Supplementary Materials

The State and Expectations of Interrater Reliability in Nonhuman Personality Research

Alexander J. Pritchard

Neuroscience and Behavior Unit, California National Primate Research Center, University of California Davis, Davis, CA, USA

Department of Population Health & Reproduction, School of Veterinary Medicine, University of California Davis, Davis, CA, USA

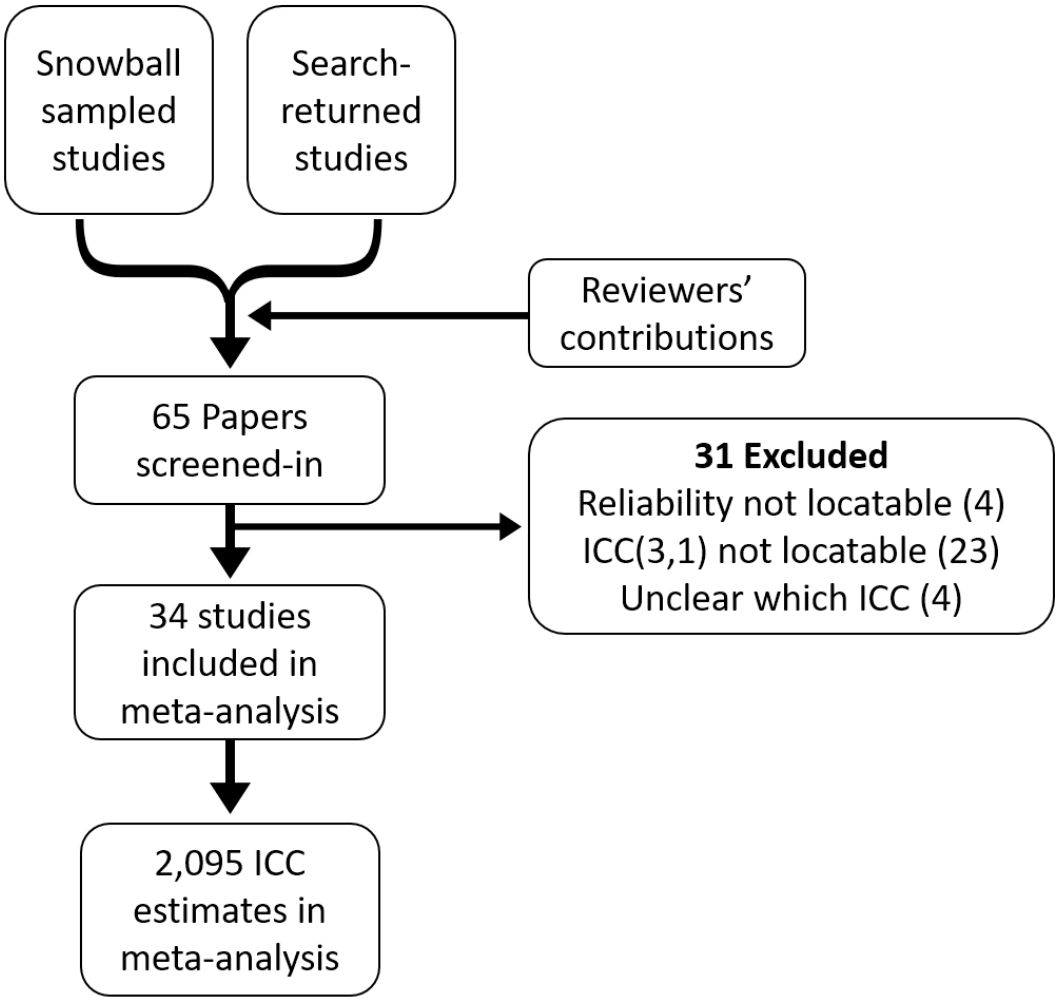
Author Note

Alexander J. Pritchard https://orcid.org/0000-0003-4922-3347

There are no original data published in this work. My simulation and meta-analytic code, as well as the ICC data from external sources and references, are available at: https://doi.org/10.17605/OSF.IO/J8RFX (Pritchard, 2025)

Correspondence concerning this article should be addressed to Alexander J. Pritchard, University of California, Davis, One Shields Avenue, Davis, CA, 95616.

