PSYC4416
Psychological Research and Theory
Readings Notes

4 X FORUM TOPICS & PAPERS

1. Is psychology a cargo cult science?

- *Feynman, R. P. (1974). Cargo cult science. Engineering and Science, 37(7), 10-13. Accessible at http://calteches.library.caltech.edu/51/2/CargoCult.htm*
- Claims that educational and psychological studies = cargo cult sciences
- *Cargo cult science:* follow all the apparent precepts and forms of scientific investigation, but they're missing something essential (scientific integrity/honesty)
  - Relates to tendency for researchers to only search and report what they are looking for and what supports their theory
  - Can see this perspective - perhaps some researchers do this and maybe have the urge to do this. But I believe that it does not occur as often as we might think - due to depth of regulations and guidelines, reviewers etc.
    - e.g It would be an offence to publish papers that only have statistical significance
    - However have seem some stretches of the imagination in some papers across my degree
    - But I do think most researchers do a good job at reporting variables that may weaken validity - we have certainly been taught the importance of this throughout our degree.
      - It might happen, but I do think it is NOT encouraged, it IS frowned upon
  - Given the amount of variables that can impact a psychological construct, this can be difficult but I think it is approached correctly.
  - Relates to philosophy in lecture - A, therefore B. Not B, therefore A.

2. Does Your Philosophy of Science Matter in Practice?

- http://daniellakens.blogspot.com/2019/01/does-your-philosophy-of-science-matter.html
- philosophy of science rarely plays direct role in research
- It shifts how you weigh what you focus on when researching
- Three main categories:
  - Anarchism - anything goes
  - Pragmatism - truth is replaced by something else e.g social consensus
  - Correspondence theories - defines truth as some correspondence between language and reality (differ in whether they believe scientific theories have truth values and its relevance)
- scientific progress is goal for science - should enable control; two important types (Kitcher, 1993)
  - Conceptual progress — refining concepts (accurate) and reach consensus; depends on data
  - Explanatory progress — understand causal mechanisms
- four philosophies differ in value regarding theories and entities and 'objective truth'
1) Instrumentalism - theories are tools to solve practical problems; not truth
   - all theories are undetermined by data - need additional criteria e.g simplicity
2) Constructive Empiricism - limits belief in theories based on observable events
   - theories often make statements that go beyond what we can observe…
3) Entity Realism - acknowledge belief in unobservable entities when causal knowledge is demonstrated
4) Scientific Realism - sees theories as attempt to reveal true nature of reality beyond limits of observation
   - information about reality; verisimilitude (truthlikeness) is basic utility of science
   - failures to predict are very impactful for a realist
- commonality among all - that goal of science is progress

3. **The narrative around the "reproducibility crisis" is too negative, and there are better ways to promote better scientific practice.**

- Fanelli, D. (2018). Opinion: Is science really facing a reproducibility crisis, and do we need it to?. *Proceedings of the National Academy of Sciences*, *115*(11), 2628-2631.
- recent effort to improve reducibility and integrity of science
- 'crisis' refers to how most published results are unreliable due to publication practices
- 90% of respondents believe there is crisis - selective reporting, fraud, pressures to publish
    - These factors contribute to irreproducible research (opinion of many researchers)
- misinformed - not distorting majority of literature; also distributed across subfields; not growing
- Misconduct occurs at small frequencies - 1-2%
    - False-positives and P-hacking; may be common but lack of impact on literature
    - Low statistical power increases risk - average below 80% level (but varies across subfields)
    - Impacted by effect size, research bias and prior probabilities
- studies on publication bias may also be subjected to publication bias
- Finding of Reproducibility being below 50% (issues here - how to measure + subfields)
- No evidence that misconduct have increased; retractions have risen
- Salami slicing - fractionalise results to increase publication output
- Risk of misconduct higher in countries that are largely represented in global scientific literature
- Better way = encourage accuracy, empowerment, inspiration

- Redish, A. D., Kummerfeld, E., Morris, R. L., & Love, A. C. (2018). Opinion: Reproducibility failures are essential to scientific inquiry. *Proceedings of the National Academy of Sciences*, *115*(20), 5042-5046
- Reproducibility is a broad concept that includes many issues
- Reproducibility failures are valuable as it contributes to the process of integrating conflicting observations and ideas into coherent theories
    - Synthesise articles and integrate diverse perspectives = good thing
    - This leads to reliable results and strong practical applications
- need to understand variables that underlie differences
- Scientific progress depends on integrating lessons learned from repeated experiments with different outcomes; cycle of observation, theory, replication, failure, reintegration
- Three examples:
1) Four Colour Theorem
- reproduce the proof
- For any map drawn in 2D plane divided into continuous regions, four colours suffice to colour these regions so that no two adjacent ones are same colour
- mathematicians sought to better understand these methods, results and inferences over time which lead to new techniques
2) Fourier analysis
- overgeneralisation - every function can be represented as series of sines and cosines
- Contained important insights - correct under limited conditions
- Violated maths intuitions at the time
3) Neural networks
- long cycle - development of insights combined with technology
* value of changing perspective, being patient, responding positively