Tackling the replication crisis: Student theses should be collaborative replication studies

Amy Amoakuh,   Leonie Twente & Onur Özsoy

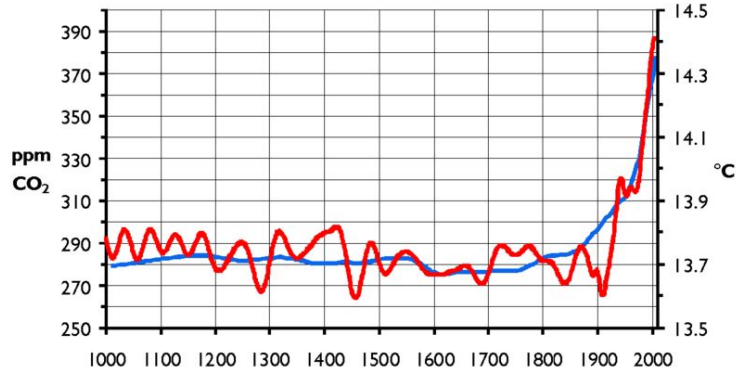Leibniz-Zentrum Allgemeine Sprachwissenschaft

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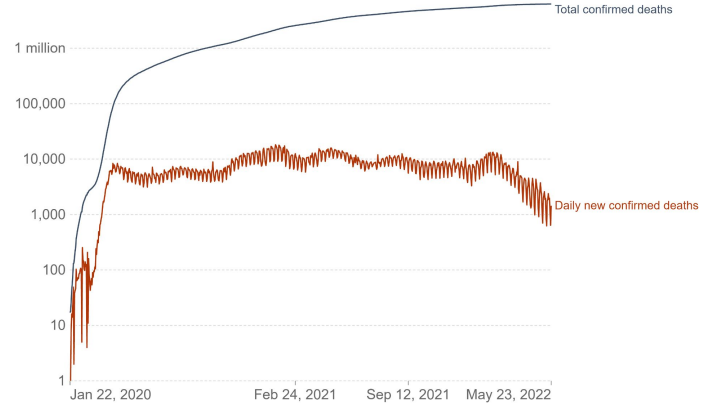72. StuTS - 4 November, 2022

Roadmap

1. Replication crisis: Ways in and out

2. Role models for (student-led) replication

3. Building a student replication network

4. Stay in touch

*Crisis*

replication crisis

?

3

Replication study

- scientific discovery if replicated
- studies need to be reproducible
- falsification of hypotheses

direct replication

duplicate critical elements

original study 🧪

extension to a new context

conceptual replication

Zwaan et al. (2018)

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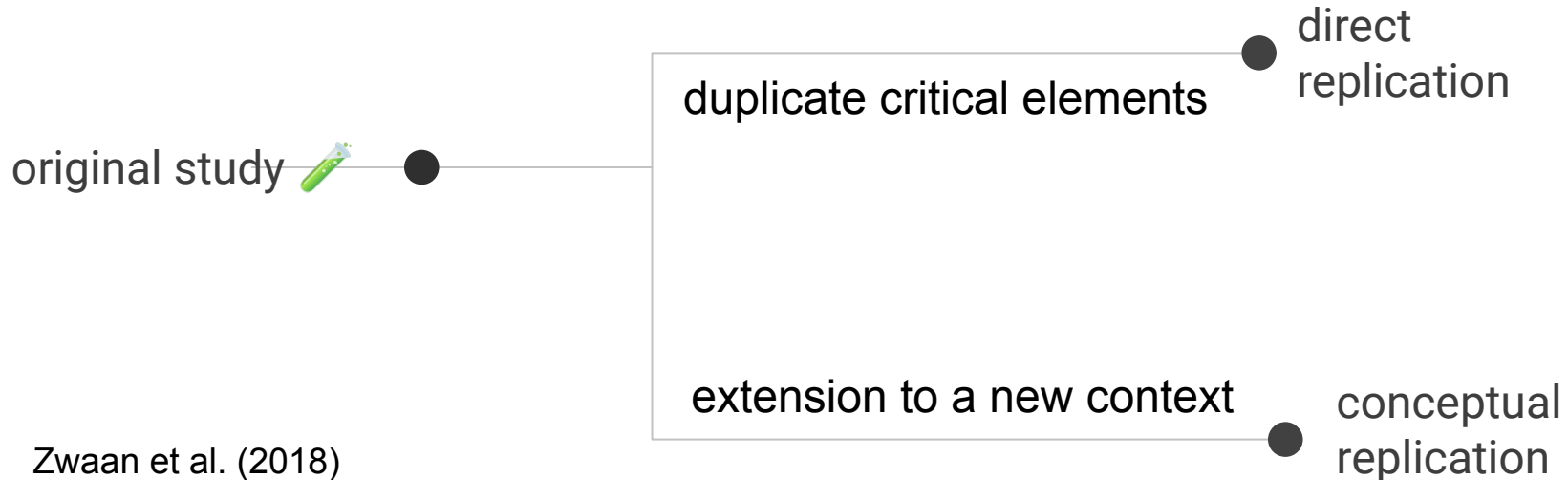
Replication crisis: ways in

