# Surprise, Surprise: It's a false positive

Jarrod Hadfield

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# Reproducibility in Medicine

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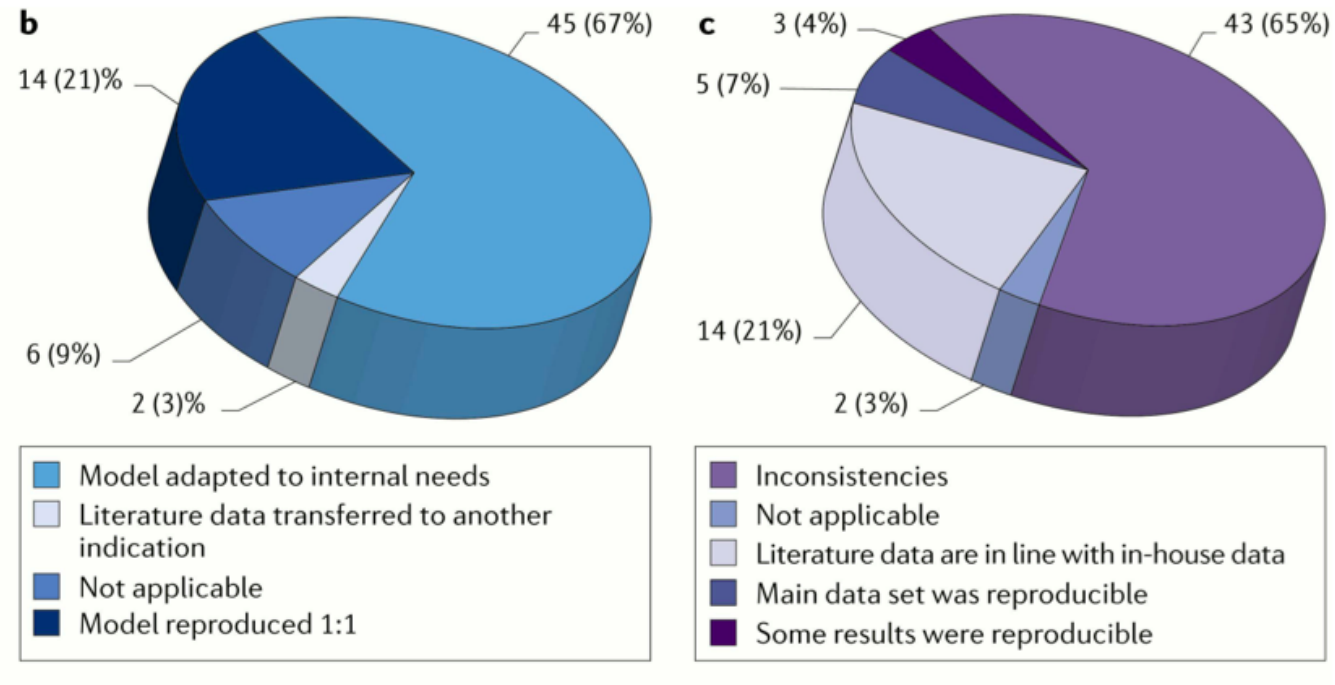

