HOW COMPLEXITY SCIENCE — AND ITS CONCEPTS — CAN CONTRIBUTE TO A BETTER UNDERSTANDING OF "GENAI" COMPETITIVE DYNAMICS AND TO THE DESIGN OF A PRO-ACTIVE PRO-INNOVATION COMPETITION POLICY

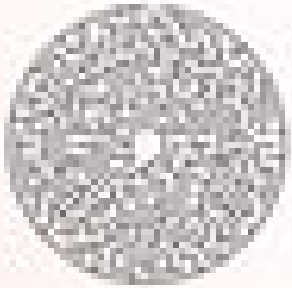
12 JUNE 2024

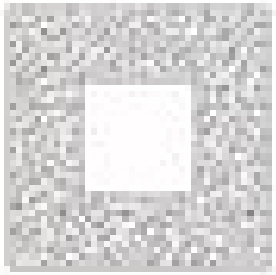
GenAI Competitive Dynamics and Challenges

THIBAULT SCHREPEL
VRIJE UNIVERSITEIT AMSTERDAM
@PROFSCHREPEL

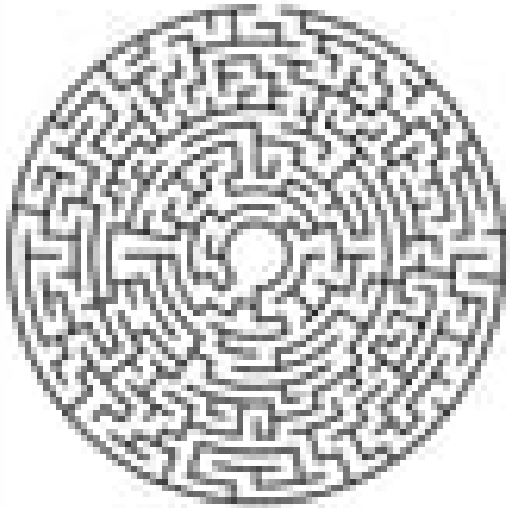
1. Competitive dynamics in Generative AI

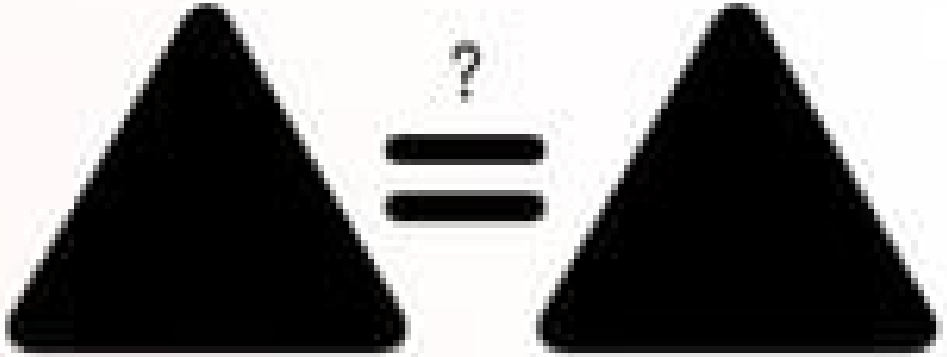
2. Pro-active competition law and policy





1. Competitive dynamics in Generative AI




?
Social media
Search
Online store
GenAI

1.1. Can we confidently predict who will 'win'? No. *(computer science)*

BIG DATA

Just **"big"** data is the **wrong focus**:

1. Small datasets can compete with big ones

2. Small companies can access large amounts of data

- April 2023: Koala: A Dialogue Model for Academic Research
- February 2023: Retrieval Enhanced Transformer
- June 2021: Low-Rank Adaptation (LoRA)
- September 2020: Less Than One-Shot Algorithms
- February 2020: Dataset Distillation
- April 2017: Attention Is All You Need
- 1970s: Synthetic data

