***Supplementary materials***

The supplementary materials file includes a description of the touchscreen training of the subjects and supplementary results.

**Training phases**

***Training phase 1***

As none of the macaques had experience with touchscreen experiments prior to the beginning of the data collection, all the macaques had to complete two training phases. The first training phase used a rectangular transparent Plexiglas sheet (42 x 30 cm) with a plastic red square target (10 x 12 cm) moved by hand. Monkeys were progressively rewarded for approaching the Plexiglas sheet, touching the target as it moved. This phase was judged as complete if the macaques followed the target 20 times in a row. Two females did not complete this training stage as they gave birth during the training period, two males could not reach the success criterion.

***Training phase 2***

After completion of the first training phase, the touchscreen was introduced. The aim of training phase 2 was to be trained to touch a target on the screen.

**Stimuli**

The target was a red (RGB 255, 0, 0) rectangle of a maximum of 1200 x 1000 pixels (ca. 32 x 26 cm) and was gradually reduced to 360 x 500 pixels (ca. 10 x 13 cm).

**General Procedure**

When the program was launched, the experimenter entered the name of the individual, the number of trials per session, the size of the target and the time limit to complete the task. Every session was initiated by the subject touching a red cross located in the centre of the screen, starting the time recording. Then, the target was displayed in the middle of a white background (RGB 255, 255, 255). For the first 30 trials a picture of peanuts was displayed inside the target to motivate the macaques to touch it. Once the subject touched the target, a high-pitched chime (composed of 3 sound frequencies: 800, 1300 and 2000 Hz) was played, the timer was stopped, and the reward was given. After an inter-trial of 2000 ms, with only the white background displayed, the next trial was presented. Based on a pilot study (N = 4 subjects), we set up a maximum response time of 35 s. If the subject left the testing area or was not focusing attention on the screen the session was aborted. If the target was not touched within the time limit (35 s), the timer was paused, a red cross appeared in the centre of the screen until the session was resumed by touching it. The size of the target was gradually reduced to 360 x 500 pixels (ca. 10 x 13 cm). Once the macaques performed successfully 20 times in a row with the target in the centre of the screen, the target was displayed randomly at the far left or right of the screen. This phase was judged as complete if the macaque followed the target 20 trials in a row. If the subject stayed inactive for more than 5 min the session was stopped and continued the next testing day, if the subject did not participate for three testing days in a row the subject was excluded from the task. The training phase 2 was completed by 21 subjects (12 males, 9 females) who therefore progressed to the experimental phase. Five subjects abandoned this training phase as they stayed at distance from the screen or gave birth in the meantime.

**Supplementary results**

**Executive function Task:**

**TEMPORAL REPEATABILITY**

**Table S1**

*Results of GLMMs for the Accuracy in the Executive function task. Confounding factors were divided in individual (sex, age and rank) 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.*

***Executive function accuracy***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Predictor** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
| (Intercept) | 0.869 | 0.065 | 13.313 | 0.000 |
| Sex male | 0.033 | 0.039 | 0.853 | 0.406 |
| Age | -0.007 | 0.005 | -1.480 | 0.158 |
| Rank high | 0.022 | 0.068 | 0.339 | 0.739 |
| Rank medium | 0.051 | 0.070 | 0.718 | 0.483 |
| Session | 0.016 | 0.013 | 1.221 | 0.225 |
| Time point | 0.021 | 0.021 | 1.024 | 0.306 |

**The Distraction task:**

**CONTENT VALIDITY**

**Table S2**

*Results of LMMs for the log transformation of the response latency in the Distraction task. Confounding factors were divided in individual (sex, age, rank 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.*

***log(response latency) on a trial***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Predictor** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
| (Intercept) | 8.223 | 0.213 | 38.526 | 0.000 |
| Stimulus picture | 0.112 | 0.035 | 3.189 | **0.001** |
| Picture Object vs face | 0.018 | 0.025 | 0.753 | 0.452 |
| Picture Threat vs neutral | -0.058 | 0.043 | -1.350 | 0.177 |
| Sex male | 0.120 | 0.150 | 0.801 | 0.436 |
| Age | 0.043 | 0.018 | 2.296 | **0.035** |
| Rank high | -0.029 | 0.224 | -0.130 | 0.898 |
| Rank medium | -0.368 | 0.250 | -1.472 | 0.162 |
| Experience  picture | -0.084 | 0.097 | -0.862 | 0.388 |
| Trial | 0.000 | 0.002 | 0.069 | 0.944 |
| Session | -0.035 | 0.017 | -2.20 | **0.027** |
| Time point | -0.534 | 0.032 | -16.877 | **0.000** |

Note. Number of subjects 21

Likelihood-ratio test comparing the best fitted model (with session, time point an age as explanatory variables) with the null model : χ2 4 = 296.02, p < 0.0001.

