1   Supplementary figures
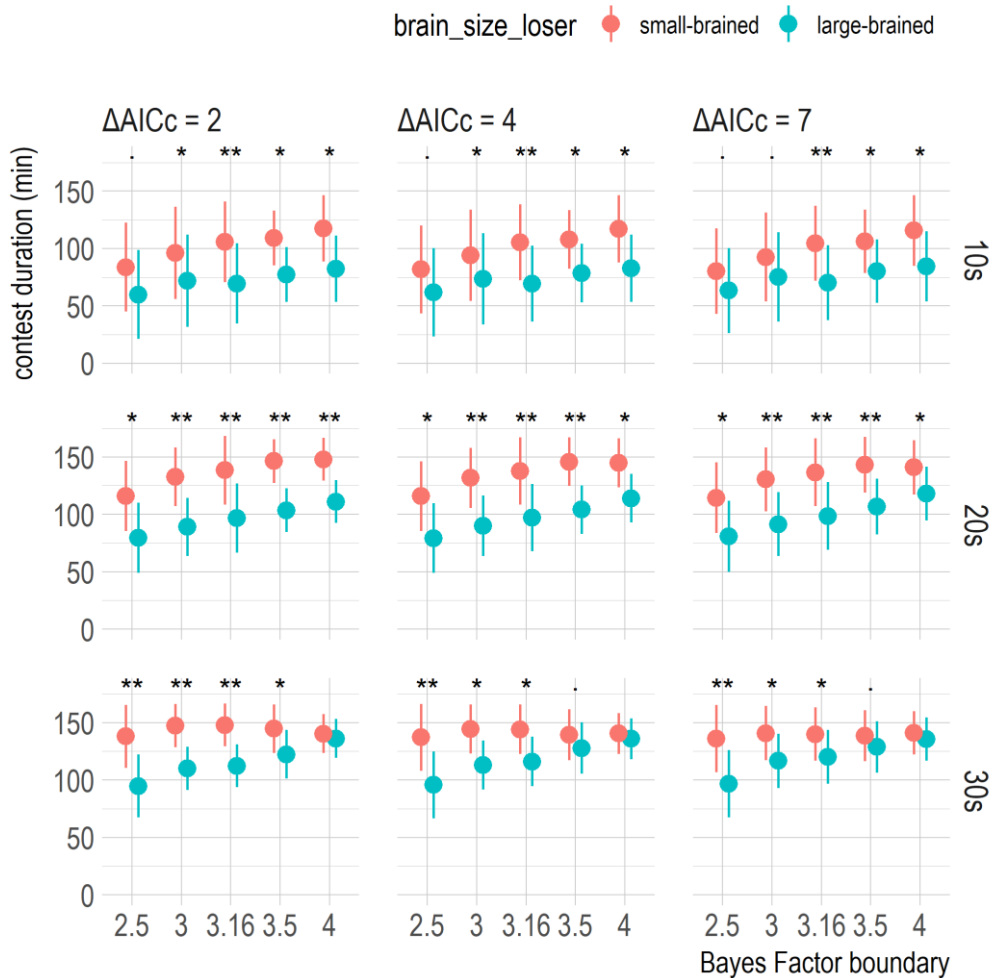

2

Figure S1: An exploration of the robustness of the effect of loser brain size in regards to differences in analysis choices. Specifically, we re-ran the analysis reported in the main text, which uses a Bayes Factor boundary of ~3.16 ($10^{1/2}$), ΔAICc of 4 and a sampling interval of 10 seconds, and varied the values for all three of these choices. Significance based on the average model is indicated with symbols, where . $p < 0.1$, * $p < 0.05$, ** $p < 0.01$. In 36 out of 45 scenarios the effect remained significant, in an additional 6 cases the effect was a trend ($p < 0.1$) in the same direction, and for no parameter combination was the effect reversed.

