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Supplemental information

Predictability alters information flow during action observation in human electrocorticographic activity

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Supplementary Materials

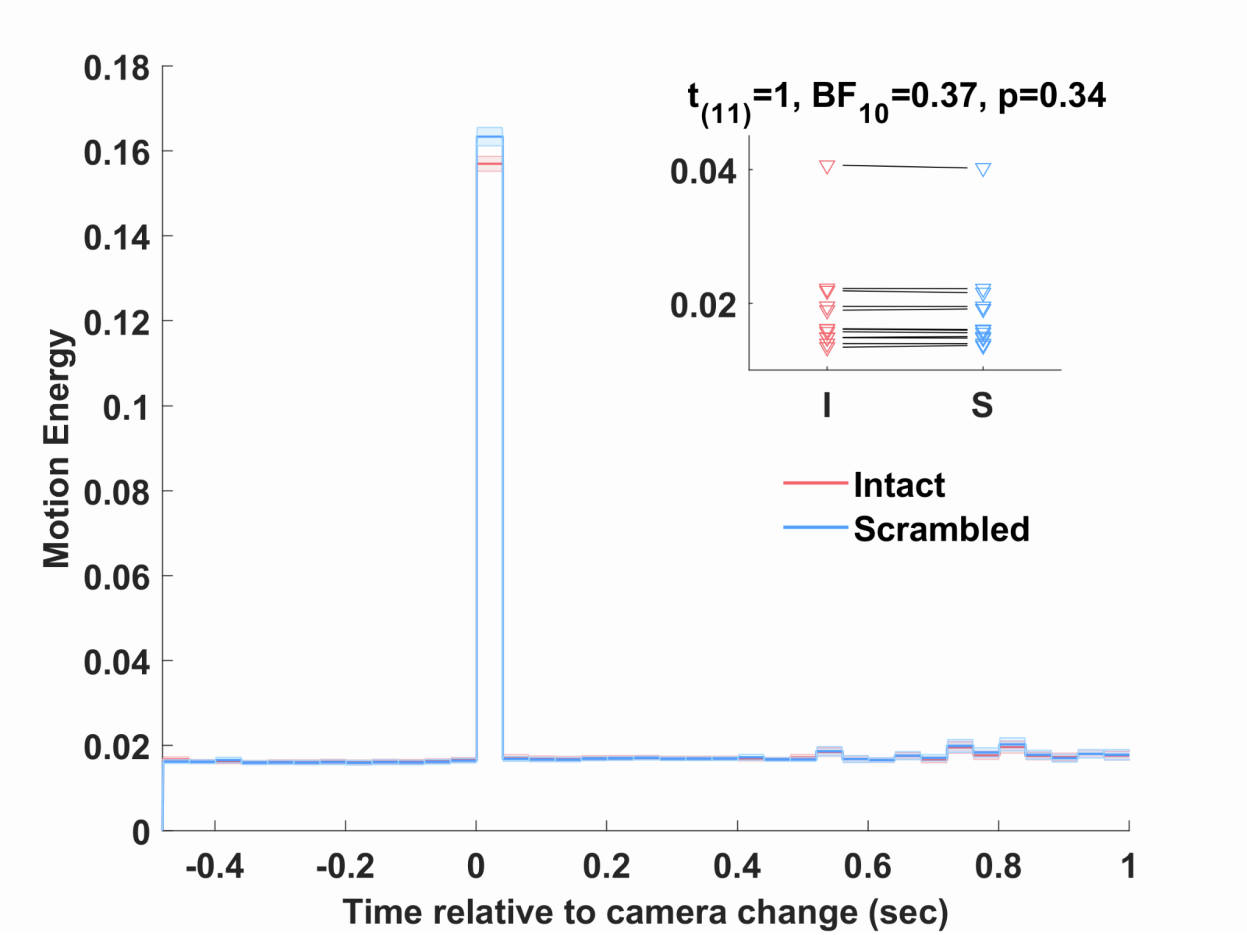

Figure S1: Motion energy at the transition between acts. To verify that our use of camera changes ensured that the scrambled sequences do not have significantly more motion energy than our intact movies, motion energy was calculated across consecutive frames as the sum, over all pixels *i*, of the cartesian distance between the vector of (*r,g,b*) values at frame *t* and *t+1*, i.e. $ME = \sum_i \sqrt{(r_t - r_{t-1})^2 + (g_t - g_{t-1})^2 + (b_t - b_{t-1})^2}$, relative to the transition between two acts (*t*=0). Error shading represents the s.e.m. across the 397 transitions over the 12 movies of each condition. As expected, motion energy peaks just following *t*=0, when the camera angle changes, with a trend for 4% more motion energy for scrambled sequences, but the difference does not survive correction for multiple comparison when applying the same statistics as used in Fig 3, 4 and 6 (t-test, corrected for multiple comparison using fdr, q=0.85), and is therefore unlikely to account for the observed differences in the ECoG signal. As some of our results are obtained using the entire movies, as in Figure 2, we also compared motion energy over the entire movies (inset), and again found no significant difference across our conditions when using a matched pair t-test (each triangle represents one of the 12 movies used).

