Reproducibility Crisis:

why it matters

Language Technologies Lab, Jan 23th, 2026

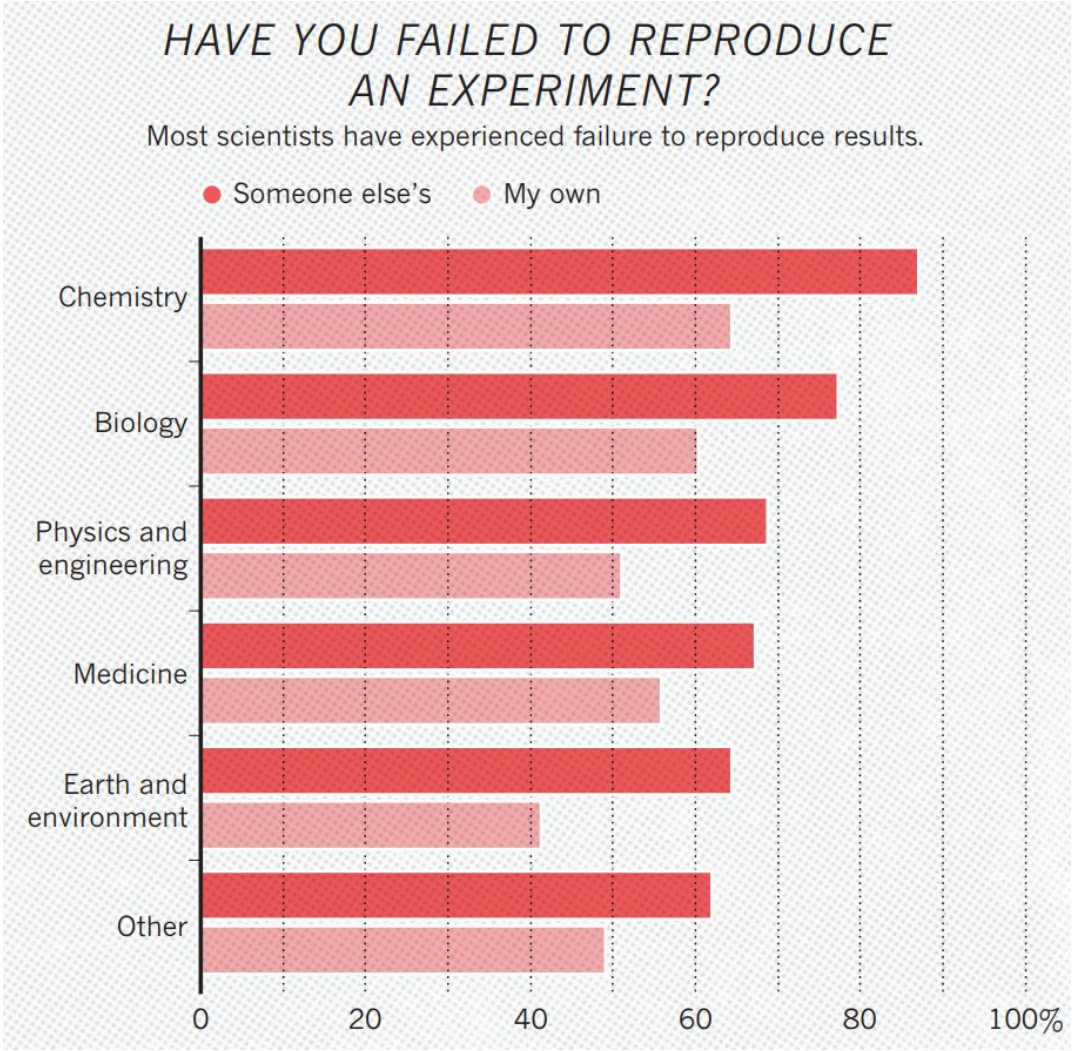
PhD. Federico Ruggeri

The crysis

A general crysis

“1,500 scientists lift the lid on reproducibility”, Baker, 2016, Nature

">70% of researchers failed in their attempt to reproduce another researcher's experiments, and >50% failed to reproduce one of their own experiments"



