

Supporting Information

Goldstein et al. 10.1073/pnas.1703643115

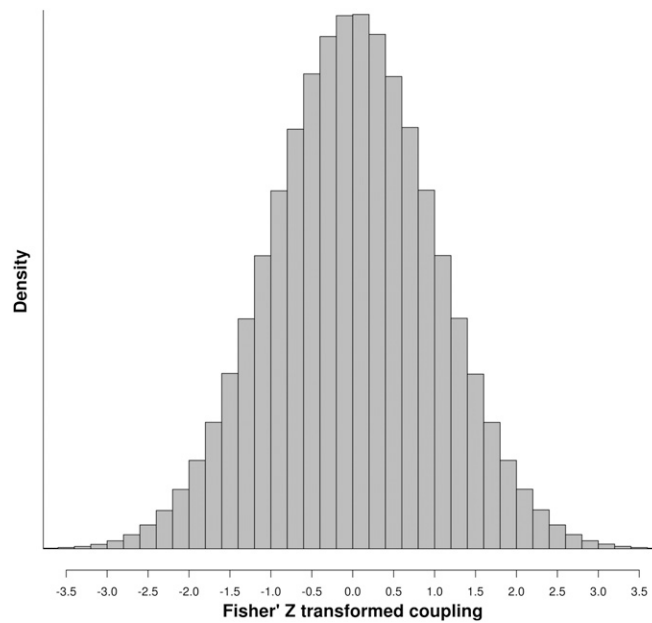


Fig. S1. Distribution of circular correlation coefficient normalized by Fisher's Z transformation.

Table S1. Cont.

Female	Male	<i>F</i> value	<i>P</i> value
P8	PO9	16.736	5.13E-11
P8	Oz	6.339	6.43E-03
P8	O2	8.592	1.61E-04
P8	PO10	12.78	7.72E-08

The first step of the interbrain analysis tested hypothesis H_1 that at least a single condition of interest (partner touch–no-pain, partner no-touch–no-pain, partner touch–pain, and partner no-touch–pain) would demonstrate higher interpartner coupling than the baseline no-pain-alone condition for each combination of interpartner electrodes. The first two columns represent the electrodes that took part in the brain-to-brain coupling, and the last two columns show the statistics and the significance of the test.