Email (preferred): ajpritchard@ucdavis.edu

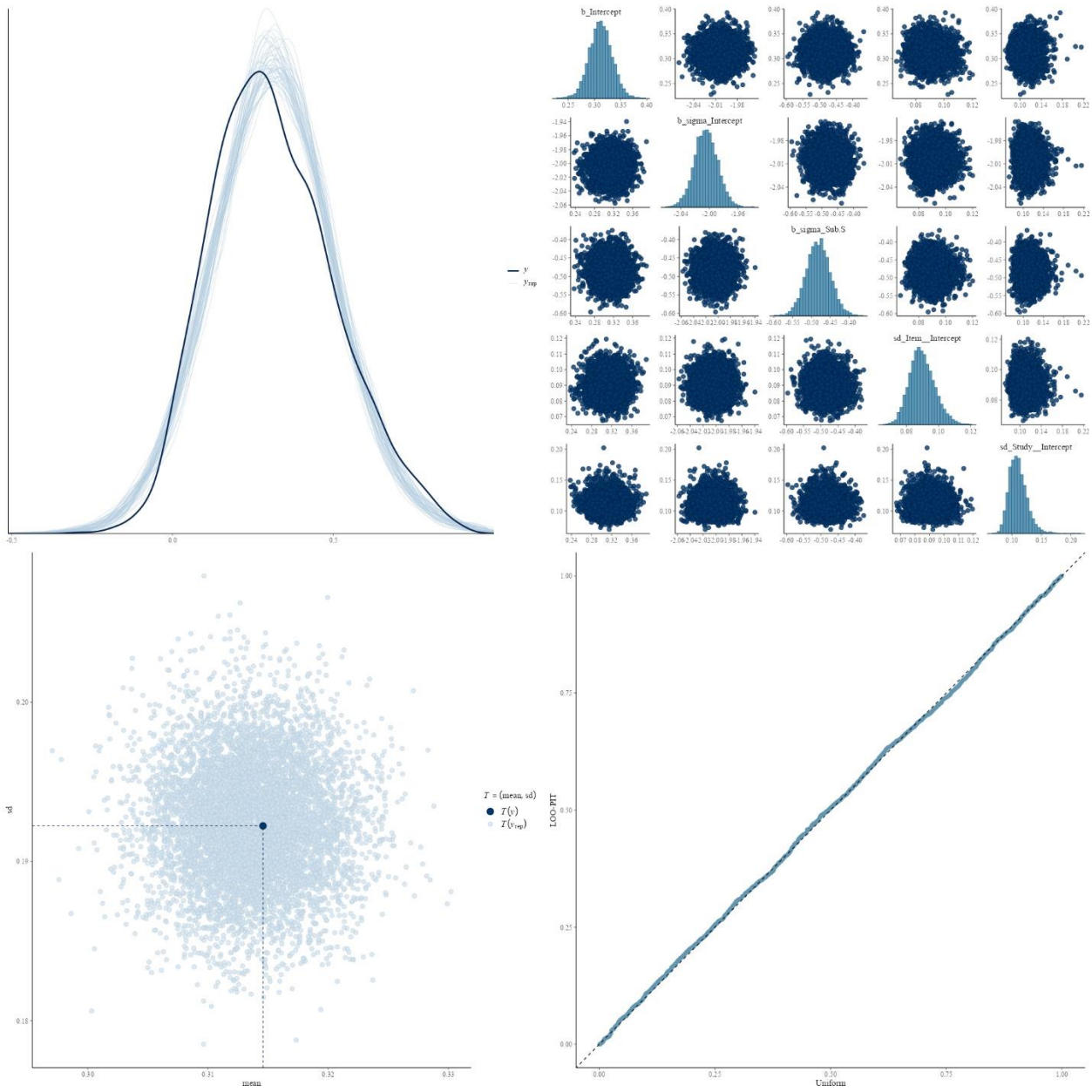


Supplementary Figure 1. Flowchart of article inclusion.

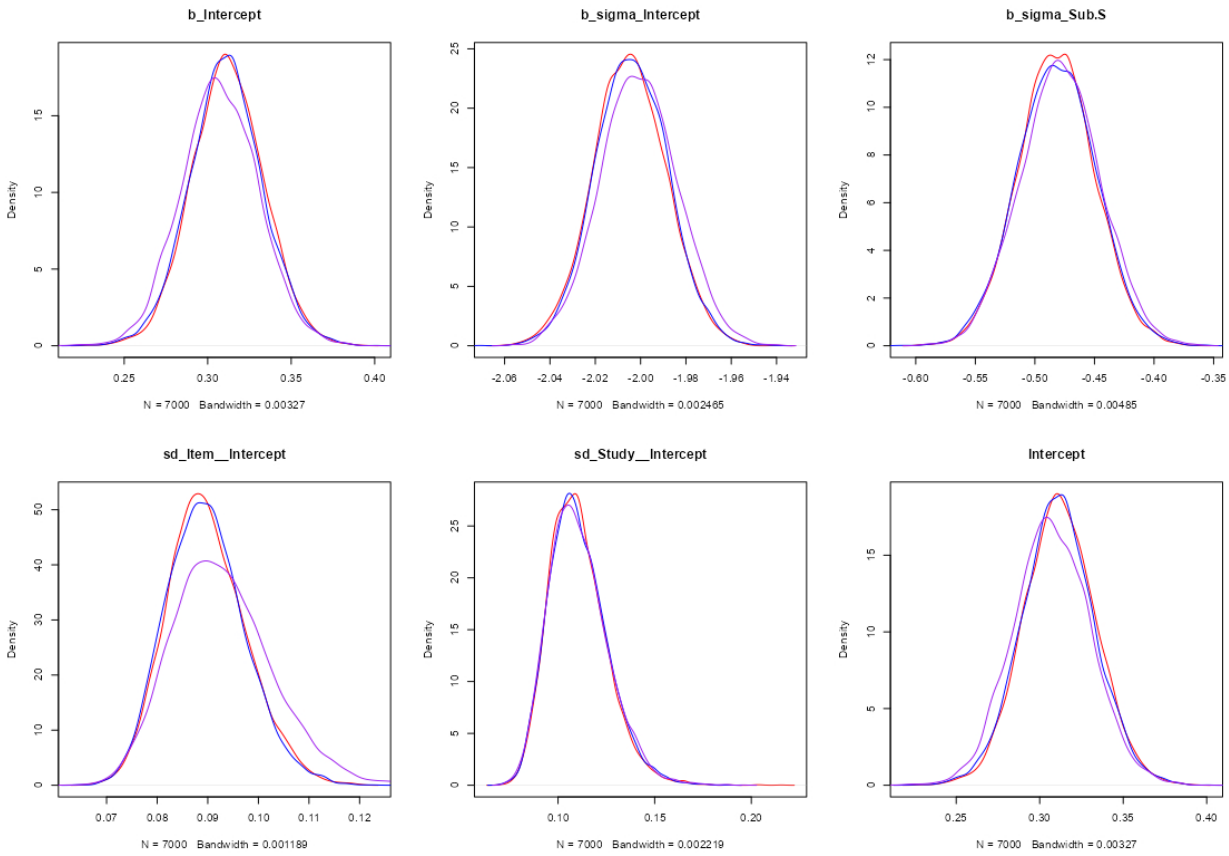
Supplementary Table 1. Studies included in the final model. Mean values are reported for rater and subjects counts.

Study	Year	Taxon	Raters	Subjects	Notes
Adams et al.	2015	*Macaca assamensis*	5.6	60	
		Macaca fuscata	1.4	74	
		Macaca mulatta	13.26	117.33	
		Macaca nigra	2	53	
		Macaca sylvanus	2.4	74	
		Macaca tonkeana	4	46	
Arlet et al.	2024	*Macaca radiata*	3	52	Visual inspection of ICC estimates with more raters but fewer subjects suggests that three raters might be representative
Baker et al.	2015	*Macaca nigra*	2	64	Rater number not reported but was more than one; I assumed two raters, which imbues the highest uncertainty
		Macaca sylvanus	2	62	
		Saimiri sciureus	2	69	
Eckardt et al.	2015	*Gorilla beringei beringei*	4.8	116	
Fernández-Bolaños et al.	2020	*Sapajus xanthosternos*	2.81	26	
Freeman et al.	2013	*Pan troglodytes*	12.36	99	Estimated the number of raters as: 12.36 72 (mean subjects per rater) * 17 (raters) / 99 (subjects)
Garai et al.	2016	*Pan paniscus*	5	16	
Hopper et al.	2018	*Macaca fuscata*	2	63	
Iwanicki & Lehmann	2015	*Callithrix jacchus*	4	63	
Konečná et al.	2008	*Semnopithecus entellus*	3.96	27	
Konečná et al.	2012	*Macaca sylvanus*	2	23	Only used season one
Koski et al.	2017	*Callithrix jacchus*	2.84	100	
Morton et al.	2013	*Sapajus apella*	3.35	121	
Murray & Diaz	2025	*Pan troglodytes*	5	28	
Parry-Howells et al.	2023	*Macaca nigra*	3.06	13	
Pohlner	2023	*Gorilla gorilla gorilla*	2.8	167	*In situ* population
			3.54	184	*Ex situ* population

