Table S1. Simulation Model Fits: 2 Conditions

	Model			
Simulated Data	*sPPI+tasks*	*sPPIplus*	*gPPI2*	*Single Condition*
PPI Effects				
1 Condition plus fixation	0.00	0.00	0.00	0.00
2 Conditions (A-B)	-10.17	-9.19	-9.19	18.63
2 Conditions (effectively the same as 2 Conditions (A-B))	-10.17	-9.19	-9.19	18.63
2 Conditions	-7.28	-77.64	-77.64	-63.36
2 Conditions plus fixation	-19.30	-264.42	-264.42	-112.01
No PPI Effects				
2 Conditions plus fixation	-136.92	-137.57	-137.57	-29.95

Mean AIC change from the sPPI model. In this context, values from -1 to -2 indicate substantial support for sPPI and should be considered in the model selection process and interpretation; values from -4 to -7 have considerly less support for sPPI; and values below -10 essentially have no support for sPPI in the model selection process (Burnham and Anderson, 2002).

Table S2. Simulation Model Fits: 3 Conditions, Fixation

	Models			
Model Parameters	*sPPI+tasks*	*sPPIplus*	*gPPI2*	*gPPI3*
PPI Effect				
PPIA=1;PPIB=0.75; PPIC=0	-0.7562	-165.1731	-165.1731	-164.2188
PPIA=1;PPIB=0.75; PPIC=0.5	-4.3131	-115.2728	-115.2728	-152.9358
PPIA=0.125; PPIB=-0.125;PPIC=0	-10.9448	-11.1374	-11.1374	-10.1831
PPIA=0.125; PPIB=-0.125;PPIC=0.5	-14.44108	-20.76908	-20.76908	-58.43208
No PPI Effect				
PPIA=0;PPIB=0; PPIC=0	-10.9448	-11.1374	-11.1374	-10.1831
PPIA=0;PPIB=0; PPIC=0.5	-14.44108	-20.76908	-20.76908	-58.43208
PPIA=0;PPIB=0; PPIC=-0.5	-2.7064	-8.9411	-8.9411	-44.6131

Mean AIC change from sPPI model.In this context, values from -1 to -2 indicate substantial support for sPPI and should be considered in the model selection process and interpretation; values from -4 to -7 have considerly less support for sPPI; and. values below -10 essentially have no support for sPPI in the model selection process (Burnham and Anderson, 2002)

Table S3. sPPI: PV>N contrast

Cluster Size	*Peak T-statistic*	*Peak X,Y,Z*	*Region*	*gPPI2*	*gPPI3*
256	4.5923	18,56,6	R. Superior Frontal Gyrus	-0.63	2.53
	3.1503	26,44,2	R. Middle Frontal Gyrus		
145	3.4918	26,-32,40	R. Postcentral Gyrus	0.29	3.59
594	**3.4741**	**40,-56,-20**	**R. Fusiform**	**-63.97**	**-62.05**
	3.4027	**20,-84,-16**	**R. Cerebellum**		
	2.9215	**32,-68,-18**	**R. Fusiform**		
	2.5887	**16,-96,-6**	**R. Calcarine Sulcus**		
149	3.4199	18,-8,52	R. Supplemental Motor Area	-4.71	-1.96
	3.0916	22,-16,62	R. Precentral Gyrus		
211	**3.3672**	**-2,-8,62**	**L. Supplemental Motor Area**	**-24.97**	**-22.83**
113	3.341	-14,28,26	L. Anterior Cingulate	-2.77	0.68
288	3.3201	30,14,26	R. Inferior Frontal Gyrus - Pars Triangularis	-6.19	-3.79
	3.0813	34,22,22	R. Middle Frontal Gyrus		
	3.0031	18,20,18	R. Caudate		
	2.4654	20,30,16	R. Anterior Cingulate Cortex		
109	**3.2134**	**-22,-84,-12**	**L. Fusiform**	**-58.10**	**-55.49**
60	**3.1279**	**4,-20,14**	**R. Thalamus**	**-1.48**	**1.58**
184	**3.0597**	**-32,-18,44**	**L. Precentral Gyrus**	**-20.62**	**-17.70**
	3.0011	**-30,-20,60**	**L. Precentral Gyrus**		
	2.9813	**-18,-16,64**	**L. Paracentral Lobule**		
221	3.01	48,-76,10	R. Middle Temporal Gyrus	-17.10	-14.53
	3.0074	40,-72,12	R. Middle Occipital Gyrus		
	2.6437	28,-68,22	R. Superior Occipital Gyrus		
67	2.9583	30,-88,16	R. Middle Occipital Gyrus	-59.19	-57.06
61	2.9485	44,-30,-6	R. Superior Temporal Gyrus	-0.24	2.62
139	2.8433	28,-48,40	R. Angular Gyrus	-15.10	-12.38