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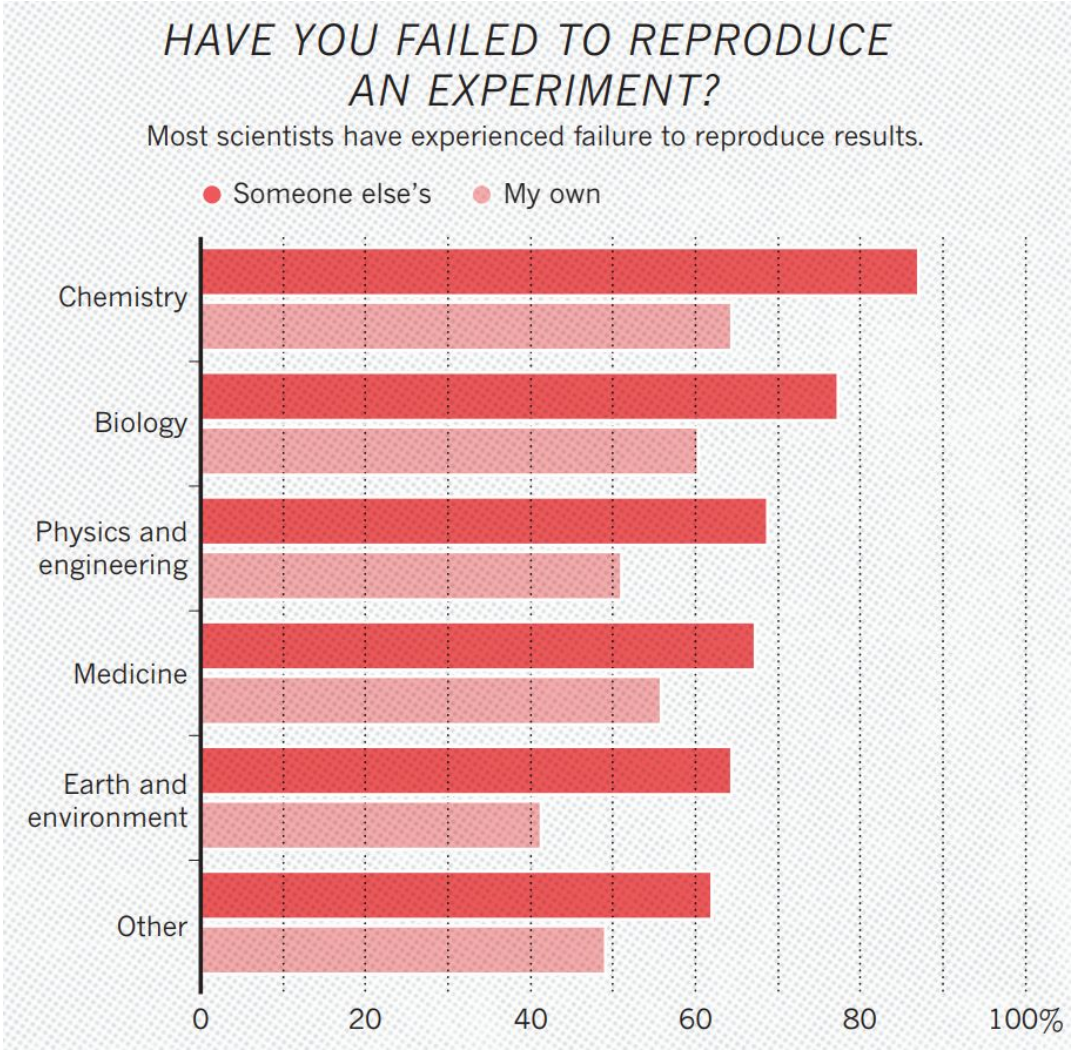

