

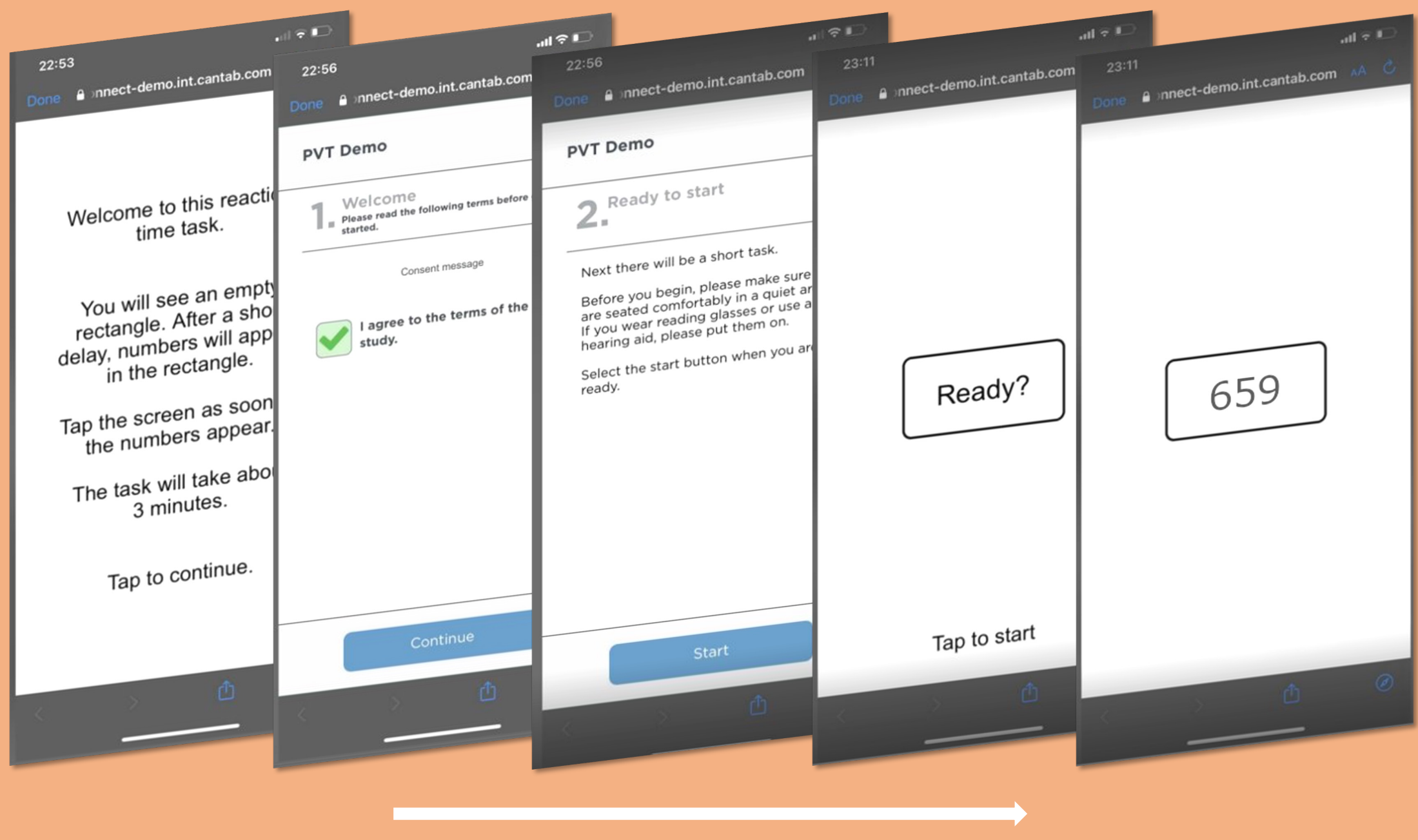
Assessing reliability and sensitivity of the Psychomotor Vigilance Task in a large longitudinal study: the impact of task length on sleep-related measures.

