

THE DYSLEXIC SUPPORT GROUP RAN INTO DIFFICULTIES WHEN THEY TRIED TO MAKE A JOKE FUNDRAISER T-SHIRT.



**A WEBCOMIC OF ROMANCE,  
SARCASM, MATH, AND LANGUAGE.**



MY HOBBY:  
ABUSING DIMENSIONAL ANALYSIS

$$\frac{\text{PLANCK ENERGY}}{\text{PRESSURE AT THE EARTH'S CORE}} \times \frac{\text{PRIUS COMBINED EPA GAS MILEAGE}}{\text{MINIMUM WIDTH OF THE ENGLISH CHANNEL}} = \pi$$

IT'S CORRECT TO WITHIN EXPERIMENTAL ERROR, AND THE UNITS CHECK OUT. IT MUST BE A FUNDAMENTAL LAW.

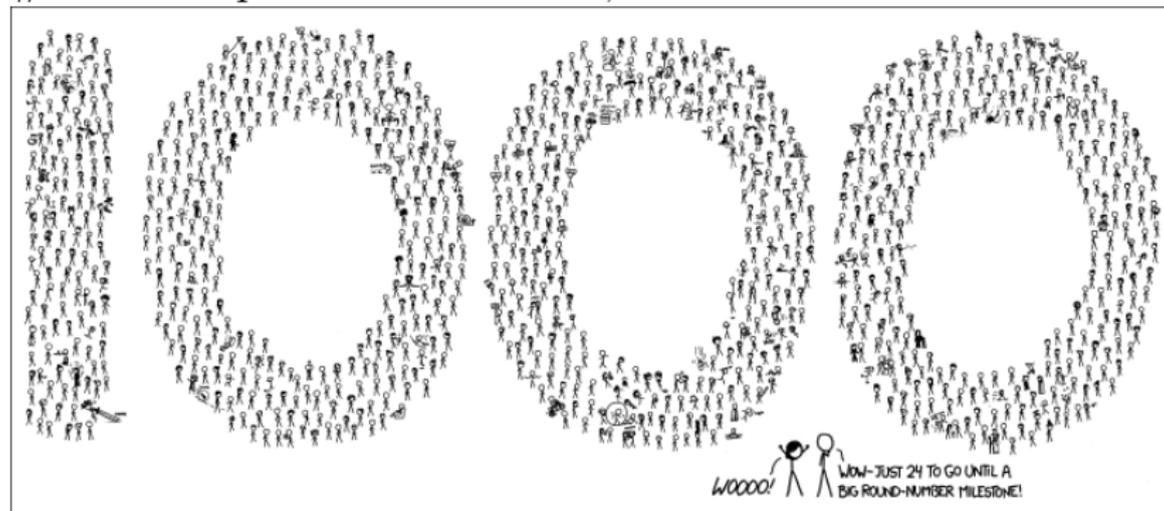


#1500

Yesterday, #1500 was published!

#1000

#1000 was published on Jan 6, 2012:



# Ask wikipedia!

**Comics** Comics is a medium used to express ideas via images, often combined with text or other visual information.

**Caricature** A caricature is a rendered image showing the features of its subject in a simplified or exaggerated way.

**Novel** A novel is a long narrative, normally in prose, which describes fictional characters and events, usually in the form of a sequential story.



# How to read a webcomic

xkcd: Terry Pratchett - Mozilla Firefox

xkcd: Terry Pratchett

S xkcd.com

ARCHIVE  
WHAT IF?  
BLAG  
STORE  
ABOUT

**xkcd** A WEBCOMIC OF ROMANCE,  
SARCASM, MATH, AND LANGUAGE.  
XKCD UPDATES EVERY MONDAY, WEDNESDAY, AND FRIDAY.

**TERRY PRATCHETT**

[<] < PREV RANDOM NEXT > [>]

*I told her we were going to get married, and all she could talk about was frogs.  
She said there's these hills where it's hot and rains all the time, and in the rainforests there are these very tall trees and right in the top branches  
of the trees there are these like great big flowers called ... bromeliads, I think, and water gets into the flowers and makes little ponds and there's a  
type of frog that lays eggs in the ponds and tadpoles hatch and grow into more frogs and these little frogs live their whole lives in the flowers right  
at the top of the trees and don't even know about the ground, and once you know the world is full of things like that, your life is never the same.  
...Maddie, Terry Pratchett's *The Bromeliad Trilogy**

Thank you for teaching us how big our world is by sharing so many of your own.

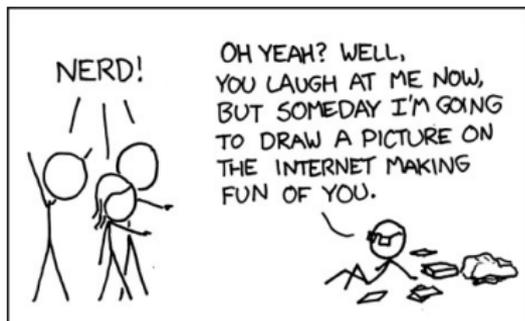


[<] < PREV RANDOM NEXT > [>]

PERMANENT LINK TO THIS COMIC: [HTTP://XKCD.COM/1498/](http://xkcd.com/1498/)  
IMAGE URL (FOR HOTLINKING/EMBEDDING): [HTTP://IMGS.XKCD.COM/COMICS/TERRY\\_PRATCHETT.PNG](http://imgs.xkcd.com/comics/terry_pratchett.png)

# xkcd and its creator

Randall Munroe (\* Oct 17, 1984)



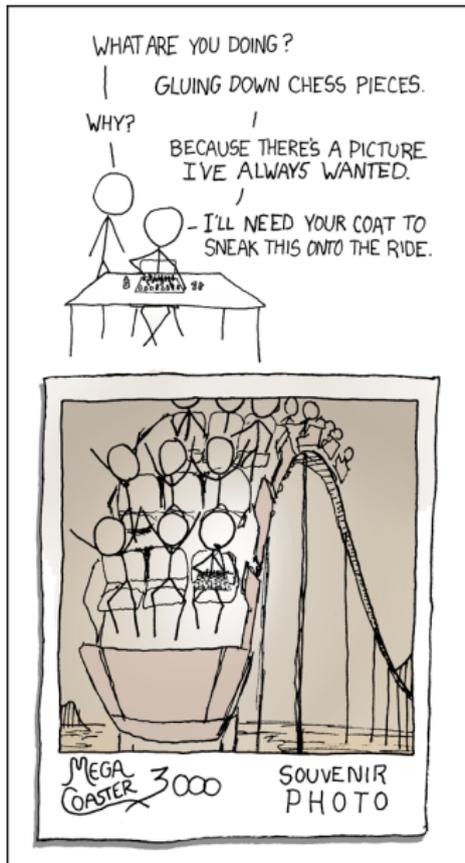
**Who are you?** “I’m a CNU graduate with a degree [BS ’06] in physics. Before starting xkcd, I worked on robots at NASA’s Langley Research Center in Virginia. As of June 2007 I live in [Somerville,] Massachusetts.”

**“What does XKCD stand for?”** It’s not actually an acronym. It’s just a word with no phonetic pronunciation – a treasured and carefully-guarded point in the space of four-character strings.”

*The New Yorker* interview, 2008: “It’s about three-fourths autobiographical. [...] Now I spend most of my time drawing pictures and looking at funny things on the Internet, which in retrospect is largely what I did at my old job, too. Maybe that’s why they kicked me out.”