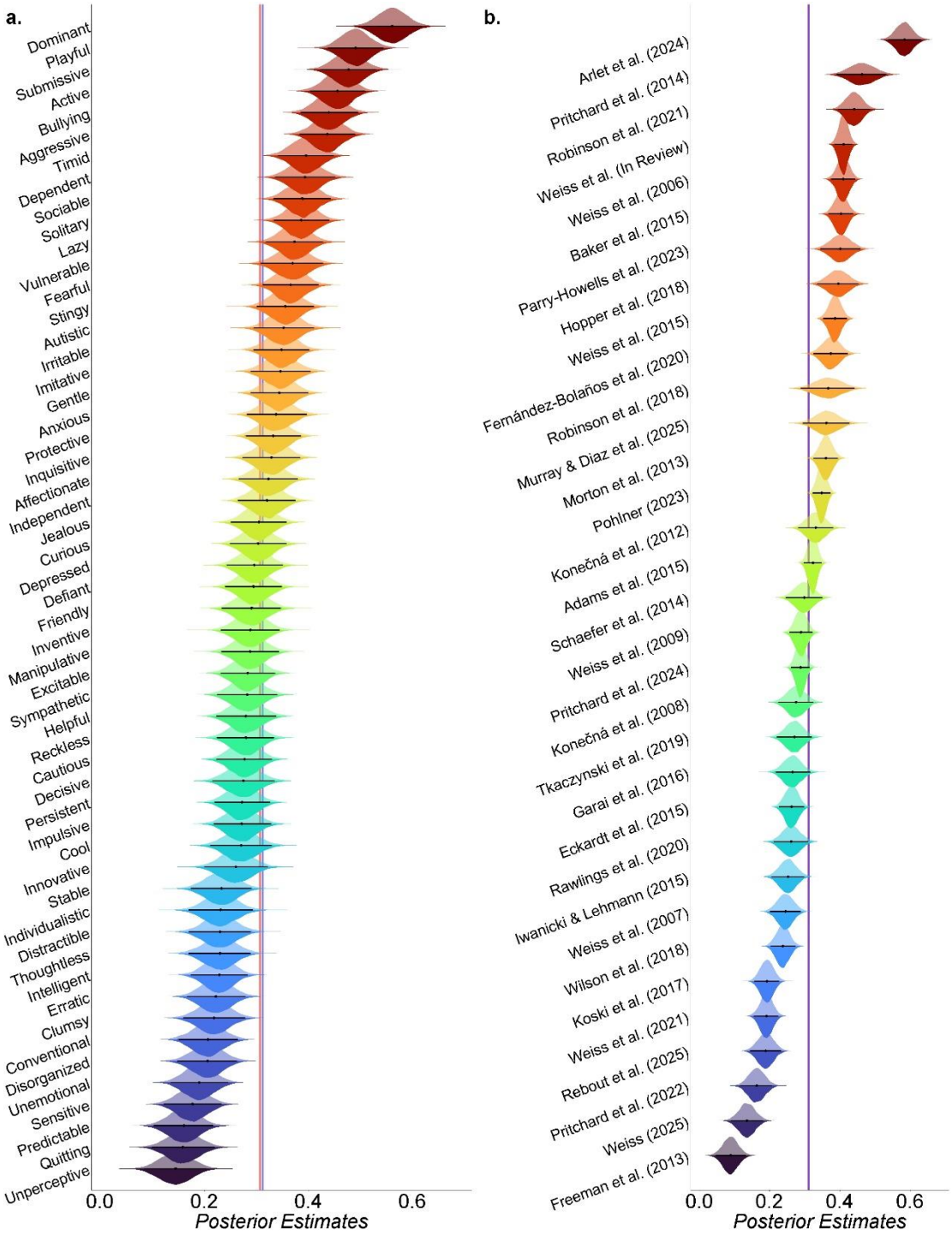
Study	Year	Taxon	Raters	Subjects	Notes
Pritchard et al.	2014	*Macaca thibetana*	6	12	
Pritchard & Palombit	2022	*Papio anubis*	4	44	Discarded second replicate used for intrarater reliability
Pritchard et al.	2024	*Macaca fascicularis*	2.42	101	
		Macaca mulatta	2.66	150	
		Macaca radiata	4.1	77	
Rawlings et al.	2020	*Pan troglodytes*	8	50	
Rebout et al.	2025	*Plecturocebus cupreus*	3	54	
Robinson et al.	2018	*Macaca mulatta*	2.23	85	
Robinson et al.	2021	*Macaca mulatta*	2	44	
Schaefer & Steklis	2014	*Gorilla gorilla gorilla*	9	8	
Tkaczynski et al.	2019	*Macaca sylvanus*	8	27	
Úbeda & Llorente	2015	*Pan troglodytes*	28	11	
Weiss et al.	2006	*Pongo* spp.	3	152	
Weiss et al.	2007	*Pan troglodytes*	2	75	
Weiss et al.	2009	*Pan troglodytes*	3.2	146	
Weiss et al.	2015	*Pan paniscus*	2.69	81	Wave one
			2.88	40	Wave two with a 5 year ±0.4*sd* separation from wave one
Weiss et al.	2021	*Callithrix jacchus*	2.63	128	
Weiss	2025	*Pan troglodytes*	7	40	
Weiss et al.	*In review*	Hylobatidae	2.49	247	
Wilson et al.	2018	*Saimiri boliviensis*	2.7	31	
		Saimiri sciureus	1.91	29	