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Conclusions

Measures of mean RT are the most reliable and sensitive to the quality of sleep. Shortening the task to 15 trials may maintain the task’s desirable properties, with lower burden to the participants.

PVT: Psychomotor Vigilance task



After instructions, reaction times are recorded from participants who are asked to respond as quickly as possible. The interval between trials is randomised.

Reaction times (RT) variables

Variable	Description	Category	Facet
RT.mean.trad	Mean of all RT	Traditional	Speed
RT.CoV.trad	SD of all RT / Mean of all RT	Traditional	Variability
lapses.trad	N of RT > 500	Traditional	Lapses
Speed	Mean 1/RT	Traditional	Speed
vig.decrement	Slope of RT over trials	Traditional	Change
Mu	Gaussian mean	ExGaussian	Speed
Sigma	Gaussian SD	ExGaussian	Variability
Tau	Exponential scale	ExGaussian	Lapses
lapses.perc.average	Mean RT > 80 percentile	Ranked RT	Lapses
RT.mean.nolapses	Mean RT < 80 percentile	Ranked RT	Speed
RT.CoV.nolapses	CoV RT < 80 percentile	Ranked RT	Variability

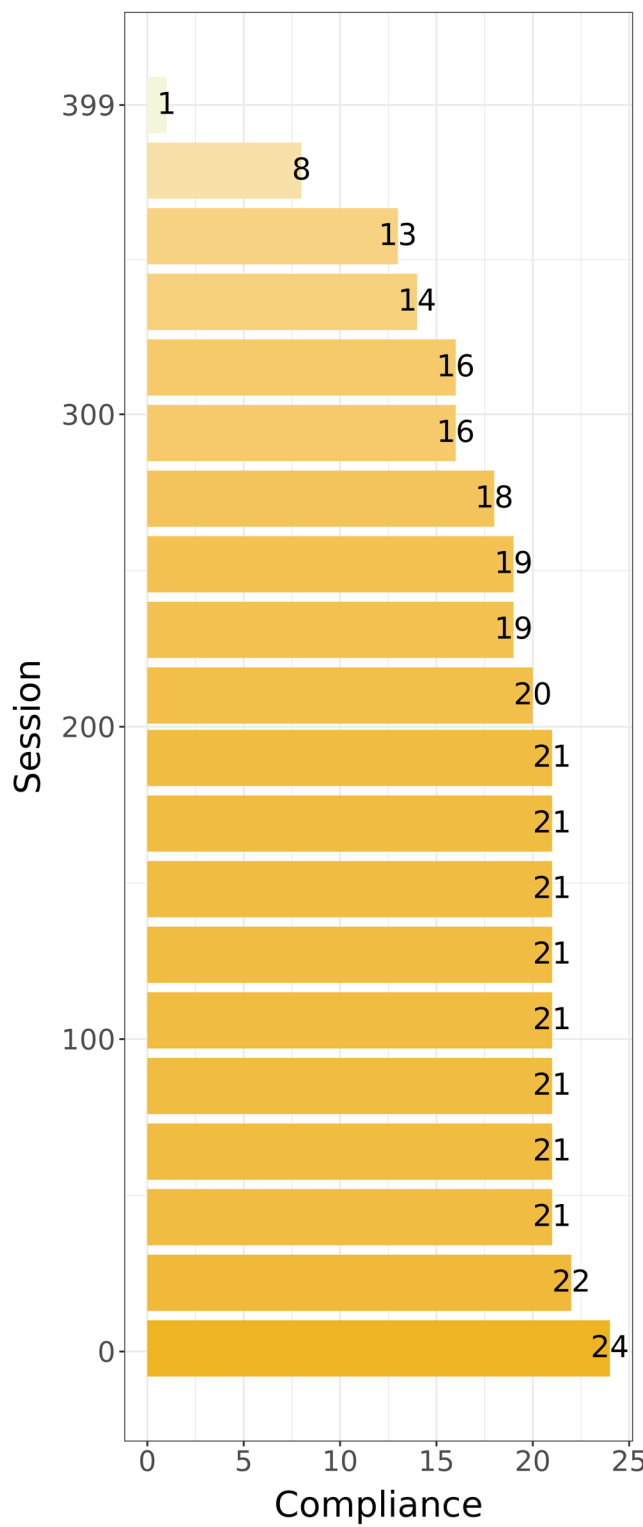
Results

Background

The PVT is a cognitive task that measures sustained attention and is closely associated to sleep patterns. Here we investigated the reliability and sensitivity of multiple RT variables, and tested whether shorter versions of the task may be as reliable and sensitive to sleep.

Method

- 25 participants performed up to 399 sessions of the PVT over a span of 459 days
- Total sleep time (TST) recorded using a subcutaneous EEG device
- Sleep quality obtained with the Karolinska Sleepiness Scale questionnaire



