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Star Chasing: A commentary on

"What's in a p? Reassessing best practices for conducting and reporting hypothesis-testing research"

Dr Agnieszka Chidlow
University of Birmingham (UK)

Professor William Greene
New York University (USA)

Professor Stewart Miller
University of Texas at San Antonio (USA)

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Overview

Journal of International Business Studies (2017) 48, 535–551

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EDITORIAL

What's in a *p*? Reassessing best practices for conducting and reporting hypothesis-testing research

Klaus E Meyer[1], Arjen van Witteloostuijn[2,3,4] and Sjoerd Beugelsdijk[5]

[1] China Europe International Business School, Shanghai, China; [2] Tilburg University, Tilburg, The Netherlands; [3] Antwerp Management School, University of Antwerp, Antwerp, Belgium; [4] Cardiff University, Cardiff, UK; [5] University of Groningen, Groningen, The Netherlands

Abstract
Social science research has recently been subject to considerable criticism regarding the validity and power of empirical tests published in leading journals, and business scholarship is no exception. Transparency and replicability of empirical findings are essential to build a cumulative body of scholarly knowledge. Yet current practices are under increased scrutiny to achieve these objectives. *JIBS* is therefore discussing and revising its editorial practices to enhance the validity of empirical research. In this editorial, we reflect on best practices with respect to conducting, reporting, and discussing the results of quantitative hypothesis-testing research, and we develop guidelines for authors

1. *Research process*

2. *What's in a p? Reassessing best practices for conducting and reporting hypothesis-testing research*
   - *The aim and recommendations*

3. *The Commentary:*
   Star chasing: A commentary on "What's in a p? Reassessing best practices for conducting and reporting hypothesis-testing research"
   - *The aim and further recommendations*

4. *Conclusions*

JIBS Special Collections

Research Methods in International Business

Editors: **Eden**, Lorraine, **Nielsen**, Bo Bernhard, **Verbeke**, Alain (Eds.)

- Discusses contemporary methodological issues related to international business research
- Includes insightful, novel commentaries by content experts
- Offers a state-of-the-art overview of pertinent IB methodological challenges as these affect empirical research
- Covers a diverse range of IB methods issues, including qualitative, quantitative and mixed approaches

