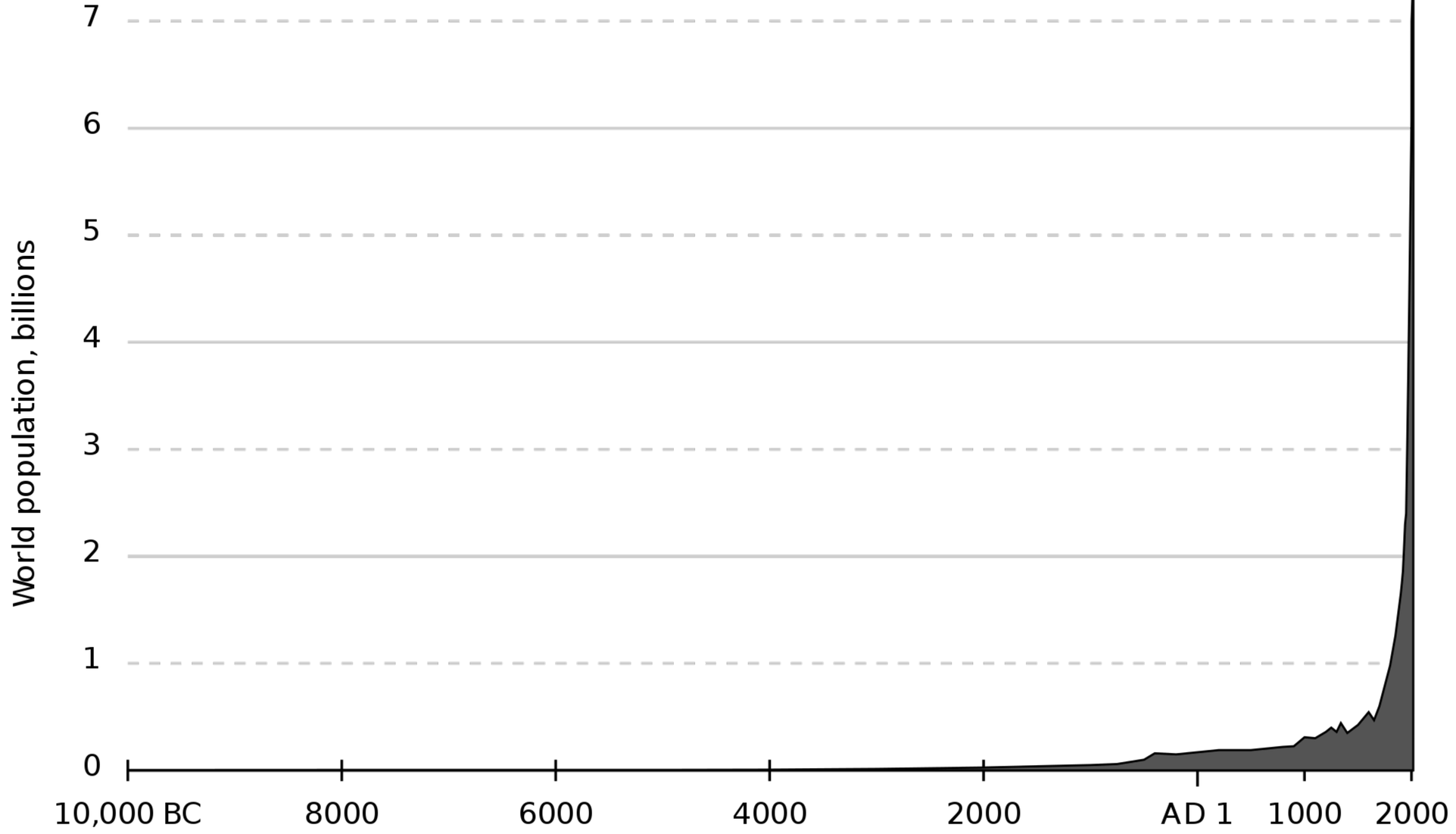