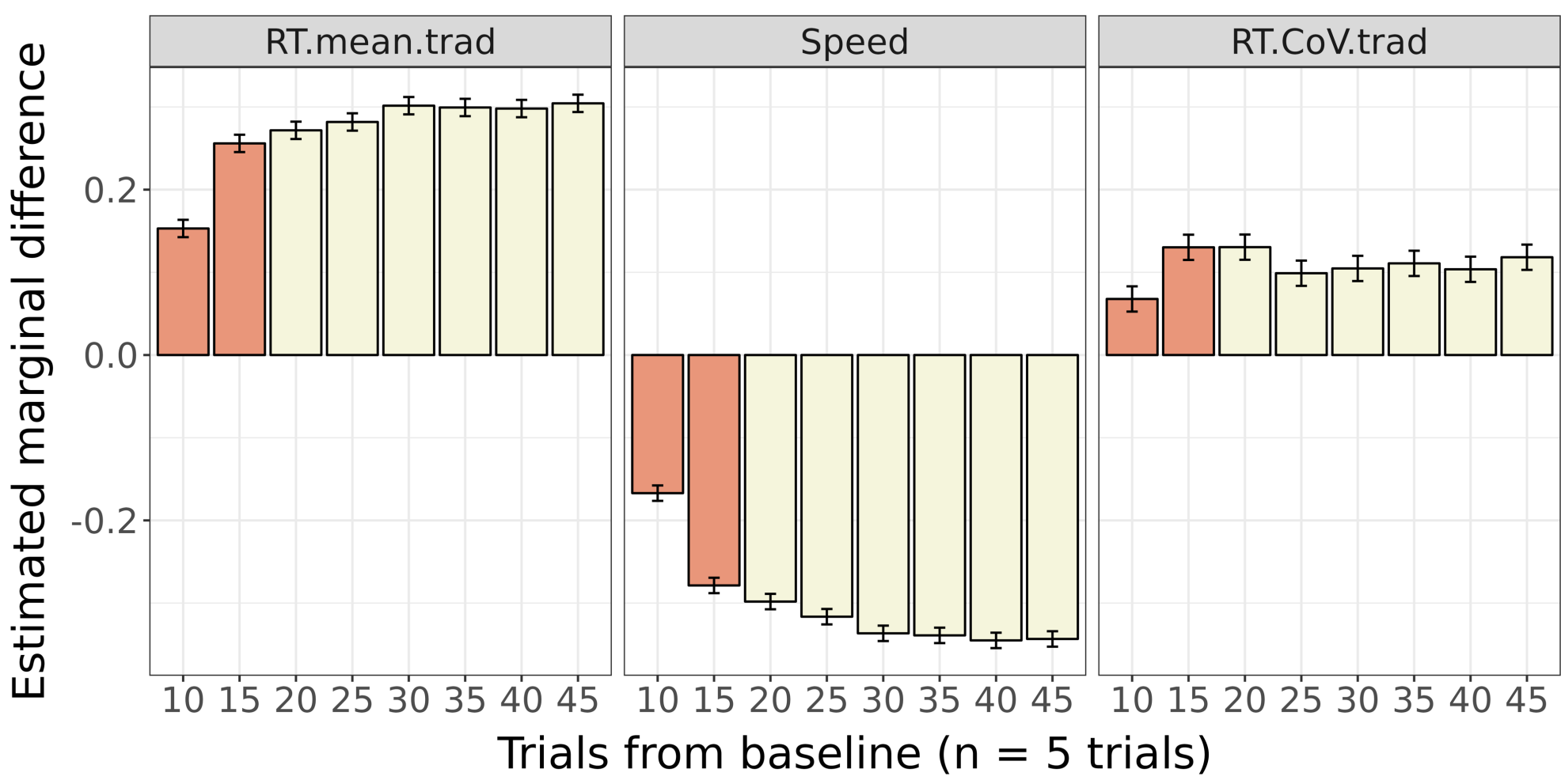
Analysis

- Reliability assessed with Intraclass Correlation
- Sensitivity and impact of task-length