A Practical Tutorial for Safe Sequential Analyses

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Sequential analyses procedures

Sequential testing (or more broadly, sequential analysis) refers to the continuous analysis of data during its collection. Several procedures have been developed to answer somehow different questions from data. For instance, sequential analyses can be conducted until a predefined level of evidence is reached, as quantified by a Bayes factor (see the *Sequential Bayes Factor* procedure presented in Schönbrodt et al., 2017; Schönbrodt & Wagenmakers, 2018). Alternatively, one can run analyses to either accept or reject some value of interest using a sequential HDI+ROPE procedure (for a practical primer, see Kruschke, 2018) or until reaching a predefined level of precision in the estimate of interest, as expressed by the width of the confidence/credible interval (e.g., see Kruschke, 2015, chapter 13). Overall, sequential analyses usually permit to reach conclusions faster (i.e., with less observation) than classical designs with a priori power analyses while keeping long-term error rates at a similar level (Schönbrodt et al., 2017, Kruschke, 2015).

What could possibly go wrong ?

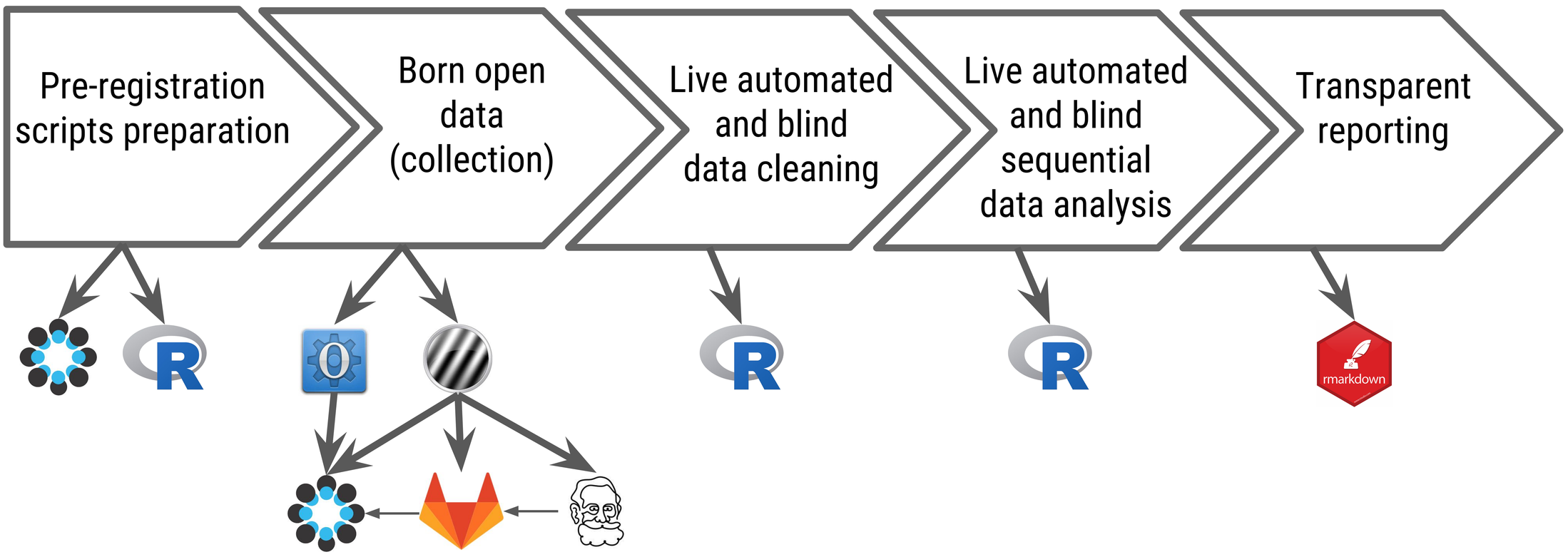
DURING DATA COLLECTION

- Expectancy effects during data collection
- Evidence confirmation loop
- Self-fulfilling prophecy amplified by feedback from previous data

AFTER DATA COLLECTION

- Expectations about what should be observed
  → Confirmation or disconfirmation biases (MacCoun & Perlmutter, 2017)
- Many choices about how to deal with new incoming data
- Expectations about the range of plausible values

A fully automated, transparent, reproducible and triple-blind protocol for sequential analyses



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Acknowledgements

We wish to thank Hans Ijzerman, Angelika Stefan, Felix Schönbrodt, Stephen Martin, Charlotte Brand and Rickard Carlsson for their very helpful comments on this work.

https://osf.io/mwtvk
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