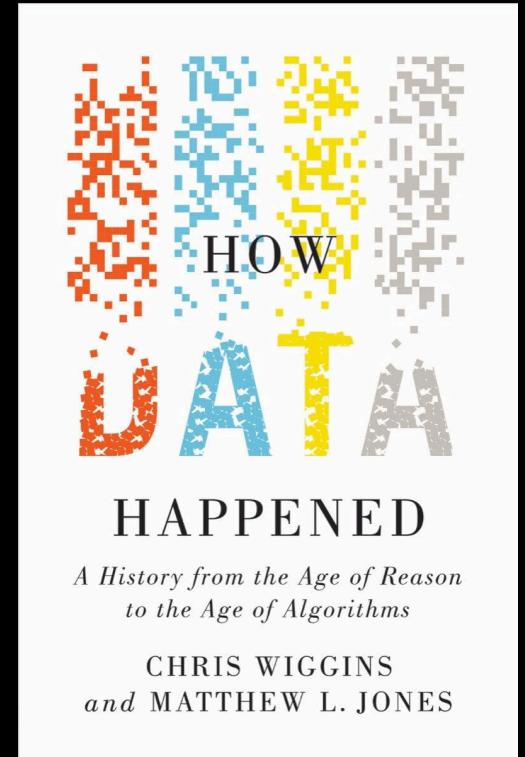


data: past, present, and future

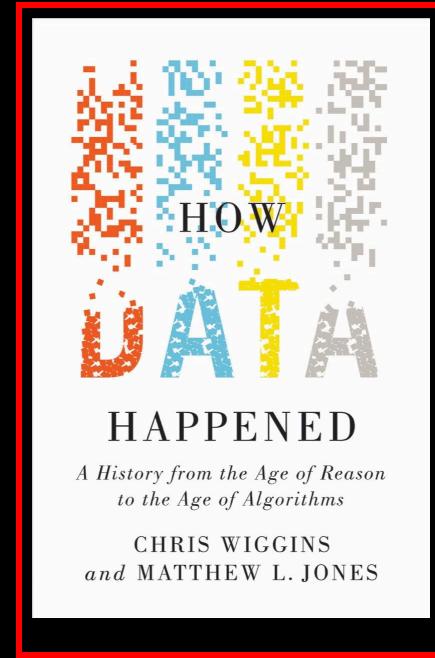
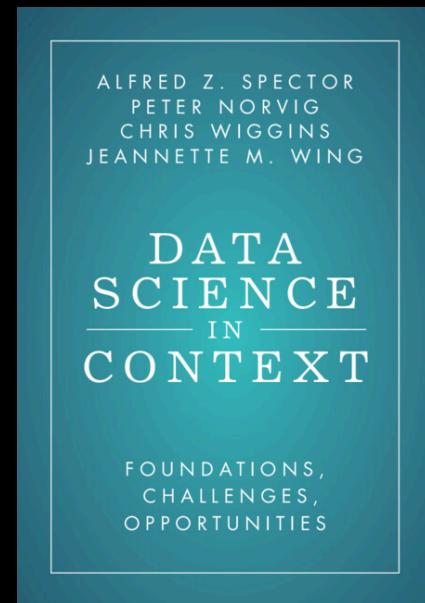
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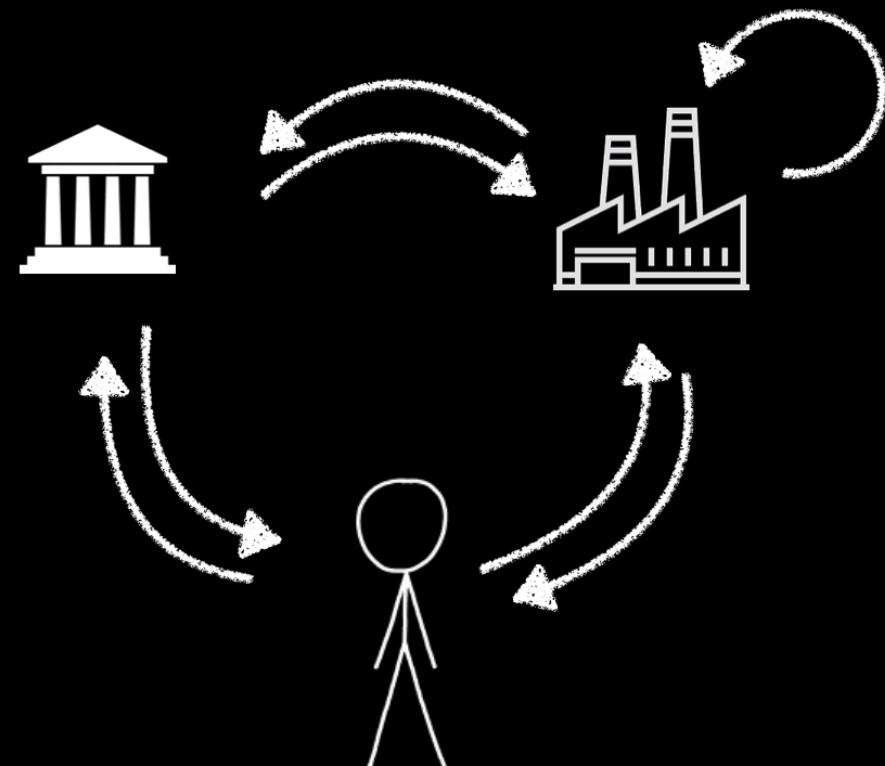
chris.wiggins@columbia.edu