- Reproducibility is a core element of science
- Several factors affect reproducibility
  - Sample size and statistical power
  - Study design (number of variables)
  - Availability of procedures and protocols
  - Availability of materials and stimuli
  - Availability of data and code

"Simulations show that for most study designs and settings, it is more likely for a research claim to be false than true." (Ioannidis, 2005)
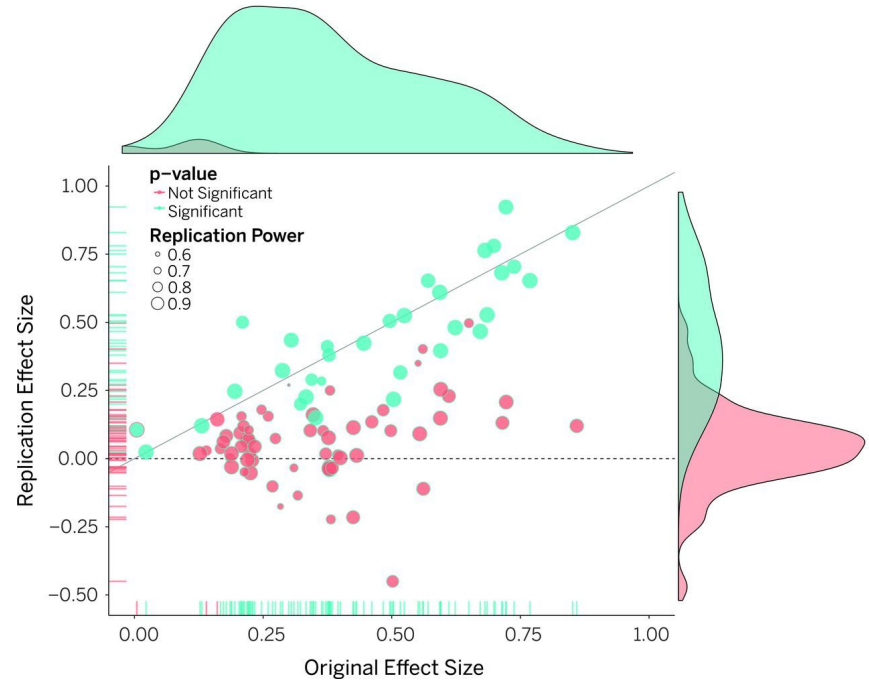
(Open Science Collaboration, 2015: 943)
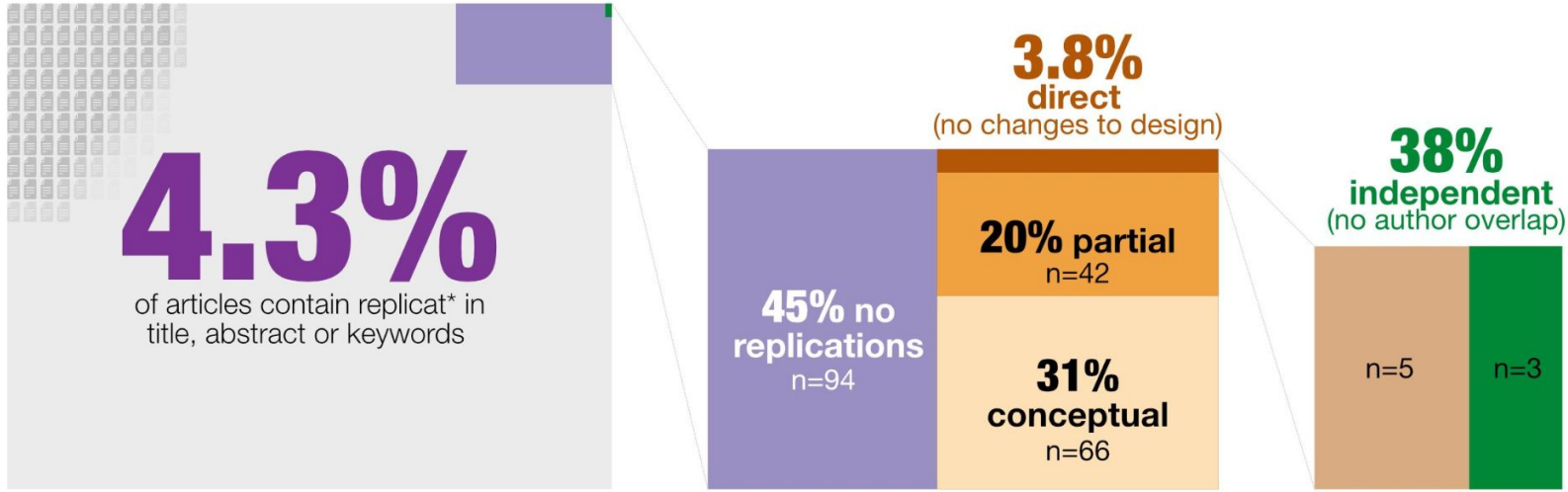
Example: Power posing

