Trust in Science

Trifels Summer School, September 26th 2022

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Introduction

- Who am I?
- Who are you? Which university are you from? What is your background? What is you favourite TV show/movie?
- Please take this short survey: tinyurl.com/XX

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What's ahead?

- Combination of input, research results, and discussions

1. **Why** is public trust important?
2. **Where/When** do we lose public trust?
3. Can we **repair** trust?
4. What does **open science** have to do with trust?

- Conversational format
- Questions? Please ask!

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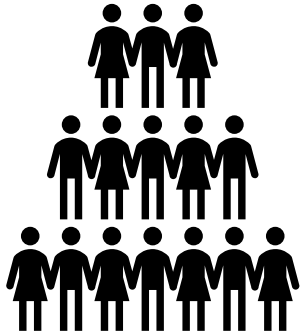
Science & Society

Why is trust in science necessary?

- No time & resources to become an expert in every field → trust in science necessary (Hendriks et al., 2015)
- Science & Society have a social contract (Gibbons, 1999)
  - In return for the public's support, science is required to **transparently** produce **reliable** knowledge about how the world operates



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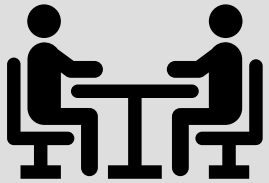
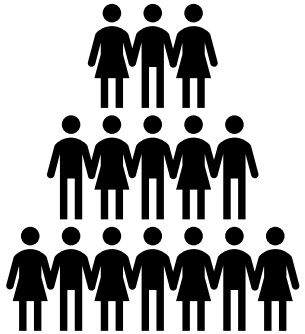


Science & Society

Regardless of the social contract:

- What could be the **upsides** of close collaborations between scientists & the public?
- What do you think might go wrong at the moment?
- Think about the whole research process from research question to publication of findings.

Discuss these questions with your neighbor and share one upside and one pitfall.



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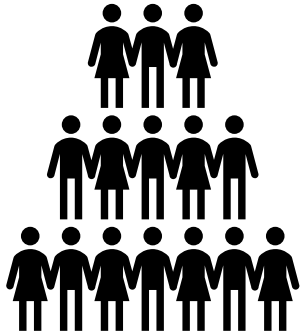
Science & Society

- Upsides of close collaboration with the public (Eagleman, 2013)
  - Inspire critical thinking and public debates
  - Correct misinformation
  - Improve law and policy



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Science & Society

Pitfalls

- Large numbers of scientists working competitively in silos without combining their efforts (Ioannidis, 2005)
- Low Replicability (Reproducibility Project: Psychology, 2012).
- Lack of science communication (Lakomý et al., 2019)
- Inaccessible materials, data, and publications (Hofner et al., 2016)