**“What else do you do?”** [...] Host a gallery of photos inspired by comic #249.”

#249



#249



#249



From *The New Yorker* interview: “I know I should be used to it, but I keep being surprised seeing the ideas in the comic leak out into real life. It’s tempting to just write a comic called “EVERYONE MAIL RANDALL MUNROE TWENTY BUCKS” – maybe it would work [...].”

# Asteroid

NASA Jet Propulsion Laboratory  
California Institute of Technology

+ View the NASA Portal  
+ Near-Earth Object (NEO) Program

Search JPL

JPL HOME EARTH SOLAR SYSTEM STARS & GALAXIES TECHNOLOGY

## Solar System Dynamics

BODIES ORBITS EPHEMERIDES TOOLS PHYSICAL DATA DISCOVERY FAQ SITE MAP

## JPL Small-Body Database Browser

Search:  [ help ]

### 4942 Munroe (1987 DU6)

Classification: Main-belt Asteroid

SPK-ID: 2004942

[ [Ephemeris](#) | [Orbit Diagram](#) | [Orbital Elements](#) | [Physical Parameters](#) | [Discovery Circumstances](#) | [Close-Approach Data](#) ]

[ show orbit diagram ]

#### Orbital Elements at Epoch 2457000.5 (2014-Dec-09.0) TDB

Reference: [JPL 12](#) (heliocentric ecliptic J2000)

Element	Value	Uncertainty (1-sigma)	Units
e	.1365686422526735	5.2346e-08	
a	2.201270616854447	8.8059e-09	AU
q	1.90064607747993	1.1556e-07	AU
i	3.834590961953976	4.6999e-06	deg
node	278.1646331186026	8.73e-05	deg
perl	11.18763266550251	9.0189e-05	deg
M	67.4869645688602	2.2819e-05	deg
$t_p$	2456776.872105014172 (2014-Apr-29.37210501)	7.5586e-05	JED
period	1192.912478864771	7.1581e-06	d
	3.27	1.96e-08	yr
n	.3017824076604447	1.8109e-09	deg/d
Q	2.501895156228964	1.0008e-08	AU

#### Orbit Determination Parameters

# obs. used (total)	1412
data	01704 data / 60 Epochs
first obs.	
last obs.	
planetary	
SB-per	
condi	
da	
sol	

## Asteroid 4942 Munroe

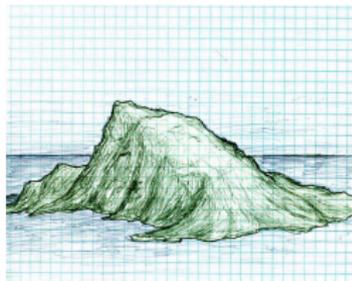
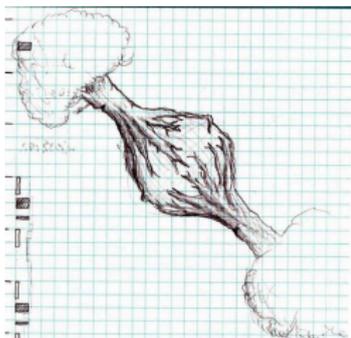
Whoa. There's an [asteroid named after me!](#)

Amazing xkcd readers Lewis Hulbert and Jordan Zhu noticed that the International Astronomical Union—the organization in charge of official astronomical naming—was taking suggestions for what to name small Solar System objects. They [submitted my name](#) for asteroid (4942) 1987 DU6, and it was subsequently renamed 4942 Munroe.

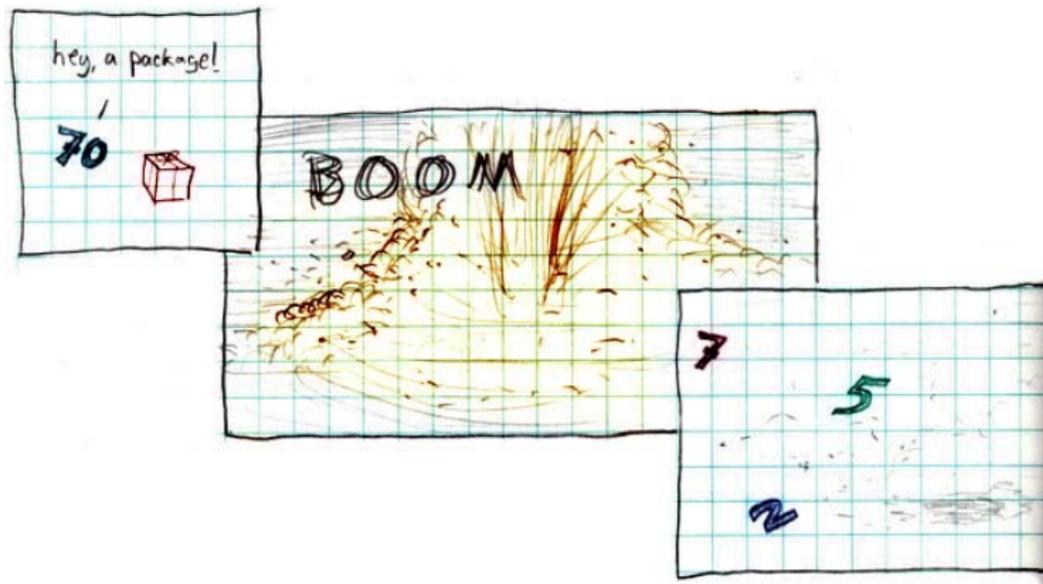
I'm really touched. I spent all weekend telling everyone who wanted to listen (and probably some who didn't) about the asteroid.

## #1-#3: Some history

**“Where did all this start?** I was going through old math/sketching graph paper notebooks and [...] started scanning pages. I took the more comic-y ones and put them up on a server I was testing out, and got a bunch of readers [...]. I started drawing more seriously, gained a lot more readers, [...] and am currently [...] drawing this comic full-time. It’s immensely fun and I really appreciate y’all’s support.”

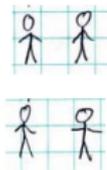


## #5: First mathematical sketch

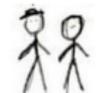


# Style development

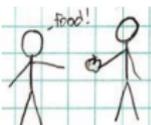
The emancipation of the stick figure



#6



#24



#119



#18



#26



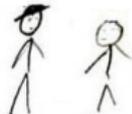
#72



#201



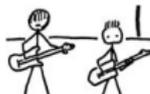
#42



#12



#15



#119



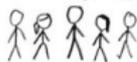
#59



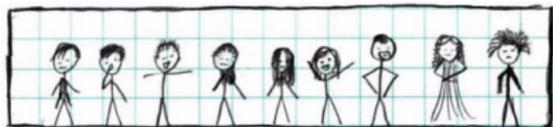
#140



#805



#84



#9



#38



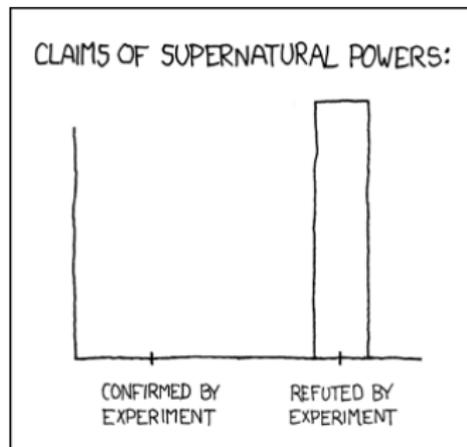
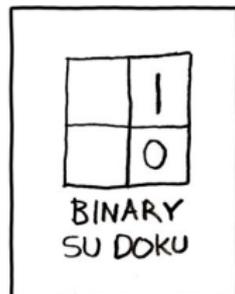
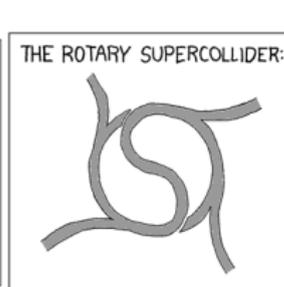
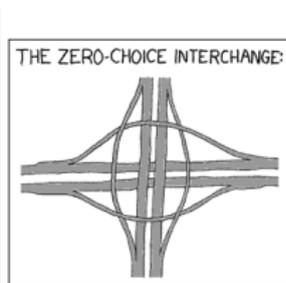
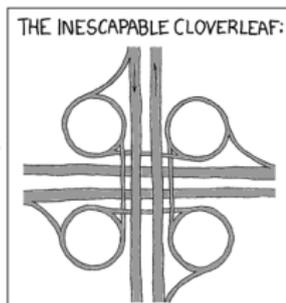
#900