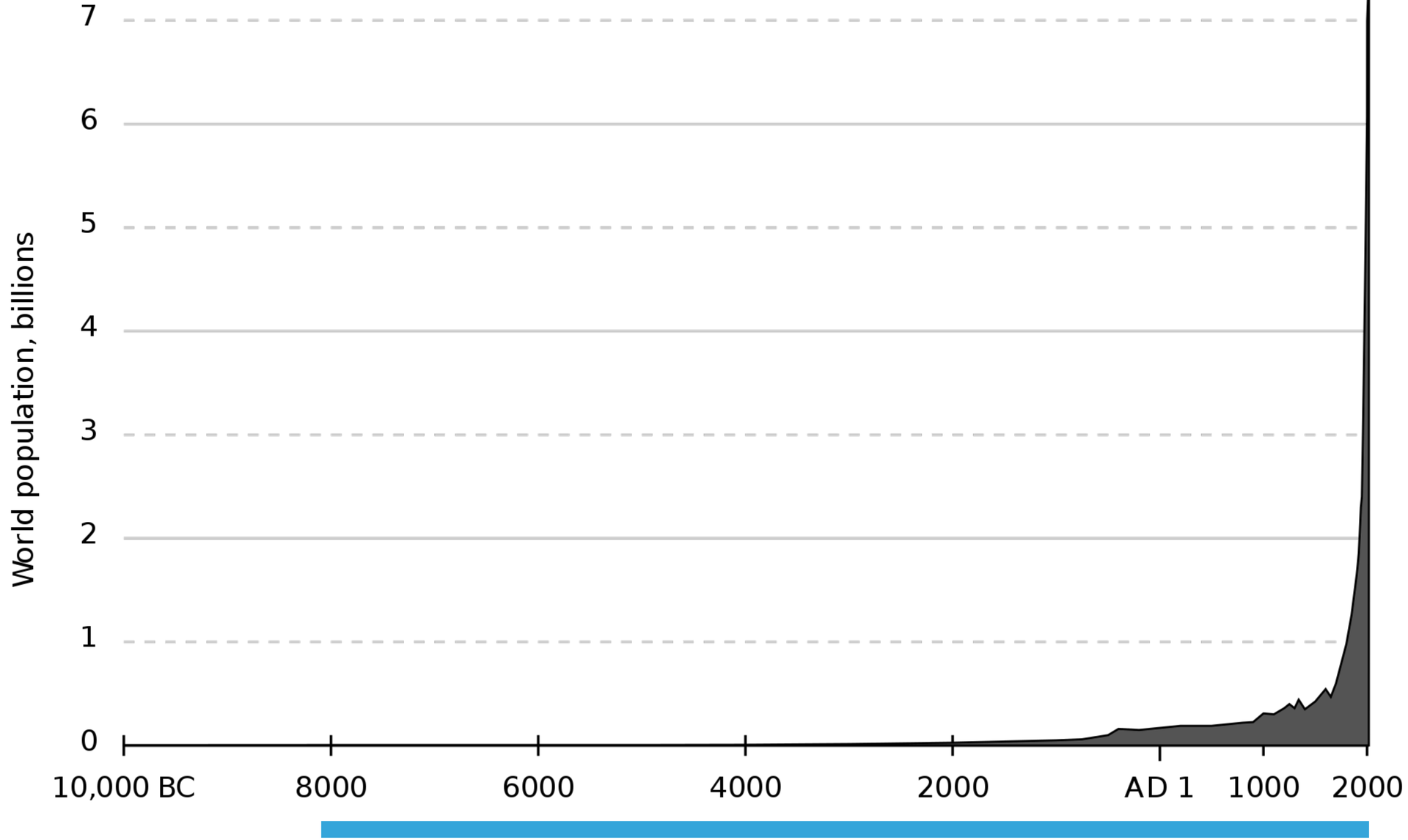
DOOMSDAY?