self-intro

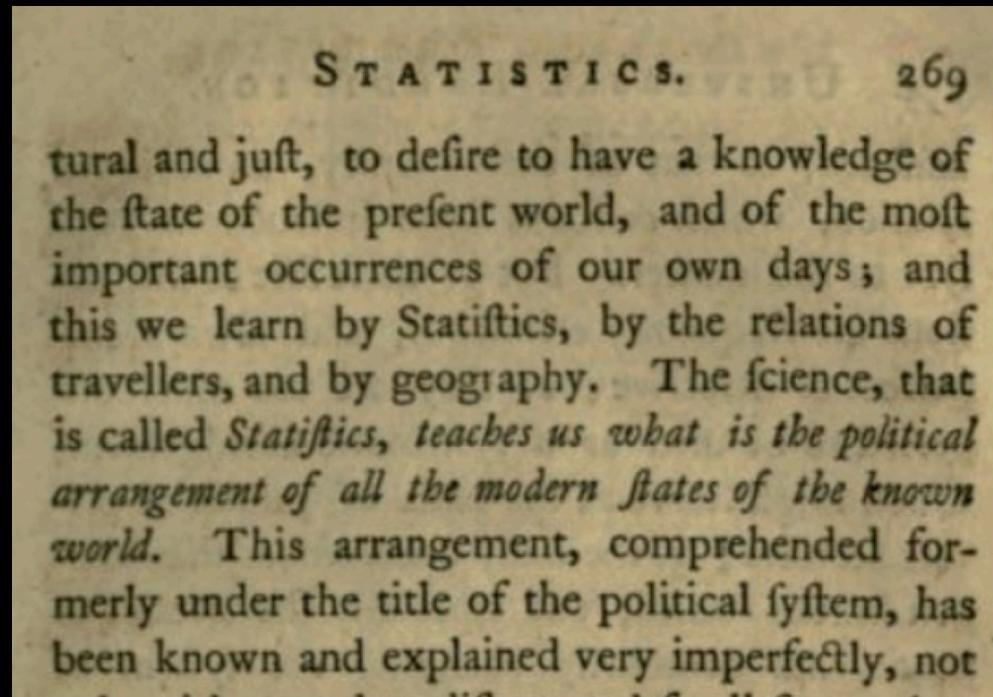


"national standing depends very much on what technologies a nation commands"
... an unstable 3-player game



Part 1: past: data & power

state-seeing & "vulgar statistics" (1806)



"**höhere**"/"**edlere**" (higher)/(nobler) vs "**gemeine**" (common/vulgar statistics) practiced by "**Zahlenknechte**" (number servants) and "**Tabellenfabrikanten**" (table manufacturers).

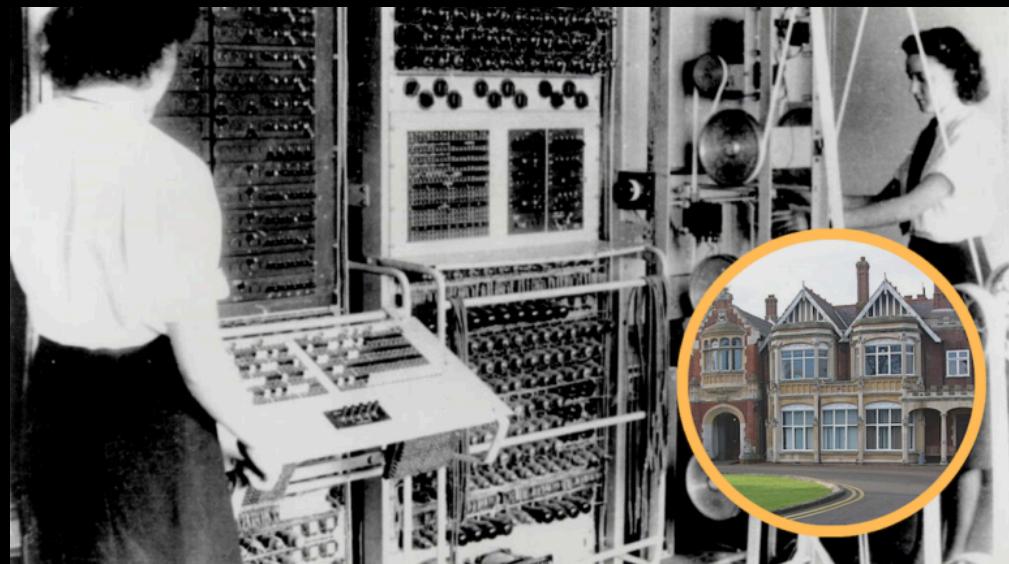
corp power & beer (Guinness, 1886 IPO)

- **Gosset** ("Student") wields data as technology controlled by a corp, not the state
- competitive, proprietary advantage

1920s: state power

- | "economy was based on agriculture and manufacturing"
 - **United Kingdom - R.A. Fisher:** @ Rothamsted Experimental Station
 - **Poland - Jerzy Neyman:** @ Worked on agricultural statistics for Polish state
 - NB: these two would go on to fight for 50+ years about truth & data
- | national standing depends [on] technologies

dawn of data science & digital compute



- Colossus computer invented for cryptanalysis - fundamentally a data science problem, solved by the state
- **Enigma**: corp technology advancing national standing
- from **Bletchley Park** to **Bell Labs**: data @ center of state-to-corporate transition tying technology and national standing