around #50: figures are drawn more carefully and represent true gestures  
no faces

around #150: head is not round and is offset  
figure is larger and more prominent

# Types of comics – no persons

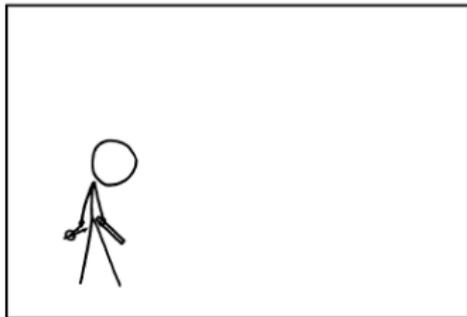
HIGHWAY ENGINEER PRANKS:



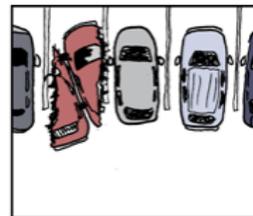
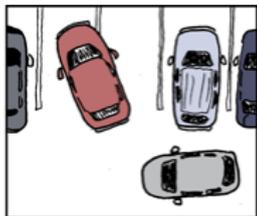
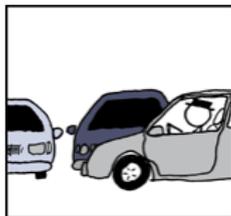
(AN UNMATCHED LEFT PARENTHESIS  
CREATES AN UNRESOLVED TENSION  
THAT WILL STAY WITH YOU ALL DAY.)

# Types of comics – no interactions

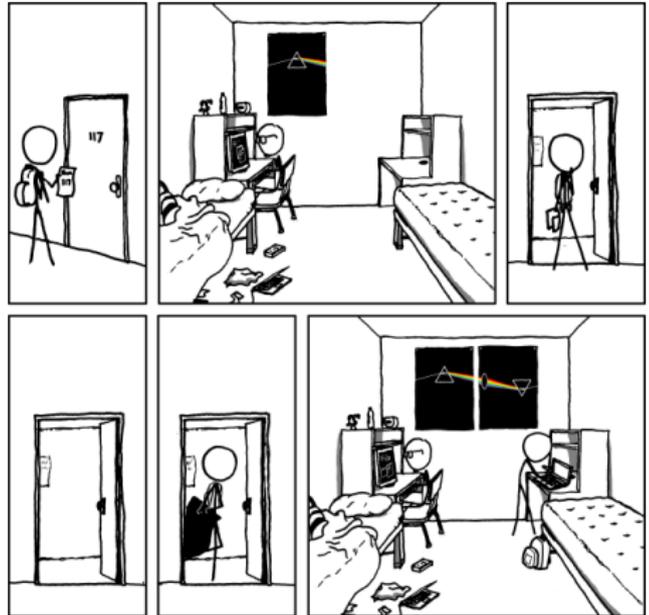
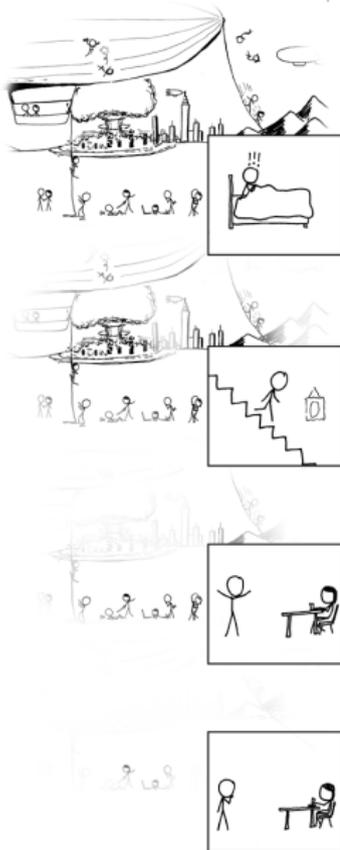
I LEARNED IN HIGH SCHOOL WHAT  
GEOMETERS DISCOVERED LONG AGO:



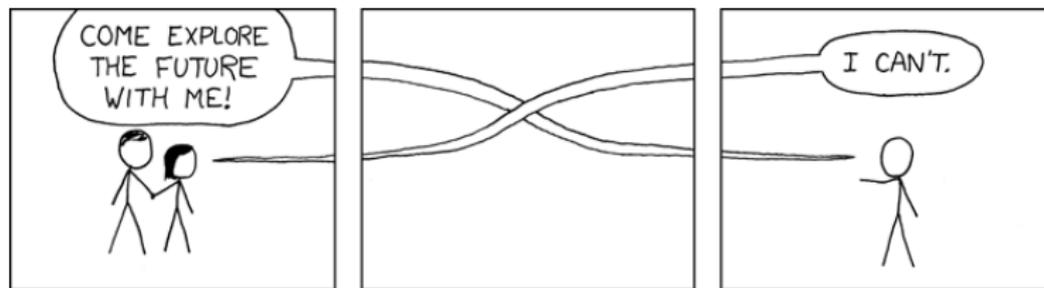
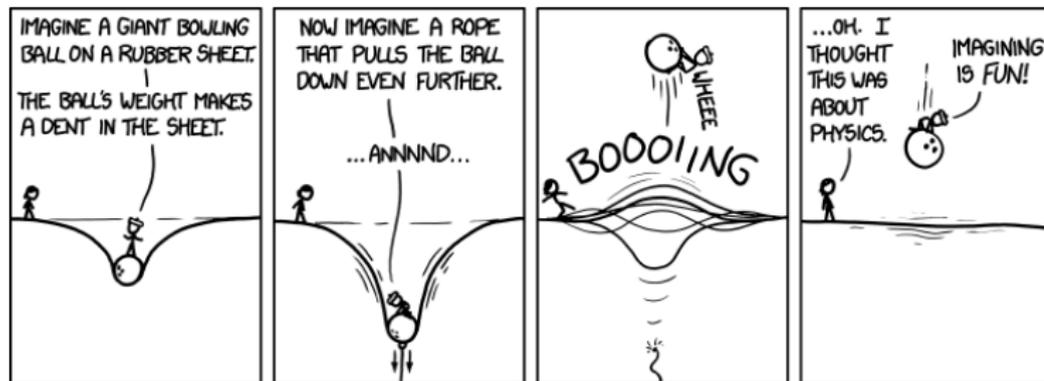
USING ONLY A COMPASS AND STRAIGHTEDGE,  
IT'S IMPOSSIBLE TO CONSTRUCT FRIENDS,



