, and compared the results. On the G-15D this ran at something like 10 numbers per second. For several weeks, Milton took any otherwise idle time on the college machine, until his loop had gone from 0 to 10⁷-1 without failure. The he proudly submitted his routine to Bendix, which duly distributed it to all users. Soon thereafter, he got a telephone call: "Are you aware that your binary to decimal conversion routine drops the sign on negative numbers?" This is the most exhaustive program test that I've ever seen, yet the program failed on half its range!

----- Horning.pa

[Excerpts from a trip report by Dr. T. Anderson of the University of Newcastle upon Tyne.]

The purpose of my trip was to attend a subworking group meeting on the production of reliable software, sponsored by NASA, chaired by John Knight (University of Virginia), and organized and hosted by the Research Triangle Institute [Nov. 3-4, 1981]. Essentially, NASA would like to know how on earth software can be produced which will conform to the FAA reliability standards of 10⁻⁹ failures/hour. Sadly, no one knew.

FRANK DONAGHE (IBM FEDERAL SYSTEMS DIVISION): PRODUCING RELIABLE SOFTWARE FOR THE SPACE SHUTTLE

Software for the Space Shuttle consists of about 1/2 million lines of code, produced by a team which at its largest had about 400 members. Costs were high at about \$400 per line. . . . Between the first and second flight 80% of the modules were changed, such that about 20% of the code was replaced. Three weeks prior to the second flight a bug in the flight software was detected which tied up the four primary computers in a tight (two instruction) loop. .

----- Laws@SRI-AI

Don't forget the bug that sank the Sheffield in the Argentine war. The shipboard computer had been programmed to ignore Exocet missiles as "friendly." I might be able to dig up an IEEE Spectrum reference, but it is not a particularly good source to cite. The bug has been widely reported in the news media, and I assume that Time and Newsweek must have mentioned it.

I'll try to find the reference, but I must issue a disclaimer: some of my SRI associates who monitor such things more closely than I (but still without inside information) are very suspicious of the "bug" explanation. "Computer error" is a very easy way to take the heat off, and to cover what may have been a tactical error (e.g., turning off the radar to permit some other communication device to function) or a more serious flaw in the ship's defensive capability.

----- PARK@SRI-AI

>From International Defense Review and New Scientist after the Falklands war ...

The radar system on the Sheffield that didn't report the incoming Exocet missile because it wasn't on the list of missiles that it expected a Russian ship to use.

The missiles fired over the heads of British troops on the Falklands beaches at the Argentines, that could have gone off if they had detected enough metal below them (probably not really software).

The missile that was guided by a person watching a tv picture of the missile from a shipboard camera. A flare on the tail of the missile intended to make the missile more visible to the camera tended to obscure the target. A hasty software mod made the missile fly 20 feet higher (lower?) so that the operator could see the target.

A more general consideration is that in the event of an electromagnetic pulse's deactivating large numbers of electronic systems, one would prefer that systems like missiles in the air fail safe.

----- Laws@SRI-AI

I have scanned Spectrum's letters column since the original Exocet mention in Oct. '82, but have not found any mention of the bug. Perhaps I read the item on the AP newswire or saw a newspaper column posted on a bulletin board here at SRI. Possibly Garvey@SRI-AI could give you a reference. Sorry.

----- Garvey@SRI-AI Subject: Re: Falkland Islands Bug

The original source (as far as I know) was an article in New Scientist (a British magazine) on 10 Feb 83. It suggested that the Exocet was detected by the Sheffield's ESM gear, but catalogued as a friendly (!) missile, so no action was taken. I have two, strictly personal (i.e., totally unsubstantiated by any facts or information whatsoever) thoughts about this: 1) I suspect the article is a bit of disinformation to cover up other failings in the overall system; from bits and pieces and rumors, I would give top billing to the possibility of poor spectrum management as the culprit; 2) I wouldn't care if the missile had the Union Jack on the nose and were humming Hail Britannia, if it were headed for me, I would classify it as hostile!

PALMER@SCRC-TENEX

I was working for a major large computer manufacturer {not the one that employees me today}. One of the projects I handled was an RPG compiler that was targeted to supporting customers that were used to IBM System III systems. There had been complaints about speed problems from the field on RPG programs that used a table lookup instruction. The computer supporting the compiler had excellent microcode features: we decided to take advantage of the feature by microcoding the capability into the basic machine.

The feature was pretty obvious: it would search for things in ordered or unordered tables and do various things depending on whether the key was in the table.

We made what we considered to be the "obvious" optimization in the case of ordered tables - we performed a binary search. Nothing could be faster given the way the tables were organized. We wrote the code, tested it on our own test cases and some field examples and got performance improvements exceeding sales requirements. It was an important fix...

Unfortunately, it was wrong. It isn't clear what "it" was in this case - Us or IBM. People loaded their tables in the machine with each run of an RPG program and they often wouldn't bother to keep their ordered tables ordered. IBM didn't care - it ignored the specification {most of the time}. Our code would break when people gave us bad data in ways that IBM's wouldn't. We had to fix ours.

60, <http://textfiles.com/100/famous.bug>

-----Olmstead.PA@PARC-MAXC

I can't supply any documentation, but I was told when I was in school with Ron Lachman (you might want to check with him at LAI -- laidback!ron, I think) that IBM had a bug in its program IEFBR14. This program's sole job was to return (via BR 14, a branch through register 14, the return register); it was used by JCL (shudder!) procedures which allocated file space and needed a program, any program, to run. It was a one-line program with a bug: it failed to clear the return code register (R 15, I think). I submit you won't find any programs with a higher bugs-per-instruction percentage.

----- hoey@NRL-AIC

I got this at MIT....

From: ihnp4!zehntel!zinfandel!berry@ucb-vax

In the April 1980 issue of ACM SIGSOFT Software Engineering Notes, editor Peter G. Neumann (NEUMANN@SRI-KL at that time) relays information that Earl Boebert got from Mark Groves (OSD R&E) regarding bugs in the software of the F-16 fighter. Apparently a problem in the navigation software inverted the aircraft whenever it crossed the equator. Luckily it was caught early in simulation testing and promptly fixed. In the July issue, J.N. Frisina at Singer-Kearfott wrote to Mr. Neumann, "concerned that readers might have mistakenly believed there was a bug in the flight software, which was of course not the case." [At least they fixed THAT one. Wasn't it Hoare who said that acceptance testing is just an unsuccessful attempt to find bugs?] Mr. Frisina wrote: "In the current search for reliable software, the F16 Navigation software is an example of the high degree of reliability and quality that can be obtained with the application of proper design verification and testing methodologies. All primary mission functions were software correct." In the April '81 Issue it is revealed that the F18 range of control travel limits imposed by the F18 software are based on assumptions about the inability of the aircraft to get into certain attitudes. Well, some of these 'forbidden' attitudes are in fact attainable. Apparently so much effort had gone design and testing of the software that it is now preferable to modify the aircraft to fit the software, rather than vice-versa!

----- Cantone@nrl-aic

I've heard from Prof. Martin Davis, a logician at NYU, that Turing's Ph.D. thesis was just filled with bugs. His thesis was a theoretical description of his Turing machine that included sample computer programs for it. It was these programs that were filled with bugs. Without computers there was no way to check them. (Those programs could have worked with only minor fixes).

[NOTE: I called Davis, who gave as a reference a paper by Emile Post on recursive unsolvability that appeared in 1947-8 in the Journal of Symbolic Logic -- js]

----- David.Smith@CMU-CS-IUS

In simulation tests between the first and second Shuttle flights, a bug was found in the onboard computer software, which could have resulted in the premature jettison of ONE of the SRB's. That would have been the world's most expensive pinwheel!

I read this in Aviation Week, but that leaves a lot of issues to scan. ----- butkiewi@nrl-css

In response to your request for info on bugs, here's one. We work with some collection system software that was initially deployed in 1974. Part of the system calculated the times of upcoming events. In 1976, on February 29th, some parts of the system thought it was a different julian day and it basically broke the whole system. Several subroutines needed leap year fixes. One software engineer was called in from home and worked all night on that one. How many sound Software Engineering Principles were violated?

----- Stachour.CSCswtec@HI-MULTICS

while i cannot cite any published documentation, and this could hardly qualify as a famous bug, a mail-system I once worked on (which ran with privilege to write into any-one mailboxes) was discovered to have an incorrect check for message-length from a message coming from a file. The result was that a 'specially prepared msg' could arrange to overlay the test of the mail-system, and especially restore the system 'change-access' program on top of the mail-system, which then gave the caller power to change access controls on any file of the system. This was for a university-built mail-system for a Honeywell GCOS3 circa 1976.

----- Sibert@MIT-MULTICS

I imagine you've heard about this already, and, if not, I can't provide any documentation, but anyway: it is said that the first Mariner space probe, Mariner 1, ended up in the Atlantic instead of around Venus because someone omitted a comma in a guidance program.

----- Kyle.wbst@PARC-MAXC

TRW made a satellite in the late '50's or early '60's with the feature that it could power down into a stand-by mode to conserve electrical consumption. On the first pass over the cape (after successful orbital check out of all systems), the ground crew transmitted the command to power down. On the next pass, they transmitted the command to power up and nothing happened because the software/hardware system on board the satellite shut EVERYTHING down (including the ground command radio receiver).

----- Hoffman.es@PARC-MAXC

>From the AP story carried on Page 1 of today's Los Angeles Times:

"Jet Engine Failure Tied to Computer: It's Too Efficient

The efficiency of a computer aboard a United Airlines 767 jet may have led to the failure of both of the plane's engines, forcing the aircraft into a four-minute powerless glide on its approach to Denver, federal officials said Tuesday. . . . [The National Transportation Safety Board's] investigation has disclosed that the overheating problem stemmed from the accumulation of ice on the engines. . . . [I]t is believed that the ice built up because the onboard computer had the aircraft operating so efficiently during the gradual descent that the engines were not running fast enough to keep the ice from forming. . . . The incident raised questions among aviation safety experts about the operation of the highly computerized new generation of jetliners that are extremely fuel-efficient because of their design and computerized systems. "The question is at what point should you override the computer," one source close to the inquiry said. . . . [T]he engines normally would have been running fast enough to keep the ice from forming. In the case of Flight 310, investigators believe, the computer slowed the engine to a rate that conserved the maximum amount of fuel but was too slow to prevent icing. A key question, one source said, is whether the computer-controlled descent might have kept the flight crew from recognizing the potential icing problem. Airline pilots for some time have complained that the highly computerized cockpits on the new jets -- such as the 767, Boeing's 757 and the Airbus 310 -- may make pilots less attentive. . . .

----- Kaehler.pa@parc-maxc Info-Kermit@COLUMBIA-20

On Wednesday, August 24, at 11:53:51-EDT, KERMIT-20 stopped working on many TOPS-20 systems. The symptom was that after a certain number of seconds (KERMIT-20's timeout interval), the retry count would start climbing rapidly, and then the transfer would hang. The problem turns out to be a "time bomb" in TOPS-20. Under certain conditions (i.e. on certain dates, provided the system has been up more than a certain number of hours), the timer interrupt facility stops working properly. If KERMIT-20 has stopped working on your system, just reload the system and the problem will go away. Meanwhile, the systems people at Columbia have developed a fix for the offending code in the monitor and have distributed it to the TOPS-20 managers on the ARPAnet.

The problem is also apparent in any other TOPS-20 facility that uses timers, such as the Exec autologout code.

The time bomb next goes off on October 27, 1985, at 19:34:06-EST.

----- Craig.Everhart@CMU-CS-A has put together a long file of stories that were gathered as the result of a request for interesting, humorous, and socially relevant system problems. They make fun reading, but most of them aren't really bugs, let alone well-documented ones, so I decided not to include them. The file, however, can be obtained from Craig.

(end-of-message)

-Bob (Krovetz@NLM-MCS)

#####◆

<https://pantsupprophet.xyz/writings/life-story.html>

1. EARLIEST YEARS (1994-1999)

Note: many place names have been redacted and all personal names are fake.
61, <https://pantsupprophet.xyz/writings/life-story.html>

I was born in the city of [HOMETOWN] in the state of [HOME STATE] in the USA on 1994/07/18. The first of many, many things I am thankful to my parents for is one of the most important early decisions: they did not circumcise me. Childhood circumcision for both males and females is a barbaric, hideous practice and should be illegal. I am very privileged to have an intact penis and can only offer my most heartfelt sympathy for those who have not been lucky enough to avoid the mutilation. The first word I ever spoke was "light".

I have a few scattered, barely comprehensible snapshots of my first few years in [HOMETOWN], but my earliest memories of consequence are from a period of a few years when my family lived in Kansas.

Some of my earliest memories are from the dead of winter, which has been my favorite season ever since. I remember sledding down a hill at a nearby park and deliberately crashing into the nearby shrubbery for fun. I would take a moment to enjoy being in the midst of the barren bushes and marvel at the latticework of their branches before doing it all over again. I also remember waking up early in the morning with a bowl, going out into the backyard, and scooping up the freshly-fallen, clean snow to bring inside, sprinkle with sugar, and make "snow ice cream" out of. These memories are very precious to me. Seeing the value in the cold and the snow and a dedication to opposing anything that exacerbates global heating is thus part of my very being because the earliest and most central memories I have are related to the snow.

In addition to snow and cold, my other biggest memory from my time in Kansas is the time I spent with our next-door neighbor Veronica. Veronica was a few years older than me. She often played the role of something of an older-sister figure since I was and remain an only child. The most important thing she introduced me to was newspaper comics. She had a number of anthologies of Peanuts, Ziggy, Garfield, and, the ones I most grew attached to, The Far Side and Calvin and Hobbes. I spent hours with these sprawled out on the floor. In fact, I owe a lot of my above-average literacy to how much time I spent reading these newspaper comics. She didn't have any capeshit "comic books" though, just anthologies of newspaper strips. Perhaps that explains why I never became interested in comic books. I would constantly ask for anthologies like these as presents from my parents on special occasions and would read the newspaper to keep up with many different strips.

2. KINDERGARTEN TO SECOND GRADE (1999-2001)

My time in Kansas was limited and when I was still very young I returned to [HOMETOWN] and entered into first grade. [HOMETOWN] is a hot city in the southern half of the US, so my beloved snow was torn away from me. I was always a bit jealous and melancholy when watching Christmas specials of any cartoon or reading comics like Calvin and Hobbes. Over the course of my life, [HOMETOWN] has only warmed more and more and the snowless winters here are much more wet and muggy than they were when I was a child. It is not a unique story and I will never forget what politicians who refused to transfer our economy away from fossil fuels, the dumbfucks who vote for them, and the lying corporate scum in the fossil fuel industry and their propagandists who are behind it all have done to this beautiful planet in the name of short-term profits. In any case though, even in the late 90s [HOMETOWN] was always a pretty ugly city. While I was fortunate enough to be part of a generation who played outside in my formative years, growing up in a big city that lacked physical attractiveness and had typically nightmarish American urban design, I always preferred indoor activities like reading comics, even from a young age.

My memories of first grade are largely pleasant but only a few are particularly distinct.

I remember working on an art project where we were gluing various things together. I don't know if it was a picture, a sculpture, or whatever else, but I had a big tub of beads. I took one of those beads, which was golden-colored, and started rolling it around my face for fun. I pretended that the bead was some kind of alien probe landing on a planet with mysterious terrain (my cheeks and face). Eventually the bead came across a "cave" which was my nostril. I started putting the bead up my nostril and got it in far enough that I couldn't get it out again. I calmly went up to a teacher and apparently said "I have a golden bead in my nose!" Then I was taken to the nurse and they pushed it out. This story makes me sound like a fucking retard when I write it out, Imao. But I was like five, what do you expect?

I took part in a school play about the story of Thanksgiving and the pilgrims, as most kids did at the time. I wanted to be the narrator and instead of acting out any particular "role". I remember greatly enjoying the feeling of being "above" and "removed from" everything and perhaps I can trace this back to a tendency I've always had towards wanting to step back and look at my existence and others from a "higher" and more reflective place (perhaps that's why I'm writing this right now, who knows?).

I had a number of friends at school who I never really saw outside. One of the ones I remember most was a ginger girl named Megan. Me and her both loved insects and would spend much of our break time out in the garden and playground digging through the dirt and looking for earthworms, pill bugs, ladybugs, or whatever else we could find. I'm not sure how much of it is just rose-tinted glasses but I remember there being many more insects in the city when I was a child than there are now. Another thing you can thank city pollution and global heating for. Anyway, Megan was a weird girl and a little manic. A friend of mine from this school who I later met again when we were teenagers confirmed that she thought Megan was "crazy". I only went to have a playdate with Megan once, and it felt a little awkward and weird to me as a kid. Her house was two stories and I remember it being very spacious and vast, but that's probably just me being a kid. When I arrived, she was busy cleaning her room or something and her mom invited me to sit on the couch and wait. I passed the time looking through a coffee table book with artsy black and white photographs of seashells. When Megan was finally ready, we went upstairs to her room. She had rented the VHS of the Rugrats in Paris: The Movie and invited me to watch it. However, she said it had an evil lady in it who abducted the main kids, skinned them, and wore their skin. That sounded creepy to me and I passed. Did she just make it up to scare me or did she have some hyperrealistic-blood-red-eyes lost-episode creepypasta version of it? We may never know.

Another kid who I had vivid memories of was named Colton. Now, Colton was a year or so younger than me at least, maybe even more. In any case, he behaved like it. I don't think Colton was quite ready for school. Nowadays, maybe he would have been put in a special ed program. Colton was a little shit, but he made me laugh and I liked playing with him. That said, he didn't treat me with the same kindness. He would get angry quickly and sometimes would bite my arm when he was frustrated. He also liked to taunt me sometimes. I remember him talking about monster trucks and saying "I'm going to ride in one and crush your mom's car!" Of course I wasn't stupid and it's not like I really believed he would, but I realized that he was saying something rude to me and that bothered me. My parents urged me to stop hanging out with him because I was becoming too upset by his mean behavior. But I've always been attracted to and interested in weirdos and outsiders, sometimes to my own detriment. Sometimes it meant I would do something very honorable, like trying to be good friends with and including the girl with a developmental disability in our class when playing (my parents tell me I did this, but I don't remember). On the other hand, sometimes it meant I would have much more patience than I should have for people like Colton. But eventually, his reckoning came. I remember one day he was out on the playground and started showing me his dick. He then said "I'm gonna pee out here in front of everyone! Let's do it together!" I tried to get him to stop and refused to join because I knew this was a bad, bad idea. So I just removed myself and stood apart, watching it unfold. The next events felt like they happened in slow motion: he pulled out his wiener and took a big piss near a bunch of kids, waving it around and laughing. Some teachers started running over in a panic and dragged him off. He would be expelled for this (apparently it was a kind of last straw as they had known he wasn't really ready to be in school yet). I just sat there thinking "I was friends with this kid? What the hell was wrong with me?" I didn't really miss him after he was gone.

The school was more oriented around "activities" than distinct "classes". But we did have a few special "classes" where we moved to a new area, namely PE, music, and art. I LOVED drawing as a kid (probably due to comic influence) and spent a ton of my free time doodling all kinds of stuff. So you might think that art class was my favorite, but it was actually the exact opposite. In art class, we had to have some kind of direction to our process, and that made me frustrated. I hated being constrained and just wanted to draw freely whatever I wanted. The best part of art class was the last five minutes or so where we could draw whatever we wanted. I remember that art class was on Monday and after art class we lined up to move to the next area. I looked back at the art room and thought to myself "This is the best part of my entire week, because I just finished art class, so now this moment is the furthest I am from having to go back!" Pretty harsh, lol.

Lastly, the earliest crush I remember having was in first grade as well, although it was a very superficial one. If I remember correctly, her name was Alyssa. She was in the second grade and in the classroom next to ours, which meant we saw each other sometimes but not that often. I remember she had a kind of bob-cut and had dirty blonde/brown hair (a similar shade to mine, actually). She also had glasses. I was a meganekko fan from as early on as I can remember and I thought she was very pretty. I remember giving her a card for one Valentine's, but not in person (I dropped it in her cubby/locker thing). I don't remember what happened after that.

One of the last memories I have of first grade is September 11, 2001. I was at school when it happened and there was a big panic. They sent us all home early because no one knew if there were more attacks coming in other major cities or not. I had no clue what was going on, of course. I just remember eating my packed lunch at home watching cartoon reruns while my mom was bothered in the other room. It was probably for the best that they waited to explain what was going on after the fact. One of the things I most remember being struck by was a certain dedication in a newspaper. I think from the one year anniversary on 2002/09/11, that had the names of all 2,996 victims in alphabetical order. The idea of that many people dying was hard for a small child like me to get my head around.

3. EARLY HOMESCHOOLING YEARS (2001-2003)

a. Shift to Homeschooling

You might notice I keep saying "first grade" instead of "elementary school". There's a reason for that. When I entered the second grade, I started having some serious problems. According to my parents, I had a lot of ASD-like symptoms. I was never officially diagnosed with autism or Aspergers and to be honest I'm not sure where I am on the spectrum, if anywhere. But at that age I had serious problems in large groups and switching from one activity to another. From my perspective, I remember suddenly feeling completely in over my head and unable to keep up. I remember looking at a math worksheet and realizing that I had no idea how to do anything on it. I gave up in despair and started drawing random faces after scratching out all the problems, feeling guilty but also hopeless to change my situation since I had fallen so far behind. I felt something similar for a reading exercise. We had these little workbooks divided into sections with a themed paragraph and then a few questions. I remember I had flipped ahead and saw one about a rover on the moon or Mars or somewhere. I was really curious about it and looked forward to reading it, but on the day I finally got there I felt horrible because even this one I was unable to understand and had to give up. It was crushing.

After a discussion with the school counselors, my parents considered two options: medication or homeschooling. First we tried medication, but I had some really bad side effects and this made my parents decide to stop. I was first on Ritalin, and while it helped my attention span, it also completely killed my appetite and made me start getting way too thin. Next I went on Zoloft, and that made me unnaturally, unusually giddy and manic. I remember camping outside in the backyard in a tent when I was on Zoloft because I was too excited and wanted to try something different than sleeping in my bed. My parents were rightfully disturbed by these side effects and decided that I was too young to be on medication. This meant that they had to consider the other option, which they ultimately went with. Between 2nd grade of elementary school and 7th grade of middle school, I was homeschooled.

Being homeschooled has advantages and disadvantages. But on the whole, I think my parents made a decision which helped me in ways I can only now appreciate. First and foremost, I should make it clear that my parents are very non-religious. My father grew up going to a very fundamentalist Pentecostal church. While his family are still extremely religious, they are some of the kindest and most loving people you would ever meet. But he grew up with a lot of fear of hell because of the church they went to and therefore grew to be a skeptic with a deep dislike of organized religion. My mother went to a Catholic grade school but her family was not strongly religious and mostly only went to church on special occasions like midnight mass on the 24th, so she did not have the same strict set of beliefs to embrace or reject. The stereotype of homeschoolers is that they are all part of crazy right-wing fundamentalist Christian families who refuse to teach them modern science or stuff like that. And those certainly exist. But the other side of homeschooling families is often families of far-left granola hippie types. My family was much closer to this end and these were most of the other homeschooling families who we networked with and engaged with (homeschooled families usually join broader groups so their kids can still partake in social events).

What are the advantages of homeschooling? It depends a lot on the country you are in. Of course, for kids with conditions like autism it is often the only way to effectively have them learn. But even for neurotypical children, homeschooling has a lot of advantages. While it requires a lot of dedication, it keeps your child out of American public schools and often for less than the tuition of a fancy private school. Anything to avoid those retard spree-shooter factories is worth it. I think that kids who are homeschooled also become less easily manipulated by peer pressure and become more skeptical, shrewd thinkers as a result, often with conviction and confidence for things like group discussions and meetings in the future. And as incidents of bullying are rarer, homeschooled kids usually become kinder and gentler people. Also, for a historical perspective, it's worth remembering that for the vast majority of human history "homeschooling" has been the norm. The public school is a very recent invention. Not that the fact that it's been the norm for so long inherently means it's good, but this is evidence at least that it's not something totally out there and untested.

However, there are some disadvantages to homeschooling that I do want to mention in the interest of fairness. First and foremost, it is very difficult to teach a child everything at the same level as a school if you are just one person. Of course, American politicians don't give a shit about education and siphon all school funding to the already obscene military budget, so a homeschooled kid in the states is still probably better off than a lot of others. But I, for example, was very bad at math and remain so because my mother had so much trouble teaching it. You can hire tutors and hopefully rely on other external resources for that kind of thing, but there might always be pitfalls like this. From a social perspective, it can be lonely and isolating. My case was exacerbated as I was an only child. While ideally homeschoolers should be involved in groups with other homeschoolers that allow them to have some social interaction and meet more kids, it's pretty much always a much smaller pool. You don't have the larger selection of a "normal" school and thus are less likely to find someone you really click well with. And when there aren't new kids constantly entering, graduating, moving in, etc. it can leave you with only the same friends for years. Not that that's inherently bad, but I think it probably contributed to me having a harder time making new friends. Of course that's something we all struggle with as we get older, but homeschooling can add to this. Homeschooling in some sense isolates you from the broader cultural world. This is, mostly, a good thing, since mainstream culture is a cancer on society in pretty much every country. However, it can lead to some kind of traumatic transitions, as all homeschooled kids eventually have to enter a university and/or get a job. Those are probably served better by "normal" schools. Although most of that could be fixed by making our universities and jobs better, in the meantime it can leave homeschooled kids with an unfairly harder transition. Lastly, the biggest problem I had with homeschooling and why I was glad to eventually stop it is that I really found it hard to go from "parent mode" to "teacher mode" and back with my mother. I found it much more psychologically comforting and manageable to have a "teacher" who was only at school and removed from my private life. Being able to compartmentalize "school stuff" and "private stuff" made things much less stressful and much more clear to me. Children need a lot of structure like this.

With all that said, I am very thankful that I got to experience both worlds. In my earlier, more formative years, I was homeschooled. In my later, more mature years, I went to a "normal" school (it was a private school which was pretty unique in its own way, but it was indeed a school). I think this is a pretty ideal way for anyone to do it and highly recommend any potential parent to do so if they are lucky enough to be able to.

There were no "grades" in homeschooling, so the years 2001-2007 or so will be more defined by my personal interests and developments. It's often hard for me to get an accurate chronology of all the varied experiences during these years. The great advantage to my homeschooling was how much I was able to develop a genuine sense of curiosity and desire for knowledge that I could direct myself. I loved learning. I was lucky enough to live a block over from a public library in my neighborhood and spent so many days walking over with my mom and finding books on whatever grabbed my interest. In my earliest years, I was most interested in biology and anthropology, or, in kid terms, "animals" and "countries". I would rent books about animals and plants and about countries and people, the more strange and obscure the better. I had a genuine interest in most subjects with one notable exception: math. I hated it. I felt like there was no real "content" to math. And that was why I disliked it. It was unbearably dry to me. I liked to learn about things where there was a need for mystery and imagination, where I could "picture" and visualize something to myself. This is still the case, although I do have a greater respect for a lot of "abstract" things in fields like philosophy and physics. Math will never be my passion, but I am thankful for my mom being serious about me learning my times tables and any other fundamentals. It's worth knowing these things even when I do have a calculator in my pocket at all times now.

Being homeschooled gave my parents a lot of freedom to take me on trips and vacations and they held this to be very important during my developmental years. I am extremely grateful for the possibility I had to visit far-away places, especially now that I believe in limiting the amount of airplane trips we take so as to not create excess carbon emissions. One of the first I remember was New York City. I wasn't old enough to appreciate things like museums. Those would come from other times when I returned to NYC over the years, so the degree of my enjoyment as a 5/6 year old was being on the top of tall buildings like the Empire State and World Trade Center (yes, this was pre-2001) and the Central Park Zoo. We also went to Hawaii (main island) and the coral reefs were truly remarkable. I imagine they've deteriorated a lot over the years. I also got to see an active volcano.

Of course, since I love cold and snow, the two trips from this era that I am most thankful for are trips to Alaska and Colorado. I was young enough for the Alaska trip to not remember a lot in detail. It was a cruise ship that departed in Vancouver and sailed to Anchorage, stopping in Juneau along the way. I got to see some glaciers for the first time and was bewitched and enthralled. I didn't go in the absolute dead of winter which I still would like to some day. It might be the only place to get the kind of cold and snow I want eventually... Fuck Anchorage and Juneau though, too warm. I want to live in Utqiagvik! While we were on the ship, every day the person who cleaned our room had a lot of fun and gave us a little surprise: he (she?) would arrange my many stuffed animals into some scene! The one I remember most is one of the stuffed animals (of a squid, with long tentacles) setting up one holding upon a kids' book I had and opening it so all the other stuffed animals could see, like it was teaching them in front of a class. Every day had something like that. It was really wonderful. On the way back home, we stopped at a family friend's home in Seattle and also saw the Redwood Forest in Northern California. I was older when we were in Colorado, and we went with my mom's whole family. My mom's family has a long history of liking biking, skating, and other outdoor sports like that, so most of my older cousins spent their time snowboarding. I tried it and didn't like it, so I just enjoyed sledding, building snowmen, etc. It was paradise. I have to reiterate every time that I've been very privileged to have a family that could afford to take me on nice trips and I'm eternally grateful.

Though I was homeschooled, I had my share of friends as a kid. But in general I never liked large groups. Most of my friends were the kids of my mother's many friends. My mother is an artist and she had a lot of connections to other artistic people in [HOMETOWN]. These were her friends. I mentioned one already, Maxwell, who was one of my oldest and closest friends. A few other important ones will be brothers Daniel and Levi who lived within walking distance from my house, female friend Ida, and oldest kid of the bunch Riley who lived out by a big patch of woods. All of them besides Maxwell were homeschooled like I was, at least at this point in time. Besides random playdates with these friends, every Thursday I went to an art class in the neighborhood taught by a friend of the family, a lovely, lively old woman from Israel named Miriam who had lived in Paris in the 1960s and many other places over the globe. She was a woman of deep compassion, creativity, and warmth who touched the lives of everyone she came in contact with. I loved her deeply as a second grandmother and will cherish the time I spent with her as a child forever. She died a few years ago and I still miss her. Daniel and Levi went to the same classes, but I didn't make many friends there besides them. I was friendly to everyone there, but they were the only two who I actually saw outside of class.

b. Cartoons and Other "Childish" Hobbies

One thing about my time as a child set me greatly apart from other kids my same age. I was uniquely sensitive to and aware of the fact that I had "childish" interests. Perhaps it was just a side-effect of being very mature for my age. I could have conversations with adults on a level that a lot of other kids my age could not, and was often complimented for being smart and mature for my age. But I would at the same time be deathly afraid of watching cartoons in front of adults. I suppose having some awareness of what was "adult" and "mature" early on also made me aware of the cartoons I watched as the opposite of that: "childish" and "immature". And yet, I still loved them. Indeed, I spent a lot of my free time watching Nickelodeon and Cartoon Network and it was probably the closest connection I had to whatever was the "mainstream" of other kids my age. I could watch them in front of my parents, because I wasn't afraid that they would judge me negatively for it. But if an adult that wasn't one of my parents came into the room, I had to turn the TV off immediately. I just felt like they would think I was a baby and stupid if they saw it. And I understood that these cartoons were very much "not for them" so I didn't want to bother them by forcing them to be in the same room as my childish shows. I know this is very unusual so I'm not sure why it was so strong for me. Even at my friends' houses, I had to run out of the room if we were watching a cartoon and his parents came in. They thought I was very weird because of it.

Around my parents, I could watch cartoons. And they often enjoyed watching them with me, so I'm not sure why I thought other adults would be any different. But during the theme songs or any other musical number, I had to turn it off. I was very very strongly embarrassed by listening to music, dancing, etc. around adults or even other kids my own age. I never allowed myself to listen to any music around other people besides very obviously "adult" things like classical symphonies etc. until I was in high school. I suppose I saw it as an extension of the "childish" phenomenon and didn't want to appear immature, so I had to take on a very somber and serious comportment around everyone who was an adult so they would keep respecting me for my maturity. This was also part of the reason I never played

any video games as a child and we never had a game console in the house until I bought a PS3 in college. The other reason was that my mother was very overly paranoid of violence in video games and didn't want to have them in her house. Later on, she would explain that she regrets being this strict and that she cut me off from the defining hobby of my generation in my younger years because of it. I am thankful for her feelings, but I don't have any memories of wanting to play a game and being kept from it at any point, so it's not quite the right picture. For me video games were just as embarrassing as pop music or cartoons, so I didn't want to have anything to do with them. She also wasn't all that strict in some ways. I could play anything at a friend's house, for example. In general, she didn't believe in enforcing rules that kept everything secret from me. She knew how kids were and how they could keep secrets. She told me that even if she banned something from the home, I could just do it at a friend's house. So she explained that it was ultimately up to me, but that she didn't want games in her house. Regardless, I never wanted to play them that much at friends' houses either. I never knew how to use a controller and was too self-conscious, and kind of "looked down on" them anyway. So I relegated myself to the role of watching them play, and found that fun in its own right.

Of course, this whole ideology was ridden with weird exceptions and contradictions, as any child's worldview would be. Why, for example, was I never embarrassed dressing up and trick or treating on Halloween? Quite to the contrary. It was my favorite holiday. Why was I not embarrassed at reading comic strips? I suppose I thought if I was "reading" them, then that was more "mature" than just watching a cartoon, but it's not like I was reading Charles Dickens. Why was I not embarrassed at playing computer games, which we had a few of? I suppose I thought it was because computers were more like an "adult" thing and less like a "toy", but for that matter I was actually not embarrassed playing with toys like stuffed animals at all! And I'm not sure why this developed around the time I was six or seven, already far past watching the most "childish" shows of all, which I never had this self-consciousness about. I can't answer any of these questions now, because I can no longer understand that mindset. In any case, it is unfortunate that I thought this way as a kid. In a lot of ways, I missed out on a lot of childhood because of it. It's one reason I am so anxious to make up for it by indulging in manga and video games today.

While living this sort of double-life, I never really deprived myself of watching cartoons. I watched them for hours and hours and don't regret it at all. I had typical taste. Besides older stuff like Wallace and Gromit, Tom and Jerry, and Looney Tunes, I liked pretty much all the standards on Nickelodeon and Cartoon Network: Rugrats, Rocko's Modern Life, The Angry Beavers, The Amanda Show, All That!, Hey Arnold!, Johnny Bravo, Dexter's Laboratory, Cow and Chicken, The PowerPuff Girls, Ed, Edd, and Eddy, and so on. I was never that big a fan of Disney as a kid and never wanted to go to Disneyland or anything like that (I would die of embarrassment even if I did like Disney things). I liked Winnie the Pooh and that was about it. I was never into superheroes or capeshit like that though, and never liked a lot of the early Toonami anime stuff either. I liked shows that were funny more than anything, and I didn't have the patience for continuing storylines like that.

I felt less embarrassed watching cartoons with my cousins. While I'm an only child, I have a lot of cousins because my mother has five siblings and my father has two. My father's family lived further away but my mother's family were all pretty close, so I saw them more and was close to them. In particular I watched a lot of cartoons with my two older male cousins Kevin and Tanner. I have a lot of memories of watching with them, but one in particular sticks out: the first time I ever saw what would soon become my all-time favorite cartoon, Courage the Cowardly Dog.

Me, Kevin, and Tanner were sprawled around my family's chaise lounge watching Cartoon Network. It was late at night and I remember being bewitched and a bit creeped out by how weird and different the show was. It was the King Ramsey episode and the one after that where Eustace's foot grows into a big purple fungal monstrosity with talking toes. A lot of kids say that Courage scared them, but it never scared me. I recognized the weird, creepy feeling but that was precisely what was so enticing about it. Courage was never a particularly funny show, even as a kid. If I wanted to laugh, I knew that I was much better off with SpongeBob or Ed, Edd, and Eddy for example. But I loved how imaginative and creative every episode was and the often eerie, surreal, and mysterious mood the whole show was steeped in. I can watch it today and of course it looks a bit less impressive, but I still attach a great degree of nostalgia to it for that reason. I even remember watching the final episode of the series, "Perfect", and somehow knew it was the final one. I think they might have announced it as such. Or maybe it just felt so final that I somehow intuited that it was. Ordinarily a kid would be sad his favorite show was ending, but for me I felt weirdly at peace with it. I felt like it was a perfect ending and gave it a great amount of finality and closure. And that is one other reason that Courage remains so good I think. It didn't overstay its welcome like other cartoons from the time. Courage the Cowardly Dog never scared me. The show that I found uncomfortable as a kid was Invader Zim. But when I was a bit older I started to remember that show with more fondness as I went through my goth/chuuni phase that that show was made to appeal to. But this was after it had already finished airing so I was rarely able to catch it, unfortunately.

I never watched a lot of Japanese anime back then, despite my current love for it. I watched Pokémon and liked the cards and toys (never learned to play the card game and never had any of the vidya though). But I got over it pretty quickly. I was just one of many kids who caught the Poke-fever and had it pass just as quickly. I also remember sometimes watching Sailor Moon and probably having some of my first 2-D crushes. But I never got to watch it too often, unfortunately. The only other early 2-D character I remember having a crush on was Phoebe from Hey Arnold! (canonically cucked by Gerald's BBC... the eternal American). I always liked nerdy Asian girls, in real life and in cartoons. Thankfully I didn't get funneled into the furry pipeline like so many other American mongrels forced to grow up on cucked shows with no sexy girls. Thank god.

I was mature for my age so my parents also let me watch The Simpsons with them sometimes. Of course I could only understand the simplest slapstick humor from it, but I was a fan. But I had to stop watching when we saw some episode with Sideshow Bob and I got really scared by it. This left me with a kind of trauma about anything Simpsons-related. Any time I saw anything Simpsons-related, I had to leave the room or otherwise try to excuse myself. I started to dread watching TV when Burger King or McDonald's had Simpsons toys because I risked seeing a commercial for them. I had a friend with some Simpsons memorabilia in his house and made all the excuses I could to not visit his house. And of course if I ever saw the show on TV, it freaked me out. I never brought this up to anyone, because I had some fear of acknowledging it at the same time. I felt like if I expressed it in language, it would make it too "real". It felt like a negative force I didn't want to draw out and encourage. Of course, this was hard because I did realize that The Simpsons was really really funny! I wanted to watch it and acknowledge the humor of it while also being afraid of it. It was strange, because in a way I began perpetuating my fear of this show simply for its own sake. I was beyond the point of finding Sideshow Bob particularly frightening. There was stuff on Courage the Cowardly Dog that was way scarier, after all. It all came to a head one day when I was at my friend Maxwell's house and he was about to start watching The Simpsons. I started to excuse myself to wait it out in another room, but suddenly had a revelation: "You know what? I'm tired of running. This is a cartoon and it can't hurt me. If Maxwell can watch it and not be hurt, then so can I. I'm going to watch it and see if it actually is as terrifying as I've been telling myself it is." Of course, it wasn't. It was hilarious! This was a very instructive experience for me. It made me realize that the terror is all in me and how I choose to respond to something. A 2-D drawing can't do anything to me. I think this explains the way I've come to view fiction as such a freeing and liberating medium where anything is allowed. It's why I never made the mistake of being afraid of something like lolicon. And I owe it to this early education. A lot of people never have it.

Most of my friends and cousins had video games, so I absorbed a lot second hand even if I wasn't the one playing. One of the people who also played games, interestingly, was my grandmother. Besides having a lot of computer games like Myst, she also had a Super Nintendo Entertainment System for her grandkids to play and played some games on it herself too. The one I remember seeing her play was The Legend of Zelda: A Link to the Past. She had a few save files, all named after her male grandkids, which was wholesome. I was absolutely mesmerized watching her play and explore that world. There were other games I remember that are standards. My friends were mostly Nintendobabies and had Nintendo 64s and Gamecubes. The one I remember thinking looked the most fun was Super Mario Sunshine. But one of the most formative memories I had was spending the night at my friend Maxwell's house playing games. That night we played some console port of Lemmings, which I thought was really fun and entertaining in its own right, but it was the next game we tried that really left an impression on me. Maxwell's stepfather was an artsy guy from Turkey and he had a game of his own that he allowed us to borrow. What was that game? Megami Ibunroku: Persona! Of course, it was the horribly butchered American version, but it was still incredible to us. Neither of us had ever played a game similar to it and we really had no clue what to make of it. We kept playing, somehow fascinated and curious despite the fact that we were impatient babbies. I remembered the opening line from that game for years, which is Zhuangzi's quote about the butterfly. It was the first place I ever heard that quote and my memory of it far outlived the game for years.

c. Reading, Painting, and Other "Mature" Hobbies

At the same time that I enjoyed cartoons and toys and all that stuff that kids my age do, my pretending to be "mature" and "serious" and "adult" about everything was far from just a LARP. I did have a lot of legitimate interests in things like art and painting. [HOMETOWN], for all its faults, has some great art museums, and my parents took my aesthetic education seriously, which meant I spent a lot of time in them. My favorite pieces of art that I experienced sometimes in museums but mostly in books were the paintings of surrealists like Salvador Dalí, René Magritte, and, my favorite of all even today, Yves Tanguy. I spent hours trying to draw these paintings and similar stuff like that. There is a term in Japanese aesthetics called *yuugen* which is perhaps best translated as "mysterious profundity". It calls attention to things that are mysterious and impossible to fully comprehend but hint at something larger than ourselves. I became convinced, as I am today, that all great art must do this and chased after anything that gave me this feeling. Of course, as a child, I would simply sum this up in the word "weird". From a young age I had no interest in fully understanding or "comprehending" something. Something you can fully understand is something you can throw out because you don't need it anymore, and I wanted to experience great art that would last a long time.

One interest came from a pretty weird place and it's kind of humorous in retrospect. My friend Maxwell had me watch a very stupid movie called Ace Ventura 2: When Nature Calls which basically features Jim Carrey acting like a complete goofball for 90 minutes. We watched this movie and adored it. Maxwell dressed up as Ace Ventura for Halloween one year, in fact. Honestly, some parts of the movie still make me laugh really hard (the infamous rhino scene) even if I admit that the movie is shit. The movie is set in Africa and features scenes of Carrey doing undercover work in some remote tribes. Nowadays it could never be made because the SJW freaks would scream about how politically incorrect it is. But the effect it had on me was actually the complete opposite. I became deeply interested in tribes like those depicted in the film. I started reading National Geographic and researching various tribes in the library to see if there were any that were similar to what I saw in the film. This interest soon outpaced that film and I became very interested in traditional tribal customs and cultures all over Africa, but in Kenya and Ethiopia especially. It was my dream to go visit and become part of the Maasai tribe.

I'm not sure what drew me to these tribes in particular. I suppose part of it was a natural curiosity at just how different a way of life could be from everything I was used to. I was especially struck by and interested in the way that nudity was so casual and accepted among them. Perhaps part of it was the natural curiosity of any American kid who sneaks a National Geographic to see some tribal booba. But I feel like it went deeper than that. I found something very refreshing and

interesting about just how different a way of life seemed possible in these tribes. I fantasized about joining them. I even tried to make some of my own chalk paint to decorate my body a few times out of curiosity and imitation. But in the back of my mind I realized that I was a slave to my surroundings in many ways. If I lived like this, I would miss going to museums, I would miss going to the movie theater, I would miss watching TV, and so on. It was a difficult balance and I felt torn about it. Maybe I would have been more interested to learn about tribes in the US and Canada who grapple with the same struggle of the appeal of the modern world versus the deep sense of meaning and belonging of living in a communal, tribal structure. But I seemed to require some degree of nudity as a prerequisite to be interested. Of course, I eventually abandoned this because I realized that I liked the cold too much to want to live somewhere where you could be naked all the time.