Table S2. Second step of interbrain analysis

Contrast	Female	Male	Estimate	SE	T value	FDR-adjusted P value	Power
Pain–no-touch vs. npa	F4	F7	0.051	0.010	5.21	1.48E-05	0.92
Pain–no-touch vs. npa	F4	F3	0.063	0.012	5.19	1.48E-05	0.90
Pain–no-touch vs. npa	F4	Fz	0.064	0.012	5.19	1.48E-05	0.89
Pain–no-touch vs. npa	FC5	F3	0.052	0.011	4.70	1.16E-04	0.86
Pain–no-touch vs. npa	FC5	FC5	0.042	0.010	4.09	1.39E-03	0.82
Pain–touch vs. npa	FC5	FC1	0.081	0.012	6.97	9.63E-10	0.94
Pain–touch vs. npa	FC5	FC2	0.062	0.009	7.02	9.63E-10	0.96
Pain–touch vs. npa	FC5	Cz	0.070	0.010	6.85	1.29E-09	0.93
Pain–touch vs. npa	FC1	FC1	0.069	0.012	5.90	3.75E-07	0.91
Pain–touch vs. npa	FC1	FC2	0.068	0.012	5.90	3.75E-07	0.91
Pain–touch vs. npa	FC1	FC6	0.069	0.012	5.90	3.75E-07	0.89
Pain–touch vs. npa	FC1	Cz	0.076	0.011	7.14	8.34E-10	0.93
Pain–touch vs. npa	FC1	C4	0.077	0.011	7.15	8.34E-10	0.93
Pain–touch vs. npa	FC1	CP1	0.035	0.009	3.81	4.41E-03	0.77
Pain–touch vs. npa	FC1	CP2	0.056	0.009	6.41	2.23E-08	0.89
Pain–touch vs. npa	FC1	CP6	0.045	0.011	3.96	2.37E-03	0.81
Pain–touch vs. npa	FC1	P4	0.045	0.009	4.75	9.41E-05	0.85
Pain–touch vs. npa	FC2	FC2	0.068	0.010	6.87	1.27E-09	0.91
Pain–touch vs. npa	FC2	Cz	0.063	0.011	5.58	2.05E-06	0.87
Pain–touch vs. npa	FC6	F8	0.037	0.009	4.12	1.27E-03	0.83
Pain–touch vs. npa	FC6	FC1	0.067	0.012	5.69	1.15E-06	0.86
Pain–touch vs. npa	FC6	FC2	0.068	0.012	5.69	1.15E-06	0.88
Pain–touch vs. npa	FC6	Cz	0.069	0.010	6.88	1.27E-09	0.92
Pain–touch vs. npa	FC6	C4	0.044	0.010	4.22	8.94E-04	0.87
Pain–touch vs. npa	FC6	T8	0.043	0.010	4.21	8.94E-04	0.88
Pain–touch vs. npa	FC6	TP9	0.042	0.010	4.20	8.94E-04	0.87
Pain–touch vs. npa	FC6	CP5	0.043	0.010	4.21	8.94E-04	0.87
Pain–touch vs. npa	FC6	CP2	0.041	0.010	4.28	7.37E-04	0.88
No-pain–touch vs. npa	C3	FC1	0.057	0.011	5.12	1.87E-05	0.89
No-pain–touch vs. npa	C3	FC2	0.057	0.011	5.12	1.87E-05	0.89
No-pain–touch vs. npa	C3	C3	0.047	0.010	4.90	5.52E-05	0.86
No-pain–touch vs. npa	C3	Cz	0.047	0.010	4.90	5.52E-05	0.87
No-pain–touch vs. npa	Cz	FC1	0.055	0.013	4.38	4.72E-04	0.85
No-pain–touch vs. npa	Cz	FC2	0.056	0.013	4.38	4.72E-04	0.85
No-pain–touch vs. npa	C4	FC1	0.046	0.009	4.81	7.94E-05	0.86
No-pain–touch vs. npa	C4	FC2	0.053	0.011	4.81	7.94E-05	0.83
No-pain–touch vs. npa	C4	FC6	0.054	0.011	4.82	7.94E-05	0.83
No-pain–touch vs. npa	C4	C3	0.052	0.010	5.36	6.89E-06	0.86
No-pain–no-touch vs. npa	P8	C4	0.042	0.009	4.76	9.16E-05	0.82
No-pain–no-touch vs. npa	P8	T8	0.043	0.009	4.77	9.16E-05	0.84
No-pain–no-touch vs. npa	P8	CP2	0.042	0.010	4.14	1.18E-03	0.80
No-pain–no-touch vs. npa	P8	CP6	0.057	0.009	6.36	2.89E-08	0.94
No-pain–no-touch vs. npa	P8	TP10	0.043	0.010	4.19	9.67E-04	0.86
No-pain–no-touch vs. npa	P8	Pz	0.041	0.009	4.42	4.21E-04	0.82
No-pain–no-touch vs. npa	P8	P4	0.061	0.009	6.87	1.27E-09	0.93
No-pain–no-touch vs. npa	P8	P8	0.064	0.009	6.97	9.63E-10	0.95
No-pain–no-touch vs. npa	P8	PO9	0.065	0.009	6.98	9.63E-10	0.88
No-pain–no-touch vs. npa	P8	Oz	0.042	0.009	4.45	3.84E-04	0.81
No-pain–no-touch vs. npa	P8	O2	0.050	0.010	5.15	1.73E-05	0.90
No-pain–no-touch vs. npa	P8	PO10	0.063	0.011	5.95	3.40E-07	0.94

Based on the first step, only significant electrodes combinations were analyzed in the second step. Each of the four conditions of interest was compared separately to the baseline no-pain-alone condition, describing the interpartner connectivity network during touch with/without pain and for partner copresence with/without pain. “npa” represents the no-pain-alone condition.