# Types of comics – interactions without words



# Types of comics – classic interactions



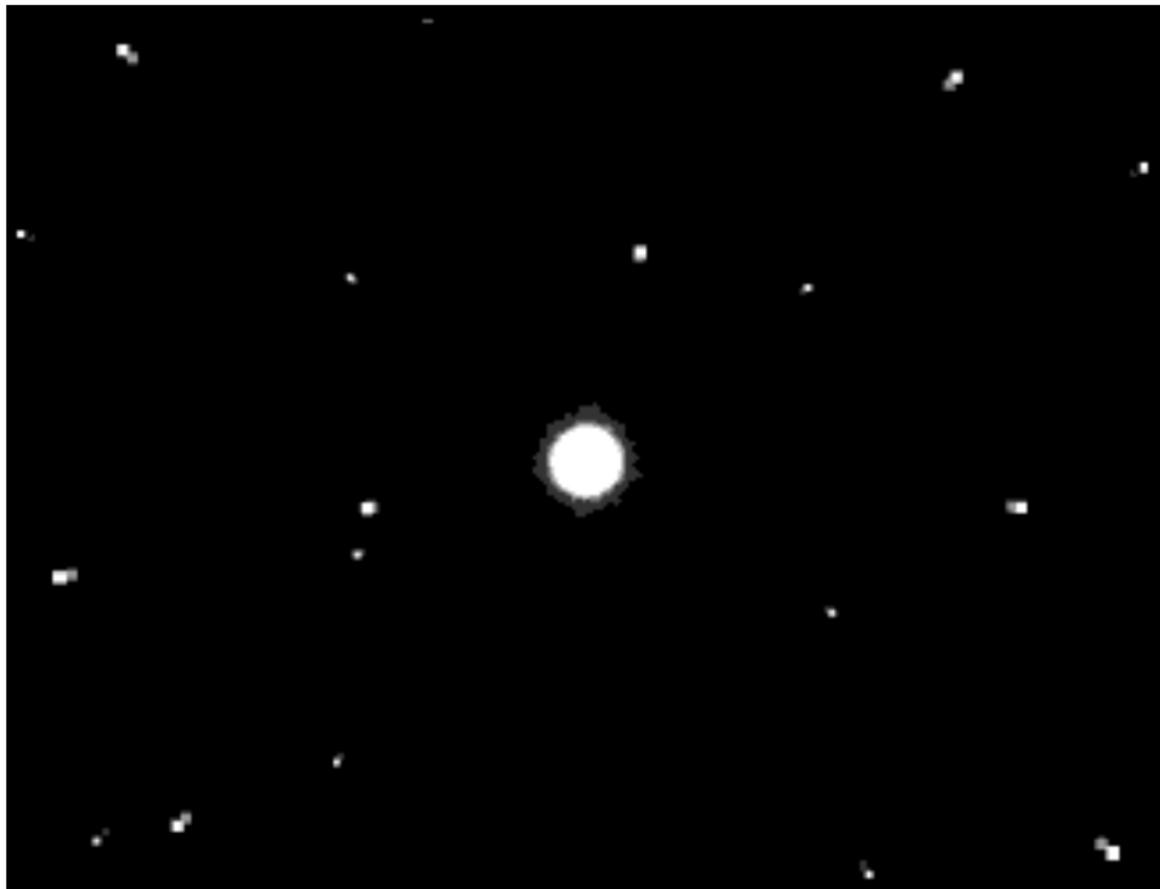
Extra for our astrophysics friends

I'VE BEEN STARING AT THE SCREEN  
EVERY NIGHT FOR TWENTY YEARS,  
AND IT FINALLY HAPPENED.