As I said before, I deprived myself of listening to a lot of poppy and "fun" music because I was afraid of how it would make me look in front of others. This was before smartphones and before I was using the internet freely, so I had no way to sneak a listen in private. I was mostly dependent on family or friends playing music that I liked and secretly enjoying it while pretending to be indifferent. My mom is a bohemian artsy type and has many friends who are similar, so one of my particular formative experiences was in the car with my mom listening to what was certainly some of the wildest music I had ever heard: Diamanda Galás. Of course, I didn't know that's who it was, but now when I remember what it sounded like I'm pretty sure it has to have been. I remember this deeply because I closed my eyes and imagined a whole little scene around the piece: It was a desolate wasteland of sorts with an oppressive, black sky. The landscape was rubble and broken buildings with wires and poles jutting out everywhere. There was a lone man walking through it, but the whole time these strange voices were calling out and he could hear them. The voices (Galás's voice and all the echoes/doubling effects) were a sort of magical ritual chant from these blue female imp creatures who lived underground. If I had to say what they looked like, they were somewhat like Midna from Twilight Princess (not exactly though, this was before that game came out so I'm just using it as an approximation). But they were more simplistic and angular with big thick outlines like characters from The PowerPuff Girls or Dexter's Laboratory. There was a whole colony of these female imps underground in a cavern, huddled together where their leader was calling into a sort of microphone and transmitting her voice to the man above the surface. The rest were swelling and raising their arms, summoning some god or creature or something. It was a powerful vision and was one of the first experiences I had with listening to "unusual" music and seeing where my imagination took me while doing so. This is something I still do to this day.

d. Edward Gorey, Chuunibyou Phase, and the Beginnings of a Worldview

I never stopped being interested in comics and illustrations, but I became interested in the real patrician stuff besides just whatever was in the newspaper at the moment. A lot of it was helped by my aunt Rachel, the oldest of my mother's five siblings and a very well-read woman who I've always been closer to than any other family member besides my parents. I found out a lot of great older illustrators just by looking through her library. Two particular ones I remember well are Gahan Wilson and Charles Addams. There was something more strange, out-there, and less suitable for the mainstream about their works and I felt something distinctive in the sense of time about reading older comics like those. But the most important older illustrator would be one I found not at aunt Rachel's house, but on my mother's own bookshelf...

I remember the night very clearly. It was a night like any other, and I was looking through a bunch of books I had never opened or even noticed before in a humble bookcase in the corner of the living room. On the bottom shelf, I found Amphigorey, an anthology of short illustrated books by Edward Gorey. I was captivated and bewitched. It was like nothing I had ever seen before. I sat there on the floor, so enthralled that I didn't even have a moment to carry the book off to the couch. For those who don't know, Edward Gorey was an illustrator and writer who worked in the second half or so of the 20th century, most prolifically during the 1960s and 1970s. Many people mistakenly think he was British because of a certain Victorian/Edwardian gothic tone that a lot of his works have, but he was 100% American. He provided illustrations for many other authors, but is most famous for his own works. They essentially take the form of children's picture books, being short stories that often rhyme with large illustrations, but the content is generally macabre, surreal, and gothic in tone, though often with a sort of Lewis Carroll-inspired sense of nonsense and whimsy. But you can't really understand what they're like until you read them yourself. I highly encourage anyone to.

The first story in this anthology I read was actually the last one in it, called The Remembered Visit. Why did I start at the end? Well, from a young age I was always fascinated with the "last" or "second to last" etc. in big collections like this. I suppose I became aware of the fact that people often have a tendency to overlook these at first glance because we become fatigued by the end. So I started here to avoid passing over the ending story and not giving it its full due. The story was one of Gorey's more "normal" stories. It had nothing surreal, nonsensical, or fantastic in it. It was a largely straightforward story about a young girl named Drusilla who is brought along on international cruises with her family and finds herself bored, listless, and lost in this world of adults and "sophisticated" things like museums and fine art. I always thought that "relating" to any character in a work of art is a deeply overrated and really pretty unsophisticated way of appreciating art. But on a personal level, the degree of connection I felt to this character is hard to explain. I too was a young kid trapped in an adult world for various reasons but unable to really find my place in either world. Skip to the next paragraph if you don't want to be spoiled, but Drusilla eventually meets a mysterious old man who gives her some beautiful pieces of rare paper and promises to someday in the future show her even finer specimens from his personal collection. Years later, she finds out the old man has died and takes out the pieces of paper he gave her. But the window is open and the wind blows them all away.

It was a simple, tragic little story but something about it moved me so deeply. I felt that in opening up this book of Gorey stories I had found something ancient and precious, a sort of repository of forgotten memories and dreams. I was absolutely hooked. I can't explain how much of an influence Edward Gorey had on my sense of art, of beauty, of drawing, and so on. Maybe more than anything it was the "tragic sense of life" that I first felt so clearly in these works. For the first time I had a great awareness of the beauty of sadness, melancholy, tragedy, and so on. Many of these stories were tragic and dark, but they never depressed me. They were stunningly moving, beautiful, and mysterious. These were more mature and deep than anything I had experienced until then, and everything before them felt immaterial and simple in comparison.

I can't think of a way to put this without it sounding like bragging, but over the course of my life I've noticed a lot of cases where in retrospect I see myself as being 3-5 years ahead of most other kids my age in terms of mental development. Of course that only goes for some things. In a lot of things I was very far behind. But one of the first ones I noticed was that I basically went through my "chuunibyou" or "goth" phase around the age of 8-10 rather than in my tween years like most others. Of course, if I was really to nail down what motivated me, it was a search for "weird" and "unusual" things more than "dark" or "edgy" things. But in a lot of cases those tended to overlap. It was strange because I was actually still rather easily afraid of scary movies at that time. I still closed my eyes whenever trailers came on for horror films. But I loved all sorts of dark, macabre, unusual things in the medium of literature or 2-D comics/illustrations. I suppose it was being able to hold it in my hands and have some degree of leverage and control over it that changed everything. Of course nowadays I'm the opposite and love horror films to death and am actually very hard to scare with them.

One of the first experiences I had with "horror" that I can trace back is reading a classic library book that tons of American kids my age have fond memories of: the Scary Stories to Tell in the Dark series with their distinctive, incredible illustrations. Many of the illustrations were creepy as hell, but I loved them. I read these over and over again, renting them from the local library until my parents finally bought me the physical editions. They never really scared me, interestingly. But I loved the eerie atmosphere and sense of strangeness. And it was a lot of fun to read those stories to my parents or other friends. I had a similar interest in reading things like anthologies of alleged stories of UFO encounters, cryptids, and so on. I deeply wanted to have a paranormal encounter but never was able to, so would read these fascinated at the possibility of something out of the realms of the easily comprehensible. Of course, the Edward Gorey books I loved fit in well with the more macabre atmosphere I was searching out.

I even had something of a "Wiccan phase". The first thing I remember related to this was a series of graphic novels about a character called Emily the Strange. I ate those up. They were the most goth thing you could imagine... perfect encapsulation of 2000s porto-Hot Topic edgy goth girl shit. It worked on me like a charm. I went through a whole phase of trying to be like her. I tried to become telepathic and read minds and stuff like that and had my parents take me to new age bookstores to get books about that stuff. My mom in fact went through something similar back in the 1970s and still had some old books about white magic and witchcraft and I eagerly read them. Eventually this all got a little scary to me. I remember having a bad dream where I had some magical die where if you rolled a "4" it would cause a gate to hell to open and for the earth to be flooded with zombies (the remake of Dawn of the Dead was coming out soon and I was very scared of the trailers). Of course, someone rolled a 4 with it and the rest played out as expected. I was scared of dealing with dark, demonic energies after that and abandoned trying to learn witchcraft. But I did continue to be interested in paranormal things like UFOs and desperately wanted to believe in something more than I could find in science.

Eventually this would have a downside. My parents were not religious at all, but I was never pushed towards being an "atheist" either. I had my fair degree of superstitious beliefs, even if just because I wanted to believe in something to discover something magical and unusual. I eventually found out about the Christian conception of heaven and hell at this age, largely when I spent time with my grandparents and other Christian cousins on my dad's side of the family over a few weeks one summer. They didn't force their beliefs on me, of course. I was always warned by my more hippie parents to avoid bad language and vulgar movies/etc. around my grandparents though because they were more conservative, but other than that things were normal and we didn't bring up religion. But I found out about everything just because I was curious and asked them a lot of questions.

I've always had a curious nature, but never a naturally skeptical one. Curiosity is natural to me, but skepticism is something I have to exercise. This can be a great asset or a great danger. This was especially true as a child. I was quick to believe things I heard. Of course, that didn't mean I always took it on exactly as it was said. The way I saw it was that there was always some level of truth in what I heard. Instead of hearing contrasting opinions and views and picking up some as "true" and leaving others behind as "false", my instinct has always been to assume that every view is somehow true and that seemingly opposed views have to be harmonized by looking at it from a "higher" perspective. There's an old legend about a number of blind men and an elephant. One touches the trunk and says that an elephant is long and thin like a snake, another touches the ear and says that an elephant is broad and flat like a palm leaf, another touches the tusk and says that it is sharp and pointy like a knife, and so on. All of them are "correct", but none of them have the full picture. My instinct has always been to do try to do this synthesis when I had contradictory information. As such, it made me very open to consider things I had no direct proof of. But the idea of hell was obviously terrifying to me. When I was petrified by it, my father had "the talk" with me and explained that he went through the same thing I did when he was a child. But he grew up to realize that there was no particular proof to that worldview. It was one thing that could happen to us when we died, but, in his words, "we could also all just drop out of some giant's butt!" That made me laugh and broke the tension. He explained his skeptical, rationalist, scientific worldview. I found it very refreshing that there was no proof of something like hell and found myself following in his footsteps. But a part of me also felt sad that, by the same logic, I had to reject

believing in things like UFOs, cryptids, ghosts, and the like. But it was probably for the better that I was able to become rational early on. Later on, I would become introduced to Buddhist and Shintou thought and gain a greater awareness of how positive a force spirituality can really be if not constrained by an Abrahamic metaphysical picture.

e. Yellow Fever and Japonophilia: Early Symptoms

It was at the same center that Miriam held art classes at that I eventually went to a kind of summer camp centered around arts and creativity. I went a total of two years and then stopped, because it felt kind of overwhelming and strange being around all these children and doing so much in such a structured way when my homeschooling background hadn't really prepared me for it. But there was one thing that was most interesting about this and it was that it gave me access to a larger range of kids than I was ever around before. Most notably, it introduced me to the next major crush I can remember having (although my mom tells me there were others beforehand). Her name was Lindsey Wu. She was a Chinese-American girl with round glasses and long, straight black hair. My taste hasn't changed much over the years as those are still the kind of girls I like! I thought she was cute as could be. I had quite the crush on her and she consumed my thoughts ever since I saw her. I remember writing her a note saying "do you want to be friends?", with a choice for yes, no, or maybe. I gave it to her and sat back on the other side of the table. I remember her smiling and waving to me and giving me back the paper, and I don't remember being crushed, so I think the answer must have been good. However, she wasn't homeschooled so there wasn't any way to continue seeing her. She wasn't at the camp the next year. But I did end up seeing her again in an extracurricular acting class I took where we put on a play of Peter Pan together. I was very shy and not sure how to initiate things. I remember trying to write her a very mushy love poem and having my cousin Caroline look it over and help. Caroline was very pushy and assertive (in less polite language, she was a bitch... I never got along with her too well). I think she ended up re-writing most of it for me, haha. But I don't think I ever was able to give that poem to Lindsey. I still wonder what happened to her some days.

I didn't have a lot of close relations with girls in my early days. My parents weren't prudish about it or anything. I was just shy and embarrassed about having crushes, especially around my parents and other family. Maybe it was because I wasn't around girls too often as a homeschooler. The one exception was Ida. Ida was the only child of my mother's close friend Susan and we grew up together. Ida's mother Susan wasn't a bad mother by any means, but was often something of a "tiger mom" who pushed her daughter in her field of excellence. That field of excellence was ballet. Ida was a ballerina and had been performing since we were little kids. Ida was not Asian (her and her mother both had blonde hair and I believe Nordic ancestry), but there were a TON of Chinese and Japanese girls were in her ballet classes and I was often desperate to have her introduce me to them, but it never really worked out. She had this connection to so many other girls that I would get very flustered and shy when I went to one of her recitals or our family picked her up from class to play. However she was a pretty introverted girl in her own right and she never was able to play matchmaker for me. I'll talk more about that later on.

My whole life, I've always had some degree of Japonophilia. It's just been stronger and weaker at certain times. I'm not sure what the earliest exposure to Japanese things in my life was. Of course I watched Pokémon and Sailor Moon as a kid (shounen series like Dragon Ball Z weren't really for me back then), but my understanding of them as "Japanese" was dim. Now, my dad has always loved seafood, and that included sushi. He absolutely loved the stuff. So we grew up going to local sushi restaurants for special occasions. It always made it feel like entering a magical world. The mystical orient! Of course, I guarantee you most of the staff at those places were Chinese, Vietnamese, or Filipino, but as a kid I couldn't tell. What was authentic was the food. I at first only had the courage for tamago, ikura, and tobiko, just as any Japanese kid starts with. But I grew to love all sushi from my father's influence. My favorite of them all today is uni, which I picked up from him.

But there were things besides food which really helped me become a weeaboo. One extraordinary memory I had was seeing a museum exhibition of Japanese "pop" artists (meaning illustrators, not musicians). This included famous painters Murakami Takashi and Nara Yoshitomo before the former became really famous abroad. I was in awe of this exhibition and wanted it to last forever. I think part of it was repression from not being able to publicly acknowledge my love of cartoons and mascots. Here I could see incredibly expressive, cute, cartoony 2-D characters but it was in a museum so it was "sophisticated" or whatever. I loved this exhibit and started becoming interested in Japanese toys and plushes and stuff like that. Of course, I still felt constrained because things like Sanrio characters were only "for girls". But my parents got me a book of illustrations from the artists in this exhibit and I became obsessed with it. So now I had cute girls, great food, and amazing pop artists/illustrators to love from Japan. My interest in the country was growing.

4. LATER HOMESCHOOLING YEARS (2004-2007)

a. The "Old" Internet (Saith the Newfag)

When I divide my homeschooling years into "early" and "late", what I primarily use as a divider is when the computer and internet became the primary place I spent all my free time. But it's hard to find an exact date when this occurred. It was a gradual process between 2002 and 2003 when I began using the internet alone and more intensely than before, and by 2004 I was thoroughly spending all my time online.

Of course, I had used the computer in some way or another since I was a kid. My earliest memories of the computer are watching screensavers and being entertained for way longer than I should have been by the classics: "After Dark" (the flying toasters), the Microsoft 3D Maze, and, the king of them all, the 3D Pipes. After that, I remember playing computer games like Pajama Sam and Freddi Fish. My friend had

RollerCoaster Tycoon and eventually my parents got me that one as well as Zoo Tycoon as well. I was introduced to a lot of classic internet stuff, probably way earlier than I should have been. But I am deeply grateful for my parents being lenient in letting me use the internet a lot early on because I got to experience the internet at its very best in the early 2000s. Early on I would just look up information about animals, countries, etc. like I did at the library. A kid using the internet to research, imagine that! Soon my friends introduced me to Neopets and I spent a lot of time there. And we all played the classic games eventually: Elasto Mania, N, The Impossible Quiz, Interactive Buddy, that one where you drag a rubber George W. Bush around a bunch of obstacles, and a million others too crappy to remember in detail. But the real breakout for me came when I discovered that there weren't just Flash games, but Flash animations as well.

The earliest I remember was the infamous "WE LIKE THE MOOOOOON" Quiznos commercial. Only true oldfags remember this one. I saw it on the TV with my dad and had complex emotions. It crept me out but also made me laugh. We both remembered it and my dad soon showed me a newspaper article about it! Apparently the commercial was equally perplexing to the rest of the American public and this little human interest bit of the newspaper talked about what people thought of it. It also revealed the creator of the strange creatures: Joel Veitch, whose animations could be seen at rathergood.com (except it looked COMPLETELY different back then, of course... namely it actually looked good and had all the content reasonably close together and well-organized instead of being a gay and soulless array of white squares). Well, we all know what the next step was. I went to the site and started watching all the animations. Of course I adored them. I ended up sharing it with my friends but they didn't become as obsessed as I did. But eventually we would bond more because my friends Riley and Daniel as well as my cousin Tanner soon introduced me to some other classic Flash animations that were even better.

Daniel, Riley, and Tanner went on all the classic sites. Maxwell only went on the most friendly of them, Flashplayer.com. But the other three got to find the good shit on edgier sites like Newgrounds and AlbinoBlackSheep. I saw so many classics. "All Your Base Are Belong to Us", "It's Peanut Butter Jelly Time!!!", Madness Combat, "The 5th Avocado", "Mashed Taters", Star Wars Kid, "The Demented Cartoon Movie", "Bill Cosby Gangsta Rap", Numa Numa Yeah, and so on (who can remember the chronology of all of these?). If you were there for it, you know what it was like waiting 3+ minutes for one of these stupid little things to load. If you are a zoomie and you weren't, I can only convey it to a certain degree, but rest assured that it was the hottest shit. As a kid I wasn't really used to thinking in terms of these "accumulation" sites. I had the mentality of "you want to check out X, you go to X website". Ah, that's how it should always be! What a difference from the modern era. So I didn't browse Newgrounds or AlbinoBlackSheep that much on my own YET (eventually I would). Instead I spent more time with a few Flash creators who had their own websites.

The first one I remember Daniel and Riley introducing to me was Legendary Frog, which I watched a few times and liked at the time but didn't get too attached to for long. But the other ones would be defining for a long time to come: Weebl's Stuff, David Firth, and, especially, Homestar Runner. I loved the "Weebl and Bob" and "Salad Fingers" series (although the one with the nettles really fucked me up for a while), but Homestar Runner soon consumed my soul and I forgot about everything else on the internet. It massively influenced my sense of humor and I still find myself sometimes referencing it unconsciously. The games section of their site also made me more interested in gaming for the first time in my life, and I for once found myself playing games on my own initiative instead of just at friends' houses. Not that most of the games on that site were really that great, but still...

Besides Homestar Runner, there were so many other sites I browsed back then that it's hard to get an accurate chronology. And when I do, it feels way too short. There's no way I experienced all those sites in only a few years... and yet, it seems I must have. That's what being a kid is like I suppose. Time seems to move slower and things are more rich. A few months can become a massive, defining epoch of your life. And using the internet back in those days absolutely was for me. Besides Flash cartoons, I mostly found interesting sites from a certain book that I stumbled across in the "humor" section of our local big chain bookstore and had my parents buy me. That book was called 505 Unbelievably Stupid Web Pages. I have to admit that even as a kid, I absolutely hated the author's comments on each site. Whoever wrote this was the most painfully unfunny and annoying faggot I'd ever read anything by. But I learned to put up with it in order to find interesting new websites. Each website was ranked from 1-10 on the scales of "Abnormality", "Stupidity", and "Entertainment". Obviously, the high "Abnormality" websites were the ones I was most after, but there were a lot of interesting websites in this book, many of which you could tell weren't really that "stupid" or "weird" but were just there to fill up space. But they were cool, so who cares?

Internet history and archaeology is fickle and transient and always has been. I probably picked up this book around 2003-2004 and a great number of these sites, many of which were just random Geocities and Tripod vanity pages, were already dead and gone. The descriptions were only more tantalizing than ever because of it! I have several of the most influential sites I found from this book (that are still online) linked in the links section of my site, but there are a few of particular importance I should note here. One is called "Vector Park" and had some extremely relaxing, atmospheric, interesting little games that were more like widgets. It was another step closer to discovering the joy of video games, which I had constantly deprived myself from. The other great ones were two huge, sprawling, HTML maze art projects called "SuperBad" and "The Bad Scary Place". You have to really look at them to understand what they're all about. "x" = " = "

https://incels.wiki/w/Adolf_Hitler

Adolf Hitler

Hitler portrait crop.jpg

Name: Adolf Hitler

Date of Birth: 20 April 1889

Occupation: Dictator

Ethnicity: German

IQ: Likely above average[1][2]

Adolf Hitler was a dictator during the early 20th century expansionist and imperialist era and most likely a NEETcel during early adulthood. Historians disagree about whether he ever had sex. It is a common meme that Hitler's inceldom and early failures were the root cause or at least the primary motivation for his violent political aspirations and totalitarian instincts. These sorts of analyses are frequently grounded in Freudian psychoanalyses that attribute authoritarian personality traits to sexual frustration, most notably that of the sexologist and Freudo-Marxist Wilhelm Reich, who argued in his book *The Mass Psychology of Fascism* that the root of fascist (which he eventually saw Stalinism as an example of) political thought was sexual repression and consequent sublimation of the sex drive into 'authoritarian idealism'.[3]

Hitler as incel or asexual[edit source]

Those who claim Hitler was incel often bring the following as evidence:

- Hitler gives no Chad signals
- Hitler was a failed artist (NEETcel) who lived a Bohemian existence as a vagabond during his twenties in Vienna (poorcel).
- His old army comrade, Ernst Hanfstaengel, claimed that Hitler was a victim of sexual bullying during his military service in the Great War. Bullying of this kind is not uncommonly directed towards sexually unsuccessful men. According to this account, the other soldiers frequently noticed his underdeveloped genitalia during communal showers and called him 'monk' because he was seemingly not interested in chasing after French girls in the countryside as they were. Hanfstaengel recalls a fellow soldier asking Hitler (who was in his mid-late 20s) whether or not he was a virgin. Hitler was said to have applied affirmatively, claiming he "had never had time for anything like that (sex)" and would "never get around to it".
- Hitler liked Friedrich Nietzsche who is also likely an incel
- During his youth, Hitler had a oneitis for a girl named Stefanie Isak. He never approached her, according to his then friend August Kubizek, perhaps indicating that Hitler was love shy. Ironically, as indicated by her surname, there is the possibility that Isak was Jewish. Kubizek also claimed that Hitler was so obsessed with her and jealous of his flirtations with other men that he conceived a murder-suicide plot to kidnap her and jump off a bridge with her. His pedestalization of Isak, combined with his seeming inability to make explicit his romantic interest, strongly indicates Hitler often engaged in thought processes and behavior women would generally find creepy and repulsive during his youth if Kubizek's account is deemed trustworthy. Kubizek later became a member of the Nazi Party and seemingly remained loyal to Hitler throughout his life.[4]
- Hitler had an oddball marriage. A biographer of his wife, Eva Braun, has claimed she suffered from a rare congenital disorder called Rokitansky-Küster-Hauser syndrome based on Braun's medical history and letters she wrote to her gynecologist. The disease results in the malformation of the vagina and uterus, making women with this syndrome barren. Vaginal intercourse is also generally too painful for women with this condition.[5]

The author of the book, Thomas Lundmark, also claimed that Braun was celibate herself and that he could find no evidence she had ever had a romantic relationship, speculating that Hitler used her to shield himself from suspicion surrounding his sexual proclivities.

- The German diplomat Eugen Dollman claimed Eva Braun confided to him that she had 'no personal intimacy' with Hitler in his memoirs.

- Hitler had a 14-year date with Eva Braun before they got married in a war bunker (possible Beta Orbiter)

- In his forties, after dictatormaxxing, he is alleged to have had a sexual relationship with his niece, Geli Raubal, which ended in her suicide. He later declared she was "the only woman he ever loved." [6] Some lurid accounts, at the time spread by his political enemies, including former Nazi party member Otto Strasser, claimed that Hitler was a Kinkcel, expecting Raubal to defecate on him for his sexual enjoyment, which contributed to her suicide. Hitler's controlling and possessive behaviour towards her after he discovered she was having an affair with his partially Jewish Chauffeur, Emil Maurice, together with her seeming lack of sexual attraction to him and his power over her, seems a more plausible contributing factor in her suicide

- He was claimed to be a masochist who paid actresses to kick him, according to a report authored by US Army psychologist Dr Henry A Murray in 1943.[7]

Murray drew on first-hand accounts and interviews for the bulk of his report, many of which were sourced from figures previously acquainted with but had since fallen out with Hitler, like his attention-seeking nephew Patrick Hitler and various anonymous sources, many presumably turncoats on the payroll of the OSS (the precursor to the CIA). Such sources are obviously of dubious validity. Historians have often dismissed Murray's heavily Freudian analysis of Hitler's personality. However, Murray correctly predicted that there would be an assassination attempt on Hitler, that he would not sue for peace, and that he would become increasingly reclusive and eventually commit suicide as the war turned against Germany, based on his evaluation of Hitler's character.[8]

Murray traced the root of his masochistic desires to what Murray viewed as Hitler's underlying passive, feminine nature (contrasted with overt authoritarian posturing) and his self-identification with his abused mother. He also claimed Hitler was impotent and incapable of 'normal' sex.

- Hitler sold himself to be a Volcel to the public as a gesture of pureness, portraying himself as being married to Germany and focused solely on his historical mission as Germany's leader, with sexual relationships being a distraction towards this end. Many of his contemporaries perceived him as asexual

- Hitler may have been medcel

- Hitler had flatulence and bad breath caused by severe digestive issues, perhaps linked to his vegetarian lifestyle. He received testosterone and methamphetamine injections for these conditions from his quack physician, Dr Morrell, before meeting with Eva Braun

- Hitler was claimed by many, including one of his former schoolmasters, psychoanalysts, and acquaintances, to have strong indications of what would now be called vulnerable narcissism. This trait may be linked to inceldom, as the case of Elliot Rodger shows.

- Another of his old army comrades, Hans Mend (mentioned below in the homosexual section), claimed that his (Mend's) girlfriend nearly dumped him when they were dining at a cafe together, and Hitler walked in and made it known that he was an acquaintance of Mend. Mend's girlfriend may have been offended by Hitler's manner and his vagabondish appearance, though there is also the impression that she thought Hitler was a homosexual.

- He had a powerful attachment and affection towards his mother. His inability to correctly individuate himself and free himself from her influence may have impeded his sociosexual development. His childhood Jewish doctor, Edward Bloch (who later treated Hitler's mother when she was dying of breast cancer), stated that "(Hitler's) affection for his mother was his most striking feature [...] I have never seen a stronger attachment between mother and son".

Claims he was homosexual[edit source]

It is also common to assert that Hitler was homosexual or bisexual, usually based on anecdotes from some of his former associates and in reference to the existence of homosexual elements in the early Nazi party (largely the SA):

- He had a pattern of close relationships with men throughout his life, including homosocial behavior (though this wasn't considered 'gay' during this era and was quite normal)

- Hitler never had a child compared to most other national dictators (e.g. Italy, Spain, Russia). This lack of fecundity is odd as politicians, in general, tend to be highly sexually/reproductively successful, even in comparison to other highly prominent men. An analysis of the psychopathological traits of various eminent men conducted by Felix Post found that politicians were very rarely unmarried and they were the among the categories of distinguished men more likely to be promiscuous (multiple marriages). Politicians (together with scientists) were also the group least likely to be never married.[9] Politicians high marriage rate and high divorce rate indicates serial monogamy is more common among these men, likely partly owing to their high SMV and traits linked with promiscuity (such as the dark triad) that are also linked to leadership skills. Post's analysis included Hitler, and he considered him to exhibit 'severe' psychopathological traits compared to other politicians. He was counted as married due to his pre-death wedding with Braun, likely one of the most unusual weddings in history.

- Hitler has been claimed to have had only one testicle and also to have had intersex characteristics. In allied propaganda, he was often depicted as having exaggeratedly effeminate characteristics such as large hips and a mincing walk

- A disgruntled former army comrade of his, Hans Mend, claimed in a private interview with members of the German Resistance that he and other soldiers once caught Hitler engaging in homosexual acts with Hitler's friend Ernst Schmidt while billeted in France during WW1.[10] In 1936, when Hitler was in power, Mend 67, https://incels.wiki/w/Adolf_Hitler

was convicted of child molestation in what he claimed were politically motivated "trumped-up charges" intended to silence his criticism of Hitler. Mend was also later convicted of rape.

- Eva Braun looks like a Becky and is possibly a "Fag Hag". However, Braun did have a voluptuous physique, a sportish disposition and a girlish sense of naïveté, traits that Hitler was reportedly attracted to in women.
- Hitler used to hang around men's hostels that were known for having gay prostitutes on Vienna, though this is not particularly remarkable on its own owing to his homelessness at the time
- Hitler was initially close friends with Ernst Roehm, the original leader of the SA (Nazi stormtroopers), who was open (after being publically exposed) homosexual, pederast, and an early advocate for gay rights.[11] Due to his potential to conduct a military coup and seize power from Hitler, together with his vocal dissatisfaction with Hitler's early acts as Fuehrer, Roehm and several of his associates were later purged from the Nazi Party and killed during the infamous "Night of the Long Knives". Roehm and his clique's involvement in homosexual acts were cited as justification for these acts by Nazi propagandists. Hitler did not mind Roehm's sexuality when Roehm was politically useful to him.

However, it is politically incorrect to say Hitler is part of the LGBT, as LGBT is part of the mainstream and Fascism is not. The Nazis also persecuted homosexuals during their time in power, frequently consigning men to concentration camps for engaging in homosexual acts. Some, however, have claimed this persecution was mainly focused on effeminate homosexuals, implying that the Nazis had a pagan conception of homosexuality where only receptive homosexuals are worthy of contempt.[12] Heinrich Himmler, leader of the SS, cited the supposed historical Germanic practice of throwing homosexuals in bogs to execute them (referring to Tacitus) and the 'abnormality' of homosexuals, together with the non-procreative nature of homosexual acts, as sufficient reasons to exterminate them, and not their effeminacy.[13] Such rhetoric is also used by neo-reactionaries to explain why his political movement is futile[14][15].

<https://en.citizendium.org/wiki/Life>

Life

<https://en.citizendium.org/wiki/index.php?title=Life&printable=yes>This editable Main Article has an approved citable version (see its Citable Version subpage). While we have done conscientious work, we cannot guarantee that this Main Article, or its citable version, is wholly free of mistakes. By helping to improve this editable Main Article, you will help the process of generating a new, improved citable version.

[edit intro]

This article is about the definition of Life. For other uses of the term Life, please see Life (disambiguation).

Bear with me, O mystery of existence, as I pluck the occasional thread from your train.

— Wislawa Szymborska, from her poem, "Under One Small Star"

(PD) Image: Ernst Haeckel

Buzz of Life: One aspect of the interrelations among living entities. Researchers begin to understand the mechanisms governing the complex network interactions between plants and pollinators, such as hummingbirds, shown in this illustration from Ernst Haeckel's *Kunstformen der Natur* (1904).[1]

Throughout history, we humans devoted much thought, speculation, debate, and research in an attempt to explain the fundamental nature of living systems and to explain their origin and biodiversity — in short, in an attempt to define life.

The typical form of the question asked: "What Is Life?"

At any given time in history, the prevailing answers to that perennial question depended on the prevailing extent of human knowledge, and to the cultural interpretations given that knowledge, including those arising from belief systems based on myth and religion-inspired faith. At this writing, in mid-second decade of the 21st century, that still remains the case.[2]

Scientist, historian, and philosopher, Evelyn Fox Keller speaks to the issue of historical context in making sense of life:

[W]hat is to count as knowledge? As explanation? As theory? Philosophers of science have traditionally tended to approach such questions in the abstract, as if they could be answered independently of historical or disciplinary context.

My own experience, as both a scientist and an historian...persuades me that answers to such questions are not given but contingent; not universal but rather matters of local and historically specific, disciplinary culture...once I was alerted to the problem, other variations in epistemological culture became evident as well...These reflect differences in questions, in available technology, in resources, and in cognitive, practical, and psychological needs.

In other words, my interest here is not in what should count as an explanation in science but on what does count. And for this, one must look to the explanatory conventions operative at particular times and in particular areas of scientific research.[2]

In keeping with Keller's thesis, we treat this article from the perspective of early 21st century scientific knowledge, including emphasis on the explanatory conventions of this particular time. In particular, we focus this article on what scientific research has revealed of the common activities that living systems perform to enable their continuing living. Specifically, we focus on the fundamental processes of the activity of living, those that constitute a system that counts as a living system, those processes qualifying as the "common denominator[s] that allows for the discrimination of the living from the non-living",[3] as inferred from the study of Earth's living systems in the light of modern science.

To make a start

We take as our theme the definition of life given by Nobel prizewinning cellular/molecular biologist Christian De Duve: "Life is what is common to all living beings".

[4] Those commonalities, expanded and discussed in detail below, include:

- basic inorganic and organic chemical constituents;
- a fundamental working unit and building block, biological cells — the 'atoms' of living systems;
- a hierarchy of networks of molecular and supramolecular structures, interrelationships and interactions;
- a boundary that both separates a cell from its external environment and enables it to exchange matter, energy, and information with that environment to maintain the activities of living;
- importation of energy, and its application in performing cellular work;
- exportation of more disorder than the order generated within itself;
- a core metabolism;
- within-cell and between-cells communication and computational information processing;
- self-assembly, self-organization, self-defense, and self-repair;
- resistance to perturbations of vital functions and mechanisms to restore deviations to normal (homeostasis);
- allostasis, physiological mechanisms that enable the system to adjust beneficially to diverse stressors through adaptive changes in physiology
- real-time and cross-generation adaptation, including learning;
- emergent behavior;
- self-reproduction;
- cognition of self and the world outside the self;
- death.

Life is one. This fact, implicitly recognized by the use of a single word to encompass objects as different as trees, mushrooms, fish, and humans, has now been established beyond doubt. Each advance in the resolving power of our tools, from the hesitant beginnings of microscopy little more than three centuries ago to the incisive techniques of molecular biology, has further strengthened the view that all extant living organisms are constructed of the same materials, function according to the same principles, and, indeed, are actually related. All are descendants of a single ancestral form of life.

—Christian De Duve, Vital Dust

In stating that Life is what is common to all living beings, De Duve explains:

This answer is not a tautology, as it allows many attributes to be excluded from the definition of life...What remains is what we humans have in common with the colibacilli in our gut. It is still a lot...We and colibacilli, together with all other living beings, are made of cells, which are constructed with the same substances. We build our constituents by the same mechanisms. We depend on the same processes to extract energy from the environment and convert it into useful work. Most telling of all, we use the same genetic language, obey the same code. There are differences, of course. Otherwise, we would all be identical. But the basic blueprint is the same. There is only one life...We and colibacilli are distant cousins; very distant, but indubitably related.[4]

What is Life?

Biologists use the word life in several of its many senses, to refer to:

No one can deny the extraordinary advances that have been made over the course of this past century in our understanding of vital processes...Yet I would argue that, despite such unquestionable success, biology is scarcely any closer to a unified understanding (or theory) of the nature of life today than it was a hundred years ago. The models, metaphors, and machines that have contributed so much to our understanding provide neither unity nor completeness. They work to answer some questions while avoiding (even obscuring) others; they satisfy certain needs while failing to address others; in short, they leave the project of "making sense of life" with an essentially-and perhaps necessarily-mosaic structure.

—Evelyn Fox Keller[2]

- the biography or lifeway of a living thing — the life of a mountain gorilla — its life history — sometimes even after it/she/he has died — the life of Albert Einstein;
- a way of living — she led the life of an artist;
- living things in the aggregate — plant life, marine life;
- the relationships among living things — the life of the forest;
- biology-related sciences — she became a life scientist, specializing in plant physiology;
- intellectual or imaginative activity — the life of the mind;
- all of the living things past and present — evolution of life; and,
- the shared fundamental processes that characterize living things and that distinguish them from non-living matter — life as a unique self-fabricating material system.

Biologists use the latter sense of life when asking "what is life?" and "what is the origin of life?"

Science can conceive that non-living matter might acquire naturally those processes that characterize living things. If living things developed from inanimate things, as science postulates, can we discover how that happened? We leave that question for an origin of life article.[5] Here we focus on discovering the shared fundamental processes that uniquely characterize living things (on Earth), those elementary processes that origin-of-life researchers would need to know in order to target their search for the mechanisms that led to the transition of the non-living to the living.

Perhaps elsewhere in the universe we might find the same kinds of processes that characterize living things on Earth, or, foregoing geocentrism, we might find different kinds of processes generating entities that we might recognize as living. In this article, for life on Earth only, can we make observations and draw a few provisional answers to the question, "what is life?". Some doubt even the provisionality of those answers (see textbox this section).

The fundamental units and processes of living things

In other words, sine qua non of the activity of living.

Building blocks

The task of supramolecular chemistry is to explore and develop systems which are programmed to form selective self-assembling, self-recognizing, and finally self-learning entities.

— Elina Ventola

Whether matter ultimately has substance/materiality or not,[6] biologists usually consider living systems as material structures made up of abundant replicates of numerous different types of atoms, giving rise, by means of a wide variety of types of chemical bonds, to small and large molecules and supramolecular complexes, spatiotemporally dynamically interacting in self-organizing networks in a matrix of the chemical compound, water. On Earth, in a water-based medium embedding and permeating the interstices of living systems, every living system teems with thermally sustained vibrating and jostling molecules of myriad types and sizes, too small for the naked human eye to see, but numerous enough to manifest themselves, collectively, as a flea or a giant sequoia tree, the latter of which may consist of up to 4.5 million pounds of molecules.[7] [8]

It inspires wonder that as particular collections of water embedded matter, powered by external energy to perform work to enable self-organized autonomy, we humans can electrically generate words shaped in metaphors that attempt to explain the very activity of living that enables that feeling of wonder, that render the human living system aware of itself as living, and as a living system.

· Biological cells, in profuse variety of types

Notwithstanding the atomic and molecular foundation of living things, the atoms and molecules must first self-assemble and self-organize as biological cells before anything living can emerge.

Science considers cells the units of life (life's atoms, so to speak). Living organisms can exist either as single cells (e.g., amoebae, paramecia, bacteria) or as communities of coherently and dynamically interacting cells (e.g., colonies of prokaryotes, integrated multicellular organisms like plants, animals). In living cells, organic molecules exist in heterogeneous pools of homogeneous and colloidal aqueous solutions bounded by lipid-protein-carbohydrate membranes (see Cell). Each pool can have a different composition with distinct properties (e.g., transmembrane electrical potential difference; density; viscosity; osmotic pressure; acidity; ionic strength; redox state) and different orderly arrangements of parts. That heterogeneity, self-organized, provides the basis for the physiology that can cause electric fields, fluid shifts, energy transfers, within-cell and between-cell communication, and the transport of molecules into and out of the pools.

Although organic molecules contain a variety of atomic elements (especially hydrogen, oxygen, nitrogen, phosphorus, and sulfur), they always have a predominant structure of carbon atoms, typically linked as carbon-to-carbon bonds in manifold diverse topologies. All cells share a common set of carbon-containing molecules — organic molecules, dissolved or dispersed in water as a common medium of housing and interaction, water typically comprising 60% or more of a cell, organ, and organism. Those molecules include relatively small molecules, like amino acids, nucleotides, monosaccharides, and esters, and large macromolecules made up of sequences of smaller organic molecules. Organic macromolecules include proteins (sequences of amino acids), lipids, nucleic acids (sequences of nucleotides), polysaccharide (sequences of monosaccharides), and many other molecular genera.

By mass, a typical mammalian cells consists of about 70% water, 18% protein, 5% lipids, 2% polysaccharides, 1% DNA and RNA, and 4% diverse chemicals, organic and inorganic.[9]

We find the 'stuff' of life, then, in carbon-to-carbon chains, studded with other chemical elements, arranged in aqueous lagoons containing a variety of organic and inorganic molecules, dynamically interacting in accord with physico-chemical principles.

— Molecules

From Molecule to Metaphor

—Jerome A. Feldman

See related topics: Chemistry, Biochemistry, and Organic Chemistry

Why do carbon atoms play a central role in the chemistry of living things? The answer emerges from the details of the physical chemistry of carbon. Carbon has four electrons in its outer shell, which has a capacity to hold eight electrons. The atom behaves as if it seeks four additional electrons to fill its outer shell to its capacity (see accompanying figure and caption). Metaphorically speaking, it usually achieves its goal by forming "covalent bonds" with other atoms, sharing electrons with other atoms also behaving as if they each sought to fill their outer shell. Thus, the physical chemistry of carbon enables it to bond with many other elements with unfilled outer shells.

Those carbon-bonding elements include hydrogen, which can share one electron with carbon to fill its [hydrogen's] outer shell, allowing carbon to covalently bond to four hydrogen atoms, as in methane (CH₄) [=natural gas]; oxygen, which can share two electrons with carbon to fill its [oxygen's] outer shell, allowing carbon to double-covalently bond with two oxygen atoms, as in carbon dioxide (CO₂, or O=C=O); and nitrogen, which can share three electrons with carbon to fill its [nitrogen's] outer shell, allowing carbon to triple-covalently bond with one nitrogen atom, as in hydrocyanic acid (HCN).

Most importantly, carbon can share electrons with itself, allowing the formation of C-C bonds, including double bonds (C=C) and triple bonds. The avidity for carbon to bond to itself allows carbon atoms to join into long chains, sometimes with C-C side chains, or even closed rings of C-C bonds, with or without side chains. Rings and chains and branches of linked carbons can combine into almost any imaginable shape. The particular covalent bonding capacity of carbon thus enables it to combine with hydrogen, oxygen, nitrogen, and itself in multi-varied ways that generate small carbon-based molecules such as sugars, amino acids and nucleotides, which can join to become huge macromolecules with remarkable stability. The sequences of the varied subunits of such macromolecules, and the particular three dimensional shapes those sequences enable, give them the informational content required for self-assembling the dynamic organization of cells, for metabolic functioning, and for constructing copies of themselves.

(CC) Image: Anthony Sebastian

Some of the ways carbon-carbon covalent bonds can configure.

The variety of carbon bonds vary in strength as well as in 3-D conformation. The simplest set of bonds that carbon can form is that of a tetrahedron, or pyramid, but the capacity of carbon for single, double and triple covalent bonding allows for many different geometries. Changing from one type of C-C bond to another type, as when a double bond is reduced to a single bond, will cause energy changes. Such changes not only affect the molecule's energy state, but also affect the shape of the molecule and the particular side groups attached to it.

(PD) Drawing: Anthony Sebastian

The properties of carbon mean that organic macromolecules can contain huge 'banks' of information coded in their structure. Not only can each of the constituent molecules be huge, but several categories of chemicals, like nucleotides or amino acids, that contain several different species, can be ordered so that the possible combinations are effectively limitless. All of these molecules are involved in the molecular-interaction networks of cells.