investigated with multi-level models

Authors & contacts

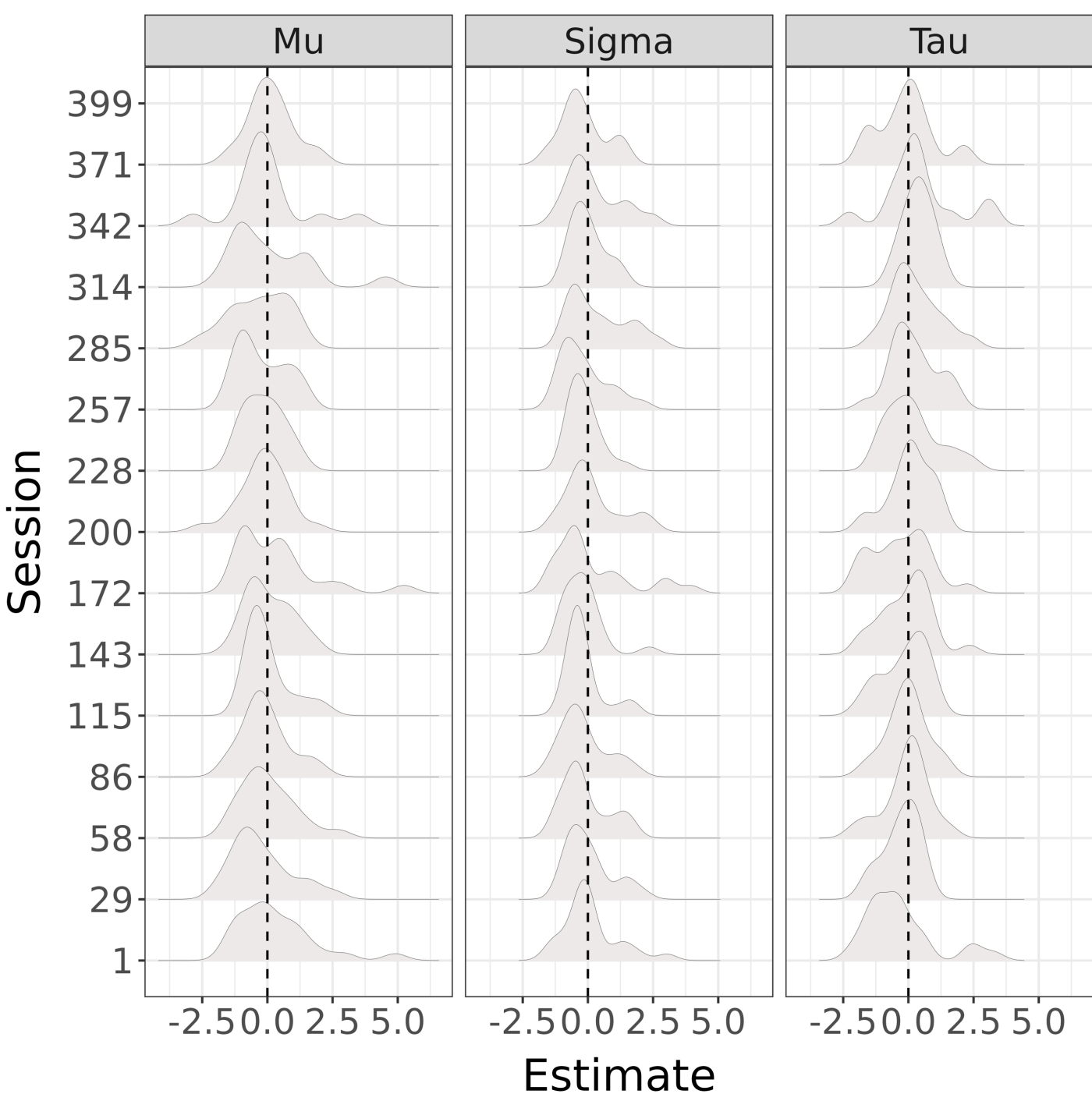
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B