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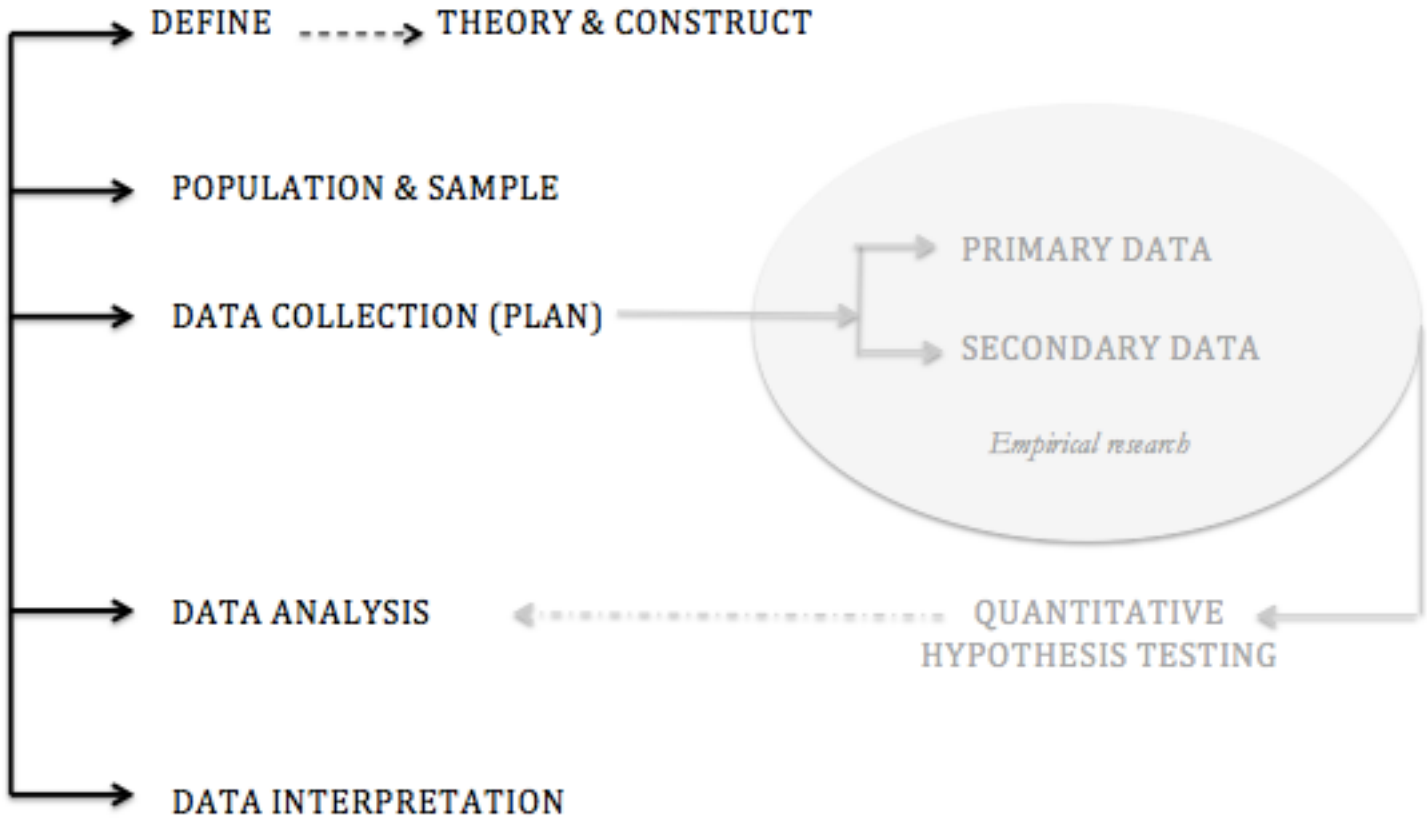
I. Research process



Source: Based on Cavusgil and Das (1997)

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II. What's in a p? Reassessing best practices for conducting and reporting hypothesis-testing research

1. The aim

- *To reflect on best practices with respect to conducting, reporting and discussing the results of quantitative hypothesis-testing research in order to derive a set of concrete and actionable guidelines and best practices for Journal of International Business Studies (JIBS) authors.*

2. **Why:** Editorial reason

- JIBS is discussing and revising its editorial practices in order to enhance the validity of empirical research as a recent surge of pleas to change extent research practices across a wider variety of disciplines, including *business studies*.
- To call for more transparency regarding the process of empirical research and hence more accurate reporting and comprehensive interpretation of empirical results.
- Validity, transparency and replicability of empirical findings are essential to build a cumulative body of scholarly knowledge. Yet, current scholarly practices are under increased scrutiny to achieve these objectives.


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3. **Why:** Social science – State of the field

- Social science research has recently been subject to considerable criticism regarding the validity and power of empirical tests published in leading journals and business scholarship is no exception.
- Surge of pleas: Bettis *et al* (2016) in *strategic management*, Barley (2016) *administrative science*, Aguinis *et al* (2010) in *organizational studies* and van Witteloostuijn (2016) in *international business* raise major concerns about the current state of affaires with regards to research practices.
- Hot debate: Triggered in *medicine* (Crosswell et al., 2009; Ioannidis, 2005; Lexchin et al, 2003) and *psychology* (Gigerenzer, 2004; John et al 2012; Simmons et al, 2011) highlighting the need for scholarly community to continuously improve its research practices (Sterling, 1959; Rosenthal, 1979).
- *p*-hacking/Search for asterisks: Publishing significance levels just below the "magic" threshold of p=.05 (Bettis, 2012; Brodeur et al 2016).
- HARKing: Hypothesizing After the Results are Known (Bosco et al, 2016; Kerr, 1998).
- In the business studies domain, the recent change of statistical reporting guidelines by *Strategic Management Journal* (Bettis et al, 2016) swiftly followed by *Organization Science* and other journals (e.g. Lewin et al, 2017) is a *clear signal* that research practices are currently being revised and updated.