Amongst those networks of molecular interactions are those that enable cells to import and transform energy and energy-rich matter from the environment and that ultimately enable cells to grow, survive and reproduce. Matter needs energy to vitalize it. D'Arcy Thompson, a pioneering biologist in the early 20th century, considered talking about molecules (or matter generally) only provides convenience in that enables us to abbreviate the nomenclature and description of the energies and their forces that give the molecular assembly living status:

Matter as such produces nothing, changes nothing, does nothing; and however convenient it may afterwards be to abbreviate our nomenclature and our descriptions, we must most carefully realise in the outset that the spermatozoon, the nucleus, the chromosomes or the germ-plasma can never act as matter alone, but only as seats of energy and as centres of force. [10]

Elsewhere in the universe, elements other than carbon and Earth-life's carbon-associated elements might give structure to living systems. Silicon, carbon's close columnar relative on the periodic table, also forms bond-chains with itself, forms covalent bonds with other elements, and supplies the basis for extraterrestrial living systems in fantasies by science fiction writers. Scientists conclude that silicon-silicon bonds do not stabilize under an Earth-like physico-chemical environment compatible with life as we know it.[11]

Living systems, whether carbon-based or not, may not even require water to support the organization's chemistry.[12]

Some physicists and science writers propose that extraterrestrial life may develop based on inorganic matter:[13]

Complex plasmas [a state of matter common in outer space consisting of a mass of charged particles] may naturally self-organize themselves into stable interacting helical structures that exhibit features normally attributed to organic living matter. The self-organization is based on non-trivial physical mechanisms of plasma interactions involving over-screening of plasma polarization. As a result, each helical string composed of solid microparticles is topologically and dynamically controlled by plasma fluxes leading to particle charging and over-screening, the latter providing attraction even among helical strings of the same charge sign. These interacting complex structures exhibit thermodynamic and evolutionary features thought to be peculiar only to living matter such as bifurcations that serve as 'memory marks', self-duplication, metabolic rates in a thermodynamically open system, and non-Hamiltonian dynamics. We examine the salient features of this new complex 'state of soft matter' in light of the autonomy, evolution, progeny and autopoiesis principles used to define life. It is concluded that complex self-organized plasma structures exhibit all the necessary properties to qualify them as candidates for inorganic living matter that may exist in space provided certain conditions allow them to evolve naturally.

— Cells

Omnis cellula e cellula

—Rudolf Carl Virchow (1821–1902)

See Related Topics: Cell, Microbiology, Systems biology

In recognizing a living thing, biologists recognize it as a unity within an environment, yet apart from it — a compartment of a larger whole, structurally distinguishable though not functionally completely isolated from or closed to its surroundings. A structurally compartmentalized building block, the biological cell, underpins very entity that biologists acknowledge as living — bacteria, trees, fish, chimpanzees. All cells extend themselves to (and include) an enclosing boundary that consists of a lipid-protein molecular membrane known as the cytoplasmic membrane, which structurally separates the interior of the cell from the external environment while allowing certain exchanges of energy and matter. Lipid molecules form the backbone of the cell membrane, a cell-enclosing lipid raft with proteins of different types floating in it, floating often with 'tentacles' sticking out of lipid external boundary and into the cell interior, serving as specialized links for transfer of information into and out of the cell.[14]

(PD) Drawing: National Library of Medicine

Eukaryotes and prokaryotes. This figure illustrates a typical human cell (eukaryote) and a typical bacterium (prokaryote). The drawing on the left highlights the internal structures of eukaryotic cells, including the nucleus (light blue), the nucleolus (intermediate blue), mitochondria (orange), and ribosomes (dark blue). The drawing on the right demonstrates how bacterial DNA is housed in a structure called the nucleoid (very light blue), as well as other structures normally found in a prokaryotic cell, including the cell membrane (black), the cell wall (intermediate blue), the capsule (orange), ribosomes (dark blue), and a flagellum (also black).

Many organisms live as isolated cells, others as cooperative colonies of cells, and still others as complex multicellular systems that include diverse cell types, each specializing in different functions.[15] Nature has produced an enormous variety of cell types that span three vast 'domains' of living systems: Archaea, Bacteria, and Eukarya,[16] yet cells in all three domains have many features in common. In particular, as described above, they have a surrounding membrane, a physical boundary that separates them from their environment. (Yet that generally accepted commonality may oversimplify: see[17])

The detailed composition of cell membranes differ among cell types, with differing protein types and auxiliary lipid species, enabling specific kinds of functional exchanges with the surroundings. Pores, receptor molecules and protective walls are often features of the cell surface, in both unicellular and multicellular entities. [18]

Current evidence indicates that only pre-existing cells can 'manufacture' cells, so how did the first cell(s) arise? Examining what all cells have in common may provide insight to the origin of cells. All extract energy from energy-rich molecules by simple oxidation reactions, and convert it into other, chemical forms of energy useful for cell function. The molecule ATP universally serves as the cell's main energy 'currency'. All cells begin life with a part of its parent's cytoplasm and its organelles, and inherit digitally stored information in the form of molecules of DNA. With minor exceptions the DNA of all cells use the same universal genetic code to guide production of a myriad of distinct protein structures. Cells use those proteins to carry out diverse activities, including energy processing and conversion of carbon, nitrogen and phosphorous-containing materials into cellular structures. In the human genome, perhaps as few as 22,000 different protein-coding genes[19] lead to the production of many times more distinct protein structures that make up the variety and quantity of protein molecules needed for the structures and functions of a cell. Numerous molecular mechanisms account for that quantitative gene-to-protein amplification.[20]

Nature has produced a huge diversity of single-celled organisms and complex animals and plants. These can contain vast numbers of cells, each part of a specialized subpopulation (cell types) — in a mammal, the cells that make up bone differ in numerous structural and functional properties from those that make up muscle, and differ again from those that make up skin, for example. Humans contain approximately 200 different cell types as classified by microscopic anatomy. [15] In multicellular organisms, cells combine to make organs, the functional and structural components of the single larger organism.

What makes a single celled organism 'alive', and does the answer apply also when we call a large complex multicellular animal or plant 'alive'? What exactly do we mean by 'living'? We turn to those considerations next.

The thermodynamics of 'living'

A deterministic emergence of life would reflect an essential continuity between physics, chemistry, and biology. It would show that a part of the order we recognize as living is thermodynamic order inherent in the geosphere, and that some aspects of Darwinian selection are expressions of the likely simpler statistical mechanics of physical and chemical self-organization.

—Harold Morowitz and Eric Smith[21]

We propose that the only absolute requirements [for life] are a thermodynamic disequilibrium and temperatures consistent with chemical bonding.

—S. A. Benner et al.[22]

Organisms do not maintain their complexity, and become more complex, in a vacuum. Their high organization and low entropy is made up for by pollution, heat, and entropic export to their surroundings.

—Eric D. Schneider and Dorion Sagan

The second law is the Greatest Good and the Biggest Bad to us...You can't get any better for good — that living is possible due to the second law. And you can't get much worse for bad — that death is always possible too, due to the second law.

—Frank L. Lambert[23]

See also: Signed Article by John Whitfield: Survival of the Likeliest? — Using the laws of thermodynamics to explain natural selection — and life itself

Biologists have learned the importance of viewing living things from the perspective of thermodynamics — the science of interactions among energy, heat, work, and entropy (the degree of disorder of a system) and information (the degree of order of a system).[24] These interactions define what a system can and cannot do when interconverting energy and work. For example, by the First Law of Thermodynamics, when a process converts one form of energy (e.g., light) to another (e.g., electricity), no net loss of energy and no net gain results, when the byproduct, heat, is taken into account.[25] Once heat gets generated in an energy conversion, it becomes difficult to reverse the conversion. We can use sunlight to generate light back having a solar cell power a light-bulb, but do not get all the light back because some of the energy of sunshine converts to heat — i.e., it gets degraded to a lower 'quality' form of energy, less organized.

Scientists developed the laws of thermodynamics through experiment, debate, mathematical formulation and conceptual refinement; Albert Einstein believed that they stood as an edifice of physical theory that would never topple.

The Second Law of Thermodynamics has fundamental pertinence to the understanding of living systems:

(PD) Photo: Courtesy NASA/JPL-Caltech

Energy emitted by our sun provides the great bulk of the energy gradient that living systems on earth exploit, either directly or indirectly, to maintain a state far from the equilibrium state of randomness. The photograph shows a handle-shaped cloud of plasma (hot ions) erupting from the Sun.

- Heat flows spontaneously — i.e., without help from an external agency — from a region of higher temperature to one of lower temperature, and never spontaneously in the reverse direction. That also holds for other forms of energy, including electromagnetic and chemical energy: concentrations of energy disperse, down-flow, to lower energy levels, flowing, so to speak, "into the cool", and in the process, capable of doing work.[26] [27]
- When heat, as input to a system, causes it to perform work (e.g., as in a steam engine), it never converts the energy input entirely to work. Some of the heat always dissipates as 'exhaust', lower quality heat energy unusable by the system for further work. That also holds for other forms of energy doing work; some of the energy always turns into exhaust, typically heat. As empirical fact, conversion of energy to work in a system can never proceed at 100% efficiency.
- Consequences arise because work can produce order in a system, but it always exports some of the energy input as a less organized form of energy, heat. Experiments reveal the balance sheet of order: the degree of order of a system (e.g., a living cell) and its surroundings together never increases when energy input causes the system to perform work; the 'net' order always decreases — disorder increases. Scientists have learned how to quantify the degree of disorder, and they refer to that quantity as entropy. Water vapor, with its molecules distributed nearly randomly, has a higher entropy (the molecules show a less ordered arrangement) than liquid water, with its molecules distributed less randomly, and a much higher entropy than ice, with its molecules distributed in a more ordered crystal-like array. Left to itself in an isolated system, ice tends to spontaneously melt and liquid water to evaporate. Order tends to disorder, with the Universe as a whole tending to exhaust itself into an 'equilibrium' state of randomness.

Water vapor in a glass jar, with its higher degree of disorder than it would have if it were liquid water in the jar, will, at room temperature, eventually settle at the bottom of the jar into a puddle of the more ordered liquid water. That decrease in disorder (entropy) of the jar-system can occur only because the water-vapor-filled jar-system is not an isolated system, closed off from energy exchange with its surroundings. The water-vapor-filled jar can export heat to the lower-temperature room as the water vapor condenses into liquid water, releasing the heat energy that maintained the water as vapor instead of liquid — an instance of energy flowing downhill, dissipating itself from a more to a less concentrated state. The exported heat, no longer a concentrated source of energy in the water vapor, becomes a less concentrated source of energy, distributed throughout the room, the jar-system's surroundings. Because experience has established that a system and its surroundings can statistically never spontaneously increase its degree of order — according to the Second Law of Thermodynamics, the room then becomes more, or minimally as much, disordered as the jar-system became more ordered. Thus, an open system can become more ordered spontaneously without conflict with the Second Law of Thermodynamics.

The above three expressions of the Second Law of Thermodynamics reflect the fact that energy and order spontaneously flow downhill — down a 'gradient' — toward eliminating the gradient of energy.[26] Upon eliminating the gradient by flowing downhill, no energy flows, all work production ceases, all order dissipates, and an equilibrium state of maximal disorder, entropy, ensues.

So, how do living entities, those manifestly energized organisms, come into existence — to develop from an embryonic state to one of more order and less entropy — and perpetuate their order? How do they thwart the Second Law of Thermodynamics?

They don't: they only seem to do so. We saw, in the jar-filled water vapor example, that an 'open' system — one that can exchange energy with its surroundings — can order itself within the constraints of the Second Law of Thermodynamics. Living systems exploit the Universe's gradients of energy and order. Like a steam engine, they 'import' energy and order, convert it to the work of building internal order in the form of a dynamic organization of constituent elements, which they fabricate themselves, and so fabricate a system of decreasing internal (within-system) entropy.[28] But, all along, they emit enough 'exhaust' to increase the disorder and entropy of their surroundings, so that the total entropy of the living system and its surroundings increases. Thereby the Second Law receives its due. The living system skims off a portion of the order flowing past it; it ingests order.

Biologist Alexei Kurakin remarks that:

...the apparent conflict between the second law of thermodynamics and biological evolution exists only if one assumes that the energy/matter comprising the Universe is near equilibrium and that it evolves toward an equilibrium state via disorganization and disordering, obeying the laws of equilibrium thermodynamics. The conflict disappears, however, if we postulate that the energy/matter making up the Universe is far from equilibrium, that it exists as an evolving flow, and that the energy/matter flowing through and comprising the Universe evolves from simplicity and disorder to complexity and order via self-organization, in accordance with the empirical laws of nonequilibrium thermodynamics.[29]

Biological cells qualify as non-equilibrium thermodynamic open systems, appropriating some of the energy flowing past them, using it to keep away from the equilibrium state of randomness dictated by the Second Law. By exporting unusable energy as heat, they actually export more disorder (entropy) than they produce within themselves, thereby increasing the total entropy of the universe. They hasten the dissipation of the energy gradient they are in, as if nature's abhorrence of energy gradients 'favored' the origin, development and persistence of living systems to maximize the rate of entropy gain of the Universe as a whole.

Importantly, living things can store energy.

Recognition of the need for energy, as defined by the physicists, to enable life, has a long history.[10] [30]

A living system always works far from the 'equilibrium' state of activity that would ensue if no energy could be imported, and energy from outside keeps the system far from equilibrium. Non-equilibrium thermodynamic open systems, including living things, can exhibit unexpectedly complex behaviors because of their far-from-equilibrium state, and one very remarkable behavior that can result is self-organization.[31]

The sun (Sol) supplies much of the energy gradient that sources thermodynamic disequilibrium for living systems on earth. However, as Benner et al.[22] point out:

...heavier atomic nuclei, left from a supernova, are not at thermodynamic equilibrium. Decay of these nuclei is a powerful source of planetary not-at-equilibrium environments. Radioactive decay [deep in Earth] drives tectonics and volcanism on Earth. These create non-equilibrium environment in many areas such as black smokers on the ocean floor. The consequent energetic disequilibrium supports life [near them] despite the absence of direct solar energy.[22]

Some biophysicists propose that the production of order by matter in an energy gradient, as in living things, tends to develop inevitably and proceed inexorably. They give two reasons: (1) the production of order through work, by exporting more than counterbalancing degrees of disorder, increases total entropy production (i.e., dissipates the energy gradient and renders the dissipated energy unusable) beyond that which would otherwise occur, and (2) energy sources dissipate their gradient to produce disorder at the fastest rate possible — to reach random thermal equilibrium as fast as they can. In other words, the physical principles governing energy gradient dissipation and energy degradation not only allows the development of living systems, but, in effect, tends to select for them — or urges their emergence — in particular, when no constraints are present disallowing their development (e.g., excess heat, poverty of appropriate resources. See additional argument in:[32]

Thermodynamic principles thus contribute not only to answering the question "what is life?" but also to "why is there life?"[33] [34]

Sir Arthur Eddington, the astronomer who first confirmed Albert Einstein's general theory of relativity, remarked:

The law that entropy always increases--the second law of thermodynamics--holds, I think, the supreme position among the laws of Nature. If someone points out to you that your pet theory of the universe is in disagreement with Maxwell's equations--then so much the worse for Maxwell's equations. If it is found to be

contradicted by observation--well, these experimentalists do bungle things sometimes. But if your theory is found to be against the second law of thermodynamics I can give you no hope; there is nothing for it but to collapse in deepest humiliation.[35]

Harold Morowitz and Eric Smith begin their essay on that perspective as follows:[21]

Life is universally understood to require a source of free energy and mechanisms with which to harness it. Remarkably, the converse may also be true: the continuous generation of sources of free energy by abiotic processes [e.g., energy from radioactive decay deep in the Earth] may have forced life into existence as a means to alleviate the buildup of free energy stresses. This assertion — for which there is precedent in non-equilibrium statistical mechanics and growing empirical evidence from chemistry — would imply that life had to emerge on the earth, that at least the early steps would occur in the same way on any similar planet, and that we should be able to predict many of these steps from first principles of chemistry and physics together with an accurate understanding of geochemical conditions on the early earth. A deterministic emergence of life would reflect an essential continuity between physics, chemistry, and biology. It would show that a part of the order we recognize as living is thermodynamic order inherent in the geosphere, and that some aspects of Darwinian selection are expressions of the likely simpler statistical mechanics of physical and chemical self-organization.[21]

See also commentary on Professors Morowitz and Smith's article.[36]

Morowitz and Smith think that such order happens because it is a better 'lightning conductor' for discharging excess energy.[36]

Life is the transmutation of sunlight.

It is the energy and matter of the sun become the green fire of photosynthesizing beings. It is the natural seductiveness of flowers. It is the warmth of the tiger stalking the jungle in the dead of night...

As life transmutes solar fire into all the material and energetic cycles of the biosphere, we pay homage to the ingenious ascension of the living plant.

—Lynn Margulis and Dorian Sagan [37]

High energy (low entropy) cannot contain itself. When it has a channel to a lower energy (higher entropy) source, it discharges itself through the channel, causing patterns in space-time. Living systems provide such a channel for free energy from the sun and hydrothermal vents, because they actively consume energy and use it, in part to lower their own entropy, through growth and development and maintaining the living state.[38] The system's surroundings receives the fruits of its labors, waste, translated as less usable energy than it would have without part of it already used up, and more entropy than without the lowering of entropy in the living organization because lowering entropy through incomplete conversion of energy to work generates entropy as waste. Living systems help relieve solar and volcanic pent-up energy, hastening its dissipation, justifying their cognomen as 'dissipative structures'.

We can, then, view a living system as a state of organizational activity maintained by importing, storing and transforming energy and matter — into the work of fabricating structures needed to sustain that state. They can only do so by producing waste and exporting it, and this lowers the ordered state of the environment. A living system maintains its organization at the expense of its external environment, leaving the environment more disordered than the gain in order of the living system — in keeping with the Second Law of Thermodynamics. Thus, from a thermodynamic perspective:

A living system:

- Has the ability to remain for a long time as an organized system
- The persistence of the organized state depends on the system's location within an energy gradient, a flow of energy from a more to a less concentrated state, like sunshine and hot springs
- Energy flows because probability ever drives concentrations of energy toward the more probable state of maximal dilution
- That downhill flow of energy provides a living system with energy and energy-rich matter
- Ultimately the energy flow drives the system to build and re-build its organized state
- The drive comes because the work of building organization causes the system to export wastes to its surroundings in the form of low-energy heat and unusable matter
- The work-waste of thusly degraded energy increases the degree of disorder of the system's surroundings, else without the system's work, the surroundings would have more order as more concentrated energy
- Empirically known, creating order through work in one place creates more than compensatory disorder elsewhere
- Thus in creating living order, the degree of disorder of a living system plus its surroundings increases — a cost of living
- In that way the system uses available energy to build and maintain an organized state far from its final equilibrium state of minimal energy and order
- A living thing not only obeys the Second Law of Thermodynamics, but also facilitates the operation of the Second Law by actively dissipating energy gradients

However, as physicist Philip Nelson writes: "The pleasure, the depth, the craft of our subject lie in the details of how living organisms work out the solution to their challenges within the framework of physical law." [39] [Emphasis in original] To discuss those details would require invoking the facts and theories of biological physics, molecular and cell physiology, and systems biology, beyond the scope of this article if not the scope yet of those disciplines.

Metabolism

A reasonable answer to the question 'What is life?,' then, seems to be: an embodied metabolism...

—Ed Regis, Science Writer

Broadly specified, metabolism encompasses the combined results of all of the body's chemical reactions and interactions that enable living:

- those that manage the energy exchanges of the living system, including capturing energy from outside the system, converting and inter-converting it to a variety of forms for differing physiological activities, and disposing of non-utilizable energy waste outside the system;
- those that manage the dynamic architectural and functional status of the system through molecular reactions, for signalling, synthesis, and degradation; and,
- those that manage disposal of waste molecular material;

— in short, the combined results of all of the body's chemical reactions and interactions that manage persistence of the living system as a dynamic functioning entity, in particular functioning to support a self-assembling, self-organizing, developing, adapting, self-reproducing entity.

Some definitions seem to synonymize metabolism and the activity of living:

....inclusive term for the chemical reactions by which the cells of an organism transform energy, maintain their identity, and reproduce. All life forms—from single-celled algae to mammals—are dependent on many hundreds of simultaneous and precisely regulated metabolic reactions to support them from conception through growth and maturity to the final stages of death. Each of these reactions is triggered, controlled, and terminated by specific cell enzymes or catalysts, and each reaction is coordinated with the numerous other reactions throughout the organism.[40]

Although a living organism is identified and recognized by its physical appearance, and hence by its structure, its status as living is defined by its chemistry, and thus by its metabolism. This is a network of reactions that is responsible for synthesizing all of the molecules needed for the organism to survive, apart from those directly available from its environment, and for disposing of molecules that are harmful or no longer required. The entire network consists of thousands of connected reactions, and as many of these need to be maintained far from equilibrium, all organisms require and consume energy. [41]

Can biology encompass living systems solely in terms of metabolism? Does 'metabolism' capture all of the activities common to living systems and essential to their activity of living? If so, we must include in metabolism all of the physics and chemistry enabling self-assembly, self-organization, homeostasis, allostasis, network regulation, gene regulation, and much more. Does 'metabolism' adequately describe the phenomenon of emergent behavior of living systems, however essential we recognize metabolism for the existence of a living system?

Those considerations and questions do not imply that metabolism, appropriately characterized, does not qualify as an essential component in the activity of living as we know it from Earth life. All Earth's organisms 'metabolize.' Indeed, Harold Morowitz and Eric Smith[42] [21] recognize a "core metabolism" in all living systems and characterize it as follows:

....we know from analysis of entire genomes (citation to:[43]) that the complete metabolic chart of autotrophs [organisms that synthesize their own food from inorganic materials and a source of free energy] has a universal core, based on a set of fewer than 500 small — less than 400 Dalton molecular weight—organic molecules. Within core metabolism, we recognize two major categories of function. Anabolism comprises the set of reactions that build organic compounds, while catabolism is the breaking down of organic compounds for energy or materials. Anabolism is essentially a reductive process, meaning that it consumes energy-rich electrons to create molecular bonds. It is possible for an organism to exist with anabolic reactions alone, if suitable electron donors [energy sources] are provided by its environment, and many major clades of anaerobic organisms that are thought to have very ancient lineage are autotrophs living on geochemical [energy] inputs (called chemo-autotrophs) whose metabolism is almost entirely anabolic (citation to:[44])[21]

72, <https://en.citizendium.org/wiki/Life>

Morowitz and Smith describe the basic reductive (electron-donating, energy-storing) anabolic network as containing the carboxylic acids of the citric acid cycle and employing them to synthesize the biochemical precursors making up the cell. Non-autotrophs (heterotrophs, which feed on other organisms) use that network of carboxylic acids in an oxidizing (electron-removing) catabolic network (the Krebs cycle) to breakdown organic compounds to CO₂ and to free up energy. Morowitz and Smith point out that:

....when run in the reductive direction this cycle can duplicate its own members from abiotic CO₂ and electrons, a property designated network autocatalysis. Thus the reductive citric-acid cycle appears, at the level of the biosynthetic network, to be a self-contained engine of synthesis for all biochemical precursors (citation to: [45])[21]

The core anabolic network, according to Morowitz and Smith, generates biological amino acids utilizing ammonia and electron donors (reducing agents, reductants), sugars, including ribose, from the citric acid cycle intermediate, pyruvate, cell membrane fatty acids from acetate, another intermediate of the cycle.

More elaborate pathways leading to the complex amino acids, nucleic acids, and cofactors, follow from these elementary steps in a dense and surprisingly simple web of reactions." [21]

Smith and Morowitz propose:

....that rTCA [the reductive tricarboxylic acid cycle] is statistically favored among competing redox relaxation pathways under early-earth conditions and that this feature drove its emergence and also accounts for its evolutionary robustness and universality.[42]

The core structurally-creative anabolic (energy-storing) network observed in autotrophs supplies the dynamical framework for energy to drive all living organization, as all living systems either are autotrophs or depend on the existence of autotrophs.[46]

Evolutionary aspects of 'living'

It is interesting to contemplate an entangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these elaborately constructed forms, so different from each other, and dependent on each other in so complex a manner, have all been produced by laws acting around us. These laws, taken in the largest sense, being Growth with Reproduction; Inheritance which is almost implied by reproduction; Variability from the indirect and direct action of the external conditions of life, and from use and disuse; a Ratio of Increase so high as to lead to a Struggle for Life, and as a consequence to Natural Selection, entailing Divergence of Character and the Extinction of less-improved forms. Thus, from the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is grandeur in this view of life, with its several powers, having been originally breathed into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved.

—Charles Darwin, Last Paragraph, Origin of Species, 1st ed.

In the human 'poetic/animistic' imagination, living systems include fires and storms. The flames of candles, forest fires, and tornadoes do qualify as non-equilibrium open systems — like the living systems of the three recognized domains of life, Archaea, Bacteria, and Eukarya — but they lack the essential activities of living systems, all of the activities required to perpetuate the informational base they constitute. Fire can spread and split, as in large forest fires, but they eventually all die out without leaving any progeny to perpetuate their informational nature, as the trees of the forest do; forests restore their former diversity and biomass after the fire dies out. Today's forest fires carry no inherited information from the forest fires of ancient times, because those ancient fires did not possess the intrinsic self-organized mechanism for replicating and re-replicating itself, generation upon generation, an inherited mechanism, like the forest trees possess, enabling them to make copies of themselves to keep populated the forest with trees after they die out, or to re-populate it after a fire.

Fires all become fire entities spontaneously, but separately, independently, without continuity over millennial time. Tornadoes, tempests in a teapot. Fires and tornadoes haven't designed themselves to maintain continuity after their death, unlike the living things comprising the three recognized domains of life.

When a living system reproduces itself, ensuring its informational continuity, its offspring inherit its properties, but the offspring may acquire new properties and lose other ones along the course of the inheritance pathway, imperfect fidelity of informational reproduction, variations on the inherited property profile caused by random events. Some variations offer some of the offspring [47] less opportunity to reproduce than others, and other offspring better opportunity, sometimes better even than their parents. Accordingly, new groups with different heritable property profiles arise that may supplant older groups because of greater reproductive fitness.[48] Heritable properties call this evolution by "natural selection", or by "survival of the fittest", and many regard it as the most important way whereby living systems evolve over geological time.

The causes of the heritable property profile variations play a role in determining species evolution. Chance plays an influential role there. Natural experiments, like endosymbiosis, a chance event, play an important role in evolution, allowing natural selection the opportunity to select among new endosymbiotic species.[49] Epigenetic transmission of information can introduce property profile variations that persist across generations, so might contribute to evolution by means of natural selection.[50] [51] Heritable properties subject to profile variations invite natural selection to act if the variations cause differences in reproductive fitness.

Evolution of living systems across reproductive generations requires variations in heritable property profiles capable of influencing reproductive fitness in circumstances where competition for reproductive fitness determines who gets to reproduce most fecundly.

Therefore, biologists recognize the ability to produce offspring that inherit some of its features, but with some variation, as an essential characteristic of living systems, one that enables descent with modification, allowing living systems to adapt to changing circumstances that determine what counts as reproductive fitness, and so perpetuation of a lineage.[49] [51] [50] Evolution by natural selection will occur if heritable variations produce offspring that differ in their reproductive fitness and if circumstances induce competition among conspecifics for reproductive fecundity. The variations occur due to chance variations (e.g., mutations) in the inherited genetic database (genome) that the organism draws upon to the help it self-construct and self-maintain its organismic traits (phenotype), and also to various natural experiments (e.g., symbiogenesis) that lead to emergent genotype-phenotypes.[49]

In all living systems, DNA primarily provides the database for the construction of their protein constituents. All living things descended with modification from an ancestral community of microorganisms with a partially shareable gene pool. (But see:[52] To glimpse beyond that horizon, we will need to take heed of the findings of intense current research on early cellular evolution -- see Evolution of cells).

Viruses have few of these characteristics, but they do have a genotype and phenotype, making them subject to natural selection and evolution. Accordingly, descent with modification is not uniquely a characteristic of living systems. Beyond the scope of this article, we find descent with modification in memes and the artificial life of computer software, such as self-modifying computer viruses and programs created through genetic programming. Descent with modification has also been proposed to account for the evolution of the universe.[53]

When it comes to the fundamental structures and processes of living, however, some biologists argue against the requirement for reproduction.[54] NASA defines 'life' as a "chemical system capable of Darwinian evolution", without specification of reproduction per se (for discussion, see Benner et al.[22]).

Adding to the thermodynamic perspective, we might say that:

A living system:

- Has the ability to maintain its self-organized state of living by producing copies of itself.
- In so doing it subjects itself as a species to mechanisms that may adapt it to a changing environment.
- In so doing it participates in trans-generational evolutionary changes of the species to which it belongs.

Self-organization

As the wind of time blows into the sails of space, the unfolding of the universe nurtures the evolution of matter under the pressure of information. From divided to condensed and on to organized, living, and thinking matter, the path is toward an increase in complexity through self-organization..

—Jean-Marie Lehn

A self-organizing system may be characterized by global, coordinated activity arising spontaneously from local interactions between the system's components. This activity is distributed over all components, without a central controller supervising or directing the behavior. Self-organization relates the behavior of the individual components (the microscopic level) to the resulting structure and functionality of the overall system (the macroscopic level). Simple interactions at the microscopic level may give rise to complex, adaptive, and robust behavior at the macroscopic level.

—Fifth International Workshop on Self-Organizing Systems (IWSOS 2011) KIT, Karlsruhe, Germany, February 2011.

The order we find in living systems results to a large degree from the ability of the system to organize itself, independently of a master controller, program director, blueprint, algorithm, or template. Self-organization 'emerges' as a spontaneous manifestation of the interactions among the systems' components, and of the interactions of the system with the environment embedding it — in effect, it emerges as computational information processing, reflecting the past influence of the processes of natural experiment and natural selection.

In cells, self-organization emerges in part from so-called intermolecular or supramolecular (non-covalent) interactions of proteins-with-proteins and proteins with other molecules.[55] [56] [57] The proteins make their appearance through a genetic transcription-translation machinery, which itself represents a self-organized 73, <https://en.citizendium.org/wiki/Life>

molecular machine that emerges in part from the non-covalent interactions of proteins with nucleic acids and other molecules. Jean-Marie Lehn, of the Institut de Science et d'Ingénierie Supramoléculaires, Université Louis Pasteur, summarizes it in this way:

A self-organization process may be considered to involve three main stages: (i) molecular recognition for the selective binding of the basic components; (ii) growth through sequential and eventually hierarchical binding of multiple components in the correct relative disposition; it may present cooperativity and nonlinear behavior; and (iii) termination of the process, requiring a built-in feature, a stop signal, that specifies the end point and signifies that the process has reached completion.[55]

Molecules interact by forming and breaking strong or weak covalent bonds, and also through weaker intermolecular interactions, like hydrogen bonding and Van der Waals forces. Those supramolecular interactions self-assemble aggregates of molecules (e.g., organelles, networks), giving them the properties that enable many biological processes.[56] [58] To quote Reinhout and Crego-Calama:[59]

In chemistry, noncovalent interactions are now exploited for the synthesis in solution of large supramolecular aggregates. The aim of these syntheses is not only the creation of a particular structure, but also the introduction of specific chemical functions in these supramolecules...

Again, J-M Lehn:[60]

Starting with the investigation of the basis of molecular recognition, [supramolecular chemistry] has explored the implementation of molecular information in the programming of chemical systems towards self-organisation processes, that may occur either on the basis of design [by the chemist] or with selection of their components.

The qualifier that self-organization emerges only in part from supramolecular interactions, proteins with proteins and other molecules, reflects the involvement not only of supramolecular self-assembly but also of evolutionary mechanisms, operating on random variation through selection of molecules and networks of molecules that tend to optimize the fitness of functional self-organization — in other words, Darwinian evolution, or adaptation, operating to influence the nature of the self-organizing process.

Many workers (see: Hoelzer et al. [61]) emphasize self-organization as playing an explanatory role for the process of natural selection: "...it is clear that the process of SO represents a potential explanation for adaptive biological evolution." Hoelzer et al. discuss that in terms of the physics of self-organizing processes — the extraction of work through channeling free energy gradients — showing that a similar physics applies to the process of natural selection, rendering self-organization and natural selection complementary processes in sustaining living complex adaptive systems.

One must also invoke local real-time selective processes that confer stability and appropriate functionality to self-assembly, called homeostasis or adaptability. Thus, order emerges out of chaos.[62]

Professor of Microbiology, Franklin M. Harold, offers the following definition of self-organization:

...let me define self-organization as the emergence of supramolecular order from the interactions among numerous molecules that obey only local rules, without reference to an external template or global plan...The definition explicitly excludes order imposed by an external template, whether physical (as in a photocopier) or genetic (as in the specification of an amino acid sequence by a sequence of nucleotides)...The structure of the self-assembled complex is wholly specified by the structures of its parts and is therefore implicit in the genes that specify those parts: natural selection crafted those genes to specify parts that assemble into a functional complex.[63]

Information resides in proteins and other molecules in virtue of their structure, and through them, information flows through cells, just as energy does, and determines their organizational nature.[64]

One way to understand this self-organization is to view a living system as a 'computing device'. The inherited and acquired information base — the genome — specifies components which arrange themselves in accord with their physico-chemical properties — i.e., they 'compute' the system in a complex chemical reaction. Systems biologist, Denis Noble, incisively describes it:

Genes code for protein sequences. They do not explicitly code for the interactions between proteins and other cell molecules and organelles that generate function. Nor do they indicate which proteins are on the critical path for supporting cell and organelle function in health and disease. Much of the logic of the interactions in living systems is implicit. Wherever possible, nature leaves that to the chemical properties of the molecules themselves and to the exceedingly complex way in which these properties have been exploited during evolution. It is as though the function of the genetic code, viewed as a program, is to build the components of a computer, which then self-assembles to run programs about which the genetic code knows nothing...[65]

Yet that description under-characterizes the complexity of the system. In a multicellular organism, each cell retrieves only its own particular pieces of information from the total information base, and the selection varies with time. Each cell must perform specific computations to effect that dynamic activity. The behavior of the system's functional networks constitute those specific dynamic computations. The apparent circularity begat by adding that further characterization of the system as a 'computing device' exemplifies two-way nature of the 'computations' self-organizing the living system. With the tinkering and discovering comprising local trial-and-error and evolution's handiwork, that 'circularity' carries out ('computes') integrative functions not explicitly encoded in the inherited and acquired information base of the system.[65]

The molecular biologist Sidney Brenner[66] [67] expressed the 'computing device' metaphor this way:

...biological systems can be viewed as special computing devices. This view emerges from considerations of how information is stored in and retrieved from the genes. Genes can only specify the properties of the proteins they code for, and any integrative properties of the system must be 'computed' by their interactions. This provides a framework for analysis by simulation and sets practical bounds on what can be achieved by reductionist models.[68]

The structure and behavior of self-organized systems need no behind-the-scenes 'master controller', and no prepared blueprints that specify the structure and dynamics of the system. Instead, they emerge from interactions among the naturally generated and naturally selected components of a system, dictated by their physico-chemical properties, and dynamically modified by the emergent organization, which is itself modified by the environment. The single-celled zygote self-organizes into a multicellular living system as genetically encoded proteins interact, responding to changing influences from the changing environment generated by growing multicellularity — becoming a network of many cell-types working cooperatively.

That biological systems self-organize has led one prominent biologist to say they are products of a "blind watchmaker".[69]

Self-organization tends to breed greater complexity of self-organization. One important aspect of self-organization in cells rests on the tendency for lipid molecules with polar (water-loving) and non-polar (water-shunning) ends to form bilayers in an aqueous solution, each unit of the bilayer with two lipid non-polar ends mutually attracted in the center and the polar ends surrounded by water. Protein molecules can span the bilayer membrane, or selectively straddle only one or the other side of the membrane and its aqueous surrounding, according to their specific amino-acid sequence and side-groups. Those lipid-protein membranes allow cells to communicate with other cells, either in free-living cellular communities or in multicellular organisms, and those communication activities self-organize by virtue of the properties of the cells, generated by natural experiments and selected for fitness by evolutionary mechanisms, and subject to downward effects by the systems' organization and environmental influences on the systems.

Self-organization occurs at all levels of living systems. For example, the dynamics of communities, such as the feeding relationships within communities of large mammals, also reflect self-organization. The animals and components of the ecosystem embedding them self-organize, resulting in "...unitary structures with coherent properties...[that] can operate in an integrated way, which allows for the acceptance of their changes on large time-scales as evolutionary."[70]

Further elaborating the descriptions of living systems beyond the thermodynamic and evolutionary perspectives, we might say that:

A living system:

- Organizes itself into a spatio-temporal dynamic system
- Such self-organization happens as a spontaneous manifestation of the physico-chemical interactions among the system's components, influenced by the larger system embedding it, and by that systems interactions with its environment

Autonomous agents

[C]onsider a bacterium swimming upstream in a glucose gradient. We would, and do, all say that the bacterium is going to get food. That is to say, the bacterium is acting on its own behalf in an environment. I will call a system that can act on its own behalf in an environment an 'autonomous agent'.

— Stuart Kauffman[71]

Stuart Kauffman uses the concept of 'autonomous agents' to explain living systems.[71] [72] He gives the hypothetical example of an enzyme that catalyzes the binding of two smaller sub-component molecules into a copy of itself — self-replication by auto-catalysis. The energy to produce the enzyme comes from a neighboring molecule, which, by breaking an energy-rich bond, serves as a 'motor' to produce excess enzyme. The self-replication stops after using all duplicates of the motor, so external energy — perhaps from light impinging on the system — must drive the repair of the broken chemical bond, re-establishing a supply of that energy-supplying molecule, thereby re-energizing the motor. A new cycle of auto-catalytic self-replication can then begin, given an influx of external energy and 'food' (sub-components of the auto-catalytic enzyme). As an essential feature, interactions among the components of a system have effects (technically 'allosteric' effects) that help organize and coordinate its processes, allowing the self-replication to proceed.[71]

Kauffman conceives, then, of an autocatalytic molecule in a network of molecules that has cycles of self-replication driven by external energy and materials. Such a network is a 'molecular autonomous agent' because, given external energy and ample materials, the network perpetuates its existence. The network is autonomous because it is not controlled by outside forces even though it depends on outside energy and materials. The 'agent' is the system doing work autonomously; in this case, the work of self-replication. (That's what 'agents' do; they do work.) In this example, the agent survives by 'eating' outside materials and energy. Work gets done because the system remains far-from-equilibrium: as energy flows through the system, the system does its work, and in so doing dissipates the energy gradient, but it temporarily constrains the rate of dissipation by storing energy in its internal organization. The agent continues to "live" only while that far-from-equilibrium state exists, and it can be starved to 'death' by stopping the matter and energy from flowing through the system. Kauffman argues that cells, and indeed all living systems, qualify as autonomous agents, constructed from molecular autonomous agents.[71]

Autonomous agents also interest scientists in the fields of artificial intelligence and artificial life. One careful description of autonomous agents from some members of that group adds further insight to this view of living systems:

An autonomous agent is a system situated within and a part of an environment that senses that environment and acts on it, over time, in pursuit of its own agenda and so as to effect what it senses in the future. It has the properties of reactivity (timely response to environmental changes; autonomy (controls its own actions); goal-orientation (pursues its own agenda); continuous processing. Some autonomous agents may also have the properties of communicability (with other agents); adaptability (based on previous experience); unscripted flexibility.[73]

For Kauffman, the property of pursuing its own agenda includes contributing to its own survival and reproduction: "...an autonomous agent is something that can both reproduce itself and do at least one thermodynamic work cycle. It turns out that this is true of all free-living cells, excepting weird special cases. They all do work cycles, just like the bacterium spinning its flagellum as it swims up the glucose gradient. The cells in your body are busy doing work cycles all the time." [74] There is only one escape from work, and that is death.

If the descriptions of living systems from thermodynamic, evolutionary, self-organizational and autonomous agent perspectives are considered, we might add that:

A living system:

- Has the ability to work autonomously, in own behalf with its own agenda, to offset disorganizing perturbations
- It does so in virtue of its construction from many molecular autonomous 'agents' working in concert
- It is enabled to do so in virtue of the external energy it feeds on and its ability to utilize that energy to perform cyclic molecular work

Networks

(CC) Drawing: David K. Gifford, et al

The modular organization of a cellular network. Yeast Transcriptional Regulatory Modules. Nodes represent modules, and boxes around the modules represent module groups. Directed edges represent regulatory relationship. The functional categories of the modules are color-coded.[75]

The science of networks[76] provides another useful perspective on living things. Networks 're-present' a system as 'nodes' and 'interactions' among the nodes (also referred to as 'edges' or 'arrows' or 'links'). For example, in a spoken sentence, words and phrases make up the nodes, and the interconnections of syntax (subject-to-predicate, preposition-to-object of preposition, etc.) make up the links. Intracellular molecular networks represent specific functions in the cell; molecules use up the nodes, and their interactions with other nodes make up the edges or arrows. Some networks accept inputs of one kind and return outputs of a different kind.

One finds networks everywhere in biology, from intracellular signaling pathways, to intraspecies networks, to ecosystems. Humans deliberately construct social networks of individuals working (more or less) to a common purpose, such as the U.S. Congress; they also construct networks of electronic parts to produce, for example, mobile phones; and networks of sentences and paragraphs to express messages, including this very article. Researchers view the World Wide Web as a network, and study its characteristics and dynamics.[76] [77]

According to Alon, "The cell can be viewed as an overlay of at least three types of networks, which describes protein-protein, protein-DNA, and protein-metabolite interactions." [78] Alon notes that cellular networks are like many human engineered networks in that they show 'modularity', 'robustness', and 'motifs':

- Modules comprise subnetworks with specific functions differing from those of other modules, and which typically but not invariably connect with other modules, often only at one input node and one output node. An individual module achieves its status as a distinct entity not only by its functional specificity but also by spatial specificity (e.g., ribosomes) or by chemical specificity (e.g., signal transduction networks). Modularity helps to facilitate real-time system adaptability to environmental change, as the organization of modules in the system contributes to the emergent properties of the system.[79] It also facilitates evolutionary adaption, as, to select an adaptation, evolution may need tinker with just a few modules rather than with the whole system. Evolution can sometimes 'exapt' existing modules for new functions that contribute to reproductive fitness. For example, Darwin surmised that the swim bladder of skeletally heavy fish evolved as an adaptation for control of buoyancy but was exapted as a respiratory organ in certain fish and in land vertebrates. [48] [80]
- Robustness describes how a network is able to maintain its functionality despite environmental perturbations that affect the components. Robustness also reduces the range of network types that researchers must consider, because only certain types of networks are robust.[81]
- Network motifs offer economy of network design, as the same circuit can have many different uses in cellular regulation, as in the case of autoregulatory circuits and feedforward loops. Nature selects motifs in part for their ability to make networks robust, so systems use motifs that work well over and over again in many different networks.[82] In several well-studied biological networks, the abundance of network motifs — small subnetworks — correlates with the degree of robustness.[83] Networks, like those in cells and those in neural networks in the brain,[84] use motifs as basic building blocks, like multicellular organisms use cells as basic building blocks. Motifs offer biologists a level of simplicity of biological functionality for their efforts to model the dynamics of organized hierarchies of networks.[82]

The view of the cell as an overlay of mathematically-definable dynamic networks can reveal how a living system can exist as an improbable, intricate, self-orchestrated dance of molecules.[85] The 'overlay of networks' view also suggests how the concept of self-organized networks can extend to all higher levels of living systems.