TED Talk

- Study published in 2010
- "Power posing" becomes famous
- 2015: **replication studies can't replicate effect**
- lead scientist distances herself from study
- „The data are flimsy. The effects are small and barely there in many cases"
- 2020: **meta-analysis indicates (different) effect**

Experimental linguists replicate too little

Only 1 in over 1600 experimental articles contains an independent direct replication

4.3%
of articles contain replicat* in title, abstract or keywords

>50k articles across 98 journals

3.8% direct
(no changes to design)

45% no replications
n=94

20% partial
n=42

31% conceptual
n=66

38% independent
(no author overlap)

n=5   n=3

Detailed analysis of 210 articles

Replication crisis: Implications for **linguistics**

Quantitative turn in linguistics

more reliance on quantitative practice, yet…

- lack of reflection on quantitative practice in most disciplines
- lack of teaching of quantitative practice

Replication failure

- inadequate designs
- lack of methodological rigor
- context-sensitivity of language phenomena

(see The Special Issue in Linguistics: Sönning & Werner, 2021; Roettger & Baer-Henney, 2019)

(Experimental) linguistics does not replicate enough!

"only **1** in 1600 experimental linguistic studies reports a direct replication performed by independent researchers"
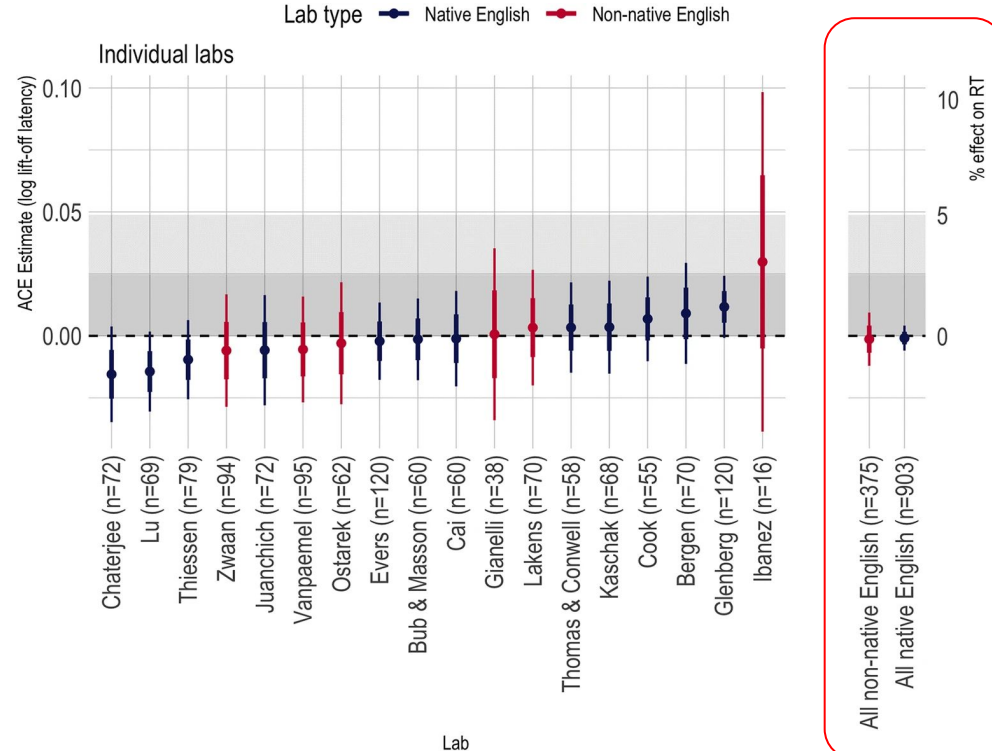(Kobrock & Roettger, 2022, for a study on replication rates)