Using probability to reason about the future

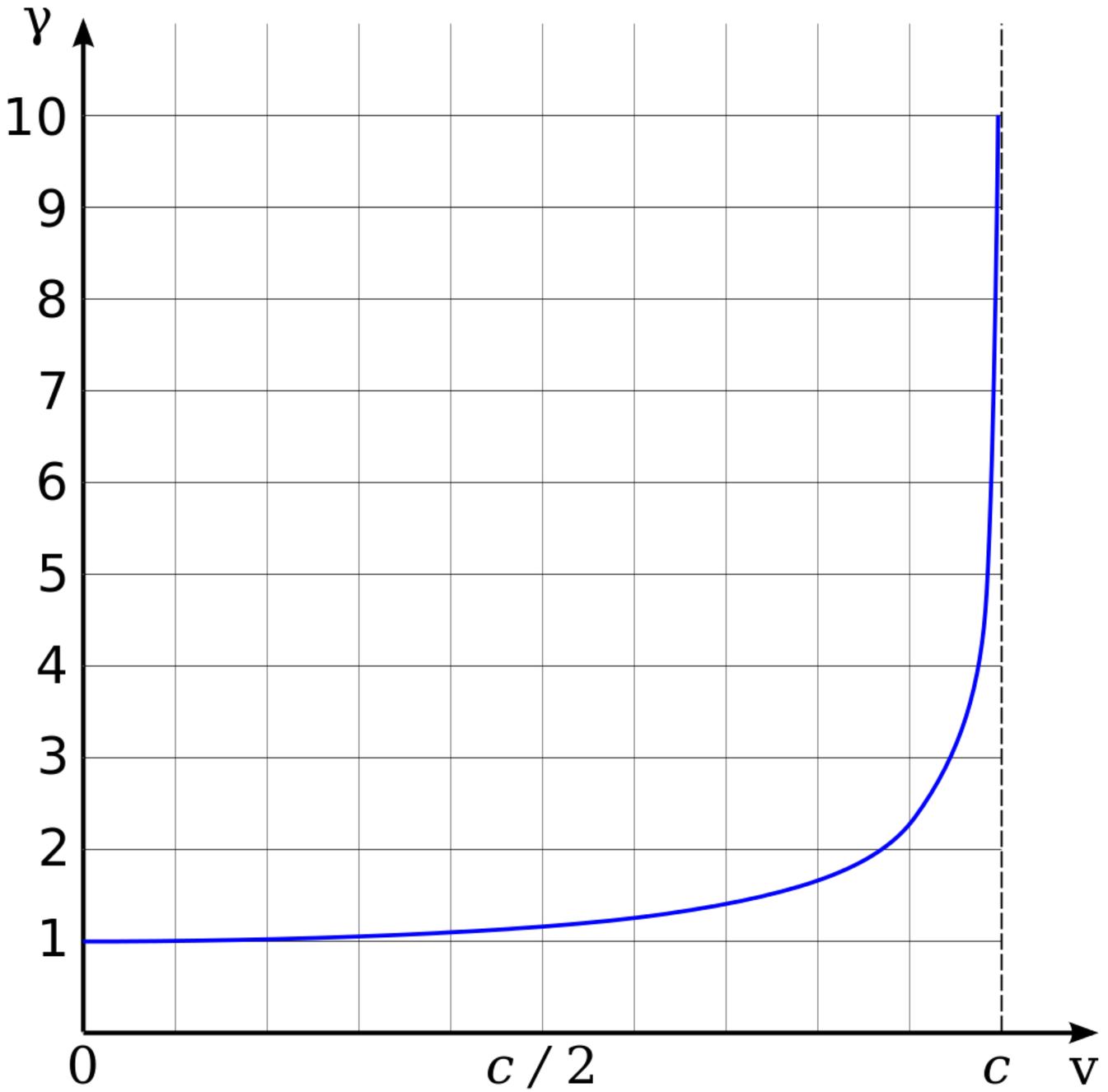

World population, billions
7
6
5
4
3
2
1
0
10,000 BC
8000
6000
4000
2000
AD 1
1000
2000

Wikipedia



(10,000 YEARS IS APPROXIMATELY 400 GENERATIONS OF HUMANS)

