

Not just normal: exploring power with Shiny apps

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1. INTRODUCTION

- motivate need for app
 - learning objectives
 - highlight how visuals lead to deeper understanding of power
 - model after [McDaniel and Green \(2012\)](#)
- lit review
 - cite ASA guidelines
 - GAISE guidelines for intro stat
- CONNECTIONS

2. MOTIVATION

- describe power teaching experience with Christian's cohort
- discuss features of the app that address difficulties introduced by example
 - highlight versatility

Features:

- Showcase power functions and sampling distributions of test statistics under a wide range of conditions without working through time consuming derivations.
- Have derivations available to work through.
- Requires no coding experience

3. APPLET IMPLEMENTATION

HOW IT COULD BE USED

VERSATILITY -> HERE ARE THREE POSSIBLE WAYS:

- describe how to use it, structured around learning objectives
- highlight versatility for different levels of instruction

Possible topics for exploration:

- Explore power curves and understand how these curves change for different tests statistics, null values, alternative hypotheses, alpha levels, sample sizes, and population distributions. **START WITH COMPARING POP DISTRIBUTIONS THEN RESTRICT TO ONE POP DIST AND DISCUSS OTHER STUFF**
 - sufficiency
 - Provides a high level of versatility in what students can explore with the app (power curves, sampling distributions, sufficient statistics, derivations, simulation, etc.) and **connections**
 - ex 1 - sum of exponential, ex 2 - order stats normal and ex 3 - uniform ????
- Explore how power curves arise by relating them to the sampling distribution of the test statistic.
- Understand difficulties of determining power in real life situations
 - Investigate alternatives to determining power such as normal approximations and simulation

4. IMPLEMENTATION

DISCUSS HOW IT WAS USED WITH REAL LIFE HUMANS AND WHAT THEY GOT FROM IT

MENTION 422, HOW IT WAS USED (JUST EXP) -> FOCUS ON 502 HERE -> "MORE SCAFFOLDING" FOR 422

LOGISTICS -> DAY 1, 2, 3 ETC -> FOR GRAD STUDENTS

5. FUTURE WORK AND CONCLUSIONS

References

- McDaniel, S. N. and Green, L. B. (2012), “Using applets and video instruction to foster students’ understanding of sampling variability,” *Technology Innovations in Statistics Education*, 6, 1–17.