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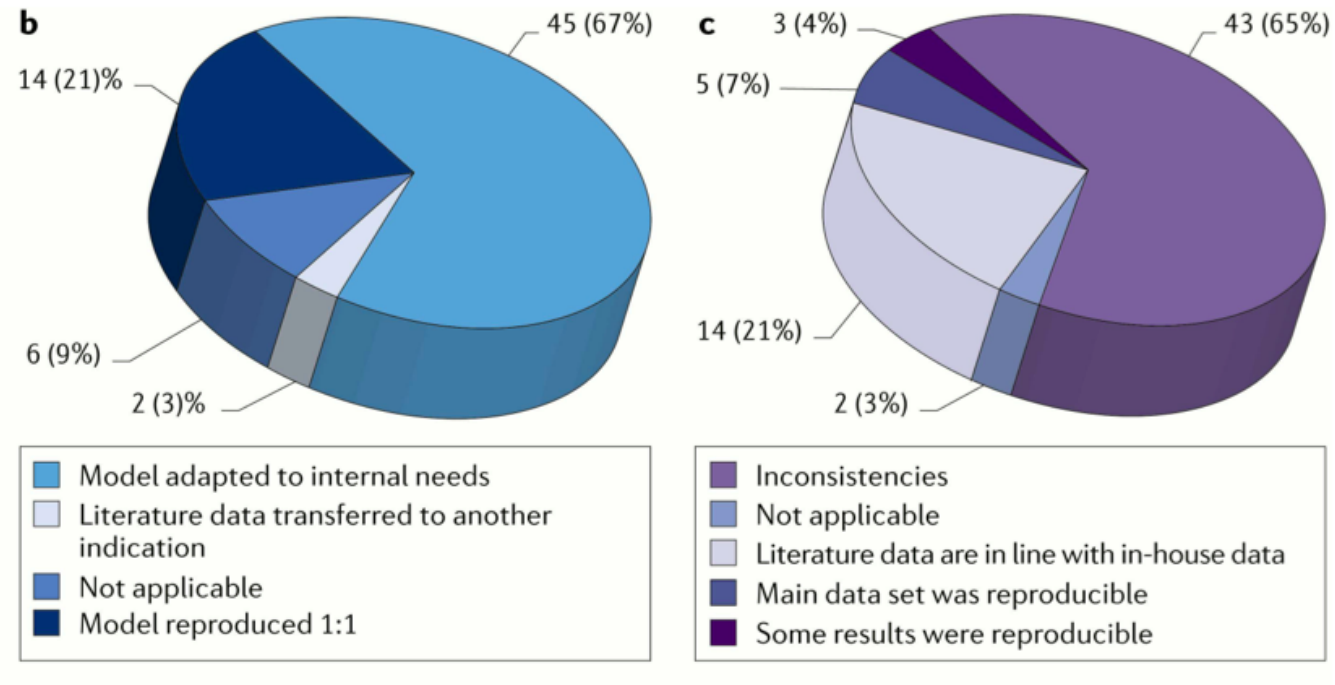


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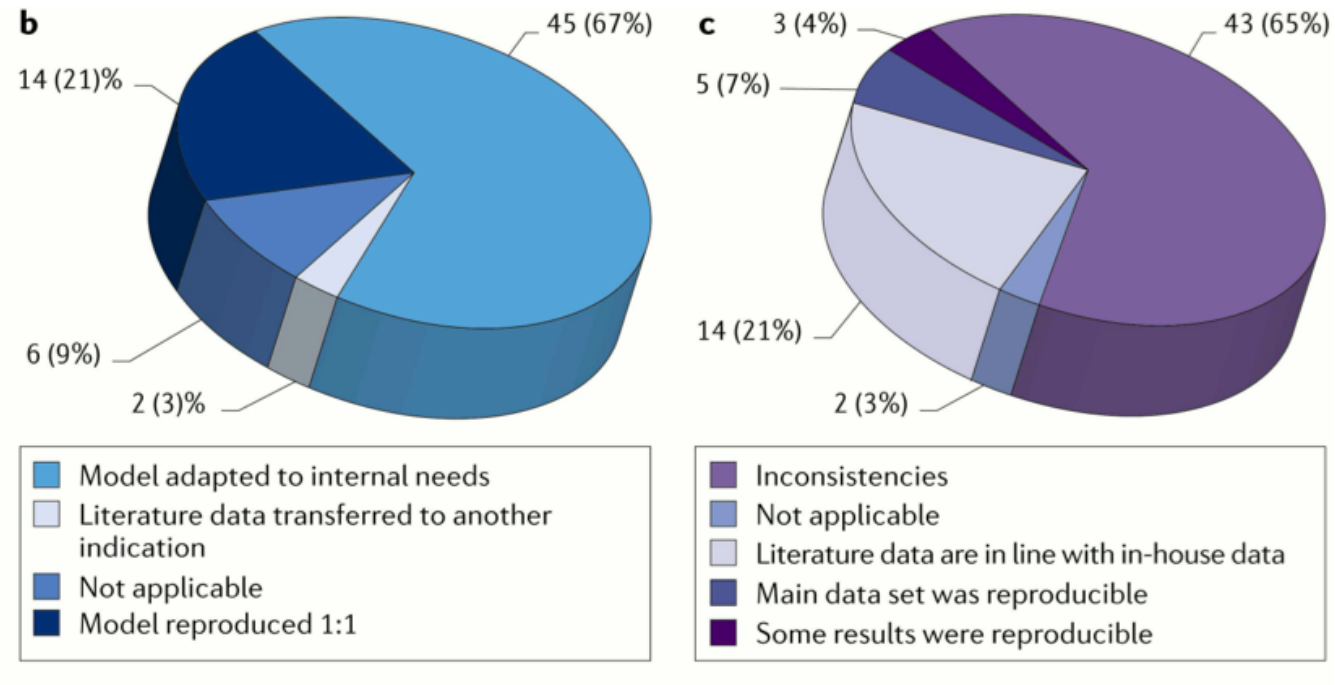


