**Additional Material**

**Chart, box and whisker chart

Description automatically generatedFigure 1**. Mean values and spread of the parameter estimates for all three model parameters by condition. The *a*-parameter reflects the amount of required information in order to reach a decision (left panel), the *v*-parameter reflects the speed of evidence accumulation (middle panel), and the *z*-parameter reflects the initial prosocial bias (right panel).

**Tables**

**Table 1**. Overview of the point options. In both options, the participant’s absolute gain was always larger than the partner’s gain. The prosocial option, however, maximized the partner’s gain at a cost to the participant.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Egoistic option | | Prosocial option | |
| distribution | participant gain | partner gain | participant gain | partner gain |
| 1 | 1020 | 0 | 1000 | 380 |
| 2 | 1030 | 0 | 990 | 380 |
| 3 | 1040 | 0 | 980 | 380 |
| 4 | 1060 | 0 | 960 | 380 |
| 5 | 1070 | 10 | 950 | 370 |
| 6 | 1090 | 10 | 930 | 370 |
| 7 | 1100 | 20 | 920 | 360 |
| 8 | 1120 | 30 | 900 | 350 |
| 9 | 1130 | 40 | 890 | 340 |
| 10 | 1150 | 50 | 870 | 330 |
| 11 | 1160 | 70 | 860 | 310 |
| 12 | 1170 | 80 | 850 | 300 |
| 13 | 1180 | 100 | 840 | 280 |
| 14 | 1190 | 110 | 830 | 270 |
| 15 | 1190 | 130 | 830 | 250 |
| 16 | 1200 | 140 | 820 | 240 |
| 17 | 1200 | 160 | 820 | 220 |
| 18 | 1200 | 170 | 820 | 210 |
| 19 | 1200 | 180 | 820 | 200 |
| 20 | 750 | 270 | 730 | 650 |
| 21 | 760 | 270 | 720 | 650 |
| 22 | 770 | 270 | 710 | 650 |
| 23 | 790 | 270 | 690 | 650 |
| 24 | 800 | 280 | 680 | 640 |
| 25 | 820 | 280 | 660 | 640 |
| 26 | 830 | 290 | 650 | 630 |
| 27 | 850 | 300 | 630 | 620 |
| 28 | 860 | 310 | 620 | 610 |
| 29 | 880 | 320 | 600 | 600 |
| 30 | 890 | 340 | 590 | 580 |
| 31 | 900 | 350 | 580 | 570 |
| 32 | 910 | 370 | 570 | 550 |
| 33 | 920 | 380 | 560 | 540 |
| 34 | 920 | 400 | 560 | 520 |
| 35 | 930 | 410 | 550 | 510 |
| 36 | 930 | 430 | 550 | 490 |
| 37 | 930 | 440 | 550 | 480 |
| 38 | 930 | 450 | 550 | 470 |

**Table 2**. Overview of the number of trials included per participant and condition as well as the mean and standard deviation (sd) for each condition (bottom row). The maximum number of trials included was 38 per condition.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Participant | Control | Empathy | Multi-motive | Reciprocity |
| 1 | 21 | 37 | 38 | 38 |
| 2 | 28 | 28 | 36 | 25 |
| 3 | 19 | 18 | 14 | 13 |
| 4 | 24 | 21 | 28 | 26 |
| 5 | 36 | 37 | 38 | 37 |
| 6 | 33 | 32 | 33 | 32 |
| 7 | 22 | 26 | 24 | 26 |
| 8 | 21 | 23 | 23 | 17 |
| 9 | 23 | 19 | 22 | 23 |
| 10 | 30 | 31 | 29 | 33 |
| 11 | 32 | 27 | 33 | 36 |
| 12 | 16 | 20 | 19 | 16 |
| 13 | 19 | 20 | 20 | 19 |
| 14 | 38 | 38 | 38 | 38 |
| 15 | 36 | 38 | 38 | 18 |
| 16 | 33 | 32 | 29 | 34 |
| 17 | 28 | 27 | 36 | 37 |
| 18 | 14 | 24 | 26 | 23 |
| 19 | 32 | 30 | 27 | 29 |
| 20 | 21 | 24 | 20 | 21 |
| 21 | 19 | 18 | 20 | 18 |
| 22 | 31 | 33 | 31 | 31 |
| 23 | 15 | 34 | 31 | 32 |
| 24 | 36 | 35 | 31 | 29 |
| 25 | 19 | 34 | 27 | 30 |
| 26 | 20 | 34 | 27 | 28 |
| 27 | 25 | 32 | 31 | 21 |
| 28 | 6 | 36 | 38 | 31 |
| 29 | 33 | 34 | 37 | 33 |
| 30 | 37 | 34 | 38 | 36 |
| 31 | 33 | 36 | 37 | 30 |
| 32 | 23 | 31 | 30 | 30 |
| 33 | 26 | 23 | 22 | 26 |
| mean (sd) | 25.7 (7.9) | 29.3 (6.4) | 27.8 (7.0) | 29.4 (6.9) |

