A tutorial on setting up a reproducible workflow in R and R Studio

Richard Ramsey[1]

[1] ETH Zürich

Author Note

Add complete departmental affiliations for each author here. Each new line herein must be indented, like this line. Enter author note here.

The authors made the following contributions. Richard Ramsey: Conceptualization, Writing - Original Draft Preparation, Writing - Review & Editing.

Correspondence concerning this article should be addressed to Richard Ramsey, Postal address. E-mail: richard.ramsey@hest.ethz.ch

Abstract

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Introduction

Methods

We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study (Simmons, Nelson, & Simonsohn, 2012).

Participants

Material

Procedure

Data analysis

We used R (Version 4.4.1; R Core Team, 2023) and the R-packages *citr* (Version 0.3.2; Aust, 2019), *dplyr* (Version 1.1.4; Wickham, François, Henry, Müller, & Vaughan, 2023), *forcats* (Version 1.0.0; Wickham, 2023a), *ggplot2* (Version 3.5.1; Wickham, 2016), *lubridate* (Version 1.9.4; Grolemund & Wickham, 2011), *papaja* (Version 0.1.3; Aust & Barth, 2023), *patchwork* (Version 1.3.0; Pedersen, 2024), *purrr* (Version 1.0.2; Wickham & Henry, 2023), *RColorBrewer* (Version 1.1.3; Neuwirth, 2022), *readr* (Version 2.1.5; Wickham, Hester, & Bryan, 2024), *stringr* (Version 1.5.1; Wickham, 2023b), *tibble* (Version 3.2.1; Müller & Wickham, 2023), *tidyr* (Version 1.3.1; Wickham, Vaughan, & Girlich, 2024), *tidyverse* (Version 2.0.0; Wickham et al., 2019), *tinylabels* (Version 0.2.4; Barth, 2023) and *tinytex* (Version 0.54; Xie, 2019) for all our analyses.