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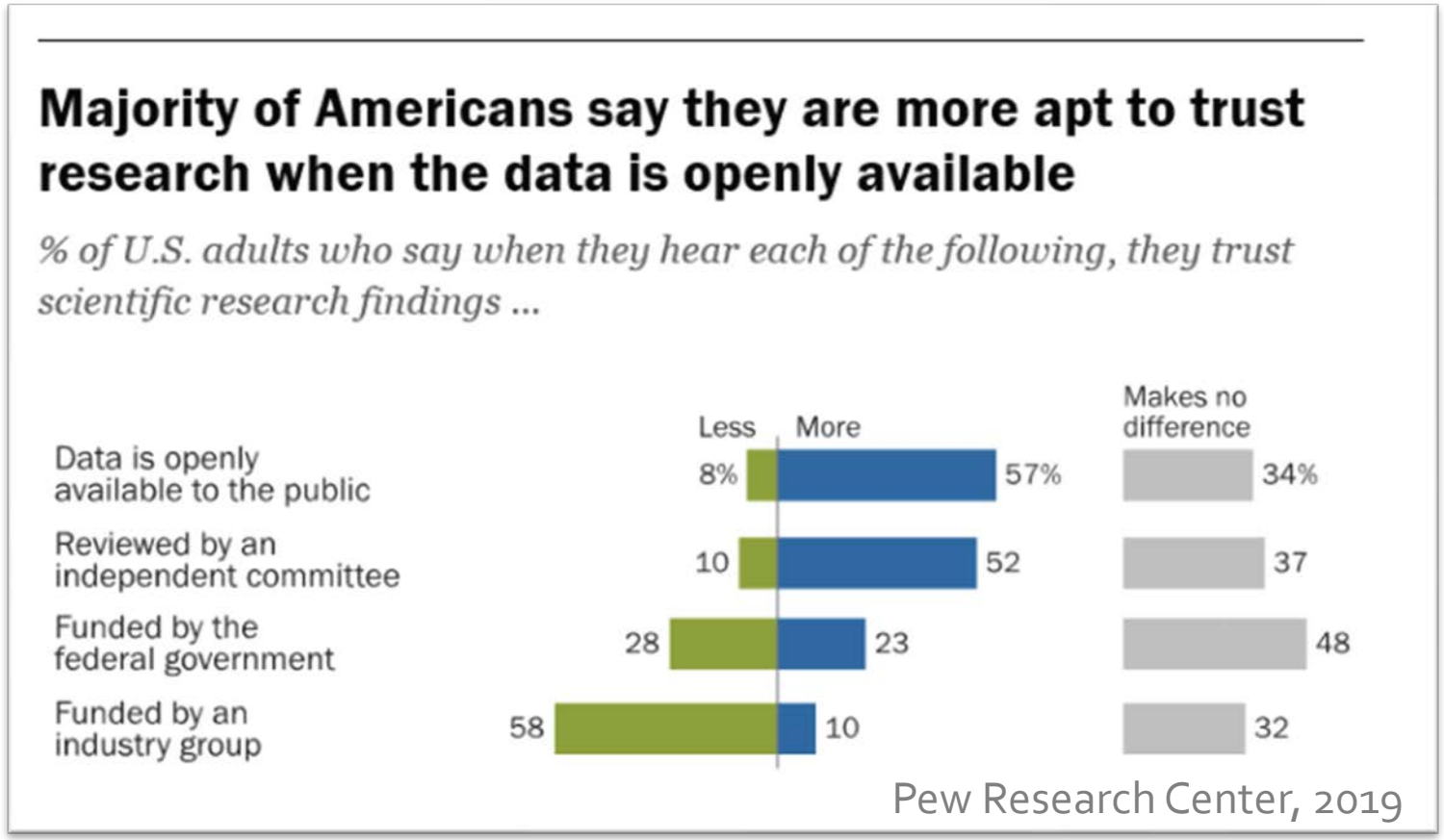
Science & Society

Pitfalls



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Science & Society

How about you?

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Science & Society

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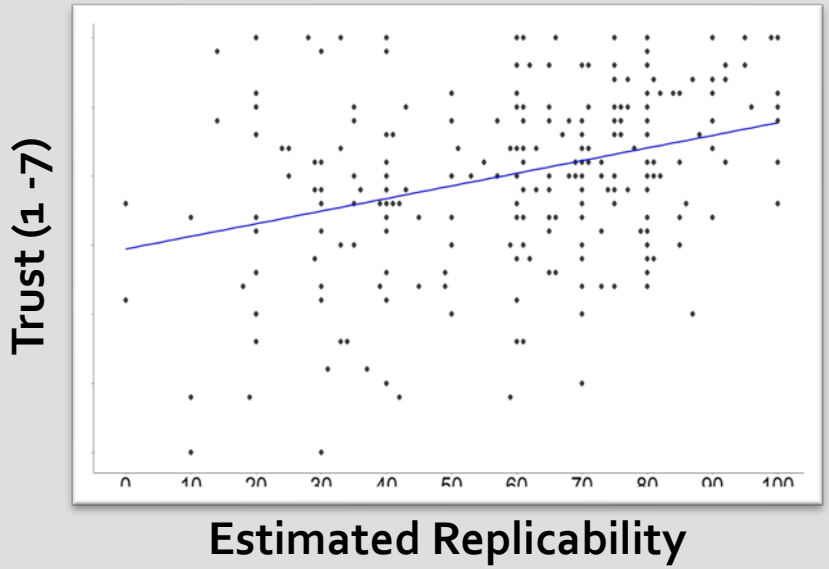
Science & Society

Pitfalls

Wingen, Berkessel, Englich (2020): Replicability & Trust in Psychological Science