-15-

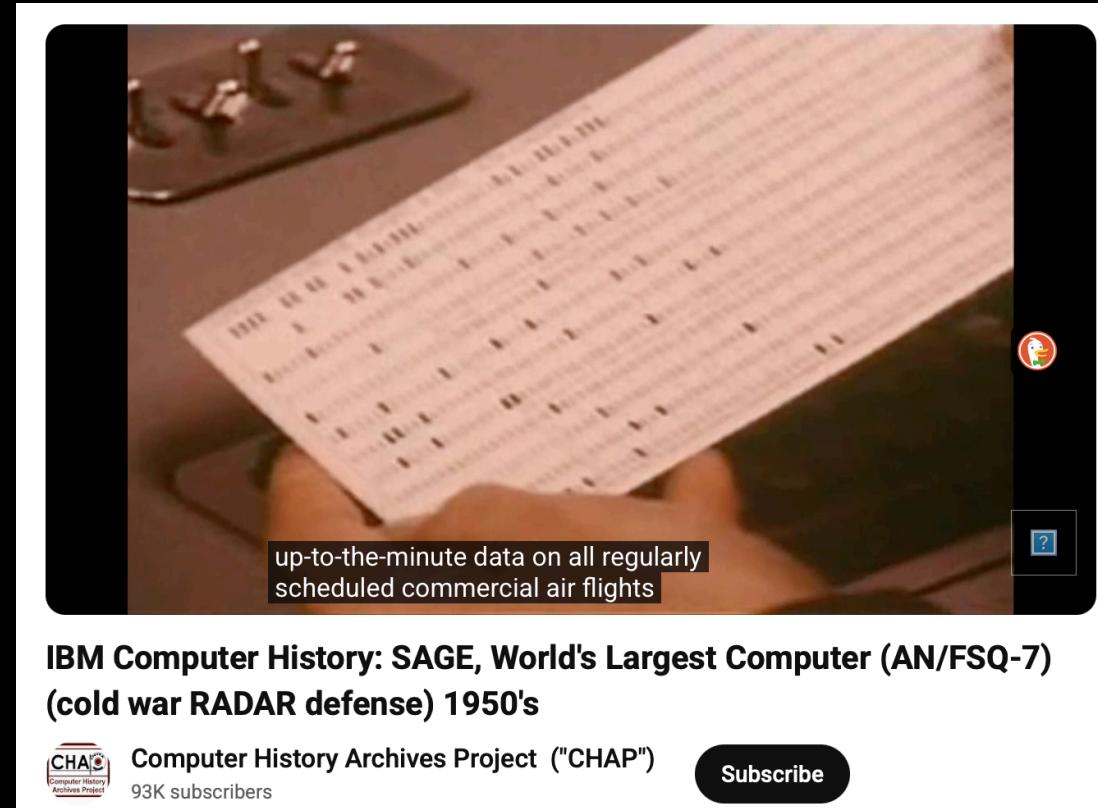
~~CONFIDENTIAL~~

6. 2nd Order Word Approximation. The word transition probabilities are correct but no further structure is included.

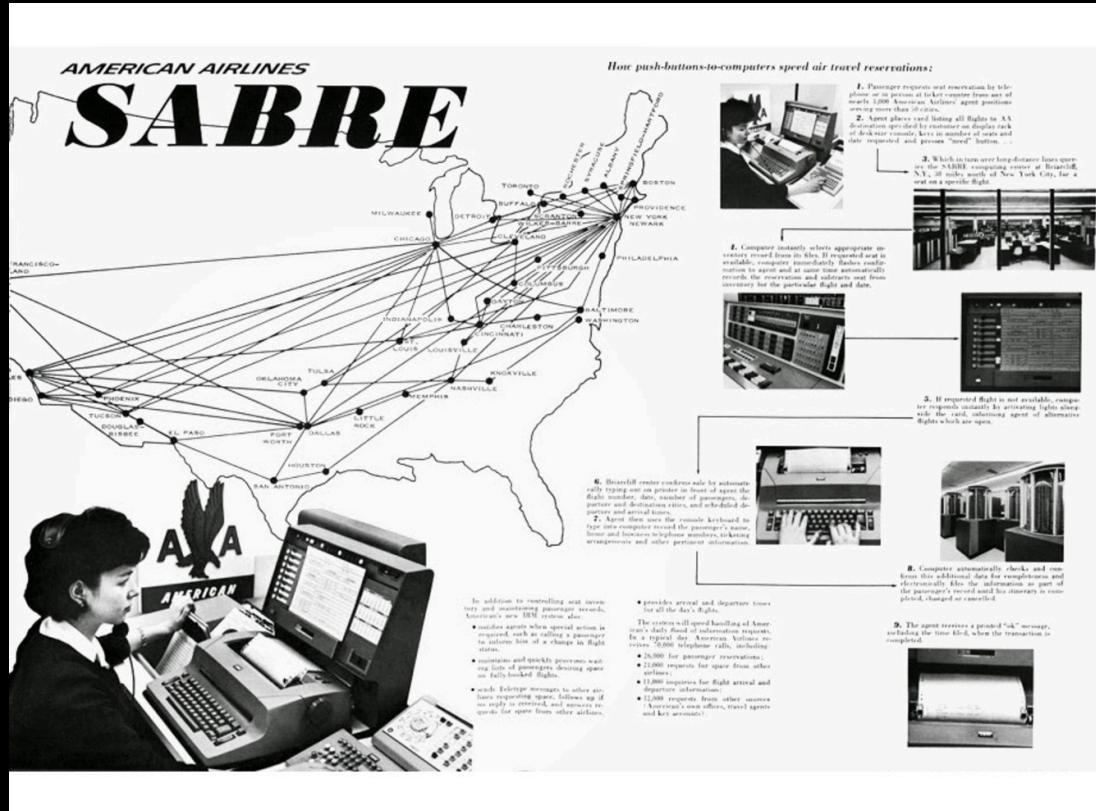
THE HEAD AND IN FRONTAL ATTACK ON AN ENGLISH WRITER THAT THE CHARACTER OF THIS POINT IS THEREFORE ANOTHER METHOD FOR THE LETTERS THAT THE TIME OF WHO EVER TOLD THE PROBLEM FOR AN UNEXPECTED

- @ ATT/Bell, Shannon's 1945 "Mathematical Theory of Cryptography" : **small language model**
- .com and .mil, national standing and technology, long before "military-industrial complex" (1961)
- cf. Mark V. Shaney (1984) natural language prank / program

SAGE (Semi-Automatic Ground Environment, 1952-1955) → *SABRE* (Semi-Automated Business Research Environment, 1960-present)



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Part 2: present: scarcity, data, tokens

The Economic Principle

Mankiw's First Principle of Economics: (including *data economics*)

| "People face trade-offs"

When one thing becomes abundant, something else becomes scarce.

information glut->attention economy

"In an information-rich world, the wealth of *information* means a dearth of something else: a *scarcity* of whatever it is that information consumes. What information consumes is rather obvious: it consumes the *attention* of its recipients.

Simon (1971)

"Compared with monetary transactions, attention transactions on the Web will be far more numerous."