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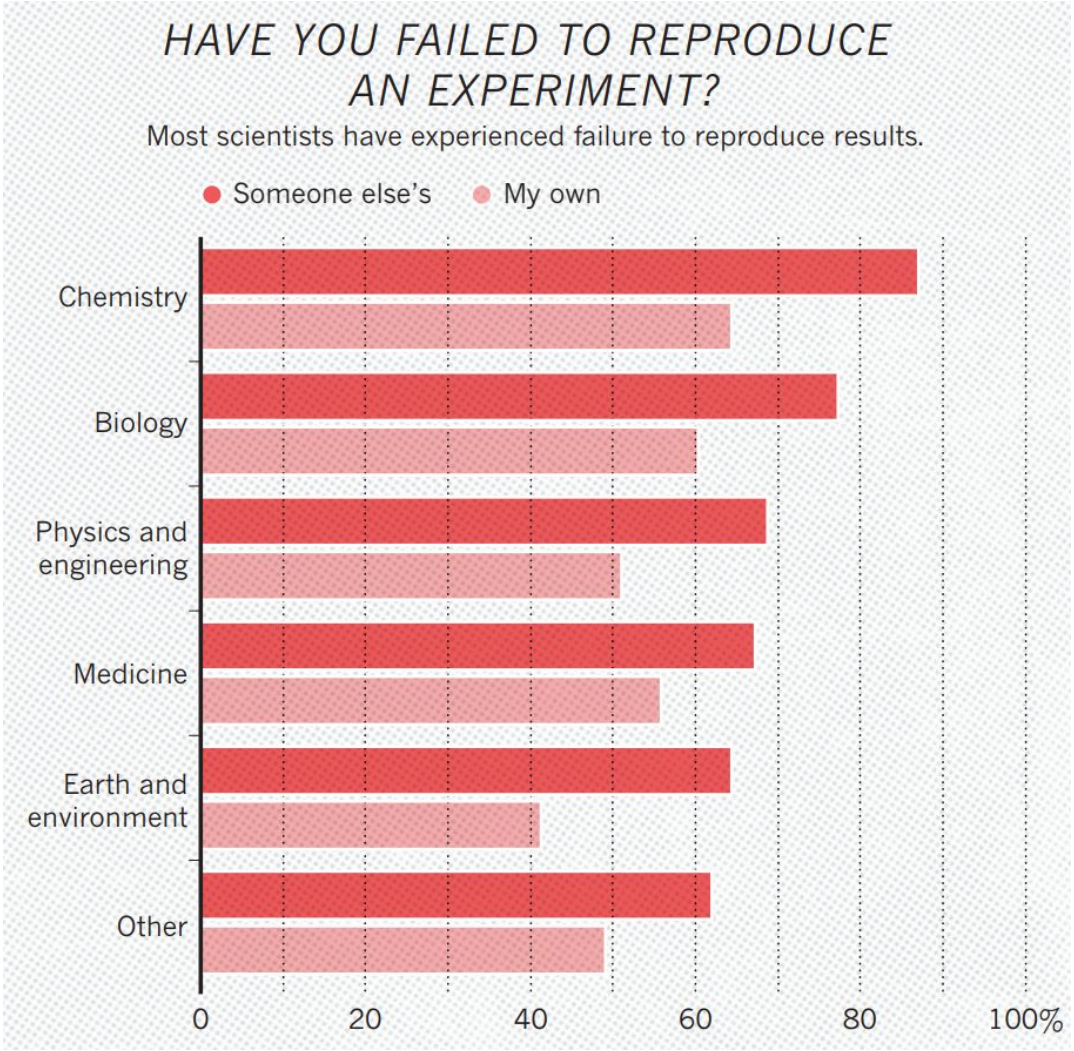