**Table 3**. Results of the pairwise Kolmogorov-Smirnov tests for the frequency of prosocial choices. Distance values D are given above the diagonal and p-values P below the diagonal.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Baseline | Empathy | Reciprocity | Multi-motive |
| Baseline | - | D = 0.21 | D = 0.18 | D = 0.24 |
| Empathy | P = 0.45 | - | D = 0.15 | D = 0.12 |
| Reciprocity | P = 0.65 | P = 0.84 | - | D = 0.12 |
| Multi-motive | P = 0.29 | P = 0.97 | P = 0.97 | - |

**Table 4**. Points of subjective equality (PSE) for the different conditions. Additionally, the infimum (PSE – inf) and the supremum (PSE – sup) of the respective PSE is reported.

|  |  |  |  |
| --- | --- | --- | --- |
| Condition | PSE | PSE - inf | PSE-sup |
| Baseline | 107.17 | 81.70 | 127.27 |
| Empathy | 41.81 | 6.18 | 69.97 |
| Reciprocity | 76.56 | 47.81 | 105.89 |
| Multi-motive | 32.29 | -8.19 | 59.49 |

**Table 5**. Overview of the models estimated and their DIC (deviance information criterion) values. The winning model is highlighted in bold font (the most complex model allowing all three parameters of interest to vary by condition). 1 = v is modulated by other gain, 2 = v additionally varies by condition, 3 = z varies by condition, 4 = a varies by condition, 5 = v and z vary by condition, 6 = v and a vary by condition, 7 = z and a vary by condition, 8a = v, z, and a vary by condition, 8b = v, z, and a vary by condition and other gain is excluded as regressor.

|  |  |  |
| --- | --- | --- |
| model | Formula | DIC |
| 1 | v ~ other gain | 11651.05 |
| 2 | v ~ other gain +condition | 11130.60 |
| 3 | v ~ other gain, z ~ condition | 11160.61 |
| 4 | v ~ other gain, a ~ condition | 11424.35 |
| 5 | v ~ other gain + condition, z ~ condition | 11034.11 |
| 6 | v ~ other gain + condition, a ~ condition | 11052.17 |
| 7 | v ~ other gain, z ~condition, a ~ condition | 11162.16 |
| 8a | v ~ other gain + condition, z ~ condition, a ~ condition | **11033.71** |
| 8b | v ~ condition, z ~ condition, a ~ condition | 12069.75 |

Table 6. Quantile comparison of the observed reaction time data with reaction time data simulated based on the drift diffusion model (500 simulations), as well as the standard deviation (std), standard error of means (SEM) and mean squared error (MSE) of the simulated data. The column “credible” indicates whether the data fall within the 95 % credible interval (if “True” the model is a 95% credible fit for the observed data). *ub* = upper boundary, *lb* = lower boundary.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| statistic | observed data | mean (simulated data) | Std | SEM | MSE | credible |
| accuracy | 0.7497 | 0.7572 | 0.1875 | 0.0001 | 0.0352 | True |
| mean (ub) | 1.5968 | 1.6667 | 0.3857 | 0.0049 | 0.1537 | True |
| std (ub) | 0.6562 | 0.6650 | 0.3155 | 0.0001 | 0.0996 | True |
| 10q (ub) | 0.8721 | 1.0686 | 0.2521 | 0.0386 | 0.1022 | True |
| 30q (ub) | 1.1543 | 1.2876 | 0.2755 | 0.0178 | 0.0936 | True |
| 50q (ub) | 1.4700 | 1.4922 | 0.3188 | 0.0005 | 0.1021 | True |
| 70q (ub) | 1.8441 | 1.7789 | 0.4201 | 0.0042 | 0.1808 | True |
| 90q (ub) | 2.5369 | 2.4325 | 0.7166 | 0.0109 | 0.5244 | True |
| mean (lb) | -2.0119 | -2.1437 | 0.7145 | 0.0174 | 0.5279 | True |
| std (lb) | 0.6889 | 0.7033 | 0.4997 | 0.0002 | 0.2499 | True |
| 10q (lb) | 1.1550 | 1.4907 | 0.5818 | 0.1127 | 0.4512 | True |
| 30q (lb) | 1.5875 | 1.7317 | 0.6126 | 0.0208 | 0.3961 | True |
| 50q (lb) | 1.9645 | 1.9825 | 0.6866 | 0.0003 | 0.4717 | True |
| 70q (lb) | 2.3345 | 2.3269 | 0.8205 | 0.0001 | 0.6732 | True |
| 90q (lb) | 2.9565 | 2.9409 | 1.1357 | 0.0002 | 1.2900 | True |