The last two columns are the mean AIC change from sPPI for the cluster. **Bolded** clusters do not overlap at all with clusters in the gPPI models. The cluster with peak at 30,-88,16 only had 2 voxels that overlapped with a cluster in gPPI3 (peaks at 38,-66,-14 and 28,-78,10), which indicates its likely a different cluster and explains the large decrease in AIC. The same is true of other clusters with large decreases, where there is a significant amount of non-overlap.

Table S4. gPPI2: PV>N contrast

Cluster Size	*Peak T-statistic*	*Peak X,Y,Z*	*Region*	*gPPI2*	*gPPI3*
925	4.8717	18,56,6	R. Superior Frontal Gyrus	-2.22	0.65
	3.5184	30,14,26	R. Inferior Frontal Gyrus - Pars Triangularis		
	3.4282	18,18,20	R. Caudate		
	3.329	34,22,20	R. Middle Frontal Gyrus		
	3.0369	26,42,2	R. Middle Frontal Gyrus		
	2.936	20,30,14	R. Caudate		
	2.7604	-8,62,2	R. Medial Superior Frontal Gyrus		
	2.7047	38,16,14	R. Inferior Frontal Operculum		
	2.6842	6,62,4	R. Medial Superior Frontal Gyrus		
	2.5565	18,34,6	R. Anterior Cingulate Cortex		
	2.5014	22,46,-8	R. Superior Frontal Gyrus - Orbital Part		
263	3.7089	-14,26,26	L. Anterior Cingulate Cortex	-1.55	2.04
	3.0004	-28,12,32	L. Middle Frontal Gyrus		
	2.9125	-18,14,34	L. Middle Cingulate Cortex		
370	3.5158	24,-32,38	R. Postcentral Gyrus	-0.42	3.00
	3.0127	26,-44,36	R. Angular Gyrus		
	2.9488	18,-24,36	R. Middle Cingulate Cortex		
	2.6324	32,-18,42	R. Precentral Gyrus		
	2.6184	26,-52,36	R. Angular Gyrus		
	2.5579	20,-40,26	R. Posterior Cingulate Cortex		
174	3.3973	44,-32,-6	R. Middle Temporal Gyrus	-0.34	2.54
	2.9019	44,-40,-10	R. Inferior Temporal Gyrus		
57	3.2983	18,-8,52	R. Supplemental Motor Area	-3.71	-0.83
60	3.1821	22,-18,64	R. Precentral Gyrus	-3.38	-0.65
144	**3.0492**	**-50,-64,30**	**L. Angular Gyrus**	**-11.51**	**-9.21**
	2.54	**-42,-68,40**	**L. Angular Gyrus**		
154	3.0348	20,44,32	R. Superior Frontal Gyrus	-4.31	-1.56
	2.7736	20,36,42	R. Superior Frontal Gyrus		
	2.7168	30,40,30	R. Middle Frontal Gyrus		
	2.7052	22,26,44	R. Middle Frontal Gyrus		
67	2.908	38,-68,12	R. Middle Occipital Gyrus	-8.29	-5.27
90	2.8647	34,10,42	R. Middle Frontal Gyrus	-6.09	-3.36

NOTES: The last two columns are the mean AIC change from sPPI for the cluster. **Bolded** clusters do not overlap at all with clusters in the sPPI or gPPI3 models.

