

Teaching Data Science in Psychology Courses

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ST MARY'S
COLLEGE *of* MARYLAND

Find our project at Open Science Framework
<https://osf.io/xze7n/>



IUSE: EDU Award 2235645

Level 1 Engaged Student Learning

Developing Modernized Data Science Instruction in Psychology Curricula

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Problem: Undergraduate data science training is *underdeveloped*

Solution: Integrate data science instruction into more programs

Project Goals

1. Develop psychology laboratory courses with scaffolded data science skill instruction
2. Complete a research study to determine how data science course experiences influence students' critical thinking and data literacy
3. Release psychology data science course materials as publicly available Open Educational Resources (OER)

Teachable Data Science Skills

Domain General

Digital
technology



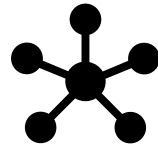
Computational
thinking

Critical
thinking



Research design
and ethics

Quantitative
literacy



Communication

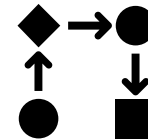
Domain Specific



Computer programming



Ethical data acquisition,
processing, & management

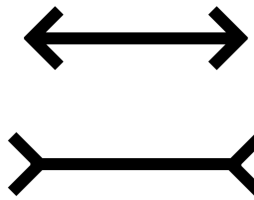


Data workflow and
storytelling



Data visualization, analysis,
& modeling

We developed two Data Science in Psychology Courses



Perception, Cognition, Computation

- Understand how visual illusions occur and implement valid perceptual measures



Conditioning, Eating, Addiction

- Understand classically conditioned behavior and applications of learning theory

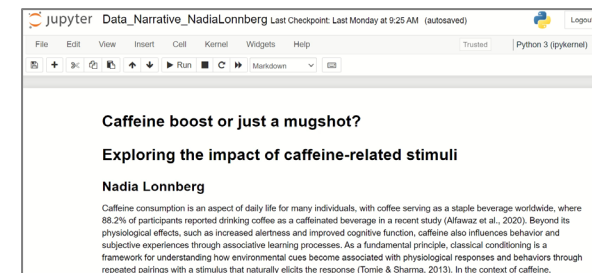
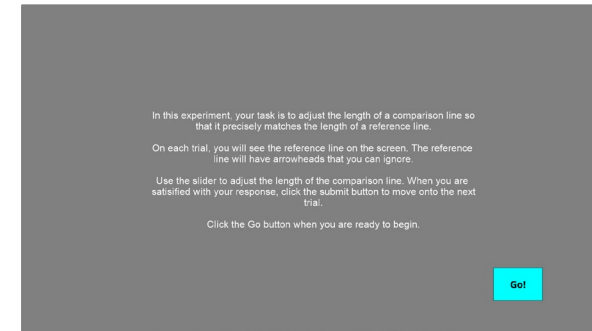


Example data science learning outcomes

Use a high-level programming language to...

- code a data collection experiment
- conduct data exploration, visualization, analysis, and modeling

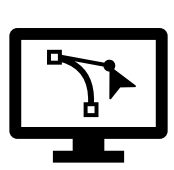
Transparently communicate analytical workflow within a data narrative



Example perception experiment
and student notebook
(*displayed with permission*)

(Granger & Pérez, 2021; Peirce et al., 2019; Waskom, 2021)

How to Teach Data Science Skills *in Psychology and Other Disciplines*



Data acquisition: Situate research design as a gateway to computer programming



Data visualization: Instead of GUI software (e.g., Excel, SPSS), teach text-based coding (e.g., Python, R)



Data storytelling: Supplement traditional outlets (posters, reports) with dynamic, transparent data narratives



Enhanced instruction in undergraduate data science will benefit students, faculty, and society

Thank you! Ideas for Q&A

- Exchange best practices for teaching data science skills (especially for new learners)
- Evaluate interdisciplinary pathways for transfer of learning in data science skills
- Identify valid assessment measures for critical thinking and quantitative/data/visualization literacy
- Explore opportunities for distributing OER course materials
- Discuss collaboration opportunities

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