Online Resource 3

Validation of a Battery of Inhibitory Control Tasks Reveals a Multi-faceted Structure in Non-Human Primates

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CONTENT VALIDITY

The Modified Stroop task:

Table S1

			log(response latency) on a trial	
Predictor	**Estimate**	**Std. Error**	**t-value**	**p-value**
(Intercept)	8.585	0.314	27.338	0.000
Stimulus picture	0.110	0.035	3.117	**0.002**
Sex male	0.120	0.150	0.801	0.436
Age	0.047	0.018	2.587	**0.021**
Rank high	-0.029	0.224	-0.130	0.898
Rank medium	-0.368	0.250	-1.472	0.162
Group size	-0.021	0.014	-1.512	0.151
Experience picture	-0.060	0.098	-0.613	0.540
Trial	-0.037	0.017	-2.180	**0.029**
Session	0.000	0.002	0.065	0.948
Time point	-0.534	0.032	-16.877	**0.000**

Number of subjects 21

Results of LMMs for the log transformation of the response latency in the Modified Stroop task. Confounding factors were divided in individual (sex, age, rank, group size and experience with picture) and experimental determinants (session and time point). All full models included the individual ID as random factor. The Estimates (representing the change in the dependent variable relative to the baseline category of each predictor variable), Standard Error, t-value and p-value using maximum likelihood method. The variables in bold stimulus, age, trial and time point had a significant effect on the models

Go/No-go task:

Table S2

			Success on a trial	
Perdictor	**Estimate**	**Std. Error**	**z value**	**p-value**
(Intercept)	7.379	0.824	8.951	0.000
Stimulus No-Go	-7.099	0.413	-17.193	**0.000**
Sex female	-0.305	0.207	-1.476	0.140
Age	-0.005	0.037	-0.129	0.897
Rank high	-0.643	0.534	-1.205	0.228
Rank medium	-0.873	0.604	-1.445	0.148
Group size	0.003	0.031	0.109	0.913
Trial	0.001	0.004	0.174	0.862
Session	0.081	0.033	2.456	**0.014**
Time point	0.091	0.094	0.969	0.333

Number of subjects 20

Results of GLMMs for the success in the Go/No-go task. Confounding factors were divided in individual (sex, age, rank, group size and experience with picture) and experimental determinants (session and time point). All full models included the individual ID as random factor. The Estimates (representing the change in the dependent variable relative to the baseline category of each predictor variable), Standard Error, z-value and p-value using maximum likelihood method. The variables in bold stimulus and session had a significant effect on the models

Go/No-go task:

Table S3

			log(response latency) on a trial	
Predictor	**Estimate**	**Std. Error**	**t-value**	**p-value**
(Intercept)	7.691	0.226	33.988	0.000
Stimulus No-Go	0.509	0.020	24.969	**0.000**
Sex female	-0.038	0.043	-0.895	0.371
Age	0.007	0.012	0.605	0.545
Rank high	-0.307	0.172	-1.781	0.094
Rank medium	-0.278	0.196	-1.422	0.174

Group size	-0.003	0.010	-0.324	0.750
Trial	-0.001	0.001	-0.970	0.332
Session	0.010	0.006	1.640	0.101
Time point	0.001	0.018	0.075	0.941

Number of subjects 20

Results of LMMs for the log transformation of the response latency in the Go/No-go task. Confounding factors were divided in individual (sex, age, rank, group size and experience with picture) and experimental determinants (session and time point). All full models included the individual ID as random factor. The Estimates (representing the change in the dependent variable relative to the baseline category of each predictor variable), Standard Error, t-value and p-value using maximum likelihood method. Only the variable in bold stimulus had a significant effect on the models

Reversal learning:

Table S4

		Success on a trial		
Predictor	**Estimate**	**Std. Error**	**z value**	**p-value**
(Intercept)	0.817	0.341	2.399	0.016
Rule 2	-0.104	0.069	-1.495	**0.135**
Sex female	-0.185	0.157	-1.183	0.237
Age	-0.045	0.017	-2.694	**0.007**
Rank high	0.110	0.237	0.465	0.642
Rank medium	0.086	0.273	0.314	0.754
Group size	0.010	0.016	0.603	0.546
Trial	0.005	0.002	2.000	**0.045**
Session	0.057	0.017	3.425	**0.001**
Time point	-0.088	0.072	-1.233	0.218

Number of subjects 19

Results of GLMMs for the success in the Reversal learning task. Confounding factors were divided in individual (sex, age, rank, group size and experience with picture) and experimental determinants (session and time point). All full models included the individual ID as random factor. The Estimates (representing the change in the dependent variable relative to the baseline category of each predictor variable), Standard Error, z-value and p-value using maximum likelihood method. The variables in bold rule, age, trial and session had a significant effect on the models