1. Information about the Reproducibility Project: Psychology



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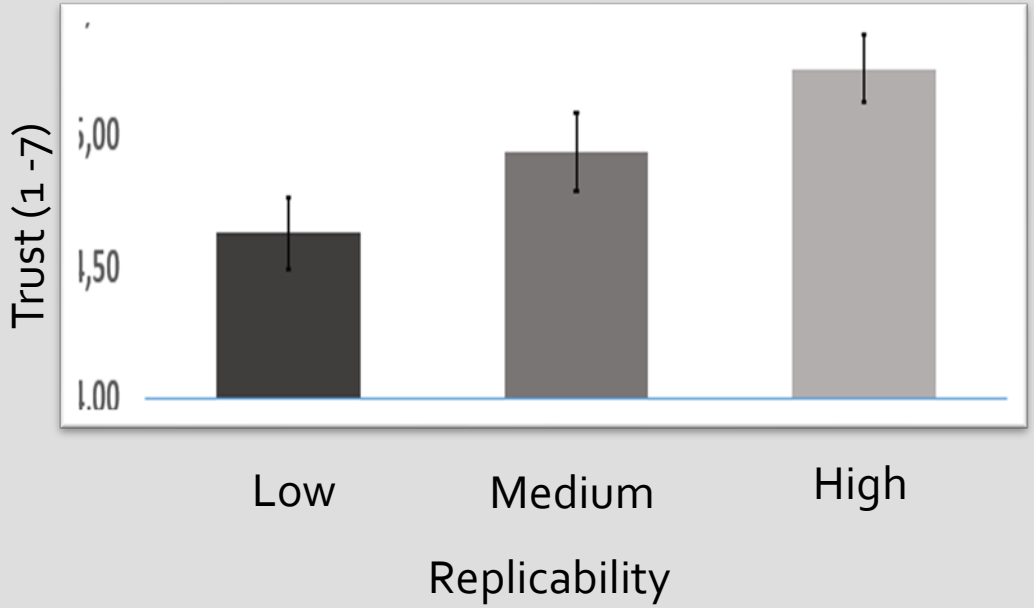
Pitfalls

Wingen, Berkessel, Englich (2020): Replicability & Trust in Psychological Science

2. Experimental manipulation of replicability



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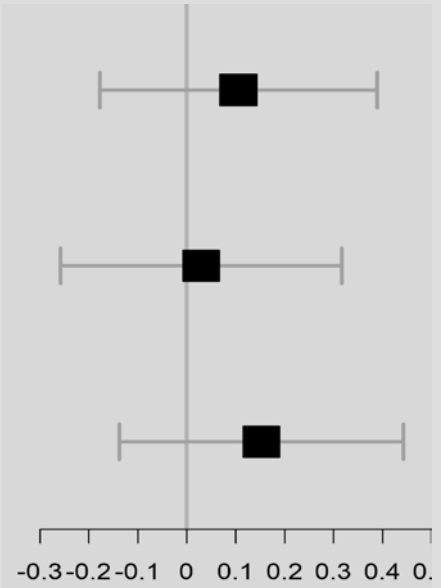
Pitfalls

Wingen, Berkessel, Englich (2020): Replicability & Trust in Psychological Science

Effects of trust repair strategies	**Cohen's d [95% CI]**
Transparency (Study 3, N = 304)	0.11 [-0.18, 0.39]
Context Sensitivity (Study 4, N = 303)	0.03 [-0.26, 0.32]
Increased Replicability (Study 5, N = 304)	0.15 [-0.14, 0.44]



→ **Trust is easy to lose and hard to repair**

(see also Anvari & Lakens, 2019 and Hendriks et al., 2020)

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Science & Society

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- → **Room for improvement in fulfilling the social contract** (Munafò et al., 2017)
- → **Improvement necessary to not lose trust** (Wingen et al., 2020)

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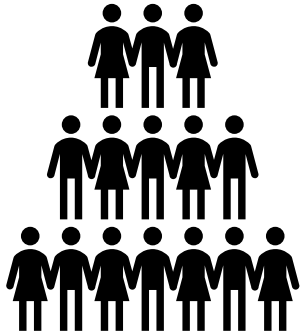
Open Science & Society

Opportunities



What now?

"Open Science is the practice of science in such a way that others can collaborate and contribute, where research data, lab notes and other research processes are freely available, under terms that enable reuse, redistribution and reproduction of the research and its underlying data and methods."

