

What is Reproducibility and why it matters for you

Research Methods e-Festival 2021



Interaction in the workshop

- Zoom Q&A (in your menu bar) to ask/upvote questions
- Mentimeter at menti.com with 8 digit code to participate in polls, word clouds, etc.

Troubleshooting audio problems

- Check your speaker/headset is plugged in / volume is on.
- Click on audio to change to listening via phone
- We are recording this webinar and will post it on YouTube (<https://www.youtube.com/user/UKDATASERVICE>)

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What are we talking about?

Getting “the same” results as published work.



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Reproducibility in brief

Essential part of the scientific method



Maybe repeat an entire scientific work

Maybe narrow recreate an analysis



Terminology

Repeatability = replicability →
data collection and/ or experimental steps



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Reproducibility = validation →
data analysis or interpretation

Reproducible research is like a good recipe

NOT like the technical challenge on Great British Bake Off



Good reproducible research recipes

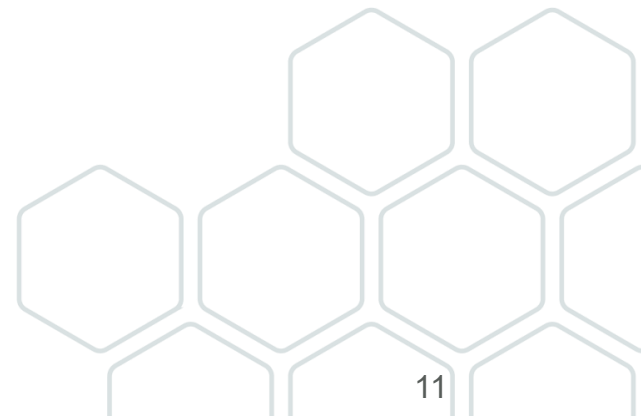
They should include:

- Data (details of acquisition, representativeness, etc.)
- Tools (materials, software, packages, etc.)
- Decisions made (in cleaning, processing, recoding, etc.)
- Results (clear and as objective as possible)
- Access (to data, code, notebooks, recordings, transcripts, etc.) IF POSSIBLE

Have you tried to reproduce a research project?



A moment to ask and answer questions



Crisis!

- *Social Psychology* and “repligate” (Chambers 2014)
- More than 70% of researchers have tried and failed to reproduce another scientist's experiments (Baker 2016, Chambers 2014)
- More than 50% have failed to reproduce their own experiments (Baker 2016, Chambers 2014)
- Few published their efforts to reproduce (especially “failed” ones) (Baker 2016, Chambers 2014)
- Few contacted the original researchers with questions about reproduction fails (Baker 2016, Chambers 2014)
- New activism/movements about open science, ‘metascience’, etc.

Consequences for society

- Inappropriate take up e.g. pro-austerity “proof” (Alesina 2010, Krugman 2013, Devries 2011)
- Wasted time, money, research efficiency, etc. (Freedman 2015, Mack 2014, Roesch 2020)
- Loss of trust (Chambers 2014, Freedman 2015, Peterson 2021)



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Consequences for science and scientists

- Wasted time, money, research efficiency, etc. (Freedman 2015)
- Distorted research culture (Baker 2016, Freedman 2015, Roesch 2020)
- Loss of trust (Chambers 2014, Freedman 2015)
- Reputational damage (Chambers 2014)



<https://kellystanford.co.uk/science-pusheen>

Let's talk about what is driving this.

Longstanding problems of research culture

Share or protect knowledge?
(Kasmire 2021)

Who gets the credit?



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Modern problems within research culture

Culture of:

- Education
- Hiring/promoting
- Publishing
- Funding
- Post-publication engagement

Questionable Research Practices!

Questionable Research Practices or “soft fraud”

