

University of Groningen

Opportunity for verbalization does not improve visual change detection performance

Sense, Florian; Morey, Candice C.; Morey, Richard; Prince, Melissa; Heathcote, Andrew

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version

Publisher's PDF, also known as Version of record

Publication date:

2014

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Sense, F., Morey, C. C., Morey, R., Prince, M., & Heathcote, A. (2014). *Opportunity for verbalization does not improve visual change detection performance: a state-trace analysis*. Poster session presented at MathPsych 2014, Quebec City, Canada.

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

Opportunity for verbalization does not improve visual change detection performance: **A state-trace analysis**

Florian **Sense**, Candice C. **Morey**, Richard D. **Morey**, Melissa **Prince**, & Andrew **Heathcote**

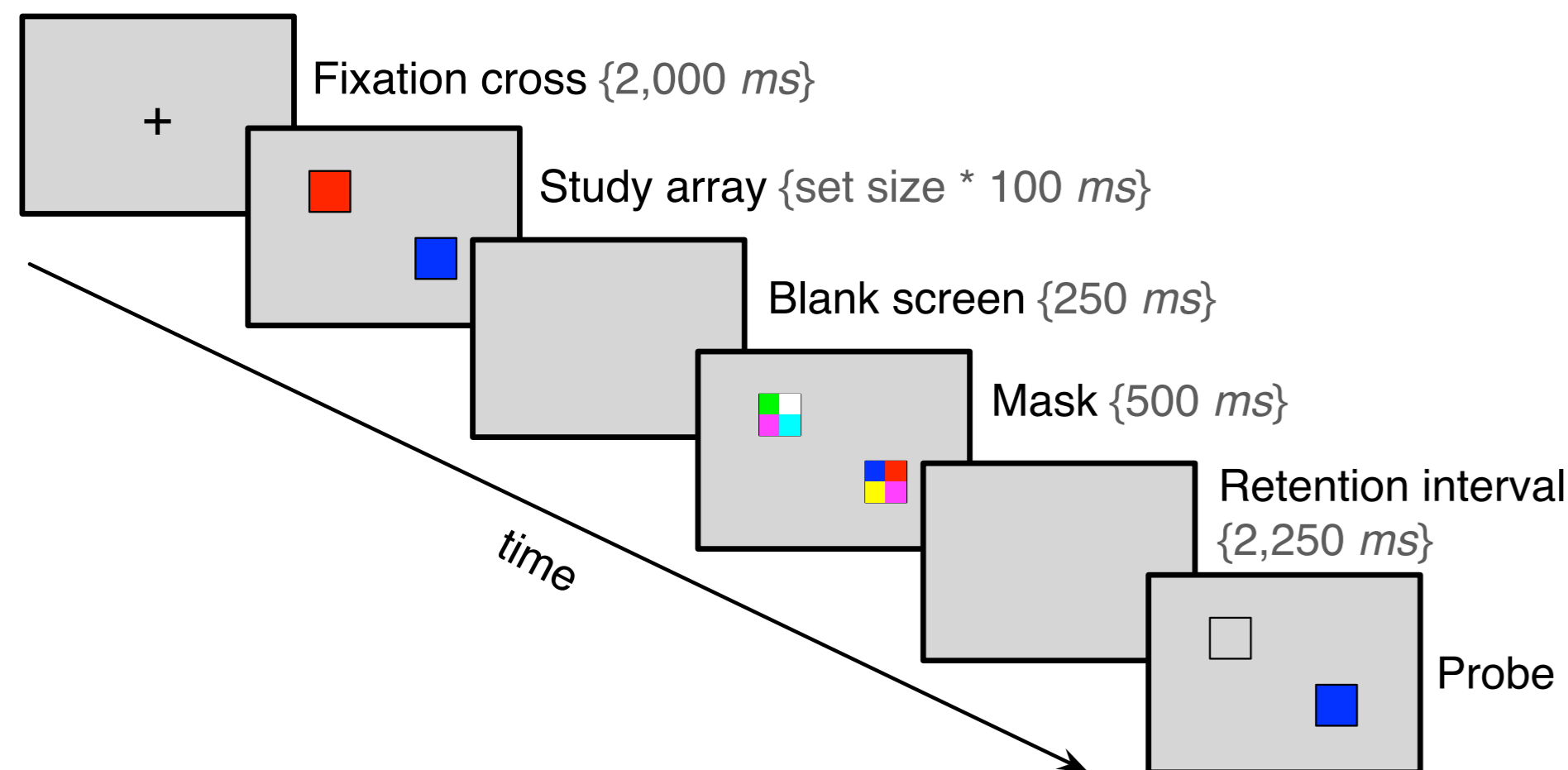
Background

People can verbalize visual information. To **study visual working memory**, cognitive psychologists need to **isolate visual components** of working memory from other components.

This has typically been done using **articulatory suppression**. Recently, it has been debated whether articulatory suppression is actually necessary.

Known **methodological issues in this debate**: claims are based on significant interaction effects or null-findings. **State-trace analysis and Bayes factors offer a solution.**

The visual change detection paradigm



Dependent variable: binary response {same, change}

Independent variables:

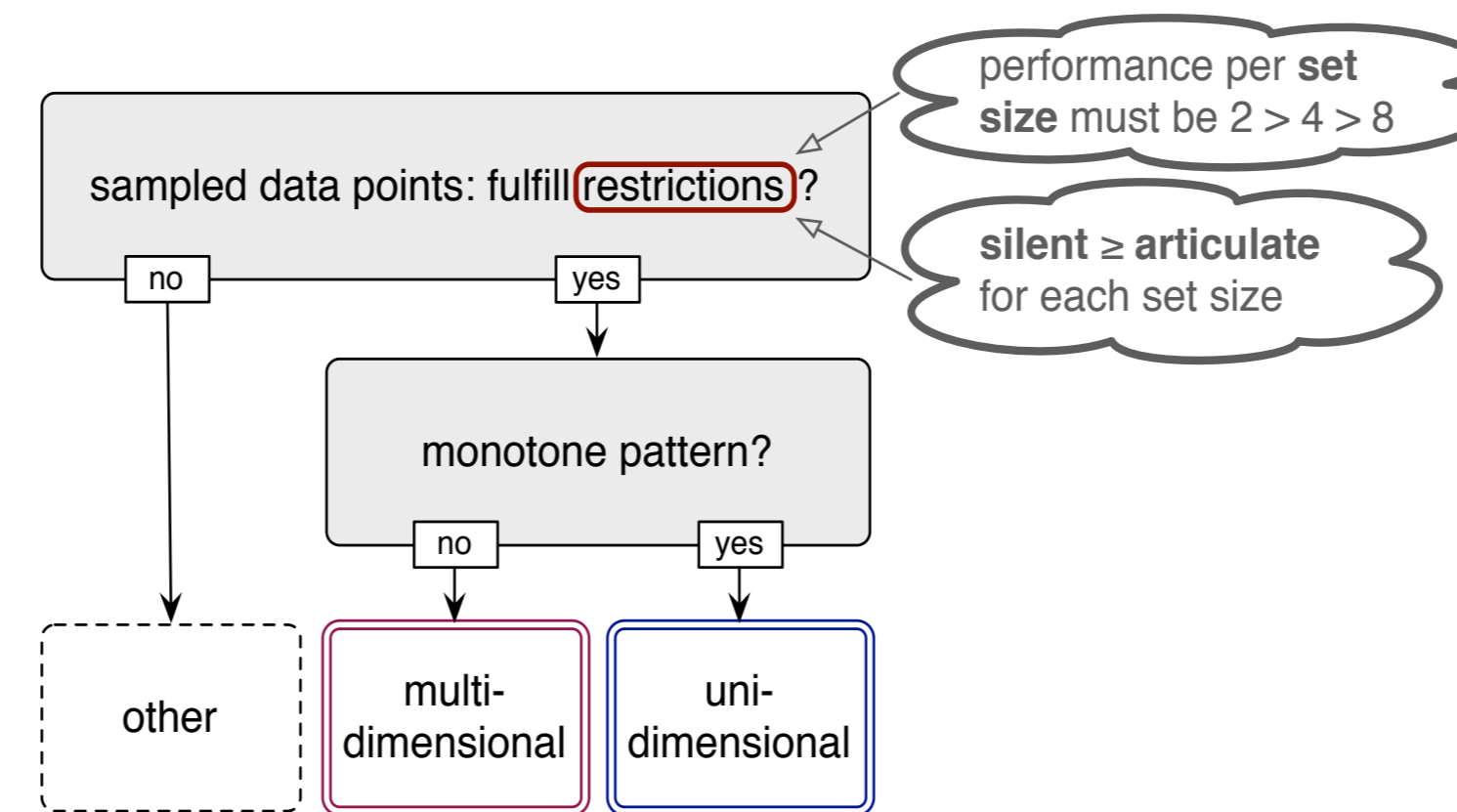
- simultaneous vs. sequential presentation of stimuli
- silent vs. articulate during trial
- set size {2, 4, 8}

