

## Research Procedures and Research Integrity: An Educational Scenario by the EntIRE project

### Background

Professor Gallagher is an expert in empirical psychology at the University of New Lowland. She has recently been awarded a substantial grant from a government body to carry out two studies into lay people's moral intuitions. As principal investigator, Professor Gallagher hires a postdoctoral researcher, Dr Jones, who has a background in theoretical philosophy, and Mr Singh, who is undertaking his doctoral studies in the psychology department.

Dr Jones was recruited to the project because of her background in moral philosophy. Although she has some basic knowledge of the pragmatics of experimental research, she has no experience of conducting survey-based research or statistical analysis. By contrast, Mr Singh's primary research interest is in empirical psychology, having carried out a similar kind of experiment into the public's moral intuitions as part of his Master's degree.

Professor Gallagher informs Dr Jones and Mr Singh that she will provide oversight for both experiments. She instructs Dr Jones to take responsibility for designing the two experiments and analyzing the data. Dr Jones will also assist Professor Gallagher in preparing the resulting manuscripts for publication. Whilst writing up his doctoral dissertation, which will include the findings from the two experiments, Mr Singh will recruit the participants, conduct the surveys and collect the data for both experiments. He will also perform a small editorial role in revising the resulting manuscripts. The bulk of the work in publishing the results will be carried out by Professor Gallagher (with Dr Jones' input).

Recognizing Dr Jones' lack of experience with experimental design and statistical analysis, Professor Gallagher instructs her to attend pertinent courses made available by the university, to read the literature she has suggested and to seek her advice and that of her other colleagues in the psychology

department. As Professor Gallagher believes that both experiments are relatively straightforward, and with Mr Singh in support, she does not envisage that there will be any problem with Dr Jones facilitating the two studies.

## **Issue 1**

For the first study, Dr Jones designs an experiment with two conditions. In the experimental condition, participants are primed with deterministic ideas by watching a YouTube video in which a world-renowned philosopher argues that all events arise naturally and inevitably from causal factors that follow natural laws. The control group are not primed at all. Sampling was carried out to ensure that the only independent variable is the experimental condition. After priming in the experimental group, Mr Singh asks all the participants thirty different questions (prepared by Dr Jones) about their moral intuitions concerning a set of hypothetical scenarios. Subsequently, after Mr Singh has collected all the survey data, Dr Jones makes pairwise comparisons of participant responses to each of the questions and undertakes statistical analyses.

Mr Singh, eager to begin writing up the final chapter of his doctoral dissertation, which will

include the results of the first experiment, asks Dr Jones whether she has the results of the statistical analysis. Dr Jones says that even though she has them, she forgot to formulate hypotheses prior to seeing the results. Worried that negative results will greatly affect the quality of his thesis, Mr Singh suggests that Dr Jones should formulate a hypothesis that achieves a positive significant result. Dr Jones queries whether Professor Gallagher would agree with this action. Mr Singh says that she, of course, would because she needs to publish the results in peer-reviewed journals in order to comply with the terms of the research grant, and it is well known that journals do not publish negative findings. Having only ever dealt with the publication system in philosophy, Dr Jones reluctantly agrees with Mr Singh. She formulates a hypothesis that generates a significant positive result, specifically, that exposure to deterministic ideas increases the rate of consequentialist intuitions. Subsequently, without disclosing the fact that she hypothesized post hoc, Dr Jones presents Professor Gallagher with the results of the first study. Professor Gallagher is extremely happy with the outcome and unquestioningly begins to prepare the first manuscript. Meanwhile, Mr Singh begins writing up the final chapter of his thesis, making sure to include the significant positive result.

## 1a. Questions for Researchers

1. Research misconduct is most often associated with practices of fabrication, falsification and plagiarism. Has research misconduct been committed here? If so, by whom? What are the reasons for your answer?
2. Why is hypothesizing after the results of the statistical analysis are known bad for science?
3. What could have been done in this situation to avoid hypothesizing after the results are known?

## 1b. Questions for Research Integrity Office/Research Ethics Committee Members

1. Research misconduct is most often associated with practices of fabrication, falsification and plagiarism. Has research misconduct been committed here? If so, by whom? What are the reasons for your answer?
2. Does your institution have a procedure, process or set of guidelines for dealing with the practice of hypothesizing after results are known? If not, what procedures could your institution put in place so as to change the culture surrounding this practice?
3. Do the ways in which the three researchers have dealt with their work and each other in this situation violate the principles of the European Code of Conduct for Research Integrity and your own institution's guidelines and regulations? If you were made aware of a similar type of situation, what would be the next steps?

### 1c. Questions for Research Administrators

1. Do the ways in which the three researchers have dealt with their work and each other in this situation violate the principles of the European Code of Conduct for Research Integrity and your own institution's guidelines and regulations? If you were made aware of a similar type of situation, what would be the next steps?

#### Issue 2

Keen to avoid the problems that arose during the first study, Dr Jones formulates multiple hypotheses when designing the second experiment. In this study, a new set of participants in the experimental condition are primed by watching a YouTube video in which a world-renowned philosopher argues for free will and against determinism. Once again, the control group are not primed one way or another. Mr Singh asks all the participants thirty different questions (prepared by Dr Jones) about their moral intuitions concerning a new set of hypothetical scenarios. Subsequently, after Mr Singh has collected all the survey data, Dr Jones undertakes statistical analyses.