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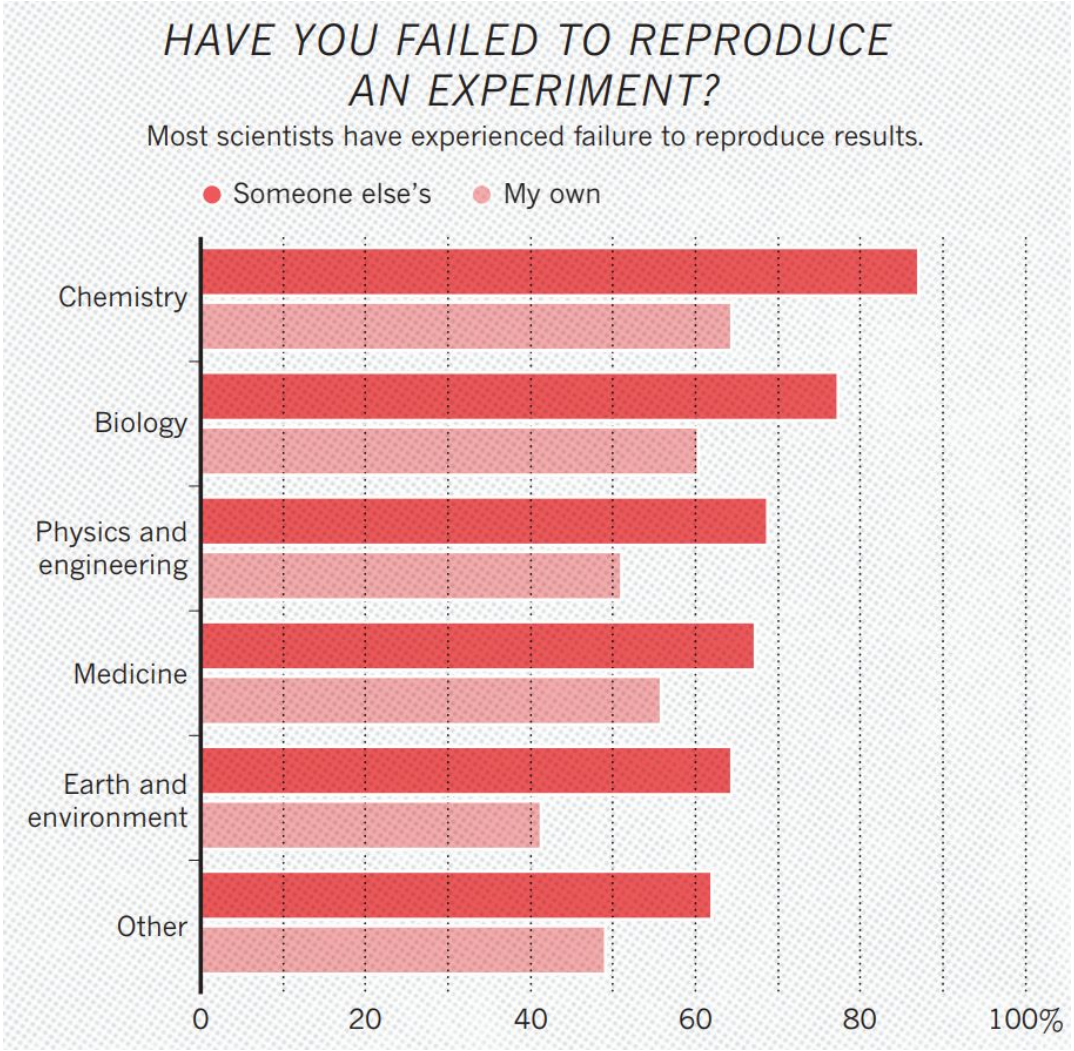