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  - *'We need to develop a value system where simply moving on from one's mistakes without publicly acknowledging them severely damages, rather than protects, a scientific reputation.'*

# How Science Goes Wrong

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*'Science still commands enormous - if sometimes bemused - respect. But its privileged status is founded on the capacity to be right most of the time and to correct its mistakes when it gets things wrong. And it is not as if the universe is short of genuine mysteries to keep generations of scientists hard at work. The false trails laid down by shoddy research are an unforgivable barrier to understanding.'*

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- Background
- Problems
- Under-graduate Project
- Solutions
- Unacknowledged Issues

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- A lot of scientific research is poorly thought through.

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| Average | Small | 0.20 | 0.80 |
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| Scenario | Effect Size | $\pi = 0.5$ | $\pi = 0.1$ |
|---|---|---|---|
| Ideal | | 0.94 | 0.64 |
| Experiment (n=30) | Small | 0.61 | 0.15 |
| Experiment (n=30) | Medium | 0.84 | 0.37 |
| Average | Small | 0.80 | 0.31 |
| Average | Medium | 0.91 | 0.53 |

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| Scenario | Effect Size | $\pi = 0.5$ | $\pi = 0.1$ | $\pi = 0.01$ |
|---|---|---|---|---|
| Ideal | | 0.94 | 0.64 | 0.14 |
| Experiment (n=30) | Small | 0.61 | 0.15 | 0.02 |
| Experiment (n=30) | Medium | 0.84 | 0.37 | 0.05 |
| Average | Small | 0.80 | 0.31 | 0.04 |
| Average | Medium | 0.91 | 0.53 | 0.09 |

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| Scenario | Effect Size | $\pi = 0.5$ | $\pi = 0.1$ | $\pi = 0.01$ | $\alpha = 0.23$ |
|---|---|---|---|---|---|
| Ideal | | 0.94 | 0.64 | 0.14 | 0.034 |
| Experiment (n=30) | Small | 0.61 | 0.15 | 0.02 | 0.003 |
| Experiment (n=30) | Medium | 0.84 | 0.37 | 0.05 | 0.011 |
| Average | Small | 0.80 | 0.31 | 0.04 | 0.009 |
| Average | Medium | 0.91 | 0.53 | 0.09 | 0.021 |

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- **Simmons, JP.** (2011) *False-Positive Psychology: Undisclosed Flexibility in Data Collection and Analysis Allows Presenting Anything as Significant* Psychological Science 22 1359-1366
- *Researcher degrees of freedom*: how many decisions were made during the course of data collection, analysis, presentation and publication.

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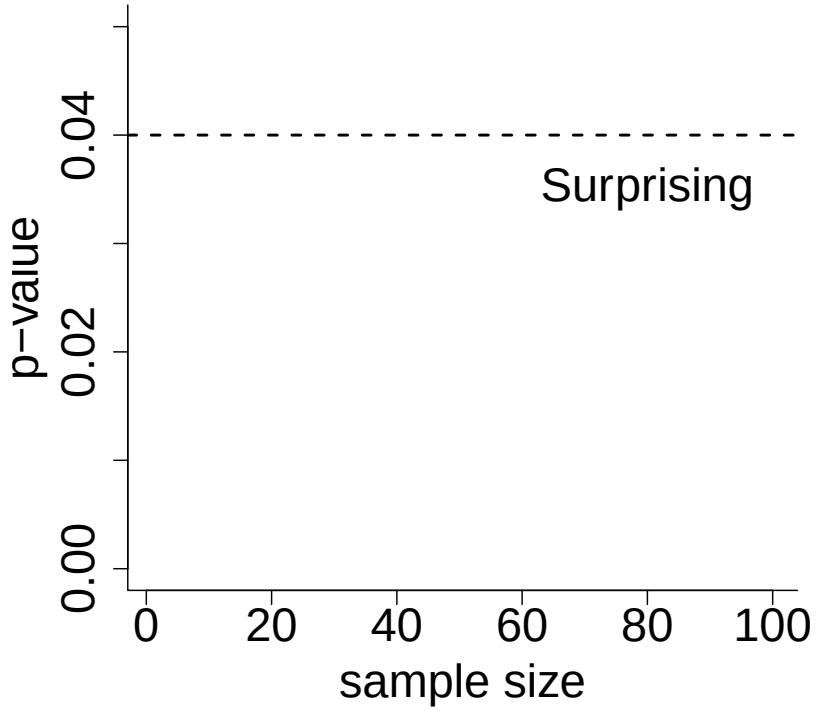