- Foster Open Science

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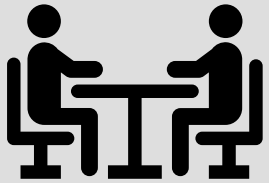
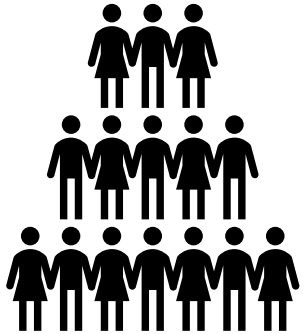


Science & Society

- You are called into your dean‘s office. He heard that you participated in an open science summer school and tells you: „The numbers just got in, the people in our town **don‘t trust** the research that comes from our institution. Do you think implementing **open science** techniques will bring this number up? What could **go wrong**? I‘m worried that the public does not understand the scientific process.“
- Prepare a 1-2 minute answer for your dean.



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Opportunities

Pre-Registration &
Registered Reports can prevent
cognitive biases
(Munafó et al., 2017)

AS PREDICTED

PREREGISTERED
OSF
PREREGISTRATION

MZES-GESIS Pre-Registration Challenge

Submit a hypothesis-driven research design and pre-registered analysis plan,
the best paper is awarded data collection free of charge.

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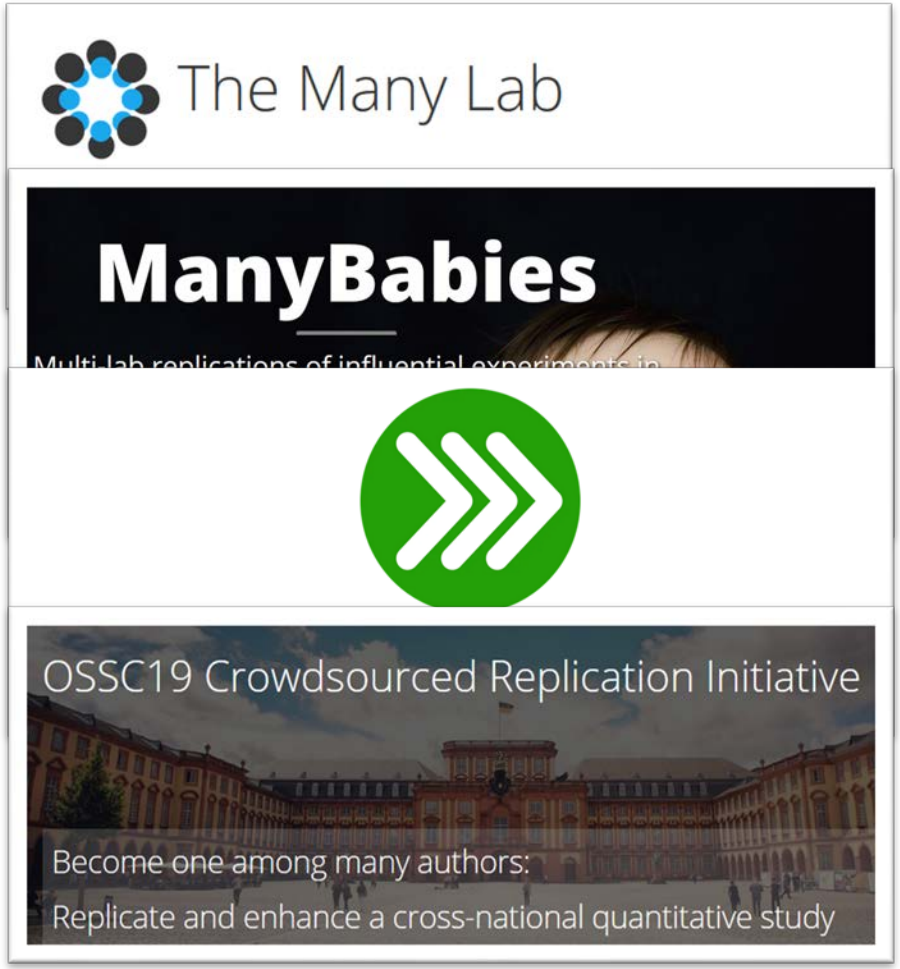
Opportunities

Team Science Efforts can prevent low power & non-cooperative research
(Klein et al., 2014)



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Open Science & Society

Opportunities

Open Materials & Data make research accessible & facilitate collaboration
(Hofner et al, 2016)