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4. Challenges to current practice

- The null hypothesis: Fisher (1925) to distinguished between interesting relationships and noise.
  - a *statistical tables* before SPSS and STATA became widely available.
  - *p*-values were given for a limited set of cutoff value (e.g. *p*=.10, *p*=.05 and *p*=.01) before a practice emerged to report *p*=values with respect to these benchmarks (e.g. *p*=.05) and to indicate the significance estimates with *, ** or ***.
  - Fisher (1925) suggested, somewhat, arbitrary, using *p=.05* as the most appropriate cutoff level.
  - With increased computing power, scholars can calculate exact *p*=values for even the most advanced statistical models. However, due to the path dependence the "old" asterisks habit remained in place.


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4. **Challenges to current practice**

- *p*-hacking/Search for asterisks/Publication bias (=publish or perish): Two practices:
  - *First*, papers reporting significant relationships are more likely to be *selected* for publication in journals leading to a bias towards tests rejecting the null hypothesis.
  - *Second*, scholars "fine-tune" their regression analysis to turn marginally non-significant relations (those above p=.01; p=.05 or p=.10) to significant relations (i.e. just below these thresholds) =*inflation of significance levels in (published and unpublished) empirical tests* (Sterling, 1959; Head et al., 2015).

- *p*-hacking/Search for asterisks: Can happen not only by selecting control variables but it can take many forms and shapes (Bosco et al, 2016, Head et al 2015; John et al, 2012)
  - To drop/keep influential observations may be biased if made after the initial analysis
  - Editors see reviewers asking for changes that promote significance (& confirmation of hypotheses) leading to establishing the validity of empirical results.


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II. What's in a p? Reassessing best practices for conducting and reporting hypothesis-testing research

4. Challenges to current practice

- *p*-hacking/Search for asterisks:
  - Is problematic because: (a) it not only affects individual careers but (b) it erodes the reliability of scientific studies
  - It is no longer the "issue" of pluralistic ignorance in the past due to increased publicity regarding these practices (Bhattacharjee, 2013).
  - *p*-value is often misinterpreted (Aguinis et al, 2010). The *p*-value generated by regression analysis is "*the probability that the sample value would be at least as large as the value observed if the null hypothesis was true*".
  - The regression result does not (a) prove or disprove a hypothesis, (b) provide evidence regarding the reliability of the research, and (c) make Statements about a population other than the sample.
  - *p*-value does no tell us about the strength of a particular relationship (i.e. lower *p*-values do not make relations more substantively significant)
  - *p*-value is just a rule of thumb suggested by Fisher (1925) in times without computers and statistical software. It was *never meant* to be interpreted as an absolute yes-or-no threshold.


Journal of International Business Studies (2017) 48, 635–651

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Social science research has recently been subject to considerable criticism regarding the validity and power of empirical tests published in leading journals, and across scholarship in general. Transparency and replicability of empirical findings are essential to build a cumulative body of scholarly knowledge. Yet current practices are under increased scrutiny to achieve these objectives. *JIBS* is therefore discussing and revising its editorial practices to enhance the validity of empirical research. In this editorial, we reflect on best practices with respect to conducting, reporting, and discussing the results of quantitative hypothesis-testing research, and we develop guidelines for authors

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5. **Towards better practice**

- Alternative Study Design:
  - Scholars may enhance the rigour of their empirical evidence through their study design
    - *First*, they may conduct multiple studies to test the same hypothesis, thus providing not only evidence of validity under different conditions, but also reducing the opportunities for HARKing.
    - *Second*, experimental study design offer interesting opportunities to advocate IB knowledge that yet to be fully exploited in the field.
    - However, alternative study designs might not be always suitable to address many of the research questions of interests to the IB research community. Therefore, the challenge remains how we can improve the reliability of research findings based on testing hypotheses using regression analysis with single-sample filed data.