Data from 15 participants (8 female) that came in for 5 sessions of 504 trials each.

State-Trace Analysis

State-trace analysis allows us to probe the **dimensionality of a latent system**. The system of interest here is working memory. We start with assuming a uni-dimensional model and only reject it if the data cannot support it.

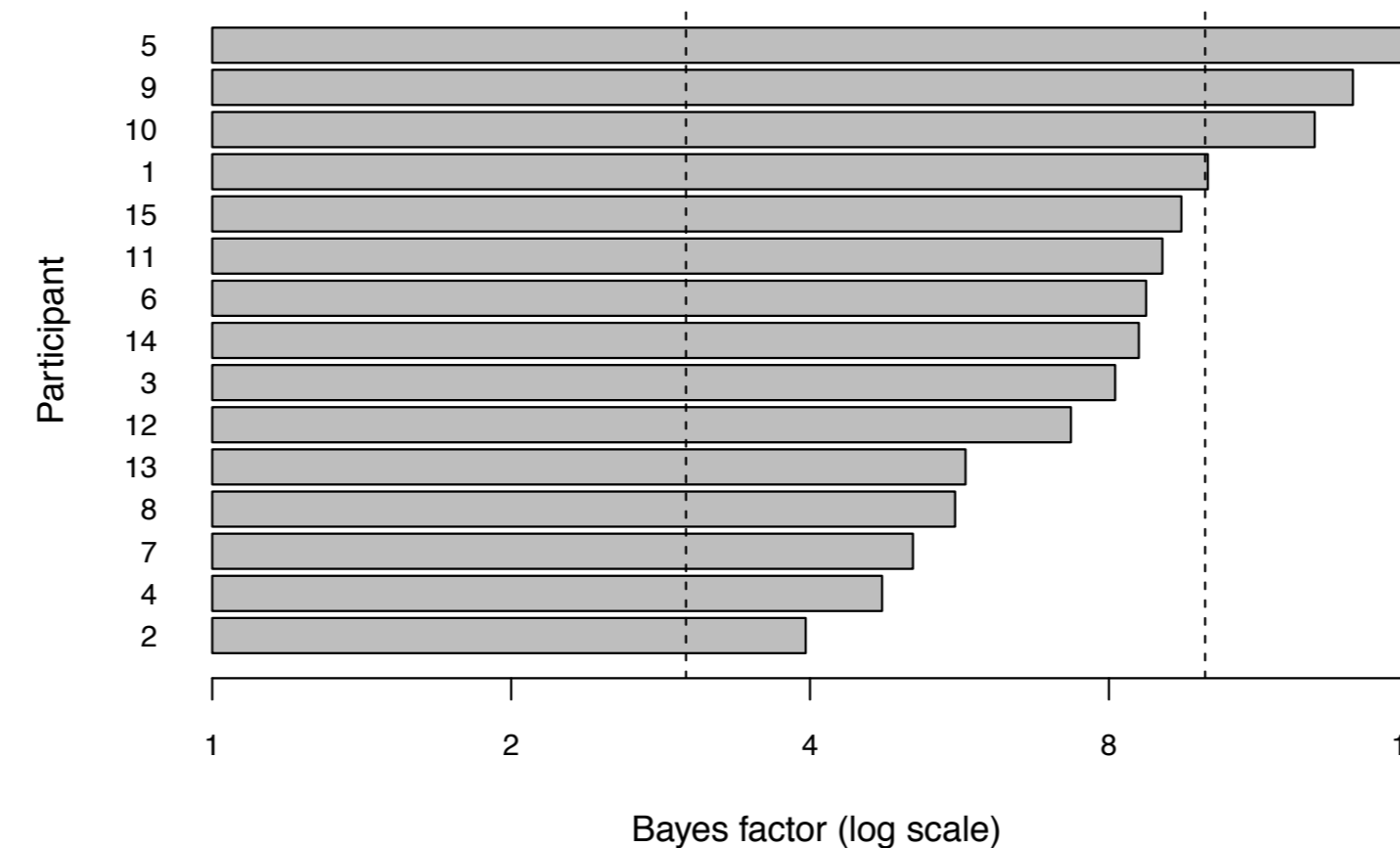
If the variation in the outcome variable is caused by a single dimension, their relationship must be monotonic when plotted against each other. Only a multi-dimensional system can produce non-monotonicity.