Wikipedia

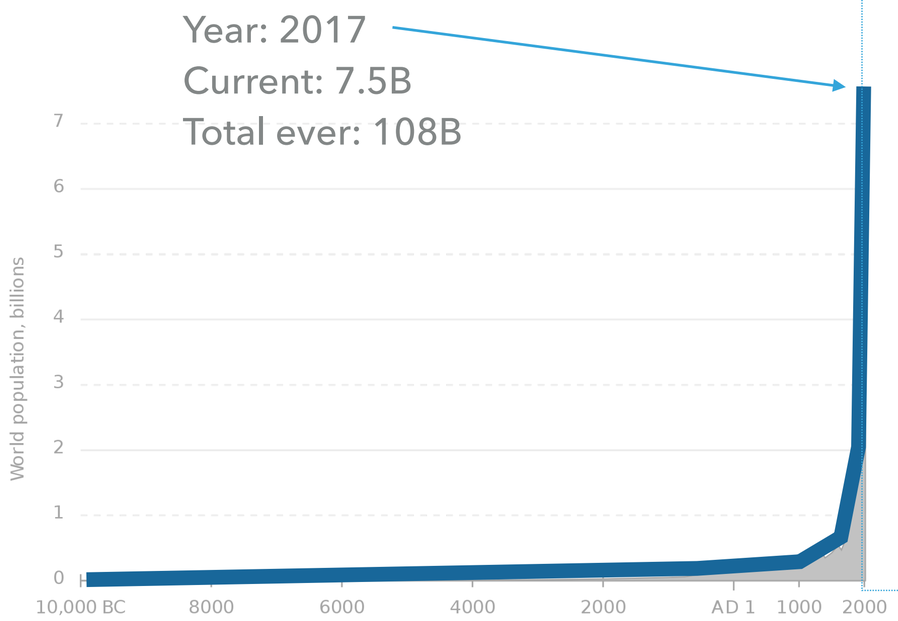

γ
10
9
8
7
6
5
4
3
2
1
0
c / 2
c
v

How Many People Have Ever Lived?

Year	Population	Births per 1,000	Births Between Benchmarks	Number Ever Born	Percent of Those Ever Born
50,000 B.C.E.	2	–	–	–	–
8000 B.C.E.	5,000,000	80	1,137,789,769	1,137,789,769	0.4
1 C.E.	300,000,000	80	46,025,332,354	47,163,122,125	0.6
1200	450,000,000	60	26,591,343,000	73,754,465,125	0.6
1650	500,000,000	60	12,782,002,453	86,536,467,578	0.6
1750	795,000,000	50	3,171,931,513	89,708,399,091	0.9
1850	1,265,000,000	40	4,046,240,009	93,754,639,100	1.3
1900	1,656,000,000	40	2,900,237,856	96,654,876,956	1.7
1950	2,516,000,000	31-38	3,390,198,215	100,045,075,171	2.5
1995	5,760,000,000	31	5,427,305,000	105,472,380,171	5.5
2011	6,987,000,000	23	2,130,327,622	107,602,707,793	6.5
2017	**7,536,000,000**	**19**	**867,982,322**	**108,470,690,115**	**6.9**
2030	8,563,000,000	16	1,806,595,106	110,277,285,221	7.8
2050	9,846,000,000	15	2,833,529,982	113,110,815,203	8.7

Source: Toshiko Kaneda and Genevieve Dupuis, *2017 World Population Data Sheet* (Washington, DC: Population Reference Bureau, 2017); United Nations Population Division, *World Population Prospects: The 2017*

Draw something here. Use additional sheets if necessary



Pick a point in your drawing and estimate the following:

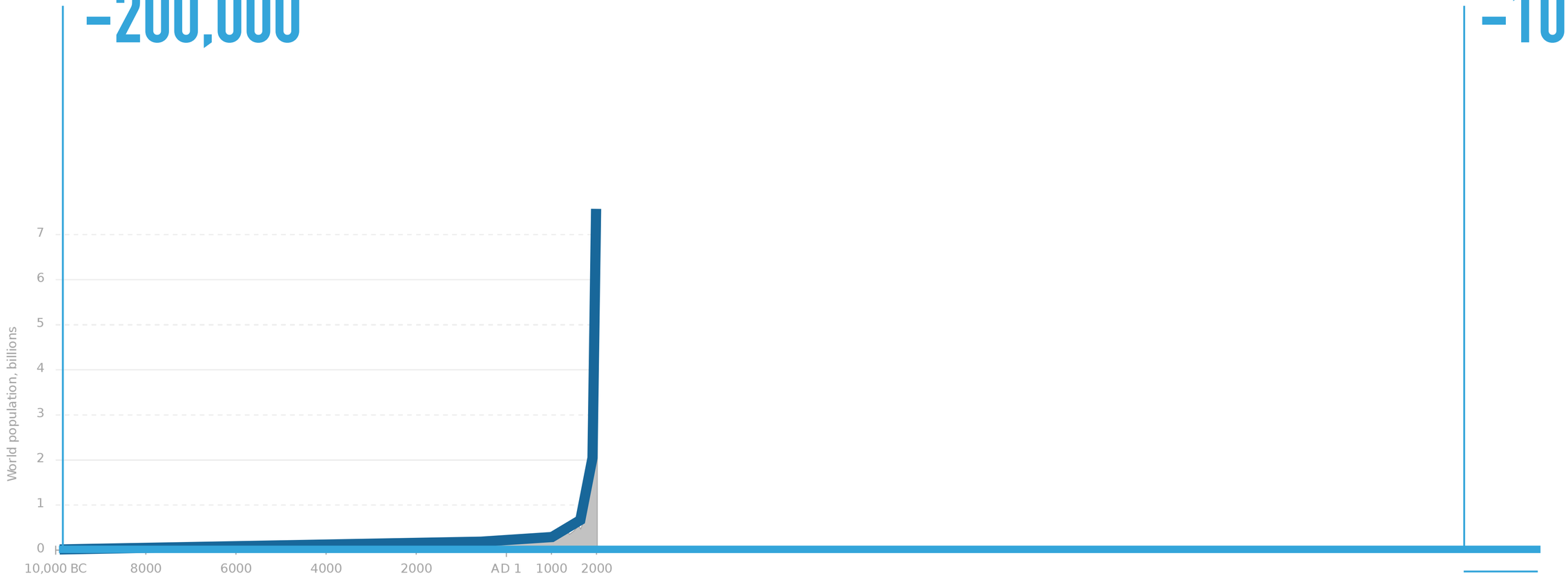
Year: _____

Current: _____

Total ever: _____

-200,000

-10,000



https://www.youtube.com/watch?v=dI7SbZx_Qiw

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CHRONOCENTRISM

COPERNICAN PRINCIPLE

ANTHROPIC PRINCIPLE, SELF-SAMPLING ASSUMPTION

DOOMSDAY ARGUMENT

CHRONOCENTRISM

Our time is special.

COPERNICAN PRINCIPLE

No it’s not.

ANTHROPIC PRINCIPLE, SELF-SAMPLING ASSUMPTION

Maybe it is.