Further elaborating the descriptions of living systems beyond the thermodynamic, evolutionary, self-organizational and autonomous agent perspectives we might add that:

A living system:

- Has the ability to generate its dynamic self-organization as a system of hierarchical robust modular networks.

Information processing

...I shall argue that this information flow, not energy per se, is the prime mover of life--that molecular information flowing in circles brings forth the organization we call "organism" and maintains it against the ever-present disorganizing pressures in the physics universe.

—Werner R. Loewenstein[64]

It seems probable that thermodynamic information derived from free energy was the driving force behind the origin of life. It is today the driving force behind all forms of life - behind the local order which life is able to produce. This is the "general law" which Darwin guessed might someday be shown to underlie the principle of life. All of the information contained in the complex, beautiful, and statistically unlikely structures which are so characteristic of living organisms can be seen as having been distilled from the enormous flood of thermodynamic information which reaches the earth in the form of sunlight.

— John Scales Avery[86]

Bioscientists study biological systems for many different reasons, hence biology has many subdisciplines (see Biology and List of biology topics). But in every subdiscipline, bioscientists study biological systems for the proximate reason of gaining information about the system to satisfy their however-motivated curiosity and to apply that information to human agendas (e.g., to prevent disease, to develop treatments, to enhance health and longevity, to conserve the environment, to develop computationally-based products to offload human cognitive loads and enhance human cognitive functioning.[87] etc.). Those realities attest that biological systems harbor, and perhaps fundamentally consist of information.[64] at least as people usually understand the 'information'.

Living systems not only harbor information useful to biologists, but they also acquire, generate, and employ information useful to themselves, as Lowenstein notes in the epigraph to this section. To appreciate how that perspective can contribute to understanding living systems, the following questions need answers:

—What do we mean by information? —How does information apply to biological systems? —How does information emerge in biological systems? —How do the answers to those questions add to explaining living systems?

The word 'information' comes from the verb 'to inform', originally meaning to put form into something: the seal in-forms the wax, and the wax now contains information. A random collection of particles or other entities has no form, nothing has given it form, and it contains no in-formation. The more randomness in the structure of the collection, the fewer improbable arrangements or interactions it has among its parts.

(PD) Drawing: U.S. Department of Energy

75, <https://en.citizendium.org/wiki/Life>

Information processing from DNA to a living system. Genes, composed of DNA, contain the information used by other cellular components to create proteins. A cell is tightly packed with tens of thousands of proteins and other molecules, often working as multi-molecular 'machines' to perform essential cellular activities.

A drinking glass falls onto the sidewalk, it falls apart into a random collection of bits of glass. Notice it doesn't regroup into the drinking glass — you could watch it for a lifetime. Our experience shows us that the drinking glass is more improbable than the glass smithereens. The more improbable the arrangements, the more information a collection of parts has received and therefore contains. An observer will conclude that something has happened to form the parts into a more improbable state — an in-formation has occurred, and that the collection of parts contains that in-formation. By that reasoning, biological systems contain information: something has happened to 'form' the parts into an improbable state.[88]

An ordered desktop soon becomes disordered. The ordered desktop has message value, or 'information', in that something must have happened to give it form. The more unlikely the arrangement of the parts, the more information it contains. Biological systems have information content in that they are unlikely (non-random) arrangements of parts, non-random collections of interactions of parts, and non-random collections of functional activities.

The above-discussed thermodynamic and autonomous agent perspectives viewed cells as interposed between a higher-to-lower degrees of usable (free) energy — embedded in downward sloping free energy gradient. The flow of energy through the cell fuels it, enabling it to perform the work that leads it to gain form, or order, or organization, and to gain functionalities, which raises its information content.[89]

Thus a living system emerges as an information processing system. It can receive information from energy[90] and energy-rich materials in its environment, which fuels and supplies the self-organizing machinery that builds and sustains an information-rich organization; it can generate new information inside itself, as in embryonic development; and it can transmit information within and outside itself, as in transcription regulation and exporting pheromones. From its parent(s), it inherits information (genetic) that provides a database to help it realize its developmental potential — including information critical for its self-reproduction, though it also inherits information in non-genetic forms (epigenetic, behavioral, symbolic) that contribute to its development.[50] [49] [91] [51]

Physiologist and Director of the Laboratory of Cell Communication at the Marine Biological Laboratory, Woods Hole, Massachusetts, Werner R. Loewenstein[64] emphasizes the reciprocal relationship between changes in information and changes in entropy: "...we may regard the two entities as related by a simple conservation law: the sum of (macroscopic) information change and entropy change in a given system is zero. This is the law which every system in the universe... must obey." He elaborates:

Living beings continuously lose information and would sink to thermodynamic equilibrium just as surely as nonliving systems do. There is only one way to keep a system from sinking to equilibrium: to infuse new information...[T]o maintain its high order, an organism must continuously pump in information. Now, this is precisely what the protein demons do inside an organism. They take information from the environment and funnel it into the organism. By virtue of the conservation law, this means that the environment must undergo an equivalent increase in thermodynamic entropy; for every bit of information the organism gains, the entropy in the demon's environment must rise by a certain amount. There is thus a trade-off here, an information-for-entropy barter; and it is this curious trade which the protein demons ply. Indeed, they know it from the ground up and have honed it to perfection. Bartering nonstop, they draw in huge information amounts, and so manage to maintain the organism above equilibrium and locally to turn the thermodynamic arrow around.

Paul Nurse, cell biologist and president of Rockefeller University, prompts for greater focus on discovering just "how living systems gather, process store and use information" and how higher level biological phenomena emerge from such information self-management.[92] One can envision logic circuits as proximal products of the molecular interactions occurring in a living cell, and envision ultimately the operation of selective forces in the development of those logic circuits. To understand living systems requires understanding living information processing.

Combined with other perspectives, viewing living systems as information processors, as inheritors, receivers, generators and transmitters of information, and as reproducers of inherited information, enables one to see living systems and their interactions with other living systems as a vast, complex, emergent, naturally-selected, self-sustaining, evolving communications network. Recently, on the timescale of evolving living systems, that evolving communications network emerged as the human brain, capable of communicating with itself and other humans using networks of symbols.[93] That led to the emergence of cultural evolution, a whole new domain of self-reproducing entities ('culturgens', 'memes') and a whole new domain of descent with modification. That in turn led to the emergence of other vast communications network: books, wikis, and other technologies of information generation and exchange.

We might now consider another closely related perspective, a 'cognitive' perspective.[94] [95] Given that networks resist common perturbations (e.g., by their robustness, and by 'homeostasis'), one might think of them as containing a representation of themselves and of their environment, and of how they might vary. As networks self-organize through interactions among proteins, any network-like 'representation' of the living system embedding it, and its environment, must derive from the information that determines those proteins. The genetic information comprises a molecular code, and the process that transforms that information into proteins describes an algorithm — the transcription-translation algorithm, including its regulatory circuits. Inasmuch as those algorithms evolved through natural experiment and selection, one can view evolution as selecting for cognitive functionality in the genome — the ability to 'represent' the cell's state and environment and, more generally, to remember and anticipate.[96]

Genetic information has the form of a digital code, one whose execution jump-starts self-organizing cellular processes, including the processes that lead to self-organization of networks that regulate execution of the genetic digital code — the gene regulatory networks. A separate digital code also has a central role in the operation of those gene regulatory networks: the code adjacent to a gene determines which transcription regulating factors can bind there, and thereby controls gene activity. In other words, a digital code, separate from the code that specifies the proteins of the gene regulatory networks, gives specificity to the behavior of those networks and to their regulation of the execution of the genetic digital code.[97] Eventually, digital codes surrender to decipherment, offering the hope that we might someday read the message they contain and find ways to edit it.

Further elaborating beyond the thermodynamic, evolutionary, self-organizational, autonomous agent and network perspectives we might add that:

A living system:

- Can generate its dynamic self-organization as a system of hierarchical robust modular networks because it possesses the informational content and information-processing ability to achieve those characteristics
- It receives its informational content by tapping the energy and matter-energy flow through the gradient it resides in, and by inheriting a molecular database from its ancestors
- It possesses its information-processing ability as a physico-chemical consequence of the interactions among its components
- Natural selection, and other evolutionary mechanisms, fine-tuned that information-processing ability

Autopoiesis

In its broadest sense a living unit or entity is one that can direct chemical changes by catalysis, and at the same time reproduce itself by autocatalysis, that is, by directing the formation of units like itself from other, and usually simpler chemical substances.

—Jerome Alexander, *Life: Its Nature and Origin* 1948, Chap5, p79

In this section we consider living systems, as distinct from non-living systems, from the perspective of the concept of 'autopoiesis' — autonomous self-fabrication — introduced in the 1970s by Humberto Maturana (b. 1928) and Francisco Varela (1946-2001).[98] though first enunciated, as pointed out in 2007 by J-H S. Hofmeyr,[99] by the philosopher Immanuel Kant (1724–1804),[100] and adumbrated by twentieth century biologists before Maturana and Varela.[101].

Microbiologist Harold Frank elaborates on Kant's view:

In a machine, [the German philosopher, Immanuel] Kant said, the parts exist for each other but not by each other; they work together to accomplish the machine's purpose, but their operation has nothing to do with building the machine. It is quite otherwise with organisms, whose parts not only work together but also produce the organism and all its parts. Each part is at once cause and effect, a means and an end. In consequence, while a machine implies a machine maker, an organism is a self-organizing entity. Unlike machines, which reflect their maker's intentions, organisms are "natural purposes." Kant's vision was eminently sensible and remains true, but even he was stymied by the next stage: How can we ever discover the cause of that purposeful organization that is the hallmark of organisms?[102]

Any entity, whether a cell or an ecosystem, that we recognize as living we recognize also as a 'living system' — Kant's 'organism' in its broadest sense — an assemblage of components, many copies of diverse types, interrelated structurally, interacting in a coordinated, dynamic, hierarchical way such as to self-construct an autonomously working organization characterizable as a 'whole' or 'operational unit' in virtue of a boundary selectively separating it from an environment — a kind of universe unto itself. We can hold that view of living systems regardless of the nature of the components that self-construct it, but on Earth we recognize those components as matter in the form of atoms and molecules, importing, converting, storing, releasing free energy, and actuated by it, all driven by physico-chemical principles, including the laws of thermodynamics.

The precise description of the organization of living things differs widely among species. Think of an ant and an anteater. We can, however, specify characteristics of the 'kind' of organization that all species share here on Earth. For one thing, we can say a living system's complexity exceeds current human cognitive ability to comprehend it, even with the aid of a powerful computer exo-cortexes. Arguably, in the future that characteristic of the organization in living things may prove non-constitutive.

We can say also that the organizational state of living systems resembles that of a man-made machine, like a super-jet airplane or a super-computer, though not made by man and not obviously having a purpose except to perpetuate its activity of living. We can think of a living system as a different 'kind' of machine than

man-made machines. We can see that living machines exhibit a natural, or non-contrived ability to keep many of its internal variables constant, or within narrow bounds, and ability to adapt to adversity and to fortunate conditions —it qualifies as both a homeostasis machine and an allostasis machine, operating autonomously.

A living system's homeostatic and allostatic abilities play a central role in defining its uniqueness, as it enables it to homeostatically and allostatically regulate the most important variables in concert required for its continued living: an organization, whatever its description, that perpetuates its existence as a living system autonomously. Through the activity of its organization, the living system produces those components that provide the structural basis for the self-construction of its state as an autonomously self-perpetuating organization, if often through change. If a living system cannot self-maintain its organization, it cannot produce the structure whose self-constructed coordinated interactions enable it to remain a living machine.

Autopoiesis co-founder Francisco Varela summarizes thusly:

Autopoiesis attempts to define the uniqueness of the emergence that produces life in its fundamental cellular form. It's specific to the cellular level. There's a circular or network process that engenders a paradox: a self-organizing network of biochemical reactions produces molecules, which do something specific and unique: they create a boundary, a membrane, which constrains the network that has produced the constituents of the membrane. This is a logical bootstrap, a loop: a network produces entities that create a boundary, which constrains the network that produced the boundary. This bootstrap is precisely what's unique about cells. A self-distinguishing entity exists when the bootstrap is completed. This entity has produced its own boundary. It doesn't require an external agent to notice it, or to say, "I'm here." It is, by itself, a self-distinction. It bootstraps itself out of a soup of chemistry and physics.[103]

We can view a living system then as:

- A self-constructed machine organized as a network of interactions that fabricate, cyclically, the components whose self-organized interactions self-construct the system's self-perpetuating network of interactions.
- A self-constructed machine organized as a network of interactions that can respond to perturbations either by self-correction of its disturbed organization (homeostasis), or by reorganizing itself into a different self-perpetuating network of interactions (adaptability; reproduction).

We can encapsulate that view of living systems preliminarily as 'self-constructed self-perpetuating homeostatic machines'. Maturana and Varela[98] introduced the term 'autopoiesis' and 'autopoietic organization' to encapsulate that view of living machines as self-constructed self-perpetuating homeostatic machines as we have characterized them. Bitbol and Luisi expressed the definition of autopoiesis as follows:[104]

\The theory of autopoiesis...captures the essence of cellular life by recognizing that life is a cyclic process that produces the components that in turn self-organize in the process itself, and all within a boundary of its own making.

That view of a living system reveals a special property of homeostasis in living machines: adaptability. A human, to take an example mammal, self-perpetuates a life-sustaining organization despite enormous perturbations of its organization during embryonic and fetal 'development'. It does it by self-reorganizing — the homeostatic property of adaptability. If we think a fetus or a child an immature adult, we must think of adults as aged fetuses or children. As one individual or identity, fetus and adult represent a single self-constructing self-perpetuating homeostatically adaptable machine.

Ontogeny highlights the living system's unique property of homeostasis in targeting with highest priority the maintenance of an organization that produces components that self-organize a network of interactions that perpetuates that organization — including its networks of interactions that retain its homeostatic property of adaptability. Homeostatic reorganization goes on continuously. The living machine maintains networks of interactions that define it as a self-constructing self-sustaining machine.

The self-constructed self-perpetuating homeostatic machine also produces its own boundary, as without that it could not maintain its organization against all the chaos outside.

A man-made, non-living machine yields products other than itself, products for human use. A living machine yields itself as its product, a product in continuous production, no matter how much it must modify itself in the process.

Therein defines the living machine's autonomy — it works in its own behalf to construct and sustain itself. So central to a living machine's uniqueness, its homeostatic organizational ability to produce components whose interactions self-organize a self-perpetuating organization, that, before accumulated perturbations of its organization overwhelms its homeostatic ability, the machine self-reproduces.

By this view, neither growth nor reproduction necessarily constitute 'primary' abilities of living machines, as both occur, in life on Earth, as the consequence of the homeostatic adaptable activities of the self-constructing organization that fabricates components whose interactions realize that organization, along with its homeostatic adaptability. On other worlds, living systems need not necessarily grow or reproduce, so long as they can, in some way, fabricate the components that can self-organize to construct the organization that can fabricate those components, including the system's own boundary whose character enables its individuality and access to resources and waste disposal.[54]

Scientists can model and even synthesize experimental living machines that satisfy the basic criteria of a self-constructing self-perpetuating homeostatic machine (see[104]).

Access to resources alone cannot carry the day for a self-constructing homeostatic machine. It must have the ability, as part of its self-constructed organization, to recognize the resources it needs in order to sustain its organization. Recognition, however mediated, implies a type of 'cognition'. In that case, for living machines to have an organization that produces the components that self-construct their-own component-producing organization, that organization must devote some of its activities to a type of cognition that enables it to recognize resources and import them and dispose of waste.

Those considerations dictate that a full description, or definition, of a living machine include the following:

- An organization of components capable of producing and reproducing, cyclically, the components that self-organize to construct the organization of components that produces those components;
- The components produced self-construct a boundary between the machine and the environment, of a nature that enables the machine to trade with the environment, acquiring the materials and/or energy required to sustain its self-perpetuating organization;
- The components produced self-construct an organization that has the cognitive ability to recognize the resources it needs to import and the wastes it needs to export.
- The components produced self-construct an organization that has the homeostatic ability to 'correct'/'accommodate' perturbations of the organization, or to reorganize appropriately to sustain a self-perpetuating organization:[105]

With those conditions realized, we can then ask about the details of the mechanisms or conditions that effect that realization in Earth's living machines, whose components are molecules that self-construct networks comprising an organization that recursively constructs its components of such nature that the organization they produce can operate autonomously with homeostatic adaptability to sustain or reorganize itself as a cognizing compartmented system capable of escaping thermodynamic equilibrium through repeated self-reproduction.

Further elaborating beyond the thermodynamic, evolutionary, self-organizational, autonomous agent, network and information-processing perspectives we might add that:

A living system:

- Has the characteristics of a cognizing living machine
- Its organization of components fabricate, and re-fabricate, the components that self-organize to construct the very organization of components that fabricates those components — unlike non-living machines
- It cognizes, through a variety of mechanisms, its own needs for self-fabrication

A hierarchy of emergent systems

(See Systems biology)

Every object that biology studies is a system of systems.

—Francois Jacob (1974) *The Logic of Living Systems: a History of Heredity* ISBN 0713903600

There is a certain amount of naivety to the idea that for any process — be it biology or weather prediction or anything else — you can simply take very large amounts of data and run a data-mining program and understand what is going on in a generic way."

— Leonid Kruglyak, geneticist[106]

A systems perspective of 'living' recalls Aristotle's four components of causality,[107] [108] [109] in that a living thing comprises:

- A list of organic and inorganic parts (e.g., molecules and ions; cells, organelles, organs and organisms) — Aristotle's 'material' cause;
- 77, <https://en.citizendium.org/wiki/Life>

- How the parts relate to each other to form structures (e.g., networks) — Aristotle's 'formal' (form-like) cause;
- How the parts and structures interact with each other (e.g., network dynamics), and how they interact in a coordinated dynamic and hierarchical manner (e.g., gene expression; self-organization; competition) — Aristotle's 'efficient' (effect-producing) cause; and
- How the living system as-a-whole functions and behaves, and the properties that characterize it (e.g., reproduction; locomotion; cognition) — Aristotle's 'final' cause

The analysis of all of those components together forms part of the new discipline of Systems Biology.

Emergence

Systems biologists study, among other things, the phenomenon of 'emergence', whereby properties, functions and behaviors of living systems arise though not exhibited by any individual component of the system, and, importantly not expected, explainable or predictable from complete understanding the components' properties/behaviors considered in isolation from the system that embeds them, and in isolation from the environment that embeds the system. Every cellular system exhibits emergent behaviors. Emergent behaviors of living systems include such things as locomotion, sexual display, flocking, and conscious experiencing. Even the biological components of living cells, such as mitochondria and other organelles, exhibit emergent properties.

Some biologists might find it tempting to see a type of 'vitalism', or 'life force', in living systems, given that some whole-system properties/behaviors of organisms, including even the activity of living itself, exemplify such emergent phenomena. One could not explain, for example, the action of an organism fleeing from a predator from a study of the properties of an organism's component subsystems. The properties of the component parts depend on the organization of those parts in the whole system, including the system's environment. Because biologists and their co-scientists can sometimes explain emergent properties/phenomena, if only in principle, by mechanisms that do not transcend interactions of energy, information, and matter, any such 'vitalism' properly qualifies only as a 'materialistic vitalism'.

One example of emergence: When components of a signaling pathway, which enable between-cell communication, interact to form the signaling system, properties can emerge — such as a self-sustaining feedback loop and generation of the signals themselves — that one cannot explain from the individuated properties of the separate components of the system.[110]

For another example, in studying a protein separated from the system it belongs to, one can observe many of its properties, but in so studying the protein one cannot explain any of the properties it has only in the context of the system that embeds it, such as the property of catalyzing a biochemical reaction, or of binding to other proteins to form a functional protein complex. Those properties of the protein emerge in the context of the protein's environment — how it interacts in the context of the system as a whole. Moreover, those emergent properties may result in effects within the system that, in a feedback way, further alters the properties of the protein in the system, as when a reaction product alters the catalytic properties of the protein.

Why do not all of the properties/behaviors of a system predictably result from the properties of its components? After all, the reductionist paradigm that dominated the Scientific method in the 20th century operated on the exactly opposite assumption. For one thing, the intrinsic properties of a system's components themselves do not determine those of the whole system; rather, their 'organizational dynamics' does — how the components interact coordinately in time and space. Those organizational dynamics include not only the interrelations among the components themselves, but also interactions among the many different organizational units in the system.

For example, physical chemists cannot predict the properties of water from knowledge of its components, hydrogen and oxygen. The way hydrogen and water interact to form H₂O, and the way H₂O molecules interact, enables the properties of water to 'emerge'. [111] Secondly, the living system always operates in a certain context (its external environment, or surroundings), and those surroundings, in turn, always affect the properties of the system-as-a-whole. For example, nutrient gradients in its environment influence the direction a bacterium's locomotion. The impact of environmental context affects the dynamic organization of the components within the system — a 'downward causation'. Following up on the example of water, the properties of its environment (e.g., temperature, pressure) affect the way the H₂O molecules organize themselves, as ice, or liquid, or steam. For another example, environmental signals can activate or suppress a metabolic pathway, reorganizing cellular activity.

In relation to downward causation, the environment's effect can sometimes reach down to the genetic database with molecular signals, altering its expression and consequently the characteristics of the cells without altering the database itself — so-called 'epigenetic' effects. When epigenetic alterations of gene expression occur in the reproductive organs, the system changes can be transmitted to the next generation.[112] [113] One cannot simply take a living system apart and predict how it will behave in its natural environment.

As Gilbert and Sarkar[114] put it: "Thus, when we try to explain how the whole system behaves, we have to talk about its parts the context of the whole and cannot get away talking only about the parts."

...picture reductionism as a system where a "bottom-up" approach (e.g., atoms to molecules to organelles to cells to tissues) is sufficient to explain all phenomena. Organicism claims that this is not sufficient and that top-down and bottom-up approaches must both be used to explain phenomena. For instance, reductionistic ontology and explanations would see a tissue as an organized collection of cells and cells as an organized collection of organelles, etc. Organist ontology and explanations would include those bottom-up considerations but would also include the functioning of the tissue within the organism, the functioning of the organism within its environment (and, perhaps, other parameters as well). The structure and function of a hepatocyte depends not only on the properties of organelles comprising it, but also on the properties of the organ in which it resides.[114]

Philosopher of science D.M. Walsh puts it this way: "The constituent parts and processes of a living thing are related to the organism as a whole by a kind of 'reciprocal causation'." [115] In other words, the organization of the components determine the behavior of the system, but that organization arises from more than the set of its internal components. How the whole system behaves as it interacts with its environment determines how those components organize themselves, and so novel properties of the system 'emerge' that characterize neither the environment nor that set of internal components. The behavior of a human kidney cell depends not only on its cellular physiology, but also on all the properties of the organ (kidney) which constitutes its environment. The kidney's overall structure and function influence the cell's structure and behavior (e.g., by physical confinement and by cell-to-cell signaling), which in turn influence the organization of its intracellular components. The kidney in turn responds to its environment, namely the individual body that it lives in, and that body responds to its environment, which includes such factors as the availability of particular food items, fresh water, and ambient temperature and humidity. Systems biologists regard emergent properties as arising from a combination of bottom-up and top-down effects — Walsh's 'reciprocal causation'.

Using the example of termites out of whose combined individual behaviors without outside management emerge complex colony mounds, a recent National Research Council report on the role of theory in advancing 21st century biology commented on emergent behavior as follows:[116]

A reasonable way of thinking about emergent behavior might be to focus on the level or scale at which the rules reside. If the rules are specified at a low level, for example, the individual termites, and the patterns and structures, like termite mounds, emerge at a scale where there are no rules specified, we may call this emergent behavior.[116]

Other examples of rule-free emergent behavior for which the 'rules' appear specified at a lower level than the emergent behavior itself include the flocking behavior of birds, and the folding of amino acid polymers into catalytic proteins.

Spectrum of emergence in biology

Emergent processes have been recognized as, for example, contributing to understanding:

- Subcellular morphology.[117]
- Developmental biology.[118] [119]
- Metabolic networks [120],
- Proteomics.[121] [122]
- Evolution of complexity in living things.

Emergent phenomena appear even in non-biological physical systems. [123] Emergent phenomena attract the attention of cellular neuroscientists; [124] and cognitive scientists [125]. At still higher systems levels, emergent properties appear for example in the behaviour of ant colonies and the concept of swarm intelligence. [126] Systems scientists have simulated emergent phenomena [127] Emergent phenomena in human societies has also received attention. [128]. Biologists even explain the biosphere itself as emergent.[129] Emergent systems always display what we recognize as 'complexity', a feature we have a difficult time precisely defining. Complex systems appear to require more bits of information (words, sentences, lines of computer code, etc.) to describe than the bits of information in the system itself. [130] The operation of the system itself supplies its own most economical model.

According the paleontologist and origin of life researcher, Robert Hazen, four basic complexity elements underpin emergence in a system: [131]

- A sufficiently large 'density' of components, with increasing complexity as the concentration increases, up to a point;
- Sufficient inter-connectivity of the components, with increasing complexity with greater and more varied types of inter-connectivity, up to a point;

- A sufficient energy flow through the system to enable the system's components to perform the work of interacting in the self-organized way characteristic of the energized system;

- Flow of energy through the system in a cyclic manner, presumably facilitating the spatio-temporal patterning characteristic of organized systems.

Living systems thus generate complexity and emergent properties as a hierarchy of emergent subsystems embedded in even more complex emergent systems, as in the case of an organism living in an environment of other organisms.

Further elaborating on the several perspectives of living systems described above, we may say that:

A living system:

- Generates novel properties, functions and behaviors at all levels of its organization

- Those novelties at any given level of organization emerge from interactions of the components comprising it, influenced by the combined effects of the properties of the subsystems it embeds and those of the larger systems that embed it

Fundamental underpinning of living systems

Different scientific perspectives

...life is an obligatory manifestation of the combinatorial properties of matter...

—Christian De Duve, Vital Dust

The different perspectives biologists use in viewing living systems can be identified as follows:

- Living systems import free energy, energy-rich matter, order (sometimes called 'negentropy') and information from their environment, and export waste in the form of low-grade, degraded energy, unusable materials, and more disorder (entropy) than the order they generate within themselves. The downhill flow of free energy through a living system enables that sequence, enables living systems to organize themselves and sustain that organization, and thus to delay (for their lifetime) the dictate of the Second Law of Thermodynamics, which states that organized systems ultimately degrade to a state of randomness;

- The basic building blocks and working units of all living systems are cells, separated from their surroundings by a boundary membrane that allows energy, material and information exchange with their surroundings; one may think of cells as the 'atoms' out of which living systems structure and functionalize themselves, atoms of many types, more than the number of chemical elements, most atom-cells consisting of numerous 'isotopes' in the form of slightly differing 'genotypes';

- All cells derive from cells and therefore begin life with a basic starter set of cellular machinery;

- As part of their starting materials, cells inherit a (genetic) database to draw upon for self-organization. That source of information, in the form of nucleic acid macromolecules, encodes many different types of proteins that interact according to their natural physico-chemical properties to self-assemble an organization of hierarchically arranged subsystems that can import energy and export waste;

- Cells inherit genetic and other forms of heritable information from 'parent' cells, raising as yet unanswered questions: how did cells arise in the first place? and how did they acquire stores of information?[132] (see Origin of life and Evolution of cells)

- The molecular and supramolecular interactions that self-assemble and sustain the living organization are governed by the universal laws of physics and chemistry; those laws, together with inherited information, enable a self-organizing system that can work autonomously in its own behalf, for persistence of the living state and for reproduction, and allow properties and physiological functions to emerge that study of the properties of the system's constituent parts isolated from the system embedding them could not have anticipated;

- The activities of a living system have no 'master controller'; they need only a type of organization, self-assembled, that maintains the system far-from-equilibrium, a state often yielding improbable self-organized novel structures and activities;

- Living things cannot escape from real-time changes in external conditions, so they must maintain homeostasis, real-time adaptability beyond the limits of homeostasis (viz., allostasis), adaptable enough to reorganize to sustain their living state, and exhibit robustness in their organization. Robustness and adaptability derive from the properties of a hierarchical network of subnetworks of molecular circuits;

- Living systems generate complexity and emergent properties as a hierarchy of emergent subsystems embedded in even more complex emergent systems, as in the case of an organism living in an environment of other organisms.

- Living systems produce enough variability during reproduction to allow evolution through natural selection, which guides the continuation of a 3.5 billion year history of Earth's living world. By evolution, living systems generate increasing varieties of living systems, occupy an extreme spectrum of environments, create their own environments that influence their own evolution and that of other species,[133] and develop sufficient complexity to enable them to process information in a way that allows them to 'experience' themselves.

Synthesis of perspectives

The eternal mystery of the world is its comprehensibility...

—Albert Einstein

(CC) Image: Chris Day

Signs of life. Top: Spermatozoon and oocyte merge to begin a new building block for a living system. Middle: DNA, the database for the construction of life's protein components. Bottom: Life as humans describe it in books.

The activity of living depends on the ability of the living cell-based system to generate and sustain quasi-steady-states of self-fabricated, self-assembled, and self-organized functioning far from a state of randomness, and its ability to respond to internally and externally derived conditions that perturb its current quasi-steady-state by making adjustive responses, including maintenance of homeostasis, resetting of homeostatic set-points through allostasis, self-reorganization (as in growth and development) and self-reproduction

The system attains those abilities partly and critically because of its location in the path of a downhill gradient of flowing free energy, including that stored in energy-rich molecules. It can draw off some of that downflow of energy by importing it, and it can export the inevitable wastes of degraded energy and materials it generates in performing the activities that keep it alive. It thereby generates, sustains and increases its own highly ordered and improbable state at the expense of a more than counterbalancing, more probable disordered state of its surroundings.

An organism lives by importing and utilizing free energy and by generating and exporting entropy.

Those principles seem to apply to all living systems: single cells, multicellular organs and organisms, and to biological systems whose parts are living systems: multi-organism demes and ecosystems. The fundamental challenges to staying alive do not differ greatly for an amoeba from those of a human. Neuroscientist Antonio Damasio[134] puts it this way:

All living organisms from the humble amoeba to the human are born with devices designed to solve automatically, no proper reasoning required, the basic problems of life. Those problems are: finding sources of energy; incorporating and transforming energy; maintaining a chemical balance of the interior compatible with the life process; maintaining the organism's structure by repairing its wear and tear; and fending off external agents of disease and physical injury.[134]

Professor Damasio neglected to stress the critical feature of the organism's ability to generate and export entropy — to a greater extent than it reduces its internal entropy. Without that ability, an internal entropy build-up would randomize it to premature death, and without that ability it would never have come to exist in the first place.

Steven Benner, Alonso Ricardo and Matthew Carrigan boil life down to this:

We propose that the only absolute requirements [for life] are a thermodynamic disequilibrium and temperatures consistent with chemical bonding.[22]

With those requirements met, living things can emerge and persist.

The building block and working unit of all living systems is the cell. For cells to utilize available external energy or energy-rich matter to achieve and maintain a state of complex organization (order), they must have, from the outset, a basic informational content, a database. That database enables the cell to self-produce components that can, by natural molecular interactions, respond to the imported energy and energy-rich material to self-organize. That organization comprises modular networks of molecular interactions, and a hierarchy of interacting networks — self-organized and coordinated functional interactions arising from chemistry and supramolecular chemistry. The properties of the networks and those of the hierarchy of networks enable the system to perpetuate itself, and to maintain its steady-state, or establish new steady-states, despite fluctuations in environmental factors. That principle, too, applies to all living systems. Any organism, plant or animal, comprises a network of organs working autonomously, maintaining and reorganizing its steady-state functioning far from equilibrium in response to environmental perturbations — physiologists refer to those as homeostasis and allostasis..

79, <https://en.citizendium.org/wiki/Life>

One can view any living organism as an autonomous cognitive living machine functioning in its own behalf, i.e., without a master controller. It comprises an organization of components capable of producing and reproducing, cyclically, the components that self-organize to construct and reconstruct the organization of components that produces those components. The components self-construct a boundary between the machine and the environment, of a nature that enables the machine to trade with self-interest with the environment, acquiring the materials and/or energy required to sustain its self-perpetuating organization. The components self-construct an organization that has the cognitive ability to recognize the resources it needs to import and the wastes it needs to export. The components self-construct an organization that has the homeostatic ability to 'correct' perturbations of the organization, or to reorganize appropriately to sustain a self-perpetuating organization, including reproducing itself.

The networks that regulate the flow of information through the cell resulted from natural experiments refined and preserved by natural selection and other evolutionary processes. The databases it inherits, that evolved by natural experiment and selection, do not program living, but enable the living thing to self-produce the molecules that can interact in the very ways that contribute to self-organization of those networks that enable a cell to sustain and reproduce itself.

The collaboration of natural selection and physico-chemical laws perpetuates living systems not only in real-time but also in geological, or 'evolutionary', time. From common ancestors — however they may have arisen (see Evolution of cells) — informationally-guided, self-organizing, autonomous network dynamics enabled generation of the diversity of all living systems on the planet, over nearly four billion years. Living systems perpetuate living systems, exploiting free energy on its inexorable path to dissipation and degradation, and harvesting energy in developing organized systems by a more than counterbalancing dis-organizing of the larger system in which it is embedded.

Life abstracted

A non-Earth-centric non-matter-centric perspective

From the viewpoint of mathematics and physics, terrestrial life looks like an example (rather, a gigantic number of closely related examples) of what ought to be a far more general process. Many biologists feel the same way: they dislike defining life in terms of what it is made of: what it does and how it works seem more appropriate and less limiting. It's rather like having a mathematics that is limited to numbers between 1 and 100, and wondering whether a more general concept of number could preserve most of the interesting properties observed in that range.

—Ian Stewart[135]

The activities, or processes, that render an entity living consist in an information dynamic that enables the entity to persist as an open system, far from thermodynamic equilibrium, doing so by enabling it to acquire energy in excess of the energy expended in the acquisition process, and to utilize that energy to power itself to work cyclically to regenerate continually short-lived components whose interactions in hierarchically structured dynamic networks enable it to operate without a central controller, as a self-assembled, self-organized, self-learning entity, one that performs emergent activities autonomously, in its own behalf, as necessary for sustaining its viability, including modifying its organization in adaption to threats to its operational viability.

An Earth-centric matter-centric perspective

On Earth, the information dynamic that spontaneously renders itself living consists in bits, or vibrating strings, arranged as code, manifesting via matter—it from bit—atoms making up the structural components. Energy from atomic nuclear reactions, flowing downhill from solar and geothermal sources, directly or indirectly drive electron and proton flows through matter pathways, converting the radiating energy into chemical energy that powers the work of living.

Supplementary text

See Life/Addendum for supplementary text pertaining to this article, on these topics:

- Selected definitions of life
- Published collections of definitions of life
- The exobiologists view
- The gray zone
- Some modern views of the four Aristotelian causes of living things

https://citizendium.org/wiki/EVE_Online

EVE Online is a massively multiplayer online space/science-fiction role-playing game developed by CCP Games that launched in 2003. The EVE universe comprises over five thousand solar systems that pilots can navigate through in a variety of ships. These systems contain space stations, planets, moons, asteroid belts (for mining) and complexes. Players can participate in a variety of roles in the EVE universe, including manufacturing and trading items, mining ore, combat with either non-player ships (through missions given by agents or through shooting pirate computer-controlled ships) or fellow players.

Unlike other massively multiplayer games, EVE does not have a system of experience point-based training, but rather 'skill points' are earned by training specific skills - the training process continues even when one is not logged into the game. The length of time skills take to train is determined by attributes, and one can train Learning skills or fit neural implants which increase those attributes. The skills are organized into levels, which usually provide a certain amount of increase in ability. Each skill has five levels, and each one is a geometric increase in training times - thus skills can range from as little as a few minutes to many months in training.

Solar systems in EVE are given a security rating, which ranges from 0.0 (no security) to 1.0 (maximum security). 0.5 - 1.0 are dubbed "high sec", 0.1 - 0.4 are "low sec" and 0.0 is "no sec". High security systems are ones where CONCORD, the game's police, roam and have sentries. If one shoots at another player in high security systems, CONCORD will fire back at the player and destroy their ship. This does not mean that attacks in high security space are impossible (until recently, pirates would use a method called fleet ganking to invite players into a trap, and they can still practice a method called suicide ganking), but the game is designed so that player-on-player combat takes place in low and no security systems.

There are four playable races - the Gallente, Amarr, Caldari and Minmatar. The Minmatar is a race of slaves who have been, and continue to be oppressed, by the theocratic Amarr Empire. The Minmatar ships, space stations and starbases have a distinct look - as if they've been pieced together from scrap. The Gallente Federation believe in liberal democracy, while the Caldari State is what could be described as a corporation-driven state capitalism.

Beyond the four factions, there is also the Jovian race, and pirate factions - the Blood Raiders, the Angel Cartel, the Serpents Corporation and others. Non-player "rats" of different strengths fly around (with weak rats in high-sec and strong rats in 0.0) - killing these rats increases one's security status - the standing one has to CONCORD, as well as earning a financial reward for helping rid the universe of dangerous pirates.

Players, upon joining the game, are automatically made a member of an NPC corporation (usually titled as a school or university or agency of the particular racial faction one is a member of), but players organize into their own corporations which provide both companionship and support for players in their chosen roles. For instance, a pirate corp may provide subsidized ammunition to players, loans to purchase ships, or offer insurance for ships lost during corporate operations. Corporations are able to declare war on one another (called "wardeccing"). In addition, corporations may join together into alliances, and those alliances can declare wars on other corporations or alliances. Alliances are used mostly to colonize areas of 0.0 space, with the individual corporations serving different roles (manufacturing, mining, defense).

As EVE does not have a set storyline, players have to find their own "end game", some role they enjoy doing. For some, this will be the pursuit of ISK, the currency in EVE - through manufacturing and selling items, through mining the minerals used in manufacturing, through running missions for NPC corporations. Others choose to pirate - 'gate camping' in low-security areas and ransoming high-value ships. There are also 'anti-pirates', who hunt and kill pirates and outlaws. Others will get into 'faction warfare' and represent their particular racial faction in combat.

At any time, there are around 30,000 players logged into the main Tranquility server during busy periods, and there is a separate server called Serenity used in China. Many users also take advantage of Singularity, a test server which allows players to test both changes to the code and also try out ship setups without it affecting their account on the main Tranquility server. Testing ship setups on Singularity can be done very easily since all ships and fittings sell for a very low, flat rate, and there are arena complexes available to test the ships in combat against other ships of the same class.

Ship classes

There are three basic classes of combat ship: frigates, cruisers and battleships. Each is larger, slower and has more fire-power than the lower class, and each has a role in combat. Frigates serve an important role in tackling and jamming an enemy while the larger ships inflict damage. There are more than just these three classes. Between frigates and cruisers there is a class of destroyers, mostly used for killing fleets of frigates in missions where larger ships cannot get into a 'complex' (an area of space where one has to use an acceleration gate to enter - the gates are often locked so particular ship classes cannot use them). Between the cruiser and battleship class, there are battlecruisers. And for each class of ship, there are "Tech 2" ships, much more expensive variations on the Tech 1 ships which require significant amounts of training.

Each faction offer 'Navy Issue' ships which can be obtained by completing missions for particular corporations and earning Loyalty Points. For many roles, there are also ships made by non-racial factions. Mining barges or exhumers (as the Tech 2 variants are called) are made by the ORE Corporation and are capable of mining large amounts of minerals (and ice) at high speed.

The different race's ships are suited for different combat roles: Gallente ships work particularly well for combat at close quarters using turret-mounted railguns and 'blasters', while Caldari ships are good for long-range missile lancer combat. The Gallente also have particular strength in the use of drones, with ships suited to carrying large numbers of drones. Other combat mechanisms include the distinction between "armor tanking" and "shield tanking" (boosting either the shield or the armor on a ship), as well as the use of electronics warfare to 'jam' ships. Ship fitting is something of an art, and players can spend many hours planning and perfecting a setup. One is not limited to flying ships of a particular racial faction.

Ship fittings

Ships can be fitted with a number of modules. These are split into three slots: high, medium and low. Low slot modules tend to be those which affect the armor, shield, hull or cargo. High slots tend to be turrets - guns, missile launchers, lasers, salvagers, tackles and mining lasers. Medium slots hold support modules: MicroWarpDrives and afterburners (which make the ship increase in speed), scanners, webbers and warp disruptors.

In addition, ships tend to have one or more "upgrade hardpoints" where "rigs" can be fitted. These are expensive addons which cannot be removed once fitted without destroying the rig. They tend to provide a benefit at a certain cost. They may, for instance, increase cargo hold space at the expense of speed.

Not all modules can be installed on all ships. Turrets tend to come in different sizes for different ships, and ships will have their own fitting requirements. For instance, the Strip Miner modules can technically be installed on any ship, if it can cope with the very high CPU usage. On Mining Barge and Exhumer ships, it has a 99.5% reduction in CPU usage, which means that in practice it tends only to be fitted in those classes of ship.

Finance, business and industry

The EVE universe has a well-developed industrial and business aspect. Although real-money trading (RMT) is banned, Game Time Cards can be purchased in real-world currencies like US dollars or Euros and then sold in-game for ISK. EVE characters can also be sold. Inside the game, ISK can be earned from "ratting" (killing non-player spawned ships) and from doing missions, or by trading items found in-game. For some, this will mean mining ore from asteroids, while others sell fittings and equipment salvaged from destroyed ships. Pirates make money primarily through ransom of ships, and salvage of the ships that don't pay. The prices paid for items vary depending on region and over time, so trade in EVE consists primarily in either stockpiling goods until prices rise, or by transporting goods from cheap market hubs like the Jita system to far-flung areas of the EVE universe. For this, a special class of transport ships are used - the Tech 1 variants are equipped to carry large quantities of goods around. The Tech 2 variants are better equipped for traversing low-security or no-security space to supply goods.

In addition to the primary market of goods, a secondary money market has grown in recent years. Two player-run banks have been setup: EBANK and Dynasty Banking (often shortened DBANK). These offer a number of banking and investment services including those which match savings accounts, loans and bonds. For many, the corporation and alliance structure is used for getting loans of ISK to purchase ships or equipment. Loans in EVE can be guaranteed by using the 'contract' system - contracts allow those making loans or conducting more complex transactions to specify the conditions for meeting them, as well as putting security on them. For instance, if one had a package worth 25 million ISK that needed to be transported, then one could place a courier contract which would specify the start and end location of the courier job as well as specify a monetary reward for completing the job within specified time limits. To prevent theft of the goods, the contract creator would specify an amount which the contract acceptor would have to put down as a security deposit. The game keeps that amount in escrow and returns the deposit and the reward if the job is completed to the satisfaction of the contract.

<https://www.gutenberg.org/cache/epub/97/pg97.txt> (Flatland)

FLATLAND

A Romance of Many Dimensions

1884

PART I

1. Of the Nature of Flatland.

I call our world Flatland, not because we call it so, but to make its nature clearer to you, my happy readers, who are privileged to live in Space.

Imagine a vast sheet of paper on which straight Lines, Triangles, Squares, Pentagons, Hexagons, and other figures, instead of remaining fixed in their places, move freely about, on or in the surface, but without the power of rising above or sinking below it, very much like shadows—only hard and with luminous edges—and you will then have a pretty correct notion of my country and countrymen. Alas, a few years ago, I should have said "my universe": but now my mind has been opened to higher views of things.

