

## Supplemental Data

### Neural Differentiation of Expected Reward and Risk in Human Subcortical Structures

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#### Supporting Tables

All locations are reported in Talairach coordinates.

**Table S1: Activation for reward**

Region	Laterality	mean x	mean y	mean z	cluster size	max stat
lateral dorsal thalamic nucleus	L	-6	-20	15	17	6.21
	R	12	-16	14	63	6.77
subthalamic nucleus	R	14	-18	-2	51	10.64
lateral geniculate	L	-22	-16	-6	50	9.55
caudate head	L	-10	1	1	39	6.72
	R	12	4	2	33	7.03
caudate	R	12	2	13	27	6.09
putamen (posterior part)	R	27	-18	-2	22	6.72
midbrain	L/R	-3	-23	-18	12	6.07
parahippocampal gyrus	L	-33	-36	-9	11	6.73
	R	23	-32	-6	17	6.68
pulvinar	L	-7	-22	-1	15	6.56
posterior cingulate gyrus	L/R	1	-39	29	101	7.20
cingulated gyrus	L/R	-2	-23	28	5	5.80
superior frontal gyrus	L/R	-3	21	49	111	8.54
inferior frontal gyrus	L	-44	22	16	10	5.82
inferior medial frontal gyrus	R	46	18	24	5	6.70
Insula	L	-33	-6	11	10	6.12
short insular gyri	L	-26	18	1	8	5.59
precentral gyrus	R	48	1	28	28	6.38
inferior precentral gyrus	L	-46	2	18	14	7.11
middle temporal gyrus	L	-52	-57	4	11	7.49
middle temporal gyrus	L	-33	-73	11	7	9.93
posterior middle temporal gyrus	R	56	-42	9	7	6.04
fusiform gyrus	R	38	-58	-13	12	6.16
precuneus	R	19	-64	22	6	5.82
lingual gyrus	R	4	-85	-3	8	5.97
cerebellum	R	17	-41	-30	9	8.13
cerebellum	L/R	-4	-47	-16	6	6.08

**Table S2: Activation for expected reward (immediate)**

Region	Laterality	mean x	mean y	mean z	cluster size	max stat
putamen	L	-26	-9	5	176	7.92
	R	23	-7	11	29	6.01
ventral striatum	L	-12	3	-3	35	5.47
	R	12	5	-3	6	4.45
medial geniculate	R	16	-22	-4	8	4.92
pons	L/R	2	-24	-28	29	5.77
midbrain	L	-5	-19	-16	5	4.43
anterior cingulate	L	-2	32	-2	15	5.41
angular gyrus	L	-45	-59	29	36	6.07
middle frontal gyrus	L	-33	7	47	14	5.07
	R	18	25	50	11	4.86
superior frontal gyrus	L/R	-3	23	53	11	4.36
	L	-12	38	17	7	4.63
superior temporal gyrus	L	-44	-37	4	25	5.88
occipital gyrus	R	22	-75	31	19	5.63
cerebellum	L	-14	-38	-29	14	4.57
	L	-36	-66	-24	8	5.23

**Table S3: Activation for expected reward (delayed)**

Region	Laterality	mean x	mean y	mean z	cluster size	max stat
cerebellum	R	23	-82	-21	22	5.39
cerebellum	R	32	-32	-22	11	6.44
lingual gyrus	R	9	-80	-16	10	4.63
middle temporal gyrus	L	-44	8	-24	8	5.35
medial orbital gyrus	L	-24	22	-11	7	5.71
gyrus rectus	L	-5	23	-11	6	4.97
parahippocampal gyrus	L	-16	-23	-13	6	4.74

**Table S4: Activation for reward variance (immediate)**

Region	Laterality	mean x	mean y	mean z	cluster size	max stat
parahippocampal gyrus	L	-17	-29	-17	110	-6.75
	R	18	-22	-14	9	-5.26
transverse temporal gyrus	R	57	-13	10	76	-6.52
	R	38	-25	23	5	-4.94
	L	-53	-8	3	19	-5.16
short insular gyri	L	-32	17	1	68	6.47
short insular gyri	R	34	13	1	9	4.61
midbrain	R	9	-32	-12	44	-8
ant cingulate	L/R	2	22	-6	14	-4.95
supramarginal gyrus	R	35	-36	45	9	-5.52
	R	40	-26	49	5	-5.06
superior frontal gyrus	L	-9	-29	47	7	-4.61

**Table S5: Activation for reward variance (delayed)**

Region	Laterality	mean x	mean y	mean z	cluster size	max stat
short insular gyri	L	-30	21	9	72	-6.59
	R	31	24	9	11	-4.25
ventral striatum	L	-10	-3	-3	45	-6.59
	R	12	-3	-3	42	-5.76
mediodorsal thalamic nucleus	L/R	1	-16	5	27	-5.18
substantia nigra	L/R	1	-18	-11	17	-5.58
superior lingual gyrus	R	7	-63	-2	14	5.00
inferior frontal gyrus	L	-33	49	8	8	4.53
middle frontal gyrus	L	-38	-10	38	12	-4.56
pulvinar	L	-15	-30	6	7	-5.75

### **Individual vs. Group Results for Figure 5**

The data presented in Figure 5 is pooled over all subjects. Most of the data presented is also significant for individual subjects. Specifically, differences in strategy (switch or stay) after wins vs. losses are not significant in 17 of 19 subjects ( $p < 0.05$ , not corrected for multiple comparison). There are no significant differences ( $p < 0.05$ ) for any subject for reaction times after win vs. loss trials and for switch vs. stay trials. No significant linear or quadratic relationship between reaction times and probability of win emerges for any subject.

Where applicable we also tested for long-term effects of learning and found no significant results. We see a general trend of decreasing reaction time over time, which does not affect the results reported in Fig 5.

Table S6 shows the number of subjects (out of 19) for which the results in Fig 5 were significant.

**Table S6: Relationship between Subject Behavior and Outcome History (individual subjects' results)**

	After Win	After Loss
Prefer to Stay	0	2
Prefer to Switch	2	0
Indifferent ( $p > 0.05$ )	17	17

	After Win	After Loss
Slower Reaction Time	0	0
Faster Reaction Time	0	0
No Difference ( $p > 0.05$ )	19	19

	When Switching	When Staying
Slower Reaction Time	0	0
Faster Reaction Time	0	0
No Difference ( $p > 0.05$ )	19	19

	As Probability Of Winning Increases...
Reaction Time Increases	0
Reaction Time Decreases	0
No Change In Reaction Time ( $p > 0.05$ )*	19

\*Test for both linear and quadratic changes in probability of winning

Note: Results reported in tables do not change with time.