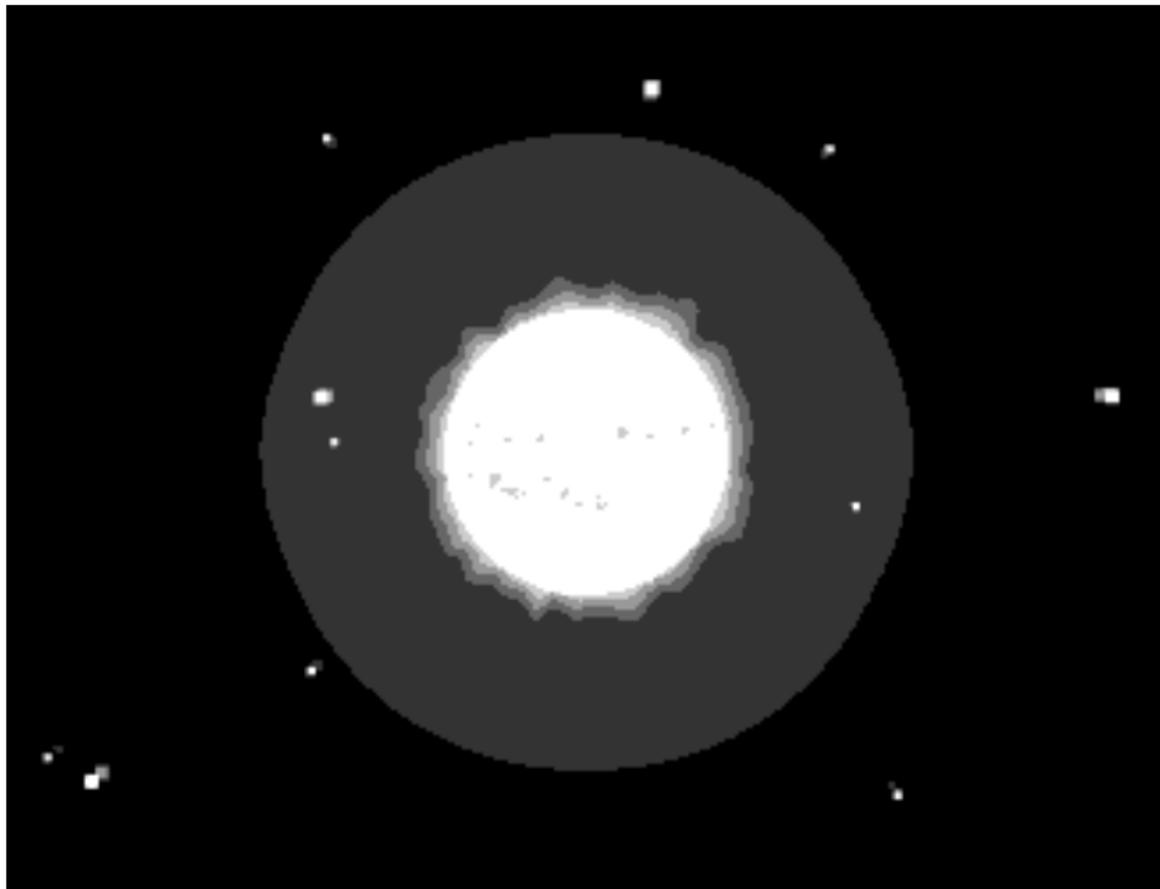
Extra for our astrophysics friends



Extra for our astrophysics friends



Extra for our astrophysics friends



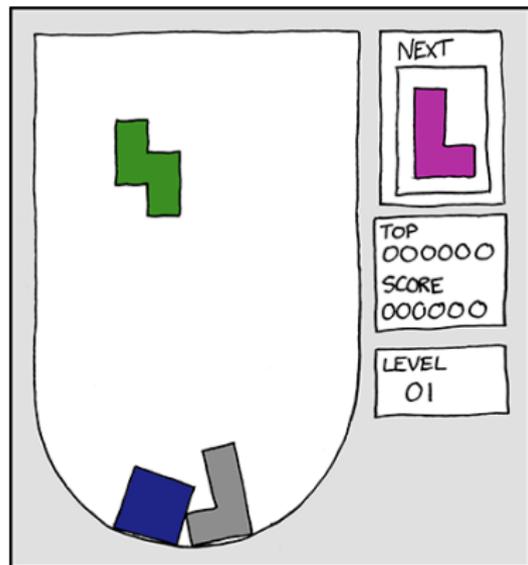
Extra for our astrophysics friends



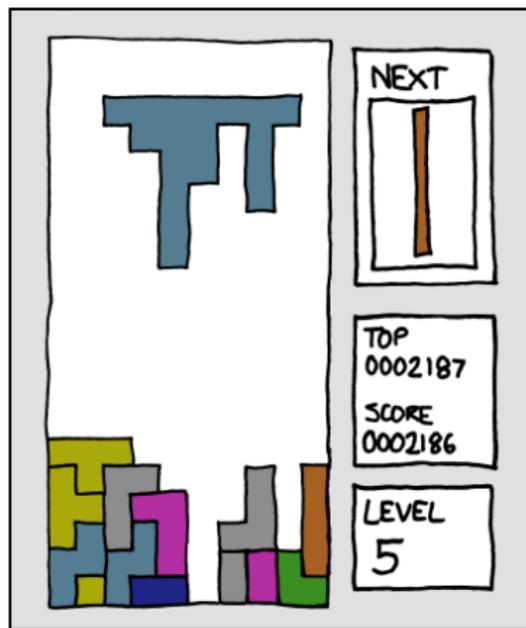
Extra for our astrophysics friends



# References (#724 & #888)

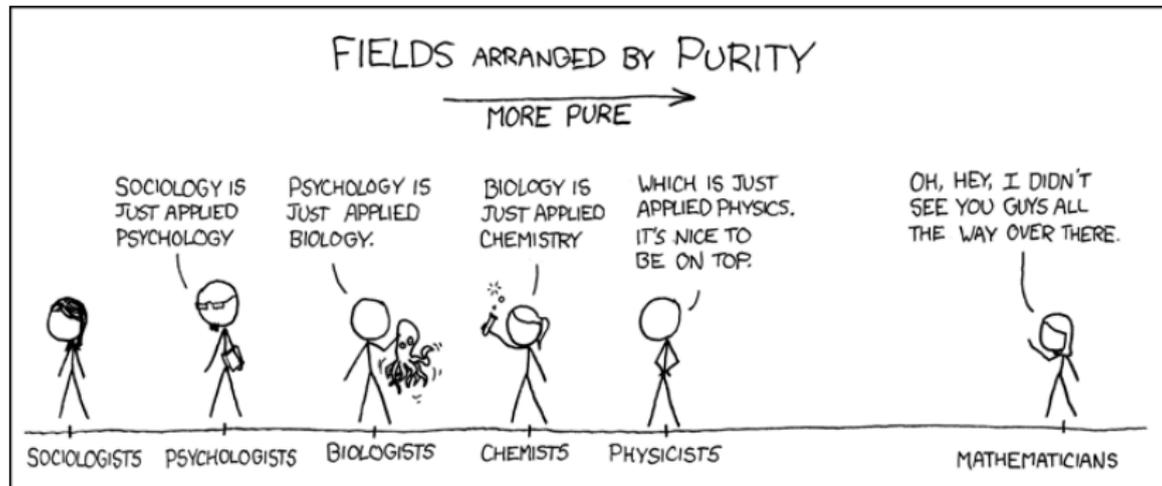


HELL

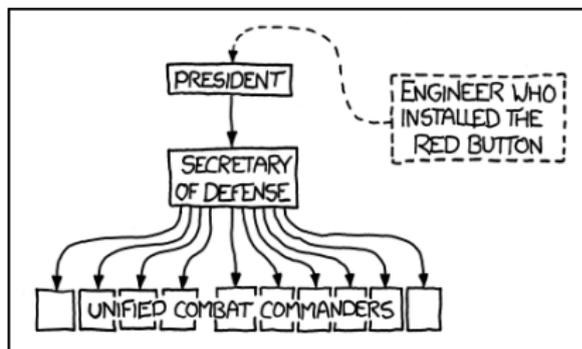
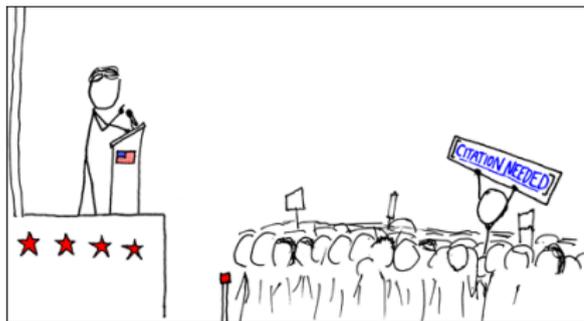


HEAVEN

# A science classic (#435)



# Politics (#285)



US NUCLEAR CHAIN OF COMMAND

Mouse-hover text: "Themistocles said his infant son ruled all Greece – "Athens rules all Greece; I control Athens; my wife controls me; and my infant son controls her." Thus, nowadays the world is controlled by whoever buys advertising time on Dora the Explorer."

# Politics (#1005)

[don't censor the web.]

I make my living drawing xkcd, which wouldn't have been possible if people hadn't been able to freely share my comics with each other all over the internet.

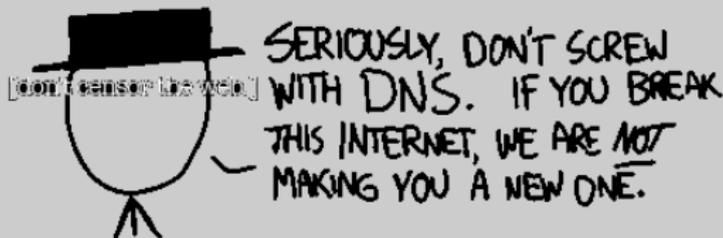
As a copyright holder and small business owner, I oppose SOPA and PIPA.

See the links below to learn more.

A handwritten signature in black ink, which appears to be "Randall Munroe", followed by a small stick figure icon.

# Politics (#1005)

## A MESSAGE FROM SYSADMINS EVERYWHERE:



I make my living drawing xkcd, which wouldn't have been possible if people hadn't been able to freely share my comics with each other all over the internet.

As a copyright holder and small business owner, I oppose SOPA and PIPA.

See the links below to learn more.

*Randall Munroe* 

# Interactive comics

<http://xkcd.com/now>

# Interactive comics

<http://xkcd.com/1110/>

(165888 by 79822 px)

# Explain xkcd

1110: Click and Drag - explain xkcd - Mozilla Firefox

www.explainxkcd.com/wiki/index.php/1110

Page: [Discussion](#)

Need [help](#) | [View history](#)

Today's incomplete explanation of the day is 887: Future Timeline. Help us fix it!