..."inequality" between "stars and fans" Goldhaber (1997)

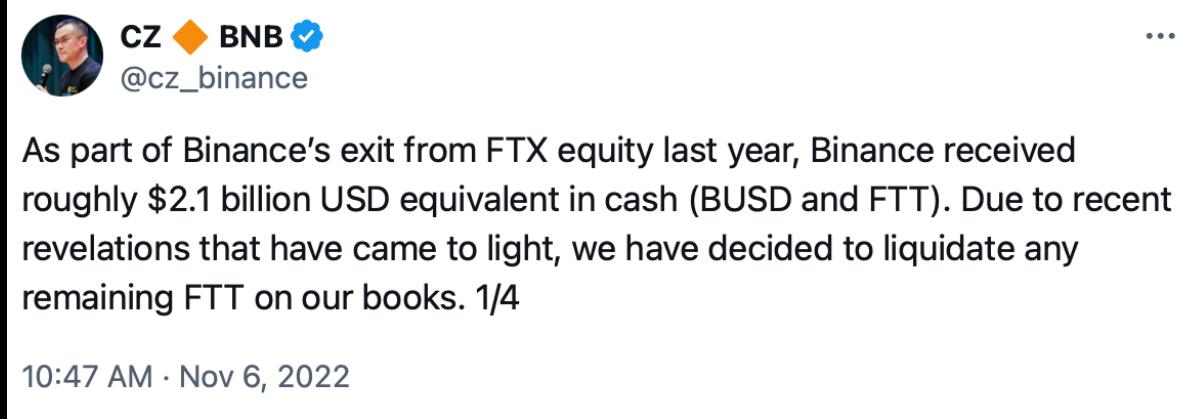
Web2.0, UGC, and attention, money, data

User-generated content platforms (Twitter, Reddit, Wikipedia; YouTube) created:

- The star/fan monetization of attention
- **also:** massive corpus of UGC esp. text, perfect for training statistical models.

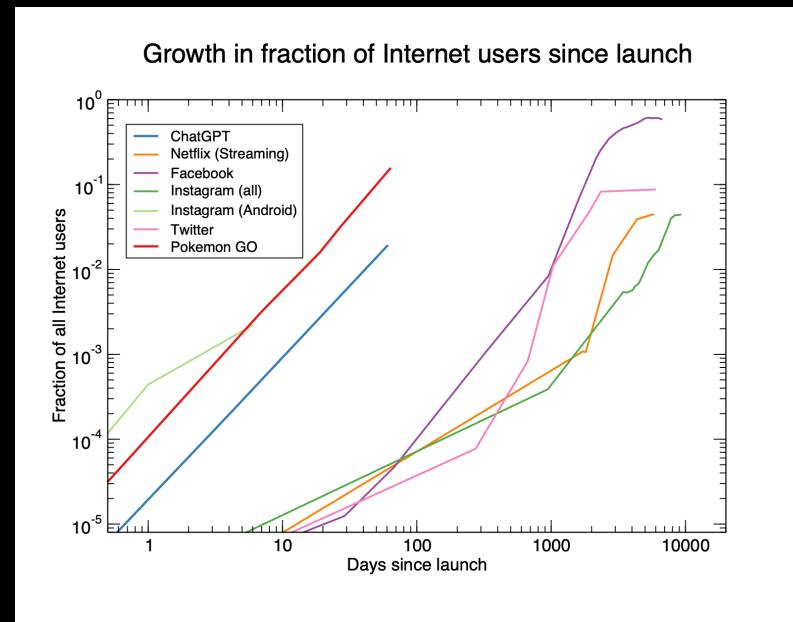
November 2022: "technology disrupts and re-orders the economy"

November 2022: "technology disrupts and re-orders the economy"



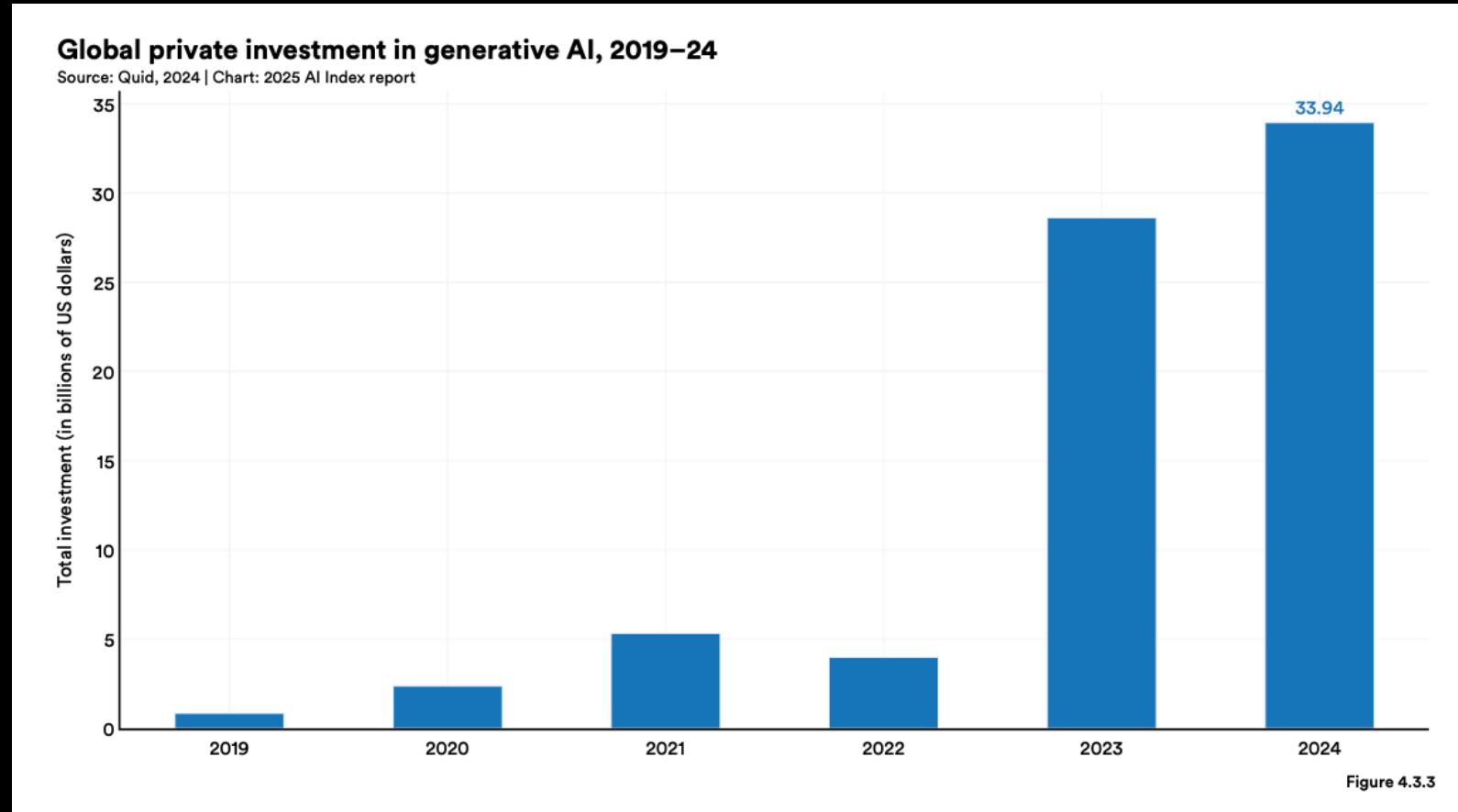
A screenshot of a Twitter post by CZ (@cz_binance). The post includes a profile picture of CZ, the BNB logo, and a blue checkmark indicating verification. The text of the tweet reads: "As part of Binance's exit from FTX equity last year, Binance received roughly \$2.1 billion USD equivalent in cash (BUSD and FTT). Due to recent revelations that have came to light, we have decided to liquidate any remaining FTT on our books. 1/4". The timestamp at the bottom left is 10:47 AM · Nov 6, 2022.