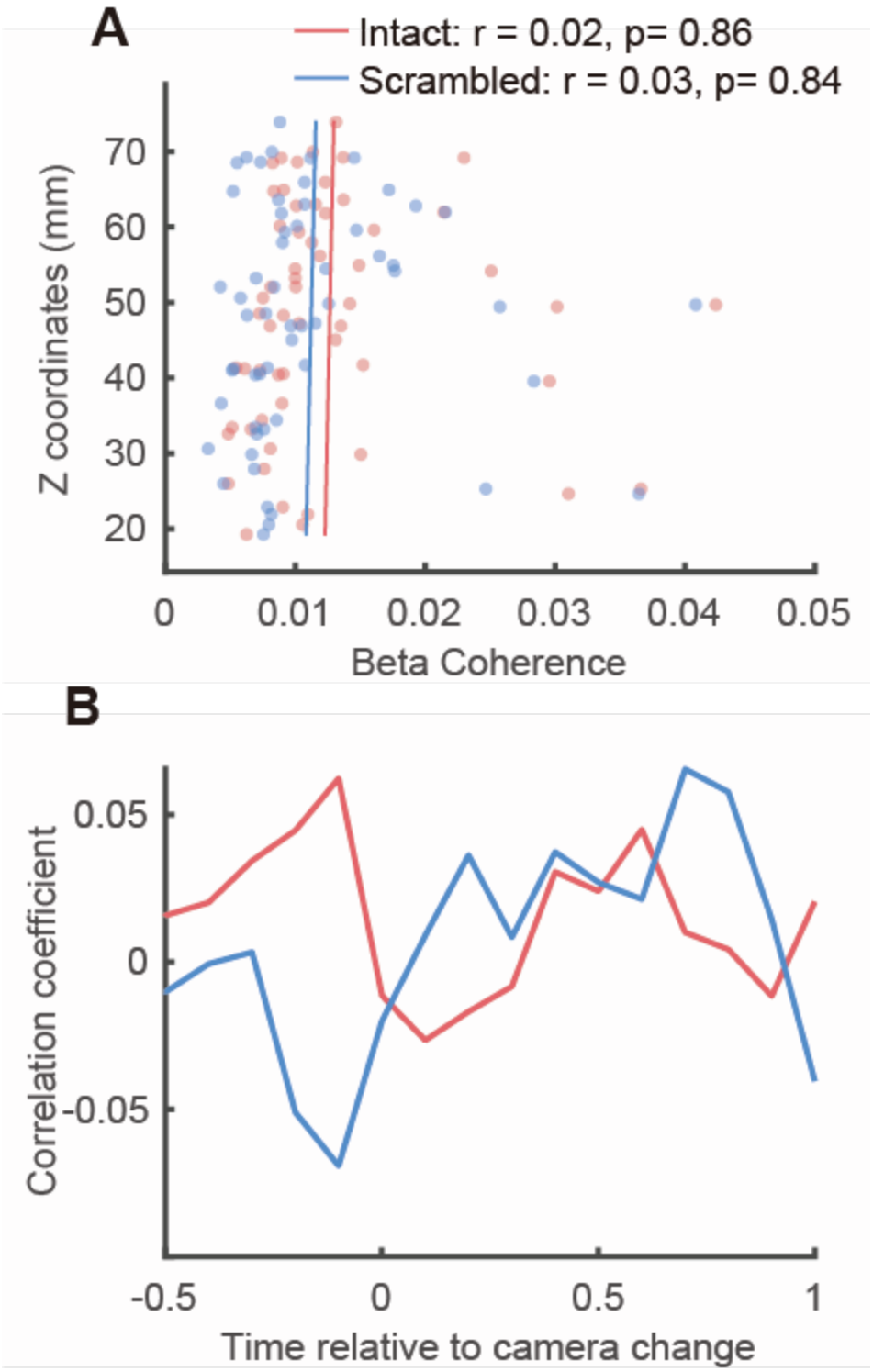

Figure S2: Location specificity of precentral electrodes in coherence with supramarginal electrodes and its temporal dynamics.

(A) The beta coherence of precentral and supramarginal electrodes estimated in 0–1s time window relative to camera change, each dot represents a precentral electrode with the location on the Z axis and the average coherence with all supramarginal electrodes. Here we didn't find a correlation between the location of precentral electrodes and the coherence in both conditions. (B) The same

correlation estimated in sliding time windows from -0.5 to 1 relative to camera change, no significant correlation was found within this period in both conditions.

Table S1: Demographic characteristics of patients. For each of the 10 patients included in the study, the first three columns specify their arbitrary number, age in years/sex and the etiology of the epilepsy. The following column provides the z-transformed correlation between the patients' pain perception and that of a control group of 93 healthy volunteers from Soyman et al.[74], in which 9 of our patients also participated. Only patient 3 did not participate in that experiment. In Soyman et al.[74], patients saw 30 videos of a hand hit by a belt, and had to report for each video how painful the slap had been based on the kinematics of the receiving hand. The 30 ratings were then compared against the average rating of the 30 videos of an age and sex matched control group to generate an *r* value quantifying how typical their