The subjects had a longer response latency as they get older (χ2 1 = 9.086, p < 0.01), and their response latency were shorter as session ( χ2 1 = 4.798, p < 0.05) and time point ( χ2 4 = 276.165, p < 0.0001) increased.

**TEMPORAL REPEATABILITY**

**Table S3**

*Results of LMMs for the Distraction control score (the Distraction task). Confounding factors were divided in individual (sex, age, rank 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.*

***Distraction control score***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Predictor** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
| (Intercept) | -500.347 | 903.952 | -0.554 | 0.579 |
| Sex male | -1411.504 | 631.269 | -2.236 | **0.041** |
| Age | -111.284 | 104.125 | -1.065 | 0.304 |
| Rank high | -838.105 | 935.795 | -0.896 | 0.385 |
| Rank medium | 528.053 | 995.247 | 0.531 | 0.603 |
| Experience with pictures | 398.939 | 864.463 | 0.461 | 0.651 |
| Trial | 6.374 | 9.807 | 0.649 | 0.517 |
| Session | 455.514 | 124.249 | 3.666 | **0.0003** |
| Time point | 2019.521 | 205.8753 | 9.815 | **0.000** |
| Type picture Object | -118.94 | 245.685 | -0.484 | 0.628 |
| Type picture Threat | 66.453 | 249.686 | 0.266 | 0.790 |

**CONTENT VALIDITY**

**Go/No-go task:**

**Table S4**

*Results of GLMMs for the success in the Go/No-go task. Confounding factors were divided in individual (sex, age and rank) 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 type of stimulus (Go or No-go) and session had a significant effect on the models.*

***Success on a trial***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Predictor** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
| (Intercept) | 7.431 | 0.671 | 11.072 | 0.000 |
| Stimulus No-Go | -7.098 | 0.413 | -17.196 | **0.000** |
| Sex female | -0.300 | 0.200 | -1.5000 | 0.134 |
| Age | -0.004 | 0.037 | -0.111 | 0.911 |
| Rank high | -0.669 | 0.513 | -1.285 | 0.199 |
| Rank medium | -0.902 | 0.538 | -1.675 | 0.094 |
| Trial | 0.001 | 0.004 | 0.173 | 0.862 |
| Session | 0.081 | 0.033 | 2,456 | **0.014** |
| Time point | 0.091 | 0.093 | 0.972 | 0.331 |

Note. Number of subjects 20

Likelihood-ratio test comparing the best fitted model (with type of stimulus and session as explanatory variables) with the null model: χ2 2 = 3335.6, p < 0.0001.

The success on a trial was higher as the number of the session increased: χ2 1 = 6.172, p < 0.05.

**Table S5**

*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 and rank) 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*.

***log(response latency) on a trial***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Perdictor** | **Estimate** | **Std. Error** | **z-value** | **p-value** |
| (Intercept) | 7.638 | 0.160 | 47.800 | 0.000 |
| Stimulus  No-Go | 0.509 | 0.020 | 24.969 | **0.000** |
| Sex female | -0.041 | 0.042 | -0.967 | 0.334 |
| Age | 0.006 | 0.012 | 0.555 | 0.579 |
| Rank high | -0.290 | 0.165 | -1.760 | 0.096 |
| Rank medium | -0.249 | 0.175 | -1.427 | 0.172 |
| Trial | -0.001 | 0.001 | -0.969 | 0.332 |
| Session | 0.010 | 0.006 | 1.640 | 0.101 |
| Time point | 0.001 | 0.018 | 0.068 | 0.946 |

Note. Number of subjects 20

Likelihood-ratio test comparing the best fitted model (with type of stimulus as explanatory variables) with the null model: χ2 1 = 600.73, p <. 0.001.