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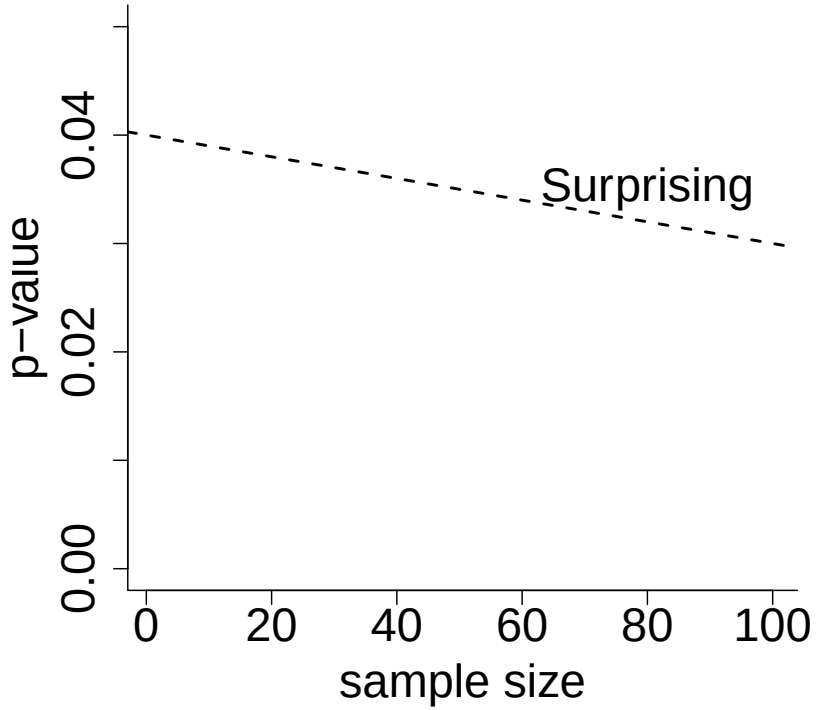

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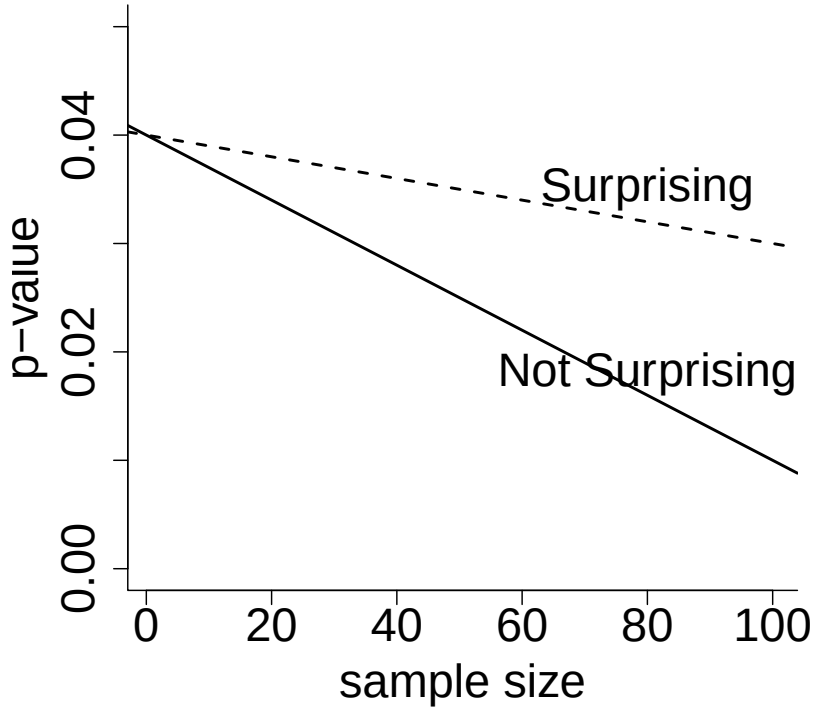