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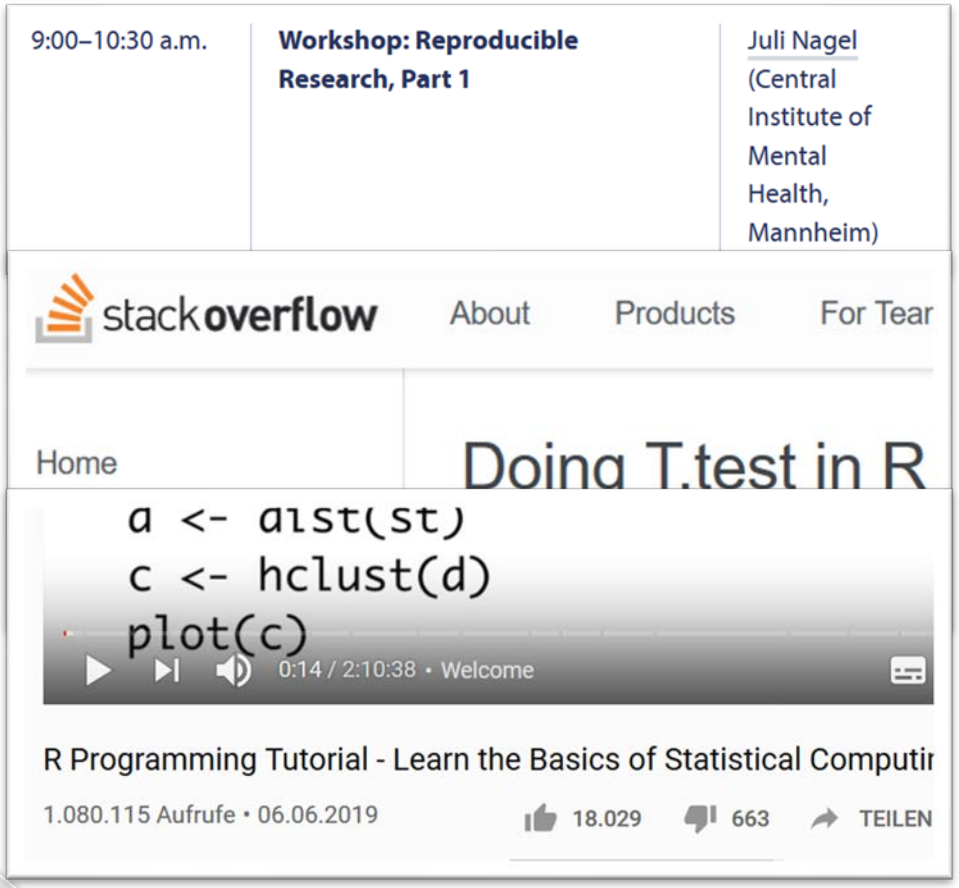
Opportunities

Reproducible & improved analyses can increase reproducibility and statistical inferences
(Nosek et al., 2015)



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Opportunities

Preprints, Open Review, Open Access open up peer-review and access to final publications

1:30–3:30 p.m.	**Revealing the Open Access potential of my dissertation**	Dr. Philipp Zumstein (University of Mannheim)

Open Peer Review

This course will introduce you to Open Peer Reviewing and let you know how you can get started

9:00–10:30 a.m.	**Workshop: The Boom of Pre-Print-Publishing and its Challenges for the Public Communication of Research Results – Part I**	Prof. Markus Lehmkuhl (Karlsruhe Institute of Technology)