Table S5. gPPI3: PV>N contrast

Cluster Size	*Peak T-statistic*	*Peak X,Y,Z*	*Region*	*gPPI2*	*gPPI3*
101	3.8151	18,56,6	R. Superior Frontal Gyrus	-1.44	1.81
	2.5598	24,60,-6	R. Superior Frontal Gyrus - Orbital Part		
209	3.6349	44,-30,-6	R. Superior Temporal Gyrus	-0.24	2.66
91	3.4799	-14,22,24	L. Anterior Cingulate Cortex	-2.01	1.52
722	3.4677	28,14,28	R. Inferior Frontal Gyrus - Pars Triangularis	-4.17	-1.60
	3.357	16,18,18	R. Caudate		
	3.2064	34,8,42	R. Middle Frontal Gyrus		
	3.1933	42,26,46	R. Middle Frontal Gyrus		
	3.0015	36,24,20	R. Middle Frontal Gyrus		
	2.8436	20,30,14	R. Caudate		
	2.7053	18,34,6	R. Anterior Cingulate Cortex		
	2.5557	30,36,16	R. Middle Frontal Gyrus		
422	3.3708	26,-32,40	R. Postcentral Gyrus	-0.91	2.41
	3.1564	16,-16,36	R. Middle Cingulate Cortex		
	2.9925	32,-18,44	R. Precentral Gyrus		
	2.9236	36,-18,52	R. Precentral Gyrus		
	2.8287	36,-34,30	White Matter		
	2.6906	36,-22,28	R. Insula		
179	3.36	38,-66,14	R. Middle Occipital Gyrus	-12.15	-9.23
	2.5523	28,-78,10	R. Calcarine Sulcus		
109	3.3027	18,-8,52	R. Supplemental Motor Area	-3.79	-0.95
	3.0984	24,-16,62	R. Precentral Gyrus		
162	3.2409	26,-54,36	R. Angular	-13.87	-11.18
	2.9821	28,-46,38	R. Angular		
79	**3.2267**	**8,-38,10**	**R. Posterior Cingulate Cortex**	**-2.67**	**-0.20**
160	**3.0971**	**28,-16,4**	**R. Putamen**	**-1.86**	**0.38**
	2.7517	**32,-4,6**	**R. Putamen**		
	2.6935	**22,0,-2**	**R. Globus Pallidum**		
88	2.8464	18,46,32	R. Superior Frontal Gyrus	-4.79	-2.48
	2.7761	30,40,30	R. Middle Frontal Gyrus		

NOTES: The last two columns are the mean AIC change from sPPI for the cluster. **Bolded** clusters do not overlap at all with clusters in the sPPI or gPPI2 models. The cluster with peaks at 38,-66,-14 and 28,-78,10 only had 2 voxels that overlapped with a cluster in sPPI (peak at 30,-88,16), which indicates its likely a different cluster and explains the large decrease in AIC. The same is true of other clusters with large decreases, where there is a significant amount of non-overlap.

Table S6. Psychophysiological Interaction Model Fits: Change in AIC from sPPI

	Number of Subjects						
gPPI AIC - sPPI AIC	*10*	*20*	*30*	*40*	*50*	*60*	*70*
0	3945	3944	3358	2446	1810	1267	319
-1	3945	3850	2872	2163	1627	1151	208
-2	3945	3528	2553	1928	1484	1023	137
-4	3882	2790	2102	1648	1291	839	53
-5	3722	2593	1939	1569	1206	781	34
-7	3191	2245	1737	1401	1058	689	16
-10	2602	1846	1547	1213	900	552	1

Number of voxels that have N subjects with AIC in gPPI being less than X of the AIC in sPPI within a mask of voxels that had a significant difference in PV>N for sPPI or gPPI models at $p<0.01$ in at least 50 voxels. Maximum number of voxels is 3945.