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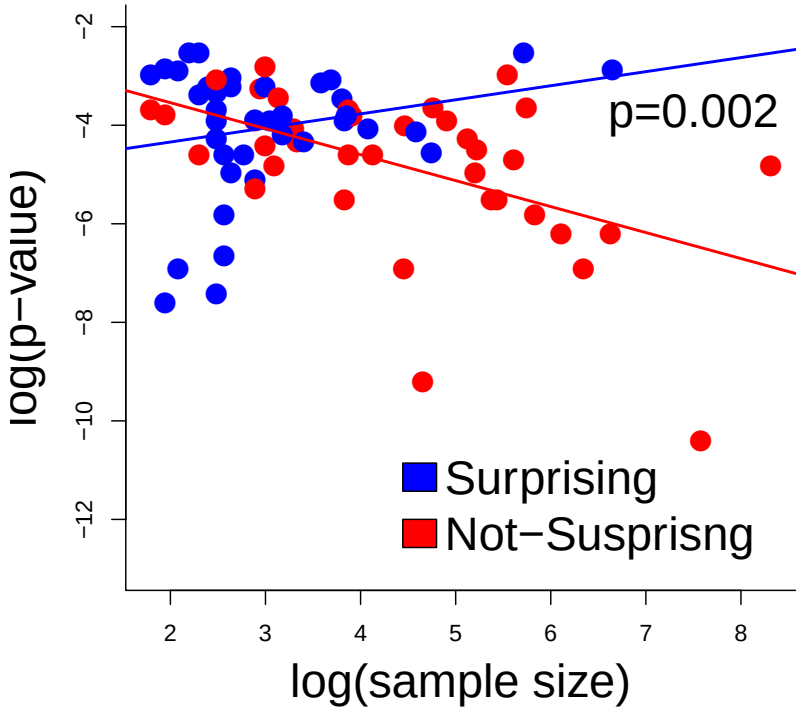

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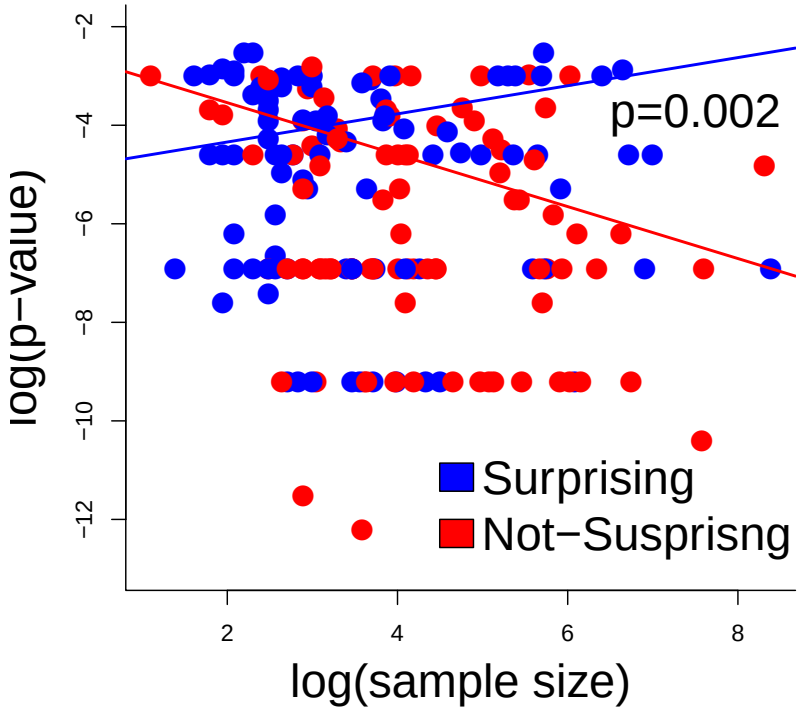