Results

Descriptive statistics

Raw data plots

Accuracy by condition violin plot

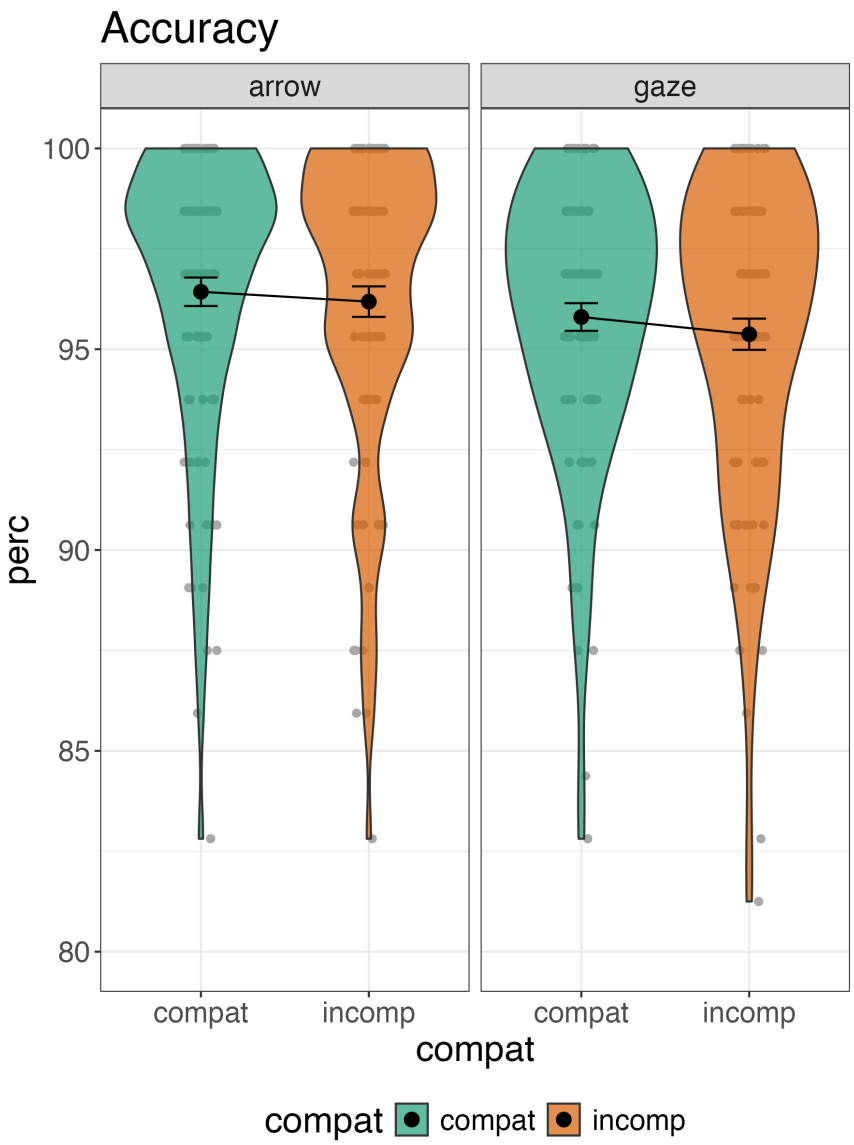

Figure 1. Accuracy is quite high for both types of stimuli

Reaction time by condition violin plot

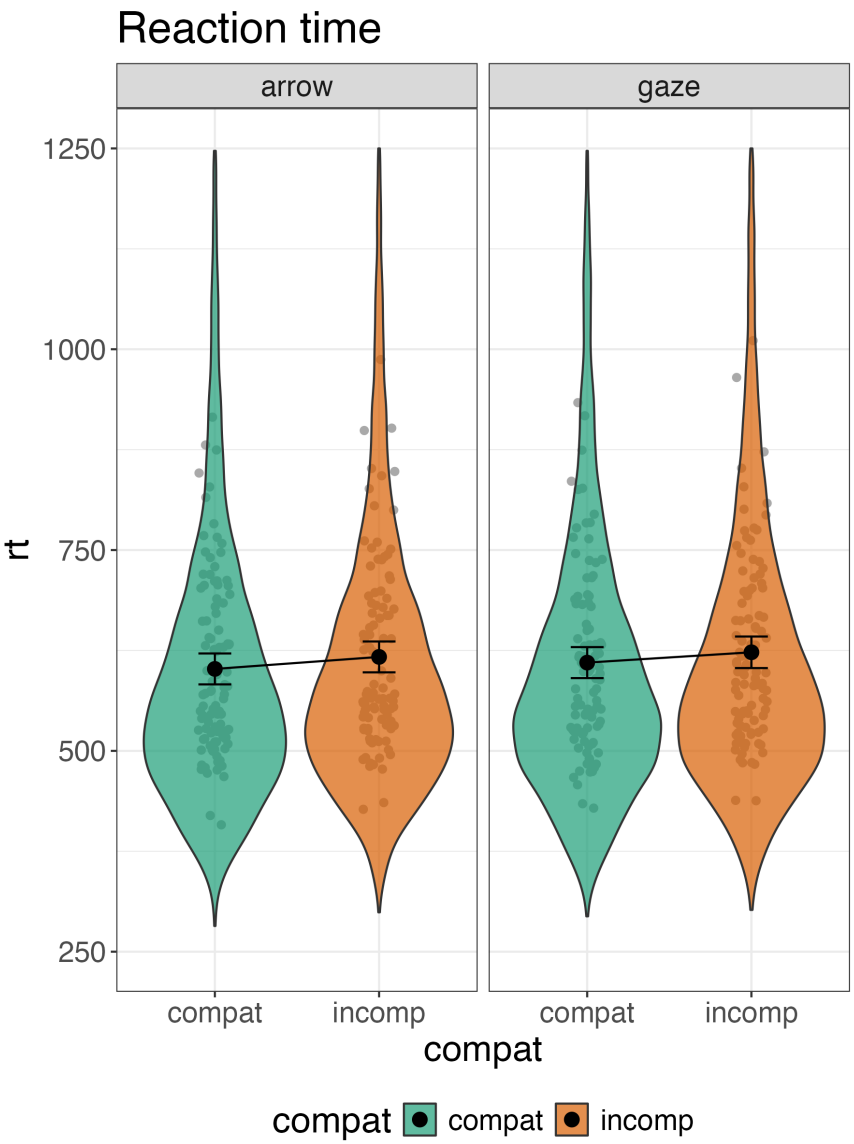

Figure 2. RT as a function of stimuli and conditions.