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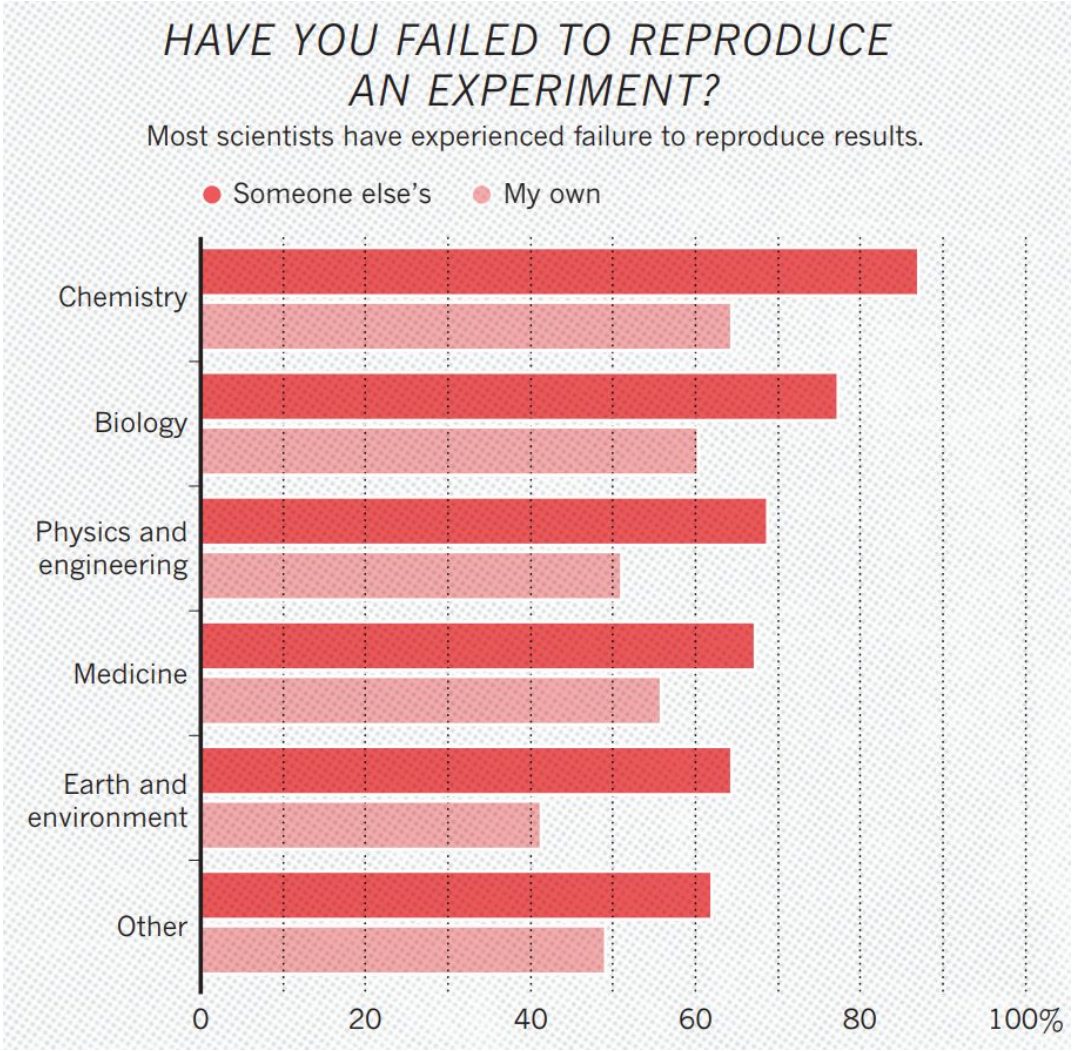

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- <20% were notified about their work

Modeling

"Are GANs Created Equal? A Large-Scale Study", Lucic et al., 2018, Neurips

A few studies show new proposed methods are often not better than previous implementations after a more thorough hyper-parameter search or initialization