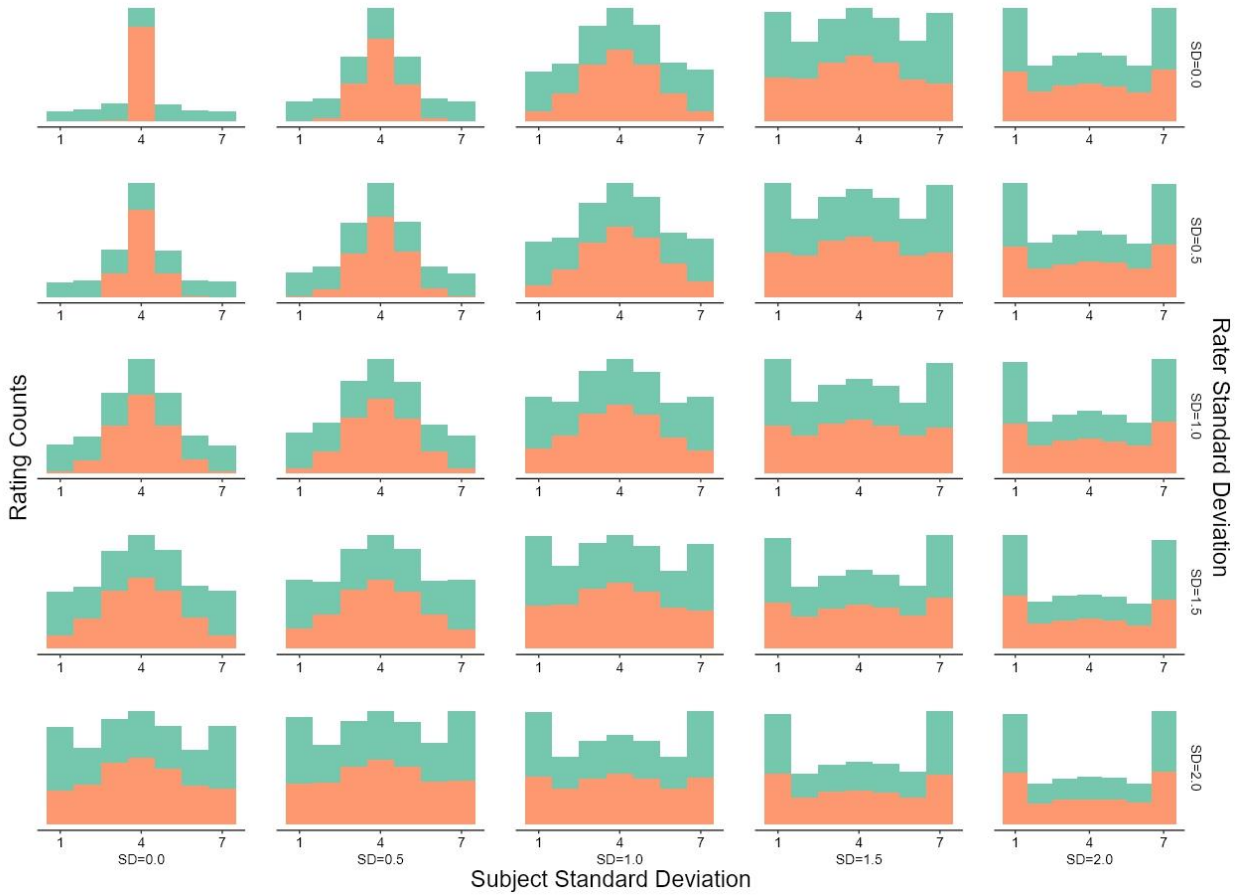
Supplementary Figure 2. Posterior predictive check and pairs plots for the final models.



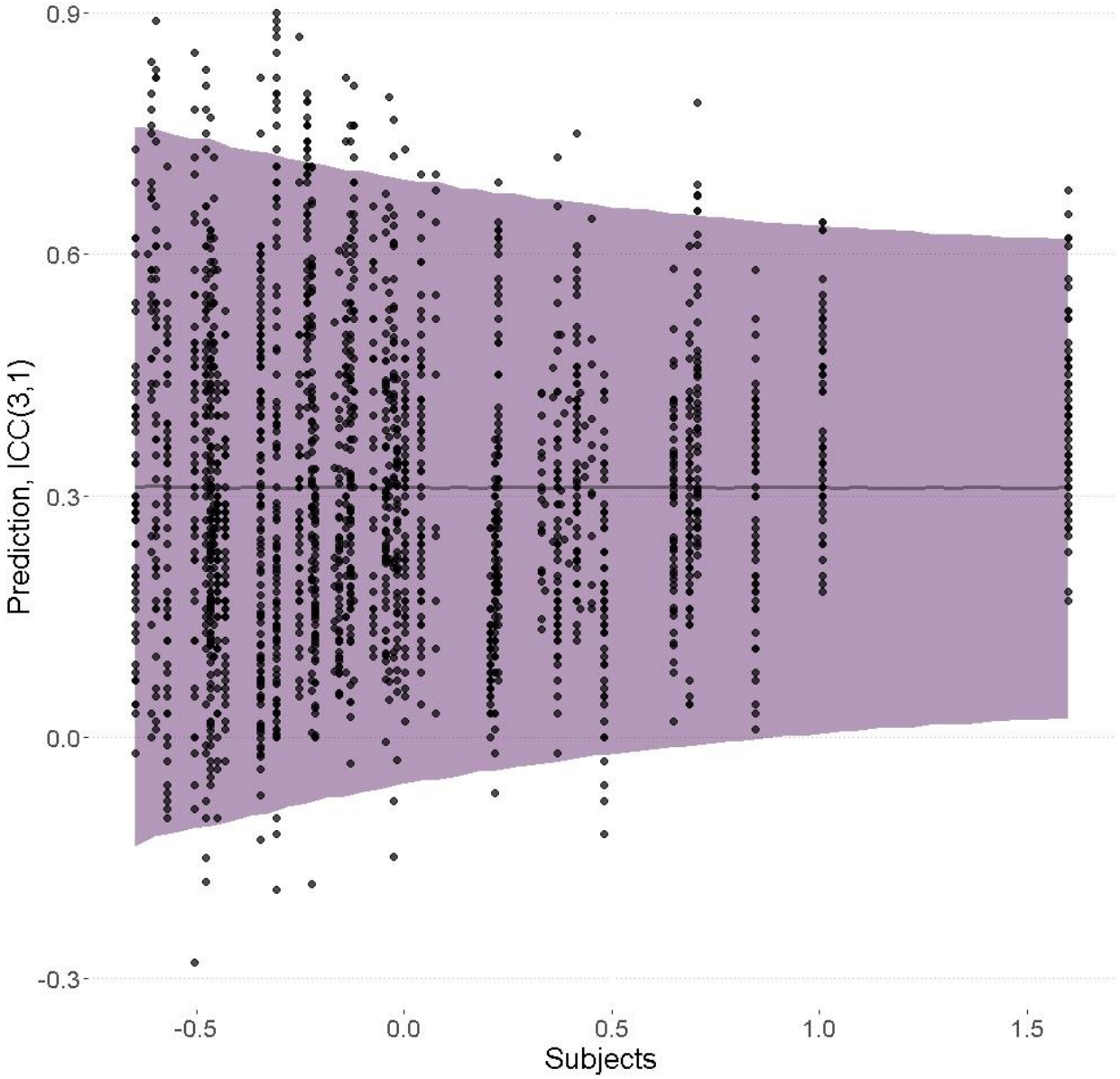
Supplementary Figure 3. Posterior parameter estimates for the final model (red) versus models constrained to studies with ≥ 4 reported ICC(3,1) estimates (blue) and items with ≥ 15 occurrences (purple). Note the high convergence around estimates means.