November 2022: "technology disrupts and re-orders the economy"

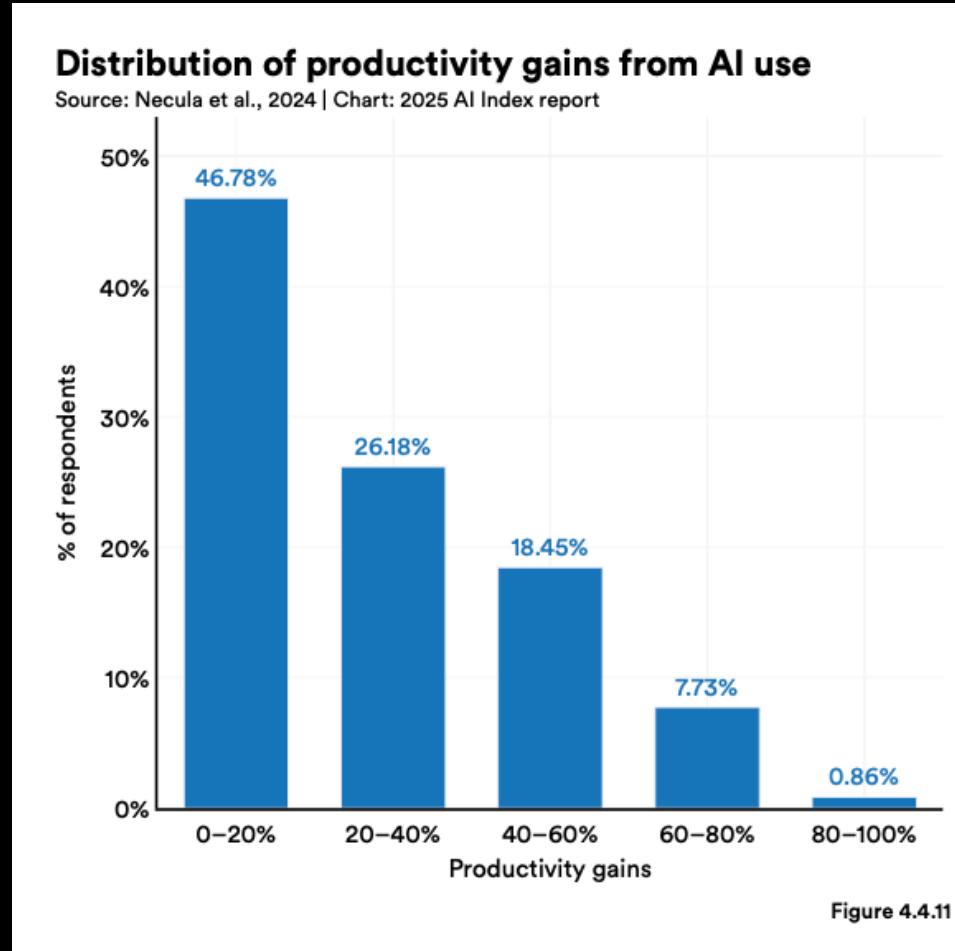


100M *users* in 2 months (fastest consumer app in history)

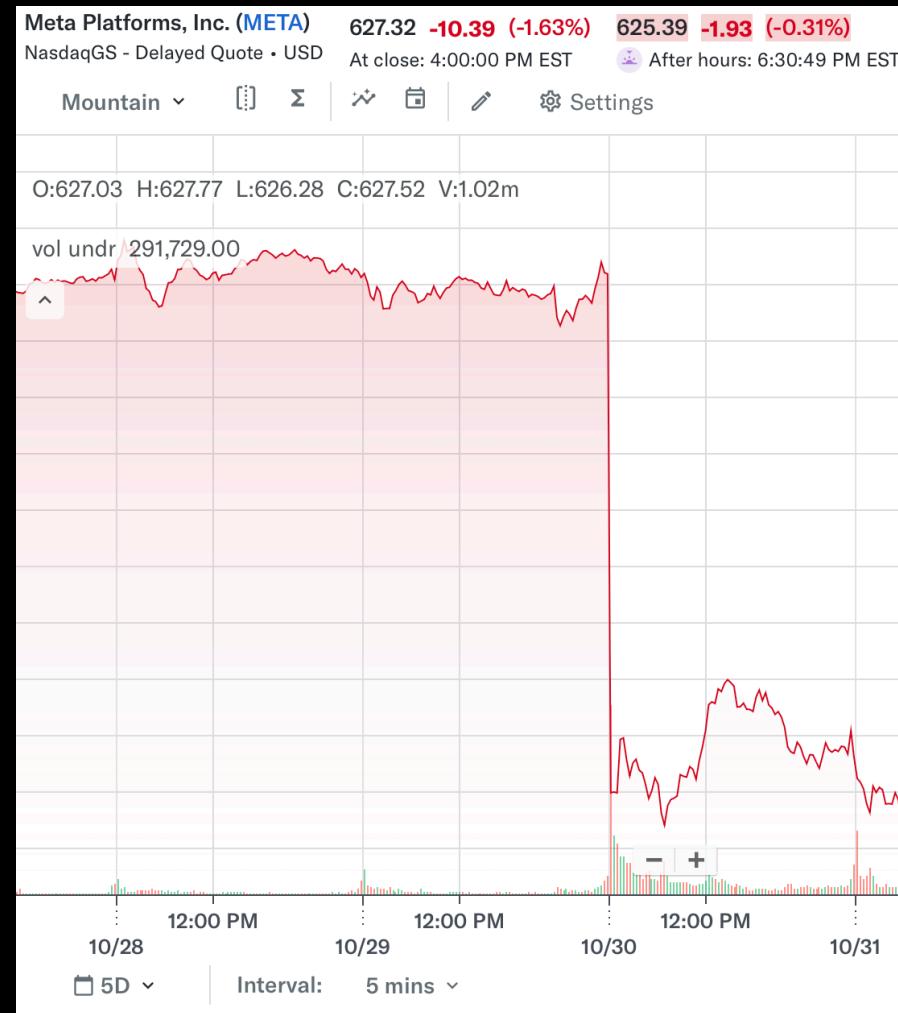
investment vs time (HAI, 2025)



