

# Open Research Case Study

## Untangling the web of mistrust in arachnology with open research practices

Jordan Cuff

Newcastle University Academic Track Fellow, School of Natural and Environmental Sciences.

### Introduction

Open research is unquestionably crucial for individuals, academic communities and research globally. I am a postdoctoral researcher and incoming NUAcT Fellow in the School of Natural and Environmental Sciences with a passion for reproducible and open science. Here, I outline my experience of adopting open research practices, how this has benefited me and my community, and the challenges encountered.

### Research context

My research uses molecular methods to detect interactions between invertebrates, particularly in agriculture, to assess the benefits and detriments of invertebrates to our food systems. My early research focused specifically on spiders. Given [serious breaches of research ethics within arachnological research](#), this field of study needs increased transparency to restore confidence. As well, given the welfare concerns associated with killing large numbers of invertebrates for such research, there is a moral imperative to maximise the reusability and accessibility of these data.

### Open practices used

To me, open research is a continuous practice from inception to publication. At the inception of practical work, I publish protocols for public use and scrutiny via protocols.io; this facilitates adoption of my methods independent of publication for the benefit of research. Prior to manuscript submission, I publish data and code openly with associated DOIs via Zenodo (Dryad when financially supported) with comprehensively descriptive README files. This has led to independent analysis of my data during review and as secondary data, increasing its societal value and the scrutiny of my science. My manuscripts are made openly available as preprints (and through open review when applicable) to widen scrutiny and to ensure translation of findings as early as possible. Whilst I publish open access at every opportunity, this also ensures availability of the research should there ever be access issues related to the published manuscript.

To improve data processing transparency, I am expanding my use of 'tidyverse' in R to streamline my open datasets/scripts and increase data processing transparency and reproducibility. Alongside this, I am learning to use GitHub to ensure robust version-controlled code is available during project development. Despite its poor uptake in ecological disciplines, I am also keen to begin pre-registering my research to increase scrutiny and transparency from the point of inception.

### Barriers and challenges

Open research reluctance is widespread. When I first began practicing open research during my PhD, many supervisors and mentors discouraged me given their scepticism of the benefits and concerns about risk. Despite the moral imperative I felt to employ open practices, this challenged my student-supervisor relationships. They ultimately conceded but assured me that I was risking the sanctity of my ideas. Since I have demonstrated the benefits of open research, they have begun to adopt these practices.

Ecology has shown slow uptake of open research relative to some neighbouring fields, which reduces the impetus to engage in it. By continuing steadfast, I believe that I have converted many others to begin employing open practices. Advocacy within one's field is surely among the greatest forces for advancing widespread adoption of open research.

### **Realised benefits**

The early critique and improvement of research facilitated by open practices is invaluable. Open research practices increase confidence in research outcomes through thorough review. At a societal level, the encouragement of open practices increases the accountability of individual researchers which is crucial in mitigating unfortunate incidents of data fabrication and manipulation. By openly sharing data and protocols, I have personally formed novel collaborations, leading to productive research with global leaders in my field at a relatively early stage of my career. For all of these reasons, it is unquestionable that open research benefits individuals, academia and research globally.

### **Lessons learned**

I have found that the supposed risks of open research are largely unfounded and, even if true, are far outweighed by the benefits. Transparency and openness are, however, separate but linked practices. Open data is only as good as the README files and documentation that explain and describe it. Open protocols are only valuable when the necessary materials and software are available. Ultimately, employing open research practices is individually beneficial, even beyond moral duty, as a catalyst for collaboration and by easing the process of revisiting and understanding previous work.

### **Conclusion**

Open data is required within entomological and arachnological research to make best use of the animals killed for research, but also to restore confidence in research outcomes. Reluctance to adopt these approaches is still rife across many subdisciplines of ecology, but through increasingly frequent examples of good practice and the benefits that brings, these challenges can be quickly overcome.

### **References**

How a scandal in spider biology upended researchers' lives. *Nature* **608**, 658-659 (2022), [10.1038/d41586-022-02156-2](https://doi.org/10.1038/d41586-022-02156-2)