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5. Towards better practice

- Enhancing Reporting Practices:
  - JIBS expects that authors *do the best* feasible analysis with
    - (a) the available data in their line of research
    - (b) do not engage in any research mal-practice
    - (c) report statistical results based on a full analysis of *p*-values
    - (d) provide maximum transparency to enable other scholars to build on their work (including reproduction and replicability, Bettis, 2016, Hubbard et al, 1998)

- Guideline 1. At the basic level, all regression analysis should include, for each coefficient, standard errors (as well as mention the confidence intervals for the variable of interest) and, for each regression model, the number of observations as well as R^2 statistics or equivalent.

- Guideline 2. Authors should refer to the actual *p*-value rather than the threshold *p*-value when assessing the evidence for and against their hypothesis.

- Guideline 3. Authors should *not* report asterisks to signal *p*-value thresholds


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5. Towards better practice

- Evaluating the Evidence:
  - Good scientific practice requires that authors assess hypotheses based on a comprehensive assessment using all available evidence rather than a singular focus on a single test statistic in a specific regression analysis. When interpreting the results, it is good practice to offer reflection and supplementary analysis that enable readers to comprehensively assess the empirical evidence

- Guideline 4. Reflections on effect size are included, reporting and discussing whether the effects (the coefficients and, if appropriate, marginal effects) are substantive in terms of research question at hand.
- Guideline 5. Outlier observations are discussed carefully, especially when they have been eliminated from the sample (e.g. through technical practices such as "winzorizing").
- Guideline 6. Null and negative findings are equally interesting as are positive and hence are honestly reported, included a discussion of what this implies for theory


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5. Towards better practice

- Causality and Endogeneity:
  - Guideline 7. In the absence of a clear strategy designed explicitly to identify causes and effects ,authors should be careful in using terminology suggesting casual relationship between variables of interest and accordingly adjust their language in the words of the hypotheses and in the discussion of the empirical results.
  - Guideline 8. To the extent feasible, authors should address issues of causality and endogeneity, either by offering technical solutions or by adopting and appropriate research design.
- Robustness Tests:
  - Guideline 9. Authors are expected to conduct a variety of robustness tests to show that the significant finding is not due to an idiosyncrasy of the selected empirical measures, model specifications and/or estimation strategy.

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Personality and Social Psychology Review
1998, Vol. 2, No. 3, 196–217

HARKing: Hypothesizing After the Results are Known

Norbert L. Kerr
Department of Psychology
Michigan State University

This article considers a practice in scientific communication termed HARKing (Hypothesizing After the Results are Known). HARKing is defined as presenting a post hoc hypothesis (i.e., one based on or informed by one's results) in one's research

5. Towards better practice

- From HARKing to Developing Theory:
  - HARKing = Hypothesizing After the Results are Known in search of hypotheses for already known positive results is causing great harm to scientific progress (Bosco et al, 2016).
  - HARKing refers to practice of determining and, after significant results are established, developing or adjusting theoretical arguments *ex post*, but presenting the theory as if already in place *ex ante*.
  - HARKing is **not** the same as "playing with your data" to explore the nature of relationships and get better feeling for possibly interesting patterns in a dataset

❖ Guideline 10. HARKing is a research malpractice. Theory developed by interpreting empirical phenomena or results should be reported as such (for example, in the discussion section).


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5. **Towards better practice**

- The role of reviewers

- Constructive engagement of reviewers is required in order to advance IB research the standards reflected in 10 guidelines suggested by Mayer et al (2016).
  - *First*, to prevent reviewers from pushing authors towards all these practices discussed above.
  - *Second*, reviewers should look for positive contributions to enhance the rigor of a given study.