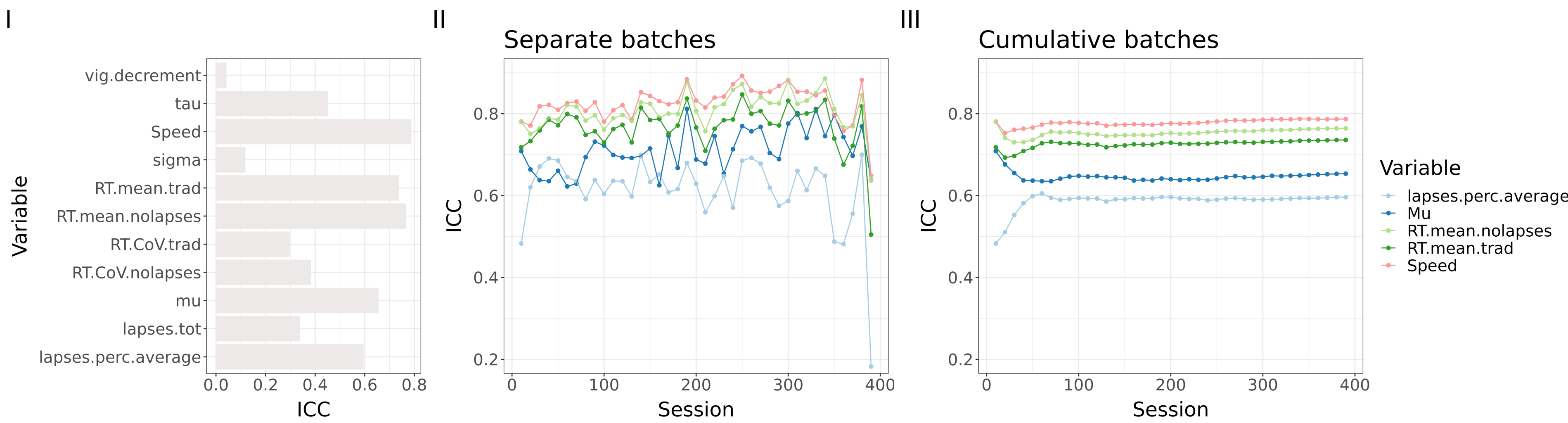


A) All facets of RT distributions were stable across sessions. B) The effect of trial number on the parameters was reduced after 15 trials (here shown as difference between the estimate with 5 trials): reliable estimates could be obtained with less than 1 minute of PVT.