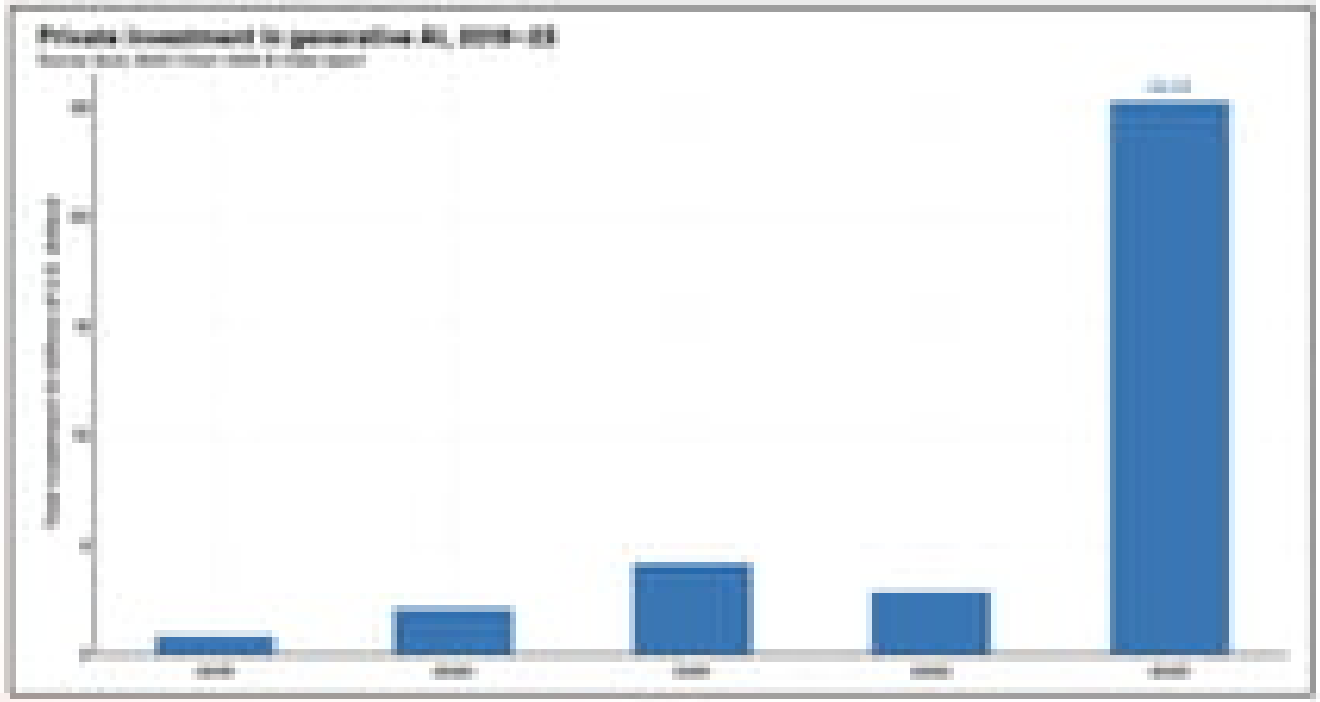
COSTS

Today, it's expensive = favor big players

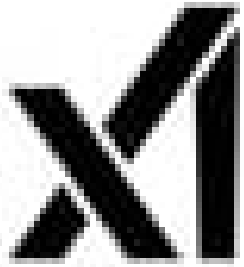
- OpenAI spent $540 million on the development of GPT-4 in 2022 alone
- OpenAI spends $700,000 per day to run ChatGPT (2023)

But tomorrow? Chip makers are lowering these costs (Nvidia's latest GPU cut the price of training LLMs from $10 million with 960 CPUs down to just $400,000) + **new model compression** and algorithms that lower costs: one can train and run "good enough" LLMs on a single GPU (even smartphones) in just a few of hours + **federated learning** is pushing

CAPITAL



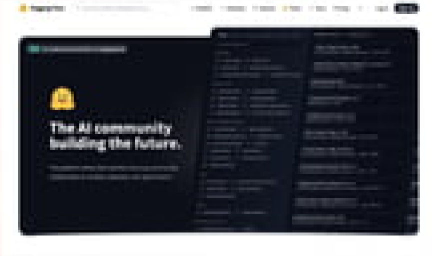
TALENT



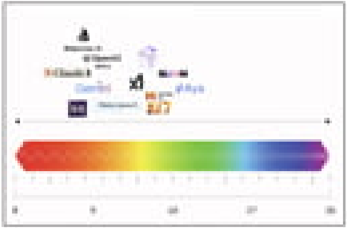
Less than 50 employees
(https://www.crunchbase.com)

= non-ergodicity

ACCESS



Some models are downloaded over 1 million times per month



Source

ACCESS

'Open' foundation models power strong competitive dynamics:

1. They can be forked (1000 forks on Llama 3 in one weekend) = diversity
2. They include limited/distributed amendment and termination provisions
3. They include "anti-opportunism" provisions
4. They do not restrict interoperability / access to the API = little leveraging power (address many antitrust concerns)

1.2. Does this imply that GenAI won't experience dominance? No. *(complexity science)*

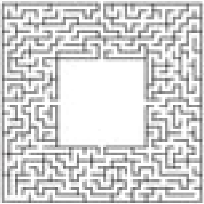
INCREASING RETURNS

Significant increasing returns:

1. No immediate "learning effect":
not like search/socials, more like operating systems

2. But "ecosystem effects":
interaction between different layers
(infrastructure – models – apps)

2. Pro-active competition law and policy



1. Follow increasing returns

What generates these returns? (snowball effect)

Target practices diminishing these returns = freezing the ecosystem

1. Follow increasing returns

How effective is the practice? Depends on the ability to enter frozen layers

Source

2. Deploy computational antitrust

E.g.: Audit code and T&C

- Track changes in the API (for the 'closed' ones)
- Track changes in access terms to models (for the 'open' ones)
- Track changes to non-compete provisions
- Track changes to interoperability terms

—

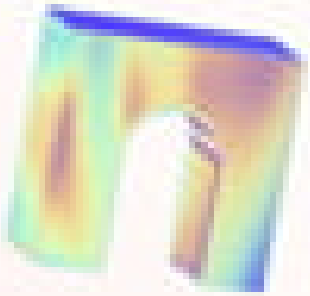
source

3. Document regulatory barriers (and captures)

Article 53 of the AI Act + Annex XI
(Providers of general purpose AI models)

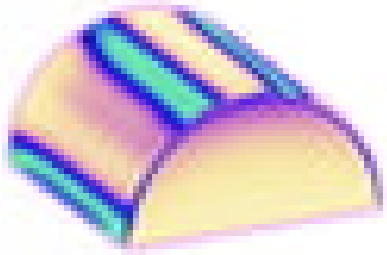
source

4. Exempt open systems



1. Forming joint ventures (between OS/OA companies) without notifying antitrust agencies

2. Forming strategic alliances without facing cartel sanctions (sharing up-front costs, marketing networks, and technical knowledge)



3. Creating/extending R&D exemption to antitrust law (25% + rivalry)

source

t.schrepel@vu.nl

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