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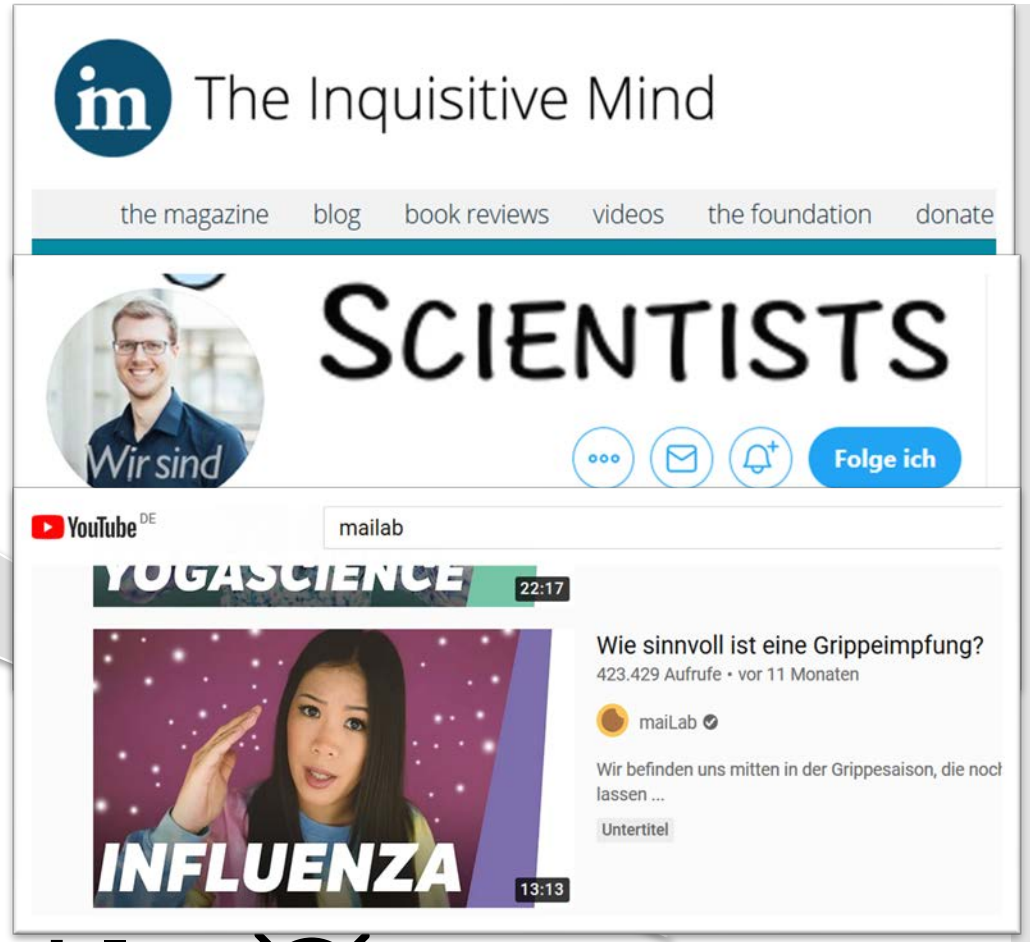
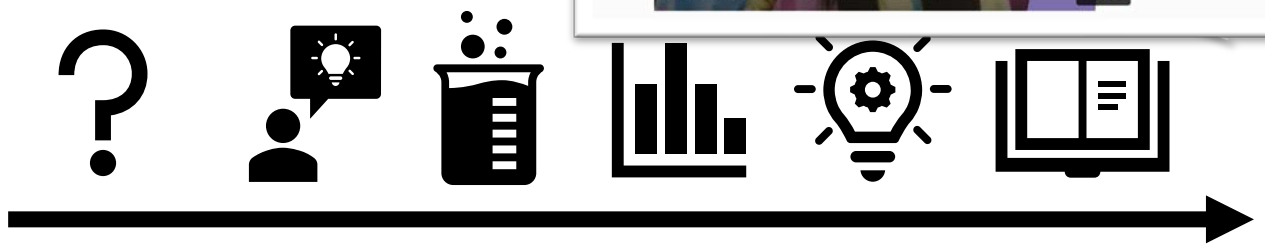
Opportunities

Science Communication can increase trust in and support of science
(Lakomý et al., 2019)





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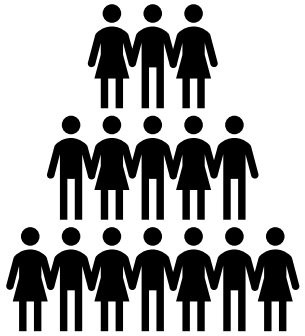
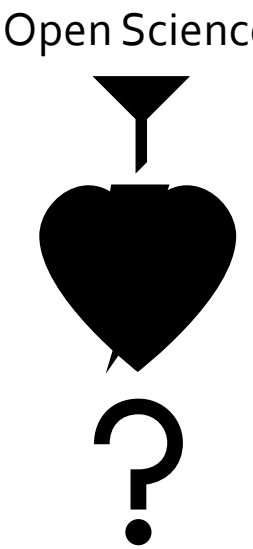
Pitfalls





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Pitfalls

„Unfiltered" information without necessary context?