A

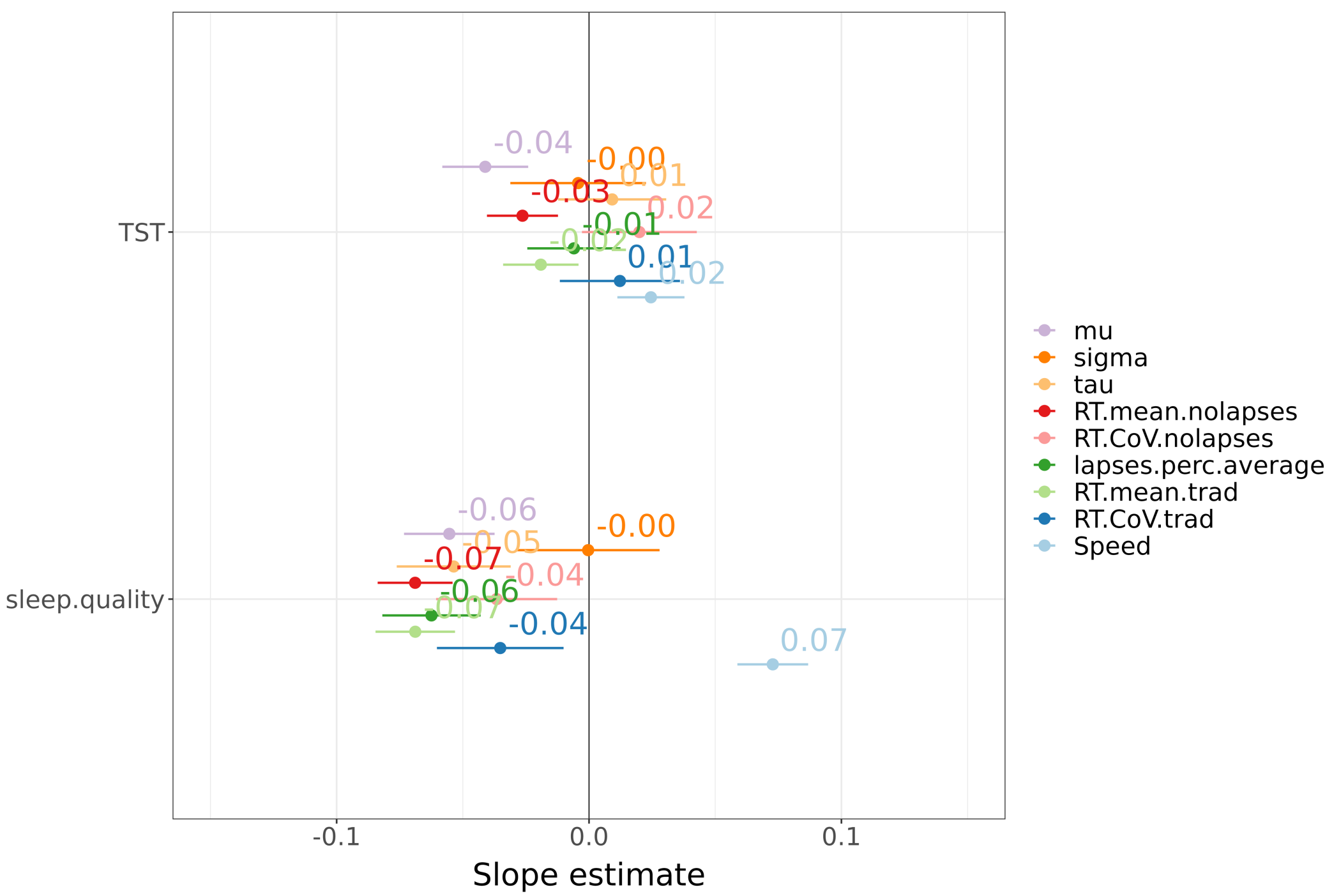


C



C) Highest reliability (ICC) was shown by mean RT variables (i). Reliability was robust across sessions: using a longitudinal approach, both looking at separate batches of 10 sessions to calculate ICC (ii) and gradually increasing the span of sessions (iii). Reliability also proved unaffected by the number of PVT trials used.

D



D) Variables of mean RT also showed highest sensitivity to both sleep indices. Relevance of these variables was further verified with iterative model selection approaches. This sensitivity was robust and did not interact with number of PVT trials.