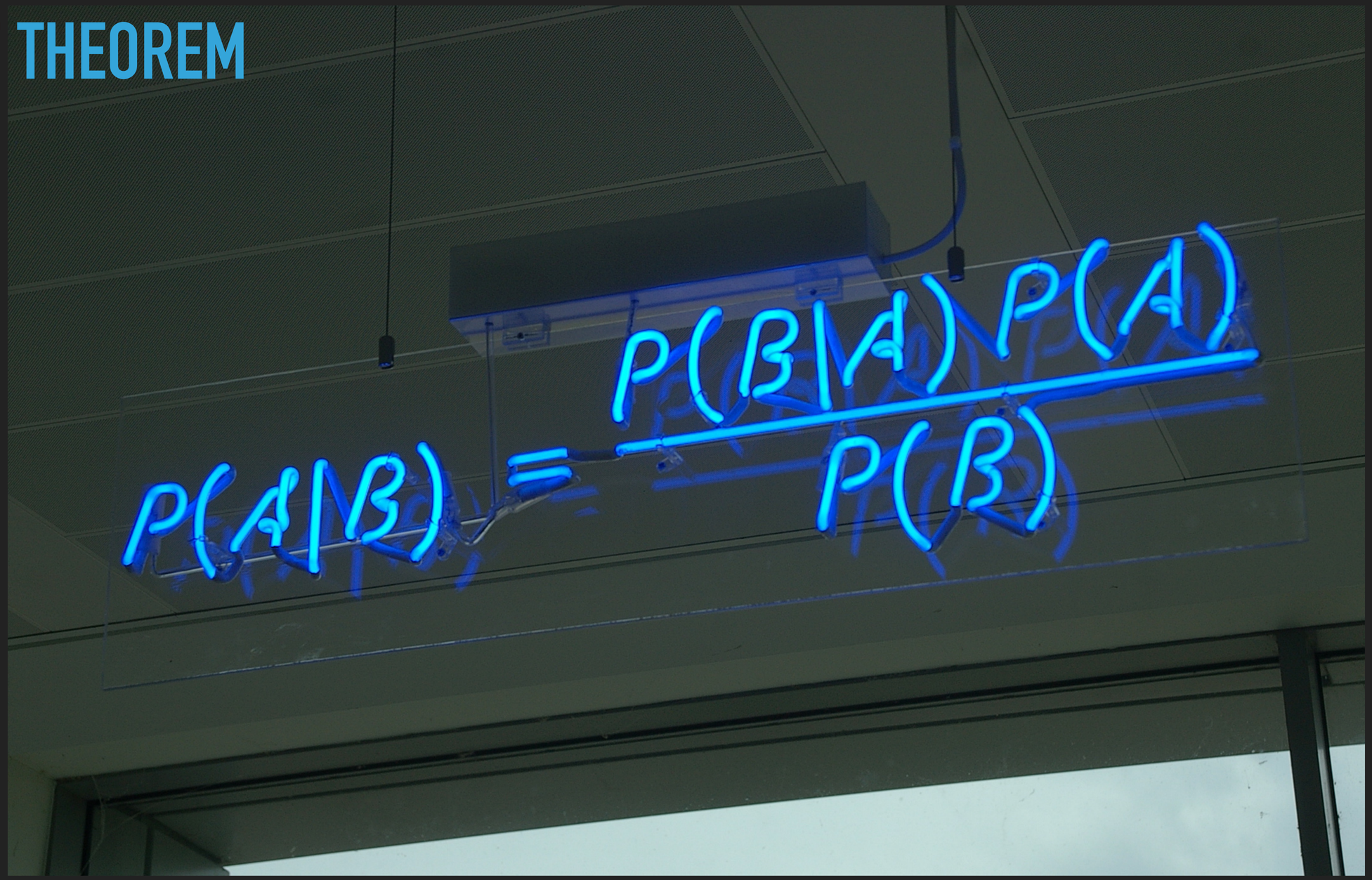
DOOMSDAY ARGUMENT

PROBABILITY AND STATISTICS

Pascal Fermat

~ 1654 correspondence re: probability
https://www.york.ac.uk/depts/maths/histstat/pascal.pdf

BAYES' THEOREM



Bayes' theorem (1763) at the offices of HP Autonomy
Wikipedia

DRAKE EQUATION

$$N = R^* \times f_p \times n_e \times f_l \times f_i \times f_c \times L$$

The number of civilisations in our galaxy in which communication might be possible.

The fraction of stars with planets

The fraction that can go on to support intelligent life.

Length of time such civilisations release detectable signs into space.

The average rate of star formation per year in our galaxy

The average number of planets that can potentially support life (per star with planets.)

The fraction that can go on to support life.

The fraction of civilisations that develop a technology detectable from space.

The Drake Equation.

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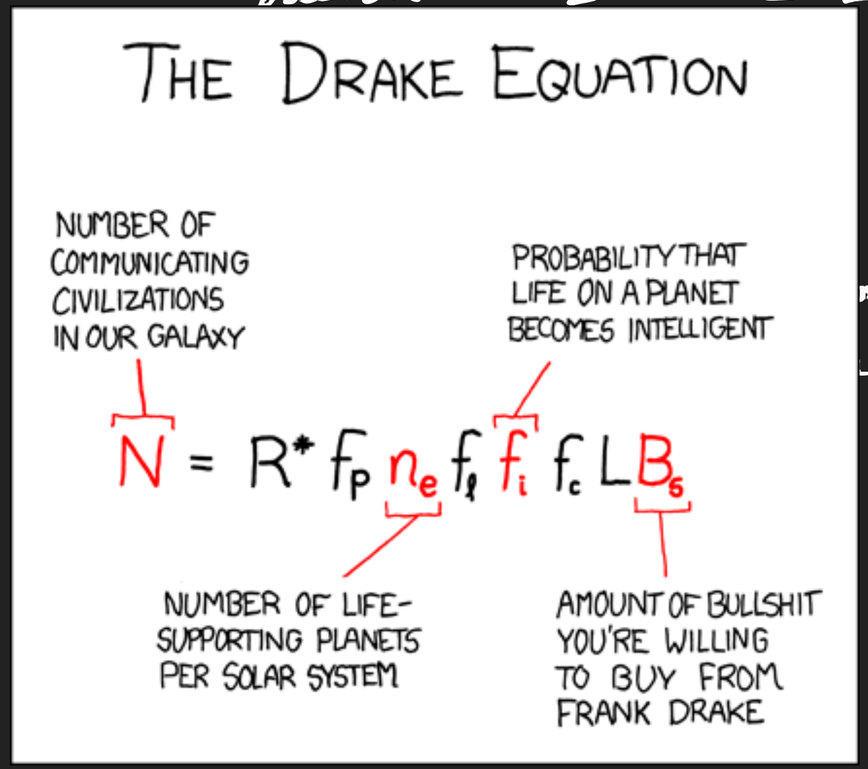


The fraction that can go on to support life.

The fraction of civilisations that develop a technology detectable from space.