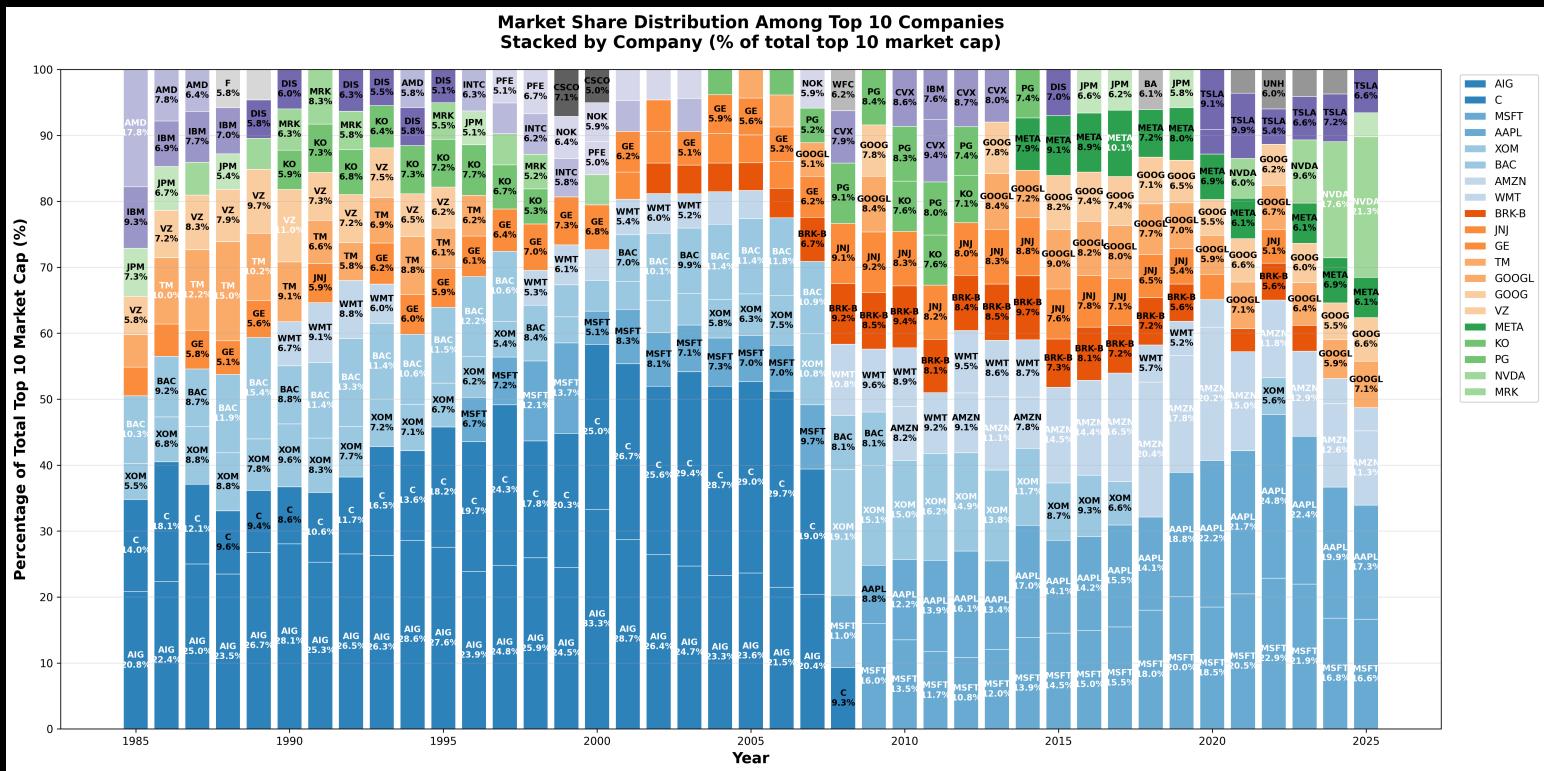
peak of inflated expectations



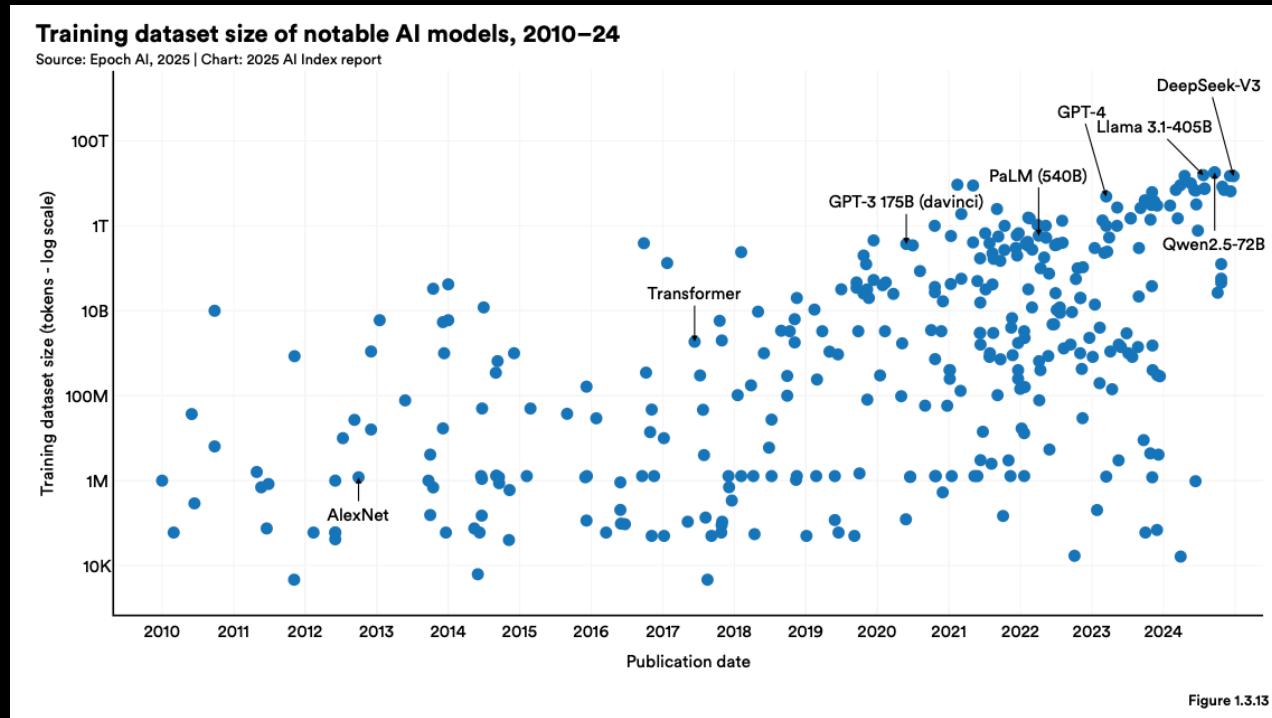
how long before crash?



"technologies...change almost annually" (cf.