- More public criticism (blogs, twitter, facebook)
  - → without training legitimate disagreement might be mistaken for "trouble" (Pittinsky, 2015)
- Scientific uncertainty reduces perceived value of scientific fields (Broomell & Kane, 2017; Howe et al., 2019)
- Preprints vs. Peer-reviewed papers (Wingen et al., 2022)
- Science Communication is not strictly controlled

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Pitfalls

- **How** scientists express uncertainty matters (Howe et al., 2019)
  - Concrete range of possibilities → increased trust
  - Unpredictable impacts → reduced trust
- Being self-corrective and stating reform intentions can increase trust (Altenmüller et al., 2021)

→ **Uncertainty not necessarily bad!**

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Pitfalls

Wingen, Berkessel, Dohle (2022, AMPPS): Caution, Preprint!
(5 studies, total N = 2,286)
If informed about the peer-review process, non-scientists trust peer-reviewed articles more than Preprints

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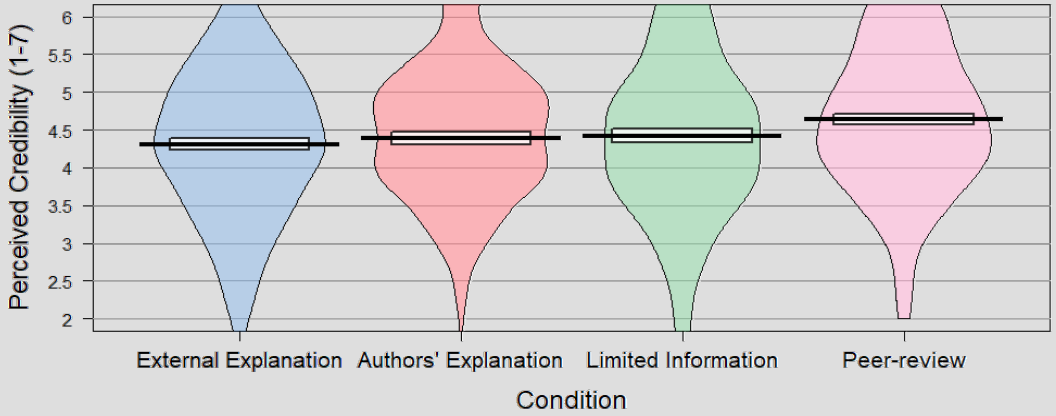
Pitfalls

Wingen, Berkessel, Dohle (2022, AMPPS): Caution, Preprint!

- No information about peer-review → no difference in trust!
- Only 26% marked as Preprints, only 12% explain peer-review
- Even brief explanations help



→ **Readers differentiate, but need sufficient information, which is often missing**

→ **Solution: Short explanation of peer-review**

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Society &
Open Science

Peer-Review in Science Communication

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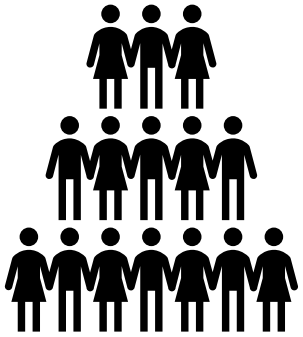
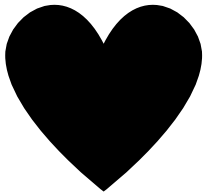
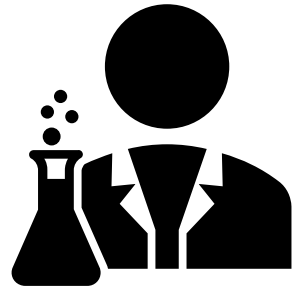
Conclusion

- Science & Society have a social contract
- Science's compliance with this contract could be improved
- Open Science offers methods to do so
- These contain pitfalls that need to be kept in mind
- Solutions are already researched & implemented







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Summary

- Science & Society have a social contract
  - Science should **transparently** produce **reliable** knowledge about how the world operates
  - Many pitfalls along the way (e.g., closed methods, data, & access)

→ Science's compliance with this contract could be improved

- Open Science offers methods to do so (e.g., collaborative efforts, reproducible methods, open access publications)
- These contain pitfalls that need to be kept in mind (e.g., uncertainty reduces trust, preprint vs. peer-review)
- Solutions are already researched and implemented (e.g., framing of uncertainty, primer on peer-review, peer-review in science communication)

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Thank you!