Identifying the Determinants of (Non-) Replicability: The Theory of Planned Behavior

October 17, 2018

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Leibniz-Psychology.org (ZPID)

- ... is a Public Open Science Institute for Psychology and related disciplines
- ... is in the process of strategic expansion towards a one-stop research support organization (i.e., research infrastructure), providing services for the entire research cycle:
Leibniz-Psychology.org (ZPID)

Supporting the (scientific) community in Psychology (and beyond) to make research accessible, transparent, reproducible, and replicable.

Diagram:
- Publication
- Information search
- Study planning
- Preregistration
- Data collection
- Data analysis
- Archiving
Aims and Scope

• General conference series: Identifying the factors rendering well established psychological theories replicable
• The present event focusing on the Theory of Planned Behavior:
  • Large number of successful replications of the TPB (40+ meta-analyses)
  • What can we learn from the TPB in view of the ongoing discussion about (the seemingly low) replicability of psychological findings?
Program and Special Issue

Identifying the Determinants of (Non-)Replicability: The Theory of Planned Behavior

October 17, 2018 – October 19, 2018

organized by the Leibniz Institute for Psychology Information (ZPID)
Event location: University of Trier, Building P, Room P 12

For further details, see: https://goo.gl/wMwipN

Keynote talk by

Icek Ajzen
University of Amherst:

Doing the Same Thing Over and Over Again and Expecting Different Results: Replication in the Theory of Planned Behavior
Keynote talk by

Peter Schmidt
University of Gießen:

Meta-Analyses of the Theory of Planned Behavior
Workshop given by Icek Ajzen and Peter Schmidt

October 18, 2018

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Theory of Planned Behavior
Hackathon

October 19, 2018

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RESEARCHERS HAVE CONTROL OVER THE DESIGN OF THEIR STUDY, THEIR HYPOTHESES, ETC. WHAT IS THE ONLY PART OF THE RESEARCH PROCESS THAT SHOULD NOT BE UNDER THE CONTROL OF THE RESEARCHER?

THE RESULT! WE ASK NATURE A QUESTION, AND NATURE GIVES US AN ANSWER. RESEARCH IS AN „OPEN OUTCOME“ PROCEDURE. RESEARCHERS CAN AND SHOULD NOT CONTROL THE RESULT.
Theory of Planned Behavior Hackathon: Pre-registration of a TPB study

October 19, 2018

Michael Bosnjak
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What the heck is a “Hackathon”?

- Portmanteau of the words "hack" and "marathon", where "hack" is used in the sense of developing something (usually: programming, here: study protocol)
- *In general*: Event in which computer programmers and others involved in software development collaborate intensively on software projects.
- *In our case*: Workshop-like event in which we are going to develop the core parts of TPB study protocols. Blueprint: SIPS conferences.
Incentives to submit a pre-reg. protocol

• Taking advantage of first-hand recommendations about how to design TPB-based studies.

• Free data collection in ZPID’s online quota-based panel (D, GB) for studies with IPA.

• Special issue in Europe's Journal of Psychology: https://goo.gl/wMwtpN
Overall goal/s

● Developing pre-registered replications of past primary studies applying the TPB to any substantive domain identifying the conditions that promote or inhibit replicability of findings.

● Developing pre-registered systematic reviews and meta-analytic syntheses of TPB studies identifying the determinants of the (non-)replicability of the TPB.

● Any other TPB study you would like to pre-register.
Agenda

• Pre-registration / Registered reports overview
  • Concept and workflow
  • Why pre-registration?
  • New hot topic or old wine in new bottles?
  • What are the barriers preventing pre-registration becoming the default approach for hypothesis-driven research?
  • How to overcome the barriers?

• How to pre-register your study (primary or meta-analytic)?
Pre-registration / Registered Reports

Further details and participating journals:
https://cos.io/rr/
Why pre-registration?

• Negative frame: Preventing, or at least alleviating, questionable research practices:
  • inadequate study designs (e.g., low statistical power, missing manipulation checks)
  • changing hypotheses retrospectively to fit obtained data ("HARKing"),
  • selective reporting of results,
  • manipulation of methods and criteria of analysis ("p-hacking"),
  • publication bias

• Positive frame (= ZPID position): Enabling researchers to demonstrate that their studies have been conducted, analyzed, and reported as initially planned.
Publication bias & lack of data sharing
~92% positive & ~70% failure
Fanelli (2010); Wicherts et al. (2006)

Lack of replication
1 in 1000 papers
Makel et al. (2012)

P-hacking
~50-100% prevalence
John et al. (2012)

HARKing
~50-90% prevalence
John et al. (2012); Kerr (1998)

Low statistical power
~50% chance to detect medium effects
Cohen (1962); Sedlmeier & Gigerenzer (1989); Bezeau & Graves (2001)
New hot topic or old wine in new bottles?