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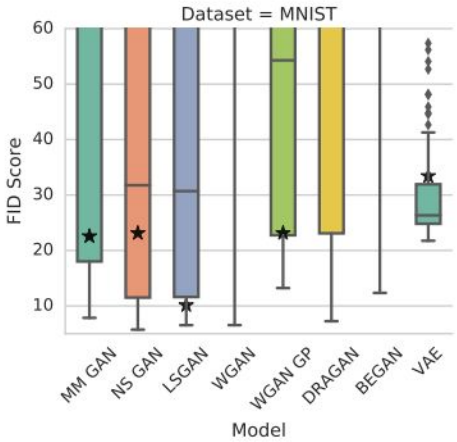

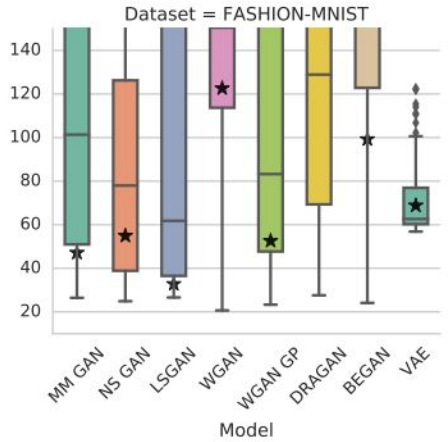

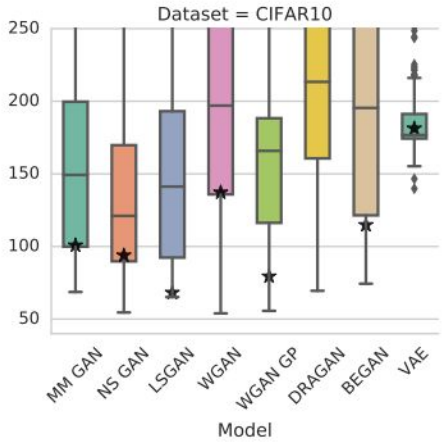

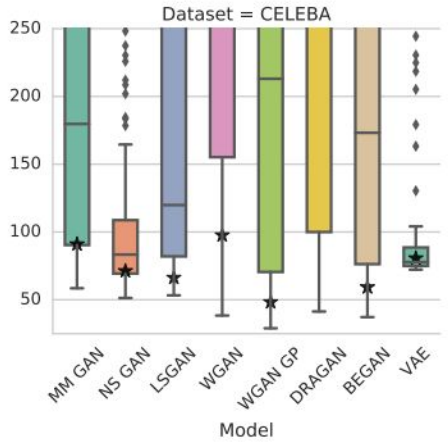

Reporting

"A Step Toward Quantifying Independently Reproducible Machine Learning Research", Raff, 2019, Neurips

And much more…

"Philosophy of Open Science", Leonelli, 2023, Cambridge Elements

Peer-Reviewing

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And much more…

Publish or Perish

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No incentives for responsible dissemination