bit.ly/MarketViz)



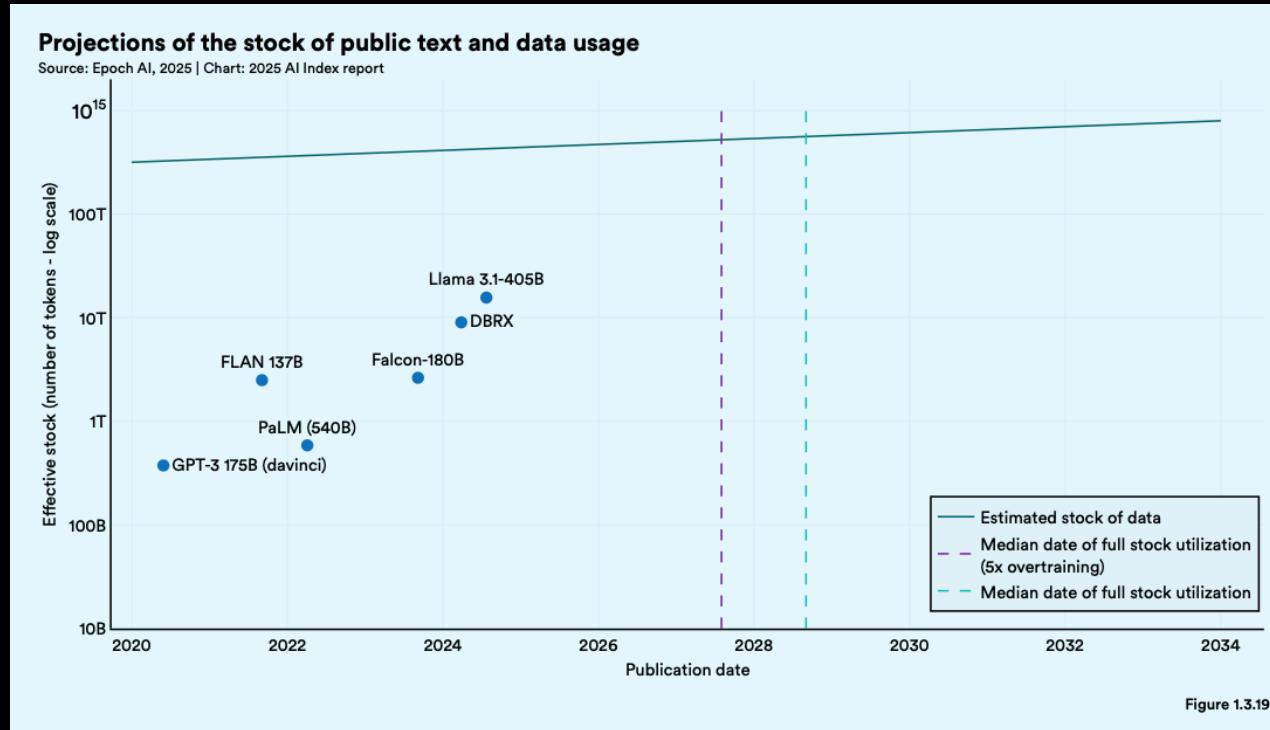
log(tokens) vs time



"Will we run out of data? Limits of LLM scaling based on human-generated data"