TEMPORAL REPEATABILITY

Table S5

Executive function accuracy

Predictor	Estimate	Std. Error	t-value	p-value
(Intercept)	0.834	0.096	8.685	0.000
Sex male	0.044	0.045	0.978	0.344
Age	-0.008	0.005	-1.555	0.141
Rank high	0.029	0.068	0.420	0.680
Rank medium	0.064	0.076	0.845	0.412
Group size	0.002	0.004	0.477	0.640
Session	0.016	0.013	1.217	0.226
Time point	0.021	0.021	1.024	0.308

Results of GLMMs for the Accuracy in the Executive function task. Confounding factors were divided in individual (sex, age, rank, group size and experience with picture) and experimental determinants (session and time point). All full models included the individual ID as random factor. The Estimates (representing the change in the dependent variable relative to the baseline category of each predictor variable), Standard Error, t-value and p-value using maximum likelihood method. None of the variables had a significant effect on the models

Table S6

Executive function response latency

Predictor	Estimate	Std. Error	t-value	p-value
(Intercept)	8210.557	2074.119	3.959	0.000
Sex male	-295.397	991.468	-0.298	0.770
Age	172.233	106.851	1.612	0.128
Rank high	-376.676	1508.445	-0.250	0.806
Rank medium	-1585.901	1678.234	-0.945	0.360
Group size	-116.500	93.476	-1.246	0.232
Trial	-45.066	22.750	-1.981	**0.048**
Session	-216.967	160.351	-1.353	0.176
Time point	-1045.173	259.866	-4.022	**0.000**

Results of GLMMs for the Response latency in the Executive function task. Confounding factors were divided in individual (sex, age, rank, group size and experience with picture) and experimental determinants (session and time point). All full models included the individual ID as random factor. The Estimates (representing the change in the dependent variable relative to the baseline category of each predictor variable), Standard Error, t-value and p-value using maximum likelihood method. Only the variables in bold trial and time point had a significant effect on the models

Table S7

		Emotional control score		
Predictor	**Estimate**	**Std. Error**	**t-value**	**p-value**
(Intercept)	439.814	1373.811	0.320	0.749
Sex male	-1602.383	656.767	-2.440	**0.029**
Age	-125.829	104.125	-1.208	0.247
Rank high	-991.729	936.795	-1.059	0.308
Rank medium	205.880	1043.027	0.197	0.846
Group size	-58.912	65.572	-0.898	0.384
Experience with testing	759.368	941.245	0.807	0.433
Trial	6.363	9.807	0.649	0.517
Session	459.510	124.344	3.695	**0.000**
Time point	2014.852	205.832	9.789	**0.000**
Type picture Object	-120.127	245.731	-0.489	0.625
Type picture Threat	66.889	249.730	0.268	0.789

Results of LMMs for the Distraction control score (the Modified Stroop task). Confounding factors were divided in individual (sex, age, rank, group size and experience with picture) and experimental determinants (session and time point). All full models included the individual ID as random factor. The Estimates (representing the change in the dependent variable relative to the baseline category of each predictor variable), Standard Error, t-value and p-value using maximum likelihood method. Only the variables in bold sex, session and time point had a significant effect on the models

Table S8

		Action control score		
Predictor	**Estimate**	**Std. Error**	**t-value**	**p-value**
(Intercept)	45.142	21.321	2.117	0.037
Sex male	-9.659	10.956	-0.882	0.393
Age	4.691	2.865	1.637	0.105
Rank high	0.694	1.111	0.624	0.543
Rank medium	-4.723	13.632	-0.347	0.734
Group size	-12.923	15.996	-0.808	0.433
Session	4.691	2.865	1.637	0.105
Time point	0.163	1.019	0.160	0.876

Results of LMMs for the Action Control Score (Go/No-go). Confounding factors were divided in individual (sex, age, rank, group size and experience with picture) and experimental determinants (session and time point). All full models included the individual ID as random factor. The Estimates (representing the change in the dependent variable relative to the baseline category of each predictor