## 1110: Click and Drag

Pages: [edit](#) | [view page source](#) | [history](#) | [diff](#) | [undo](#) | [redo](#) | [rollback](#) | [warp](#) | [delete](#) | [protect](#) | [unprotect](#) | [help](#)

Navigation: [Main page](#) | [Recent events](#) | [Random page](#) | [Search](#) | [Help](#) | [About](#) | [Contact](#) | [Privacy](#) | [Terms](#) | [Feedback](#) | [Report a problem](#) | [Help](#) | [About](#) | [Contact](#) | [Privacy](#) | [Terms](#) | [Feedback](#) | [Report a problem](#)

1110: Click and Drag

From the comic: [1110: Click and Drag](#)

Click and Drag

From the comic: [1110: Click and Drag](#)

To experience the interactivity, visit the original comic: [1110: Click and Drag](#)

**Explanation**

**!** This explanation may be incomplete or incorrect: Some of the jokes in the larger world might benefit from an explanation. If you can address this issue, please edit the page!

This comic is a take on how we use and view the world, and on the thrill of exploring it. The world can be described as wonderful, even if this seems a bit contradictory, just because there are so many different things happening in it. That *Cubell* is hanging from a beam brings to mind the expanded perspective over the landscape afforded by early experimenters in overland flight. The explanation of the sea and wonderful aspects of the world is the subject of a movie, "The Red Balloon", in which a young boy experiences the complexity of human society through his interactions with a mysterious, winged balloon.

**Content:** [1110: Click and Drag](#)

1. Explanation  
2. General  
3. General  
4. Trivia  
5. General  
6. List of terms and references  
7. References by Category  
8. Links  
9. Non-mainstream

# Explain xkcd

1110: Click and Drag - explain xkcd - Mozilla Firefox

www.explainkcd.com/wiki/index.php/1110

## Explaination

**1** This explanation may be incomplete or incorrect: Some of the jobs in the larger world might benefit from an explanation. If you can address this issue, please edit the page. Thank you.

This comic is a take on how we see the world, and on the thrill of exploring it. The world can be described as such, as well as it can be described as wonderful, even if this seems a bit contradictory, just because there are so many different things happening in it. That's *Corbis* is hanging from a balloon string to show the explanation perspective over the *Pixel* one obtained by early experimenters in unaided flight. The explanation of the world is the subject of a movie, "The Red Balloon", in which a young boy experiences the complexity of human society through his interactions with a mysterious, intelligent balloon.

Custom comments about this, and the first text invites the reader to, with their mouse, click and drag the inside of the red panel, and by dragging and dragging, explore what is hidden outside that panel. The image displayed at that turns out to be part of a huge tentacle sea, filled with big or small things, humorous details, people here and there, cool movies, things floating in the air, jokes and references, unexpected things, missing views, etc.

the fact that we only see a small part of the landscape as once reflects the idea that we cannot in-real life comprehend the whole world properly, but only what is around us within the range of our understanding at the time. The click-and-drag process, in which it is impossible to go as fast as we would want to, also draws a parallel with the fact that exploration is always done gradually, step by step, and trying something (i.e. here dragging) in a certain direction allows for a cost. This click-and-drag explanation reproduces the thrill of discovering new horizons, getting lost sometimes, finding unexpected things, seeing beauty, order, direction or happiness here and there... which can easily substitute an *and* it made for a long time (and as such quantities as word counts).

## Transcript

This transcript will only cover the first 3 panels.

**Panel 1** [Narration]: From the domain  
Corbis [Narration]: I expected the world to be flat  
[Corbis is floating by holding onto a balloon with one hand.]  
Corbis [Narration]: And it was  
Corbis [Narration]: And I expected to be wonderful.  
[Corbis has grabbed hold of the balloon with both hands.]  
[The wind picks up and blows Corbis eastward.]  
Corbis [Narration]: It was  
[That with paper, initial view of the world. Part of title 1014.]  
Corbis [Narration]: I just didn't expect it to be flat.  
[Now he opens up. You see Corbis is about a foot's height from the ground. To the right there is a tall tree with leaves on it and a broken sign.]

## Viewers

- [1014:2004-04-09:1100 \(native audio, click-and-drag\)](#)

**Warning:** There are cheating possibilities—available here—improving ways to explore that world more easily—but the best way to enjoy this comic is to play the game, explore the comic's world the way you're exploring it, get lost in the caves or in the sky, be startled by unexpected things or happy when finding some people when you're clicking and dragging through a repetitive landscape... so if you start at that screen, **reading any further will reduce your truly enjoying the comic.**

Though you can download the full view, the easiest way to browse it is through a [scrolling user interface](#).

- [1014:2004-04-09:1100 \(HTML\)](#) (all features of following viewer plus content highlighting, zooming, zoom memory and bookmarks, goes to history)
- [1014:2004-04-09:1100 \(HTML\)](#) (all zoom controls, scroll-wheel, click-and-drag, touch gestures, full-screen)
- [1014:2004-04-09:1100 \(HTML\)](#) (all zoom controls, scroll-wheel, click-and-drag)
- [1014:2004-04-09:1100 \(HTML\)](#) (native audio, scroll-wheel controls, full-screen)
- [1014:2004-04-09:1100 \(HTML\)](#) (native audio, scroll-wheel controls, full-screen)
- [1014:2004-04-09:1100 \(HTML\)](#) (native audio, scroll-wheel controls, full-screen)

## Trivia

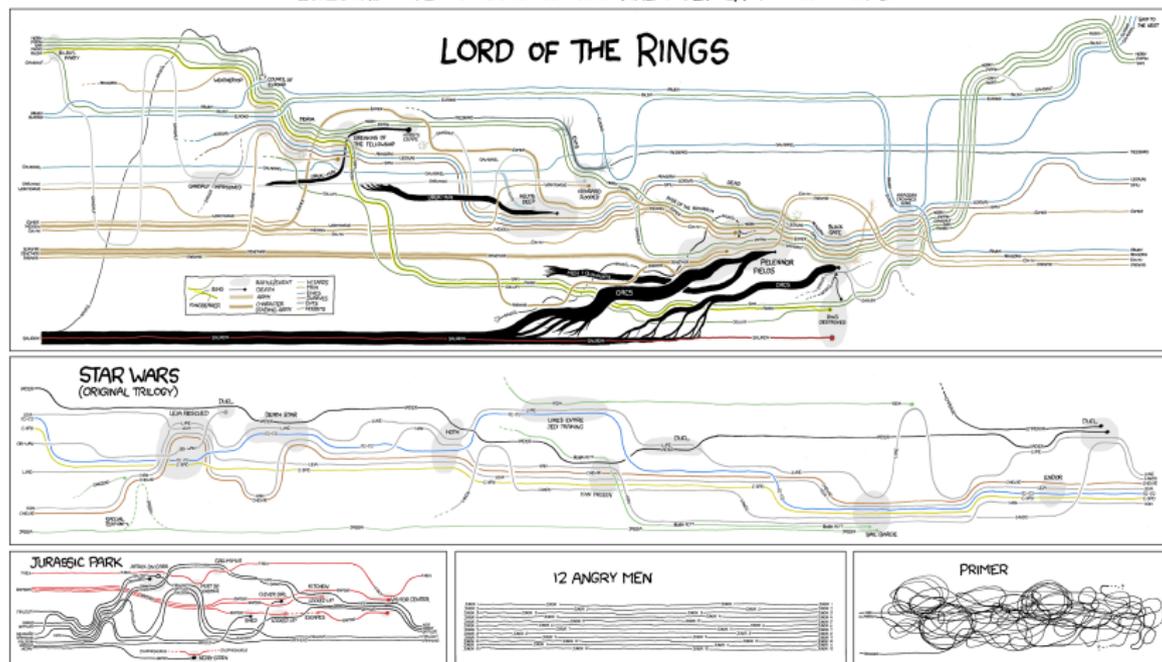
- The click-and-drag portion of this comic is divided up into 2700 sections of 2048x2048 pixels.
- There are 120 separate 2048x2048 PNG files (just the PNG container with the first panel). The other 2337 sections are either fully black (in the south) or white (in the north) with HTML.
- The associated area is 84 frames wide (33 West - 48 East) and 32 frames tall (13 North - 39 South).
- According to [Panel 2](#) in *And so the right this was released*, a full size view of this comic (bearing out the *comic*) would be 60 gigabytes, and a true single rectangular image would be close to a terabyte. The entire version is 1 gigabyte without the blanks and 10 gigabyte as rectangular image (2048x2048x120 = 943,718,400 and 2048x2048x120 = 39,870,000).
- Based on the height of figures as well as the "two meter" figure given on the left and only, the space should be approximately 10 pixels per foot, making the entire map 27000 feet wide (4.1 miles or 7.1 kilometers) by 10000 feet tall (1.6 miles or 2.6 kilometers). If we use an overhead view, it would be about 8.5 square miles (2188 acres or 28.7 square km), making the total black space, White space, USA, just the PNGs, HTML and 120 PNG files with something drawn on them would be 120 acres or 18208 square miles — about the size of Princeton University.
- If the 2048x2048 PNGs were to be printed out at a single color at 300 dpi, the poster would be 15.36 yards (14.05 meters) long and 6.87 yards (5.53 meters) tall. Most of that would be invisible, as these PNGs are optimized for ~70 dpi screens.
- There is one byte every pixel given in 8 bits, 1 byte @ 8 2048x2048. The remainder is for graphics.
- At the end of the right side it shows Corbis pondering where his foot next.

