

# EFAshiny: An User-Friendly Shiny Application for Exploratory Factor Analysis

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## Summary

EFAshiny is an user-friendly web application for exploratory factor analysis (EFA) (David J. Bartholomew 2011). The graphical user interface (GUI) in `shiny` (Winston Chang 2017) is designed to free users from scripting by wrapping together various R (Team 2000) packages, such as `ggplot2` (Wickham 2016), `psych` (Revelle 2017), `corrplot` (Wei 2017), and `EGA` (Hudson Golino 2017), for data management, EFA, and graphics. The major focus is on item-level scale data, which usually require the implementation of EFA. EFAshiny implments a easy-to-follow analysis flow and a vareity of appropaches to explore, analyze and visualize data and results. Resonable default setting are provided according to proffered recommendations in the literature (Robin K Henson 2006) are provided. Without having worry about data processing or programming users can obtain insights into the data and the results of EFA. Also, results of analysis in tables and graphs are all presented on-line and can be exported. Documentation, tutorials and usages can be found on **our page**.

Key features of EFAshiny include:

- An user-friendly GUI for users without programming experiences
- An easy-to-follow step by step analysis flow to easily perform EFA
- Quick data explorations with numeric summary and graphics
- Graphical and numerical factor retention methods
- Lots of extraction and rotation methods
- Confidence intervals calculation of factor loadings
- Visualizations of factor loadings with confidence intervals and correlation matrix
- Default arguments from recommendations in the literature
- Demonstrations using a typical item-level scale dataset

Our application is primarily aimed at behavioral science researchers who want to analyze and visualize item-level scales or datasets with a set of associated variables using EFA. It is also noted that EFAshiny can be used to provide EFA-based connectivity analyses in neuroimaging data, such as event related potentials (ERPs) and functional near-infrared spectroscopy (fNIRS).

## References

- David J. Bartholomew, Irini Moustaki, Martin Knott. 2011. *Latent Variable Models and Factor Analysis: A Unified Approach*. John Wiley & Sons. New Jersey.
- Hudson Golino, Sacha Epskamp. 2017. “Exploratory Graph Analysis: A New Approach for Estimating the Number of Dimensions in Psychological Research.” *Plos One* 12 (6). Public Library of Science:26. <https://doi.org/https://doi.org/10.1371/journal.pone.0174035>.
- Revelle, William. 2017. *Psych: Procedures for Psychological, Psychometric, and Personality Research*. <https://cran.r-project.org/web/packages/psych/>.
- Robin K Henson, J Kyle Roberts. 2006. “Use of Exploratory Factor Analysis in Published Research: Common Errors and Some Comment on Improved Practice.” *Educational and Psychological Measurement* 66 (3). Sage Publications:393–416. <https://doi.org/https://doi.org/10.1177/0013164405282485>.
- Team, R Core. 2000. “R Language Definition.” *Vienna, Austria: R Foundation for Statistical Computing*.

Wei, Taiyun. 2017. *Corrplot: Visualization of a Correlation Matrix*. <https://cran.r-project.org/web/packages/corrplot/>.

Wickham, Hadley. 2016. *Ggplot2: Elegant Graphics for Data Analysis*. Springer. New York.

Winston Chang, JJ Allaire, Joe Cheng. 2017. *Shiny: Web Application Framework for R*. <https://cran.r-project.org/web/packages/shiny/>.