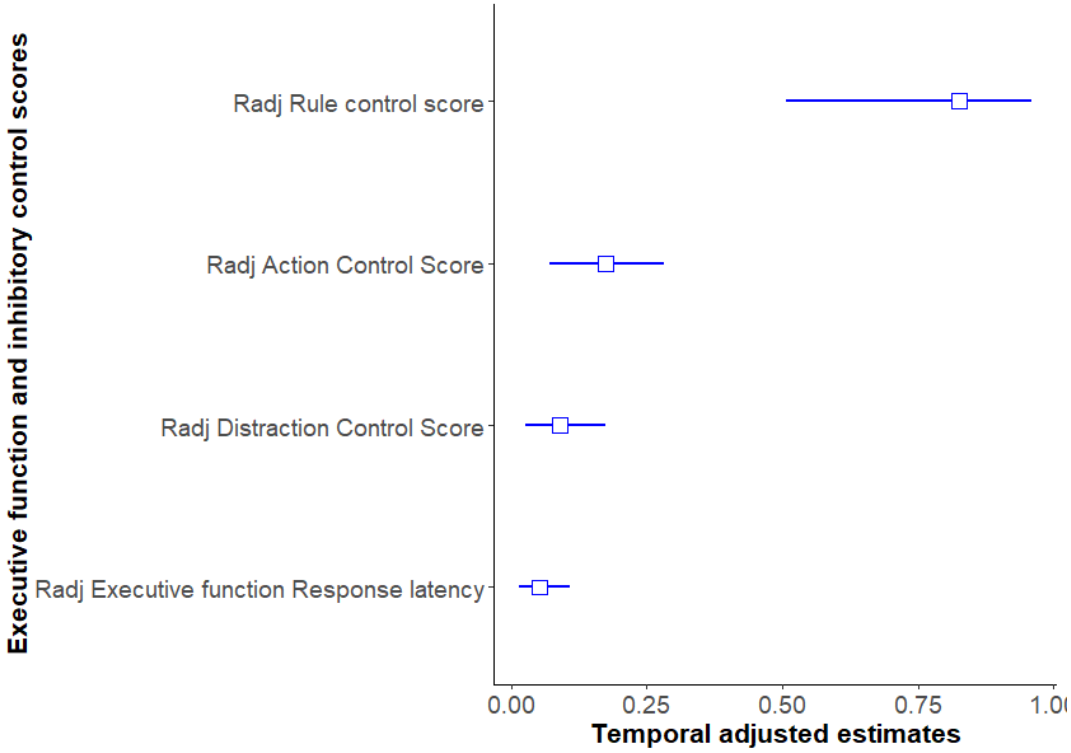
variable), Standard Error, t-value and p-value using maximum likelihood method. None of the variable had a significant effect on the models

Table S9

			Rule control score	
Predictor	**Estimate**	**Std. Error**	**t-value**	**p-value**
(Intercept)	264.734	141.971	1.865	0.085
Sex male	-179.277	67.224	-2.667	0.019
Age	12.105	7.612	1.590	0.136
Rank high	-47.967	101.790	-0.471	0.645
Rank medium	-83.767	115.352	-0.726	0.481
Group size	-14.645	6.864	-2.134	0.052
Time point	-1.177	14.016	-0.084	0.934

Results of GLMMs for the Rule Control Score (Reversal learning task). Confounding factors were divided in individual (sex, age, rank, group size and experience with picture) and experimental determinants (session and time point). The Estimates (representing the change in the dependent variable relative to the baseline category of each predictor variable), z-value and p-value using maximum likelihood method. None of the variable had a significant effect on the model (even the sex variable)

Fig. S1



Temporal repeatability R (adjusted) and 95% bootstrapped confidence intervals for inhibitory control scores. Y-axis presents the repeatability for each type of inhibitory control measurement: executive function (Executive function response latency), Modified Stroop task (Distraction control score), Go/No-go (Action control score) and Reversal learning (Rule control score)

CONTEXTUAL REPEATABILITY

Table S10

Predictor	**Estimate**	**Std. Error**	**t-value**	**p-value**
(Intercept)	0.013	0.216	0.062	0.950
Task	-0.044	0.055	-0.792	0.429
Sex male	-0.128	0.100	-1.285	0.218
Age	-0.015	0.011	-1.380	0.188
Rank high	-0.052	0.150	-0.345	0.735
Rank medium	0.113	0.167	0.675	0.510
Group size	-0.003	0.009	-0.279	0.784
Session	0.072	0.034	2.123	**0.035**
Time point	0.227	0.055	4.116	**0.000**

Results of LMMs for the Executive function task (Executive function accuracy) and the Modified Stroop task (Distraction Control Score). Confounding factors were divided in individual (sex, age, rank, group size and experience with picture) and experimental determinants (session and time point). All full models included the individual ID as random factor. The Estimates (representing the change in the dependent variable relative to the baseline category of each predictor variable), t-value and p-value using maximum likelihood method. The variables in bold session and time point had a significant effect on the models