In such a country, you will perceive at once that it is impossible that there should be anything of what you call a "solid" kind; but I dare say you will suppose that we could at least distinguish by sight the Triangles, Squares, and other figures, moving about as I have described them. On the contrary, we could see nothing of the kind, not at least so as to distinguish one figure from another. Nothing was visible, nor could be visible, to us, except straight Lines; and the necessity of this I will speedily demonstrate.

Place a penny on the middle of one of your tables in Space; and leaning over it, look down upon it. It will appear a circle.

But now, drawing back to the edge of the table, gradually lower your eye (thus bringing yourself more and more into the condition of the inhabitants of Flatland), and you will find the penny becoming more and more oval to your view; and at last when you have placed your eye exactly on the edge of the table (so that you are, as it were, actually a Flatlander) the penny will then have ceased to appear oval at all, and will have become, so far as you can see, a straight line.

The same thing would happen if you were to treat in the same way a Triangle, or Square, or any other figure cut out of pasteboard. As soon as you look at it with your eye on the edge of the table, you will find that it ceases to appear to you a figure, and that it becomes in appearance a straight line. Take for example an equilateral Triangle—who represents with us a Tradesman of the respectable class. Fig. 1 represents the Tradesman as you would see him while you were bending over him from above; figs. 2 and 3 represent the Tradesman, as you would see him if your eye were close to the level, or all but on the level of the table; and if your eye were quite on the level of the table (and that is how we see him in Flatland) you would see nothing but a straight line.

When I was in Spaceland I heard that your sailors have very similar experiences while they traverse your seas and discern some distant island or coast lying on the horizon. The far-off land may have bays, forelands, angles in and out to any number and extent; yet at a distance you see none of these (unless indeed your sun shines bright upon them, revealing the projections and retirements by means of light and shade), nothing but a grey unbroken line upon the water.

Well, that is just what we see when one of our triangular or other acquaintances comes towards us in Flatland. As there is neither sun with us, nor any light of such a kind as to make shadows, we have none of the helps to the sight that you have in Spaceland. If our friend comes close to us we see his line becomes larger; if he leaves us it becomes smaller: but still he looks like a straight line; be he a Triangle, Square, Pentagon, Hexagon, Circle, what you will—a straight Line he looks and nothing else.

You may perhaps ask how under these disadvantageous circumstances we are able to distinguish our friends from one another: but the answer to this very natural question will be more fitly and easily given when I come to describe the inhabitants of Flatland. For the present let me defer this subject, and say a word or two about the climate and houses in our country.

2. Of the climate and houses in Flatland.

As with you, so also with us, there are four points of the compass North, South, East, and West.

There being no sun nor other heavenly bodies, it is impossible for us to determine the North in the usual way; but we have a method of our own. By a Law of Nature with us, there is a constant attraction to the South; and, although in temperate climates this is very slight—so that even a Woman in reasonable health can journey several furlongs northward without much difficulty—yet the hampering effect of the southward attraction is quite sufficient to serve as a compass in most parts of our earth. Moreover the rain (which falls at stated intervals) coming always from the North, is an additional assistance; and in the towns we have the guidance of the houses, which of course have their side-walls running for the most part North and South, so that the roofs may keep off the rain from the North. In the country, where there are no houses, the trunks of the trees serve as some sort of guide. Altogether, we have not so much difficulty as might be expected in determining our bearings.

Yet in our more temperate regions, in which the southward attraction is hardly felt, walking sometimes in a perfectly desolate plain where there have been no houses nor trees to guide me, I have been occasionally compelled to remain stationary for hours together, waiting till the rain came before continuing my journey. On the weak and aged, and especially on delicate Females, the force of attraction tells much more heavily than on the robust of the Male Sex, so that it is a point of breeding, if you meet a Lady in the street always to give her the North side of the way—by no means an easy thing to do always at short notice when you are in rude health and in a climate where it is difficult to tell your North from your South.

81, <https://www.gutenberg.org/cache/epub/97/pg97.txt> (Flatland)

Windows there are none in our houses: for the light comes to us alike in our homes and out of them, by day and by night, equally at all times and in all places, whence we know not. It was in old days, with our learned men, an interesting and oft-investigated question, "What is the origin of light?" and the solution of it has been repeatedly attempted, with no other result than to crowd our lunatic asylums with the would-be solvers. Hence, after fruitless attempts to suppress such investigations indirectly by making them liable to a heavy tax, the Legislature, in comparatively recent times, absolutely prohibited them. I—alas I alone in Flatland—know now only too well the true solution of this mysterious problem; but my knowledge cannot be made intelligible to a single one of my countrymen; and I am mocked at—I, the sole possessor of the truths of Space and of the theory of the introduction of Light from the world of Three Dimensions—as if I were the maddest of the mad! But a truce to these painful digressions: let me return to our houses.

The most common form for the construction of a house is five-sided or pentagonal, as in the annexed figure. The two Northern sides RO, OF, constitute the roof, and for the most part have no doors; on The East is a small door for the Women; on the West a much larger one for the Men; the South side or floor is usually doorless.

Square and triangular houses are not allowed, and for this reason. The angles of a Square (and still more those of an equilateral Triangle) being much more pointed than those of a Pentagon, and the lines of inanimate objects (such as houses) being dimmer than the lines of Men and Women, it follows that there is no little danger lest the points of a square or triangular house residence might do serious injury to an inconsiderate or perhaps absent-minded traveller suddenly running against them: and therefore, as early as the eleventh century of our era, triangular houses were universally forbidden by Law, the only exceptions being fortifications, powder-magazines, barracks, and other state buildings, which it is not desirable that the general public should approach without circumspection.

At this period, square houses were still everywhere permitted, though discouraged by a special tax. But, about three centuries afterwards, the Law decided that in all towns containing a population above ten thousand, the angle of a Pentagon was the smallest house-angle that could be allowed consistently with the public safety. The good sense of the community has seconded the efforts of the Legislature; and now, even in the country, the pentagonal construction has superseded every other. It is only now and then in some very remote and backward agricultural district that an antiquarian may still discover a square house.

3. Concerning the Inhabitants of Flatland.

The greatest length or breadth of a full-grown inhabitant of Flatland may be estimated at about eleven of your inches. Twelve inches may be regarded as a maximum.

Our Women are Straight Lines.

Our Soldiers and Lowest Classes of Workmen are Triangles with two equal sides, each about eleven inches long, and a base or third side so short (often not exceeding half an inch) that they form at their vertices a very sharp and formidable angle. Indeed when their bases are of the most degraded type (not more than the eighth part of an inch in size) they can hardly be distinguished from Straight Lines or Women; so extremely pointed are their vertices. With us, as with you, these Triangles are distinguished from others by being called Isosceles; and by this name I shall refer to them in the following pages.

Our Middle Class consists of Equilateral or Equal-sided Triangles.

Our Professional Men and Gentlemen are Squares (to which class I myself belong) and Five-sided figures or Pentagons.

Next above these come the Nobility, of whom there are several degrees, beginning at Six-sided Figures, or Hexagons, and from thence rising in the number of their sides till they receive the honourable title of Polygonal, or many-sided. Finally when the number of the sides becomes so numerous, and the sides themselves so small, that the figure cannot be distinguished from a circle, he is included in the Circular or Priestly order; and this is the highest class of all.

It is a Law of Nature with us that a male child shall have one more side than his father, so that each generation shall rise (as a rule) one step in the scale of development and nobility. Thus the son of a Square is a Pentagon; the son of a Pentagon, a Hexagon; and so on.

But this rule applies, not always to the Tradesman, and still less often to the Soldiers, and to the Workmen; who indeed can hardly be said to deserve the name of human Figures, since they have not all their sides equal. With them therefore the Law of Nature does not hold; and the son of an Isosceles (i.e. a Triangle with two sides equal) remains Isosceles still. Nevertheless, all hope is not shut out, even from the Isosceles, that his posterity may ultimately rise above his degraded condition. For, after a long series of military successes, or diligent and skilful labours, it is generally found that the more intelligent among the Artisan and Soldier classes manifest a slight increase of their third side or base, and a shrinkage of the two other sides. Intermarriages (arranged by the Priests) between the sons and daughters of these more intellectual members of the lower classes generally result in an offspring approximating still more to the type of the Equal-sided Triangle.

Rarely—in proportion to the vast number of Isosceles births—is a genuine and certifiable Equal-sided Triangle produced from Isosceles parents.[1] Such a birth requires, as its antecedents, not only a series of carefully arranged intermarriages, but also a long-continued exercise of frugality and self-control on the part of the would-be ancestors of the coming Equilateral, and a patient, systematic, and continuous development of the Isosceles intellect through many generations.

The birth of a True Equilateral Triangle from Isosceles parents is the subject of rejoicing in our country for many furlongs round. After a strict examination conducted by the Sanitary and Social Board, the infant, if certified as Regular, is with solemn ceremonial admitted into the class of Equilaterals. He is then immediately taken from his proud yet sorrowing parents and adopted by some childless Equilateral, who is bound by oath never to permit the child henceforth to enter his former home or so much as to look upon his relations again, for fear lest the freshly developed organism may, by force of unconscious imitation, fall back again into his hereditary level.

The occasional emergence of an Isosceles from the ranks of his serf-born ancestors, is welcomed not only by the poor serfs themselves, as a gleam of light and hope shed upon the monotonous squalor of their existence, but also by the Aristocracy at large; for all the higher classes are well aware that these rare phenomena, while they do little or nothing to vulgarise their own privileges, serve as a most useful barrier against revolution from below.

Had the acute-angled rabble been all, without exception, absolutely destitute of hope and of ambition, they might have found leaders in some of their many seditious outbreaks, so able as to render their superior numbers and strength too much for the wisdom even of the Circles. But a wise ordinance of Nature has decreed that, in proportion as the working-classes increase in intelligence, knowledge, and all virtue, in that same proportion their acute angle (which makes them physically terrible) shall increase also and approximate to the harmless angle of the Equilateral Triangle. Thus, in the most brutal and formidable of the soldier class creatures almost on a level with women in their lack of intelligence—it is found that, as they wax in the mental ability necessary to employ their tremendous penetrating power to advantage, so do they wane in the power of penetration itself.

How admirable is this Law of Compensation! And how perfect a proof of the natural fitness and, I may almost say, the divine origin of the aristocratic constitution of the States in Flatland! By a judicious use of this Law of Nature, the Polygons and Circles are almost always able to stifle sedition in its very cradle, taking advantage of the irrepressible and boundless hopefulness of the human mind. Art also comes to the aid of Law and Order. It is generally found possible—by a little artificial compression or expansion on the part of the State physicians—to make some of the more intelligent leaders of a rebellion perfectly Regular, and to admit them at once into the privileged classes; a much larger number, who are still below the standard, allured by the prospect of being ultimately ennobled, are induced to enter the State Hospitals, where they are kept in honourable confinement for life; one or two alone of the more obstinate, foolish, and hopelessly irregular are led to execution.

Then the wretched rabble of the Isosceles, planless and leaderless, are either transfixed without resistance by the small body of their brethren whom the Chief Circle keeps in pay for emergencies of this kind; or else, more often, by means of jealousies and suspicions skilfully fomented among them by the Circular party, they are stirred to mutual warfare, and perish by one another's angles. No less than one hundred and twenty rebellions are recorded in our annals, besides minor outbreaks numbered at two hundred and thirty-five; and they have all ended thus.

[1.] "What need of a certificate?" a Spaceland critic may ask: "Is not the procreation of a Square Son a certificate from Nature herself, proving the Equal-sidedness of the Father?" I reply that no Lady of any position will marry an uncertified Triangle. Square offspring has sometimes resulted from a slightly Irregular Triangle: but in almost every such case the Irregularity of the first generation is visited on the third; which either fails to attain the Pentagonal rank, or relapses to the Triangular.

4. Concerning the Women.

If our highly pointed Triangles of the Soldier class are formidable, it may be readily inferred that far more formidable are our Women. For, if a Soldier is a wedge, a Woman is a needle; being, so to speak, all point, at least at the two extremities. Add to this the power of making herself practically invisible at will, and you will perceive that a Female in Flatland, is a creature by no means to be trifled with.

But here, perhaps, some of my younger Readers may ask how a woman in Flatland can make herself invisible. This ought, I think, to be apparent without any explanation. However, a few words will make it clear to the most unreflecting.

Place a needle on a table. Then, with your eye on the level of the table, look at it side-ways, and you see the whole length of it; but look at it end-ways, and you see nothing but a point: it has become practically invisible. Just so is it with one of our Women. When her side is turned towards us, we see her as a straight line; when the end containing her eye or mouth—for with us these two organs are identical—is the part that meets our eye, then we see nothing but a highly lustrous point; but when the back is presented to our view, then—being only sub-lustrous, and, indeed, almost as dim as an inanimate object—her hinder extremity serves her as a kind of Invisible Cap.

The dangers to which we are exposed from our Women must now be manifest to the meanest capacity in Spaceland. If even the angle of a respectable Triangle in the middle class is not without its dangers; if to run against a Working Man involves a gash; if collision with an Officer of the military class necessitates a serious wound; if a mere touch from the vertex of a Private Soldier brings with it danger of death;—what can it be to run against a Woman, except absolute and immediate

destruction? And when a Woman is invisible, or visible only as a dim sub-lustrous point, how difficult must it be, even for the most cautious, always to avoid collision!

Many are the enactments made at different times in the different States of Flatland, in order to minimize this peril; and in the Southern and less temperate climates, where the force of gravitation is greater, and human beings more liable to casual and involuntary motions, the Laws concerning Women are naturally much more stringent. But a general view of the Code may be obtained from the following summary:—

1. Every house shall have one entrance in the Eastern side, for the use of Females only; by which all Females shall enter "in a becoming and respectful manner"[1] and not by the Men's or Western door.
2. No Female shall walk in any public place without continually keeping up her Peace-cry, under penalty of death.
3. Any Female, duly certified to be suffering from St. Vitus's Dance, fits, chronic cold accompanied by violent sneezing, or any disease necessitating involuntary motions, shall be instantly destroyed.

In some of the States there is an additional Law forbidding Females, under penalty of death, from walking or standing in any public place without moving their backs constantly from right to left so as to indicate their presence to those behind them; others oblige a Woman, when travelling, to be followed by one of her sons, or servants, or by her husband; others confine Women altogether to their houses except during the religious festivals. But it has been found by the wisest of our Circles or Statesmen that the multiplication of restrictions on Females tends not only to the debilitation and diminution of the race, but also to the increase of domestic murders to such an extent that a State loses more than it gains by a too prohibitive Code.

For whenever the temper of the Women is thus exasperated by confinement at home or hampering regulations abroad, they are apt to vent their spleen upon their husbands and children; and in the less temperate climates the whole male population of a village has been sometimes destroyed in one or two hours of simultaneous female outbreak. Hence the Three Laws, mentioned above, suffice for the better regulated States, and may be accepted as a rough exemplification of our Female Code.

After all, our principal safeguard is found, not in Legislature, but in the interests of the Women themselves. For, although they can inflict instantaneous death by a retrograde movement, yet unless they can at once disengage their stinging extremity from the struggling body of their victim, their own frail bodies are liable to be shattered.

The power of Fashion is also on our side. I pointed out that in some less civilised States no female is suffered to stand in any public place without swaying her back from right to left. This practice has been universal among ladies of any pretensions to breeding in all well-governed States, as far back as the memory of Figures can reach. It is considered a disgrace to any State that legislation should have to enforce what ought to be, and is in every respectable female, a natural instinct. The rhythmical and, if I may so say, well-modulated undulation of the back in our ladies of Circular rank is envied and imitated by the wife of a common Equilateral, who can achieve nothing beyond a mere monotonous swing, like the ticking of a pendulum; and the regular tick of the Equilateral is no less admired and copied by the wife of the progressive and aspiring Isosceles, in the females of whose family no "back-motion" of any kind has become as yet a necessity of life. Hence, in every family of position and consideration, "back motion" is as prevalent as time itself; and the husbands and sons in these households enjoy immunity at least from invisible attacks.

Not that it must be for a moment supposed that our Women are destitute of affection. But unfortunately the passion of the moment predominates, in the Frail Sex, over every other consideration. This is, of course, a necessity arising from their unfortunate conformation. For as they have no pretensions to an angle, being inferior in this respect to the very lowest of the Isosceles, they are consequently wholly devoid of brain-power, and have neither reflection, judgment, nor forethought, and hardly any memory. Hence, in their fits of fury, they remember no claims and recognise no distinctions. I have actually known a case where a Woman has exterminated her whole household, and half an hour afterwards, when her rage was over and the fragments swept away, has asked what has become of her husband and her children!

Obviously then a Woman is not to be irritated as long as she is in a position where she can turn round. When you have them in their apartments—which are constructed with a view to denying them that power—you can say and do what you like; for they are then wholly impotent for mischief, and will not remember a few minutes hence the incident for which they may be at this moment threatening you with death, nor the promises which you may have found it necessary to make in order to pacify their fury.

On the whole we get on pretty smoothly in our domestic relations, except in the lower strata of the Military Classes. There the want of tact and discretion on the part of the husbands produces at times indescribable disasters. Relying too much on the offensive weapons of their acute angles instead of the defensive organs of good sense and seasonable simulations, these reckless creatures too often neglect the prescribed construction of the Women's apartments, or irritate their wives by ill-advised expressions out of doors, which they refuse immediately to retract. Moreover a blunt and stolid regard for literal truth indisposes them to make those lavish promises by which the more judicious Circle can in a moment pacify his consort. The result is massacre; not however without its advantages, as it eliminates the more brutal and troublesome of the Isosceles; and by many of our Circles the destructiveness of the Thinner Sex is regarded as one among many providential arrangements for suppressing redundant population, and nipping Revolution in the bud.

Yet even in our best regulated and most approximately circular families I cannot say that the ideal of family life is so high as with you in Spaceland. There is peace, in so far as the absence of slaughter may be called by that name, but there is necessarily little harmony of tastes or pursuits; and the cautious wisdom of the Circles has ensured safety at the cost of domestic comfort. In every Circular or Polygonal household it has been a habit from time immemorial—and has now become a kind of instinct among the women of our higher classes—that the mothers and daughters should, constantly keep their eyes and mouths towards their husband and his male friends; and for a lady in a family of distinction to turn her back upon her husband would be regarded as a kind of portent, involving loss of status. But, as I shall soon shew, this custom, though it has the advantage of safety, is not without its disadvantages.

In the house of the Working Man or respectable Tradesman—where the wife is allowed to turn her back upon her husband, while pursuing her household avocations—there are at least intervals of quiet, when the wife is neither seen nor heard, except for the humming sound of the continuous Peace-cry; but in the homes of the upper classes there is too often no peace. There the voluble mouth and bright penetrating eye are ever directed towards the Master of the household; and light itself is not more persistent than the stream of feminine discourse. The tact and skill which suffice to avert a Woman's sting are unequal to the task of stopping a Woman's mouth; and as the wife has absolutely nothing to say, and absolutely no constraint of wit, sense, or conscience to prevent her from saying it, not a few cynics have been found to aver that they prefer the danger of the death-dealing but inaudible sting to the safe sonorousness of a Woman's other end.

To my readers in Spaceland the condition of our Women may seem truly deplorable, and so indeed it is. A Male of the lowest type of the Isosceles may look forward to some improvement of his angle, and to the ultimate elevation of the whole of his degraded caste; but no Woman can entertain such hopes for her sex. "Once a Woman, always a Woman" is a Decree of Nature; and the very Laws of Evolution seem suspended in her disfavour. Yet at least we can admire the wise Prearrangement which has ordained that, as they have no hopes, so they shall have no memory to recall, and no forethought to anticipate, the miseries and humiliations which are at once a necessity of their existence and the basis of the constitution of Flatland.

[1.] When I was in Spaceland I understood that some of your Priestly Circles have in the same way a separate entrance for Villagers, Farmers, and Teachers of Board Schools (Spectator, Sept. 1884, p. 1255) that they may "approach in a becoming and respectful manner."

5. Of our methods of recognizing one another.

You, who are blessed with shade as well as light, you who are gifted with two eyes, endowed with a knowledge of perspective, and charmed with the enjoyment of various colours, you, who can actually see an angle, and contemplate the complete circumference of a Circle in the happy region of Three Dimensions—how shall I make clear to you the extreme difficulty which we in Flatland experience in recognizing one another's configuration?

Recall what I told you above. All beings in Flatland, animate or inanimate, no matter what their form, present to our view the same, or nearly the same, appearance, viz. that of a straight Line. How then can one be distinguished from another, where all appear the same?

The answer is threefold. The first means of recognition is the sense of hearing; which with us is far more highly developed than with you, and which enables us not only to distinguish by the voice our personal friends, but even to discriminate between different classes, at least so far as concerns the three lowest orders, the Equilateral, the Square, and the Pentagon—for of the Isosceles I take no account. But as we ascend in the social scale, the process of discriminating and being discriminated by hearing increases in difficulty, partly because voices are assimilated partly because the faculty of voice-discrimination is a plebeian virtue not much developed among the Aristocracy. And wherever there is any danger of imposture we cannot trust to this method. Amongst our lowest orders, the vocal organs are developed to a degree more than correspondent with those of hearing, so that an Isosceles can easily feign the voice of a Polygon, and, with some training, that of a Circle himself. A second method is therefore more commonly resorted to.

Feeling is, among our Women and lower classes—about our upper classes I shall speak presently—the principal test of recognition, at all events between strangers, and when the question is, not as to the individual, but as to the class. What therefore "introduction" is among the higher classes in Spaceland, that the process of "feeling" is with us. "Permit me to ask you to feel and be felt by my friend Mr. So-and-so"—is still, among the more old-fashioned of our country gentlemen in districts remote from towns, the customary formula for a Flatland introduction. But in the towns, and among men of business, the words "be felt by" are omitted and the sentence is abbreviated to, "Let me ask you to feel Mr. So-and-so"; although it is assumed, of course, that the "feeling" is to be reciprocal. Among our still more modern and dashing young gentlemen—who are extremely averse to superfluous effort and supremely indifferent to the purity of their native language—the formula is still further curtailed by the use of "to feel" in a technical sense, meaning, "to recommend-for-the purposes-of-feeling-and-being-felt"; and at this moment the "slang" of polite or fast society in the upper classes sanctions such a barbarism as "Mr. Smith, permit me to feel you Mr. Jones."

Let not my Reader however suppose that "feeling" is with us the tedious process that it would be with you, or that we find it necessary to feel right round all the sides of every individual before we determine the class to which he belongs. Long practice and training, begun in the schools and continued in the experience of daily life, enable us to discriminate at once by the sense of touch, between the angles of an equal-sided Triangle, Square, and Pentagon; and I need not say that the brainless vertex of an acute-angled Isosceles is obvious to the dullest touch. It is therefore not necessary, as a rule, to do more than feel a single angle of any individual; and this, once ascertained, tells us the class of the person whom we are addressing, unless indeed he belongs to the higher sections of the nobility. There the difficulty is much greater. Even a Master of Arts in our University of Wentbridge has been known to confuse a ten-sided with a twelve-sided Polygon; and there is hardly a Doctor of Science in or out of that famous University who could pretend to decide promptly and unhesitatingly between a twenty-sided and a twenty-four sided member of the Aristocracy.

Those of my readers who recall the extracts I gave above from the Legislative code concerning Women, will readily perceive that the process of introduction by contact requires some care and discretion. Otherwise the angles might inflict on the unwary Feeler irreparable injury. It is essential for the safety of the Feeler that the Felt should stand perfectly still. A start, a fidgety shifting of the position, yes, even a violent sneeze, has been known before now to prove fatal to the incautious, and to nip in the bud many a promising friendship. Especially is this true among the lower classes of the Triangles. With them, the eye is situated so far from their vertex that they can scarcely take cognizance of what goes on at that extremity of their frame. They are moreover of a rough coarse nature, not sensitive to the delicate touch of the highly organized Polygon. What wonder then if an involuntary toss of the head has ere now deprived the State of a valuable life!

I have heard that my excellent Grandfather—one of the least irregular of his unhappy Isosceles class, who indeed obtained, shortly before his decease, four out of seven votes from the Sanitary and Social Board for passing him into the class of the Equal-sided—often deplored, with a tear in his venerable eye, a miscarriage of this kind, which had occurred to his great-great-Grandfather, a respectable Working Man with an angle or brain of $59^{\circ} 30'$. According to his account, my unfortunate Ancestor, being afflicted with rheumatism, and in the act of being felt by a Polygon, by one sudden start accidentally transfixed the Great Man through the diagonal; and thereby, partly in consequence of his long imprisonment and degradation, and partly because of the moral shock which pervaded the whole of my Ancestor's relations, threw back our family a degree and a half in their ascent towards better things. The result was that in the next generation the family brain was registered at only 58° , and not till the lapse of five generations was the lost ground recovered, the full 60° attained, and the Ascent from the Isosceles finally achieved. And all this series of calamities from one little accident in the process of Feeling.

At this point I think I hear some of my better educated readers exclaim, "How could you in Flatland know anything about angles and degrees, or minutes? We can see an angle, because we, in the region of Space, can see two straight lines inclined to one another; but you, who can see nothing but one straight line at a time, or at all events only a number of bits of straight lines all in one straight line,—how can you ever discern any angle, and much less register angles of different sizes?"

I answer that though we cannot see angles, we can infer them, and this with great precision. Our sense of touch, stimulated by necessity, and developed by long training, enables us to distinguish angles far more accurately than your sense of sight, when unaided by a rule or measure of angles. Nor must I omit to explain that we have great natural helps. It is with us a Law of Nature that the brain of the Isosceles class shall begin at half a degree, or thirty minutes, and shall increase (if it increases at all) by half a degree in every generation; until the goal of 60° is reached, when the condition of serfdom is quitted, and the freeman enters the class of Regulars.

Consequently, Nature herself supplies us with an ascending scale or Alphabet of angles for half a degree up to 60° , specimens of which are placed in every Elementary School throughout the land. Owing to occasional retrogressions, to still more frequent moral and intellectual stagnation, and to the extraordinary fecundity of the Criminal and Vagabond Classes, there is always a vast superfluity of individuals of the half degree and single degree class, and a fair abundance of Specimens up to 10° . These are absolutely destitute of civic rights; and a great number of them, not having even intelligence enough for the purposes of warfare, are devoted by the States to the service of education. Fettered immovably so as to remove all possibility of danger, they are placed in the class rooms of our Infant Schools, and there they are utilized by the Board of Education for the purpose of imparting to the offspring of the Middle Classes that tact and intelligence of which these wretched creatures themselves are utterly devoid.

In some states the Specimens are occasionally fed and suffered to exist for several years; but in the more temperate and better regulated regions, it is found in the long run more advantageous for the educational interests of the young, to dispense with food, and to renew the Specimens every month,—which is about the average duration of the foodless existence of the Criminal class. In the cheaper schools, what is gained by the longer existence of the Specimens is lost, partly in the expenditure for food, and partly in the diminished accuracy of the angles, which are impaired after a few weeks of constant "feeling." Nor must we forget to add, in enumerating the advantages of the more expensive system, that it tends, though slightly yet perceptibly, to the diminution of the redundant Isosceles population—an object which every statesman in Flatland constantly keeps in view. On the whole therefore—although I am not ignorant that, in many popularly elected School Boards, there is a reaction in favour of "the cheap system," as it is called—I am myself disposed to think that this is one of the many cases in which expense is the truest economy.

But I must not allow questions of School Board politics to divert me from my subject. Enough has been said, I trust, to show that Recognition by Feeling is not so tedious or indecisive a process as might have been supposed; and it is obviously more trustworthy than Recognition by hearing. Still there remains, as has been pointed out above, the objection that this method is not without danger. For this reason many in the Middle and Lower classes, and all without exception in the Polygonal and Circular orders, prefer a third method, the description of which shall be reserved for the next section.

6. Of Recognition by Sight.

I am about to appear very inconsistent. In previous sections I have said that all figures in Flatland present the appearance of a straight line; and it was added or implied, that it is consequently impossible to distinguish by the visual organ between individuals of different classes: yet now I am about to explain to my Spaceland Critics how we are able to recognize one another by the sense of sight.

If however the Reader will take the trouble to refer to the passage in which Recognition by Feeling is stated to be universal, he will find this qualification—"among the lower classes." It is only among the higher classes and in our more temperate climates that Sight Recognition is practised.

That this power exists in any regions and for any classes, is the result of Fog; which prevails during the greater part of the year in all parts save the torrid zones. That which is with you in Spaceland an unmixed evil, blotting out the landscape, depressing the spirits, and enfeebling the health, is by us recognized as a blessing scarcely inferior to air itself, and as the Nurse of arts and Parent of sciences. But let me explain my meaning, without further eulogies on this beneficent Element.

If Fog were non-existent, all lines would appear equally and indistinguishably clear; and this is actually the case in those unhappy countries in which the atmosphere is perfectly dry and transparent. But wherever there is a rich supply of Fog, objects that are at a distance, say of three feet, are appreciably dimmer than those at a distance of two feet eleven inches; and the result is that by careful and constant experimental observation of comparative dimness and clearness, we are enabled to infer with great exactness the configuration of the object observed.

An instance will do more than a volume of generalities to make my meaning clear.

Suppose I see two individuals approaching whose rank I wish to ascertain. They are, we will suppose, a Merchant and a Physician, or in other words, an Equilateral Triangle and a Pentagon: how am I to distinguish them?

It will be obvious, to every child in Spaceland who has touched the threshold of Geometrical Studies, that, if I can bring my eye so that its glance may bisect an angle (A) of the approaching stranger, my view will lie as it were evenly between his two sides that are next to me (viz. CA and AB), so that I shall contemplate the two impartially, and both will appear of the same size.

Now in the case of (1) the Merchant, what shall I see? I shall see a straight line DAE, in which the middle point (A) will be very bright because it is nearest to me; but on either side the line will shade away rapidly into dimness, because the sides AC and AB recede rapidly into the fog; and what appear to me as the Merchant's extremities, viz. D and E, will be very dim indeed.

On the other hand in the case of (2) the Physician, though I shall here also see a line (D'A'E') with a bright centre (A'), yet it will shade away less rapidly into dimness, because the sides (A'C', A'B') recede less rapidly into the fog; and what appear to me the Physician's extremities, viz. D' and E', will be not so dim as the extremities of the Merchant.

The Reader will probably understand from these two instances how—after a very long training supplemented by constant experience—it is possible for the well-educated classes among us to discriminate with fair accuracy between the middle and lowest orders, by the sense of sight. If my Spaceland Patrons have grasped this general conception, so far as to conceive the possibility of it and not to reject my account as altogether incredible—I shall have attained all I can reasonably expect. Were I to attempt further details I should only perplex. Yet for the sake of the young and inexperienced, who may perchance infer—from the two simple instances I have given above, of the manner in which I should recognize my Father and my Sons—that Recognition by sight is an easy affair, it may be needful to point out that in actual life most of the problems of Sight Recognition are far more subtle and complex.

If for example, when my Father, the Triangle, approaches me, he happens to present his side to me instead of his angle, then, until I have asked him to rotate, or until I have edged my eye round him, I am for the moment doubtful whether he may not be a Straight Line, or, in other words, a Woman. Again, when I am in the company of one of my two hexagonal Grandsons, contemplating one of his sides (AB) full front, it will be evident from the accompanying diagram that I shall see one whole line (ab) in comparative brightness (shading off hardly at all at the ends) and two smaller lines (ca and bd) dim throughout and shading away into greater dimness toward the extremities c and d.

But I must not give way to the temptation of enlarging on these topics. The meanest mathematician in Spaceland will readily believe me when I assert that the problems of life, which present themselves to the well-educated—when they are themselves in motion, rotating, advancing or retreating, and at the same time

84, <https://www.gutenberg.org/cache/epub/97/pg97.txt> (Flatland)

attempting to discriminate by the sense of sight between a number of Polygons of high rank moving in different directions, as for example in a ball-room or conversazione—must be of a nature to task the angularity of the most intellectual, and amply justify the rich endowments of the Learned Professors of Geometry, both Static and Kinetic, in the illustrious University of Wentbridge, where the Science and Art of Sight Recognition are regularly taught to large classes of the élite of the States.

It is only a few of the scions of our noblest and wealthiest houses, who are able to give the time and money necessary for the thorough prosecution of this noble and valuable Art. Even to me, a Mathematician of no mean standing, and the Grandfather of two most hopeful and perfectly regular Hexagons, to find myself in the midst of a crowd of rotating Polygons of the higher classes, is occasionally very perplexing. And of course to a common Tradesman, or Serf, such a sight is almost as unintelligible as it would be to you, my Reader, were you suddenly transported into our country.

In such a crowd you could see on all sides of you nothing but a Line, apparently straight, but of which the parts would vary irregularly and perpetually in brightness or dimness. Even if you had completed your third year in the Pentagonal and Hexagonal classes in the University, and were perfect in the theory of the subject, you would still find that there was need of many years of experience, before you could move in a fashionable crowd without jostling against your betters, whom it is against etiquette to ask to "feel," and who, by their superior culture and breeding, know all about your movements, while you know very little or nothing about theirs. In a word, to comport oneself with perfect propriety in Polygonal society, one ought to be a Polygon oneself. Such at least is the painful teaching of my experience.

It is astonishing how much the Art—or I may almost call it instinct—of Sight Recognition is developed by the habitual practice of it and by the avoidance of the custom of "Feeling." Just as, with you, the deaf and dumb, if once allowed to gesticulate and to use the hand-alphabet, will never acquire the more difficult but far more valuable art of lip-speech and lip-reading, so it is with us as regards "Seeing" and "Feeling." None who in early life resort to "Feeling" will ever learn "Seeing" in perfection.

For this reason, among our Higher Classes, "Feeling" is discouraged or absolutely forbidden. From the cradle their children, instead of going to the Public Elementary schools (where the art of Feeling is taught,) are sent to higher Seminaries of an exclusive character; and at our illustrious University, to "feel" is regarded as a most serious fault, involving Rustication for the first offence, and Expulsion for the second.

But among the lower classes the art of Sight Recognition is regarded as an unattainable luxury. A common Tradesman cannot afford to let his son spend a third of his life in abstract studies. The children of the poor are therefore allowed to "feel" from their earliest years, and they gain thereby a precocity and an early vivacity which contrast at first most favourably with the inert, undeveloped, and listless behaviour of the half-instructed youths of the Polygonal class; but when the latter have at last completed their University course, and are prepared to put their theory into practice, the change that comes over them may almost be described as a new birth, and in every art, science, and social pursuit they rapidly overtake and distance their Triangular competitors.

Only a few of the Polygonal Class fail to pass the Final Test or Leaving Examination at the University. The condition of the unsuccessful minority is truly pitiable. Rejected from the higher class, they are also despised by the lower. They have neither the matured and systematically trained powers of the Polygonal Bachelors and Masters of Arts, nor yet the native precocity and mercurial versatility of the youthful Tradesman. The professions, the public services are closed against them; and though in most States they are not actually debared from marriage, yet they have the greatest difficulty in forming suitable alliances, as experience shows that the offspring of such unfortunate and ill-endowed parents is generally itself unfortunate, if not positively Irregular.

It is from these specimens of the refuse of our Nobility that the great Tumults and Seditions of past ages have generally derived their leaders; and so great is the mischief thence arising that an increasing minority of our more progressive Statesmen are of opinion that true mercy would dictate their entire suppression, by enacting that all who fail to pass the Final Examination of the University should be either imprisoned for life, or extinguished by a painless death.

But I find myself digressing into the subject of Irregularities, a matter of such vital interest that it demands a separate section.

7. Of Irregular Figures.

Throughout the previous pages I have been assuming—what perhaps should have been laid down at the beginning as a distinct and fundamental proposition—that every human being in Flatland is a Regular Figure, that is to say of regular construction. By this I mean that a Woman must not only be a line, but a straight line; that an Artisan or Soldier must have two of his sides equal; that Tradesmen must have three sides equal; Lawyers (of which class I am a humble member), four sides equal, and, generally, that in every Polygon, all the sides must be equal.

The size of the sides would of course depend upon the age of the individual. A Female at birth would be about an inch long, while a tall adult Woman might extend to a foot. As to the Males of every class, it may be roughly said that the length of an adult's sides, when added together, is two feet or a little more. But the size of our sides is not under consideration. I am speaking of the equality of sides, and it does not need much reflection to see that the whole of the social life in Flatland rests upon the fundamental fact that Nature wills all Figures to have their sides equal.

If our sides were unequal our angles might be unequal. Instead of its being sufficient to feel, or estimate by sight, a single angle in order to determine the form of an individual, it would be necessary to ascertain each angle by the experiment of Feeling. But life would be too short for such a tedious groping. The whole science and art of Sight Recognition would at once perish; Feeling, so far as it is an art, would not long survive; intercourse would become perilous or impossible; there would be an end to all confidence, all forethought; no one would be safe in making the most simple social arrangements; in a word, civilization would relapse into barbarism.

Am I going too fast to carry my Readers with me to these obvious conclusions? Surely a moment's reflection, and a single instance from common life, must convince every one that our whole social system is based upon Regularity, or Equality of Angles. You meet, for example, two or three Tradesmen in the street, whom you recognize at once to be Tradesmen by a glance at their angles and rapidly bedimmed sides, and you ask them to step into your house to lunch. This you do at present with perfect confidence, because every one knows to an inch or two the area occupied by an adult Triangle: but imagine that your Tradesman drags behind his regular and respectable vertex, a parallelogram of twelve or thirteen inches in diagonal:—what are you to do with such a monster sticking fast in your house door?

But I am insulting the intelligence of my Readers by accumulating details which must be patent to every one who enjoys the advantages of a Residence in Spaceland. Obviously the measurements of a single angle would no longer be sufficient under such portentous circumstances; one's whole life would be taken up in feeling or surveying the perimeter of one's acquaintances. Already the difficulties of avoiding a collision in a crowd are enough to tax the sagacity of even a well-educated Square; but if no one could calculate the Regularity of a single figure in the company, all would be chaos and confusion, and the slightest panic would cause serious injuries, or—if there happened to be any Women or Soldiers present—perhaps considerable loss of life.

Expediency therefore concurs with Nature in stamping the seal of its approval upon Regularity of conformation: nor has the Law been backward in seconding their efforts. "Irregularity of Figure" means with us the same as, or more than, a combination of moral obliquity and criminality with you, and is treated accordingly. There are not wanting, it is true, some promulgators of paradoxes who maintain that there is no necessary connection between geometrical and moral Irregularity. "The Irregular," they say, "is from his birth scouted by his own parents, derided by his brothers and sisters, neglected by the domestics, scorned and suspected by society, and excluded from all posts of responsibility, trust, and useful activity. His every movement is jealously watched by the police till he comes of age and presents himself for inspection; then he is either destroyed, if he is found to exceed the fixed margin of deviation, or else immured in a Government Office as a clerk of the seventh class; prevented from marriage; forced to drudge at an uninteresting occupation for a miserable stipend; obliged to live and board at the office, and to take even his vacation under close supervision; what wonder that human nature, even in the best and purest, is embittered and perverted by such surroundings!"

All this very plausible reasoning does not convince me, as it has not convinced the wisest of our Statesmen, that our ancestors erred in laying it down as an axiom of policy that the toleration of Irregularity is incompatible with the safety of the State. Doubtless, the life of an Irregular is hard; but the interests of the Greater Number require that it shall be hard. If a man with a triangular front and a polygonal back were allowed to exist and to propagate a still more Irregular posterity, what would become of the arts of life? Are the houses and doors and churches in Flatland to be altered in order to accommodate such monsters? Are our ticket-collectors to be required to measure every man's perimeter before they allow him to enter a theatre, or to take his place in a lecture room? Is an Irregular to be exempted from the militia? And if not, how is he to be prevented from carrying desolation into the ranks of his comrades? Again, what irresistible temptations to fraudulent impostures must needs beset such a creature! How easy for him to enter a shop with his polygonal front foremost, and to order goods to any extent from a confiding Tradesman! Let the advocates of a falsely called Philanthropy plead as they may for the abrogation of the Irregular Penal Laws, I for my part have never known an Irregular who was not also what Nature evidently intended him to be—a hypocrite, a misanthropist, and, up to the limits of his power—a perpetrator of all manner of mischief.

Not that I should be disposed to recommend (at present) the extreme measures adopted in some States, where an infant whose angle deviates by half a degree from the correct angularity is summarily destroyed at birth. Some of our highest and ablest men, men of real genius, have during their earliest days laboured under deviations as great as, or even greater than, forty-five minutes: and the loss of their precious lives would have been an irreparable injury to the State. The art of healing also has achieved some of its most glorious triumphs in the compressions, extensions, trepannings, colligations, and other surgical or diætic operations by which Irregularity has been partly or wholly cured. Advocating therefore a Via Media, I would lay down no fixed or absolute line of demarcation; but at the period when the frame is just beginning to set, and when the Medical Board has reported that recovery is improbable, I would suggest that the Irregular offspring be painlessly and mercifully consumed.

8. Of the Ancient Practice of Painting.

If my Readers have followed me with any attention up to this point, they will not be surprised to hear that life is somewhat dull in Flatland. I do not, of course, mean that there are not battles, conspiracies, tumults, factions, and all those other phenomena which are supposed to make History interesting; nor would I deny that the

strange mixture of the problems of life and the problems of Mathematics, continually inducing conjecture and giving the opportunity of immediate verification, imparts to our existence a zest which you in Spaceland can hardly comprehend. I speak now from the aesthetic and artistic point of view when I say that life with us is dull; æsthetically and artistically, very dull indeed.

How can it be otherwise, when all one's prospect, all one's landscapes, historical pieces, portraits, flowers, still life, are nothing but a single line, with no varieties except degrees of brightness and obscurity?

It was not always thus. Colour, if Tradition speaks the truth, once for the space of half a dozen centuries or more, threw a transient splendour over the lives of our ancestors in remote ages. Some private individual—a Pentagon whose name is variously reported—having casually discovered the constituents of the simpler colours and a rudimentary method of painting, is said to have begun by decorating first his house, then his slaves, then his Father, his Sons and Grandsons, lastly himself. The convenience as well as the beauty of the results commended themselves to all. Wherever Chromatistes,—for by that name the most trustworthy authorities concur in calling him,—turned his variegated frame, there he at once excited attention, and attracted respect. No one now needed to "feel" him; no one mistook his front for his back; all his movements were readily ascertained by his neighbours without the slightest strain on their powers of calculation; no one jostled him, or failed to make way for him; his voice was saved the labour of that exhausting utterance by which we colourless Squares and Pentagons are often forced to proclaim our individuality when we move amid a crowd of ignorant Isosceles.

The fashion spread like wildfire. Before a week was over, every Square and Triangle in the district had copied the example of Chromatistes, and only a few of the more conservative Pentagons still held out. A month or two found even the Dodecagons infected with the innovation. A year had not elapsed before the habit had spread to all but the very highest of the Nobility. Needless to say, the custom soon made its way from the district of Chromatistes to surrounding regions; and within two generations no one in all Flatland was colourless except the Women and the Priests.