The average number of planets that can potentially support life (per star with planets.)

The Drake Equation.

https://www.xkcd.com/384/

noeticscience.co.uk

DOOMSDAY ARGUMENT

"To put it more simply: Out of all people who will ever live, we should probably assume we're somewhere in the middle; after all, most people are.

*If our population **levels out around 9 billion**, this suggests humans will probably go extinct in about 800 years, and not more than 16,000.*

This is the Doomsday Argument.

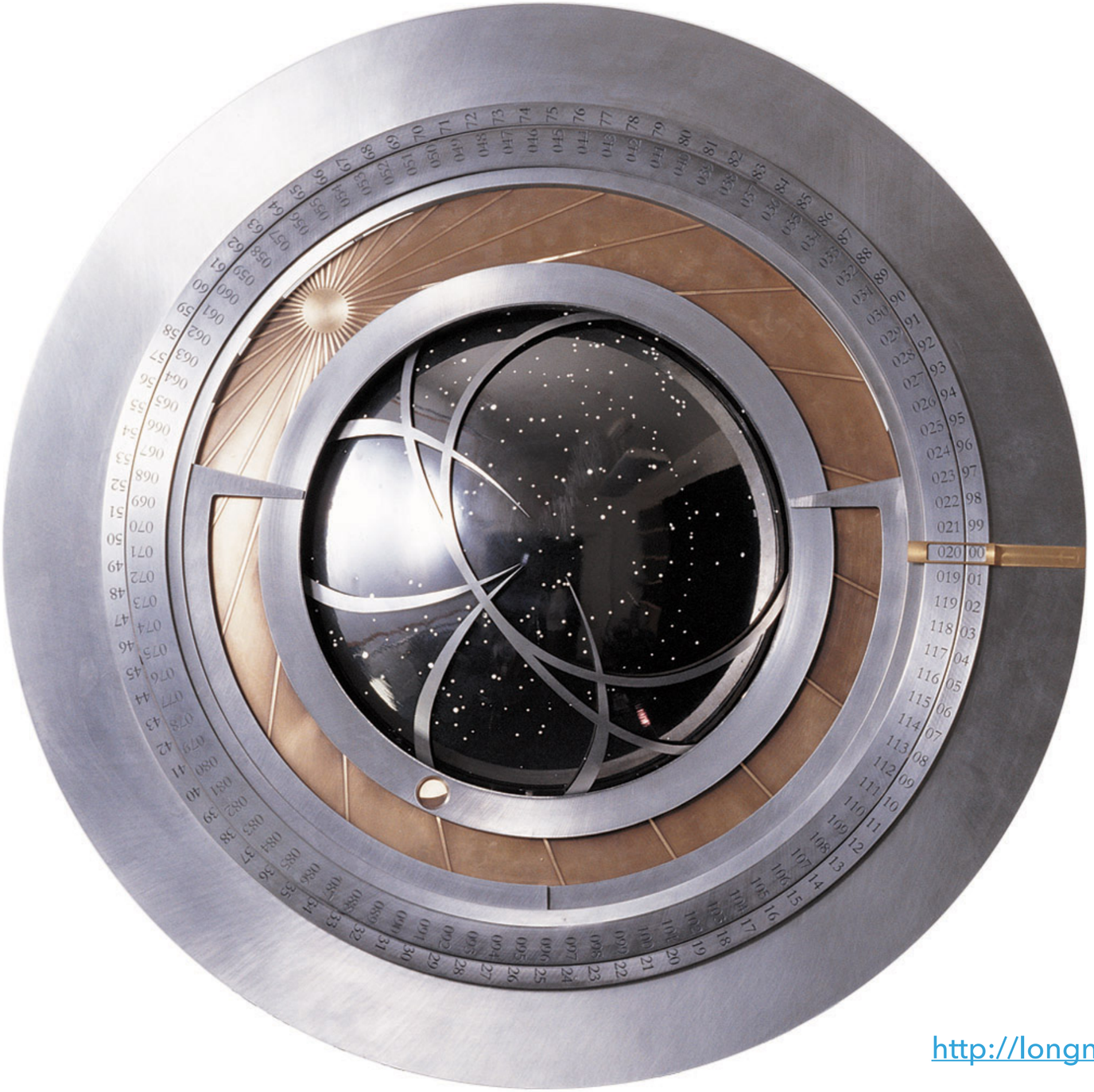
Yeah, but that's stupid

Almost everyone who hears this argument immediately sees something wrong with it.