## Whole image



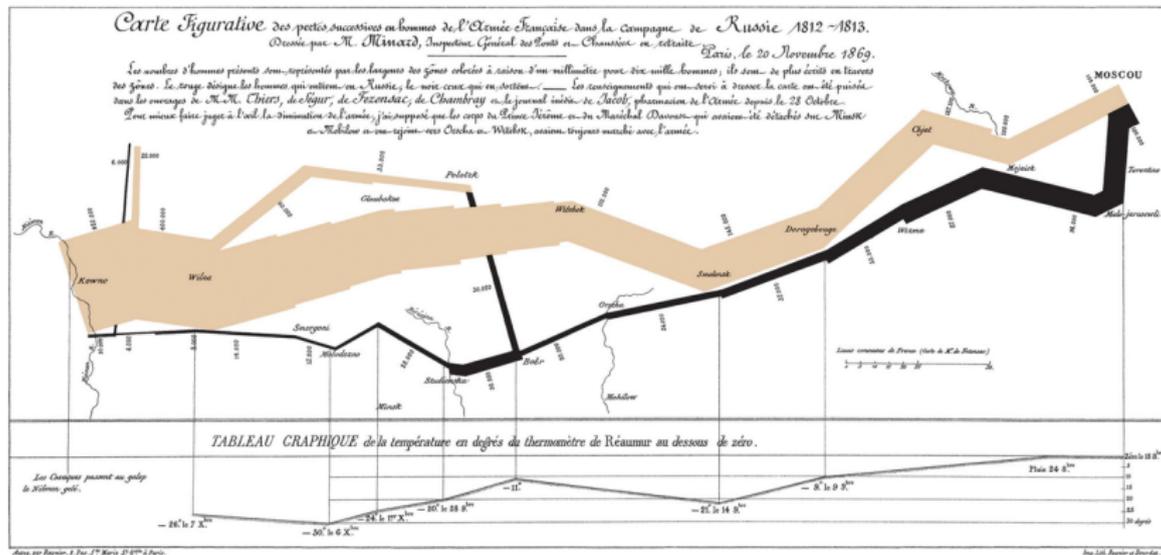
# Data overview plots

THESE CHARTS SHOW MOVIE CHARACTER INTERACTIONS.  
THE HORIZONTAL AXIS IS TIME. THE VERTICAL GROUPING OF THE  
LINES INDICATES WHICH CHARACTERS ARE TOGETHER AT A GIVEN TIME.

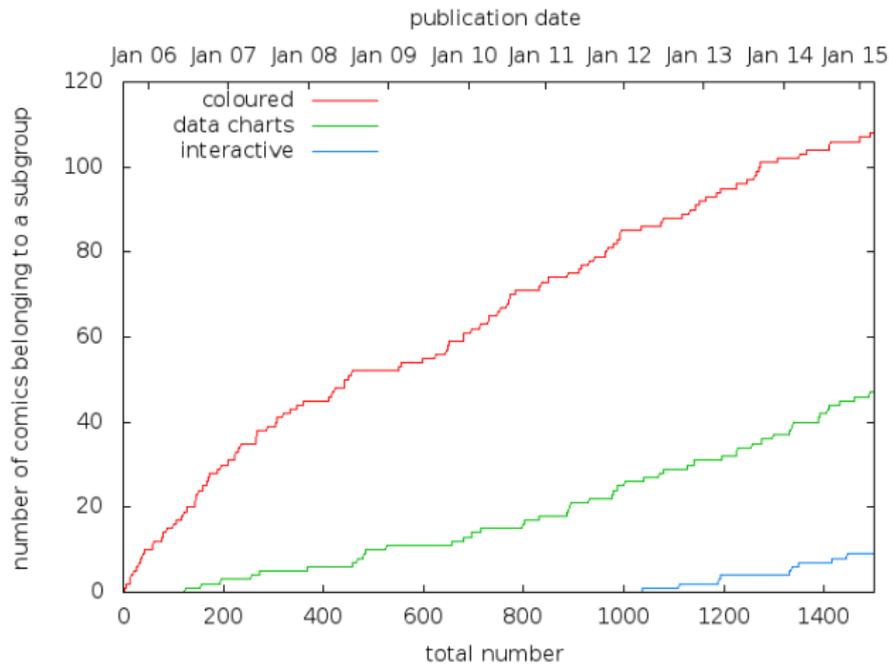


# Minard's losses of Napoleon's army

Charles Joseph Minard (1781–1870) – French civil engineer and information graphics pioneer



# Comic style statistics



# What if?

Weekly blog with Munroe answering questions apparently posed by readers. He “takes the question beyond the original scope likely intended by the reader and takes it to some extreme for humorous effect.” ([explainxkcd.com](http://explainxkcd.com))  
What if? was published as a book on September 2, 2014.

# What if?

- ▶ What would happen if you tried to hit a baseball pitched at 90% the speed of light?
- ▶ How much Force power can Yoda output?
- ▶ What would happen if you were to gather a mole (unit of measurement) of moles (the small furry critter) in one place?
- ▶ What if there was a robot apocalypse? How long would humanity last?
- ▶ What if a glass of water was, all of a sudden, literally half empty?
- ▶ Is there enough energy to move the entire current human population off-planet?
- ▶ What would happen if everyone on earth stood as close to each other as they could and jumped, everyone landing on the ground at the same instant?
- ▶ What if everyone actually had only one soul mate, a random person somewhere in the world?
- ▶ What would the world be like if the land masses were spread out the same way as now - only rotated by an angle of 90 degrees?
- ▶ If you went outside and lay down on your back with your mouth open, how long would you have to wait until a bird pooped in it?
- ▶ What if a rainstorm dropped all of its water in a single giant drop?
- ▶ If every person on Earth aimed a laser pointer at the Moon at the same time, would it change color?
- ▶ In Armageddon, a NASA guy comments that a plan to shoot a laser at the asteroid is like "shooting a b.b. gun at a freight train." What would it take to stop an out-of-control freight train using only b.b. guns?
- ▶ If you carry a penny in your coin tray, how long would it take for that penny to cost you more than a cent in extra gas?
- ▶ The story of the three wise men got me wondering: What if you did walk towards a star at a fixed speed? What path would you trace on the Earth? Does it converge to a fixed cycle?
- ▶ From what height would you need to drop a steak for it to be cooked when it hit the ground?
- ▶ What would happen if you tried to fly a normal Earth airplane above different Solar System bodies?
- ▶ When - if ever - will the bandwidth of the Internet surpass that of FedEx?
- ▶ If the Hubble telescope were aimed at the Earth, how detailed would the images be?
- ▶ How much would the sea level fall if every ship were removed all at once from the Earth's waters?
- ▶ ... [132 posts as of Mar 17, 2015]

## What if? #6

What if a glass of water was, all of a sudden, literally half empty?