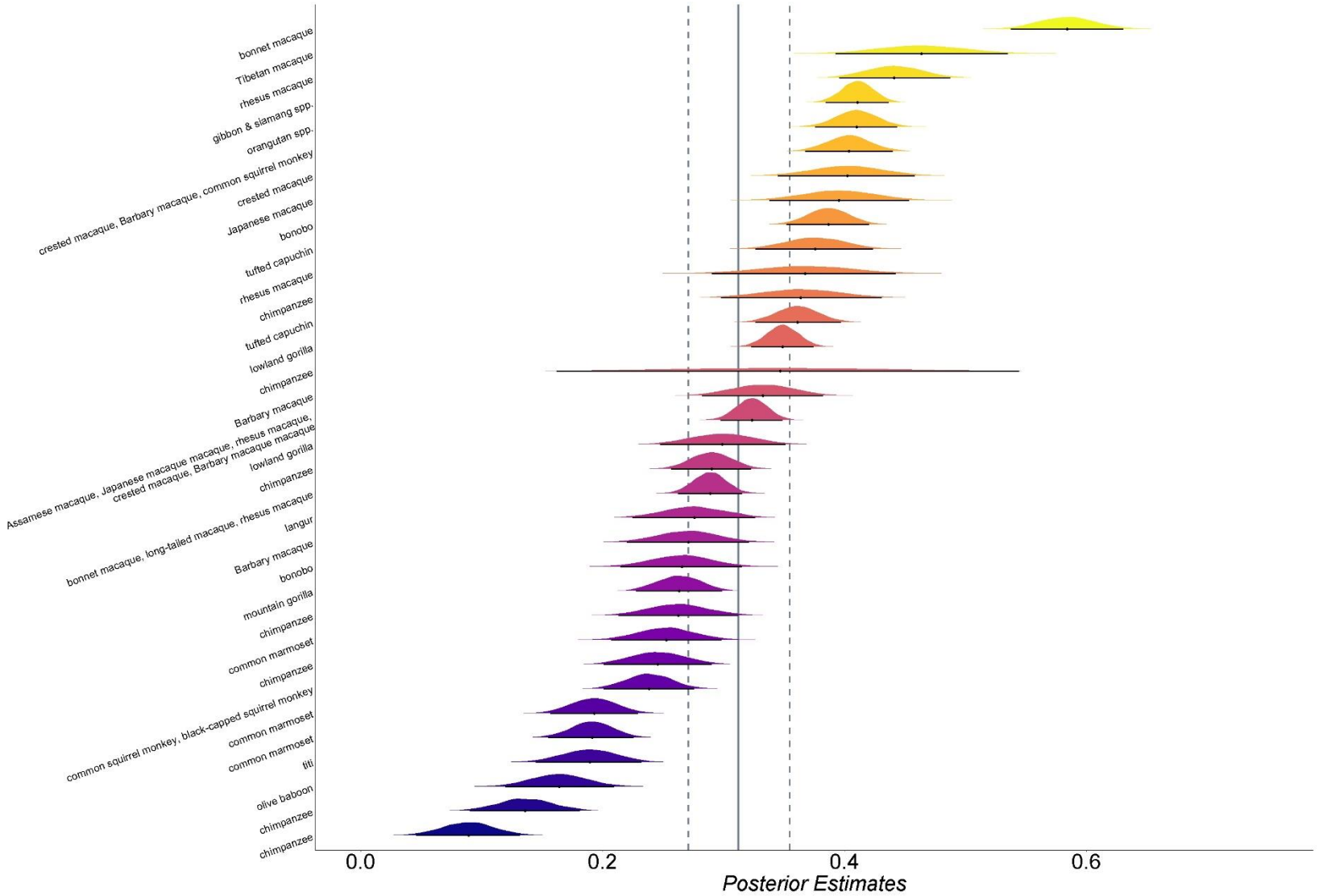
Supplementary Figure 4. Item (**a.**) and study (**b.**) estimates for the effect sizes of ICC(3,1) (x-axis). Fill color is used to emphasize items or studies, labelled on the y-axes. Eye densities above each slab show the posterior draws from the final model for a given study or item, with interval point and slab emphasizing the average and 95% interval, respectively. Eye densities below each slab show alternative model structures with fewer items (**a.**) or studies (**b.**). The central flanking vertical lines show the model average estimate (y-intercept) of the final model (blue) and the alternative models (red), note that the nearly complete overlap results in a purple appearance.



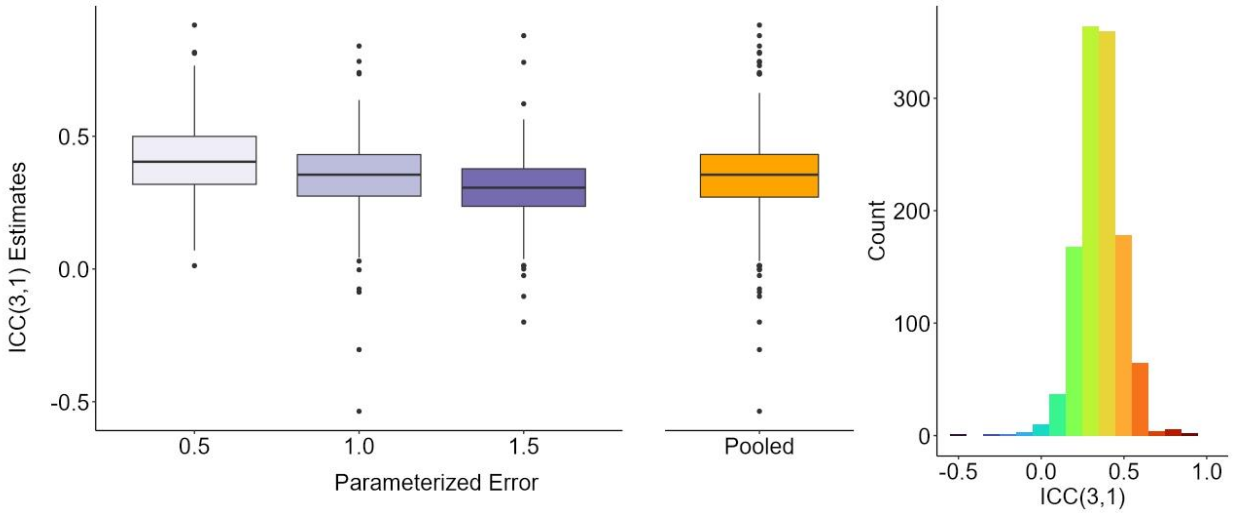
Supplementary Figure 5. Simulated distributions of ratings with different parameter estimates for subject (columns) and raters (rows). Each plot has two distributions with minimal error (0.2 – in teal) and maximal error (2.5 – in orange).