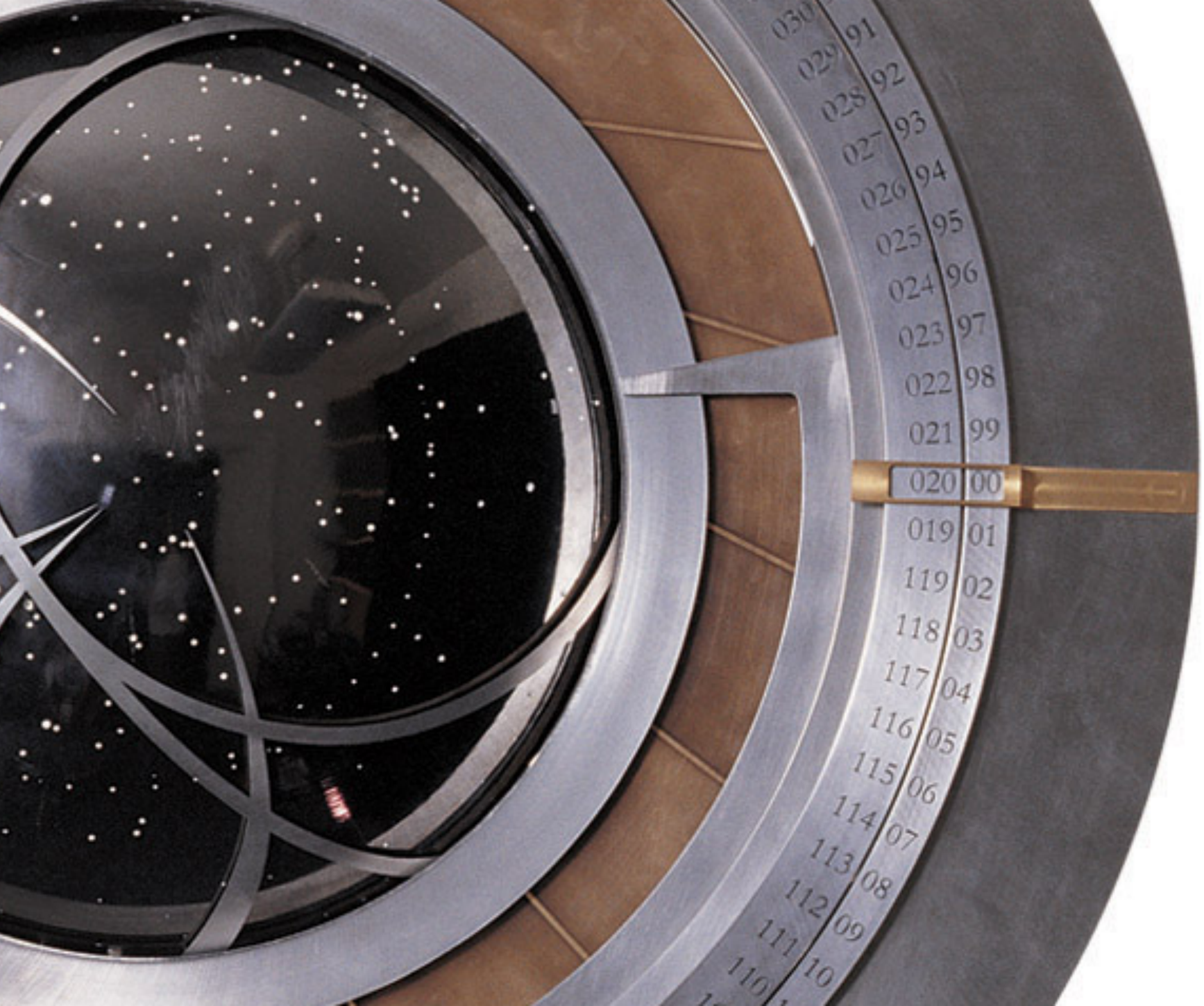
The problem is, everyone thinks it's wrong for a different reason. And the more they study it, the more they tend to change their minds about what that reason is.

*Since it was proposed in 1983, it's been the subject of tons of papers refuting it, and tons of papers refuting those papers. There's no consensus about the answer; it's like the **airplane on a treadmill** problem, but worse."*

https://what-if.xkcd.com/65/



http://longnow.org/clock/



http://longnow.org/clock/