10 Supplementary tables

Coefficients	df	AICc	ΔAICc	weight
2/4/5/8/11	9	777.6	0	0.09
2/4/5/8/11/18	10	777.94	0.34	0.07
2/4/8/11	8	778.68	1.08	0.05
2/4/5/8/11/14	10	779.06	1.46	0.04
4/5/8/11	8	779.32	1.72	0.04
2/4/5/8/11/16	10	779.56	1.96	0.03
2/4/5/8/9/11	10	779.67	2.07	0.03
2/4/5/8/10/11	10	779.73	2.13	0.03
2/4/8/11/18	9	779.83	2.24	0.03
2/4/5/8/11/15	10	780.07	2.47	0.02
2/3/4/5/8/11	10	780.11	2.51	0.02
1/2/4/5/8/11	10	780.17	2.57	0.02
2/4/5/8/11/17	10	780.25	2.65	0.02
2/4/5/8/11/12	10	780.27	2.67	0.02
2/4/5/8/11/13	10	780.27	2.67	0.02
2/4/5/8/12/13	10	780.27	2.67	0.02
4/5/8/11/18	9	780.32	2.72	0.02
2/4/5/6/7/11	10	780.33	2.73	0.02
2/4/5/6/8/11	10	780.33	2.73	0.02
2/4/5/7/8/11	10	780.33	2.73	0.02
2/3/4/8/11	9	780.65	3.06	0.02
2/4/8/11/14	9	780.67	3.08	0.02
2/4/8/11/16	9	780.7	3.11	0.02
3/4/5/8/11/18	10	780.83	3.23	0.02
3/4/5/8/11	9	780.84	3.24	0.02
2/4/8/11/15	9	780.88	3.29	0.02
2/4/8/9/11	9	780.94	3.34	0.02
4/5/8/11/14	9	780.99	3.39	0.02
2/4/8/10/11	9	781.05	3.45	0.02
2/3/4/8/11/18	10	781.08	3.48	0.02
4/8/11	7	781.15	3.56	0.01
4/5/8/9/11	9	781.2	3.61	0.01
2/4/6/7/11	9	781.26	3.66	0.01
2/4/6/8/11	9	781.26	3.66	0.01
2/4/7/8/11	9	781.26	3.66	0.01
1/2/4/8/11	9	781.26	3.66	0.01
2/4/8/11/12	9	781.3	3.71	0.01
2/4/8/11/13	9	781.3	3.71	0.01
2/4/8/12/13	9	781.3	3.71	0.01
2/4/8/11/17	9	781.32	3.72	0.01
1/4/5/8/11	9	781.4	3.8	0.01
4/5/8/11/14/18	10	781.53	3.94	0.01
2/4/8/11/14/18	10	781.54	3.95	0.01

11   Table S1: All models within 4 ΔAICc. Coefficient numbers refer to: 1 difference in black coloration, 2

12   black coloration of the loser, 3 black coloration of the winner, 4 brain size of the loser, 5 brain size of

13   the winner, 6 difference in condition, 7 condition of the loser, 8 condition of the winner, 9 standard

14   length of the loser, 10 standard length of the winner, 11 difference in bright coloration, 12 bright

15   coloration of the loser, 13 bright coloration of the winner, 14 difference in standard length, 15

16   difference in tail length, 16 tail size of the loser, 17 tail size of the winner, 18 total displacement. All

17   models include an intercept and random intercepts for the interaction between the brain size of the

18   winner and the brain size of the loser, nested within replicate (*lme4* syntax: (1 | replicate /

19   (brain_size_winner : brain_size_loser)).

20

	Estimate	SE	Adjusted SE	z	p	
(Intercept)	114.461	14.799	15.030	7.62	< 0.001	***
loser brain size	-35.937	13.261	13.523	2.66	0.008	**
winner brain size	-17.965	16.613	16.752	1.07	0.284	
condition winner	-21.686	7.976	8.093	2.68	0.007	**
difference bright coloration	25.221	8.458	8.572	2.94	0.003	**
black coloration loser	-12.498	8.239	8.331	1.50	0.134	
total displacement	1.787	4.812	4.848	0.37	0.712	
difference standard length	-0.689	2.949	2.979	0.23	0.817	
tail size loser	-0.285	1.942	1.965	0.15	0.885	
standard length loser	0.315	2.055	2.082	0.15	0.880	
standard length winner	-0.204	1.696	1.719	0.12	0.906	
difference tail size	0.164	1.611	1.636	0.10	0.920	
black coloration winner	-0.668	3.154	3.185	0.21	0.834	
difference black coloration	0.153	1.683	1.711	0.09	0.929	
tail size winner	-0.042	1.396	1.424	0.03	0.976	
bright coloration loser	-0.764	4.332	4.353	0.18	0.861	
bright coloration winner	0.666	4.185	4.207	0.16	0.874	
difference condition	-0.991	5.512	5.534	0.18	0.858	
condition loser	-0.553	3.595	3.616	0.15	0.878	

21   Table S2: Coefficients, standard errors and test statistics of all terms after full model averaging.

22