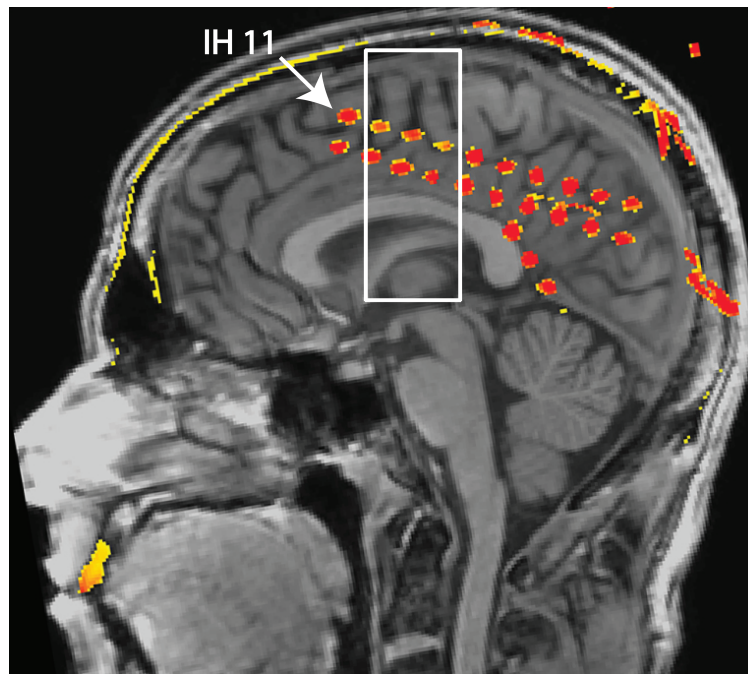


Supplementary Materials

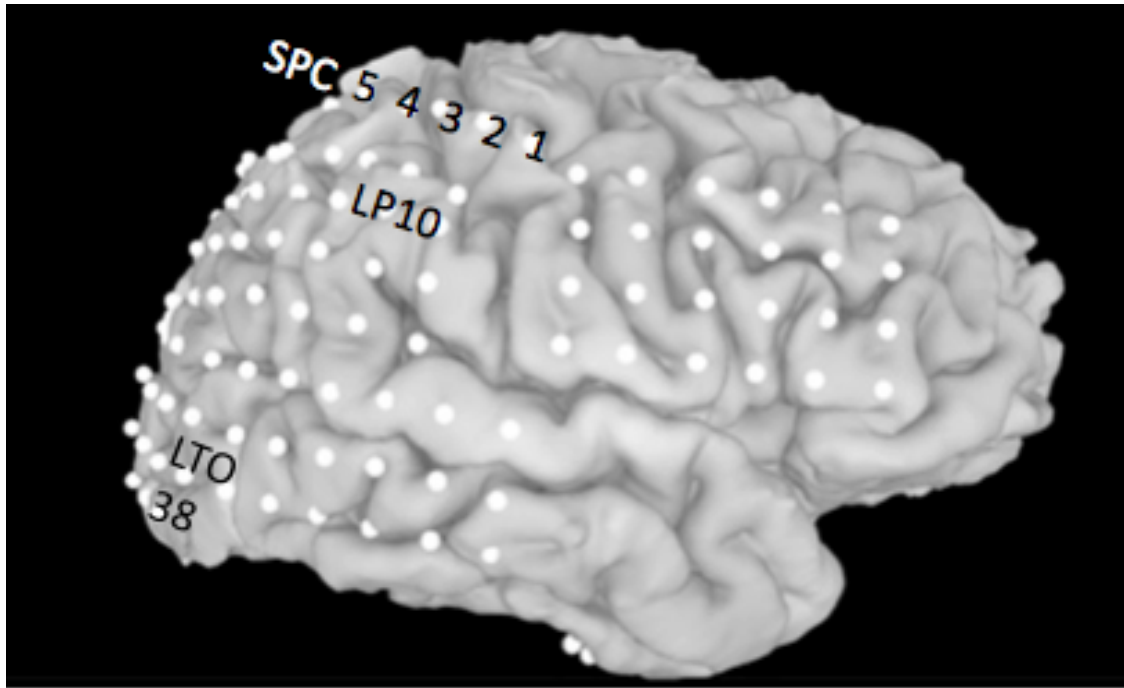
“Roles for the presupplementary motor area and the right inferior frontal gyrus in stopping action: electrophysiological responses and functional and structural connectivity”

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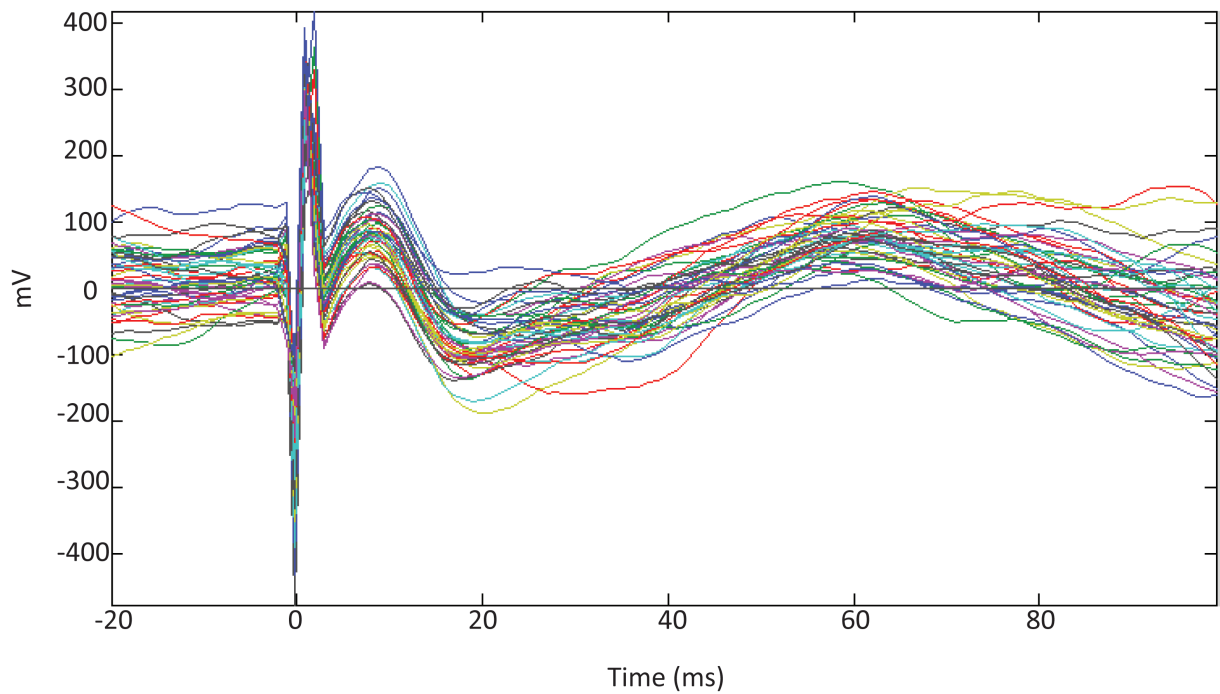
Supplementary Figure 1. preSMA location. Electrodes IH 11 and 1 are located in the posterior pre-SMA, with electrode IH 11 indicated with an arrow. The AC-PC line (indicating the locations of the anterior and posterior commissures) and perpendiculars from this line at the AC and the PC are shown. The AC line demarcates the junction between the pre-SMA and the SMA – this line passes posterior to the two electrodes (IH 11 and 1). Talairach co-ordinates of electrode IH11 are 0, 12, 51. Electrodes artifacts localized on CT scans are shown overlaid on the pre-implantation MRI.