**TEMPORAL REPEATABILITY**

**Table S6**

*Results of LMMs for the Action Control Score (Go/No-go). Confounding factors were divided in individual (sex, age and rank) 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.*

***Action control score***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Predictor** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
| (Intercept) | 47.742 | 13.653 | 3.497 | 0.001 |
| Sex male | -10.487 | 9.604 | -1.092 | 0.292 |
| Age | 0.744 | 1.061 | 0.701 | 0.494 |
| Rank high | -5.107 | 13.361 | -0.382 | 0.701 |
| Rank medium | -13.939 | 14.607 | -0.954 | 0.355 |
| Session | 4.631 | 2.851 | 1.646 | 0.103 |
| Time point | 2.983 | 4.370 | 0.631 | 0.523 |

**Reversal learning task:**

**CONTENT VALIDITY**

**Table S7**

*Results of GLMMs for the success in the Reversal learning task.* *Confounding factors were divided in individual (sex, age and rank) 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, trial and session had a significant effect on the models.*

**Success on a trial**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Predictor** | | **Estimate** | | **Std. Error** | | **z value** | | **p-value** | |  | |
| (Intercept) | | 0.797 | | 0.272 | | 2.885 | | 0.004 | |  | |
| Ruverse rule | | -0.099 | | 0.069 | | -1.437 | | **0.150** | |  | |
| Sex female | -0.185 | | 0.157 | | -1.183 | | 0.237 | |  | |
| Age | | -0.025 | | 0.016 | | -1.607 | | 0.108 | |  | |
| Rank high | | 0.030 | | 0.230 | | 0.130 | | 0.897 | |  | |
| Rank medium | | 0.006 | | 0.244 | | 0.025 | | 0.98 | |  | |
| Trial | | 0.005 | | 0.002 | | 2.047 | | **0.041** | |  | |
| Session | | 0.056 | | 0.017 | | 3.377 | | **0.001** | |  | |
| Time point | | -0.088 | | 0.072 | | -1.233 | | 0.218 | |  | |

Note. Number of subjects 19

Likelihood-ratio test comparing the best fitted model with the null model: χ2 4 = 27.74, p < 0.001.

The success on a trial was higher as the trials (χ2 1 = 4.101, p < 0.05) and session increased ( χ2 1 = 11.687, p < 0.05 ).

**TEMPORAL REPEATABILITY**

**Table S8**

*Results of GLMMs for the Rule Control Score (Reversal learning task). Confounding factors were divided in individual (sex, age, rank) 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.*

***Rule control score***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Predictor** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
| (Intercept) | 26.882 | 98.731 | 0.272 | 0.789 |
| Sex male | -109.509 | 65.719 | -1.666 | 0.118 |
| Age | 6.471 | 8.011 | 0.808 | 0.4323 |
| Rank high | -2.566 | 111.981 | -0.023 | 0.982 |
| Rank medium | 22.372 | 117.197 | 0.191 | 0.851 |
| Time point | -2.001 | 13.721 | -0.146 | 0.887 |

**CONTEXTUAL REPEATABILITY**

**Table S9**

*Contextual unadjusted repeatability estimates of the scores of executive function and inhibitory control. Executive function accuracy (Executive function), Distraction control score (Distraction task), Action control score (Go/No-go) and Rule control score (Reversal Learning) are represented*



* Indicates that the individual’s performances are significantly repeatable between tasks.

\* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

**Table S10**

*Results of LMMs for the Executive function task (Executive function accuracy) and the Distraction task (Distraction Control Score). Confounding factors were divided in individual (sex, age and rank) 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.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Predictor** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
| (Intercept) | -0.030 | 0.151 | -0.195 | 0.845 |
| Task Modified Stroop | -0.044 | 0.055 | -0.804 | 0.422 |
| Sex male | -0.114 | 0.085 | -1.331 | 0.202 |
| Age | -0.016 | 0.011 | -1.522 | 0.148 |
| Rank high | -0.044 | 0.147 | -0.300 | 0.769 |
| Rank medium | 0.130 | 0.154 | 0.854 | 0.410 |
| Session | 0.071 | 0.034 | 2.123 | **0.035** |
| Time point | 0.227 | 0.055 | 4.116 | **0.000** |