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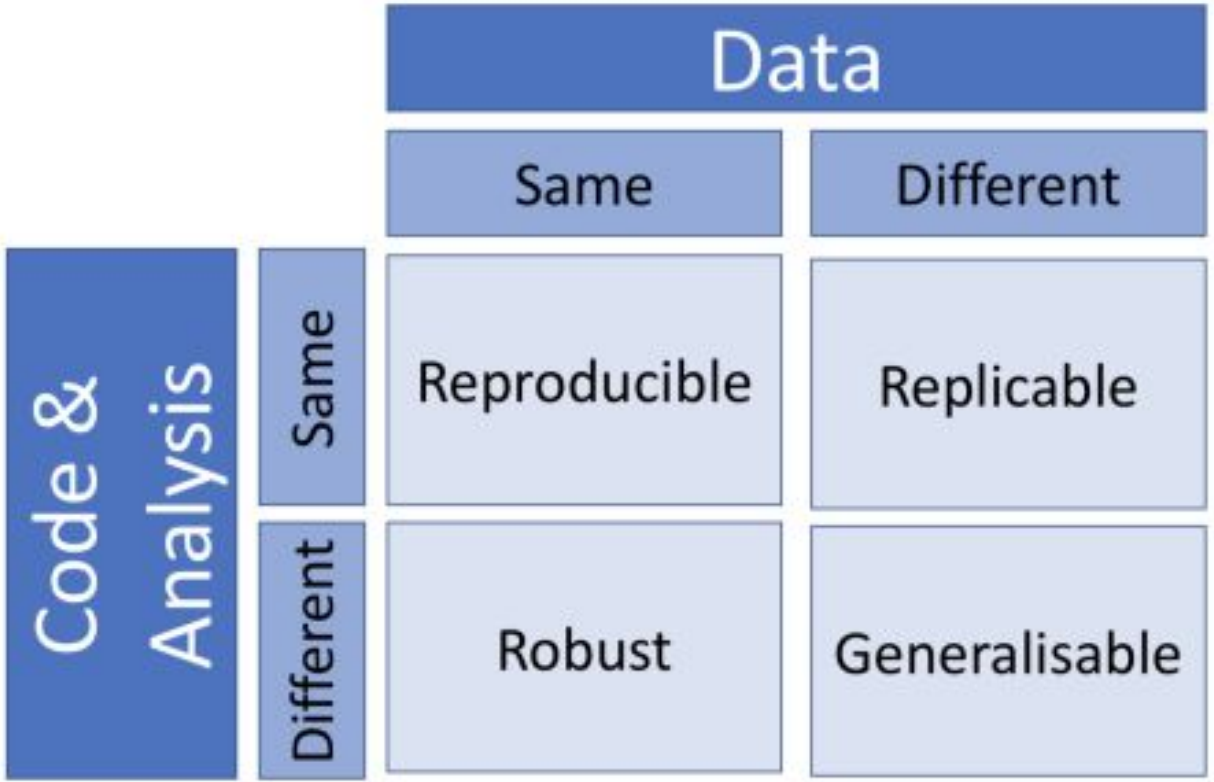
Reproducibility

“Reproducibility”, McNutt, 2014, Science

There's a growing interest in improving reproducibility across scientific disciplines: guidelines, recommendations

"Improving Reproducibility in Machine Learning", Pineau et al., 2021, JMLR



Many definitions

Open Science Movement

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Artifacts Availability

Many definitions

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Reproducibility of Findings

Many definitions

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Results Reproducibility

Reproducibility of Findings

Many definitions

Artifacts Availability

Open Science Movement

Results Reproducibility

Reproducibility of Findings

Computational Reproducibility

Equitability, Fairness,

And Countering Discrimination

A brief example

(Scientific) progress is made by trusted research, where that trust is laid on research being reproducible.