Here Nature herself appeared to erect a barrier, and to plead against extending the innovation to these two classes. Many-sidedness was almost essential as a pretext for the Innovators. "Distinction of sides is intended by Nature to imply distinction of colours"—such was the sophism which in those days flew from mouth to mouth, converting whole towns at a time to the new culture. But manifestly to our Priests and Women this adage did not apply. The latter had only one side, and therefore—plurally and pedantically speaking—no sides. The former—if at least they would assert their claim to be really and truly Circles, and not mere high-class Polygons with an infinitely large number of infinitesimally small sides—were in the habit of boasting (what Women confessed and deplored) that they also had no sides, being blessed with a perimeter of one line or, in other words, a Circumference. Hence it came to pass that these two Classes could see no force in the so-called axiom about "Distinction of Sides implying Distinction of Colour"; and when all others had succumbed to the fascinations of corporal decoration, the Priests and the Women alone still remained pure from the pollution of paint.

Immoral, licentious, anarchical, unscientific—call them by what names you will—yet, from an æsthetic point of view, those ancient days of the Colour Revolt were the glorious childhood of Art in Flatland—a childhood, alas, that never ripened into manhood, nor even reached the blossom of youth. To live was then in itself a delight, because living implied seeing. Even at a small party, the company was a pleasure to behold; the richly varied hues of the assembly in a church or theatre are said to have more than once proved too distracting for our greatest teachers and actors; but most ravishing of all is said to have been the unspeakable magnificence of a military review.

The sight of a line of battle of twenty thousand Isosceles suddenly facing about, and exchanging the sombre black of their bases for the orange and purple of the two sides including their acute angle; the militia of the Equilateral Triangles tricoloured in red, white, and blue; the mauve, ultramarine, gamboge, and burnt umber of the Square artillerymen rapidly rotating near their vermilion guns; the dashing and flashing of the five-coloured and six-coloured Pentagons and Hexagons careering across the field in their offices of surgeons, geometricians and aides-de-camp—all these may well have been sufficient to render credible the famous story how an illustrious Circle, overcome by the artistic beauty of the forces under his command, threw aside his marshal's bâton and his royal crown, exclaiming that he henceforth exchanged them for the artist's pencil. How great and glorious the sensuous development of these days must have been is in part indicated by the very language and vocabulary of the period. The commonest utterances of the commonest citizens in the time of the Colour Revolt seem to have been suffused with a richer tinge of word or thought; and to that era we are even now indebted for our finest poetry and for whatever rhythm still remains in the more scientific utterance of these modern days.

9. Of the Universal Colour Bill.

But meanwhile the intellectual Arts were fast decaying.

The Art of Sight Recognition, being no longer needed, was no longer practised; and the studies of Geometry, Statics, Kinetics, and other kindred subjects, came soon to be considered superfluous, and fell into disrepute and neglect even at our University. The inferior Art of Feeling speedily experienced the same fate at our Elementary Schools. Then the Isosceles classes, asserting that the Specimens were no longer used nor needed, and refusing to pay the customary tribute from the Criminal classes to the service of Education, waxed daily more numerous and more insolent on the strength of their immunity from the old burden which had formerly exercised the twofold wholesome effect of at once taming their brutal nature and thinning their excessive numbers.

Year by year the Soldiers and Artisans began more vehemently to assert—and with increasing truth—that there was no great difference between them and the very highest class of Polygons, now that they were raised to an equality with the latter, and enabled to grapple with all the difficulties and solve all the problems of life, whether Statical and Kinetical, by the simple process of Colour Recognition. Not content with the natural neglect into which Sight Recognition was falling, they began boldly to demand the legal prohibition of all "monopolising and aristocratic Arts" and the consequent abolition of all endowments for the studies of Sight Recognition, Mathematics, and Feeling. Soon, they began to insist that inasmuch as Colour, which was a second Nature, had destroyed the need of aristocratic distinctions, the Law should follow in the same path, and that henceforth all individuals and all classes should be recognized as absolutely equal and entitled to equal rights.

Finding the higher Orders wavering and undecided, the leaders of the Revolution advanced still further in their requirements, and at last demanded that all classes alike, the Priests and the Women not excepted, should do homage to Colour by submitting to be painted. When it was objected that Priests and Women had no sides, they retorted that Nature and Expediency concurred in dictating that the front half of every human being (that is to say, the half containing his eye and mouth) should be distinguishable from his hinder half. They therefore brought before a general and extraordinary Assembly of all the States of Flatland a Bill proposing that in every Woman the half containing the eye and mouth should be coloured red, and the other half green. The Priests were to be painted in the same way, red being applied to that semicircle in which the eye and mouth formed the middle point; while the other or hinder semicircle was to be coloured green.

There was no little cunning in this proposal, which indeed emanated, not from any Isosceles—for no being so degraded would have had angularity enough to appreciate, much less to devise, such a model of state-craft—but from an Irregular Circle who, instead of being destroyed in his childhood, was reserved by a foolish indulgence to bring desolation on his country and destruction on myriads of his followers.

On the one hand the proposition was calculated to bring the Women in all classes over to the side of the Chromatic Innovation. For by assigning to the Women the same two colours as were assigned to the Priests, the Revolutionists thereby ensured that, in certain positions, every Woman would appear like a Priest, and be treated with corresponding respect and deference—a prospect that could not fail to attract the Female Sex in a mass.

But by some of my Readers the possibility of the identical appearance of Priests and Women, under the new Legislation, may not be recognized; if so, a word or two will make it obvious.

Imagine a woman duly decorated, according to the new Code; with the front half (i.e. the half containing eye and mouth) red, and with the hinder half green. Look at her from one side. Obviously you will see a straight line, half red, half green.

Now imagine a Priest, whose mouth is at M, and whose front semicircle (AMB) is consequently coloured red, while his hinder semicircle is green; so that the diameter AB divides the green from the red. If you contemplate the Great Man so as to have your eye in the same straight line as his dividing diameter (AB), what you will see will be a straight line (CBD), of which one half (CB) will be red, and the other (BD) green. The whole line (CD) will be rather shorter perhaps than that of a full-sized Woman, and will shade off more rapidly towards its extremities; but the identity of the colours would give you an immediate impression of identity of Class, making you neglectful of other details. Bear in mind the decay of Sight Recognition which threatened society at the time of the Colour Revolt; add too the certainty that Women would speedily learn to shade off their extremities so as to imitate the Circles; it must then be surely obvious to you, my dear Reader, that the Colour Bill placed us under a great danger of confounding a Priest with a young Woman.

How attractive this prospect must have been to the Frail Sex may readily be imagined. They anticipated with delight the confusion that would ensue. At home they might hear political and ecclesiastical secrets intended not for them but for their husbands and brothers, and might even issue commands in the name of a priestly Circle; out of doors the striking combination of red and green, without addition of any other colours, would be sure to lead the common people into endless mistakes, and the Women would gain whatever the Circles lost, in the deference of the passers by. As for the scandal that would befall the Circular Class if the frivolous and unseemly conduct of the Women were imputed to them, and as to the consequent subversion of the Constitution, the Female Sex could not be expected to give a thought to these considerations. Even in the households of the Circles, the Women were all in favour of the Universal Colour Bill.

The second object aimed at by the Bill was the gradual demoralization of the Circles themselves. In the general intellectual decay they still preserved their pristine clearness and strength of understanding. From their earliest childhood, familiarized in their Circular households with the total absence of Colour, the Nobles alone preserved the Sacred Art of Sight Recognition, with all the advantages that result from that admirable training of the intellect. Hence, up to the date of the introduction of the Universal Colour Bill, the Circles had not only held their own, but even increased their lead of other classes by abstinence from the popular fashion.

Now therefore the artful Irregular whom I described above as the real author of this diabolical Bill, determined at one blow to lower the status of the Hierarchy by forcing them to submit to the pollution of Colour, and at the same time to destroy their domestic opportunities of training in the Art of Sight Recognition, so as to

enfeeble their intellects by depriving them of their pure and colourless homes. Once subjected to the chromatic taint, every parental and every childish Circle would demoralize each other. Only in discerning between the Father and the Mother would the Circular infant find problems for the exercise of its understanding—problems too often likely to be corrupted by maternal impostures with the result of shaking the child's faith in all logical conclusions. Thus by degrees the intellectual lustre of the Priestly Order would wane, and the road would then lie open for a total destruction of all Aristocratic Legislature and for the subversion of our Privileged Classes.

10. Of the Suppression of the Chromatic Sedition.

The agitation for the Universal Colour Bill continued for three years; and up to the last moment of that period it seemed as though Anarchy were destined to triumph.

A whole army of Polygons, who turned out to fight as private soldiers, was utterly annihilated by a superior force of Isosceles Triangles—the Squares and Pentagons meanwhile remaining neutral. Worse than all, some of the ablest Circles fell a prey to conjugal fury. Infuriated by political animosity, the wives in many a noble household wearied their lords with prayers to give up their opposition to the Colour Bill; and some, finding their entreaties fruitless, fell on and slaughtered their innocent children and husbands, perishing themselves in the act of carnage. It is recorded that during that triennial agitation no less than twenty-three Circles perished in domestic discord.

Great indeed was the peril. It seemed as though the Priests had no choice between submission and extermination; when suddenly the course of events was completely changed by one of those picturesque incidents which Statesmen ought never to neglect, often to anticipate, and sometimes perhaps to originate, because of the absurdly disproportionate power with which they appeal to the sympathies of the populace.

It happened that an Isosceles of a low type, with a brain little if at all above four degrees—accidentally dabbling in the colours of some Tradesman whose shop he had plundered—painted himself, or caused himself to be painted (for the story varies) with the twelve colours of a Dodecagon. Going into the Market Place he accosted in a feigned voice a maiden, the orphan daughter of a noble Polygon, whose affection in former days he had sought in vain; and by a series of deceptions—aided, on the one side, by a string of lucky accidents too long to relate, and, on the other, by an almost inconceivable fatuity and neglect of ordinary precautions on the part of the relations of the bride—he succeeded in consummating the marriage. The unhappy girl committed suicide on discovering the fraud to which she had been subjected.

When the news of this catastrophe spread from State to State the minds of the Women were violently agitated. Sympathy with the miserable victim and anticipations of similar deceptions for themselves, their sisters, and their daughters, made them now regard the Colour Bill in an entirely new aspect. Not a few openly avowed themselves converted to antagonism; the rest needed only a slight stimulus to make a similar avowal. Seizing this favourable opportunity, the Circles hastily convened an extraordinary Assembly of the States; and besides the usual guard of Convicts, they secured the attendance of a large number of reactionary Women.

Amidst an unprecedented concourse, the Chief Circle of those days—by name Pantocycclus—arose to find himself hissed and hooted by a hundred and twenty thousand Isosceles. But he secured silence by declaring that henceforth the Circles would enter on a policy of Concession; yielding to the wishes of the majority, they would accept the Colour Bill. The uproar being at once converted to applause, he invited Chromatistes, the leader of the Sedition, into the centre of the hall, to receive in the name of his followers the submission of the Hierarchy. Then followed a speech, a masterpiece of rhetoric, which occupied nearly a day in the delivery, and to which no summary can do justice.

With a grave appearance of impartiality he declared that, as they were now finally committing themselves to Reform or Innovation, it was desirable that they should take one last view of the perimeter of the whole subject, its defects as well as its advantages. Gradually introducing the mention of the dangers to the Tradesmen, the Professional Classes and the Gentlemen, he silenced the rising murmurs of the Isosceles by reminding them that, in spite of all these defects, he was willing to accept the Bill if it was approved by the majority. But it was manifest that all, except the Isosceles, were moved by his words and were either neutral or averse to the Bill.

Turning now to the Workmen he asserted that their interests must not be neglected, and that, if they intended to accept the Colour Bill, they ought at least to do so with a full view of the consequences. Many of them, he said, were on the point of being admitted to the class of the Regular Triangles; others anticipated for their children a distinction they could not hope for themselves. That honourable ambition would now have to be sacrificed. With the universal adoption of Colour, all distinctions would cease; Regularity would be confused with Irregularity; development would give place to retrogression; the Workman would in a few generations be degraded to the level of the Military, or even the Convict Class; political power would be in the hands of the greatest number, that is to say the Criminal Classes; who were already more numerous than the Workmen, and would soon out-number all the other Classes put together when the usual Compensative Laws of Nature were violated.

A subdued murmur of assent ran through the ranks of the Artisans, and Chromatistes, in alarm, attempted to step forward and address them. But he found himself encompassed with guards and forced to remain silent while the Chief Circle in a few impassioned words made a final appeal to the Women, exclaiming that, if the Colour Bill passed, no marriage would henceforth be safe, no woman's honour secure; fraud, deception, hypocrisy would pervade every household; domestic bliss would share the fate of the Constitution and pass to speedy perdition: "Sooner than this," he cried, "Come death."

At these words, which were the preconcerted signal for action, the Isosceles Convicts fell on and transfixed the wretched Chromatistes; the Regular Classes, opening their ranks, made way for a band of Women who, under direction of the Circles, moved, back foremost, invisibly and unerringly upon the unconscious Soldiers; the Artisans, imitating the example of their betters, also opened their ranks. Meantime bands of Convicts occupied every entrance with an impenetrable phalanx.

The battle, or rather carnage, was of short duration. Under the skilful generalship of the Circles almost every Woman's charge was fatal, and very many extracted their sting uninjured, ready for a second slaughter. But no second blow was needed; the rabble of the Isosceles did the rest of the business for themselves. Surprised, leader-less, attacked in front by invisible foes, and finding egress cut off by the Convicts behind them, they at once—after their manner—lost all presence of mind, and raised the cry of "treachery." This sealed their fate. Every Isosceles now saw and felt a foe in every other. In half an hour not one of that vast multitude was living; and the fragments of seven score thousand of the Criminal Class slain by one another's angles attested the triumph of Order.

The Circles delayed not to push their victory to the uttermost. The Working Men they spared but decimated. The Militia of the Equilaterals was at once called out; and every Triangle suspected of Irregularity on reasonable grounds, was destroyed by Court Martial, without the formality of exact measurement by the Social Board. The homes of the Military and Artisan classes were inspected in a course of visitations extending through upwards of a year; and during that period every town, village, and hamlet was systematically purged of that excess of the lower orders which had been brought about by the neglect to pay the Tribute of Criminals to the Schools and University, and by the violation of the other natural Laws of the Constitution of Flatland. Thus the balance of classes was again restored.

Needless to say that henceforth the use of Colour was abolished, and its possession prohibited. Even the utterance of any word denoting Colour, except by the Circles or by qualified scientific teachers, was punished by a severe penalty. Only at our University in some of the very highest and most esoteric classes—which I myself have never been privileged to attend—it is understood that the sparing use of Colour is still sanctioned for the purpose of illustrating some of the deeper problems of mathematics. But of this I can only speak from hearsay.

Elsewhere in Flatland, Colour is now non-existent. The art of making it is known to only one living person, the Chief Circle for the time being; and by him it is handed down on his death-bed to none but his Successor. One manufactory alone produces it; and, lest the secret should be betrayed, the Workmen are annually consumed, and fresh ones introduced. So great is the terror with which even now our Aristocracy looks back to the far-distant days of the agitation for the Universal Colour Bill.

11. Concerning our Priests.

It is high time that I should pass from these brief and discursive notes about things in Flatland to the central event of this book, my initiation into the mysteries of Space. That is my subject; all that has gone before is merely preface.

For this reason I must omit many matters of which the explanation would not, I flatter myself, be without interest for my Readers: as for example, our method of propelling and stopping ourselves, although destitute of feet; the means by which we give fixity to structures of wood, stone, or brick, although of course we have no hands, nor can we lay foundations as you can, nor avail ourselves of the lateral pressure of the earth; the manner in which the rain originates in the intervals between our various zones, so that the northern regions do not intercept the moisture from falling on the southern; the nature of our hills and mines, our trees and vegetables, our seasons and harvests; our Alphabet, suited to our linear tablets; our eyes, adapted to our linear sides; these and a hundred other details of our physical existence I must pass over; nor do I mention them now except to indicate to my readers that their omission proceeds, not from forgetfulness on the part of the Author, but from his regard for the time of the Reader.

Yet before I proceed to my legitimate subject some few final remarks will no doubt be expected by my Readers upon those pillars and mainstays of the Constitution of Flatland, the controllers of our conduct and shapers of our destiny, the objects of universal homage and almost of adoration: need I say that I mean our Circles or Priests?

When I call them Priests, let me not be understood as meaning no more than the term denotes with you. With us, our Priests are Administrators of all Business, Art, and Science; Directors of Trade, Commerce, Generalship, Architecture, Engineering, Education, Statesmanship, Legislature, Morality, Theology; doing nothing themselves, they are the Causes of everything, worth doing, that is done by others.

Although popularly every one called a Circle is deemed a Circle, yet among the better educated Classes it is known that no Circle is really a Circle, but only a Polygon with a very large number of very small sides. As the number of the sides increases, a Polygon approximates to a Circle; and, when the number is very

great indeed, say for example three or four hundred, it is extremely difficult for the most delicate touch to feel any polygonal angles. Let me say rather, it would be difficult; for, as I have shown above, Recognition by Feeling is unknown among the highest society, and to feel a Circle would be considered a most audacious insult. This habit of abstinence from Feeling in the best society enables a Circle the more easily to sustain the veil of mystery in which from his earliest years, he is wont to enwrap the exact nature of his Perimeter or Circumference. Three feet being the average Perimeter it follows that, in a Polygon of three hundred sides, each side will be no more than the hundredth part of a foot in length, or little more than the tenth part of an inch; and in a Polygon of six or seven hundred sides the sides are little larger than the diameter of a Spaceland pin-head. It is always assumed, by courtesy, that the Chief Circle for the time being has ten thousand sides.

The ascent of the posterity of the Circles in the social scale is not restricted, as it is among the lower Regular classes, by the Law of Nature which limits the increase of sides to one in each generation. If it were so, the number of sides in a Circle would be a mere question of pedigree and arithmetic; and the four hundred and ninety-seventh descendant of an Equilateral Triangle would necessarily be a Polygon with five hundred sides. But this is not the case. Nature's Law prescribes two antagonistic decrees affecting Circular propagation; first, that as the race climbs higher in the scale of development, so development shall proceed at an accelerated pace; second, that in the same proportion, the race shall become less fertile. Consequently in the home of a Polygon of four or five hundred sides it is rare to find a son; more than one is never seen. On the other hand the son of a five-hundred-sided Polygon has been known to possess five hundred and fifty, or even six hundred sides.

Art also steps in to help the process of the higher Evolution. Our physicians have discovered that the small and tender sides of an infant Polygon of the higher class can be fractured, and his whole frame re-set, with such exactness that a Polygon of two or three hundred sides sometimes—by no means always, for the process is attended with serious risk—but sometimes overleaps two or three hundred generations, and as it were doubles at a stroke, the number of his progenitors and the nobility of his descent.

Many a promising child is sacrificed in this way. Scarcely one out of ten survives. Yet so strong is the parental ambition among those Polygons who are, as it were, on the fringe of the Circular class, that it is very rare to find a Nobleman, of that position in society, who has neglected to place his first-born son in the Circular Neo-Therapeutic Gymnasium before he has attained the age of a month.

One year determines success or failure. At the end of that time the child has, in all probability, added one more to the tombstones that crowd the Neo-Therapeutic Cemetery; but on rare occasions a glad procession bears back the little one to his exultant parents, no longer a Polygon, but a Circle, at least by courtesy: and a single instance of so blessed a result induces multitudes of Polygonal parents to submit to similar domestic sacrifices, which have a dissimilar issue.

12. Of the Doctrine of our Priests.

As to the doctrine of the Circles it may briefly be summed up in a single maxim, "Attend to your Configuration." Whether political, ecclesiastical, or moral, all their teaching has for its object the improvement of individual and collective Configuration—with special reference of course to the Configuration of the Circles, to which all other objects are subordinated.

It is the merit of the Circles that they have effectually suppressed those ancient heresies which led men to waste energy and sympathy in the vain belief that conduct depends upon will, effort, training, encouragement, praise, or anything else but Configuration. It was Pantocyclyus—the illustrious Circle mentioned above, as the queller of the Colour Revolt—who first convinced mankind that Configuration makes the man; that if, for example, you are born an Isosceles with two uneven sides, you will assuredly go wrong unless you have them made even—for which purpose you must go to the Isosceles Hospital; similarly, if you are a Triangle, or Square, or even a Polygon, born with any Irregularity, you must be taken to one of the Regular Hospitals to have your disease cured; otherwise you will end your days in the State Prison or by the angle of the State Executioner.

All faults or defects, from the slightest misconduct to the most flagitious crime, Pantocyclyus attributed to some deviation from perfect Regularity in the bodily figure, caused perhaps (if not congenital) by some collision in a crowd; by neglect to take exercise, or by taking too much of it; or even by a sudden change of temperature, resulting in a shrinkage or expansion in some too susceptible part of the frame. Therefore, concluded that illustrious Philosopher, neither good conduct nor bad conduct is a fit subject, in any sober estimation, for either praise or blame. For why should you praise, for example, the integrity of a Square who faithfully defends the interests of his client, when you ought in reality rather to admire the exact precision of his right angles? Or again, why blame a lying, thievish Isosceles when you ought rather to deplore the incurable inequality of his sides?

Theoretically, this doctrine is unquestionable; but it has practical drawbacks. In dealing with an Isosceles, if a rascal pleads that he cannot help stealing because of his unevenness, you reply that for that very reason, because he cannot help being a nuisance to his neighbours, you, the Magistrate, cannot help sentencing him to be consumed—and there's an end of the matter. But in little domestic difficulties, where the penalty of consumption, or death, is out of the question, this theory of Configuration sometimes comes in awkwardly; and I must confess that occasionally when one of my own Hexagonal Grandsons pleads as an excuse for his disobedience that a sudden change of the temperature has been too much for his Perimeter, and that I ought to lay the blame not on him but on his Configuration, which can only be strengthened by abundance of the choicest sweetmeats, I neither see my way logically to reject, nor practically to accept, his conclusions.

For my own part, I find it best to assume that a good sound scolding or castigation has some latent and strengthening influence on my Grandson's Configuration; though I own that I have no grounds for thinking so. At all events I am not alone in my way of extricating myself from this dilemma; for I find that many of the highest Circles, sitting as Judges in Law courts, use praise and blame towards Regular and Irregular Figures; and in their homes I know by experience that, when scolding their children, they speak about "right" or "wrong" as vehemently and passionately as if they believed that these names represented real existences, and that a human Figure is really capable of choosing between them.

Consistently carrying out their policy of making Configuration the leading idea in every mind, the Circles reverse the nature of that Commandment which in Spaceland regulates the relations between parents and children. With you, children are taught to honour their parents; with us—next to the Circles, who are the chief object of universal homage—a man is taught to honour his Grandson, if he has one; or, if not, his Son. By "honour," however, is by no means meant "indulgence," but a reverent regard for their highest interests: and the Circles teach that the duty of fathers is to subordinate their own interests to those of posterity, thereby advancing the welfare of the whole State as well as that of their own immediate descendants.

The weak point in the system of the Circles—if a humble Square may venture to speak of anything Circular as containing any element of weakness—appears to me to be found in their relations with Women.

As it is of the utmost importance for Society that Irregular births should be discouraged, it follows that no Woman who has any Irregularities in her ancestry is a fit partner for one who desires that his posterity should rise by regular degrees in the social scale.

Now the Irregularity of a Male is a matter of measurement; but as all Women are straight, and therefore visibly Regular, so to speak, one has to devise some other means of ascertaining what I may call their invisible Irregularity, that is to say their potential Irregularities as regards possible offspring. This is effected by carefully-kept pedigrees, which are preserved and supervised by the State; and without a certified pedigree no Woman is allowed to marry.

Now it might have been supposed that a Circle—proud of his ancestry and regardful for a posterity which might possibly issue hereafter in a Chief Circle—would be more careful than any other to choose a wife who had no blot on her escutcheon. But it is not so. The care in choosing a Regular wife appears to diminish as one rises in the social scale. Nothing would induce an aspiring Isosceles, who had hopes of generating an Equilateral Son, to take a wife who reckoned a single Irregularity among her Ancestors; a Square or Pentagon, who is confident that his family is steadily on the rise, does not enquire above the five-hundredth generation; a Hexagon or Dodecagon is even more careless of the wife's pedigree; but a Circle has been known deliberately to take a wife who has had an Irregular Great-Grandfather, and all because of some slight superiority of lustre, or because of the charms of a low voice—which, with us, even more than with you, is thought "an excellent thing in Woman."

Such ill-judged marriages are, as might be expected, barren, if they do not result in positive Irregularity or in diminution of sides; but none of these evils have hitherto proved sufficiently deterrent. The loss of a few sides in a highly-developed Polygon is not easily noticed, and is sometimes compensated by a successful operation in the Neo-Therapeutic Gymnasium, as I have described above; and the Circles are too much disposed to acquiesce in infecundity as a Law of the superior development. Yet, if this evil be not arrested, the gradual diminution of the Circular class may soon become more rapid, and the time may be not far distant when, the race being no longer able to produce a Chief Circle, the Constitution of Flatland must fall.

One other word of warning suggests itself to me, though I cannot so easily mention a remedy; and this also refers to our relations with Women. About three hundred years ago, it was decreed by the Chief Circle that, since Women are deficient in Reason but abundant in Emotion, they ought no longer to be treated as rational, nor receive any mental education. The consequence was that they were no longer taught to read, nor even to master Arithmetic enough to enable them to count the angles of their husband or children; and hence they sensibly declined during each generation in intellectual power. And this system of female non-education or quietism still prevails.

My fear is that, with the best intentions, this policy has been carried so far as to react injuriously on the Male Sex.

For the consequence is that, as things now are, we Males have to lead a kind of bi-lingual, and I may almost say bi-mental existence. With the Women, we speak of "love," "duty," "right," "wrong," "pity," "hope," and other irrational and emotional conceptions, which have no existence, and the fiction of which has no object except to control feminine exuberances; but among ourselves, and in our books, we have an entirely different vocabulary and I may almost say, idiom. "Love" then becomes "the anticipation of benefits;" "duty" becomes "necessity" or "fitness;" and other words are correspondingly transmuted. Moreover, among Women, we use language implying the utmost deference for their Sex; and they fully believe that the Chief Circle Himself is not more devoutly adored by us than they are: but behind their backs they are both regarded and spoken of—by all except the very young—as being little better than "mindless organisms."

Our Theology also in the Women's chambers is entirely different from our Theology elsewhere.

Now my humble fear is that this double training, in language as well as in thought, imposes somewhat too heavy a burden upon the young, especially when, at the age of three years old, they are taken from the maternal care and taught to unlearn the old language—except for the purpose of repeating it in the presence of their Mothers and Nurses—and to learn the vocabulary and idiom of Science. Already methinks I discern a weakness in the grasp of mathematical truth at the present time as compared with the more robust intellect of our ancestors three hundred years ago. I say nothing of the possible danger if a Woman should ever surreptitiously learn to read and convey to her Sex the result of her perusal of a single popular volume; nor of the possibility that the indiscretion or disobedience of some infant Male might reveal to a Mother the secrets of the logical dialect. On the simple ground of the enfeebling of the Male intellect, I rest this humble appeal to the highest Authorities to reconsider the regulations of Female Education.

PART II

OTHER LANDS

13. How I had a Vision of Lineland.

It was the last day but one of the 1999th year of our era, and the first day of the Long Vacation. Having amused myself till a late hour with my favourite recreation of Geometry, I had retired to rest with an unsolved problem in my mind. In the night I had a dream.

I saw before me a vast multitude of small Straight Lines (which I naturally assumed to be Women) interspersed with other Beings still smaller and of the nature of lustrous Points—all moving to and fro in one and the same Straight Line, and, as nearly as I could judge, with the same velocity.

A noise of confused, multitudinous chirping or twittering issued from them at intervals as long as they were moving; but sometimes they ceased from motion, and then all was silence.

Approaching one of the largest of what I thought to be Women, I accosted her, but received no answer. A second and a third appeal on my part were equally ineffectual. Losing patience at what appeared to me intolerable rudeness, I brought my mouth into a position full in front of her mouth so as to intercept her motion, and loudly repeated my question, "Woman, what signifies this concourse, and this strange and confused chirping, and this monotonous motion to and fro in one and the same Straight Line?"

"I am no Woman," replied the small Line; "I am the Monarch of the world. But thou, whence intrudest thou into my realm of Lineland?"

Receiving this abrupt reply, I begged pardon if I had in any way startled or molested his Royal Highness; and describing myself as a stranger I besought the King to give me some account of his dominions. But I had the greatest possible difficulty in obtaining any information on points that really interested me; for the Monarch could not refrain from constantly assuming that whatever was familiar to him must also be known to me and that I was simulating ignorance in jest. However, by persevering questions I elicited the following facts:

It seemed that this poor ignorant Monarch—as he called himself—was persuaded that the Straight Line which he called his Kingdom, and in which he passed his existence, constituted the whole of the world, and indeed the whole of Space. Not being able either to move or to see, save in his Straight Line, he had no conception of anything out of it. Though he had heard my voice when I first addressed him, the sounds had come to him in a manner so contrary to his experience that he had made no answer, "seeing no man," as he expressed it, "and hearing a voice as it were from my own intestines." Until the moment when I placed my mouth in his World, he had neither seen me, nor heard anything except confused sounds beating against—what I called his side, but what he called his inside or stomach; nor had he even now the least conception of the region from which I had come. Outside his World, or Line, all was a blank to him; nay, not even a blank, for a blank implies Space; say, rather, all was non-existent.

His subjects—of whom the small Lines were Men and the Points Women—were all alike confined in motion and eye-sight to that single Straight Line, which was their World. It need scarcely be added that the whole of their horizon was limited to a Point; nor could any one ever see anything but a Point. Man, woman, child, thing—each was a Point to the eye of a Linelander. Only by the sound of the voice could sex or age be distinguished. Moreover, as each individual occupied the whole of the narrow path, so to speak, which constituted his Universe, and no one could move to the right or left to make way for passers by, it followed that no Linelander could ever pass another. Once neighbours, always neighbours. Neighbourhood with them was like marriage with us. Neighbours remained neighbours till death did them part.

Such a life, with all vision limited to a Point, and all motion to a Straight Line, seemed to me inexpressibly dreary; and I was surprised to note the vivacity and cheerfulness of the King. Wondering whether it was possible, amid circumstances so unfavourable to domestic relations, to enjoy the pleasures of conjugal union, I hesitated for some time to question his Royal Highness on so delicate a subject; but at last I plunged into it by abruptly inquiring as to the health of his family. "My wives and children," he replied, "are well and happy."

Staggered at this answer—for in the immediate proximity of the Monarch (as I had noted in my dream before I entered Lineland) there were none but Men—I ventured to reply, "Pardon me, but I cannot imagine how your Royal Highness can at any time either see or approach, their Majesties, when there are at least half a dozen intervening individuals, whom you can neither see through, nor pass by? Is it possible that in Lineland proximity is not necessary for marriage and for the generation of children?"

"How can you ask so absurd a question?" replied the Monarch. "If it were indeed as you suggest, the Universe would soon be depopulated. No, no; neighbourhood is needless for the union of hearts; and the birth of children is too important a matter to have been allowed to depend upon such an accident as proximity. You cannot be ignorant of this. Yet since you are pleased to affect ignorance, I will instruct you as if you were the veriest baby in Lineland. Know, then, that marriages are consummated by means of the faculty of sound and the sense of hearing. "You are of course aware that every Man has two mouths or voices—as well as two eyes—a bass at one, and a tenor at the other, of his extremities. I should not mention this, but that I have been unable to distinguish your tenor in the course of our conversation." I replied that I had but one voice, and that I had not been aware that His Royal Highness had two. "That confirms my impression," said the King, "that you are not a Man, but a feminine Monstrosity with a bass voice and an utterly uneducated ear. But to continue.

Nature herself having ordained that every Man should wed two wives———"Why two?" asked I. "You carry your affected simplicity too far," he cried. "How can there be a completely harmonious union without the combination of the Four in One, viz. the Bass and Tenor of the Man and the Soprano and Contralto of the two Women?" "But supposing," said I, "that a man should prefer one wife, or three." "It is impossible," he said; "it is as inconceivable as that two and one should make five, or that the human eye should see a Straight Line." I would have interrupted him; but he proceeded as follows:

"Once in the middle of each week a Law of Nature compels us to move to and fro with a rhythmic motion of more than usual violence, which continues for the time you would take to count a hundred and one. In the midst of this choral dance, at the fifty-first pulsation, the inhabitants of the Universe pause in full career, and each individual sends forth his richest, fullest, sweetest strain. It is in this decisive moment that all our marriages are made. So exquisite is the adaptation of Bass to Treble, of Tenor to Contralto, that oftentimes the Loved Ones, though twenty thousand leagues away, recognise at once the responsive note of their destined Lover; and, penetrating the paltry obstacles of distance, Love unites the three. The marriage in that instant consummated results in a threefold Male and Female offspring which takes its place in Lineland.

"What! Always threefold?" said I. "Must one wife then always have twins?"

"Bass-voiced Monstrosity! yes," replied the King. "How else could the balance of the Sexes be maintained, if two girls were not born for every boy.? Would you ignore the very Alphabet of Nature?" He ceased, speechless for fury; and some time elapsed before I could induce him to resume his narrative.

"You will not, of course, suppose that every bachelor among us finds his mates at the first wooing in this Universal Marriage Chorus. On the contrary, the process is by most of us many times repeated. Few are the hearts whose happy lot it is at once to recognise in each other's voices the partner intended for them by Providence, and to fly into a reciprocal and perfectly harmonious embrace. With most of us the courtship is of long duration. The Wooer's voices may perhaps accord with one of the future wives, but not with both; or not, at first, with either; or the Soprano and Contralto may not quite harmonise. In such cases Nature has provided that every weekly Chorus shall bring the three Lovers into closer harmony. Each trial of voice, each fresh discovery of discord, almost imperceptibly induces the less perfect to modify his or her vocal utterance so as to approximate to the more perfect. And after many trials and many approximations, the result is at last achieved. There comes a day at last, when, while the wonted Marriage Chorus goes forth from universal Lineland, the three far-off Lovers suddenly find themselves in exact harmony, and, before they are aware, the wedded Triplet is rapt vocally into a duplicate embrace; and Nature rejoices over one more marriage and over three more births."

14. How I vainly tried to explain the nature of Flatland.

Thinking that it was time to bring down the Monarch from his raptures to the level of common sense, I determined to endeavour to open up to him some glimpses of the truth, that is to say of the nature of things in Flatland. So I began thus: "How does your Royal Highness distinguish the shapes and positions of his subjects? I for my part noticed by the sense of sight, before I entered your Kingdom, that some of your people are Lines and others Points, and that some of the Lines are larger———" "You speak of an impossibility," interrupted the King; "you must have seen a vision; for to detect the difference between a Line and a Point by the sense of sight is, as every one knows. In the nature of things, impossible; but it can be detected by the sense of hearing, and by the same means my shape can be exactly ascertained. Behold me—I am a Line, the longest in Lineland, over six inches of Space———" "Of Length," I ventured to suggest. "Fool," said he, "Space is Length. Interrupt me again, and I have done."

I apologised; but he continued scornfully, "Since you are impervious to argument, you shall hear with your ears how by means of my two voices I reveal my shape to my Wives, who are at this moment six thousand miles seventy yards two feet eight inches away the one to the North, the other to the South. Listen, I call to them."

He chirruped, and then complacently continued: "My Wives, at this moment receiving the sound of one of my voices, closely followed by the other, and perceiving that the latter reaches them after an interval in which sound can traverse 6.457 inches, infer that one of my mouths is 6.457 inches further from them than the other, and accordingly know my shape to be 6.457 inches. But you will of course understand that my Wives do not make this calculation every time they hear my two voices. They made it, once for all, before we were married. But they could make it at any time. And in the same way I can estimate the shape of any of my Male subjects by the sense of sound."

"But how," said I, "if a Man feigns a Woman's voice with one of his two voices, or so disguises his Southern voice that it cannot be recognised as the echo of the Northern? May not such deceptions cause great inconvenience? And have you no means of checking frauds of this kind by commanding your neighbouring subjects to feel one another?" This of course was a very stupid question; for feeling could not have answered the purpose: but I asked with the view of irritating the Monarch, and I succeeded perfectly.

"What!" cried he in horror, "explain your meaning." "Feel, touch, come into contact," I replied. "If you mean by feeling," said the King, "approaching so close as to leave no space between two individuals, know, Stranger, that this offence is punishable in my dominions by death. And the reason is obvious. The frail form of a Woman, being liable to be shattered by such an approximation, must be preserved by the State; but since Women cannot be distinguished by the sense of sight from Man, the Law ordains universally that neither Man nor Woman shall be approached so closely as to destroy the interval between the approximator and the approximated."

"And indeed what possible purpose would be served by this illegal and unnatural excess of approximation which you call touching, when all the ends of so brutal and coarse a process are attained at once more easily and more exactly by the sense of hearing. As to your suggested danger of deception, it is non-existent: for the Voice, being the essence of one's Being, cannot be thus changed at will. But come, suppose that I had the power of passing through solid things, so that I could penetrate my subjects, one after another, even to the number of a billion, verifying the size and distance of each by the sense of feeling: how much time and energy would be wasted in this clumsy and inaccurate method! Whereas now, in one moment of audition, I take as it were the census and statistics, local, corporal, mental, and spiritual, of every living being in Lineland. Hark, only hark!"

So saying he paused and listened, as if in an ecstasy, to a sound which seemed to me no better than a tiny chirping from an innumerable multitude of lilliputian grasshoppers.

"Truly," replied I, "your sense of hearing serves you in good stead, and fills up many of your deficiencies. . But permit me to point out that your life in Lineland must be deplorably dull. To see nothing but a Point! Not even to be able to contemplate a Straight Line! Nay, not even to know what a Straight Line is! To see, yet to be cut off from those Linear prospects which are vouchsafed to us in Flatland! Better surely to have no sense of sight at all than to see so little! I grant you I have not your discriminative faculty of hearing; for the concert of all Lineland which gives you such intense pleasure, is to me no better than a multitudinous twittering or chirping. But at least I can discern, by sight, a Line from a Point. And let me prove it. Just before I came into your kingdom, I saw you dancing from left to right, and then from right to left, with seven Men and a Woman in your immediate proximity on the left, and eight Men and two Women on your right. Is not this correct?"

"It is correct," said the King, "so far as the numbers and sexes are concerned, though I know not what you mean by 'right' and 'left.' But I deny that you saw these things. For how could you see the Line, that is to say the inside, of any Man? But you must have heard these things, and then dreamed that you saw them. And let me ask what you mean by those words 'left' and 'right.' I suppose it is your way of saying Northward and Southward."

"Not so," replied I; "besides your motion of Northward and Southward, there is another motion which I call from right to left."

King, Exhibit to me, if you please, this motion from left to right.

I. Nay, that I cannot do, unless you could step out of your Line altogether.

King. Out of my Line? Do you mean out of the World? Out of Space?

I. Well, yes. Out of your World. Out of your Space. For your Space is not the true Space. True Space is a Plane; but your Space is only a Line.

King. If you cannot indicate this motion from left to right by yourself moving in it, then I beg you to describe it to me in words.

I. If you cannot tell your right side from my left, I fear that no words of mine can make my meaning clear to you. But surely you cannot be ignorant of so simple a distinction.

King. I do not in the least understand you.

I. Alas! How shall I make it clear. When you move straight on, does it not sometimes occur to you that you could move in some other way, turning your eye round so as to look in the direction towards which your side is now fronting? In other words, instead of always moving in the direction of one of your extremities, do you never feel a desire to move in the direction, so to speak, of your side?

King. Never. And what do you mean? How can a man's inside "front" in any direction? Or how can a man move in the direction of his inside?

I. Well then, since words cannot explain the matter, I will try deeds, and will move gradually out of Lineland in the direction which I desire to indicate to you.

At the word I began to move my body out of Lineland. As long as any part of me remained in his dominion and in his view, the King kept exclaiming, "I see you, I see you still; you are not moving."

But when I had at last moved myself out of his Line, he cried in his shrillest voice, "She is vanished; she is dead." "I am not dead," replied I; "I am simply out of Lineland, that is to say, out of the Straight Line which you call Space, and in the true Space, where I can see things as they are. And at this moment I can see your Line, or side—or inside—as you are pleased to call it; and I can also see the Men and Women on the North and South of you, whom I will now enumerate, describing their order, their size, and the interval between each."

When I had done this at great length, I cried triumphantly, "Does this at last convince you?" And, with that, I once more entered Lineland, taking up the same position as before.

But the Monarch replied, "If you were a Man of sense—though, as you appear to have only one voice I have little doubt you are not a Man but a Woman—but, if you had a particle of sense, you would listen to reason. You ask me to believe that there is another Line besides that which my senses indicate, and another motion besides that of which I am daily conscious. I, in return, ask you to describe in words or indicate by motion that other Line of which you speak. Instead of moving, you merely exercise some magic art of vanishing and returning to sight; and instead of any lucid description of your new World, you simply tell me the numbers and sizes of some forty of my retinue, facts known to any child in my capital. Can anything be more irrational or audacious. Acknowledge your folly or depart from my dominions."

Furious at his perversity, and especially indignant that he professed to be ignorant of my Sex, I retorted in no measured terms, "Besotted Being! You think yourself the perfection of existence, while you are in reality the most imperfect and imbecile. You profess to see, whereas you can see nothing but a Point! You plume yourself on inferring the existence of a Straight Line; but I can see Straight Lines and infer the existence of Angles, Triangles, Squares, Pentagons, Hexagons, and even Circles. Why waste more words? Suffice it that I am the completion of your incomplete self. You are a Line, but I am a Line of Lines, called in my country a Square: and even I, infinitely superior though I am to you, am of little account among the great Nobles of Flatland, whence I have come to visit you, in the hope of enlightening your ignorance."

Hearing these words the King advanced towards me with a menacing cry as if to pierce me through the diagonal; and in that same moment there arose from myriads of his subjects a multitudinous war-cry, increasing in vehemence till at last methought it rivalled the roar of an army of a hundred thousand Isosceles, and the artillery of a thousand Pentagons. Spell-bound and motionless, I could neither speak nor move to avert the impending destruction; and still the noise grew louder, and the King came closer, when I awoke to find the breakfast-bell recalling me to the realities of Flatland.

15. Concerning a Stranger from Spaceland.

From dreams I proceed to facts.

It was the last day of the 1999th year of our era. The pattering of the rain had long ago announced nightfall; and I was sitting[1] in the company of my wife, musing on the events of the past and the prospects of the coming year, the coming century, the coming Millennium.

My four Sons and two orphan Grandchildren had retired to their several apartments; and my Wife alone remained with me to see the old Millennium out and the new one in.

I was rapt in thought, pondering in my mind some words that had casually issued from the mouth of my youngest Grandson, a most promising young Hexagon of unusual brilliancy and perfect angularity. His uncles and I had been giving him his usual practical lesson in Sight Recognition, turning ourselves upon our centres, now rapidly, now more slowly, and questioning him as to our positions; and his answers had been so satisfactory that I had been induced to reward him by giving him a few hints on Arithmetic as applied to Geometry.