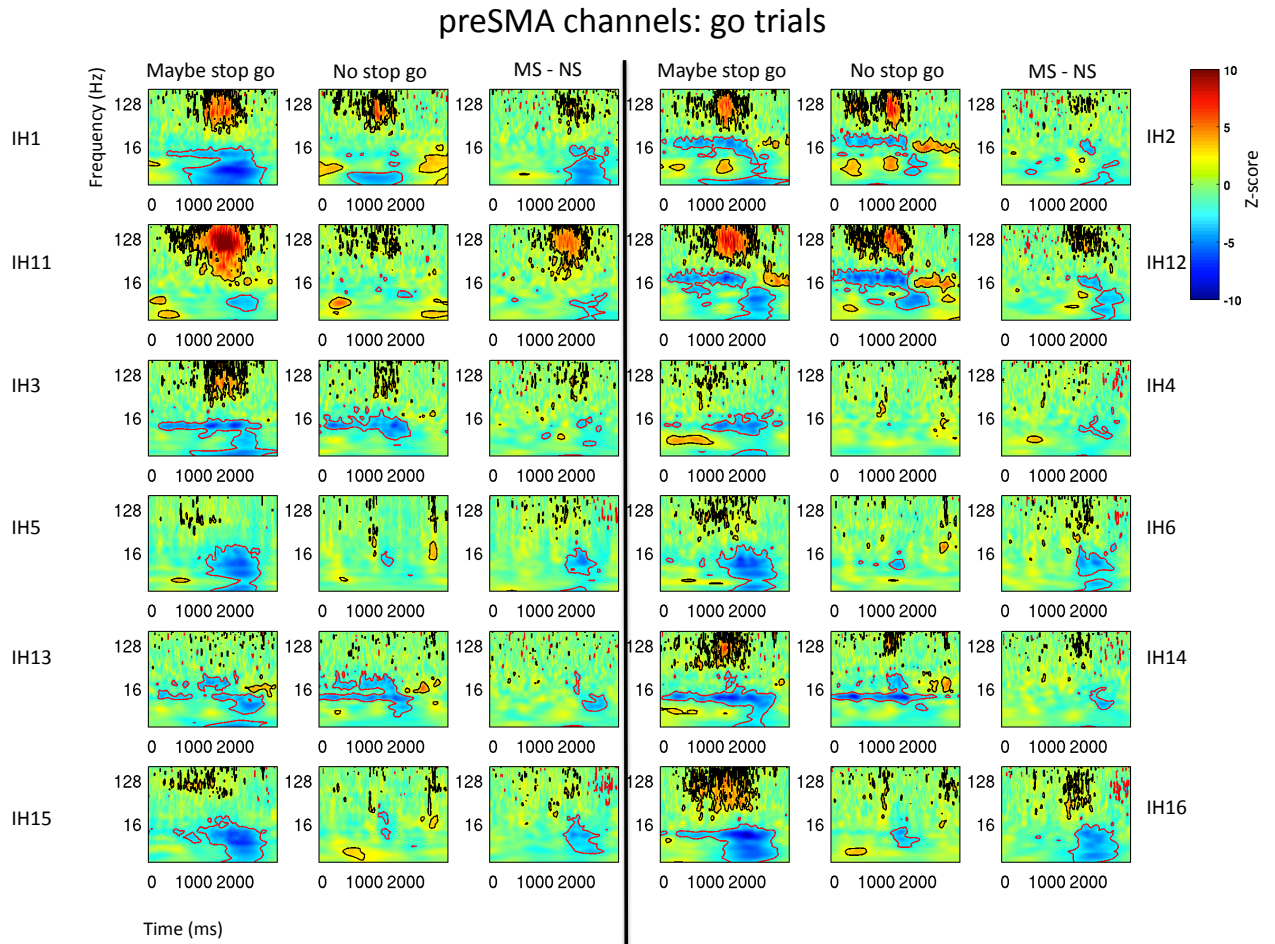
Supplementary Figure 2. Locations of electrodes with non-zero CCEP or DTI values (shown in Supplementary Table 3) which were not on the lateral frontal or inter-hemispheric grids (shown in Figure 2).