**Table S11**

*Results of LMMs for the Distraction task (Distraction control scores) and the Go/No-go task (Action Control Score). Confounding factors were divided in individual (sex, age and rank) 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.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Predictor** | **Estimate** |  | **Std. Error** | **t-value** | **p-value** |
| (Intercept) | -0.121 |  | 0.260 | -0.465 | 0.642 |
| Task Go/No-go | 0.012 |  | 0.096 | 0.128 | 0.898 |
| Sex male | -0.381 |  | 0.162 | -2.338 | 0.032 |
| Age | 0.007 |  | 0.020 | 0.320 | 0.752 |
| Rank high | -0.131 |  | 0.229 | -0.574 | 0.567 |
| Rank medium | -0.142 |  | 0.258 | -0.551 | 0.588 |
| Session | 0.126 |  | 0.058 | 2.160 | **0.032** |
| Time point | 0.268 |  | 0.096 | 2.809 | **0.006** |

**Table S12**

*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 and rank) 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 (when comparing with the full model).*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Predictor** | **Estimate** | **Std.Error** | **t-value** | **p-value** |
| (Intercept) | -0.225 | 0.367 | -0.613 | 0.541 |
| Task Reversal learning | 0.183 | 0.219 | 0.838 | 0.404 |
| Sex male | -0.444 | 0.218 | -2.034 | **0.057** |
| Age | 0.030 | 0.025 | 1.230 | 0.221 |
| Rank high | -0.136 | 0.304 | -0.447 | 0.656 |
| Rank medium | -0.387 | 0.346 | -1.152 | 0.265 |
| Session | 0.163 | 0.112 | 1.457 | 0.148 |
| Time point | 0.122 | 0.162 | 0.751 | 0.454 |

**Table S13**

*Results of LMMs for the Distraction task (Distraction control scores) and the Reversal learning task (Rule Control Score). Confounding factors were divided in individual (sex, age and rank) 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 and time point had a significant effect on the models.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Predictor** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
| (Intercept) | -0.094 | 0.243 | -0.389 | 0.698 |
| Task Reversal learning | 0.114 | 0.131 | 0.872 | 0.385 |
| Sex male | -0.416 | 0.133 | -3.140 | **0.006** |
| Age | 0.006 | 0.016 | 0.396 | 0.693 |
| Rank high | -0.145 | 0.224 | -0.648 | 0.526 |
| Rank medium | 0.050 | 0.234 | 0.212 | 0.8345 |
| Session | 0.099 | 0.065 | 1.530 | 0.128 |
| Time point | 0.309 | 0.095 | 3.266 | **0.001** |

**Table S14**

*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 and rank) 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.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Predictor** | **Value** | **Std.Error** | **t-value** | **p-value** |
| (Intercept) | 0.030 | 0.261 | 0.115 | 0.909 |
| Task Go/No-go | -0.028 | 0.095 | -0.300 | 0.764 |
| Sex male | -0.098 | 0.163 | -0.599 | 0.557 |
| Age | 0.004 | 0.019 | 0.217 | 0.831 |
| Rank high | -0.255 | 0.230 | -1.107 | 0.299 |
| Rank medium | -0.321 | 0.260 | -1.235 | 0.234 |
| Session | 0.102 | 0.057 | 1.788 | 0.075 |
| Time point | 0.094 | 0.093 | 1.016 | 0.311 |

**Table S15**

*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 and rank) 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.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Predictor** | **Estimate** | **Std.Error** | **t-value** | **p-value** |
| (Intercept) | -0.067 | 0.245 | -0.270 | 0.788 |
| Task Reversal learning | 0.033 | 0.130 | 0.258 | 0.797 |
| Sex male | -0.060 | 0.134 | -0.450 | 0.658 |
| Age | -0.005 | 0.016 | -0.316 | 0.753 |
| Rank high | 0.014 | 0.231 | 0.00 | 0.953 |
| Rank medium | 0.085 | 0.242 | 0.352 | 0.729 |
| Session | 0.048 | 0.063 | 0.761 | 0.448 |
| Time point | 0.077 | 0.092 | 0.838 | 0.403 |