Ch. 15 and Ch. 16 Responses

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1 Ch. 15 Question Responses

1.1 Question 1

You do a lab experiment with power $(1 - \beta) = 0.8$ and estimated prior 0.4 found an α of 0.0. What is the post study probability? What would the post study probability be following a single successful replication (α of 0.05) in an artefactual field experiment setting ($d = 0.2$) with power (1- β) =0.9?

I'm kind of confused by what it means to have an α of 0.0, but that being said, if you did suppose an α of 0.0, then the post study probability would be 1 based on

$$\text{PSP} = \frac{(1-\beta)\pi}{(1-\beta)\pi + \alpha(1-\pi)}.$$

If we consider the artefactual field experiment, based on Exhibit 15.8, it seems that the PSP should be around 0.68.

1.2 Question 2

How would you address the replication crisis in economic experiments, list two feasible solutions with explanation?

One method is to increase the prevalence and detail of pre-analysis plans to make p-hacking more difficult. Another is to increase the prevalence and rewards for replication, especially given that surprising results are currently rewarded.

2 Main Takeaways

2.1 Ch. 15 Takeaways

1. Our assessment of the probability of a result being "true" depending on the power of the study, the prior probability of the hypothesis being true, and the significance level of the study:

$$PSP = \frac{(1-\beta)\pi}{(1-\beta)\pi + \alpha(1-\pi)}.$$

2. Replications are valuable for knowledge generation. We can update our PSP expression to incorporate replications:

$$PSP = \frac{\pi \sum_{i=r}^{n} \binom{n}{i} (1-\beta)^i \beta^{(n-i)}}{\pi \sum_{i=r}^{n} \binom{n}{i} (1-\beta)^i \beta^{(n-i)} + (1-\pi) \sum_{i=r}^{n} \binom{n}{i} \alpha^i (1-\alpha)^{(n-i)}}$$

3. We can reckon with domain distance by adjusting our PSP expression:

$$PSP^{\mathrm{d}} = \frac{(1-\beta)\pi + \beta\pi\mathrm{d}}{(1-\beta)\pi + \beta\pi\mathrm{d} + [\alpha + (1-\alpha)\mathrm{d}](1-\pi)}$$

2.2 Ch. 16 Takeaways

1. If we lose internal validity for an experiment, then we have lost our whole foundation, as internal validity is necessary for any hope of external validity. However, it is not sufficient on its own for external validity.

2. Generalizability faces many challenges, such as selection into experiments. These challenges may be influenced by our design, e.g., different upfront payment levels.

3. The Voltage Effect refers to when the benefit-cost profile associated with a treatment worsens when moving from the lab to scale.