Failure to replicate more: Why?

- little awareness of replication crisis
- structural factors inhibiting replication studies

An example fresh off the press: Morey et al. 2021
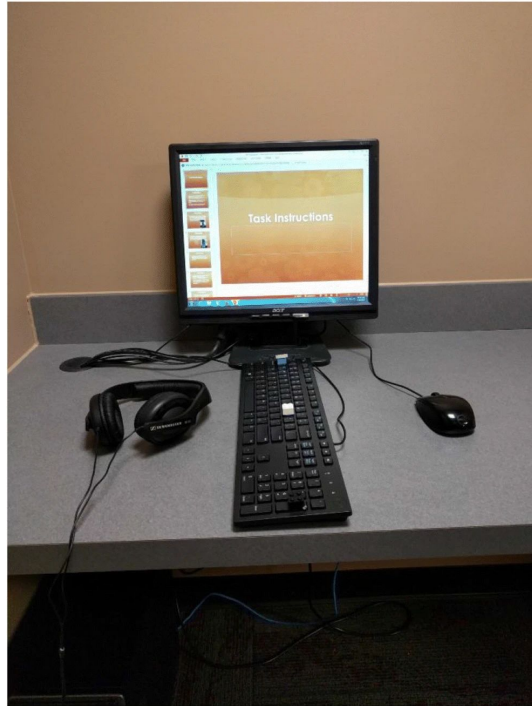
Setting for testing the
Action-sentence Compatibility Effect (ACE)

Replication crisis: **one way out**

Echoing Quintana (2021):

"Requiring undergraduate students to perform what is termed original research for their thesis, an investigation that cannot constitute a replication of an existing study, is a failed opportunity for science and education"

Good arguments for student theses replications:

1. **Ideal candidates:** Young researchers are not constrained as much by institutional practices
   (cf. also Roettger & Baer-Henney, 2019)

2. **Better theses:** students (**you!**) get a template for their final thesis

3. **Better training:** students (**you!**) gain research skills from the experience & contribute to science (add to accumulation of evidence and thereby more reliable data-based claims)

Student Theses Replication Network Linguistics (STReNeL)

1. Form a network of students in language sciences

2. Define criteria for student-lead replications & develop guidelines

3. Determine studies that warrant a replication ("replication targets")

4. Create a database of studies/projects that are eligible for replication in thesis projects
   (e.g., Winter, Perlman, Perry & Lupyan, 2017, a study on iconicity ratings in sensory words)

5. Pilot replications to show the world the benefits of collaborative student replication

6. Raise awareness through big events and publications

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The vision of a Student Theses Replication Network Linguistics (STRENeL)

How to join and proceed

1. Join our Slack channel: shorturl.at/bqvQ3

2. Meet & discuss how to proceed

3. Continue to develop our OSF repository: osf.io/cm2ud/

4. Build a repository of replicable studies

5. Write a multi-author peer-reviewed journal paper with our ideas and demands

Stay in touch & join the discussion

Find us on Twitter:

Amy @a_amoakuh

Leonie @LeonieTwente

Onur @_Onurunki

Recommended Reading and Resources

Learn about replication

Frank & Saxe (2012). Teaching Replication. https://journals.sagepub.com/doi/pdf/10.1177/1745691612460686

Quintana, D. S. (2021). Replication studies for undergraduate theses to improve science and education. *Nature Human Behaviour*, *5*(9), 1117-1118.

Sönning, Lukas & Werner, Valentine (Hrsg.). 2021. The replication crisis: Implications for linguistics, Special issue in *Linguistics 59*(5)*.*

Learn from examples

Collaborative Replications and Education Project (CREP) at https://osf.io/wfc6u/

Roettger**,** Timo B. & Baer-Henney, Dinah (2019). Toward a replication culture: Speech production research in the classroom. *Phonological Data and Analysis*, 4(1).