Table S3. Third step of interbrain analysis

Contrasts to pain–touch condition	Female	Male	Estimate	SE	T value	FDR-adjusted P value	Power
No-pain–no-touch	FC5	FC1	0.074	0.011	6.92	5.78E-11	0.89
No-pain–no-touch	FC5	FC2	0.054	0.009	6.01	1.78E-08	0.85
No-pain–no-touch	FC5	Cz	0.068	0.009	7.34	3.27E-12	0.94
No-pain–no-touch	FC1	FC1	0.077	0.010	7.48	1.31E-12	0.96
No-pain–no-touch	FC1	FC2	0.076	0.010	7.47	1.30E-12	0.96
No-pain–no-touch	FC1	FC6	0.075	0.010	7.46	1.29E-12	0.95
No-pain–no-touch	FC1	Cz	0.081	0.009	8.74	2.42E-16	0.97
No-pain–no-touch	FC1	C4	0.081	0.009	8.73	2.41E-16	0.96
No-pain–no-touch	FC1	CP1	0.036	0.011	3.41	3.56E-03	0.81
No-pain–no-touch	FC1	CP2	0.043	0.009	4.91	7.41E-06	0.85
No-pain–no-touch	FC1	CP6	0.040	0.010	4.12	2.36E-04	0.83
No-pain–no-touch	FC1	P4	0.035	0.009	3.95	4.62E-04	0.82
No-pain–no-touch	FC2	FC2	0.078	0.011	7.06	2.33E-11	0.94
No-pain–no-touch	FC2	Cz	0.059	0.011	5.32	8.85E-07	0.90
No-pain–no-touch	FC6	F8	0.040	0.009	4.30	1.18E-04	0.86
No-pain–no-touch	FC6	FC1	0.076	0.010	8.01	3.58E-14	0.94
No-pain–no-touch	FC6	FC2	0.076	0.010	8.02	3.59E-14	0.94
No-pain–no-touch	FC6	Cz	0.066	0.009	7.24	6.72E-12	0.91
No-pain–no-touch	FC6	C4	0.042	0.010	4.14	2.19E-04	0.84
No-pain–no-touch	FC6	T8	0.043	0.010	4.15	2.120E-04	0.84
No-pain–no-touch	FC6	TP9	0.042	0.010	4.14	2.19E-04	0.84
No-pain–no-touch	FC6	CP5	0.042	0.010	4.14	2.19E-04	0.85
No-pain–no-touch	FC6	CP2	0.036	0.012	2.97	1.48E-02	0.79
No-pain–touch	FC5	FC1	0.071	0.010	6.90	6.69E-11	0.89
No-pain–touch	FC5	FC2	0.068	0.010	6.68	2.85E-10	0.88
No-pain–touch	FC5	Cz	0.070	0.011	6.44	1.35E-09	0.86
No-pain–touch	FC1	FC1	0.082	0.009	9.19	6.71E-18	0.99
No-pain–touch	FC1	FC2	0.081	0.009	9.17	6.72E-18	0.98
No-pain–touch	FC1	FC6	0.082	0.009	9.19	6.71E-18	0.99
No-pain–touch	FC1	Cz	0.072	0.009	7.92	5.48E-14	0.96
No-pain–touch	FC1	C4	0.072	0.009	7.92	5.48E-14	0.96
No-pain–touch	FC1	CP1	0.043	0.009	4.73	1.83E-05	0.83
No-pain–touch	FC1	CP2	0.053	0.009	6.11	1.05E-08	0.89
No-pain–touch	FC1	CP6	0.044	0.010	4.47	5.70E-05	0.84
No-pain–touch	FC1	P4	0.040	0.009	4.49	5.34E-05	0.83
No-pain–touch	FC2	FC2	0.064	0.012	5.47	3.88E-07	0.87
No-pain–touch	FC2	Cz	0.078	0.010	7.97	4.60E-14	0.95
No-pain–touch	FC6	FC1	0.081	0.010	8.38	2.17E-15	0.97
No-pain–touch	FC6	FC2	0.081	0.010	8.38	2.17E-15	0.97
No-pain–touch	FC6	Cz	0.076	0.009	8.51	1.32E-15	0.96
No-pain–touch	FC6	C4	0.034	0.009	3.76	9.34E-04	0.82
No-pain–touch	FC6	T8	0.033	0.009	3.75	9.33E-04	0.81
No-pain–touch	FC6	TP9	0.034	0.009	3.76	9.34E-04	0.81
No-pain–touch	FC6	CP5	0.033	0.009	3.75	9.33E-04	0.82
No-pain–touch	FC6	CP2	0.040	0.009	4.41	7.49E-05	0.84
Pain–no-touch	FC5	FC1	0.067	0.012	5.68	1.19E-07	0.87
Pain–no-touch	FC5	FC2	0.056	0.009	6.14	8.74E-09	0.89
Pain–no-touch	FC5	Cz	0.083	0.011	7.61	5.12E-13	0.93
Pain–no-touch	FC1	FC1	0.091	0.011	8.38	2.17E-15	0.96
Pain–no-touch	FC1	FC2	0.092	0.011	8.39	2.18E-15	0.96
Pain–no-touch	FC1	FC6	0.091	0.011	8.38	2.17E-15	0.96
Pain–no-touch	FC1	Cz	0.076	0.010	7.65	3.95E-13	0.91
Pain–no-touch	FC1	C4	0.076	0.010	7.65	3.95E-13	0.91
Pain–no-touch	FC1	CP1	0.044	0.010	4.38	8.40E-05	0.84
Pain–no-touch	FC1	CP2	0.058	0.009	6.38	1.96E-09	0.89
Pain–no-touch	FC1	CP6	0.048	0.012	4.14	2.19E-04	0.83
Pain–no-touch	FC1	P4	0.048	0.010	4.62	2.99E-05	0.81
Pain–no-touch	FC2	FC2	0.074	0.011	7.04	2.60E-11	0.86
Pain–no-touch	FC2	Cz	0.077	0.009	8.10	1.97E-14	0.92
Pain–no-touch	FC6	FC1	0.075	0.012	6.02	1.65E-08	0.85
Pain–no-touch	FC6	FC2	0.075	0.012	6.02	1.65E-08	0.85
Pain–no-touch	FC6	Cz	0.080	0.010	7.95	5.05E-14	0.93