rating was. The same was done for each control participant, against the average rating of all other control participants. The mean and standard deviation of the 93 control participant was then used to z-transform the *r* values of each patient, so that a z-value of 0 represents a typical performance, one of z=-1, a r-value one sd under the average etc. As a group, the 9 patients do not differ from zero (mean(z)=0.04, t(8)=-0.116, p=0.91, BF_{10}=0.323), suggesting their ability to perceive biological kinematics is within the normal range. Only one had individually unusual performance (patient 1, z=-2.35), but one out of 9 is to be expected (binomial distribution, p=0.071). For each patient, the last 3 columns specify whether the patient had electrodes in each of our 3 regions of interest, and if so, whether we recorded any epileptic activity in this region that may indicate that data from that ROI may be directly affected by the epilepsy.

No	Age (y)/Sex	Etiology and MRI findings	Pain Rating (z-score)	epileptic activity(+=yes, -=no, n/a=no contacts in ROI)					
				PreCG		SMG		MOG	
				Left	Right	Left	Right	Left	Right
1	37/M	No lesion	-2.35	-	-	-	-	-	-
2	34/M	No lesion	0.45	-	-	n/a	n/a	-	-
3	23/M	Cavernous hemangioma	n/a	-	n/a	+	n/a	-	n/a
4	21/F	Ganglioglioma	-0.4	-	-	-	-	-	-
5	39/F	No lesion	-0.45	-	n/a	-	n/a	n/a	n/a
6	30/M	No lesion	1.03	-	n/a	-	n/a	-	n/a
7	23/F	Focal cortical dysplasia	1.39	-	n/a	+	n/a	-	n/a
8	26/F	Post-encephalitis	0.91	-	-	-	-	-	-
9	22/M	Post-encephalitis	-0.78	-	n/a	+	n/a	-	n/a
10	18/F	Rt T ulegyria	-0.2	n/a	-	n/a	-	n/a	-