Reaction time by difference scores violin plot

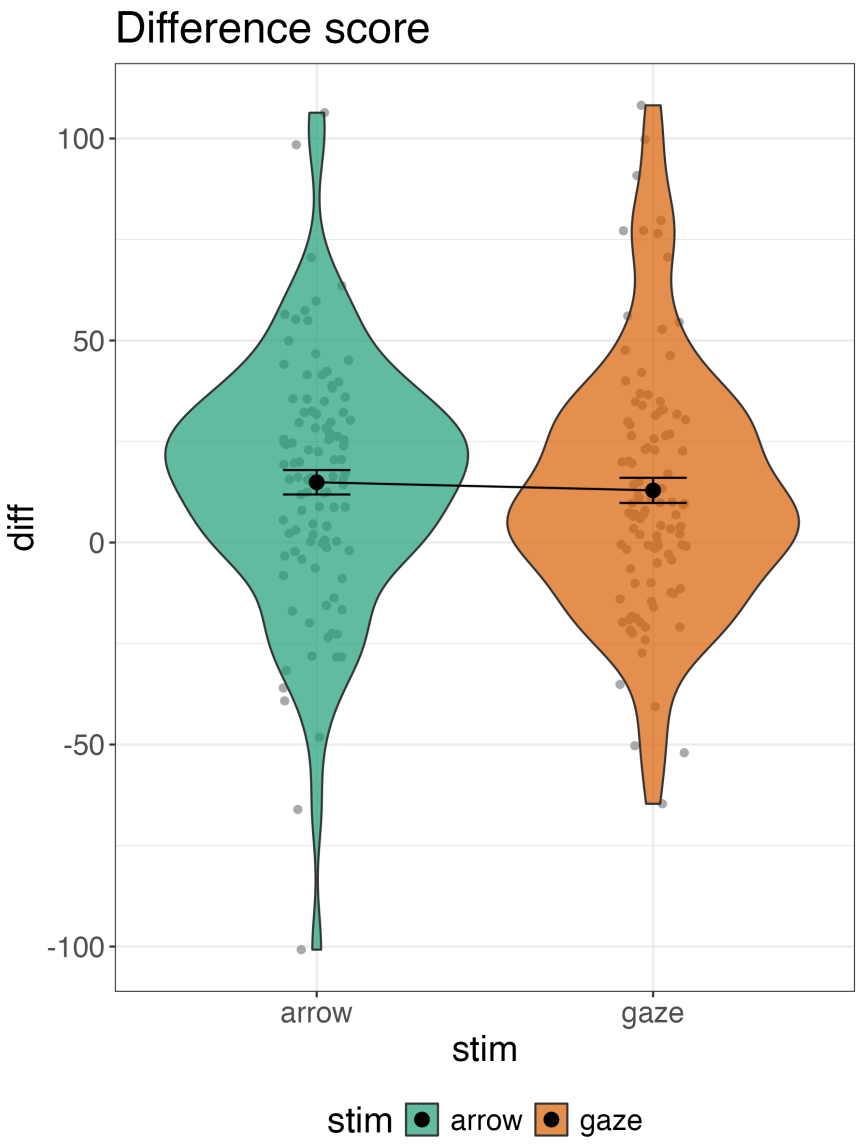

Figure 3. RT difference scores (incomp - compat) by stimulus type.

