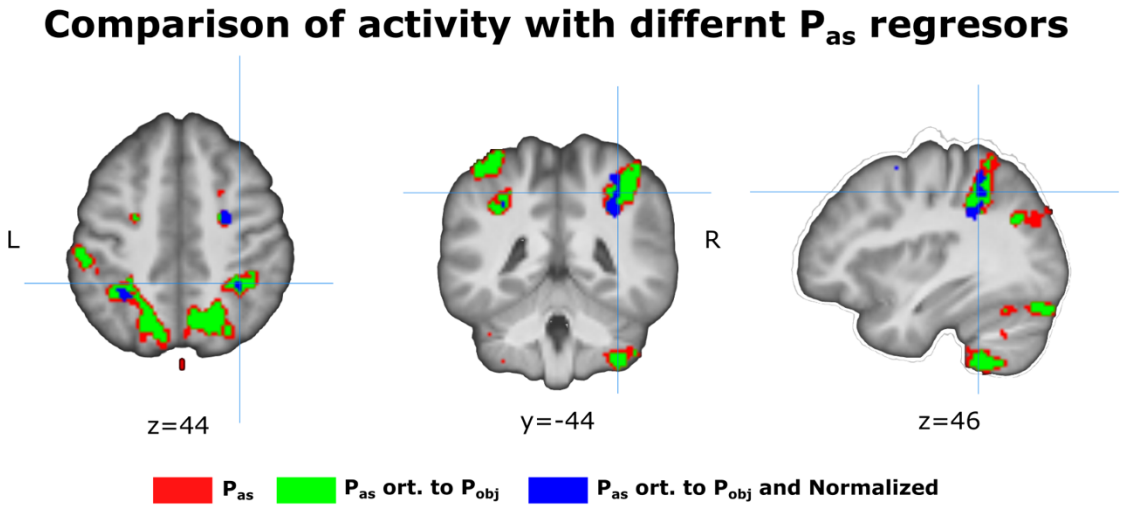
Supplementary Information



Supplementary Figure 1. Comparison of brain activity extracted used different for to calculate the assigned probability (P_{as}). Red represents P_{as} calculate used the tau_i estimate for each subject (P_{as} = P_a * tau_i *0.5). Green represents the Pas regressor that was additionally orthogonalized to P_{obj}. Blue represents Pas that was additionally normalized to reduce collinearity with P_a.

Supplementary Table 1

Comparison among Behavior Logistic Models (fMRI experiment)

Model	AIC	BIC	DIC
$Choice_{left} = P_{all\_l} + Rw_{\_l} + P_a + P_a*P_{all\_l} + Rw_{\_l}*P_a$	1540.3	1684.1	1802.087
$Choice_{left} = P_{all\_l} + Rw_{\_l} + P_a + P_a*P_{all\_l}$	1532.5	1639.1	1822.287
$Choice_{left} = P_{all\_l} + Rw_{\_l} + P_a + P_a*P_{all\_l} + Rw_{\_l}*P_a + P_{all\_l}*Rw_{\_l} + P_{all\_l}*Rw_{\_l}*P_a$	1565.2	1799.6	
$Choice_{\_left} = P_{obj\_l} + Rw_{\_l} + P_a + P_a*P_{obj\_l} + R_{w\_l}*P_a$	1552.5	1696.3	
$Choice_{\_left} = P_{obj\_l} + Rw_{\_l} + P_{\_all\_}l + P\_obj\_l*Rw_{\_l} + P_{\_all\_l}*Rw_{\_l}$	1559.9	1703.7	
$Choice_{\_left} = P_{obj\_l} + Rw_{\_l} + P_{\_all\_l} + P_{\_obj\_l}*P_{\_all\_l}$	1555.5	1694.0	
$Choice_{\_left} = P_{\_obj\_l} + Rw_{\_l} + P_{\_a} + P_{\_a}*P_{\_obj\_l}$	1543.1	1649.7	

Supplementary Table 2

	Estimate std.	Error	Z -value	P-value
(Intercept)	-8.4	1.0	-8.1	2.9e-16
Palll	12.1	1.3	9.2	< 2e-16
Reward (Rwl)	5.2	1.0	5.0	4.1e-7
Pa	1.3	1.2	1.0	0.2
Palll: Pa	-2.3	2.4	-1.3	0.1

Behavioral results of Logic Mixed Model. Dependent Variable: choice left (l) option, n = 38 participants, participants as a group factor for random effect, degree of freedom = 1493 , AIC = 1532.

Supplementary Table 3: BOLD results

fMRI Decision Model 1

Regressor: Rw

Cluster Index	Voxels	P	Z-MAX	x	y	z
16	1532	1.48e-17	4.42	-14	-70	44
15	925	2.6e-12	4.46	0	38	34
14	701	4.26e-10	4.98	-10	6	-6
13	670	8.99e-10	5.32	14	12	-6
12	595	5.74e-09	4.52	32	-10	54
11	483	1.19e-07	4.02	-14	6	70
10	480	1.19e-07	4.35	34	-38	56
9	346	5.3e-06	4.08	24	-80	-16
8	222	0.000294	4.83	-40	52	6
7	193	0.00083	4.2	16	-68	46
6	147	0.00483	4	-48	-72	8
5	136	0.00755	4.18	50	-68	-2
4	117	0.0168	4.27	-12	-18	0
3	114	0.0191	4.53	58	14	0
2	93	0.0486	4.29	28	-56	-28
1	93	0.0486	3.81	18	-78	-54

Regressor: P_{obj}

Cluster Index	Voxels	P	Z-MAX	x	y	z
3	300	1.07e-05	4.14	-46	-40	58
2	213	0.000232	4.63	-56	-20	36
1	103	0.0228	4.14	-58	-22	20