**Table 7**. Relative differences between the baseline condition and the motive conditions for each of the three drift-diffusion modelling parameters of interest.

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter |  |  |  |
| *a* | -2.89 % | -3.37 % | 2.86 % |
| *v* | -2.80 % | -1.71 % | - 2.81 % |
| *z* | 4.26 % | 1.89 % | 8.49 % |

**Table 8.** Neural results of the second-level regression between prosocial choice-related activity in the multi-motive condition > reciprocity condition and increase in prosocial choice bias in the multi-motive condition relative to reciprocity (Δ*z*multi-motive/reciprocity) (P < .001 uncorrected, k > 10 voxels).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Region | Hemisphere | x y z | Cluster size | *t*-value | P(FWEcluster-corrected) | |
| Putamen | Right | 30 2 -2 | 100 | 5.32 | .008 | |
|  | Left | -28 -6 3 | 73 | 4.85 | .035 | |
| Middle cingulate gyrus | Right | 8 -24 31 | 28 | 5.29 | .469 |
| Posterior cingulate gyrus | Right | 8 -39 21 | 27 | 4.36 | .496 | |
| Precentral gyrus | Left | -58 -1 18 | 22 | 4.18 | .641 | |
| Hippocampus | Left | -30 -21 -15 | 12 | 4.24 | .922 | |
|  | Right | 25 -9 -12 | 13 | 3.92 | .900 | |

**Table 9.** Neural results of the second-level regression between prosocial choice-related activity in the multi-motive condition > empathy condition and increase in prosocial choice bias in the multi-motive condition relative to reciprocity (Δ*z*multi-motive/empathy) (P < .001 uncorrected, k > 10 voxels).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Region | Hemisphere | x y z | Cluster size | *t*-value | P(FWEcluster-corrected) |
| Hippocampus | Right | 30 -6 -15 | 24 | 4.68 | .527 |
|  | Left | -30 -9 10 | 18 | 3.91 | .729 |
| Posterior cingulate gyrus | Left | -8 41 26 | 13 | 4.19 | .886 |

**Table 10.** Neural results of the second-level regression between prosocial choice-related activity in the multi-motive condition > reciprocity condition as well as multi-motive condition < reciprocity and the increase of the decision threshold in the multi-motive condition relative to reciprocity (Δ*a*multi-motive/reciprocity) (P < .001 uncorrected, k > 10 voxels).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Region | Hemisphere | x y z | Cluster size | *t*-value | P(FWEcluster-corrected) | |
| multi-motive condition > reciprocity |  |  |  |  |  | |
| Calcarine gyrus | Left | -23 -71 8 | 67 | 5.47 | .051 | |
| Putamen | Left | -30 27 -5 | 13 | 4.32 | .902 | |
| multi-motive condition < reciprocity |  |  |  |  |  |
| Amygdala | Right | 35 -1 -20 | 12 | 4.62 | .923 | |
| Hippocampus | Left | -23 -4 20 | 19 | 4.45 | .738 | |
| Putamen | Left | -28 4 3 | 14 | 3.95 | .878 | |

**Table 11.** Neural results of the second-level regression between prosocial choice-related activity in the multi-motive condition < empathy and the increase of the decision threshold in the multi-motive condition relative to empathy (Δ*a*multi-motive/empathy) (P < .001 uncorrected, k > 10 voxels).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Region | Hemisphere | x y z | Cluster size | *t*-value | P(FWEcluster-corrected) | |
| Posterior cingulate gyrus | Left | -5 -34 23 | 13 | 4.66 | .886 | |
| Precentral gyrus | Left | -30 -14 43 | 12 | 4.56 | .911 | |
| Putamen | Right | 28 -6 11 | 11 | 4.42 | .934 | |
|  | Left | -30 -6 -5 | 28 | 4.13 | .411 |
| Middle cingulate gyrus | Left | -15 -6 41 | 13 | 4.19 | .886 | |