The Questionable Research Practice Bestiary

[qrp\_contributors\_table](https://docs.google.com/spreadsheets/d/1Wap7eVD8Y1atM4fbHAkyw7pXOVCG-uobPPoouU5KNIs/edit?usp=sharing)

# Abstract

# Introduction (Jane)

PLEASE ADD REFERENCES LIKE THIS .

* What are QRPs? QRP-definition by someone else
* Empirical research on the prevalence of QRPs - How often they are used? Based on separate studies [(Fraser et al., 2018; Gopalakrishna et al., 2022; Grant et al., 2018; Kaiser et al., 2021; Krishna & Peter, 2018; Rabelo et al., 2020)](https://paperpile.com/c/c0bbea/hEJC+VIOy+6FVq+XemH+2mIw+q8eO).
* The role of QRPs in the credibility crisis [(Simmons et al. 2011; Ioannidis 2005)](https://paperpile.com/c/c0bbea/sfFY+bAd4)
* What are similar concepts
  + Catalog of bias [(Pannucci & Wilkins, 2010; Simundić, 2013)](https://paperpile.com/c/c0bbea/1HZC+6E7B) <https://catalogofbias.org/biases/>
  + ~~Research misconduct~~
  + ~~Ethical misconduct~~
  + ~~Researcher errors~~
  + Researcher degrees of freedom [(Wicherts et al., 2016)](https://paperpile.com/c/c0bbea/MqMY)
  + Threats to the Validity of Empirical Research <https://psyarxiv.com/fc8v3>
* How big is the damage? Simulation studies [(Stefan and Schönbrodt 2022)](https://paperpile.com/c/c0bbea/eH6F)
* Aims of this study:
  + Definition
  + Create a comprehensive list of QRPs complemented with QRPs arising from Open Science practices
  + Collect actual damages of the QRPs from simulation studies and assess their destructive potential
  + Provide a firm basis for researchers, teachers, students, reviewers, and editors about how to identify and prevent qrps.
* Counterpoint? When qrps are not causing large damage [(Ulrich & Miller, 2020)](https://paperpile.com/c/c0bbea/UIye)
* Questionable meta-science practices? [(Rubin 2023)](https://paperpile.com/c/c0bbea/hia5)
* How not to see a QRP where there isn’t one
* Umbrella terms

# Methods (Tamas)

Hackathon working document:

[6C-QRP bestiary: Creating an inventory and taxonomy of questionable research practices](https://docs.google.com/document/d/1_sPld-vncdq6FY_Pfmzf4Vs8G5iIaMq9mvyyIUITujY)

## Procedure

This study aimed to collect and categorize questionable research practices using an expert consensus method. The data collection process involved a hybrid hackathon held at the SIPS 2022 conference in Victoria, British Columbia, Canada. The hackathon was organized to find a definition of QRPs, collect as many QRPs as possible, and create a taxonomy for QRPs. Participants collaborated in person and online. In a follow-up session, the QRPs were merged and grouped by similarity. This process took place primarily online, although it began at the conference.

Subsequently, online groups of three-five participants were formed to further refine the list of QRPs. Each group was assigned 10-12 QRPs and worked together to define each QRP's attributes, including its name, aliases, damage, remedy, detectability, clues, examples, and references. The groups worked independently, and their workflow varied. Some groups divided the QRPs among members and scheduled meetings to discuss their findings. Other groups met together to work through the QRPs, dividing the remaining terms among members to complete them individually. The groups then met again to refine their findings and come to a consensus on each QRP. Some groups created separate documents to fine-tune the definitions, while others shared sources via Dropbox. The groups provided an opportunity for individuals to collaborate and refine their work, resulting in a more comprehensive list of QRPs.

The two main authors, T.N. and J.H., reviewed the list, unified the language, and finalized the QRP attributes. Finally, all authores were given an opportunity to suggest additional changes and corrections to the QRP list.

The expert consensus method used in this study allowed for a collaborative effort to collect and categorize QRPs. By bringing together individuals with diverse expertise, the study aimed to create a comprehensive list of QRPs that could be used in future research. The hybrid hackathon and online group work provided opportunities for participants to collaborate regardless of location and time zone, creating a more inclusive and efficient data collection process.

## Evaluation and classification of QRPs

Each QRP underwent evaluation based on several attributes. The initial attribute assessed was the name of the QRP, which was formulated to specifically describe the action involved. Additionally, any aliases or alternative names associated with the QRP were collected.

The definition of each QRP was also created, along with the research phase in which the QRP may occur, such as planning, data collection, data processing, data analysis, write-up, and publication. To help illustrate each QRP, examples were provided.