Table S11

Predictor	Estimate	Std. Error	t-value	p-value
(Intercept)	-0.065	0.385	-0.169	0.866
Task	0.012	0.096	0.124	0.902
Sex male	-0.400	0.189	-2.109	0.051
Age	0.007	0.020	0.364	0.721
Rank high	-0.139	0.232	-0.599	0.550
Rank medium	-0.164	0.280	-0.586	0.566
Group size	-0.004	0.018	-0.197	0.847
Session	0.126	0.058	2.159	**0.032**
Time point	0.268	0.096	2.798	**0.006**

Table A.11. Results of LMMs for the Modified Stroop task (Distraction control scores) and the Go/No-go task (Action Control Score). Confounding factors were divided in individual (sex, age, rank, group size and experience with picture) and experimental determinants (session and time point). The Estimates (representing the change in the dependent variable relative to the baseline category of each predictor variable t-value and p-value using maximum likelihood method. The variables in bold session and time point had a significant effect on the models.

Table S12

Predictor	Estimate	Std.Error	t-value	p-value
(Intercept)	0.116	0.520	0.224	0.823
Reversal learning	0.187	0.219	0.853	0.395
Sex male	-0.560	0.249	-2.244	**0.039**
Age	0.037	0.026	1.461	0.147
Rank high	-0.183	0.305	-0.599	0.550
Rank medium	-0.520	0.362	-1.435	0.171
Group size	-0.021	0.023	-0.917	0.373
Session	0.163	0.112	1.454	0.149
Time point	0.122	0.162	0.756	0.451

Results of LMMs for the Go/No-go (Action control scores) and the Reversal learning task (Rule Control Score). Confounding factors were divided in individual (sex, age, rank, group size and experience with picture) and experimental determinants (session and time point). All full models included the individual ID as random factor. The Estimates (representing the change in the dependent variable relative to the baseline category of each predictor variable t-value and p-value using maximum likelihood method. Only the variable in bold sex had a significant effect on the model

Table S13

Predictor	Estimate	Std. Error	t-value	p-value
(Intercept)	0.448	0.299	1.499	0.136
Task	0.124	0.131	0.944	0.347
Sex male	-0.591	0.133	-4.439	**0.000**
Age	0.019	0.015	1.267	0.208
Rank high	-0.248	0.193	-1.288	0.216
Rank medium	-0.187	0.217	-0.861	0.402
Group size	-0.034	0.013	-2.639	**0.018**
Session	0.105	0.065	1.608	0.110
Time point	0.306	0.095	3.223	**0.002**

Results of LMMs for the Modified Stroop task (Distraction control scores) and The Reversal learning task (Rule Control Score). Confounding factors were divided in individual (sex, age, rank, group size and experience with picture) and experimental determinants (session and time point). All full models included the individual ID as random factor. The Estimates (representing the change in the dependent variable relative to the baseline category of each predictor variable), Standard Error, t-value and p-value using maximum likelihood method. The variable in bold sex, group size and time point had a significant effect on the models

Table S14

Predictor	Value	Std.Error	t-value	p-value
(Intercept)	-0.045	0.386	-0.117	0.907
Reversal learning	-0.028	0.095	-0.301	0.764
Sex male	-0.073	0.190	-0.385	0.705
Age	0.003	0.020	0.142	0.889
Rank high	-0.244	0.233	-1.047	0.296
Rank medium	-0.293	0.281	-1.043	0.312
Group size	0.005	0.018	0.262	0.797
Session	0.102	0.057	1.784	0.076
Time point	0.094	0.093	1.013	0.312

Results of LMMs for the Executive function task (Executive function Accuracy) and the Go/No-go task (Action Control Score). Confounding factors were divided in individual (sex, age, rank, group size and experience with picture) and experimental determinants (session and time point). All full models included the individual ID as random factor. The Estimates (representing the change in the dependent variable relative to the baseline category of each predictor variable), t-value and p-value using maximum likelihood method. None of the variables had a significant effect on the models

Table S15

Predictor	Estimate	Std.Error	t-value	p-value
(Intercept)	0.188	0.340	0.554	0.581
Reversal learning	0.037	0.130	0.283	0.777
Sex male	-0.143	0.152	-0.936	0.363
Age	0.000	0.017	-0.029	0.977
Rank high	-0.031	0.229	-0.134	0.895
Rank medium	-0.019	0.255	-0.074	0.942
Group size	-0.015	0.014	-1.062	0.304
Session	0.048	0.063	0.759	0.449
Time point	0.077	0.092	0.838	0.404

Results of LMMs for the Executive function task (Executive function Accuracy) and the Reversal learning task (Rule Control Score). Confounding factors were divided in individual (sex, age, rank, group size and experience with picture) and experimental determinants (session and time point). All full models included the individual ID as random factor. The Estimates (representing the change in the dependent variable relative to the baseline category of each predictor variable), t-value and p-value using maximum likelihood method. None of the variables had a significant effect on the model