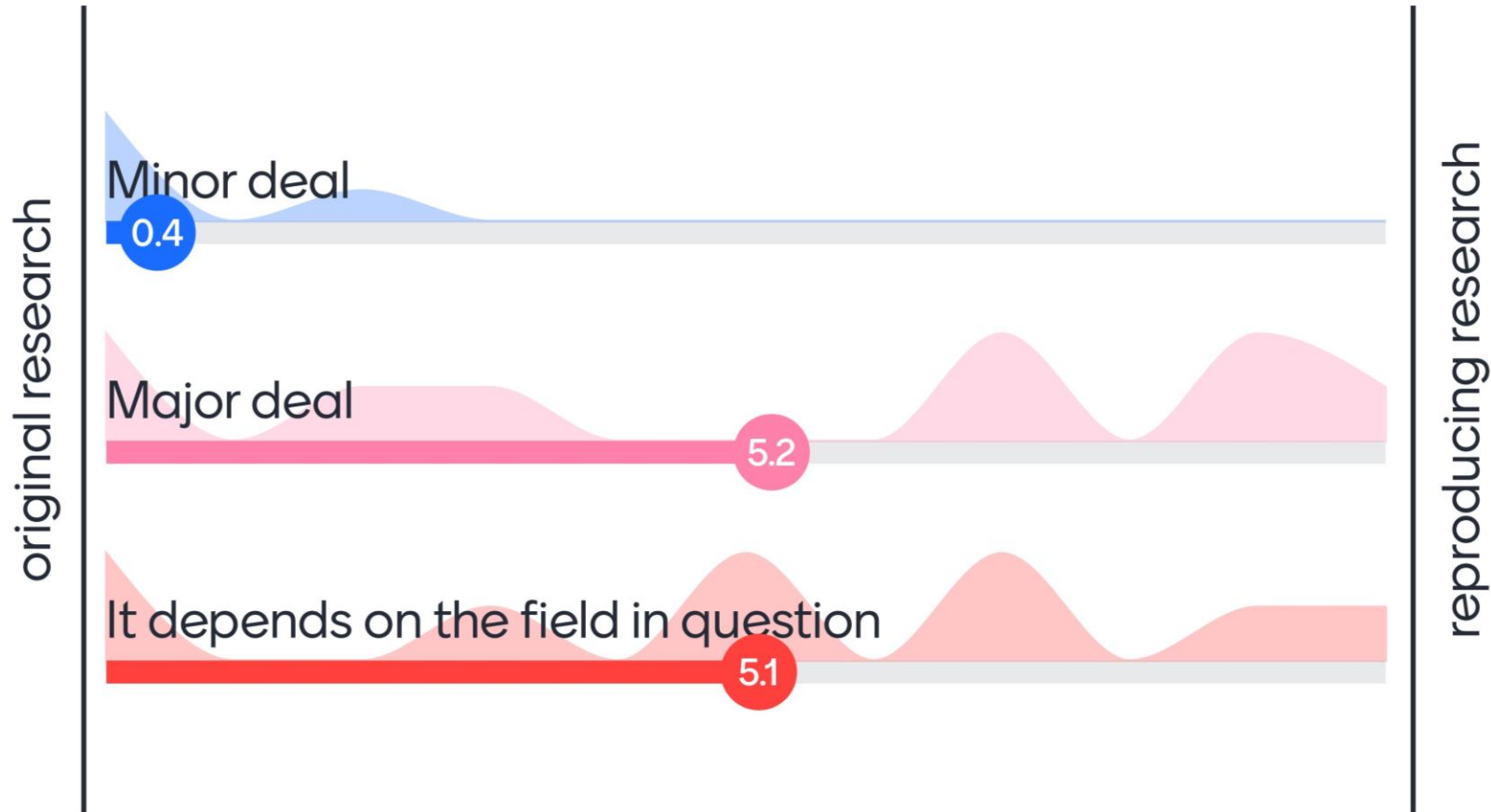
shared method variance

implied consent

Solutions? Here is a few gut reactions

- It is just a misunderstanding
 - This “crisis” is overblown and proposed changes too broad brush (Peterson 2021)
 - Attempts to reproduce should require permission/collaboration of original author (Chambers 2014)
- We call for a revolution!
 - make “soft” sciences more like “hard” sciences (Chambers 2014)
 - Market based solutions e.g. incentives, apps, journals, etc. (Roesch 2020)

What is your gut reaction?



Another moment to ask and answer questions



Except – oh no!

- Hard sciences are not exempt
(Baker 2016, Freedman 2015, Roesch 2020)
- Efforts to improve show *some* improvement...
(in the most high impact journals (Ball 2018))
- Nobody likes imposed solutions from above
that seem irrelevant (Peterson 2021)



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Solutions that dig deeper

Better training,
mentorship,
experience

Self/buddy
replication,
replication
journals

Consolidate or
standardise
methods/material
s/protocols

More time,
rewards, support,
incentives

Change
publishing
practice

Share data, code,
etc.

Attitude change

Field-generated
or field-specific
solutions

Mack 2014,
Freedman 2015,
Baker 2016, Ball
2018, Roesch
2020, Peterson

Let's hear your suggestions!

Update informed consent collected to enable access requests from certain journals and groups.

Could funders play a role in imposing reproducibility? Eg fund smaller reproduction studies after the original study

My college at University of Exeter are going hard re: replicability crisis. We have workshops etc. to talk about it and are encouraged to put everything on OSF. My first study in PhD project will be a replication of very recent work in my field.

Maybe we should teach more coding to ensure people are analysing data in R, Python etc.? This means researchers would have data scripts which can be checked, rather than hoping people selected the right buttons in SPSS etc.

Encourage journals to formally withdraw articles found to have used fraudulent data- until this happens consistently there is no penalty or no perceived disadvantage. So people just submit and publish with little consequence.

Redefine the problem and goal

- 100% reproducibility is not the goal
- Go cautiously
- Embrace complexity
- Embrace collaboration
- Strive for open science
- Automate the boring stuff (Sweigart 2019)

References

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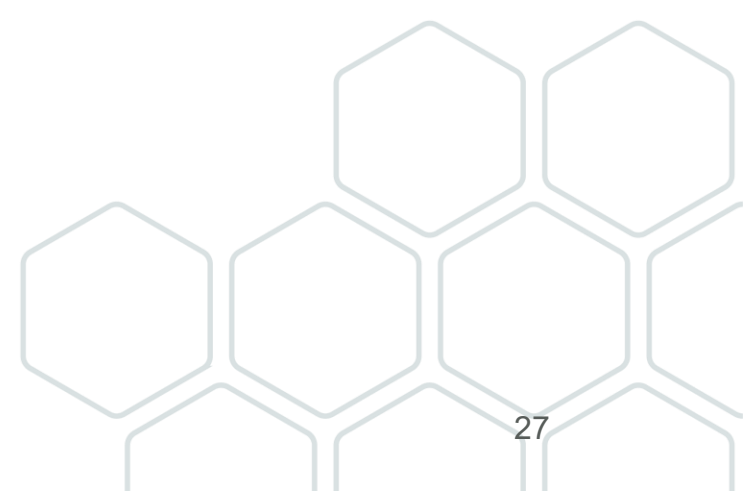
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Any last questions?