Regressor: P_{as} (Normalized and orthogonolazed to Pobj)

Cluster Index	Voxels	P	Z-MAX	x	y	z
3	148	0.00244	3.97	26	-6	48
2	124	0.00715	3.98	32	-46	38
1	91	0.035	3.71	-32	-54	58

fMRI Decision Model 2

Regressor: P_a (no-normalized, no orthogonalaized)

8	5156	4.34e-44	5.56	-14	-68	48
7	474	2.71e-08	4.63	-48	-72	0
6	366	7.75e-07	5.13	26	-4	48
5	351	1.25e-06	4.33	52	-70	-2
4	305	5.84e-06	4.71	-24	-4	46
3	152	0.00199	3.91	18	-84	-18
2	147	0.00248	3.98	38	-76	-24
1	96	0.0267	3.68	-26	-76	-22

fMRI Feedback Model

Regressor: Win

Cluster Index	Voxels	P	Z-MAX	x	y	z
10	895	8.77e-13	4.23	4	-88	-6
9	455	5.96e-08	4.49	-16	6	-14
8	230	0.000116	4.52	22	12	-8
7	174	0.000997	3.88	-8	-76	42
6	147	0.00305	4.05	-52	14	28
5	137	0.0047	4.19	34	-48	-28
4	136	0.00491	4.37	50	-30	56
3	101	0.0243	3.91	-44	-46	58
2	100	0.0255	4.21	-38	4	54
1	90	0.0414	3.76	-38	-80	-20
Regressor: uPE_P_{as}						
2	146	0.00247	4.09	-52	16	26
1	87	0.0407	4.11	42	8	26
Regressor: Rw						
1	378	9.54e-07	4.5	2	30	-18

Supplementary Table 4

	TMS vertex		TMS IPS		TMS PCC		IPS vs ertex	PPC vs ertex	IPS vs PC
Parameter	**mean**	95% HDI	**mean**	95% HDI	**mean**	95% HDI	p_{MCMC}	p_{MCMC}	p_{MCMC}
alpha	**0.56**	0.1 1.1	**0.47**	0.1 1.09	**0.47**	0.1 0.96		>0.4 uncorrecetd	
gamma	**2.1**	0.1 3.7	**3.7**	0.1 7.0	**1.7**	0.1 3.7		>0.3 uncorrecetd	
$beta_1$	**14.6**	5.6 27.2	**32.3**	7.3 84	**13.9**	7.0 21.9		>0.4 uncorrecetd	
tau_i	**0.59**	0.49 0.67	**0.81**	0.67 0.92	**0.88**	0.73 0.99	<0.001*	<.0001*	>0.3*

*= bonferroni corrected

Supplementary Table 5

bias parameter	mean	95% HDI	p_{MCMC} (uncorrected)	delta DIC
$beta_0$ vertex	-0.6	-0.2 .1	0.5	12
$beta_0$ IPS	0.05	-.2 1.3	0.5	161
$beta_0$ PPC	-0.1	-0.3 0.07	0.1	0.1
tau_b vertex	0.42	0.3 0.5	0.09	17
tau_b IPS	0.56	0.48 0.64	0.11	43
tau_b PPC	0.49	0.43 0.53	0.7	5

Supplementary Table 6

Behavior Logistic Models (TMS experiment)

TMS (colapses IPS and PPC)

	Estimate	(Std. Error)	Z	value Pr(>|z|)	
(Intercept)	-5.64307	1.06181	-5.315	1.07e-07	***
P_all_l	8.38036	1.38027	6.072	1.27e-09	***
Rew_l	3.44811	1.06748	3.230	0.00124	**
P_a	-2.98226	1.18825	-2.510	0.01208	*
TMS	-1.19943	0.81706	-1.468	0.14211	
P_all_l*P_a	4.40061	2.44418	1.800	0.07179	.
P_all_l*TMS	1.95055	1.18960	1.640	0.10107	
Rew_l*TMS	0.08555	0.70390	0.122	0.90326	
P_a*TMS	3.19954	1.36135	2.350	0.01876	*
P_all*P_a*TMS	-5.45781	2.64676	-2.062	0.03920	*

TMS IPS

	Estimate	(Std. Error)	Z	value Pr(>|z|)	
(Intercept)	-6.2182	1.0101	-6.156	7.44e-10	***
P_all_l	9.0865	1.2055	7.537	4.80e-14	***
Rew_l	3.7479	1.1072	3.385	0.000712	***
P_a	-1.6245	0.9791	-1.659	0.097081	.
TMS	-0.8287	0.9209	-0.900	0.368193	
P_all_l*P_a	1.9782	1.9753	1.001	0.316595	
P_all_l*TMSips	2.2292	1.3584	1.641	0.100784	
Rew_l*TMSips	-0.8230	0.6869	-1.198	0.230831	
P_a*TMSips	2.6924	1.4501	1.857	0.063360	.
P_all*P_a*TMSips	-4.4036	2.8965	-1.520	0.128429	

TMS PPC

	Estimate	(Std. Error)	Z	value Pr(>|z|)	
(Intercept)	-6.2418	0.9756	-6.398	1.57e-10	***
P_all_l	9.4444	1.2857	7.346	2.05e-13	***
Rew_l	3.3273	0.9797	3.396	0.000683	***
P_a	-1.3136	0.9895	-1.328	0.184315	
TMS	-0.8614	0.9663	-0.892	0.372649	
P_all_l*P_a	1.8070	2.0325	0.889	0.373977	
P_all_l*TMSips	0.7982	1.3257	0.602	0.547118	
Rew_l*TMSips	0.8768	0.7793	1.125	0.260532	
P_a*TMSips	1.3869	1.3687	1.013	0.310940	
P_all*P_a*TMSips	-2.8877	2.7791	-1.039	0.298782	