One by One: A Shiny Web-app for the Design and Analysis of Single-Case Experiments

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Hosted and available for testing at https://tamalks.shinyapps.io/scda/

Introduction

A single-case experiment is an experiment in which the effect of at least one independent variable on a single entity is assessed by repeated measurements. Increase in popularity of single-case experiments in the fields of educational, behavioural, and psychological research has boosted the development of computer programmes for the design and analysis of these experiments.

Researchers at KU Leuven – University of Leuven have developed R packages for this purpose (SCRT, SCVA and SCMA; Bulté and Onghena, 2013). However, many potential users may not be comfortable with R, so we decided to develop a web-application which implements these R functions in a user-friendly GUI.

Design

We chose Shiny by Rstudio as the platform for SCDA (Single-Case Data Analysis). For ease of use, we grouped the available functionality in separate tabs, namely Design, Data, Visual Analysis, Randomization Test, and Meta-Analysis, based on a natural progression of functions needed over the course of designing an experiment and analyzing the data.

Inside these tabs, we implemented a navigation panel on the left to navigate between different functions, an input panel in the middle, and an output panel on the right. A final tab, Information, contains examples and useful information for the user.

Example

We will replicate the design and analysis by Bredin-Oja and Fey (2014) in their experiment with 5 participants which implemented an alternating treatments design (ATD) with a maximum of 3 consecutive administrations of the same condition to determine whether children in the early stage of combining words are more likely to respond to imitation prompts that are telegraphic than to prompts that are grammatically complete.

The experiment was conducted over 14 sessions for each participant, with 7 applications of each prompt condition. For simplicity, we will focus on the first participant.

Conclusion

We conclude that the SCDA Shiny app makes designing and analyzing single-case experiments easier and more accessible to researchers and practitioners. We are working on adding more functionality to the R packages as well as new features to the SCDA Shiny app.

References


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