The damage caused by each QRP was also evaluated, including the type of harm it may cause to research outcomes, and the perception of the study. We recognized that QRPs are often employed to provide support for a hypothesis, but we also considered research where QRPs are used to generate negative results. Thus, we examined the potential damage caused by each QRP, regardless of the direction or nature of the research findings.

Possible remedies to prevent or counteract the effects of each QRP were also collected. These were considered from the standpoint of the author of a publication. They comprise a collection of methods and best practices aimed at avoiding engagement in a QRP or providing evidence that the authors did not engage in that particular QRP. It's worth noting that the remedies would vary significantly for editors, publishers, reviewers, and funding agencies.

Another evaluated attribute was detectability, which indicates whether it is possible to detect the presence of the QRP. This attribute was classified as either yes, no, or maybe, assuming a scenario where someone is reading a publication with some knowledge of the topic. Additionally, various clues were compiled that could potentially indicate the presence of each QRP. It is important to note that the presence of a clue does not necessarily indicate evidence of a QRP, but if multiple clues align in the same direction, it may justify further investigation.

Finally, the source or references that discuss each QRP were provided.

## Participants

At the onset, 37 experts joined the project, and 19 of them persevered until the manuscript's completion. The majority of participants hailed from the USA (12), Canada (6), Germany (5), the United Kingdom (4), and New Zealand (2). Additionally, one participant represented each of Austria, Australia, Hungary, The Netherlands, North Macedonia, Poland, Scotland, and Singapore.

The participant pool encompassed a diverse range of academic positions, comprising one full professor, two associate professors, eight assistant professors, three research associates, nine postdoctoral fellows, eleven doctoral students and candidates, as well as three graduate students.

# Results (Tamas)

## The definition of questionable research practices

After a debate and discussion, we arrived at a definition that was accepted by all participating experts. The definition is the following:

*“Questionable research practices (QRPs) are ways of producing, maintaining, sharing, analyzing, or interpreting data that are likely to produce misleading conclusions, typically in the interest of the researcher. QRPs are not normally considered to include research practices that are prohibited or proscribed in the researcher’s field (e.g., fraud, research misconduct). Neither do they include random/non-motivated researcher error (e.g., data loss).”*

This definition has several essential elements that provide a clear understanding of what constitutes a QRP. First, the definition specifies that QRPs are ways of producing, maintaining, sharing, analyzing, or interpreting data. This broad definition encompasses a wide range of research activities, including data collection and analysis, data presentation and interpretation, and data sharing.

Second, the definition highlights that QRPs are likely to produce misleading conclusions, which is typically in the interest of the researcher. This aspect emphasizes that QRPs are not always intentional, but they can still result in misleading conclusions. This aspect is particularly important because it acknowledges that researchers may not always be aware that their actions constitute a QRP.

Third, the definition excludes research practices that are prohibited or proscribed in the researcher's field, such as fraud or research misconduct. This exclusion is essential because these practices are already well-established as being unacceptable in the research community. Finally, the definition also excludes random or non-motivated researcher errors, such as data loss [(Kovacs et al. 2021)](https://paperpile.com/c/c0bbea/6Gqj). This exclusion is important because it clarifies that not all errors are considered QRPs. QRPs typically involve deliberate or intentional actions by researchers that lead to misleading or incorrect conclusions.

Overall, the definition of QRPs provides a clear understanding of the types of research practices that are considered questionable and can lead to misleading conclusions. It emphasizes the importance of integrity and ethical conduct in research, while also acknowledging that researchers may not always be aware of the impact of their actions.

## QRP attributes

A total of 37 QRPs were collected, with two QRPs pertaining to the planning phase, four QRPs dedicated to data collection, seven QRPs focused on data processing, six QRPs centered around data analysis, thirteen QRPs involving the write-up process, and five QRPs concerning publication.

Out of the total number of QRPs, we categorized fifteen as detectable by readers possessing sufficient knowledge of the field, relying solely on the information presented within the publication. Conversely, three QRPs were deemed undetectable. As for the remaining nineteen QRPs, their detection is contingent upon the availability of supplementary information, such as open data, preregistration records, or other relevant resources. We found that the clues utilized to identify a QRP exhibit a high degree of idiosyncrasy. In other words, the majority of clues are unique to each specific QRP and do not apply universally across different QRPs. We identified 84 separate clues, with only a few associated with multiple QRPs.

* List all QRPs
* Some descriptive statistics of QRPs
  + ~~How many QRPs were collected by research phase?~~
  + ~~How many are detectable?~~
  + What are the most frequent damages?
* Figures and tables (e.g. damages table, Venn diagram? of QRPs, hierarchy of qrps)

## List of QRPs

# Discussion (Jane)

* Summary of results
* Limitations
  + Critique of SME-approach
* Future studies:
  + Encourage readers to run simulation studies of underinvestigated QRPs

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