Ideas, comments and feedback

🎤 Speak and write, fellow linguists!

References

Ioannidis, J. P. (2005). Why most published research findings are false. *PLoS medicine*, *2*(8), e124.

Kobrock, K. & Roettger, T. (2022). Assessing the replication landscape in experimental linguistics. Submitted to Journal of Memory and Language.

Larsson, Tove & Egbert, Jesse & Biber, Douglas. (2021). On the status of statistical reporting versus linguistic description in corpus linguistics: A ten-year perspective. Corpora. 17.

Morey, R. D., Kaschak, M. P., Díez-Álamo, A. M., Glenberg, A. M., Zwaan, R. A., Lakens, D., … Ziv-Crispel, N. (2021). A pre-registered, multi-lab non-replication of the action-sentence compatibility effect (ACE). *Psychonomic Bulletin & Review*. doi:10.3758/s13423-021-01927-8

Open Science Collaboration (2015). Psychology. Estimating the reproducibility of psychological science. *Science*, *349*(6251), aac4716.

Quintana, D. S. (2021). Replication studies for undergraduate theses to improve science and education. *Nature Human Behaviour*, *5*(9), 1117-1118.

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Elkjær et al. (2020). Expansive and Contractive Posture and Movement. A Systematic Review and Meta-Analysis of the Effect of Motor Displays on Affective and Behavioral Responses. *Perspectives on Psychological Science*, 17(1).

TED Talk by Amy Cuddy: https://www.youtube.com/watch?v=Ks-_Mh1QhMc&t=728s&ab_channel=TED

https://www.forbes.com/sites/kimelsesser/2020/10/02/the-debate-on-power-posing-continues-heres-where-we-stand/

Zwaan, R., Etz, A., Lucas, R., & Donnellan, M. (2018). Making replication mainstream. Behavioral and Brain Sciences, 41, E120. doi:10.1017/S0140525X17001972

Bonus: Normalize your data

Daily and total confirmed COVID-19 deaths, World

Due to varying protocols and challenges in the attribution of the cause of death, the number of confirmed deaths may not accurately represent the true number of deaths caused by COVID-19.
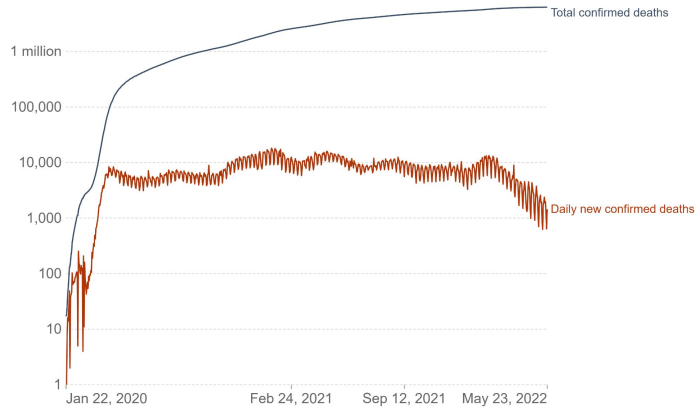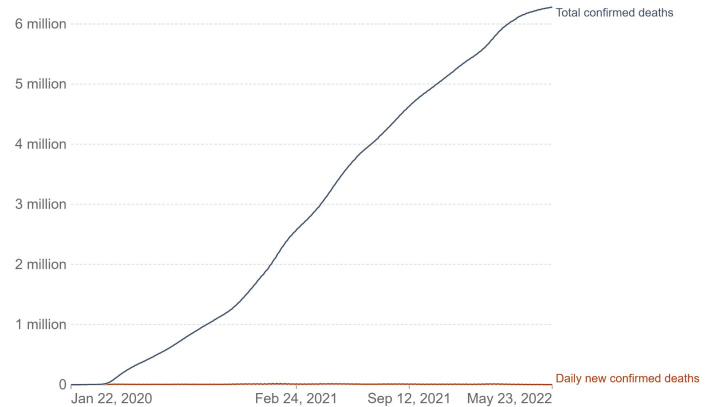
Source: Johns Hopkins University CSSE COVID-19 Data
OurWorldInData.org/coronavirus • CC BY

Daily and total confirmed COVID-19 deaths, World

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