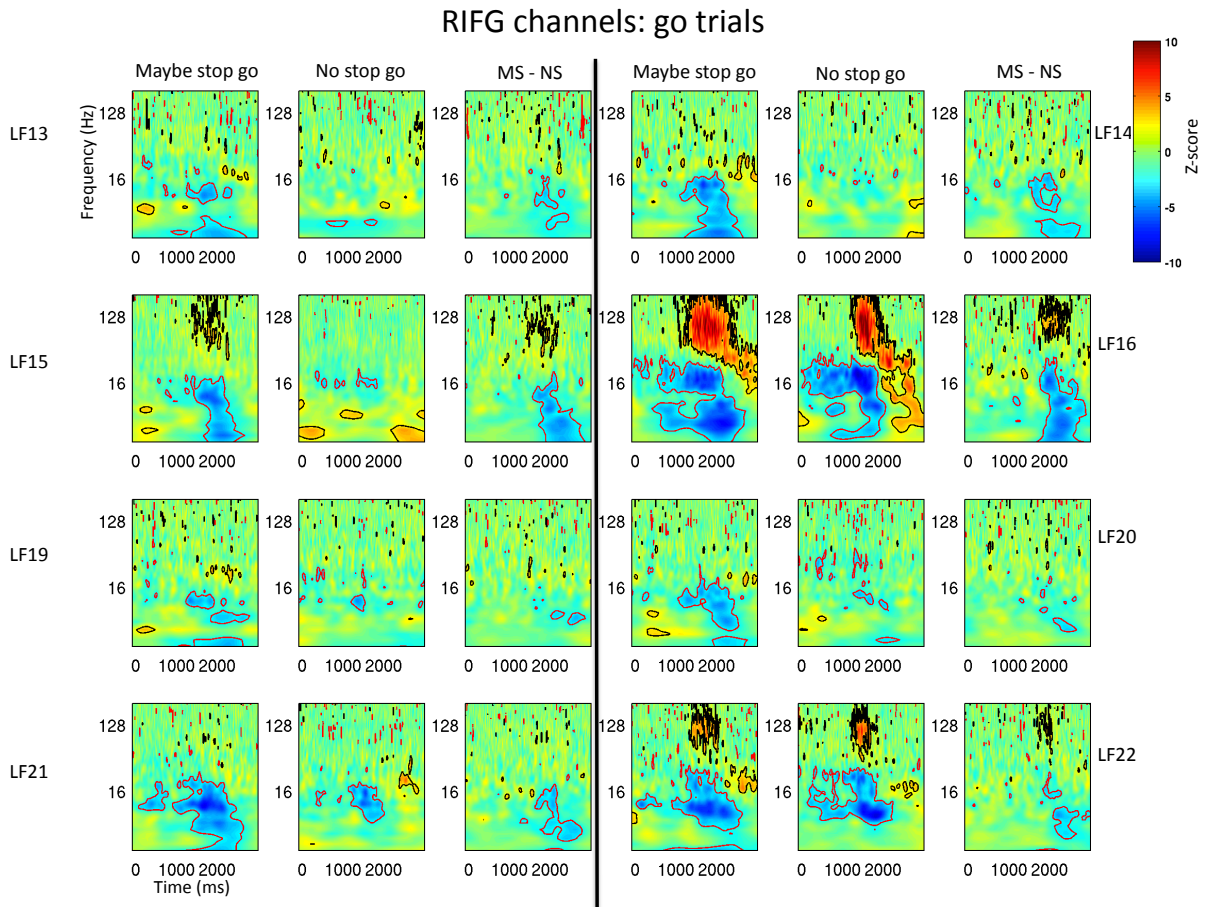
Supplementary Figure 3. Example CCEPs (cortico-cortical evoked potentials) from channel LF 16. Individual ECoG traces from 50 trials of 10mA stimulation at electrodes IH 11-12 are overlaid in different colors. Note the quick, large amplitude increases are remarkably consistent across trials.