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1. The Commentary

- *A False Sense of Security about Modern Software*

  - Modern analytical software (e.g. SPSS, STATA) have:
    - evaluated the technical level of empirical social science research
    - provided access to new models and methods
    - automated the graphical and numerical analysis of effect sizes in models
    - enabled more intricate and precise uses of models including subtle analysis of effect sizes and interactions

  - This is all very welcome: However, this computing power comes with a greater need for a detailed theoretical understanding on the part of researchers where "statistical significance" needs to be considered very carefully.

  - Very common tendency: scholars outsource such expertise to the software developers

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- *Criteria for Selecting a Statistical Level of Significance*
  - We strongly agree with Mayer et al (2016) that scholars should steer away from "old asterisk habit" and instead report the obtained statistical level of significance in their models.
  - This is because the classical statistical theory does not provide a set of rules for searching the levels of .01, .05, and .001 (Fisher 1925; Gibbons and Pratt, 1975; Greene, 2018) due to the different nature and type of the research problems under investigations as well as the fact that the selection of a significance level is a complex process.
  - Skipper et al (1967) and Stanford (1968) = Number of criteria pertaining to the selection of significance levels and how to report them.
    - Skipper et al (1967) = encourage scholars to think and reflect on the arbitrary nature of the conventionally accepted levels of significance because different classes of research may require different levels of alpha to report the actual levels obtained and to have an opinion if the obtained levels support (or not) tested hypothesis.

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1. The Commentary

- *Criteria for Selecting a Statistical Level of Significance*
  - Skipper et al (1967) and Stanford (1968) = Number of criteria pertaining to the selection of significance levels and how to report them.
    - Stanford (1968) = goes further than Skipper at al (1967) by suggesting the following:

a) To take into consideration the practicality of the problem under examination and the gravity of errors available on the basis of value orientation.

(b) To consider the rational and empirical evidence from other studies when interpreting a significance level in order to avoid testing hypotheses in isolation

(c) To carefully examine the relationship between the power of the test and the sample size as well as the size of the true difference

(d) To think carefully about the robustness of the tests used, the degree of control in design as well as the confidence interval

(e) To be clear about both Type I and Type II errors in hypotheses testing as these (to some extent) vary inversely with one another.

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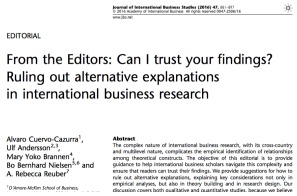

Journal of International Business Studies (2016) 47, 351–354
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EDITORIAL

From the Editors: Can I trust your findings? Ruling out alternative explanations in international business research