A few *selective* historical milestones tackling pre-registration issues:

- **2018 (Oct.):** Registered reports offered by approx. 150 journals, but heterogeneous pre-registration standards, and adoption rates still very low.
- **2017:** Chris Chambers “The seven deadly sins of psychology” (*ZPID Video, Jan 2018*)
- **2015:** Open Science Collab: Estimating the reproducibility of psychological science
- **2012:** The journal Cortex introduces registered reports.
- **1987:** Newcombe: Towards a reduction in publication bias (British Medical Journal)
- **1970:** Walster and Cleary: A new editorial policy in the social sciences aimed at facilitating transparency, reproducibility/replicability (American Statistician)
- **1966:** Robert Rosenthal recommends pre-registration
The cultural/habitual barrier

• Non-perishable things (e.g., intellectual artifacts) have fundamentally different survival patterns than perishable things (e.g., organisms) (Taleb, 2012; Mandelbrot, 1982; Goldman, 1964)

• “Lindy effect”:
  • the future life expectancy of some non-perishable thing (like an idea, cultural habit or research practice) is proportional to their current age, so that every additional period of survival implies a longer remaining life expectancy
  • mortality rate decreases with time, following a power law distribution
Other barriers to pre-registration

• Cultural habits (see above)

• Current incentive structures for:
  • Researchers
  • Editors
  • Publishers

• Missing disciplinary agreed-upon guidelines and standards for
  • pre-registration
  • handling of protocol deviations
# Overcoming barriers (selection)

## Cultural habits
- **Teaching & Regulation:** Pre-registration becomes obligatory
- Gentle paternalism, e.g. by changing defaults (pre-registration as default, changes must be well justified)
- Incentive-based approach (see below)

## Current incentive structures
- Introducing a blockchain-based ´currency´ as a notarization service and to incentivize pre-registration
- ´Badges´ rendering pre-registration prominently visible
- Pre-registration challenges offering $ (OSF approach)
- **Free data collection and curation services** (ZPID approach)

## Missing guidelines and standards
- Developing joint **disciplinary** standards for pre-registration, encompassing
  - measures against ´open washing´ (e.g., [SMART working group](#))
  - rules for handling deviations
Pre-registration services & First steps

• OSF Registries
  https://osf.io/registries/

• AsPredicted
  https://aspredicted.org/

• Protocols.io (ZPID partner)
  https://www.protocols.io/

Register with the OSF >
Create new project (My Projects > Create Project) >
Go to new project >
Registrations > New Registration

Create >
Provide names ("I am just trying things out.") >
Fill out form with 8 questions

Register >
My Library >
NEW Protocol (and use your own template)
Pre-registration templates: Primary studies

• APA Styleguides for Publications (please retrieve and read)
  • Quantitative research: [http://dx.doi.org/10.1037/amp0000191](http://dx.doi.org/10.1037/amp0000191)
  • Qualitative and Mixed-Methods Research: [http://dx.doi.org/10.1037/amp0000151](http://dx.doi.org/10.1037/amp0000151)
  • Collection of tables

• Journal specific styleguides: [https://cos.io/rr/](https://cos.io/rr/)
• Pre-registration service specific styleguides: See above
Pre-registration templates: Meta-analysis

- APA MARS Styleguide, Table 9, p. 21: [http://dx.doi.org/10.1037/amp0000191](http://dx.doi.org/10.1037/amp0000191)
- MARS overview in tabular format
- SIPS 2018 Reviews Preregistration Form [Draft]
How to proceed?

---- today ---

• Develop and discuss your TPB research question
• Select the APA styleguide template corresponding to your study design
• Develop, discuss, and present the core parts of your protocol

--- post-event ---

• Finalize and submit your protocol
• Request data collection at ZPID (online panel studies only)
• Submit to EJOP special issue (or another journal)
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ZPID’s take on pre-registration

• No normative statements (mission of DGPs, APA, among others)

• Supporting pre-registration by:
  • embedding pre-registration into a research cycle
  • participating in developing and implementing joint standards (currently with: DGPs, Hogrefe, SIPS, etc.)
  • offering free and independent data collection services for successfully reviewed protocols
  • offering data curation and long-term preservation services (e.g., self-archiving, DataWiz, PsychData service)
  • implementing SMART-preregistration in PsychOpen GOLD (OA journals)
How smart do you think you are?

A meta-analysis on the validity of self-estimates of cognitive ability

Philipp Alexander Freund and Nadine Haaben

Hypotheses

Overall Relationship: Most studies investigating the relationship between self-estimates of cognitive ability and psychometric test scores report significant, positive correlations. We therefore expect to find a significant, positive overall relationship between the two variables.

Moderator Analysis: We hypothesize that self-estimates concerning verbal, numerical, or spatial abilities should be more valid than self-assessments of general cognitive ability, which in turn is usually a composite of different subtests (as implemented in computerized test batteries). Consequently, use of these "standard" subtests should also result in more valid self-estimates than use of more randomly assessed abilities, such as memory or processing speed, for instance.

Results

Descriptive Statistics
Open-Access-Repository for psychology

PsychArchives is the disciplinary repository for Open Access contents in psychology. We safeguard and provide access to all kinds of publications, tests, data and code that are related to the discipline of psychology. PsychArchives thereby is well embedded into the other services offered by ZPID. We make it easy to pre-register your studies, work on your study data, publish them following the Open Access principles and get cited by automatically assigned DOIs.
We recruited a sample of 61 participants as specified by our pre-registered stopping rule\(^{[6]}\).

P-6: A power analysis was carried out to determine that a sample size of 61 participants was necessary to detect medium effects \(f = .25\), as outlined by Cohen, 1988), with power of .9.

SMART-preregistration by Tom Hardwicke et al. (2018)