A brief example

Equitable Algorithms

Fairness

Algorithm Biases

A brief example

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Fairness

Algorithm Biases

Results Reproducibility

Computational Reproducibility

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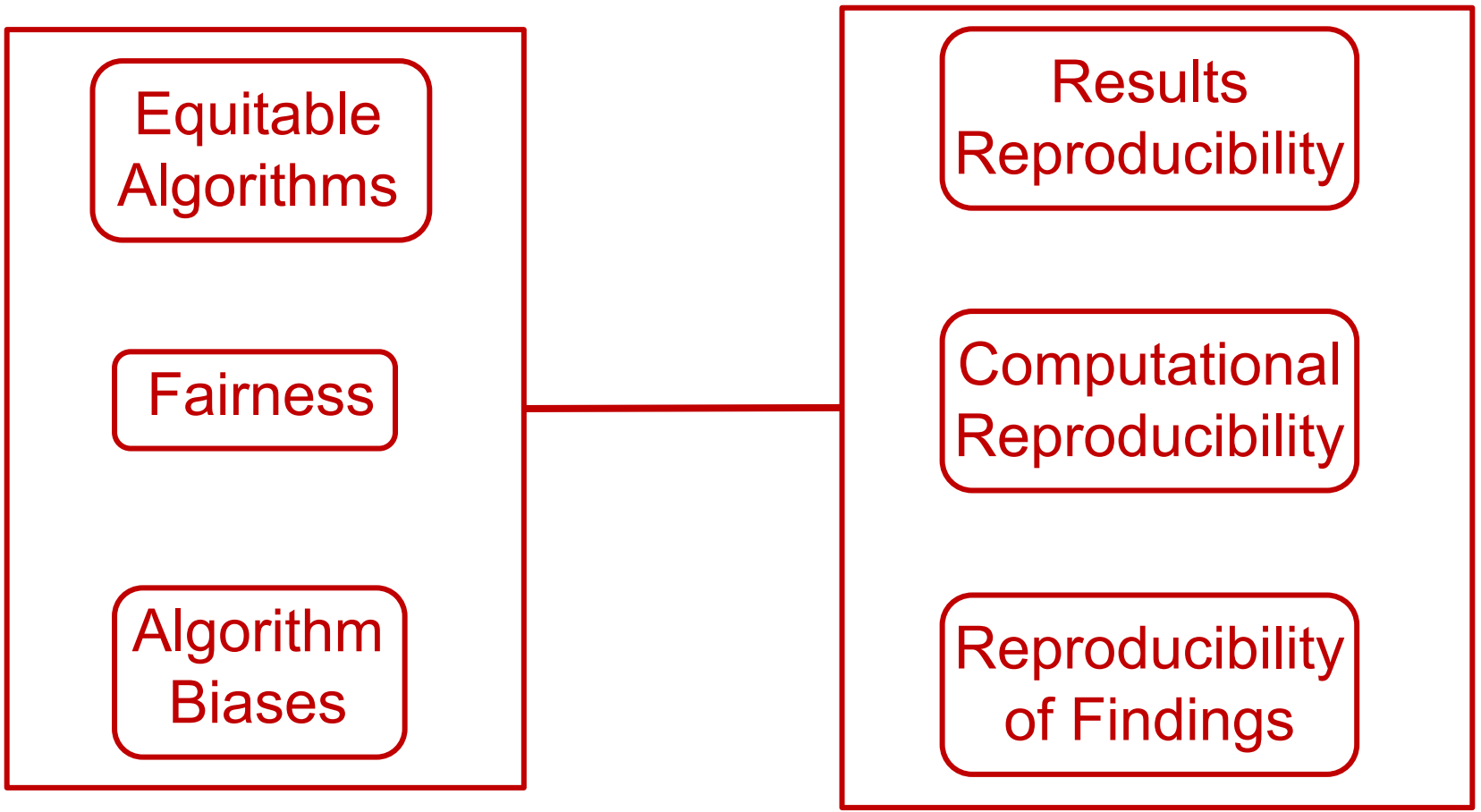
A brief example



Robust and Reproducible Research

Teacher: Federico Ruggeri (DISI, University of Bologna)
Year of study: first, second or third year
Teaching period: from March to April 2025
Total hours: 16
Doctoral credits: 3,2
Assessment method: by project

The number of scientific articles published in Computer Science (and similar fields) increases steadily every year. This is mainly due to breakthroughs like Deep Learning, and, more recently, Large Language Models. Paradoxically, researchers are struggling even more to reproduce published research. This issue affects all possible aspects of research, including methodology, data curation, approach comparison, and implementation.
In this course, we'll introduce and discuss the concept of 'reproducibility' in research. In particular, we'll overview current issues in research and existing attempts to address them. We'll focus on data curation, experimental setup, model comparison, and programming best practices.
This course is recommended for all types of researchers, from those who have just embarked on their journey to those who have always wondered how certain research managed to get published.

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All course material available!

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Thanks for the attention!