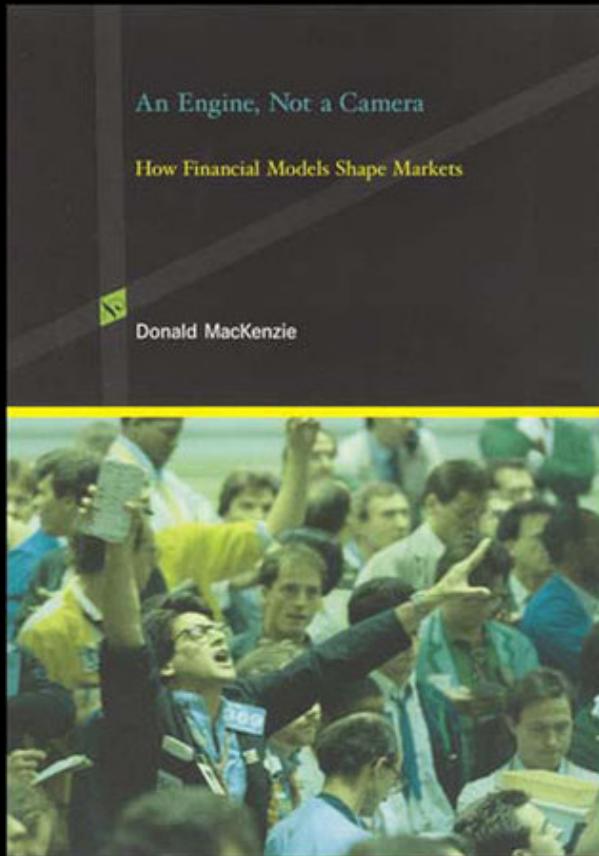
(Villalobos et al. <https://arxiv.org/pdf/2211.04325>)

log(tokens) vs time, WWW-scale shown

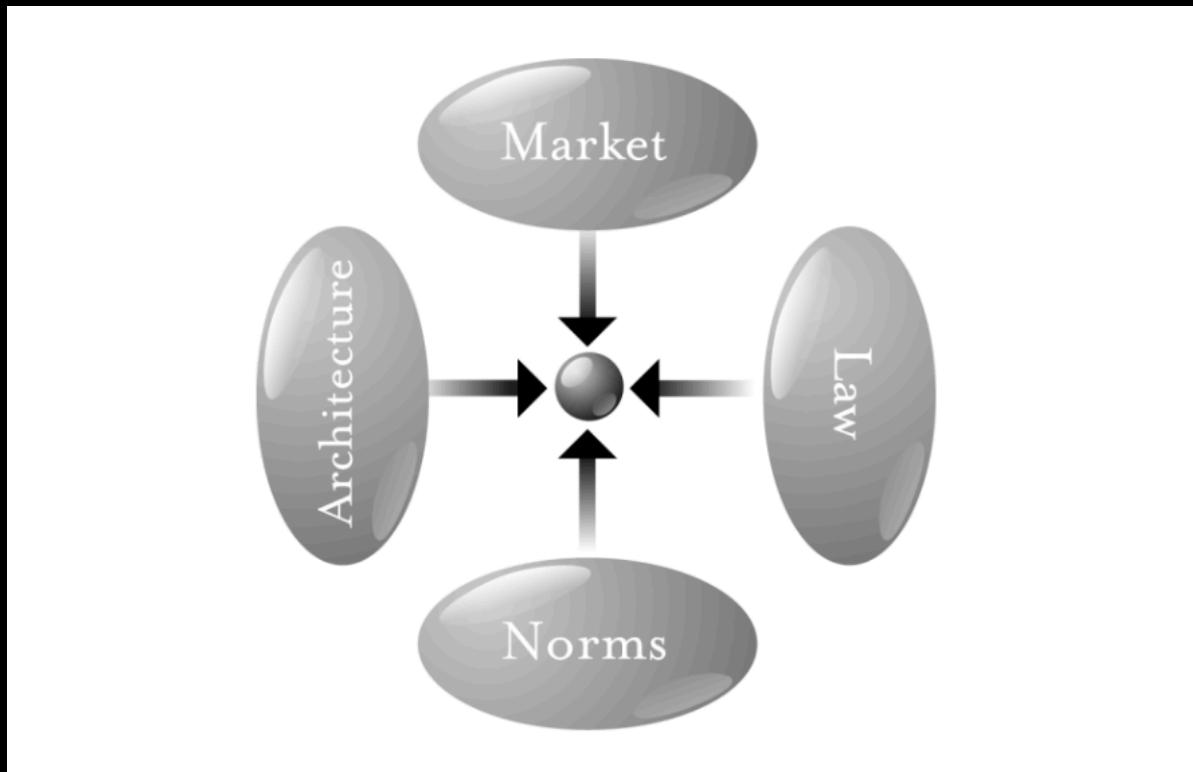


"Will we run out of data? Limits of LLM scaling based on human-generated data"
(Villalobos et al. <https://arxiv.org/pdf/2211.04325>)

"Solutions cause problems which call for further solutions"



- run out of 'net ->
 - multimodal (e.g., Ray Bans) -> infra needs
 - synthetic data (img, text, vid...) -> model collapse
- custom LLMs for specific industries-> data poisoning
- price, e.g., "truth" & "truthiness"?
- unlike SAGE → SABRE (.mil->.com) this is .mil->.com->.mil



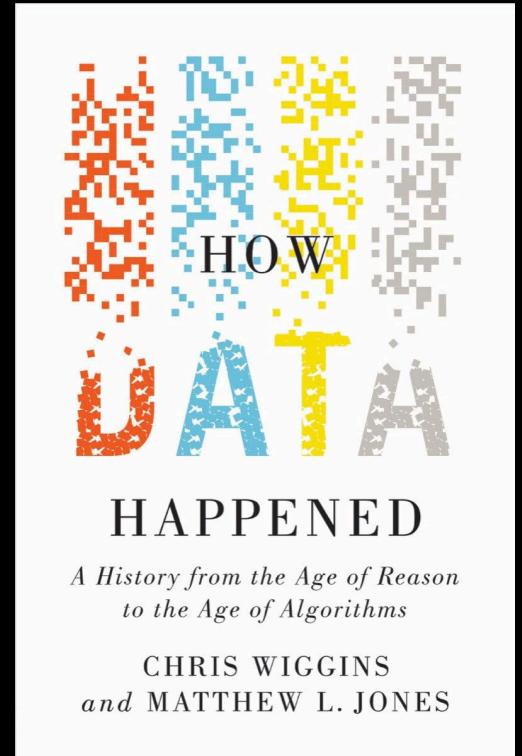
Lessig 1998, 1999, 2006: modes, dynamics (inc. people power)

thank you

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