Dr Jones sets about testing each hypothesis in turn by running statistical tests on the dataset until some statistically significant results arise. Dr Jones analyzes many outcomes, looking for many possible associations in the dataset, but only reports those where  $P < 0.05$ , that is, where a significant positive result points towards a possible underlying effect.

In order to arrive at the significant positive results, Dr Jones realizes that she has to exclude the responses of those participants who are over the age of 60 from the statistical analyses. She raises this issue with Professor Gallagher and Mr Singh. Although she realizes that a number of the responses have not been included in the analyses, Professor Gallagher

is, nevertheless, happy to see that there appear to be some positive findings. She instructs Dr Jones and Mr Singh to omit the excluded data, to make out that responses

from participants over the age of 60 was an exclusion criterion all along, and to only report the statistically significant findings.

## 2a. Questions for Researchers

1. Research misconduct is most often associated with practices of fabrication, falsification and plagiarism. Has research misconduct been committed here? If so, by whom? What are the reasons for your answer?
2. It is clear that the statistical analysis has been exploited ('P-hacking'). Why is P-hacking bad for science? What steps can be taken by researchers and the broader scientific community to avoid it?
3. Why is the selective reporting of statistically significant findings (selection bias) bad for science? What steps can be taken by researchers and the broader scientific community to avoid it?

## 2b. Questions for Research Administrators

1. Do the ways in which the three researchers have dealt with their work and each other in this situation violate the principles of the European Code of Conduct for Research Integrity and your own institution's guidelines and regulations? If you were made aware of a similar type of situation, what would be the next steps?

## 2c. Questions for Research Integrity Office/Research Ethics Committee Members

1. Research misconduct is most often associated with practices of fabrication, falsification and plagiarism. Has research misconduct been committed here? If so, by whom? What are the reasons for your answer?
2. Does your institution have a procedure, process or set of guidelines for dealing with P-hacking (data dredging) and the selective reporting of statistically significant findings (selection bias)? If not, what procedures could your institution put in place so as to change the culture surrounding these practices?
3. Do the ways in which the three researchers have dealt with their work and each other in this situation violate the principles of the European Code of Conduct for Research Integrity and your own institution's guidelines and regulations? If you were made aware of a similar type of situation, what would be the next steps?

### Issue 3

Mr Singh has recently submitted his thesis, which contains the results of both studies in the final chapter. The *viva voce* is due to take place within two weeks. Prior to the *viva*, the internal examiner notices that, in terms of the second study, some of the data has been excluded and only the statistically significant findings have been reported. She raises it with

Professor Gallagher, who informs the university's examination board. During the examination board meeting, Mr Singh denies all wrong-doing, and claims that Professor Gallagher and Dr Jones are responsible not only for P-hacking during the second study, but for hypothesizing after the results of the first study were known.

### 3a. Questions for Research Administrators

1. Would the potential case against Mr Singh be considered under your institution's research misconduct procedure or exam regulations? What are the reasons for your answer?
2. Depending on whether the potential case against Mr Singh is considered under your institution's research misconduct procedure or exam regulations, what would be the next steps?
3. As the project is funded by a government body, what are your institution's contractual and other obligations when an allegation like Mr Singh's has been made against the grant holder (Professor Gallagher in this case)?
4. In light of the allegations made by Mr Singh against Professor Gallagher and Dr Jones, what, according to your institution's procedures, would be the next steps?

### 3b. Questions for Research Integrity Office/Research Ethics Committee Members

- 1) Based on the details presented in this scenario, are there grounds for a complaint against any of the named individuals? What are the reasons for your answer.
- 2) Assuming you have all the necessary information relating to any complaint(s), what would be an appropriate verdict for your committee to come to? On what basis have you come to that conclusion?

## Suggested Resources

Bakker, M., Wicherts, J.M. (2011). The (mis)reporting of statistical results in psychology journals. *Behavior Research Methods* 43: 666-78.

ECCRI: The European Code of Conduct for Research Integrity

Head, ML, Holman, L, Lanfear, R, Kahn, AT, Jennions, MD. (2015). The extent and consequences of p-hacking in science. *PLoS Biol.* 13(3).

ICMJE: Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals

Kerr, N. L. (1998). HARKing: hypothesizing after the results are known. *Personality and Social Psychology Review*, 2(3): 196-217.

Murphy, K.R., Aguinis, H. (2019). HARKing: How Badly Can Cherry-Picking and Question Trolling Produce Bias in Published Results? *J Bus Psychol* 34: 1–17.

Rubin, M. (2017). When does HARKing hurt? Identifying when different types of undisclosed post hoc hypothesizing harm scientific progress. *Review of General Psychology*, 21: 308-320.

Simmons, J.P., Nelson, L.D., Simonsohn, U. (2011). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. *Psychological Science* 22: 1359-1366.

Suter, GW., Cormier, SM. (2015). The Problem of Biased Data and Potential Solutions for Health and Environmental Assessments. *Human and Ecological Risk Assessment: An International Journal*, 21(7): 1736-1752

The Embassy of Good Science: Data driven hypotheses without disclosure ('HARKing')



The Embassy of Good Science: [Non-reporting of negative findings](#)

The Embassy of Good Science: [Outcome-reporting bias](#)

The Embassy of Good Science: [P-Value Hacking](#)

Wikipedia: [Data Dredging](#)

## Related Scenarios

Issue 3 in this scenario has been inspired by the following case study:

UKRIO, 'Case Study 4', <http://ukrio.org/wp-content/uploads/UKRIO-Case-study-pack-No.-1.pdf>.

Accessed 20 December 2019.