Taking nine Squares, each an inch every way, I had put them together so as to make one large Square, with a side of three inches, and I had hence proved to my little Grandson that—though it was impossible for us to see the inside of the Square—yet we might ascertain the number of square inches in a Square by simply squaring the number of inches in the side: "and thus," said I, "we know that 32 or 9, represents the number of square inches in a Square whose side is 3 inches long."

The little Hexagon meditated on this awhile and then said to me: "But you have been teaching me to raise numbers to the third power; I suppose 33 must mean something in Geometry; what does it mean?" "Nothing at all," replied I, "not at least in Geometry; for Geometry has only Two Dimensions." And then I began to show the boy how a Point by moving through a length of three inches makes a Line of three inches, which may be represented by 3; and how a Line of three inches, moving parallel to itself through a length of three inches, makes a Square of three inches every way, which may be represented by 32.

Upon this, my Grandson, again returning to his former suggestion, took me up rather suddenly and exclaimed, "Well, then, if a Point by moving three inches, makes a Line of three inches represented by 3; and if a straight Line of three inches, moving parallel to itself, makes a Square of three inches every way, represented by 32; it must be that a Square of three inches every way, moving somehow parallel to itself (but I don't see how) must make a Something else (but I don't see what) of three inches every way—and this must be represented by 33."

"Go to bed," said I, a little ruffled by his interruption; "if you would talk less nonsense, you would remember more sense."

So my Grandson had disappeared in disgrace; and there I sat by my Wife's side, endeavouring to form a retrospect of the year 1999 and of the possibilities of the year 2000, but not quite able to shake off the thoughts suggested by the prattle of my bright little Hexagon. Only a few sands now remained in the half-hour glass. Rousing myself from my reverie I turned the glass Northward for the last time in the old Millennium; and in the act, I exclaimed aloud, "The boy is a fool."

Straightway I became conscious of a Presence in the room, and a chilling breath thrilled through my very being. "He is no such thing," cried my Wife, "and you are breaking the Commandments in thus dishonouring your own Grandson." But I took no notice of her. Looking round in every direction I could see nothing; yet still I felt a Presence, and shivered as the cold whisper came again. I started up. "What is the matter?" said my Wife, "there is no draught; what are you looking for? There is nothing." There was nothing; and I resumed my seat, again exclaiming, "The boy is a fool, I say; 33 can have no meaning in Geometry." At once there came a distinctly audible reply, "The boy is not a fool; and 33 has an obvious Geometrical meaning."

My Wife as well as myself heard the words, although she did not understand their meaning, and both of us sprang forward in the direction of the sound. What was our horror when we saw before us a Figure! At the first glance it appeared to be a Woman, seen sideways; but a moment's observation shewed me that the extremities passed into dimness too rapidly to represent one of the Female Sex; and I should have thought it a Circle, only that it seemed to change its size in a manner impossible for a Circle or for any Regular Figure of which I had had experience.

But my Wife had not my experience, nor the coolness necessary to note these characteristics. With the usual hastiness and unreasoning jealousy of her Sex, she flew at once to the conclusion that a Woman had entered the house through some small aperture. "How comes this person here?" she exclaimed, "you promised me, my dear, that there should be no ventilators in our new house." "Nor are there any," said I; "but what makes you think that the stranger is a Woman? I see by my power of Sight Recognition——" "Oh, I have no patience with your Sight Recognition," replied she, "'Feeling is believing' and 'A Straight Line to the touch is worth a Circle to the sight'—two Proverbs, very common with the Frailer Sex in Flatland."

"Well," said I, for I was afraid of irritating her, "if it must be so, demand an introduction." Assuming her most gracious manner, my Wife advanced towards the Stranger, "Permit me, Madam, to feel and be felt by——" then, suddenly recoiling, "Oh! it is not a Woman, and there are no angles either, not a trace of one. Can it be that I have so misbehaved to a perfect Circle?"

"I am indeed, in a certain sense a Circle," replied the Voice, "and a more perfect Circle than any in Flatland; but to speak more accurately, I am many Circles in one." Then he added more mildly, "I have a message, dear Madam, to your husband, which I must not deliver in your presence; and, if you would suffer us to retire for a few minutes——" But my Wife would not listen to the proposal that our august Visitor should so incommode himself, and assuring the Circle that the hour for her own retirement had long passed, with many reiterated apologies for her recent indiscretion, she at last retreated to her apartment.

I glanced at the half-hour glass. The last sands had fallen. The second Millennium had begun.

[1.] When I say "sitting," of course I do not mean any change of attitude such as you in Spaceland signify by that word; for as we have no feet, we can no more "sit" nor "stand" (in your sense of the word) than one of your soles or flounders. Nevertheless, we perfectly well recognise the different mental states of volition implied in "lying," "sitting," and "standing," which are to some extent indicated to a beholder by a slight increase of lustre corresponding to the increase of volition. But on this, and a thousand other kindred subjects, time forbids me to dwell.

16. How the Stranger vainly endeavoured to reveal to me in words the mysteries of Spaceland.

As soon as the sound of the Peace-cry of my departing Wife had died away, I began to approach the Stranger with the intention of taking a nearer view and of bidding him be seated: but his appearance struck me dumb and motionless with astonishment. Without the slightest symptoms of angularity he nevertheless varied every instant with gradations of size and brightness scarcely possible for any Figure within the scope of my experience. The thought flashed across me that I might have before me a burglar or cut-throat, some monstrous Irregular Isosceles, who, by feigning the voice of a Circle, had obtained admission somehow into the house, and was now preparing to stab me with his acute angle.

In a sitting-room, the absence of Fog (and the season happened to be remarkably dry), made it difficult for me to trust to Sight Recognition, especially at the short distance at which I was standing. Desperate with fear, I rushed forward with an unceremonious "You must permit me, Sir—" and felt him. My Wife was right. There was not the trace of an angle, not the slightest roughness or inequality: never in my life had I met with a more perfect Circle. He remained motionless while I walked round him, beginning from his eye and returning to it again. Circular he was throughout, a perfectly satisfactory Circle; there could not be a doubt of it. Then followed a dialogue, which I will endeavour to set down as near as I can recollect it, omitting only some of my profuse apologies—for I was covered with shame and humiliation that I, a Square, should have been guilty of the impertinence of feeling a Circle. It was commenced by the Stranger with some impatience at the lengthiness of my introductory process.

Stranger. Have you felt me enough by this time? Are you not introduced to me yet?

I. Most illustrious Sir, excuse my awkwardness, which arises not from ignorance of the usages of polite society, but from a little surprise and nervousness, consequent on this somewhat unexpected visit. And I beseech you to reveal my indiscretion to no one, and especially not to my Wife. But before your Lordship enters into further communications, would he deign to satisfy the curiosity of one who would gladly know whence his Visitor came?

Stranger. From Space, from Space, Sir: whence else?

I. Pardon me, my Lord, but is not your Lordship already in Space, your Lordship and his humble servant, even at this moment?

Stranger. Pooh! what do you know of Space? Define Space.

I. Space, my Lord, is height and breadth indefinitely prolonged.

Stranger. Exactly: you see you do not even know what Space is. You think it is of Two Dimensions only; but I have come to announce to you a Third—height, breadth, and length.

I. Your Lordship is pleased to be merry. We also speak of length and height, or breadth and thickness, thus denoting Two Dimensions by four names.

Stranger. But I mean not only three names, but Three Dimensions.

I. Would your Lordship indicate or explain to me in what direction is the Third Dimension, unknown to me?

Stranger. I came from it. It is up above and down below.

I. My Lord means seemingly that it is Northward and Southward.

Stranger. I mean nothing of the kind. I mean a direction in which you cannot look, because you have no eye in your side.

I. Pardon me, my Lord, a moment's inspection will convince your Lordship that I have a perfect luminary at the juncture of two of my sides.

Stranger. Yes: but, in order to see into Space you ought to have an eye, not on your Perimeter, but on your side, that is, on what you would probably call your inside; but we in Spaceland should call it your side.

I. An eye in my inside! An eye in my stomach! Your Lordship jests.

Stranger. I am in no jesting humour. I tell you that I come from Space, or, since you will not understand what Space means, from the Land of Three Dimensions whence I but lately looked down upon your Plane which you call Space forsooth. From that position of advantage I discerned all that you speak of as solid (by which you mean "enclosed on four sides"), your houses, your churches, your very chests and safes, yes even your insides and stomachs, all lying open and exposed to my view.

I. Such assertions are easily made, my Lord.

Stranger. But not easily proved, you mean. But I mean to prove mine.

When I descended here, I saw your four Sons, the Pentagons, each in his apartment, and your two Grandsons the Hexagons; I saw your youngest Hexagon remain a while with you and then retire to his room, leaving you and your Wife alone. I saw your Isosceles servants, three in number, in the kitchen at supper, and the little Page in the scullery. Then I came here, and how do you think I came?

I. Through the roof, I suppose.

Stranger. Not so. Your roof, as you know very well, has been recently repaired, and has no aperture by which even a Woman could penetrate. I tell you I come from Space. Are you not convinced by what I have told you of your children and household.

I. Your Lordship must be aware that such facts touching the belongings of his humble servant might be easily ascertained by any one in the neighbourhood possessing your Lordship's ample means of obtaining information.

Stranger. (To himself). What must I do? Stay; one more argument suggests itself to me. When you see a Straight Line—your wife, for example—how many Dimensions do you attribute to her?

I. Your Lordship would treat me as if I were one of the vulgar who, being ignorant of Mathematics, suppose that a Woman is really a Straight Line, and only of One Dimension. No, no, my Lord; we Squares are better advised, and are as well aware as your Lordship that a Woman, though popularly called a Straight Line, is, really and scientifically, a very thin Parallelogram, possessing Two Dimensions, like the rest of us, viz., length and breadth (or thickness).

Stranger. But the very fact that a Line is visible implies that it possesses yet another Dimension.

I. My Lord, I have just acknowledged that a Woman is broad as well as long. We see her length, we infer her breadth; which, though very slight, is capable of measurement.

Stranger. You do not understand me. I mean that when you see a Woman, you ought—besides inferring her breadth—to see her length, and to see what we call her height; although that last Dimension is infinitesimal in your country. If a line were mere length without "height" it would cease to occupy space and would become invisible. Surely you must recognize this?

I. I must indeed confess that I do not in the least understand your Lordship. When we in Flatland see a Line, we see length and brightness. If the brightness disappears, the line is extinguished, and, as you say, ceases to occupy space. But am I to suppose that your Lordship gives to brightness the title of a Dimension, and that what we call "bright" you call "high"?

Stranger. No; indeed. By "height" I mean a Dimension like your length: only, with you, "height" is not so easily perceptible, being extremely small.

I. My Lord, your assertion is easily put to the test. You say I have a Third Dimension, which you call "height." Now, Dimension implies direction and measurement. Do but measure my "height," or merely indicate to me the direction in which my "height" extends, and I will become your convert. Otherwise, your Lordship's own understanding must hold me excused.

Stranger. (To himself). I can do neither. How shall I convince him? Surely a plain statement of facts followed by ocular demonstration ought to suffice.—Now, Sir; listen to me.

You are living on a Plane. What you style Flatland is the vast level surface of what I may call a fluid, on, or in, the top of which you and your countrymen move about, without rising above it or falling below it.

I am not a plane Figure, but a Solid. You call me a Circle; but in reality I am not a Circle, but an infinite number of Circles, of size varying from a Point to a Circle of thirteen inches in diameter, one placed on the top of the other. When I cut through your plane as I am now doing, I make in your plane a section which you, very rightly, call a Circle. For even a Sphere—which is my proper name in my own country—if he manifest himself at all to an inhabitant of Flatland—must needs manifest himself as a Circle.

Do you not remember—for I, who see all things, discerned last night the phantasmal vision of Lineland written upon your brain—do you not remember, I say, how, when you entered the realm of Lineland, you were compelled to manifest yourself to the King not as a Square, but as a Line, because that Linear Realm had not Dimensions enough to represent the whole of you, but only a slice or section of you? In precisely the same way, your country of Two Dimensions is not spacious enough to represent me, a being of Three, but can only exhibit a slice or section of me, which is what you call a Circle.

The diminished brightness of your eye indicates incredulity. But now prepare to receive proof positive of the truth of my assertions. You cannot indeed see more than one of my sections, or Circles, at a time; for you have no power to raise your eye out of the plane of Flatland; but you can at least see that, as I rise in Space, so my section becomes smaller. See now, I will rise; and the effect upon your eye will be that my Circle will become smaller and smaller till it dwindles to a point and finally vanishes.

There was no "rising" that I could see; but he diminished and finally vanished. I winked once or twice to make sure that I was not dreaming. But it was no dream. For from the depths of nowhere came forth a hollow voice—close to my heart it seemed—"Am I quite gone? Are you convinced now? Well, now I will gradually return to Flatland, and you shall see my section become larger and larger."

Every reader in Spaceland will easily understand that my mysterious Guest was speaking the language of truth and even of simplicity. But to me, proficient though I was in Flatland Mathematics, it was by no means a simple matter. The rough diagram given above will make it clear to any Spaceland child that the Sphere, ascending in the three positions indicated there, must needs have manifested himself to me, or to any Flatlander, as a Circle, at first of full size, then small, and at last very small indeed, approaching to a Point. But to me, although I saw the facts before me, the causes were as dark as ever. All that I could comprehend was, that the Circle had made himself smaller and vanished, and that he had now reappeared and was rapidly making himself larger.

When he had regained his original size, he heaved a deep sigh; for he perceived by my silence that I had altogether failed to comprehend him. And indeed I was now inclining to the belief that he must be no Circle at all, but some extremely clever juggler; or else that the old wives' tales were true, and that after all there were such people as Enchanters and Magicians.

After a long pause he muttered to himself, "One resource alone remains, if I am not to resort to action. I must try the method of Analogy." Then followed a still longer silence, after which he continued our dialogue.

Sphere. Tell me, Mr. Mathematician; if a Point moves Northward, and leaves a luminous wake, what name would you give to the wake?

I. A straight Line.

Sphere. And a straight Line has how many extremities .

I. Two.

Sphere. Now conceive the Northward straight line moving parallel to itself, East and West, so that every point in it leaves behind it the wake of a straight Line. What name will you give to the Figure thereby formed? We will suppose that it moves through a distance equal to the original straight Line.—What name, I say?

I. A Square.

Sphere. And how many sides has a Square? And how many angles?

I. Four sides and four angles.

Sphere. Now stretch your imagination a little, and conceive a Square in Flatland, moving parallel to itself upward.

I. What? Northward?

Sphere. No, not Northward; upward; out of Flatland altogether! If it moved Northward, the Southern points in the Square would have to move through the positions previously occupied by the Northern points. But that is not my meaning.

I mean that every Point in you—for you are a Square and will serve the purpose of my illustration—every Point in you, that is to say in what you call your inside, is to pass upwards through Space in such a way that no Point shall pass through the position previously occupied by any other Point; but each Point shall describe a straight Line of its own. This is all in accordance with Analogy; surely it must be clear to you.

Restraining my impatience—for I was now under a strong temptation to rush blindly at my Visitor and to precipitate him into Space, or out of Flatland, anywhere, so that I could get rid of him—I replied:—

"And what may be the nature of the Figure which I am to shape out by this motion which you are pleased to denote by the word 'upward'? I presume it is describable in the language of Flatland."

Sphere. Oh, certainly. It is all plain and simple, and in strict accordance with Analogy—only, by the way, you must not speak of the result as being a Figure, but as a Solid. But I will describe it to you. Or rather not I, but Analogy. We began with a single Point, which of course—being itself a Point—has only one terminal Point.

One Point produces a Line with two terminal Points.

One Line produces a Square with four terminal Points.

Now you can yourself give the answer to your own question: 1, 2, 4, are evidently in Geometrical Progression. What is the next number.

I. Eight.

92, <https://www.gutenberg.org/cache/epub/97/pg97.txt> (Flatland)

Sphere. Exactly. The one Square produces a Something-which-you-do-not-as-yet-know-a-name-for-but-which-we-call-a-Cube with eight terminal Points. Now are you convinced?

I. And has this Creature sides, as well as angles or what you call "terminal Points?"

Sphere. Of course; and all according to Analogy. But, by the way, not what you call sides, but what we call sides. You would call them solids.

I. And how many solids or sides will appertain to this Being whom I am to generate by the motion of my inside in an "upward" direction and whom you call a Cube?

Sphere. How can you as? And you a mathematician! The side of anything is always, if I may so say, one Dimension behind the thing. Consequently, as there is no Dimension behind a Point, a Point has 0 sides; a Line, if I may so say, has 2 sides (for the Points of a Line may be called by courtesy, its sides); a Square has 4 sides; 0, 2, 4; what Progression do you call that?

I. Arithmetical.

Sphere. And what is the next number?

I. Six.

Sphere. Exactly. Then you see you have answered your own question. The Cube which you will generate will be bounded by six sides, that is to say, of your insides. You see it all now, eh?

"Monster," I shrieked, "be thou juggler, enchanter, dream, or devil, no more will I endure thy mockeries. Either thou or I must perish." And saying these words I precipitated myself upon him.

17. How the Sphere, having in vain tried words, resorted to deeds.

It was in vain. I brought my hardest right angle into violent collision with the Stranger, pressing on him with a force sufficient to have destroyed any ordinary Circle: but I could feel him slowly and unarrestably slipping from my contact; not edging to the right nor to the left, but moving somehow out of the world and vanishing to nothing. Soon there was a blank. But I still heard the Intruder's voice.

Sphere. Why will you refuse to listen to reason? I had hoped to find in you—as being a man of sense and an accomplished mathematician—a fit apostle for the Gospel of the Three Dimensions, which I am allowed to preach once only in a thousand years: but now I know not how to convince you. Stay, I have it. Deeds, and not words, shall proclaim the truth. Listen, my friend.

I have told you I can see from my position in Space the inside of all things that you consider closed. For example, I see in yonder cupboard near which you are standing, several of what you call boxes (but like everything else in Flatland, they have no tops nor bottoms) full of money; I see also two tablets of accounts. I am about to descend into that cupboard and to bring you one of those tablets. I saw you lock the cupboard half an hour ago, and I know you have the key in your possession. But I descend from Space; the doors, you see, remain unmoved. Now I am in the cupboard and am taking the tablet. Now I have it. Now I ascend with it.

I rushed to the closet and dashed the door open. One of the tablets was gone. With a mocking laugh, the Stranger appeared in the other corner of the room, and at the same time the tablet appeared upon the floor. I took it up. There could be no doubt—it was the missing tablet.

I groaned with horror, doubting whether I was not out of my senses; but the Stranger continued: "Surely you must now see that my explanation, and no other, suits the phenomena. What you call Solid things are really superficial; what you call Space is really nothing but a great Plane. I am in Space, and look down upon the insides of the things of which you only see the outsides. You could leave this Plane yourself, if you could but summon up the necessary volition. A slight upward or downward motion would enable you to see all that I can see.

"The higher I mount, and the further I go from your Plane, the more I can see, though of course I see it on a smaller scale. For example, I am ascending; now I can see your neighbour the Hexagon and his family in their several apartments; now I see the inside of the Theatre, ten doors off, from which the audience is only just departing; and on the other side a Circle in his study, sitting at his books. Now I shall come back to you. And, as a crowning proof, what do you say to my giving you a touch, just the least touch, in your stomach? It will not seriously injure you, and the slight pain you may suffer cannot be compared with the mental benefit you will receive."

Before I could utter a word of remonstrance, I felt a shooting pain in my inside, and a demoniacal laugh seemed to issue from within me. A moment afterwards the sharp agony had ceased, leaving nothing but a dull ache behind, and the Stranger began to reappear, saying, as he gradually increased in size, "There, I have not hurt you much, have I? If you are not convinced now, I don't know what will convince you. What say you?"

My resolution was taken. It seemed intolerable that I should endure existence subject to the arbitrary visitations of a Magician who could thus play tricks with one's very stomach. If only I could in any way manage to pin him against the wall till help came!

Once more I dashed my hardest angle against him, at the same time alarming the whole household by my cries for aid. I believe, at the moment of my onset, the Stranger had sunk below our Plane, and really found difficulty in rising. In any case he remained motionless, while I, hearing, as I thought, the sound of some help approaching, pressed against him with redoubled vigour, and continued to shout for assistance.

A convulsive shudder ran through the Sphere. "This must not be," I thought I heard him say; "either he must listen to reason, or I must have recourse to the last resource of civilization." Then, addressing me in a louder tone, he hurriedly exclaimed, "Listen: no stranger must witness what you have witnessed. Send your Wife back at once, before she enters the apartment. The Gospel of Three Dimensions must not be thus frustrated. Not thus must the fruits of one thousand years of waiting be thrown away. I hear her coming. Back! back! Away from me, or you must go with me—whither you know not—into the Land of Three Dimensions!"

"Fool! Madman! Irregular!" I exclaimed; "never will I release thee; thou shalt pay the penalty of thine impostures."

"Ha! Is it come to this?" thundered the Stranger: "then meet your fate: out of your Plane you go. Once, twice, thrice! 'Tis done!"

18. How I came to Spaceland, and what I saw there.

An unspeakable horror seized me. There was a darkness; then a dizzy, sickening sensation of sight that was not like seeing; I saw a Line that was no Line; Space that was not Space; I was myself, and not myself. When I could find voice, I shrieked aloud in agony, "Either this is madness or it is Hell." "It is neither," calmly replied the voice of the Sphere, "it is Knowledge; it is Three Dimensions: open your eye once again and try to look steadily."

I looked, and, behold, a new world! There stood before me, visibly incorporate, all that I had before inferred, conjectured, dreamed, of perfect Circular beauty. What seemed the centre of the Stranger's form lay open to my view: yet I could see no heart, nor lungs, nor arteries, only a beautiful harmonious Something—for which I had no words; but you, my Readers in Spaceland, would call it the surface of the Sphere.

Prostrating myself mentally before my Guide, I cried, "How is it, O divine ideal of consummate loveliness and wisdom, that I see thy inside, and yet cannot discern thy heart, thy lungs, thy arteries, thy liver?"

"What you think you see, you see not," he replied; "it is not given to you, nor to any other Being, to behold my internal parts. I am of a different order of Beings from those in Flatland. Were I a Circle, you could discern my intestines, but I am a Being composed, as I told you before, of many Circles, the Many in the One, called in this country a Sphere. And, just as the outside of a Cube is a Square, so the outside of a Sphere presents the appearance of a Circle."

Bewildered though I was by my Teacher's enigmatic utterance, I no longer chafed against it, but worshipped him in silent adoration. He continued, with more mildness in his voice: "Distress not yourself if you cannot at first understand the deeper mysteries of Spaceland. By degrees they will dawn upon you. Let us begin by casting back a glance at the region whence you came. Return with me a while to the plains of Flatland, and I will show you that which you have so often reasoned and thought about, but never seen with the sense of sight—a visible angle."

"Impossible!" I cried; but, the Sphere leading the way, I followed as if in a dream, till once more his voice arrested me: "Look yonder, and behold your own Pentagonal house and all its inmates."

I looked below, and saw with my physical eye all that domestic individuality which I had hitherto merely inferred with the understanding. And how poor and shadowy was the inferred conjecture in comparison with the reality which I now beheld!

My four Sons calmly asleep in the North-Western rooms, my two orphan Grandsons to the South; the Servants, the Butler, my Daughter, all in their several apartments. Only my affectionate Wife, alarmed by my continued absence, had quitted her room and was roving up and down in the Hall, anxiously awaiting my return. Also the Page, aroused by my cries, had left his room, and under pretext of ascertaining whether I had fallen somewhere in a faint, was prying into the cabinet in my study. All this I could now see, not merely infer; and as we came nearer and nearer, I could discern even the contents of my cabinet, and the two chests of gold, and the tablets of which the Sphere had made mention.

Touched by my Wife's distress, I would have sprung downward to reassure her, but I found myself incapable of motion. "Trouble not yourself about your Wife," said my Guide; "she will not be long left in anxiety; meantime, let us take a survey of Flatland."

Once more I felt myself rising through space. It was even as the Sphere had said. The further we receded from the object we beheld, the larger became the field of vision. My native city, with the interior of every house and every creature therein, lay open to my view in miniature. We mounted higher, and lo, the secrets of the earth, the depths of mines and inmost caverns of the hills, were bared before me.

Awestruck at the sight of the mysteries of the earth, thus unveiled before my unworthy eye, I said to my Companion, "Behold, I am become as a God. For the wise men in our country say that to see all things, or as they express it, omnividence, is the attribute of God alone." There was something of scorn in the voice of my Teacher as he made answer: "Is it so indeed. Then the very pickpockets and cut-throats of my country are to be worshipped by your wise men as being Gods: for there is not one of them that does not see as much as you see now. But trust me, your wise men are wrong."

I. Then is omnividence the attribute of others beside Gods?

Sphere. I do not know. But, if a pick-pocket or a cut-throat of our country can see everything that is in your country, surely that is no reason why the pick-pocket or cut-throat should be accepted by you as a God. This omnividence, as you call it—it is not a common word in Spaceland—does it make you more just, more merciful, less selfish, more loving? Not in the least. Then how does it make you more divine?

I. "More merciful, more loving!" But these are the qualities of women! And we know that a Circle is a higher Being than a Straight Line, in so far as knowledge and wisdom are more to be esteemed than mere affection.

Sphere. It is not for me to classify human faculties according to merit. Yet many of the best and wisest in Spaceland think more of the affections than of the understanding, more of your despised Straight Lines than of your belauded Circles. But enough of this. Look yonder. Do you know that building?

I looked, and afar off I saw an immense Polygonal structure, in which I recognized the General Assembly Hall of the States of Flatland, surrounded by dense lines of Pentagonal buildings at right angles to each other, which I knew to be streets; and I perceived that I was approaching the great Metropolis.

"Here we descend," said my Guide. It was now morning, the first hour of the first day of the two thousandth year of our era. Acting, as was their wont, in strict accordance with precedent, the highest Circles of the realm were meeting in solemn conclave, as they had met on the first hour of the first day of the year 1000, and also on the first hour of the first day of the year 0.

The minutes of the previous meetings were now read by one whom I at once recognized as my brother, a perfectly Symmetrical Square, and the Chief Clerk of the High Council. It was found recorded on each occasion that: "Whereas the States had been troubled by divers ill-intentioned persons pretending to have received revelations from another World, and professing to produce demonstrations whereby they had instigated to frenzy both themselves and others, it had been for this cause unanimously resolved by the Grand Council that on the first day of each millenary, special injunctions be sent to the Prefects in the several districts of Flatland, to make strict search for such misguided persons, and without formality of mathematical examination, to destroy all such as were Isosceles of any degree, to scourge and imprison any regular Triangle, to cause any Square or Pentagon to be sent to the district Asylum, and to arrest any one of higher rank, sending him straightway to the Capital to be examined and judged by the Council."

"You hear your fate," said the Sphere to me, while the Council was passing for the third time the formal resolution. "Death or imprisonment awaits the Apostle of the Gospel of Three Dimensions." "Not so," replied I, "the matter is now so clear to me, the nature of real space so palpable, that methinks I could make a child understand it. Permit me but to descend at this moment and enlighten them." "Not yet," said my Guide, "the time will come for that. Meantime I must perform my mission. Stay thou there in thy place." Saying these words, he leaped with great dexterity into the sea (if I may so call it) of Flatland, right in the midst of the ring of Counsellors. "I come," cried he, "to proclaim that there is a land of Three Dimensions."

I could see many of the younger Counsellors start back in manifest horror, as the Sphere's circular section widened before them. But on a sign from the presiding Circle,—who showed not the slightest alarm or surprise—six Isosceles of a low type from six different quarters rushed upon the Sphere. "We have him," they cried; "No; yes; we have him still! he's going! he's gone!"

"My Lords," said the President to the Junior Circles of the Council, "there is not the slightest need for surprise; the secret archives, to which I alone have access, tell me that a similar occurrence happened on the last two millennial commencements. You will, of course, say nothing of these trifles outside the Cabinet."

Raising his voice, he now summoned the guard. "Arrest the policemen; gag them. You know your duty." After he had consigned to their fate the wretched policemen—ill-fated and unwilling witnesses of a State-secret which they were not to be permitted to reveal—he again addressed the Counsellors. "My Lords, the business of the Council being concluded, I have only to wish you a happy New Year." Before departing, he expressed, at some length, to the Clerk, my excellent but most unfortunate brother, his sincere regret that, in accordance with precedent and for the sake of secrecy, he must condemn him to perpetual imprisonment, but added his satisfaction that, unless some mention were made by him of that day's incident, his life would be spared.

19. How, though the Sphere showed me other mysteries of Spaceland, I still desired more; and what came of it.

When I saw my poor brother led away to imprisonment, I attempted to leap down into the Council Chamber, desiring to intercede on his behalf, or at least bid him farewell. But I found that I had no motion of my own. I absolutely depended on the volition of my Guide, who said in gloomy tones, "Heed not thy brother; haply thou shalt have ample time hereafter to condole with him. Follow me."

Once more we ascended into space. "Hitherto," said the Sphere, "I have shown you naught save Plane Figures and their interiors. Now I must introduce you to Solids, and reveal to you the plan upon which they are constructed. Behold this multitude of moveable square cards. See, I put one on another, not, as you supposed, Northward of the other, but on the other. Now a second, now a third. See, I am building up a Solid by a multitude of Squares parallel to one another. Now the Solid is complete, being as high as it is long and broad, and we call it a Cube."

"Pardon me, my Lord," replied I; "but to my eye the appearance is as of an Irregular Figure whose inside is laid open to the view; in other words, methinks I see no Solid, but a Plane such as we infer in Flatland; only of an Irregularity which betokens some monstrous criminal, so that the very sight of it is painful to my eyes."

"True," said the Sphere; "it appears to you a Plane, because you are not accustomed to light and shade and perspective; just as in Flatland a Hexagon would appear a Straight Line to one who has not the Art of Sight Recognition. But in reality it is a Solid, as you shall learn by the sense of Feeling."

He then introduced me to the Cube, and I found that this marvellous Being was indeed no Plane, but a Solid; and that he was endowed with six plane sides and eight terminal points called solid angles; and I remembered the saying of the Sphere that just such a Creature as this would be formed by a Square moving, in Space, parallel to himself: and I rejoiced to think that so insignificant a Creature as I could in some sense be called the Progenitor of so illustrious an offspring.

But still I could not fully understand the meaning of what my Teacher had told me concerning "light" and "shade" and "perspective"; and I did not hesitate to put my difficulties before him.

Were I to give the Sphere's explanation of these matters, succinct and clear though it was, it would be tedious to an inhabitant of Space, who knows these things already. Suffice it, that by his lucid statements, and by changing the position of objects and lights, and by allowing me to feel the several objects and even his own sacred Person, he at last made all things clear to me, so that I could now readily distinguish between a Circle and a Sphere, a Plane Figure and a Solid.

This was the Climax, the Paradise, of my strange eventful History. Henceforth I have to relate the story of my miserable Fall:—most miserable, yet surely most undeserved! For why should the thirst for knowledge be aroused, only to be disappointed and punished! My volition shrinks from the painful task of recalling my humiliation; yet, like a second Prometheus, I will endure this and worse, if by any means I may arouse in the interiors of Plane and Solid Humanity a spirit of rebellion against the Conceit which would limit our Dimensions to Two or Three or any number short of Infinity. Away then with all personal considerations! Let me continue to the end, as I began, without further digressions or anticipations, pursuing the plain path of dispassionate History. The exact facts, the exact words,—and they are burnt in upon my brain,—shall be set down without alteration of an iota; and let my Readers judge between me and Destiny.

The Sphere would willingly have continued his lessons by indoctrinating me in the conformation of all regular Solids, Cylinders, Cones, Pyramids, Pentahedrons, Hexahedrons, Dodecahedrons and Spheres: but I ventured to interrupt him. Not that I was wearied of knowledge. On the contrary, I thirsted for yet deeper and fuller draughts than he was offering to me.

"Pardon me," said I, "O Thou Whom I must no longer address as the Perfection of all Beauty; but let me beg thee to vouchsafe thy servant a sight of thine interior."

Sphere. "My what?"

I. "Thine interior: thy stomach, thy intestines."

Sphere. "Whence this ill-timed impertinent request? And what mean you by saying that I am no longer the Perfection of all Beauty?"

I. My Lord, your own wisdom has taught me to aspire to One even more great, more beautiful, and more closely approximate to Perfection than yourself. As you yourself, superior to all Flatland forms, combine many Circles in One, so doubtless there is One above you who combines many Spheres in One Supreme Existence, surpassing even the Solids of Spaceland. And even as we, who are now in Space, look down on Flatland and see the insides of all things, so of a certainty there is yet above us some higher, purer region, whither thou dost surely purpose to lead me—O Thou Whom I shall always call, everywhere and in all Dimensions, my Priest, Philosopher, and Friend—some yet more spacious Space, some more dimensionable Dimensionality, from the vantage-ground of which we shall look down together upon the revealed insides of Solid things, and where thine own intestines, and those of thy kindred Spheres, will lie exposed to the view of the poor wandering exile from Flatland, to whom so much has already been vouchsafed.

Sphere. Pooh! Stuff! Enough of this trifling! The time is short, and much remains to be done before you are fit to proclaim the Gospel of Three Dimensions to your blind benighted countrymen in Flatland.

I. Nay, gracious Teacher, deny me not what I know it is in thy power to perform. Grant me but one glimpse of thine interior, and I am satisfied for ever, remaining henceforth thy docile pupil, thy unemancipable slave, ready to receive all thy teachings and to feed upon the words that fall from thy lips.

Sphere. Well, then, to content and silence you, let me say at once, I would show you what you wish if I could; but I cannot. Would you have me turn my stomach inside out to oblige you?

I. But my Lord has shown me the intestines of all my countrymen in the Land of Two Dimensions by taking me with him into the Land of Three. What therefore more easy than now to take his servant on a second journey into the blessed region of the Fourth Dimension, where I shall look down with him once more upon this land of Three Dimensions, and see the inside of every three-dimensioned house, the secrets of the solid earth, the treasures of the mines in Spaceland, and the intestines of every solid living creature, even of the noble and adorable Spheres.

Sphere. But where is this land of Four Dimensions?

I. I know not: but doubtless my Teacher knows.

Sphere. Not I. There is no such land. The very idea of it is utterly inconceivable.

I. Not inconceivable, my Lord, to me, and therefore still less inconceivable to my Master. Nay, I despair not that, even here, in this region of Three Dimensions, your Lordship's art may make the Fourth Dimension visible to me; just as in the Land of Two Dimensions my Teacher's skill would fain have opened the eyes of his blind servant to the invisible presence of a Third Dimension, though I saw it not.

Let me recall the past. Was I not taught below that when I saw a Line and inferred a Plane, I in reality saw a Third unrecognized Dimension, not the same as brightness, called "height"? And does it not now follow that, in this region, when I see a Plane and infer a Solid, I really see a Fourth unrecognized Dimension, not the same as colour, but existent, though infinitesimal and incapable of measurement?

And besides this, there is the Argument from Analogy of Figures.

Sphere. Analogy! Nonsense: what analogy?

I. Your Lordship tempts his servant to see whether he remembers the revelations imparted to him. Trifle not with me, my Lord; I crave, I thirst, for more knowledge. Doubtless we cannot see that other higher Spaceland now, because we have no eye in our stomachs. But, just as there was the realm of Flatland, though that poor puny Lineland Monarch could neither turn to left nor right to discern it, and just as there was close at hand, and touching my frame, the land of Three Dimensions, though I, blind senseless wretch, had no power to touch it, no eye in my interior to discern it, so of a surety there is a Fourth Dimension, which my Lord perceives with the inner eye of thought. And that it must exist my Lord himself has taught me. Or can he have forgotten what he himself imparted to his servant?

In One Dimension, did not a moving Point produce a Line with two terminal points?

In Two Dimensions, did not a moving Line produce a Square with four terminal points?

In Three Dimensions, did not a moving Square produce—did not this eye of mine behold it—that blessed Being, a Cube, with eight terminal points?

And in Four Dimensions shall not a moving Cube—alas, for Analogy, and alas for the Progress of Truth, if it be not so—shall not, I say, the motion of a divine Cube result in a still more divine Organization with sixteen terminal points?

Behold the infallible confirmation of the Series, 2, 4, 8, 16: is not this a Geometrical Progression? Is not this—if I might quote my Lord's own words—"strictly according to Analogy"?

Again, was I not taught by my Lord that as in a Line there are two bounding Points, and in a Square there are four bounding Lines, so in a Cube there must be six bounding Squares? Behold once more the confirming Series, 2, 4, 6: is not this an Arithmetical Progression? And consequently does it not of necessity follow that the more divine offspring of the divine Cube in the Land of Four Dimensions, must have 8 bounding Cubes: and is not this also, as my Lord has taught me to believe, "strictly according to Analogy"?

O, my Lord, my Lord, behold, I cast myself in faith upon conjecture, not knowing the facts; and I appeal to your Lordship to confirm or deny my logical anticipations. If I am wrong, I yield, and will no longer demand a Fourth Dimension; but, if I am right, my Lord will listen to reason.

I ask therefore, is it, or is it not, the fact, that ere now your countrymen also have witnessed the descent of Beings of a higher order than their own, entering closed rooms, even as your Lordship entered mine, without the opening of doors or windows, and appearing and vanishing at will? On the reply to this question I am ready to stake everything. Deny it, and I am henceforth silent. Only vouchsafe an answer.

Sphere (after a pause). It is reported so. But men are divided in opinion as to the facts. And even granting the facts, they explain them in different ways. And in any case, however great may be the number of different explanations, no one has adopted or suggested the theory of a Fourth Dimension. Therefore, pray have done with this trifling, and let us return to business.

I. I was certain of it. I was certain that my anticipations would be fulfilled. And now have patience with me and answer me yet one more question, best of Teachers! Those who have thus appeared—no one knows whence—and have returned—no one knows whither—have they also contracted their sections and vanished somehow into that more Spacious Space, whither I now entreat you to conduct me?

Sphere (moodyly). They have vanished, certainly—if they ever appeared. But most people say that these visions arose from the thought—you will not understand me—from the brain; from the perturbed angularity of the Seer.

I. Say they so? Oh, believe them not. Or if it indeed be so, that this other Space is really Thoughtland, then take me to that blessed Region where I in Thought shall see the insides of all solid things. There, before my ravished eye, a Cube, moving in some altogether new direction, but strictly according to Analogy, so as to make every particle of his interior pass through a new kind of Space with a wake of its own—shall create a still more perfect perfection than himself, with sixteen terminal Extra-solid angles, and Eight solid Cubes for his Perimeter. And once there, shall we stay our upward course? In that blessed region of Four Dimensions, shall we linger on the threshold of the Fifth, and not enter therein? Ah, no! Let us rather resolve that our ambition shall soar with our corporal ascent. Then, yielding to our intellectual onset, the gates of the Sixth Dimension shall fly open; after that a Seventh, and then an Eighth——

How long I should have continued I know not. In vain did the Sphere, in his voice of thunder, reiterate his commands of silence, and threaten me with the direst penalties if I persisted. Nothing could stem the flood of my ecstatic aspirations. Perhaps I was to blame; but indeed I was intoxicated with the recent draughts of Truth to which he himself had introduced me. However, the end was not long in coming. My words were cut short by a crash outside, and a simultaneous crash inside me, which impelled me through Space with a velocity that precluded speech. Down! down! down! I was rapidly descending; and I knew that return to Flatland was my doom. One glimpse, one last and never-to-be-forgotten glimpse I had of that dull level wilderness—which was now to become my Universe again—spread out before my eye. Then a darkness. Then a final, all-consummating thunder-peal; and, when I came to myself, I was once more a common creeping Square, in my Study at home, listening to the Peace-Cry of my approaching Wife.

20. How the Sphere encouraged me in a Vision.

Although I had less than a minute for reflection, I felt, by a kind of instinct, that I must conceal my experiences from my Wife. Not that I apprehended, at the moment, any danger from her divulging my secret, but I knew that to any Woman in Flatland the narrative of my adventures must needs be unintelligible. So I endeavoured to reassure her by some story, invented for the occasion, that I had accidentally fallen through the trap-door of the cellar, and had there lain stunned.

The Southward attraction in our country is so slight that even to a Woman my tale necessarily appeared extraordinary and well-nigh incredible; but my Wife, whose good sense far exceeds that of the average of her Sex, and who perceived that I was unusually excited, did not argue with me on the subject, but insisted that I was ill and required repose. I was glad of an excuse for retiring to my chamber to think quietly over what had happened. When I was at last by myself, a drowsy sensation fell on me; but before my eyes closed I endeavoured to reproduce the Third Dimension, and especially the process by which a Cube is constructed through the motion of a Square. It was not so clear as I could have wished; but I remembered that it must be "Upward, and yet not Northward," and I determined steadfastly to retain these words as the clue which, if firmly grasped, could not fail to guide me to the solution. So mechanically repeating, like a charm, the words, "Upward yet not Northward," I fell into a sound refreshing sleep.

During my slumber I had a dream. I thought I was once more by the side of the Sphere, whose lustrous hue betokened that he had exchanged his wrath against me for perfect placability. We were moving together towards a bright but infinitesimally small Point, to which my Master directed my attention. As we approached, methought there issued from it a slight humming noise as from one of your Spaceland blue-bottles, only less resonant by far, so slight indeed that even in the perfect stillness of the Vacuum through which we soared, the sound reached not our ears till we checked our flight at a distance from it of something under twenty human diagonals.

"Look yonder," said my Guide, "in Flatland thou hast lived; of Lineland thou hast received a vision; thou hast soared with me to the heights of Spaceland; now, in order to complete the range of thy experience, I conduct thee downward to the lowest depth of existence, even to the realm of Pointland, the Abyss of No Dimensions.

"Behold yon miserable creature. That Point is a Being like ourselves, but confined to the non-dimensional Gulf. He is himself his own World, his own Universe; of any other than himself he can form no conception; he knows not Length, nor Breadth, nor Height, for he has had no experience of them; he has no cognizance even of the number Two; nor has he a thought of Plurality; for he is himself his One and All, being really Nothing. Yet mark his perfect self-contentment, and hence learn this lesson, that to be self-contented is to be vile and ignorant, and that to aspire is better than to be blindly and impotently happy. Now listen."

He ceased; and there arose from the little buzzing creature a tiny, low, monotonous, but distinct tinkling, as from one of your Spaceland phonographs, from which I caught these words, "Infinite beatitude of existence! It is; and there is none else beside It."

"What," said I, "does the puny creature mean by 'it'?" "He means himself," said the Sphere: "have you not noticed before now, that babies and babyish people who cannot distinguish themselves from the world, speak of themselves in the Third Person? But hush!"

"It fills all Space," continued the little soliloquizing Creature, "and what It fills, It is. What It thinks, that It utters; and what It utters, that It hears; and It itself is Thinker, Utterer, Hearer, Thought, Word, Audition; it is the One, and yet the All in All. Ah, the happiness, ah, the happiness of Being!"

"Can you not startle the little thing out of its complacency?" said I. "Tell it what it really is, as you told me; reveal to it the narrow limitations of Pointland, and lead it up to something higher." "That is no easy task," said my Master; "try you."

Hereon, raising my voice to the uttermost, I addressed the Point as follows:

"Silence, silence, contemptible Creature. You call yourself the All in All, but you are the Nothing: your so-called Universe is a mere speck in a Line, and a Line is a mere shadow as compared with—" "Hush, hush, you have said enough," interrupted the Sphere, "now listen, and mark the effect of your harangue on the King of Pointland."