Reaction time by difference scores density plot with quantiles

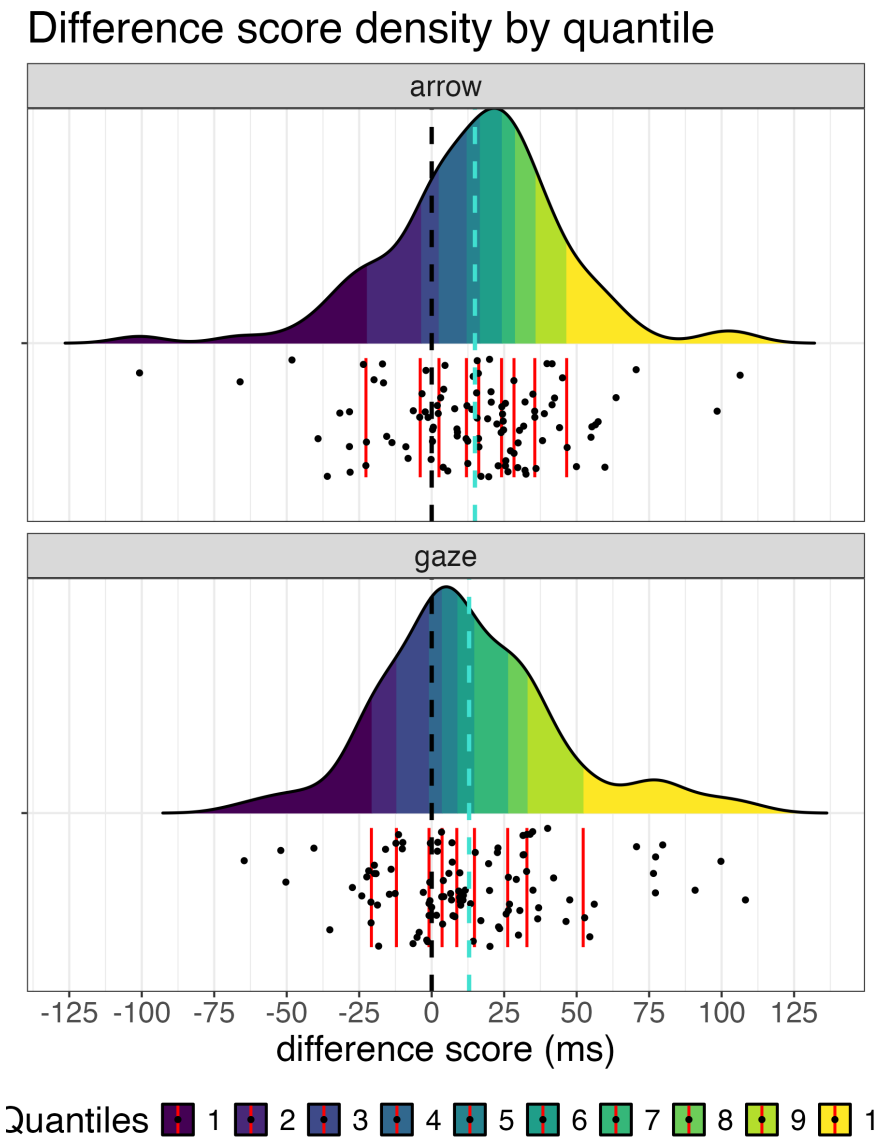

Figure 4. RT difference scores (incomp - compat) as a density plot.

Inferential statistics

Now we plot and tabulate parameters from the posterior distribution.