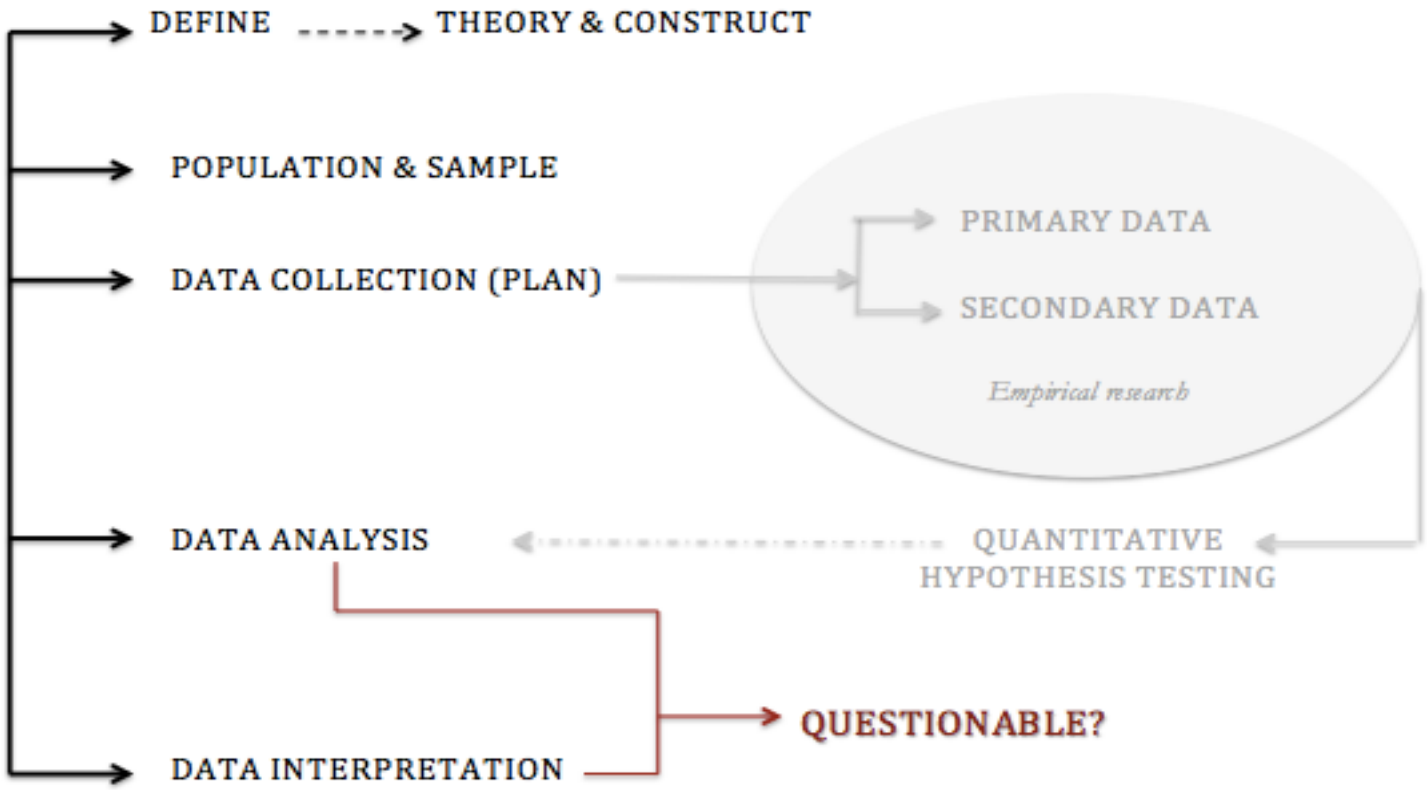
Alvaro Cuervo-Cazurra[1], Ulf Andersson[2,3], Mary Yoko Brannen[4], Bo Bernhard Nielsen[5,6] and A. Rebecca Reuber[7]

[1] D'Amore-McKim School of Business

Abstract
The complex nature of international business research, with its cross-country and multilevel nature, complicates the empirical identification of relationships among theoretical constructs. The objective of this editorial is to provide guidance to the international business community on how to rule out alternatives and ensure that readers can trust their findings. We provide suggestions for how to rule out alternative explanations, explaining key considerations not only in empirical analyses, but also in theory building and in research design. Our discussion covers both qualitative and quantitative studies, because we believe

- *Ethical Issues Associated with Scholarly Research*
  - Mayer et al (2016) work has boosted the post-publication detection of poor practices within the business and management scholarly communities (Eden et al, 2018, Aguinis et al, 2017, Bergh et al., 2017) including significant ethical problems such as star chasing behavior.
    - fudging coefficient and/or standard errors
    - skewing the data collection process
    - dropping unfriendly observations
    - excluding key control variables
    - selective or distorted reporting
    - failure to perform the requisite specification diagnostics that reveal data issues.
  - Publish or perish culture or learned from others.
  - Responsible Research in Business & Management movement

IV. Conclusions



Source: Based on Cavusgil and Das (1997)

IV. Conclusions

1. The future?

- These *guidelines* serve as suggestions (NOT a fixed rule) providing direction for authors submitting papers employing quantitative hypothesis-testing methods.
- Such guidelines *should not* result in a uniform straightjacket but help advocate research practices in order to stimulate the search for solutions to shortcomings in contemporary practice.
- Best practices are not set in stone but experience shows that a set of benchmarks for both researchers and reviewers can be very helpful to push the quality bar of research upwards.
- To help readers to assess empirical evidence comprehensively.
- To build a cumulative body of empirical knowledge .

Thank you & Questions

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