The lustre of the Monarch, who beamed more brightly than ever upon hearing my words, showed clearly that he retained his complacency; and I had hardly ceased when he took up his strain again.

"Ah, the joy, ah, the joy of Thought! What can It not achieve by thinking! Its own Thought coming to Itself, suggestive of Its disparagement, thereby to enhance Its happiness! Sweet rebellion stirred up to result in triumph! Ah, the divine creative power of the All in One! Ah, the joy, the joy of Being!"

"You see," said my Teacher, "how little your words have done. So far as the Monarch understands them at all, he accepts them as his own—for he cannot conceive of any other except himself—and plumes himself upon the variety of 'Its Thought' as an instance of creative Power. Let us leave this God of Pointland to the ignorant fruition of his omnipresence and omniscience: nothing that you or I can do can rescue him from his self-satisfaction."

After this, as we floated gently back to Flatland, I could hear the mild voice of my Companion pointing the moral of my vision, and stimulating me to aspire, and to teach others to aspire. He had been angered at first—he confessed—by my ambition to soar to Dimensions above the Third; but, since then, he had received fresh insight, and he was not too proud to acknowledge his error to a Pupil. Then he proceeded to initiate me into mysteries yet higher than those I had witnessed, showing me how to construct Extra-Solids by the motion of Solids, and Double Extra-Solids by the motion of Extra-Solids, and all "strictly according to Analogy," all by methods so simple, so easy, as to be patent even to the Female Sex.

21. How I tried to teach the theory of Three Dimensions to my Grandson, and with what success.

I awoke rejoicing, and began to reflect on the glorious career before me. I would go forth, methought, at once, and evangelize the whole of Flatland. Even to Women and Soldiers should the Gospel of Three Dimensions be proclaimed. I would begin with my Wife.

Just as I had decided on the plan of my operations, I heard the sound of many voices in the street commanding silence. Then followed a louder voice. It was a herald's proclamation. Listening attentively, I recognized the words of the Resolution of the Council, enjoining the arrest, imprisonment, or execution of any one who should pervert the minds of the people by delusions, and by professing to have received revelations from another World.

I reflected. This danger was not to be trifled with. It would be better to avoid it by omitting all mention of my Revelation, and by proceeding on the path of Demonstration—which after all, seemed so simple and so conclusive that nothing would be lost by discarding the former means. "Upward, not Northward"—was the clue to the whole proof. It had seemed to me fairly clear before I fell asleep; and when I first awoke, fresh from my dream, it had appeared as patent as Arithmetic; but somehow it did not seem to me quite so obvious now. Though my Wife entered the room opportunely just at that moment, I decided, after we had interchanged a few words of commonplace conversation, not to begin with her.

My Pentagonal Sons were men of character and standing, and physicians of no mean reputation, but not great in mathematics, and, in that respect, unfit for my purpose. But it occurred to me that a young and docile Hexagon, with a mathematical turn, would be a most suitable pupil. Why therefore not make my first experiment with my little precocious Grandson, whose casual remarks on the meaning of 33 had met with the approval of the Sphere? Discussing the matter with him, a mere boy, I should be in perfect safety; for he would know nothing of the Proclamation of the Council; whereas I could not feel sure that my Sons—so greatly did their patriotism and reverence for the Circles predominate over mere blind affection—might not feel compelled to hand me over to the Prefect, if they found me seriously maintaining the seditious heresy of the Third Dimension.

But the first thing to be done was to satisfy in some way the curiosity of my Wife, who naturally wished to know something of the reasons for which the Circle had desired that mysterious interview, and of the means by which he had entered our house. Without entering into the details of the elaborate account I gave her,—an account, I fear, not quite so consistent with truth as my Readers in Spaceland might desire,—I must be content with saying that I succeeded at last in persuading her to return quietly to her household duties without eliciting from me any reference to the World of Three Dimensions. This done, I immediately sent for my Grandson; for, to confess the truth, I felt that all that I had seen and heard was in some strange way slipping away from me, like the image of a half-grasped, tantalizing dream, and I longed to essay my skill in making a first disciple.

When my Grandson entered the room I carefully secured the door. Then, sitting down by his side and taking our mathematical tablets—or, as you would call them, Lines—I told him we would resume the lesson of yesterday. I taught him once more how a Point by motion in One Dimension produces a Line, and how a straight Line in Two Dimensions produces a Square. After this, forcing a laugh, I said, "And now, you scamp, you wanted to make me believe that a Square may in the same way by motion 'Upward, not Northward,' produce another figure, a sort of extra Square in Three Dimensions. Say that again, you young rascal."

At this moment we heard once more the herald's "O yes! O yes!" outside in the street proclaiming the Resolution of the Council. Young though he was, my Grandson—who was unusually intelligent for his age, and bred up in perfect reverence for the authority of the Circles—took in the situation with an acuteness for which I was quite unprepared. He remained silent till the last words of the Proclamation had died away, and then, bursting into tears, "Dear Grandpapa," he said, "that was only my fun, and of course I meant nothing at all by it; and we did not know anything then about the new Law; and I don't think I said anything about the Third Dimension; and I am sure I did not say one word about 'Upward, not Northward,' for that would be such nonsense, you know. How could a thing move Upward, and not Northward? Upward, and not Northward! Even if I were a baby, I could not be so absurd as that. How silly it is! Ha! ha! ha!"

"Not at all silly," said I, losing my temper; "here for example, I take this Square,"—and, at the word, I grasped a moveable Square, which was lying at hand—"and I move it, you see, not Northward but—yes, I move it Upward—that is to say, not Northward, but I move it somewhere—not exactly like this, but somehow—" Here I brought my sentence to an inane conclusion, shaking the Square about in a purposeless manner, much to the amusement of my Grandson, who burst out laughing louder than ever, and declared that I was not teaching him, but joking with him. So saying he unlocked the door and ran out of the room; and thus ended my first attempt to convert a pupil to the Gospel of Three Dimensions.

22. How I then tried to diffuse the Theory of Three Dimensions by other means, and of the result.

My failure with my Grandson did not encourage me to communicate my secret to others of my household; yet neither was I led by it to despair of success. Only I saw that I must not wholly rely on the catchphrase "Upward, not Northward," but must rather endeavour to seek a demonstration by setting before the public a clear view of the whole subject; and for this purpose it seemed necessary to resort to writing.

So I devoted several months in privacy to the composition of a treatise on the mysteries of Three Dimensions. Only, with the view of evading the Law, if possible, I spoke not of a physical Dimension, but of a Thoughtland whence, in theory, a Figure could look down upon Flatland and see simultaneously the insides of all things, and where it was possible that there might be supposed to exist a Figure environed, as it were, with six Squares, and containing eight terminal Points. But in writing this book I found myself sadly hampered by the impossibility of drawing such diagrams as were necessary for my purpose; for of course, in our country of Flatland, there are no tablets but Lines, and no diagrams but Lines, all in one straight Line and only distinguishable by difference of size and brightness; so that, when I had finished my treatise (which I entitled "Through Flatland to Thoughtland") I could not feel certain that many would understand my meaning.

Meanwhile my life was under a cloud. All pleasures palled upon me; all sights tantalized and tempted me to outspoken treason, because I could not but compare what I saw in Two Dimensions with what it really was if seen in Three, and could hardly refrain from making my comparisons aloud. I neglected my clients and my own business to give myself to the contemplation of the mysteries which I had once beheld, yet which I could impart to no one, and found daily more difficult to reproduce even before my own mental vision.

One day, about eleven months after my return from Spaceland, I tried to see a Cube with my eye closed, but failed; and though I succeeded afterwards, I was not then quite certain (nor have I been ever afterwards) that I had exactly realized the original. This made me more melancholy than before, and determined me to take some step; yet what, I knew not I felt that I would have been willing to sacrifice my life for the Cause, if thereby I could have produced conviction. But if I could not convince my Grandson, how could I convince the highest and most developed Circles in the land?

And yet at times my spirit was too strong for me, and I gave vent to dangerous utterances. Already I was considered heterodox if not treasonable, and I was keenly alive to the dangers of my position; nevertheless I could not at times refrain from bursting out into suspicious or half-seditious utterances, even among the highest

96, <https://www.gutenberg.org/cache/epub/97/pg97.txt> (Flatland)

Polygonal and Circular society. When, for example, the question arose about the treatment of those lunatics who said that they had received the power of seeing the insides of things, I would quote the saying of an ancient Circle, who declared that prophets and inspired people are always considered by the majority to be mad; and I could not help occasionally dropping such expressions as "the eye that discerns the interiors of things," and "the all-seeing land:" once or twice I even let fall the forbidden terms "the Third and Fourth Dimensions." At last, to complete a series of minor indiscretions, at a meeting of our Local Speculative Society held at the palace of the Prefect himself,—some extremely silly person having read an elaborate paper exhibiting the precise reasons why Providence has limited the number of Dimensions to Two, and why the attribute of omnividence is assigned to the Supreme alone—I so far forgot myself as to give an exact account of the whole of my voyage with the Sphere into Space, and to the Assembly Hall in our Metropolis, and then to Space again, and of my return home, and of everything that I had seen and heard in fact or vision. At first, indeed, I pretended that I was describing the imaginary experiences of a fictitious person; but my enthusiasm soon forced me to throw off all disguise, and finally, in a fervent peroration, I exhorted all my hearers to divest themselves of prejudice and to become believers in the Third Dimension.

Need I say that I was at once arrested and taken before the Council?

Next morning, standing in the very place where but a very few months ago the Sphere had stood in my company, I was allowed to begin and to continue my narration unquestioned and uninterrupted. But from the first I foresaw my fate; for the President, noting that a guard of the better sort of Policemen was in attendance, of angularity little, if at all, under 55°, ordered them to be relieved before I began my defence, by an inferior class of 2° or 3°. I knew only too well what that meant. I was to be executed or imprisoned, and my story was to be kept secret from the world by the simultaneous destruction of the officials who had heard it; and, this being the case, the President desired to substitute the cheaper for the more expensive victims.

After I had concluded my defence, the President, perhaps perceiving that some of the junior Circles had been moved by my evident earnestness, asked me two questions:—

1. Whether I could indicate the direction which I meant when I used the words "Upward, not Northward"?
2. Whether I could by any diagrams or descriptions (other than the enumeration of imaginary sides and angles) indicate the Figure I was pleased to call a Cube?

I declared that I could say nothing more, and that I must commit myself to the Truth, whose cause would surely prevail in the end.

The President replied that he quite concurred in my sentiment, and that I could not do better. I must be sentenced to perpetual imprisonment; but if the Truth intended that I should emerge from prison and evangelize the world, the Truth might be trusted to bring that result to pass. Meanwhile I should be subjected to no discomfort that was not necessary to preclude escape, and, unless I forfeited the privilege by misconduct, I should be occasionally permitted to see my brother, who had preceded me to my prison.

Seven years have elapsed and I am still a prisoner, and—if I except the occasional visits of my brother—debarred from all companionship save that of my jailers. My brother is one of the best of Squares, just, sensible, cheerful, and not without fraternal affection; yet I must confess that my weekly interviews, at least in one respect, cause me the bitterest pain. He was present when the Sphere manifested himself in the Council Chamber; he saw the Sphere's changing sections; he heard the explanation of the phenomena then given to the Circles. Since that time, scarcely a week has passed during seven whole years, without his hearing from me a repetition of the part I played in that manifestation, together with ample descriptions of all the phenomena in Spaceland, and the arguments for the existence of Solid things derivable from Analogy. Yet—I take shame to be forced to confess it—my brother has not yet grasped the nature of the Third Dimension, and frankly avows his disbelief in the existence of a Sphere.

Hence I am absolutely destitute of converts, and, for aught that I can see, the millennial Revelation has been made to me for nothing. Prometheus up in Spaceland was bound for bringing down fire for mortals, but I—poor Flatland Prometheus—lie here in prison for bringing down nothing to my countrymen. Yet I exist in the hope that these memoirs, in some manner, I know not how, may find their way to the minds of humanity in Some Dimension, and may stir up a race of rebels who shall refuse to be confined to limited Dimensionality.

That is the hope of my brighter moments. Alas, it is not always so. Heavily weighs on me at times the burdensome reflection that I cannot honestly say I am confident as to the exact shape of the once-seen, oft-regretted Cube; and in my nightly visions the mysterious precept, "Upward, not Northward," haunts me like a soul-devouring Sphinx. It is part of the martyrdom which I endure for the cause of the Truth that there are seasons of mental weakness, when Cubes and Spheres flit away into the background of scarce-possible existences; when the Land of Three Dimensions seems almost as visionary as the Land of One or None; nay, when even this hard wall that bars me from my freedom, these very tablets on which I am writing, and all the substantial realities of Flatland itself, appear no better than the offspring of a diseased imagination, or the baseless fabric of a dream.

http://lolwut.info/*

=== Adobe Flash Will Never Die ===

In a way, my earliest motivation to get Internet access in our house was due to Adobe Flash. During Halloween 2003, my school held its annual Halloween party for the students and their parents; it was held at the school, but as this was an evening party outside of regular school hours, the rules were relaxed quite a bit. At one point during the party, I very clearly remember heading into the school's Internet-connected computer lab and (most likely because I saw the other kids doing so) accessing—for the first time in my life—the Flash-heavy CartoonNetwork.com Web site, exploring it, and eventually spending most of the rest of the party playing the site's Flash (and also Shockwave) games, which I very much enjoyed.

Soon afterwards (around November 2003) our house got connected to the Internet, no doubt due in part to my insistence. At the time, the sole reason I wanted Internet access in our house was so that I could visit the Cartoon Network and Nickelodeon Web sites on my home computer and play the Flash and Shockwave games found on them; my goals were very narrow and specific, and I did not imagine that I would ever use this connection for anything else. Very soon afterwards, though, I branched out, and took to exploring the wider Internet, and in so doing immediately exposed myself to the countless games, animations, applications, advertisements, and even Web sites built with Flash. In time I would stumble upon and then begin frequenting major Flash sites like eBaum's World, Newgrounds, and YouTube (which, though technically centered around videos rather than Flash animations/games, nevertheless relied on the Flash Player for many years to play those videos), as well as discover and then spend much time playing large, popular Flash-based games like AdventureQuest and Club Penguin, among many, many others.

Flash thus forms an indispensable part both of my specific 2000s Internet experience as well as of the 2000s Web in general, though its use, of course, persisted well into the next decade, and even today it is still far from dead, if you know where to look. During the 2000s I did not, admittedly, notice its presence very much, it being the platform on which the content runs, rather than the content itself—i.e., I was more apt to notice whatever Flash animation I was viewing or Flash game I was playing than to notice the technology running it; but neither was I totally ignorant of the peculiarities of Flash, particularly its characteristic look (which is a result of its use of vector graphics) that, I think, anybody who has viewed many Flashes will immediately recognize. It was always there, in the background, quietly powering pretty much all interactivity on the Web.

Flash's dominance in the 2000s is commonly described as "ubiquitous" or "pervasive", and both words are very fitting: it really was everywhere, because any site that wanted to deliver games, animations, video, or anything more than rudimentary functionality used Flash (or maybe even Java applets); JavaScript in those days was relegated to its rightful place as the insignificant tool you used to spawn annoying pop-up windows, and little else. I recall that in the several instances when I either bought a new computer, reinstalled the operating system on my current computer, or restored my computer to a pre-installed factory image on my hard drive, one of the first things I installed on this fresh OS, before I did any serious Web browsing, was the latest version of Flash Player—not doing so would simply result in too many broken Web sites, including (for many years) YouTube. At the end of the 2000s it appeared to me—and many others—that Flash would be long secure in its position, and would continue to drive multimedia on the Web for the foreseeable future.

Although Flash held strong throughout the early 2010s, it was during the middle of that decade that I first noticed its presence on the Web begin to diminish. I started hearing talk of how Flash was "outdated", "deprecated", and that it "needed to die". It suddenly became hip to ridicule Flash, and fashionable to tout that HTML5™ meme thing as the "replacement" for Flash in the Modern Web™. As the 2010s progressed, and Adobe announced the planned end-of-life, the critics grew ever more smug; when 2020 drew to a close, and the end-of-life date arrived, these joyless souls proclaimed their final victory over Flash, which they had been incessantly declaring as "dead", as if a single software company could decide the fate of a platform that had very much grown beyond its control. They acted as if every SWF file would suddenly break and every Web site would instantly remove all Flashes hosted on it, but this was plainly wrong, and Flash continues to be used, even today. (Perhaps, though, if they were to write, for the ten thousandth time, the "FLASH IS DEAD!!!" line in the title of their "news articles", they might finally manage to fool themselves.)

Invalid Criticisms of Flash

I have never understood the hostility towards Flash. Many of its critics today parrot the same two arguments: that Flash has serious security vulnerabilities, and that it is largely lacking support on mobile devices. The Wikipedia article for Adobe Flash lists in its criticisms section six distinct complaints, including the two aforementioned, but, besides the security concerns, none are convincing; below I address each one.

Vendor Lock-in

Alas, today this is largely a theoretical FOSS'er concern that has worked its way into a Wikipedia article. I do not believe that the fact that Flash being proprietary, by itself, is a valid moral objection, and far less that it is a cause of real-world worry; it is only if Adobe (or Macromedia, in the old days) were somehow to take advantage of this and abuse it that it would become an issue, but the Web's 20+ years of experience with Flash has shown that this has not been the case. The 97, http://lolwut.info/*

concern is that both users and Flash authors will be dependent upon Adobe for the software to make and view Flashes, but in the very same Wikipedia article are listed many non-Adobe third-party Flash animation tools, Flash programming tools, and Flash players, including even some open-source ones to satisfy the FOSS'ers. What is especially mistaken is the second half of the quote by Tristan Nitot, which claims that "there's someone in the middle deciding whether users should see [Flash authors'] content", which is utterly false—neither the official Adobe Flash Player plug-in nor the official Adobe Flash authoring software requires you to obtain some permission from Adobe to view or compile SWF files.

Over the years, as Flash became widespread on the Web, complete control of the format gradually slipped from Adobe's grasp, and now, in a way, it has become something like an open standard: this is evidenced by the existence of all the non-official (i.e. non-Adobe) Flash tools and players, some open source, developed without any connection to Adobe. Perhaps in the past, when the non-official tools and Flash players didn't exist, this argument might have had more merit, but today it is entirely possible for someone to produce Flashes using non-Adobe tools, and for others to view those Flashes using non-Adobe players; hence the vendor lock-in argument, in practical terms, is no longer relevant. Some will still object on principle to SWF being a proprietary format, but, again, this has been reduced to a purely theoretical complaint.

Accessibility and Usability

This is a criticism concerning a specific use of Flash, and not of Flash itself: the distinction must be made, for it is an important one. That some people will use Flash in a manner that results in poor Web accessibility—e.g., they design their whole Web site as a large Flash application, or otherwise implement major and fundamental portions of it in Flash—is not a valid complaint against the whole platform, but only towards those particular individuals. Note also that the sole article referenced for this subsection of the Wikipedia article was published in 2000, back when completely Flash-based Web sites were far more common; after the practice itself largely disappeared, the strength of this argument—which was not ever applicable to Flash, anyway—diminished in turn, and today it is very much an outdated complaint.

Flash Blocking in Web Browsers

Again, this is not a flaw of Flash itself; instead, the fault lies with the specific Web browsers that either do not support Flash or have elected to block it, or with the specific users who cannot even be bothered to download and install a single browser plug-in. I also find it laughable that this subsection of the Wikipedia article suggests that requiring the user to click to play Flash content in the browser is a significant issue, as if merely clicking something once were anything but an extremely simple and quick act which all but the absolute laziest would readily perform in order to view Flashes. This entire subsection, indeed, is full of irrelevancies and non-issues.

Flash Cookies

This is another concern that today is no longer relevant: as noted in this subsection of the Wikipedia article, it is only in version 10.2 and earlier of Adobe Flash Player that it might be somewhat troublesome for the user to delete Flash cookies stored on his system; beginning with the subsequent version 10.3 of Flash Player—which was released nearly a decade ago—the matter was greatly simplified. Even in versions prior to 10.3, however, it is far from impossible to delete the cookies, and certain parts of this subsection of the article seem to present the nonsensical claim that Flash should be blamed for its users' own ignorance of Flash cookies. As regards the issue of Web sites not adequately disclosing in their privacy policies the use of Flash cookies, the fault there clearly lies with the particular sites, and not with Flash itself.

Mobile Support

This is at once the most irrelevant and absurd of the six criticisms, and the reason is so plainly obvious that I cannot believe there really exist in the world those who are unable to apprehend it, and for whose sake I am obliged to provide here the explanation.

To them, I say that the primary purpose of the cell phone is communication, viz., voice calling, text messaging, and e-mail. Web browsing was not one of its original purposes, nor should it now be assumed to be a core one, but rather a bonus feature over which, if your cell phone happens to support it, you should feel fortunate—i.e., on cell phones complete Web and Flash support should not be seen as the default; instead, it is the absence of such support that should be expected from that class of device. A desktop or laptop computer is vastly superior to a mobile phone in regards to Web browsing, and if the former is available for this use, I see no reason why anybody would ever prefer the latter. It is only if you find yourself in the unfortunate situation of needing to access the Web and/or the wider Internet, but are away from your desktop or laptop PC, that you must resort to using a mobile phone; in this case, when you have been forced to settle for a device that is very constrained and underpowered when compared to a PC, and which has a screen about the size of your hand, then I should have thought it common sense that you only prepare yourself for a heavily limited, degraded, and inferior browsing experience, which, among many other things, entails a complete lack of Flash support.

Mobile, in other words, is merely a temporary Web browsing solution, to be used when access to a far more capable PC is unavailable; for Web access it is only a stopgap, and hence it should be immediately apparent that many faults will be present and many features (like Flash) missing, but this must be understood and tolerated as inherent limitations of the platform. I could at least understand if the complaints were directed specifically towards those cell phones that don't have Flash support, or which support it poorly, for in those cases the deficiency is clearly on the part of those particular devices.

This is not, however, what the critics of Flash have done. Rather than criticizing the mobile platform for having poor or no Flash support, as is proper, in an utter inversion of reason itself they have somehow shifted the blame on Flash, and maintain that Flash, not mobile, should be criticized because a certain insignificant category of computing devices does not support it. This is flatly absurd, and should not require any further explanation, but for the truly slow perhaps an analogy here will help.

Consider, for example, the case of software written for supercomputers: such software either cannot run on PCs, or, if it can, would run so slowly that it would be practically useless; yet this lack of support on a particular computing platform is never taken as a shortcoming of the supercomputer software itself, for it is widely understood that it is designed and developed for an entirely different category of computer, and we would instead fault the PC for being incapable of running such software. For what reason, then, would the case of Flash and mobile be any different? Is not Flash designed for the Web, while mobile phones are not? Flash was never intended for the mobile sector, just as supercomputer software was never intended for PCs; hence the lack of support is normal, and should be perceived as such.

Nevertheless this "argument" still persists today, because (I can only suspect) Flash, unlike supercomputer software, has numerous enemies who seek to discredit it at every turn. Those who push it, at best, demonstrate a profound misunderstanding of the purpose of the cell phone, and, at worst, attempt deceptively to shift the blame from some other entity to Flash itself.

Security and the Cultural Importance of Flash

Thus only the matter of Flash's security record remains. Although I will acknowledge that this not an insignificant issue, yet its importance is not absolute, and the chief error of the anti-Flash crowd regarding this topic is their mistaken assumption that it is so—i.e., they believe that, in every discussion concerning Flash, they can simply make an appeal to the supposed Final Authority of Security, which they have elevated to a position of primary concern, and thus render insignificant all of their opponents' arguments in favor of Flash, for, in their eyes, security takes precedence over everything else. In the worst and most extreme cases, there are those so narrow-minded that they assert that security is the only concern, that nothing else matters, and that Flash should be judged solely by its security record.

I cannot help but feel a degree of pity for these security zealots. Their single-minded fixation with Flash's security issues indicate that they have not any fond memories of the 2000s Web and its domination by Flash, but rather see the whole platform in a very cold and detached manner. Their poor minds are unable to recall and appreciate the great cultural value that Flash has contributed to the world: classics of Internet animation, like "Peanut Butter Jelly Time", "The End of the World", and "The Ultimate Showdown of Ultimate Destiny" (SWF file), were all produced with Flash; some Flash animations and games, like "Scient!LO!jyuichi!!" (SWF file), Warfare 1917, and nearly everything by ZONE, though made by amateurs, attained a level of quality and polish that, I would contend, rivaled anything found on television or released by a large video game developer; whole books were written concerning the platform; entire sites were built around Flash content, such as Newgrounds, eBaum's World, Albino Blacksheep, YTMND, AddictingGames, Miniclip, and Kongregate, to name some of the largest; whole companies specialized in Flash games, like Armor Games and XGen Studios; 4chan has had its own Flash upload board since 2004, from which emerged its own distinct Flash-based cultural heritage; YouTube relied on Flash throughout the entirety of the 2000s to play every video on the site, and did not default to an HTML5 player until 2015; and large, successful games, like Neopets, AdventureQuest, and even an MMOG like Club Penguin, were developed entirely in Flash—and this is not even considering the countless other sites that had Flash content, or the great many companies and organizations that must have used Flash-based applications internally, and relied heavily upon them.

There are also technical advantages to Flash: for example, an animation encoded as a SWF is typically smaller than one encoded in a video format, particularly if it is all or mostly vector-based animation; Flashes, unlike video, can much more smoothly upscale to higher resolutions due to the nature of vector graphics; and Flash content, unlike HTML5, is compiled as a single SWF file and thus is very easily distributed.

However, it is the doubtless the cultural importance of Flash that is its greatest legacy. Much of the 2000s indie game and animation scene was centered around Flash, and I know of no other platform that permitted so many people to produce such material so easily. It was easy to learn and not too expensive; anybody could become reasonably proficient with the technology in a week or two, and thereafter begin putting out animations that previously had required far more time, effort, and training to produce. It was precisely this accessibility—the fact that the average individual could so readily leverage its power—that made Flash a great democratizing force on the Web: now animations, which prior to Flash had been the domain of professional animators, and video games, which prior to Flash had largely been the works either of large companies or of highly skilled and dedicated programmers, suddenly fell within the power of ordinary Web users to produce, and consequently the Web saw a great flourishing of creativity in these two areas that was enabled solely by Flash—although, of course, its utility was so great that it was not confined only to the Web, but also saw, and continues to see, use by major film studios and television networks.

Flash, truly, is the king of Web multimedia, and contributed immensely to Web and Internet culture; so much diverse and wonderful material—much of which was made by amateurs—would not exist if it weren't for Flash, and when I consider all of this, I am tempted to assert that not even the security concerns can override its cultural legacy and value. It might have its competitors and emulators, but nothing can replace it perfectly, and neither will it vanish simply because an annoying vocal minority wishes it so. My perception is that we appear to be (as of March 2021) in the midst of an anti-Flash hysteria, driven largely by the efforts of the aforementioned group, which will assuredly wear off in time, after which I predict that Flash, like many old technologies, will see a renewal of interest. The sentiment is amusingly expressed in the following post I encountered on 4chan's /f/:

=== Memories of the 2000s YouTube Trolling Scene ===

I signed up for my first YouTube account in March 2007. Around the beginning of September 2007 (I remember because it was right around the time the 2007–2008 school year started), I began using the account for an odd sort of semi-trolling (but not really true trolling), which I continued to do until around May 2008, after which I transitioned to real, dedicated trolling with my YouTube account. I did this daily until the beginning of September 2009, when I decided to take a break for the 2009–2010 school year; I then briefly returned to YouTube trolling during the summer of 2010, but at that point I found it quite boring and unfulfilling, so I closed my YouTube account that very same summer.

From March 2007 until the summer of 2010, then—with the exception, of course, of the break I took for the 2009–2010 school year—I logged on to my YouTube account pretty much daily and spent a good deal of time on the site, so I was pretty aware of the events and people back then. Though I did not only use my account for trolling (I still made friends and interacted with them normally, uploaded non-trolling videos, and watched, rated, and favorited videos like everybody else), for a long time it was my primary focus, so naturally I paid much attention to my other fellow trolls on YouTube.

What follows are my memories of other YouTube trolls who were active on the site during the 2000s. Of course, even back then YouTube was already an enormous place, so it's virtually impossible for a single person to know about every single troll on the site. I only write about those I can remember, so this list will always be hopelessly incomplete; it is also very biased towards my experience, as I list very famous trolls (e.g. ultraforge) alongside small fries, simply because I happened to be friends with those little guys back then. Where possible, I have provided links to their live YouTube channel and/or an old Internet Archive capture of their channel.

The 4chan Crowd/The Anti-Furries

These were the guys who either were involved in the YouTube Furry War back in the day, continued to troll furries in the aftermath of that war, or otherwise had a heavy 4chan background. They were the most well-known and top trolls on the site, and what I—and probably many others—aspired to be. I knew who they were, but I didn't know any of them personally.

FrizzleFry101/NotFrizzleFry101: Yes, this was the FrizzleFry, the last leader of the original Patriotic Nigras, who maintained a YouTube account that he used to upload Patriotic Nigras-related videos. The FrizzleFry101 account was his earlier one, and when it was banned, he registered the NotFrizzleFry101 account.

paxilrose: He, along with VampiressMaura (see below) and a few other trolls whose names I cannot remember, founded and served as an admin for the YouTube Evidence Library. Unfortunately, I don't remember much else about him, though I do remember that he was one of the top trolls back then.

The Fried Chicken Trolling Crew (FCTC): This was a group of trolls, not an individual troll. They participated in the YouTube Furry War, and most of what I know about them I read from their Encyclopedia Dramatica article.

ultraforge (see also the various captures of his channel at the Internet Archive): We nicknamed him the "Father of YouTube Trolls" back in the day. He was a YouTube veteran from 2005, having registered his account on 19 December 2005. He was also a member of the FCTC (listed above), and by 2009 he had become the biggest and most respected troll on YouTube. He left the site sometime near the end of 2009—we lost a real hero that day.

VampiressMaura: She, along with paxilrose (listed above) and a few other trolls whose names I cannot remember, founded and served as an admin for the YouTube Evidence Library, a Web site started around mid-2009 which hosted YouTube videos removed by their uploaders, with the uploaders usually being furries who were targets of trolling. It was an invitation-only site that also served as a troll community, and I was a part of it back when it first started. (When I was invited to it, I knew then that I had made it to the trolling big time.) She was active in 2008 and 2009; originally, she wore the Guy Fawkes mask and a short wig in her videos, but later started showing her face. She is the only female troll I know about.

The Legends

I have only watched videos or read about their activities; unfortunately, I was not lucky enough to have been able to witness their channels or exploits firsthand.

ErrorSucks12960: A spammer in YouTube's old days. When his ErrorSucks12960 account was banned, I recall that a great deal of new accounts popped up that used the name ErrorSucks in some variation; some simply used the name (and usually were trolls or spammers), whereas others were imposters who claimed to be the original ErrorSucks12960. I was friends with a fellow named ErrorSucks1296O (notice the last character in the username is the letter O, not the digit zero), who merely used the name and didn't claim to be the original.

Spamass12: Another spammer from the days of yore. Searching his username on YouTube still brings up some videos about him, as well as a channel made by somebody who, apparently, was incredibly mad at him. He may or may not have been the same person as Unknown283 (see below); I am not really sure on that.

Unknown283: A true God amongst men. He was a very active troll and spammer in (I think) 2007, and searching for his username on YouTube still brings up many videos concerning him. His greatest feat was perhaps his abuse of an old bug in YouTube's channel comments to spam something like 1,000+ comments in a very short amount of time on Tay Zonday's official channel, all of which contained nothing but the word nigger repeated many, many times. He may or may not have been the same person as Spamass12 (listed above).

The RockmanKenny Trolls

These were a group of trolls who, for a time in 2008 (and probably prior to that year as well), frequently trolled a fellow by the name of RockmanKenny, as well as some of his friends. Besides Cirus206, I was friends with all of them, and later on I joined them in trolling RockmanKenny.

Arthur: A decent troll who appeared one day and joined us in our trolling of RockmanKenny. His username was never simply Arthur; I remember that he was banned a few times, so he ended up making multiple accounts, each of which used some variation of the name Arthur.

Cirus206 (see also a capture of his channel from 19 December 2012): In addition to his trolling of RockmanKenny, he is also the founder of yourewinner.com, a forum focusing on discussion of the PC game Big Rigs: Over the Road Racing. I can remember that when RockmanKenny began to criticize Big Rigs, Cirus saw it as an opportunity for trolling him and jumped on it. We knew about each other, but were never friends.

GuyWhoLikesSpam: A very good troll, and probably the second-best one I was personally friends with (the best one was MercurialIris, listed below). He closed his account sometime during early/mid-2008. His profile picture was an image of an aqua sedan from the 1980s or 1990s.

MercurialIris (see also a capture of his channel from 16 April 2011): The best troll I was personally friends with, and a very active one, too: despite not having uploaded a single video until 2010, his channel still managed to collect tens of thousands of views before then (which, in the 2000s, was a pretty noteworthy amount) due to his frequent trolling. I will admit that I even looked up to the guy as a troll—he knew the craft very well. For a long time, his profile picture was Leonardo da Vinci's Vitruvian Man.

RulesOneandTwo (see also another capture of his channel from a few days later): A good troll, he also had a 4chan background: his username, if you didn't know, is a reference to an old 4chan catchphrase, back when that site was much less mainstream than it is today.

Others

Other trolls I was friends with.

Anonymous450 (see also another capture of his channel from a few days later): A skilled troll, who befriended me soon after he made his YouTube account. He only trolled for perhaps a month or two before disappearing (I cannot remember if he was banned, closed his account, or simply became inactive).

DarkElementFade: A friend of mine, he uploaded the original "troll pride" video to YouTube before his account was banned. (That video was later reuploaded to YouTube by MSPaintCannon, and also uploaded to VidLii by me.)

DEFTA: A small troll group that operated during 2009. I was friends with the leader, deftalulz, as well as MechaDeftha, another member whose name I can still recall.

GAYNIGGERWITHAIDS: Funny name.

Testement117 (see also a capture of his channel from 20 April 2012): A decent troll, who was rather active for a while.

For a much longer list of YouTube trolls, take a look at the list made by the Anti-Troll Organization, which was last updated on 23 July 2009; however, I should warn you against taking that list too seriously, because it's likely that they also added to it anybody they didn't like or found to be slightly unpleasant, not just actual trolls. (And, yes, there really was an Anti-Troll Organization on YouTube back then; I can remember viewing their YouTube channel when it still existed. Hell, there was even an Anti-Anti-Troll Organization! YouTube truly was a more fun and entertaining place in those days.)

=== Thoughts on Froge's "4chan: A Song of Kek and Cringe" ===

99, <http://lolwut.info/>*

A fellow Neocities user, Froge, recently published an article entitled "4chan: A Song of Kek and Cringe", which is mostly a glossary of terms used on the site, but also contains a bit of its history. It was undertaken by him after I commented on an earlier piece of his (a history of Tumblr, including his personal experiences on it), in which I casually inquired if he had been browsing 4chan for as long as Tumblr, and expressed my interest regarding his perspective of the history of 4chan. At the time, I did not think that he would seriously consider my request, but he did, and devoted three weeks to writing it; because of this, and because it concerns a subject that is very close to my heart, I feel compelled to acknowledge it with a response.

Froge reveals in the piece that he discovered 4chan in 2010, but that he has not browsed the site heavily, instead preferring Tumblr. I first discovered 4chan around December 2007, and though initially I only visited it sporadically, sometime in the early 2010s (and definitely no later than mid-2012) I began checking it regularly, and still continue to do so; it is therefore my hope that I may be able to offer a perspective which has the benefit of at least two more years' worth of firsthand experience with the site and its culture.

I admit that when I first read through the article, I was caught off-guard by the appearance in the glossary of a few terms of which I was completely unaware, despite the fact that I began visiting 4chan a few years before Froge. I soon noticed, however, that all the terms I didn't know (viz., Barneyfag, bumpfag, Doremifriend, froge, and GR15) were peculiar to boards that I do not browse, but which Froge does (viz., /co/, /trash/, /mlp/, and /s4s/). During my first reading I thought that the piece was, in places, too biased towards the brony subculture—in the brief history of the site at the beginning of the article, for instance, he dedicates an entire subsection to the "Great Pony War", i.e., the emergence of the subculture on 4chan, which, if I were to write a history of the site, would have been but a mere paragraph, or less.

I now realize that such bias is almost inevitable in any history of the site written in 2020 by a single person. 4chan's userbase has grown very large over the years, so much so that today it is less meaningful to speak of a single, site-wide culture. Every board now has, to varying degrees, its own culture, memes, and slang, and today it is no longer possible for a single individual to regularly browse every board on the site and thereby absorb all parts of the culture, unlike in the 2000s, when 4chan culture was, more or less, /b/ culture. Froge acknowledges his bias, stating that he writes from the perspective of a "Canadian social democrat who shills for the NDP" and who reads /co/, /trash/, /mlp/, and /s4s/; I will here acknowledge mine, and say that the following piece is written from the perspective of a 2000s nostalgic, an American cyberlibertarian who shills for the Libertarian Party, and a regular of /g/ and /pol/ who also visits /t/, /his/, and /int/ occasionally,⁽¹⁾ and who used to browse /b/ regularly back when it was the largest and most influential board on the site.

There are many good sections in the article, and much humor is scattered throughout. Much of it is very accurate, though there are some entries, mostly concerning contentious topics, which I feel have been given somewhat of an unfair treatment.⁽²⁾ Normally I would not hesitate to hurl harsh criticisms and call the author a massive faggot—such is the standard course of action for a 4chaner, of course—but because Froge is a fellow whom I very much respect, because he is also a fellow 4chaner, and because the entire thing, in the first place, was written due to a request of mine, I shall restrain myself in those cases to strictly constructive criticism.

I will comment first on particular glossary entries, and then proceed to offer my thoughts concerning the short history near the beginning of the article.

Thoughts on Specific Glossary Terms

As a general note, the author's decisions regarding which terms to include in the glossary are sensible, though biased at times to board-specific (as opposed to site-wide) slang, and personally I would have also included important terms like, e.g., AIDS, b&, butthurt, cospasta, happening, moar, pizza, PROTIP, and v&; an entry for Project Chanology; and definitions for catchphrases like "Hackers on steroids", "Internet Hate Machine", "Not your personal army", "Tits or GTFO", and, of course, "The Internet is Serious Business".

Anon

This is mostly correct, with only a very small issue: in the first paragraph, Froge asserts that the representation of the hacktivist Anonymous during the late 2000s and early 2010s was "an invisible man wearing a Guy Fawkes mask in addition to a black-tie tuxedo". To more be precise, there were in those days two common representations of the movement: the one was an invisible man wearing a black business suit and tie, and the other was a (normal, not invisible) man wearing the Guy Fawkes mask, whatever other clothing being irrelevant; at times, even the mask by itself, without a body, was used. An example of the first can be found in the demotivator below (this specific image, notably, has been saved on my hard drive for over 12 years now):

Anonymous: Because none of us are as cruel as all of us.

Of course, it's entirely possible to merge the two representations into what Froge has described, but I simply wanted to point out that there were, in fact, two separate images for this particular subgroup of Anonymous.

Cancer

I agree fully with his comment that "Pepe and Wojak [Feels Guy] overtaking 4chan's entire meme culture" is a cancer; it has led to much staleness in this aspect of the site, in total contrast to the great creativity of the past, when memes overflowed—to where, I ask, has the imagination of old 4chan gone?

Coolf

I am confused over the author's remark at the end of the first paragraph stating that the coronavirus has "no vaccine": there are at least two vaccines out now that have been authorized by the FDA and have been shown to be effective. I can only assume that it was one of the earlier entries written, and was not updated later on to reflect the most recent developments concerning the vaccines.

Coom

The first sentence of the second paragraph is very true: 4chan has always been filled with porn, perverts, and chronic masturbators, which is something that Froge and every oldfag understands, but which many politically conservative newfags on the site these days do not. It is still somewhat regrettable, however, that /b/ has for the past handful of years become little more than a porn dump, and has (for this and other reasons) lost much of the variety and unpredictability that made it so exciting to read back in the day. I don't mean to say that the porn itself is bad, or that it has no place on /b/; rather, what I mean is that too much of it reduces the board's variety of content and crowds out other material that is equally interesting. I would certainly not reproach somebody for merely posting porn on /b/ (or any other non-porn board), but today I would at least encourage them, if they were thinking of starting a thread about it, to perhaps first consider taking it to the porn boards, as /b/ these days has grown very stale, and is in great need of non-pornographic OC.

Also, I object to his remark about "objectifying" cartoon characters—this is nothing but a feminist-tier complaint that is used at times to censor porn, and in this case it is not even a valid one, because these are not real, living persons, but rather fictional, drawn characters; it is pointless to speak of this when the things being "objectified" are, in the first place, non-living objects.

Cringe

That cospasta spawned a hilarious audio recording of its reading, which I then took and put together a little Flash animation featuring it.

Cripplechan

The account of events given here, though containing biased language throughout, is (as far as I am able to tell) factually correct. Regardless, the author still makes two mistakes in this entry, one being very minor, and the other being the most serious in the whole article.

The first mistake, the very minor one, is that he claims that 7chan has "obsolete forum software and [an] atrocious layout", which I disagree with—I see nothing wrong with that site's software or layout, and if the layout, as he also writes, is "reminiscent of 4chan's earliest [i.e. 2000s-era] days", why, then this is a good thing!⁽³⁾

The second mistake is found in the second paragraph, and it is here, I think, that the author's relative newfaggotry is most apparent, and to his detriment. Froge started browsing 4chan in 2010, while I started around December 2007; Hotwheels began even earlier, reporting that he discovered the site in 2006, at age 12. When I compare my firsthand experiences on 4chan during 2010 with those of 2008, it is apparent to me that the amount of freedom on it had diminished—not to a stifling degree, but it was still noticeable. Froge had no opportunity to experience for himself the incredible freedom which existed on 4chan during the 2000s, a priceless treasure that both Hotwheels and I, thankfully, were able for a time to savor. It was truly something that, when once you are exposed to it, everything else by comparison becomes oppressive, and almost all rules feel suffocating: such is probably one of the few curses of tasting true freedom in a world where it is a rarity. Froge might draw from his experiences on 4chan in 2010, and come to believe that the site's rules in 2013 (when 8chan was founded) were "reasonable limits", but I very much disagree—in 2013, the site had become uncomfortably restrictive when compared to how it was in 2008, or even 2010, and I can only imagine how more intensely Hotwheels must have felt this very same sentiment, having in his case his memories of the site in 2006 and 2007—which was even freer, according to stories told and remarks made by oldfags that I have heard—as a point of reference.

Even worse, Froge then writes that in 2013 8chan was established "in response to [Hotwheels] interpreting 4chan's policies at the time as authoritarian—despite 2013 4chan having even less rules than it does now", implying, firstly, that 4chan in 2013 was not unduly burdened with rules, and Hotwheels was therefore misguided in his belief in 2013 that it had become unacceptably unfree; and, secondly, that even 4chan today, in 2020, does not have an excessive amount of rules and still possesses a satisfactory degree of freedom.

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