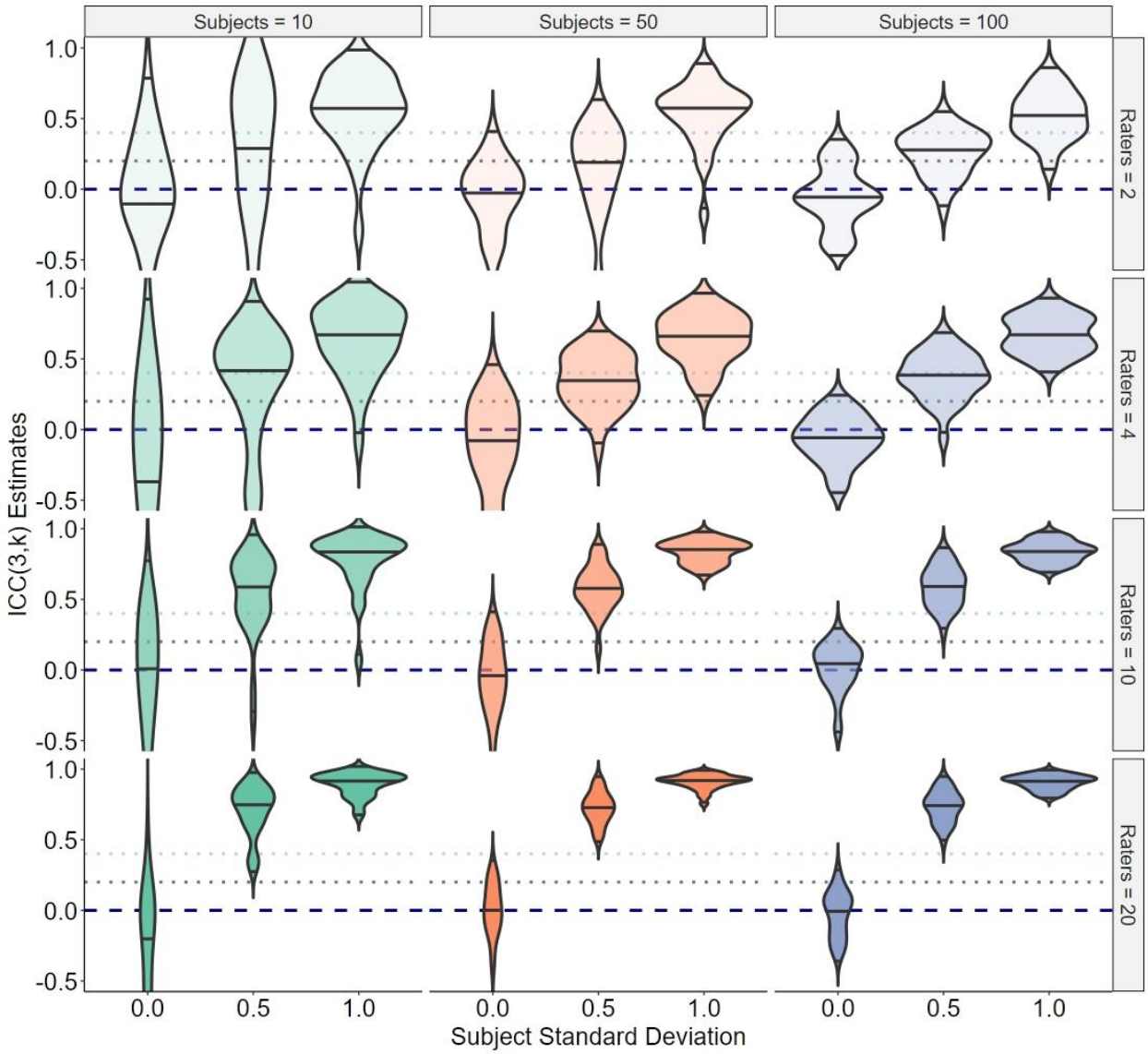
Supplementary Figure 6. The final model estimates based on the number of subjects, fit to σ. The x-axis is scaled by two standard deviations.



