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Christopher Harms, University of Bonn

**We need to talk: Replicability in Online Research**

Contact: [christopher.harms@skopos.de](mailto:christopher.harms@skopos.de)

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# We need to Talk

## Replicability in Online Research

**Christopher Harms**

[christopher.harms@uni-bonn.de](mailto:christopher.harms@uni-bonn.de)

# ReplicableOnlineResearch

# Brief Definition of Two Relevant Terms

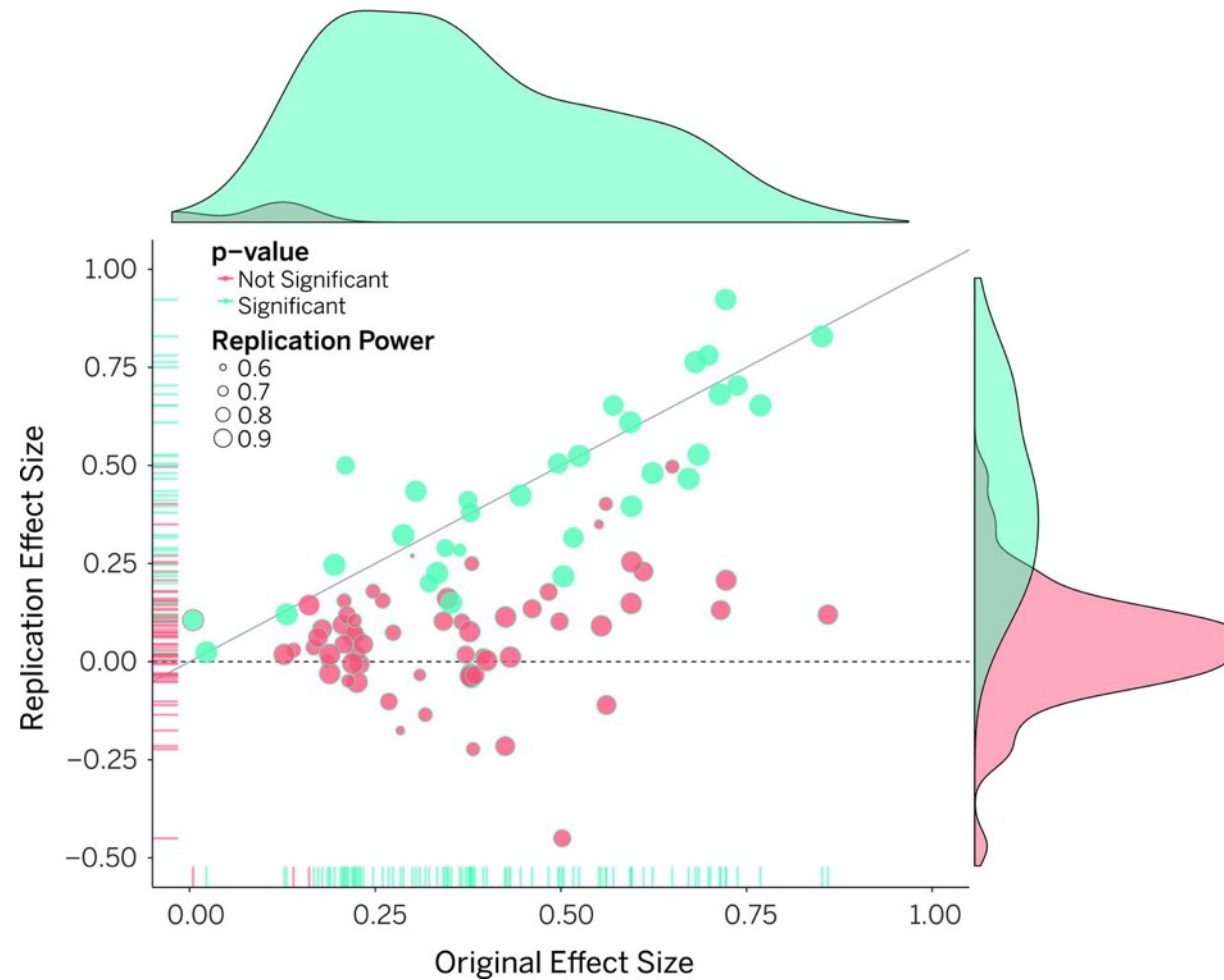
## Reproducibility

- › Different researchers come to the same conclusion, based on the **same data set** from the **same study**.
- › Warranted through reproducible analysis scripts (R code, SPSS syntax, ...) and availability of data

## Replicability

- › Different researchers come to the same conclusion, based on a **new data set** from a **different study**.
- › Exact, close, direct or conceptual replications

# Reproducibility Project: Psychology – Results



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

# Replicability Crisis: A Crisis of Confidence?

The rate of successful replications is alarmingly low!

# Causes for low replicability in Psychology? Among others...

- › Publication Bias
- › Garden of Forking Paths (Questionable Research Practices /  $p$ -Hacking)
- › Mindless Statistics
- › Sexy effects & Weak theories
- › Small, WEIRD samples
- › Incentive structure in academia („publish or perish“)
- › Data Fabrication / Data Manipulation





# What can we do? Among others...

## „Quick“ fixes

- › Pre-registration & Registered Reports
- › Open Science principles: Open Material, Open Data
- › Direct & Conceptual Replications
- › Better Statistical Analysis
  - Discern confirmatory from exploratory analysis
  - Use adequate statistical tool (not everything warrants  $p$ -values)
  - Account for measurement error

## Long-term Fixes

- › Meta-Analysis and systematic reviews
- › Improve Theories
- › Improve Measurements
- › Change common practices and institutional incentives

# What About Online Research?

Online Research shares **theoretical and methodological foundation**  
with psychological science

Academic Research



Market Research

# What is Replicability in Market Research?



**Would two different market research institutes come to the same conclusion?**

# Recommendations to Improve our Research

## Academic Online Research / Research on Research

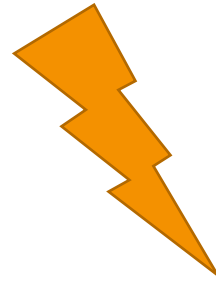
- › Pre-registration of hypotheses and study protocols / **Registered Reports**
- › Conduct **replications & Meta-analyses**
- › **Open Science:** Share study material and research data openly (where possible)
- › Improve **statistical analysis**
  - Discern confirmatory from exploratory analysis
  - Use adequate statistical tool (not everything warrants  $p$ -values)
  - Account for measurement error

## Commercial Market Research

- › Pre-registration of hypotheses and study protocols
- › Statistical analysis fit for investigating noisy, possibly hierarchical, exploratory data (e.g. Bayesian data analysis)
- › Reproducible Analyses
- › Design analysis (sample size planning)
- › Internal Replications (Cross-Validation, Split-Half analyses, Sensitivity analysis, ...)

## Conflict of Goals – We might need to trade off...

**High quality, replicable research**



**Agile, low-cost research**

## Outlook: What can we do?

- › Investigate findings in Online Research: **Validate, Replicate and Integrate**
- › **Start a discussion** in both academic and commercial research



# Thanks for your attention!



## **Christopher Harms, M.Sc.**

University of Bonn, Department of Psychology  
Unit Methodology, Psychological Assessment and Evaluation

[christopher.harms@uni-bonn.de](mailto:christopher.harms@uni-bonn.de)

 @chrisharms |  [www.neurotroph.de](http://www.neurotroph.de)

# References & Further Reading

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