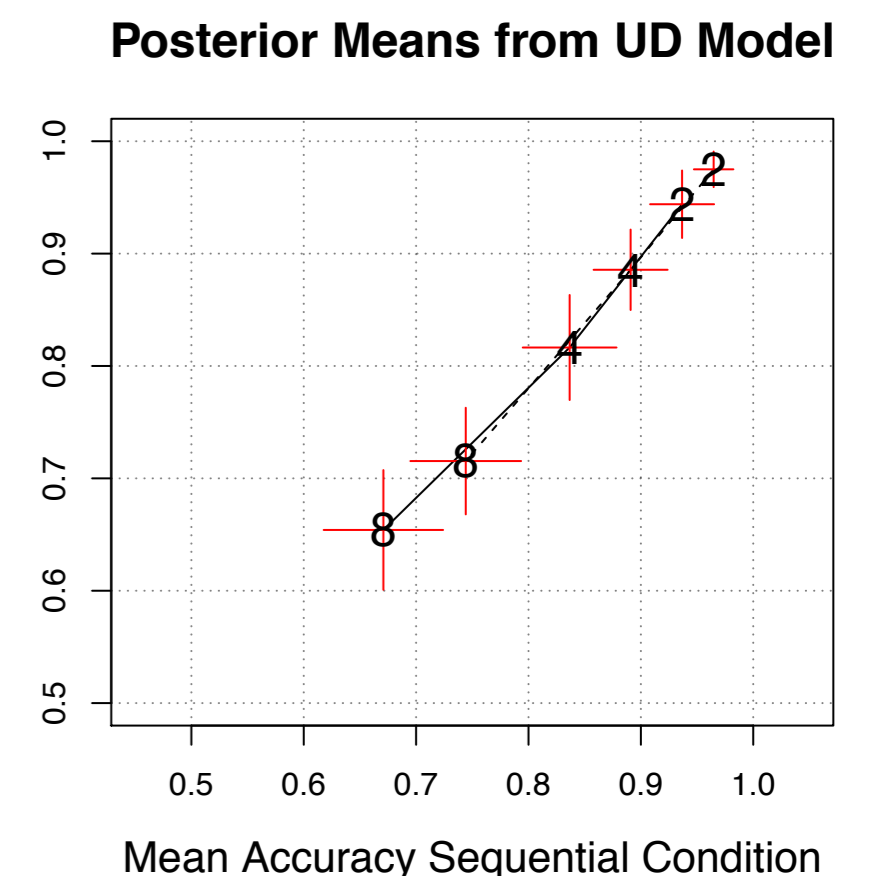
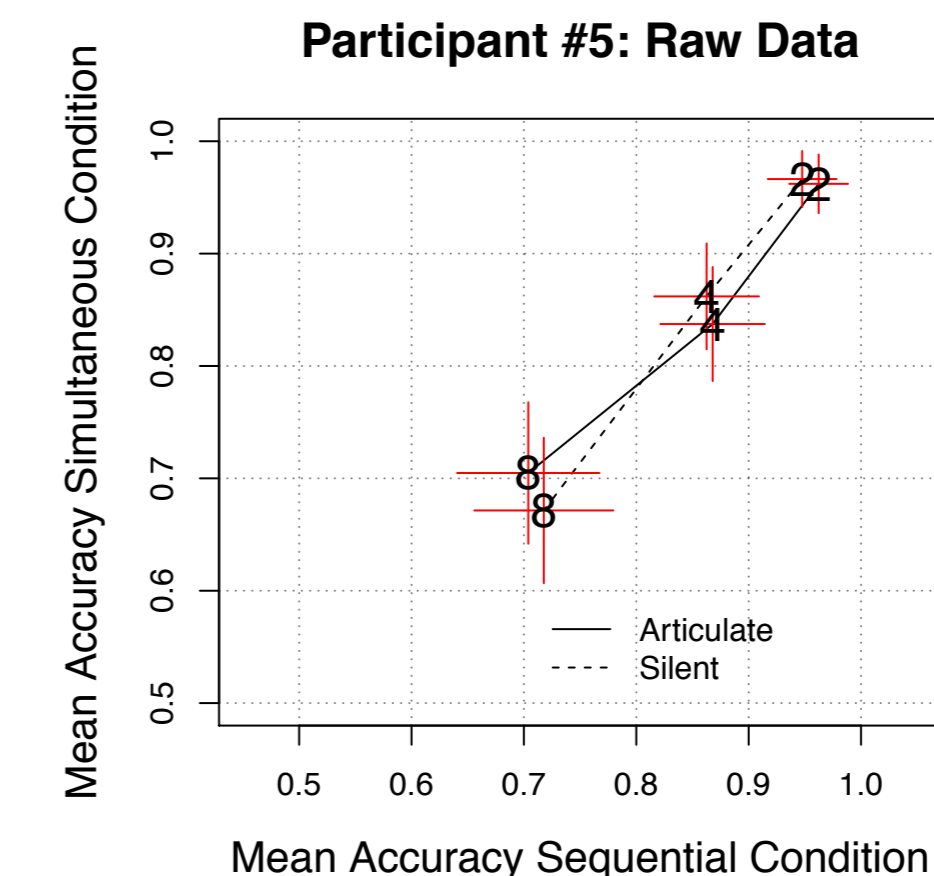
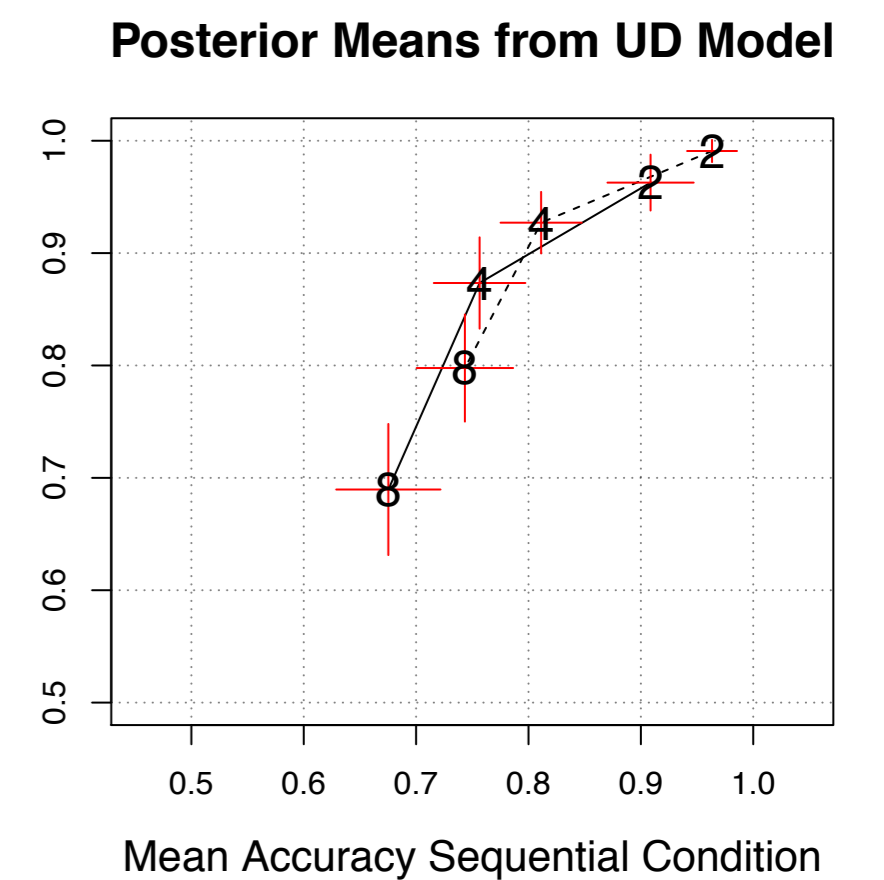
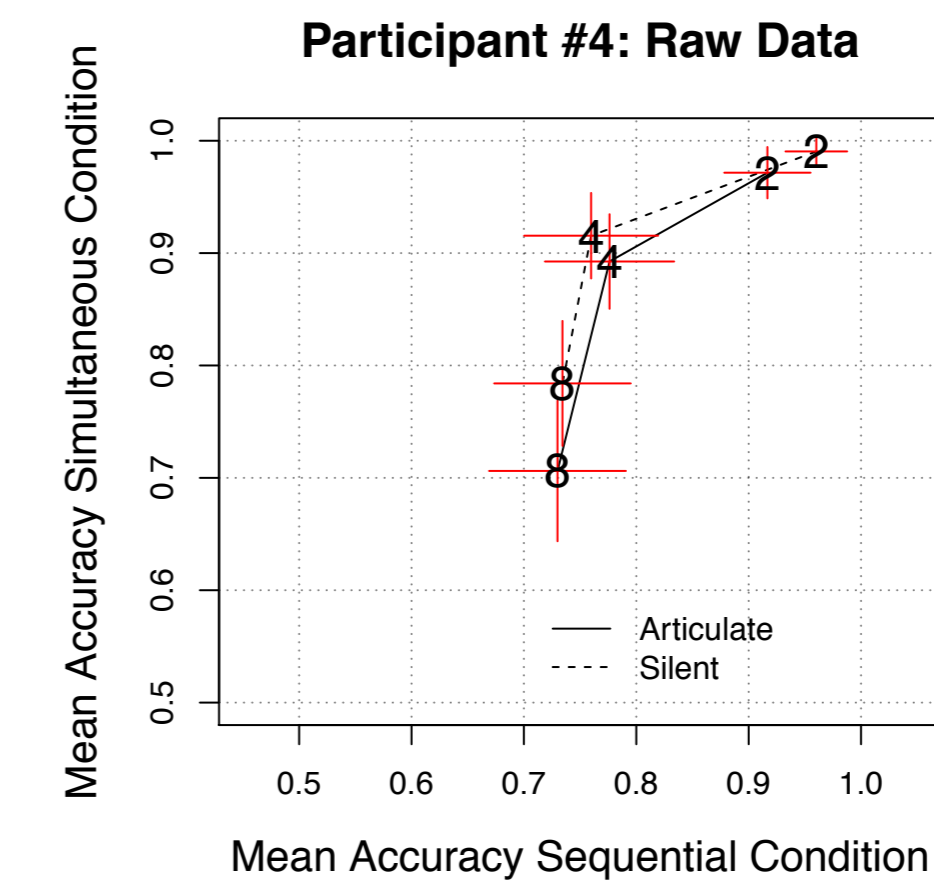
$$BF = \frac{Pr(M_1 | D)}{Pr(M_2 | D)} / \frac{Pr(M_1)}{Pr(M_2)} = \frac{\# UD \text{ samples}}{\# MD \text{ samples}} / \frac{\# UD \text{ orderings}}{\# MD \text{ orderings}}$$

Bayes factors let us quantify the relative evidence the data provide for two competing models: the **restricted** versus the **encompassing** model.

Bayes Factors in Favor of Monotonicity



Selected State-Trace Plots



Conclusions

Support for the uni-dimensional model is very strong.

State-trace analysis is an appropriate and informative alternative to conventional methods.

Pre-cautionary articulatory suppression does not seem to be necessary (in this particular setup).

contact: f.sense@rug.nl