Fixed effects from model b2

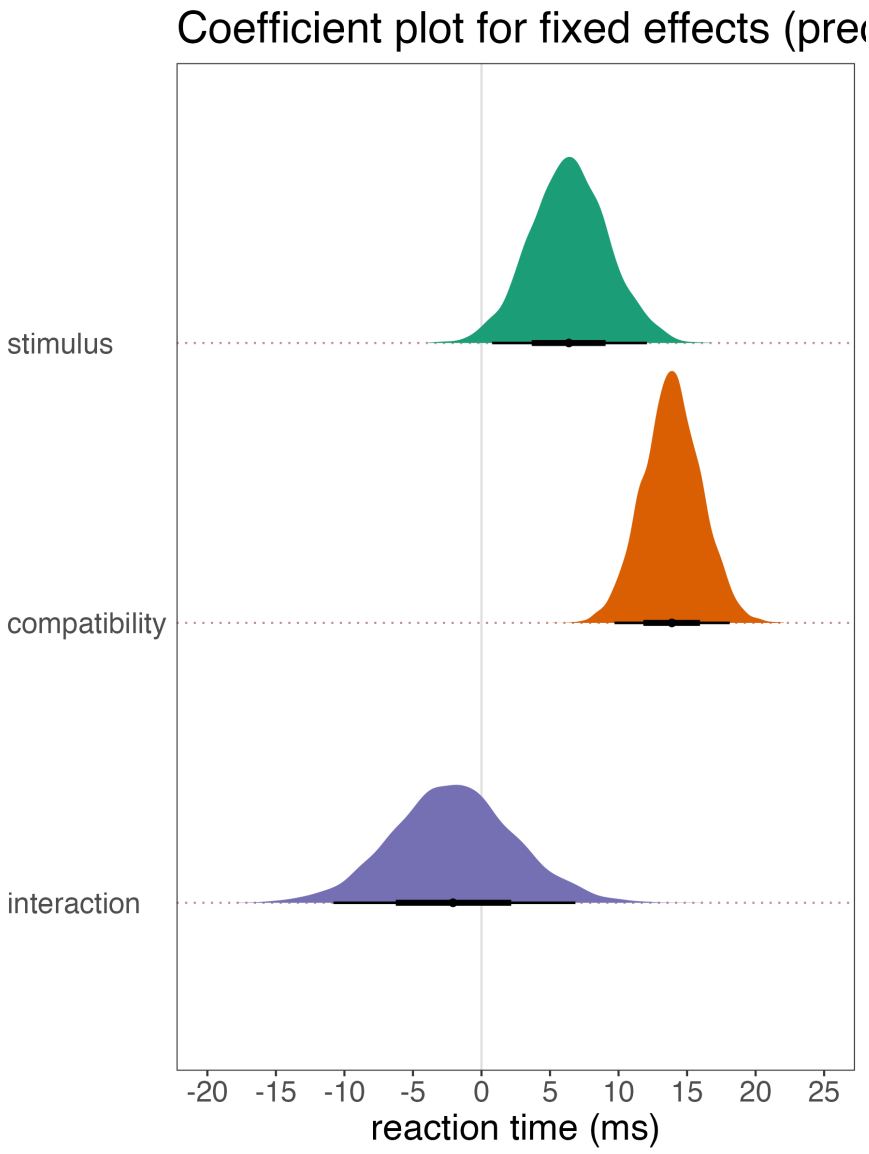

Figure 5. Fixed effects from model b2.

Table 1

Fixed effects from model b2.

term	value	.lower	.upper
intercept	613.94	593.62	634.79
stimulus	6.38	0.77	12.07
compatibility	13.89	9.70	18.11
interaction	-2.08	-10.80	6.85

Note. Median point estimates and 95% quantile intervals shown.

Discussion

References

Aust, F. (2019). *Citr: 'RStudio' add-in to insert markdown citations*. Retrieved from https://github.com/crsh/citr

Aust, F., & Barth, M. (2023). *papaja: Prepare reproducible APA journal articles with R Markdown*. Retrieved from https://github.com/crsh/papaja

Barth, M. (2023). *tinylabels: Lightweight variable labels*. Retrieved from https://cran.r-project.org/package=tinylabels

Grolemund, G., & Wickham, H. (2011). Dates and times made easy with lubridate. *Journal of Statistical Software*, *40*(3), 1–25. Retrieved from https://www.jstatsoft.org/v40/i03/

Müller, K., & Wickham, H. (2023). *Tibble: Simple data frames*. Retrieved from https://CRAN.R-project.org/package=tibble

Neuwirth, E. (2022). *RColorBrewer: ColorBrewer palettes*. Retrieved from https://CRAN.R-project.org/package=RColorBrewer

Pedersen, T. L. (2024). *Patchwork: The composer of plots*. Retrieved from https://CRAN.R-project.org/package=patchwork

R Core Team. (2023). *R: A language and environment for statistical computing*. Vienna, Austria: R Foundation for Statistical Computing. Retrieved from https://www.R-project.org/

Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2012). *A 21 Word Solution* (SSRN Scholarly Paper No. 2160588). Rochester, NY: Social Science Research Network. https://doi.org/10.2139/ssrn.2160588

Wickham, H. (2016). *ggplot2: Elegant graphics for data analysis*. Springer-Verlag New York. Retrieved from https://ggplot2.tidyverse.org

Wickham, H. (2023a). *Forcats: Tools for working with categorical variables (factors)*. Retrieved from https://CRAN.R-project.org/package=forcats

Wickham, H. (2023b). *Stringr: Simple, consistent wrappers for common string operations*. Retrieved from https://CRAN.R-project.org/package=stringr

Wickham, H., Averick, M., Bryan, J., Chang, W., McGowan, L. D., François, R., ... Yutani, H. (2019). Welcome to the tidyverse. *Journal of Open Source Software*, *4*(43), 1686. https://doi.org/10.21105/joss.01686

Wickham, H., François, R., Henry, L., Müller, K., & Vaughan, D. (2023). *Dplyr: A grammar of data manipulation*. Retrieved from https://CRAN.R-project.org/package=dplyr

Wickham, H., & Henry, L. (2023). *Purrr: Functional programming tools*. Retrieved from https://CRAN.R-project.org/package=purrr

Wickham, H., Hester, J., & Bryan, J. (2024). *Readr: Read rectangular text data*. Retrieved from https://CRAN.R-project.org/package=readr

Wickham, H., Vaughan, D., & Girlich, M. (2024). *Tidyr: Tidy messy data*. Retrieved from https://CRAN.R-project.org/package=tidyr

Xie, Y. (2019). TinyTeX: A lightweight, cross-platform, and easy-to-maintain LaTeX distribution based on TeX live. *TUGboat*, *40*(1), 30–32. Retrieved from https://tug.org/TUGboat/Contents/contents40-1.html