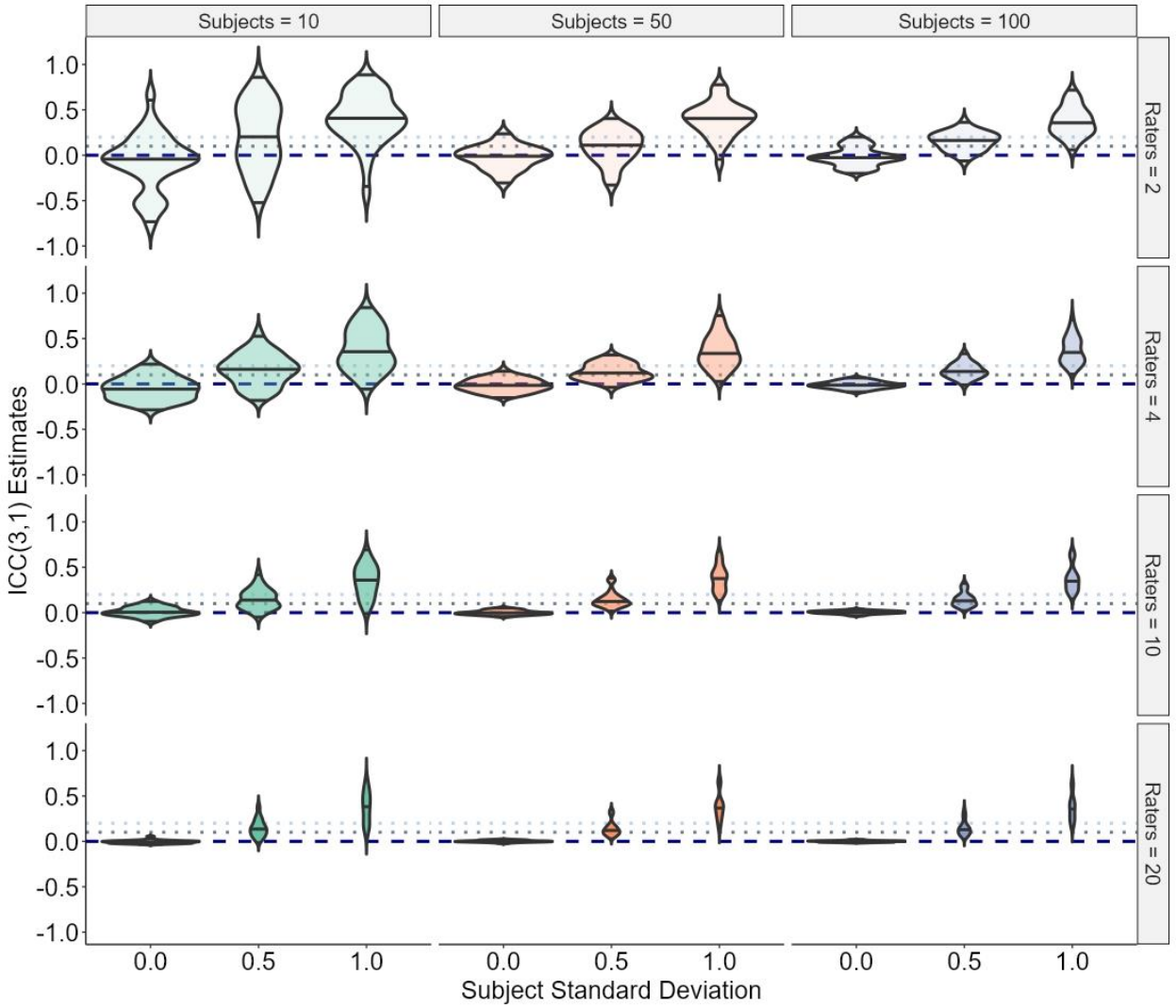
Supplementary Figure 7. Study estimates for the effect sizes of ICC(3,1) (x-axis), as in **Figure 2b**. Y-axis labels emphasize taxa within each study. Densities show posterior draws for each study, with interval point and slab emphasizing the average and 95% interval. Central and flanking vertical lines show the model average estimate (y-intercept) and its 95% credible intervals.



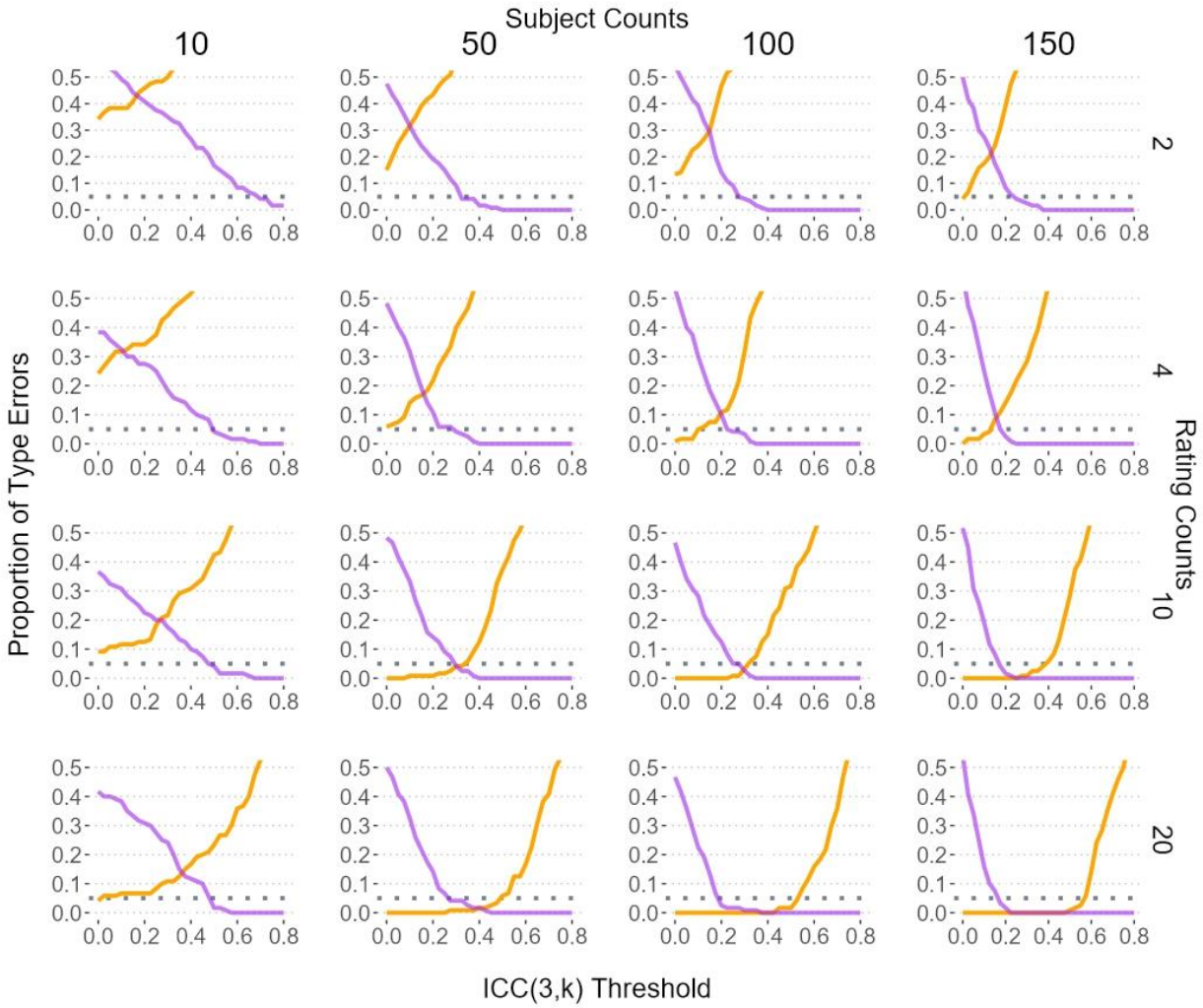
Supplementary Figure 8. Simulated ICC estimates with unreasonably high rater or subject variance (1.5 or 2.0) presented as a boxplot and histogram. Boxplots show the simulated ICC(3,1) estimates with several parameterized values for unattributed error (purple fill; x-axis) or for the pooled values (orange fill). The histogram shows the count of these ICC estimates by bins of 0.1.