Table S3. Cont.

Contrasts to pain–touch condition	Female	Male	Estimate	SE	T value	FDR-adjusted P value	Power
Pain–no-touch	FC6	C4	0.038	0.012	3.15	8.30E-03	0.80
Pain–no-touch	FC6	T8	0.037	0.012	3.14	8.29E-03	0.78
Pain–no-touch	FC6	TP9	0.037	0.012	3.14	8.29E-03	0.80
Pain–no-touch	FC6	CP5	0.038	0.012	3.15	8.30E-03	0.80
Pain–no-touch	FC6	CP2	0.048	0.012	4.10	2.49E-04	0.83
No-pain-alone	FC5	FC1	0.081	0.012	6.97	9.63E-10	0.89
No-pain-alone	FC5	FC2	0.062	0.009	7.02	9.63E-10	0.90
No-pain-alone	FC5	Cz	0.070	0.010	6.85	1.29E-09	0.89
No-pain-alone	FC1	FC1	0.068	0.012	5.89	3.74E-07	0.85
No-pain-alone	FC1	FC2	0.069	0.012	5.90	3.75E-07	0.84
No-pain-alone	FC1	FC6	0.069	0.012	5.90	3.75E-07	0.84
No-pain-alone	FC1	Cz	0.076	0.011	7.14	8.34E-10	0.91
No-pain-alone	FC1	C4	0.076	0.011	7.14	8.34E-10	0.90
No-pain-alone	FC1	CP1	0.035	0.009	3.81	4.41E-03	0.83
No-pain-alone	FC1	CP2	0.056	0.009	6.41	2.23E-08	0.87
No-pain-alone	FC1	CP6	0.045	0.011	3.96	2.37E-03	0.82
No-pain-alone	FC1	P4	0.045	0.009	4.75	9.41E-05	0.86
No-pain-alone	FC2	FC2	0.068	0.010	6.87	1.27E-09	0.91
No-pain-alone	FC2	Cz	0.063	0.011	5.58	2.05E-06	0.88
No-pain-alone	FC6	F8	0.037	0.009	4.12	1.27E-03	0.83
No-pain-alone	FC6	FC1	0.067	0.012	5.69	1.15E-06	0.88
No-pain-alone	FC6	FC2	0.067	0.012	5.69	1.15E-06	0.88
No-pain-alone	FC6	Cz	0.069	0.010	6.88	1.27E-09	0.93
No-pain-alone	FC6	C4	0.042	0.010	4.20	8.95E-04	0.83
No-pain-alone	FC6	T8	0.043	0.010	4.21	8.94E-04	0.83
No-pain-alone	FC6	TP9	0.044	0.010	4.22	8.93E-04	0.84
No-pain-alone	FC6	CP5	0.043	0.010	4.21	8.94E-04	0.83
No-pain-alone	FC6	CP2	0.041	0.010	4.28	7.37E-04	0.85

The third step was planned to identify a unique interpartner connectivity network during touch and pain. The following interbrain electrode pairs showed higher brain-to-brain coupling in the partner touch–pain conditions compared with each of the control conditions.