Statistics and Data Analysis

Unit 03 – Lecture 07: Case Exercise: Interpreting Hypothesis Testing Results

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https://github.com/tali7c/Statistics-and-Data-Analysis

Quick Links

Overview Reading Results Pitfalls Exercises Demo Summary

Agenda

Learning Outcomes

- Interpret p-values and confidence intervals correctly

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- Avoid correlation-causation confusion

Reading Results: Key Points

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- Ask: what does it mean in the real world?

Pitfalls: Key Points

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- Over-claiming causation

Exercise 1: Interpret CI

95% CI for (new-old) is (1.2, 3.8). What does it suggest?

Solution 1

- Likely positive effect (CI above 0).
- Magnitude between 1.2 and 3.8 units.

Exercise 2: Compute d

A: n=20 mean=72 SD=10; B: n=20 mean=68 SD=10. Compute Cohen's d.

Solution 2

- Pooled SD=10
- d=(72-68)/10=0.4

Exercise 3: Cautious conclusion

p-value=0.03 but effect size is tiny. What should you conclude?

Solution 3

- Evidence of difference, but small magnitude.
- May not justify action without cost/benefit.

Mini Demo (Python)

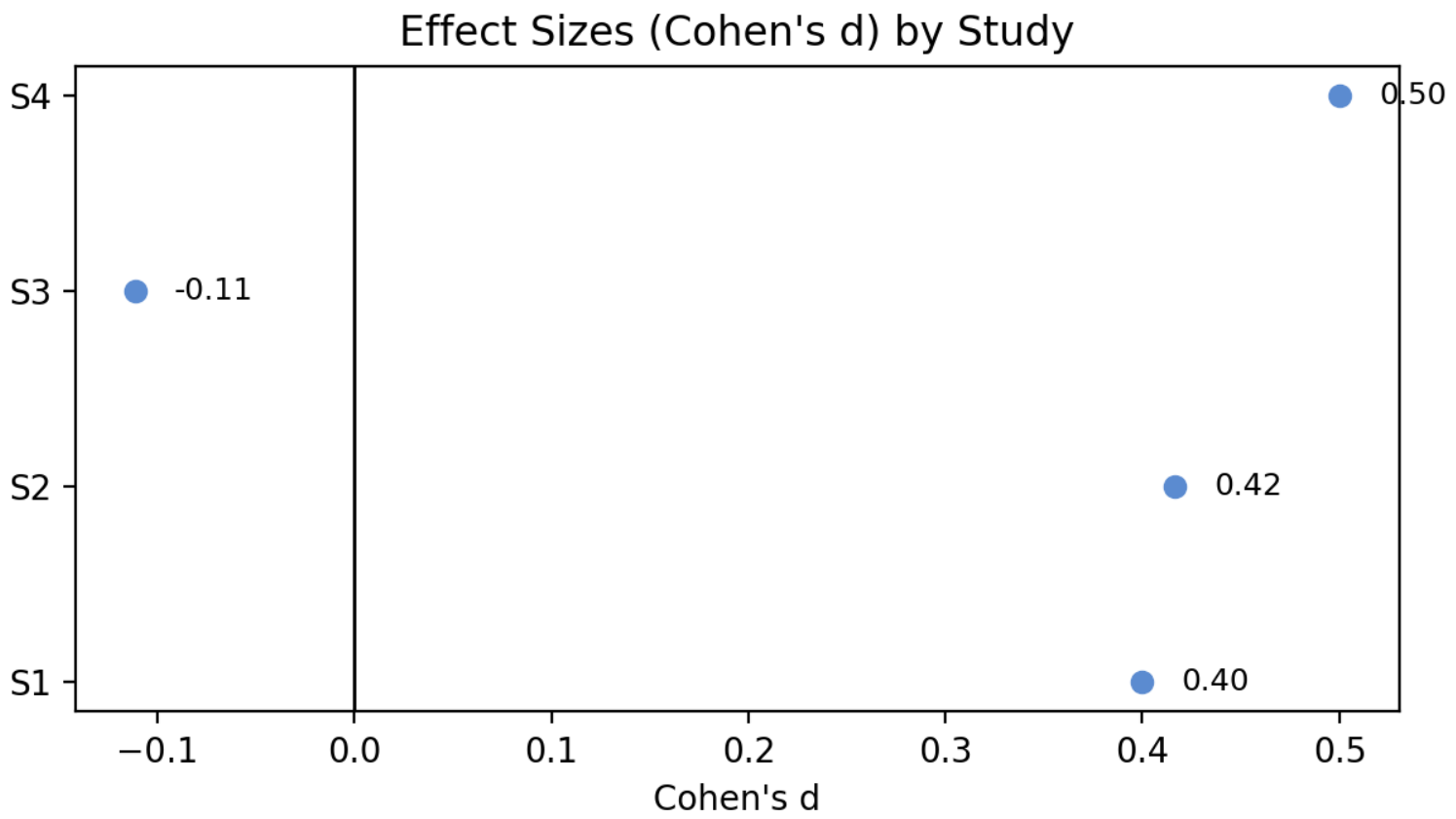
Run from the lecture folder:

```
python demo/demo.py
```

Outputs:

- `images/demo.png`
- `data/results.txt`

Demo Output (Example)



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- How the demo connects to the theory.

Exit Question

What is one red flag when a paper reports only p-values and no effect sizes?