Sample size matters when estimating variability of flexible, goal directed behaviour

Brendan Williams1,2 | Lily FitzGibbon3 | Daniel Brady2,4 | Anastasia Christakou1,2

1. Centre for Integrative Neuroscience and Neurodynamics, University of Reading, United Kingdom
2. School of Psychology and Clinical Language Sciences, University of Reading, United Kingdom
3. Division of Psychology, Faculty of Natural Sciences, University of Stirling, United Kingdom
4. Department of Computer Science, Faculty of Engineering, University of Sheffield, United Kingdom

Correspondence: Centre for Integrative Neuroscience and Neurodynamics, Harry Pitt Building, University of Reading, Reading, UK, RG6 6AF; +44(0)118 3784365; b.williams3@reading.ac.uk; Twitter: @brenwill; https://research.reading.ac.uk/cinn

We evaluated test-retest reliability of flexible, goal directed behaviour using reversal learning in an online study. Intra-class correlation coefficients (ICCs) of behavioural task performance between sessions were in line with previous literature [1-4]. However, we found sample size significantly affected estimates of variance component (between-subjects, within-subjects, and error). We propose the combined use of ICCs and variance decomposition alongside appropriately powered studies to study variability in behaviour.

Summary

Results

Methods

Conclusion

We show that the estimation of both between- and within-subject variance components becomes more precise as sample size increases.

Additionally, we show that estimates of within-subject variance are weakly correlated with ICC(A,1) measures of reliability across all sample sizes, and suggest that reporting only ICC values is insufficient for systematically estimating reliability of a measure over time.