# What if? #6

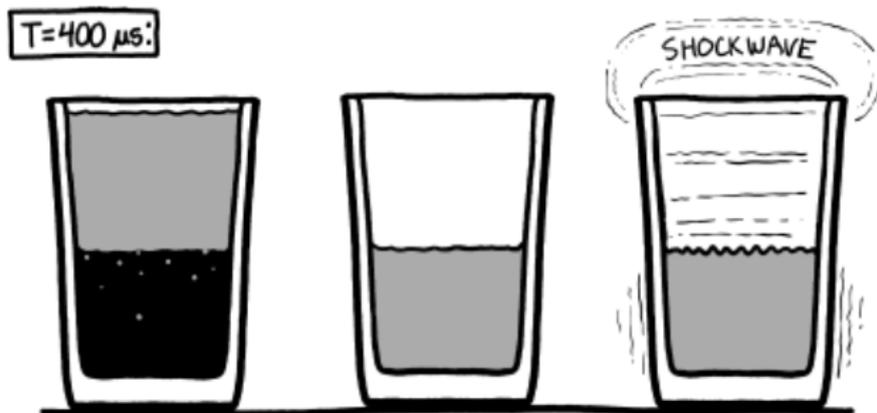
What if a glass of water was, all of a sudden, literally half empty?

$T = 150 \mu\text{s}$



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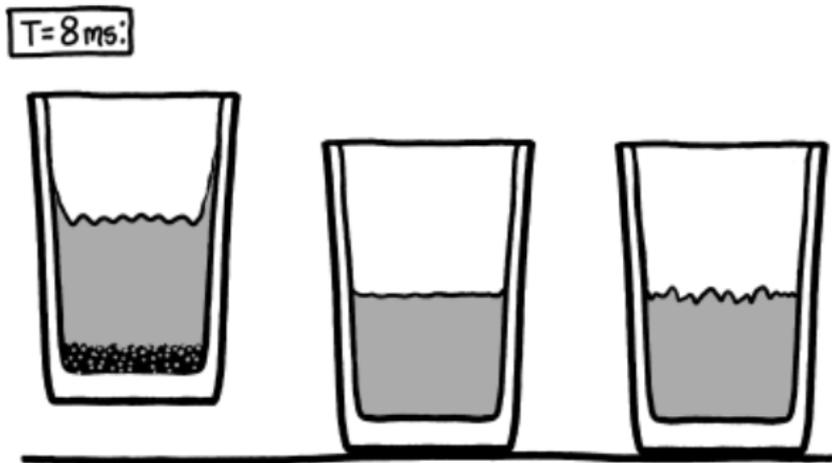
What if a glass of water was, all of a sudden, literally half empty?

$T = 5 \text{ ms.}$



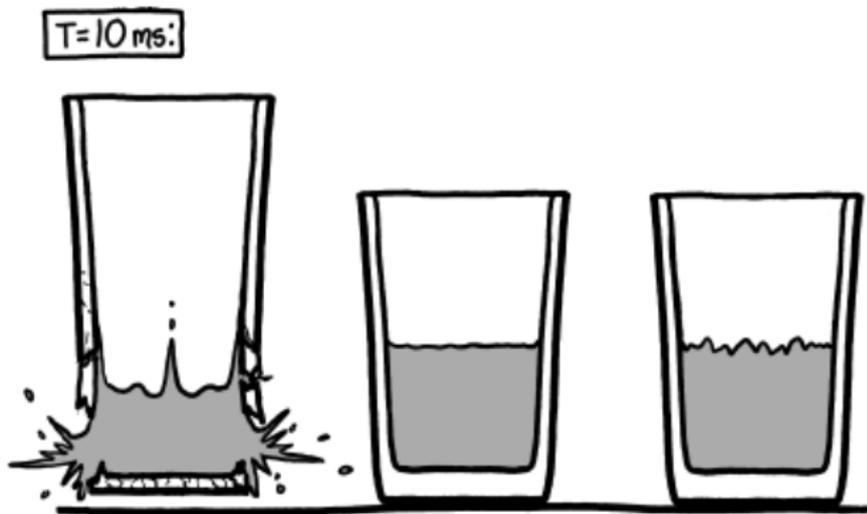
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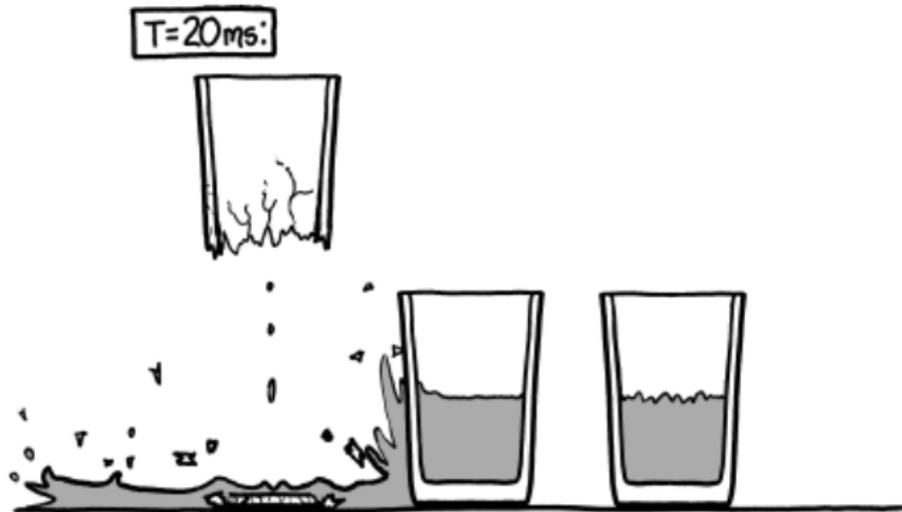
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#1294

THE VERY LARGE TELESCOPE	<input checked="" type="checkbox"/>
THE EXTREMELY LARGE TELESCOPE	<input checked="" type="checkbox"/>
THE OVERWHELMINGLY LARGE TELESCOPE	<input checked="" type="checkbox"/> (ONCELED)
THE OPPRESSIVELY COLOSSAL TELESCOPE	<input type="checkbox"/>
THE MIND-NUMBINGLY VAST TELESCOPE	<input type="checkbox"/>
THE DESPAIR TELESCOPE	<input type="checkbox"/>
THE CATAclySMIC TELESCOPE	<input type="checkbox"/>
THE TELESCOPE OF DEVASTATION	<input type="checkbox"/>
THE NIGHTMARE SCOPE	<input type="checkbox"/>
THE INFINITE TELESCOPE	<input type="checkbox"/>
THE FINAL TELESCOPE	<input type="checkbox"/>

Thank you!