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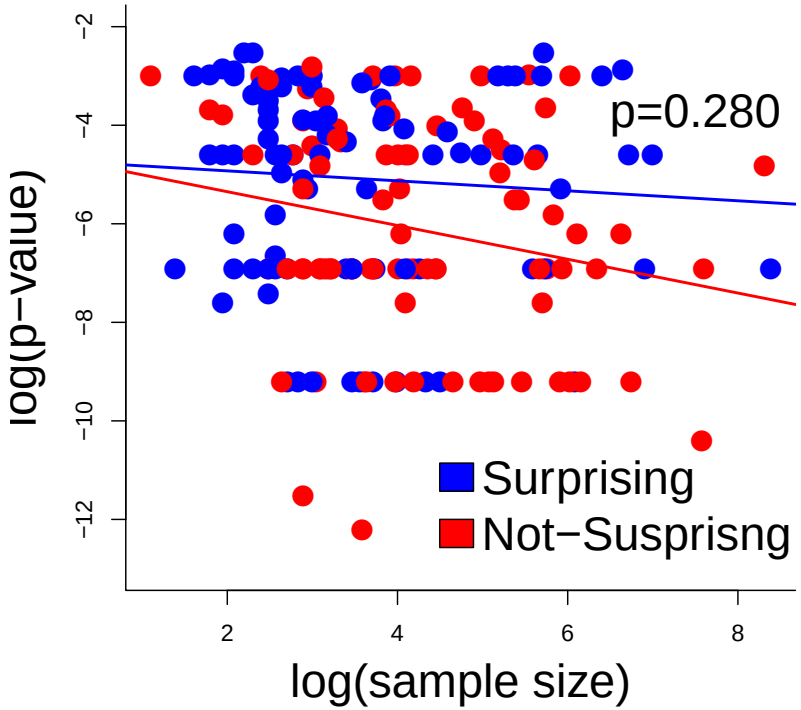
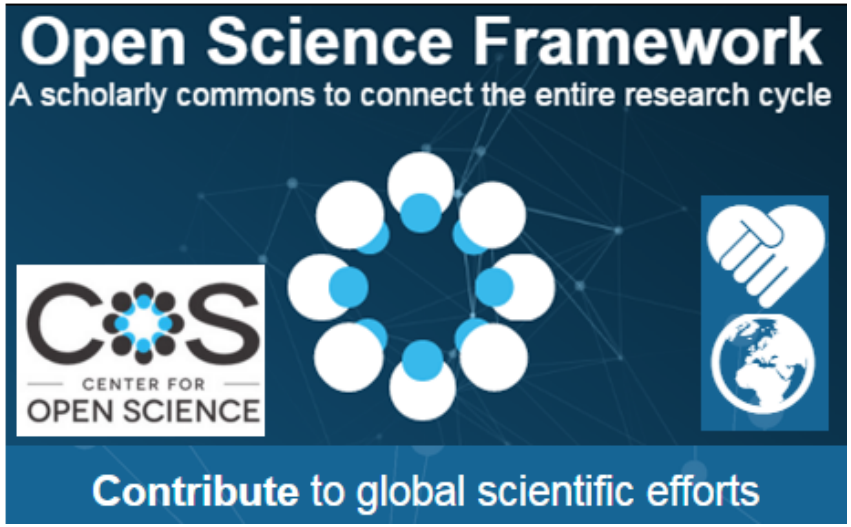


# Solutions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A scholarly commons to connect the entire research cycle
CENTER FOR
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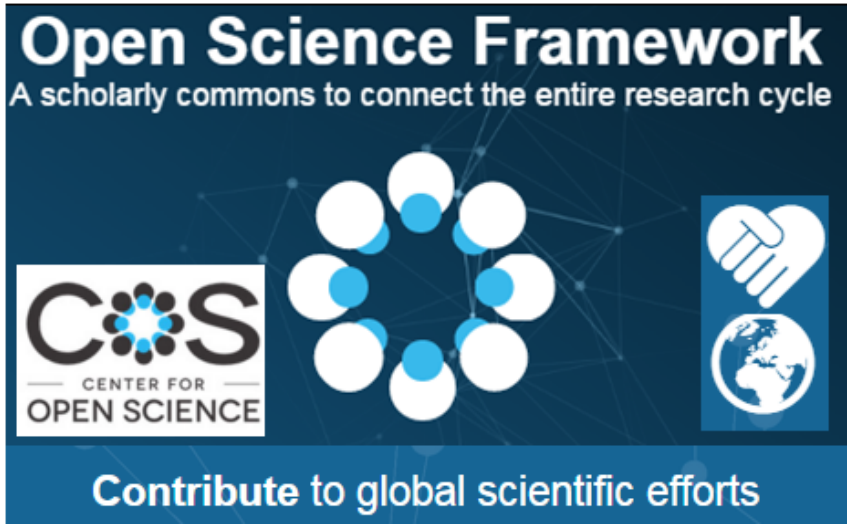


- Digitally pre-register study hypotheses, data collection and analysis plans as a record of intent.

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