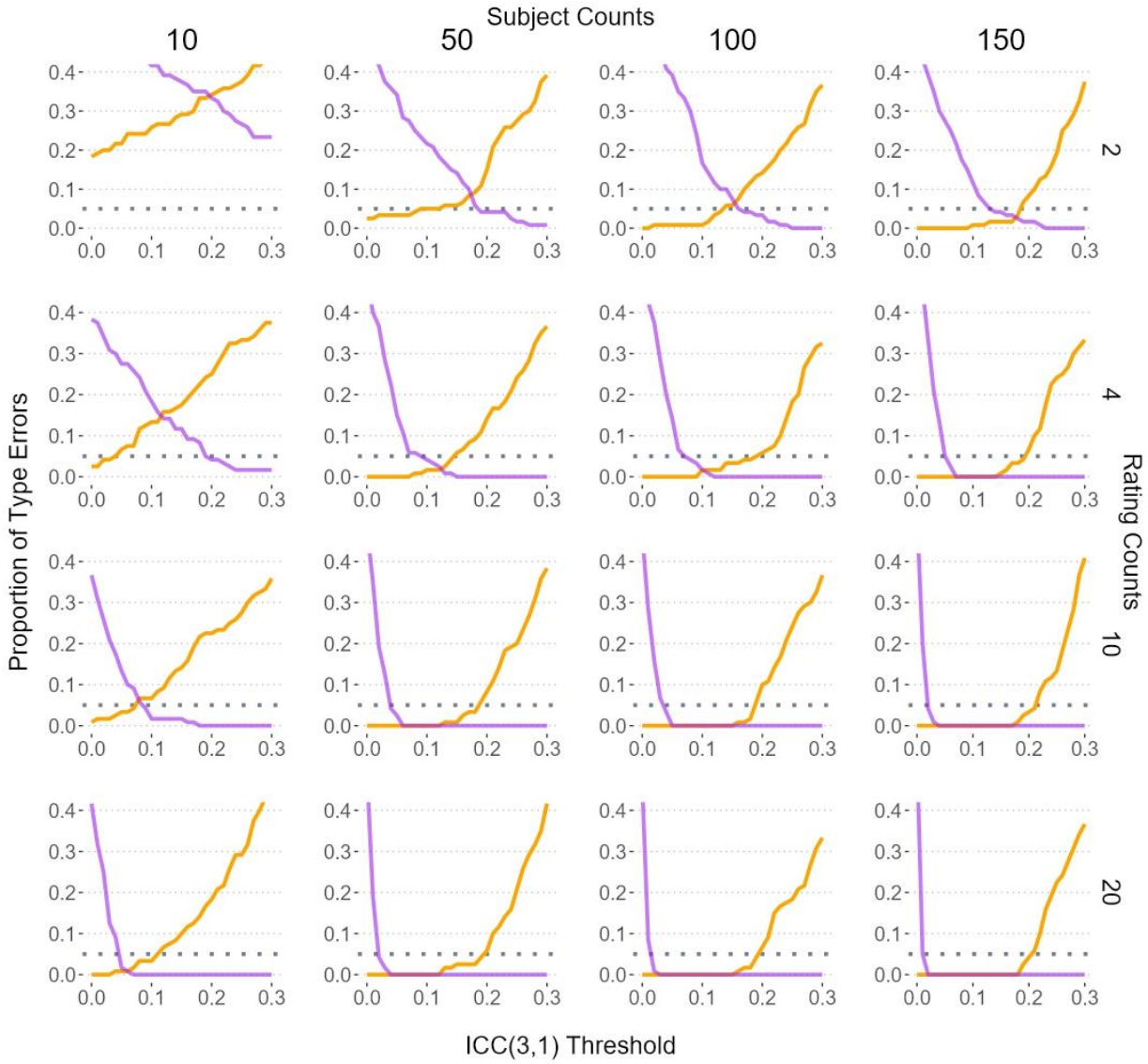
Supplementary Figure 9. Violin plots of ICC(3,k) (y-axes) for different numbers of subjects (columns; color fill) and raters (rows; hue fill). Subject variance parameters are on the x-axes. Dashed lines emphasize an ICC(3,k) of 0.00, with dotted lines at 0.20 and 0.40. Violins have quartile lines set at 2.5%, 50%, and 97.5%. These plots are obtained by extracting a subset of the simulation results for rater and subject variance parameters to 0.5 or 1.0, unattributed error to 0.5, 1.0, or 1.5, subject counts to 10, 50, and 100 (150 or 200 subjects performed similarly to 100), and rater counts to 2, 4, 10, and 20.



Supplementary Figure 10. Violin plots of ICC(3,1) (y-axes) for different numbers of subjects (columns; color fill) and raters (rows; hue fill). Subject variance parameters are on the x-axes. Dashed lines emphasize an ICC(3,1) of 0.00, with dotted lines at 0.10 and 0.20. Violins have quartile lines set at 2.5%, 50%, and 97.5%. These plots are obtained by extracting a subset of the simulation results for rater and subject variance parameters to 0.5 or 1.0, unattributed error to 0.5, 1.0, or 1.5, subject counts to 10, 50, and 100 (150 or 200 subjects performed similarly to 100), and rater counts to 2, 4, 10, and 20.



Supplementary Figure 11. Assuming a true subject variance of 0.0 (purple) or 0.5 (orange), proportion of errors (y-axis) with differing ICC(3,k) reliability cut-offs (x-axis). Purple lines, with a negative association, show erroneous acceptance of items that have no subject variance. Orange lines, with a positive or null association, show erroneous rejection of items that have known subject variance. Subject and rater counts are shown across columns and rows, respectively.



Supplementary Figure 12. Assuming a true subject variance of 0.0 (purple) or 1.0 (orange), proportion of errors (y-axis) with differing ICC(3,1) reliability cut-offs (x-axis). Purple lines, with a negative association, show erroneous acceptance of items that have no subject variance. Orange lines, with a positive or null association, show erroneous rejection of items that have known subject variance. Subject and rater counts are shown across column and row panels, respectively.

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