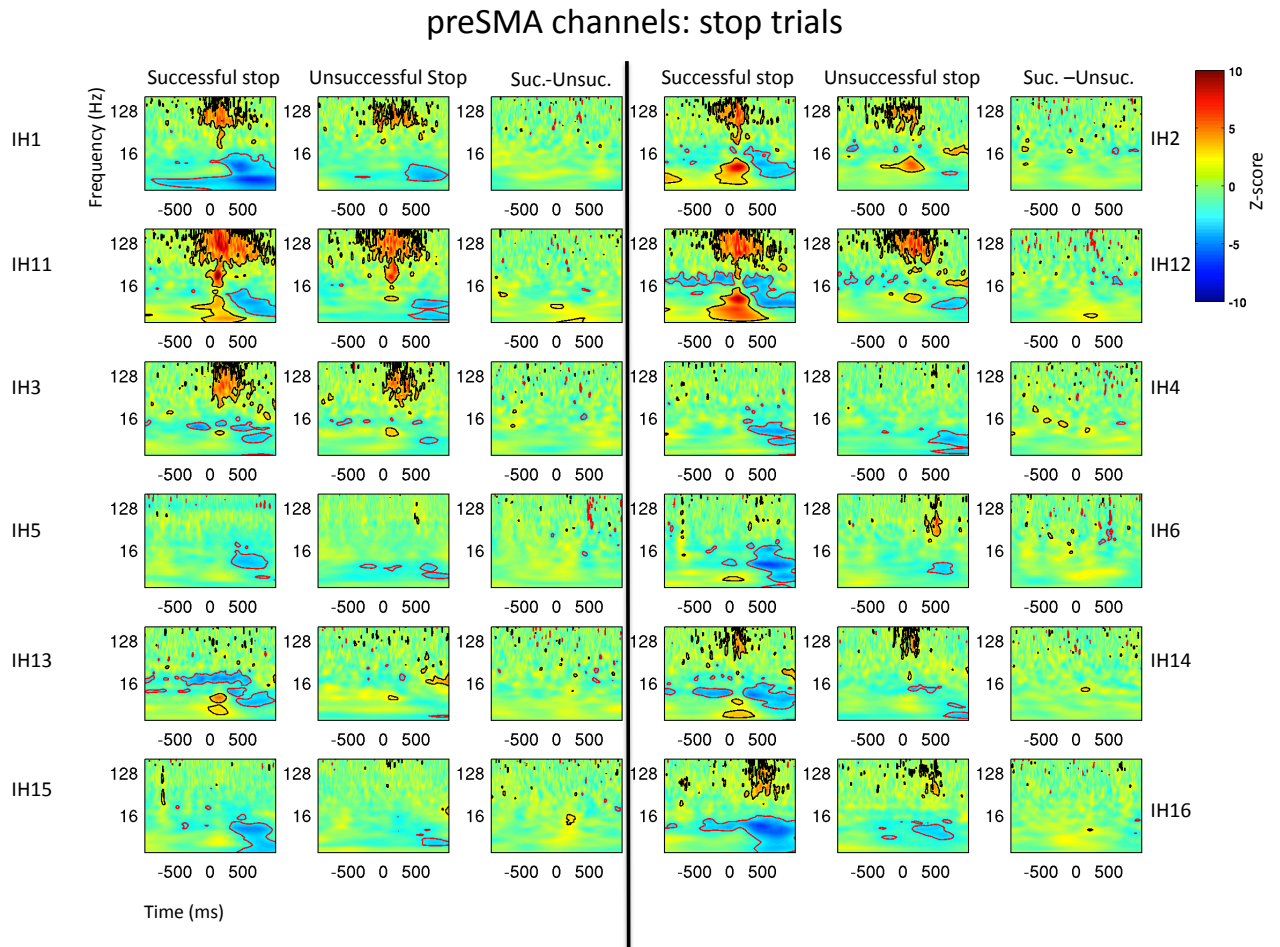
Supplementary Figure 4. Time-frequency responses for all preSMA electrodes for MS_Go and NS_Go trials and the difference between the two. Zero is the time of the MS/NS cue and 1000 ms is the time of the Go signal. Z-scored amplitude is expressed in color and significance at $p < 0.01$ uncorrected is indicated with the black outline (for positive differences), or the red outline (for negative differences).



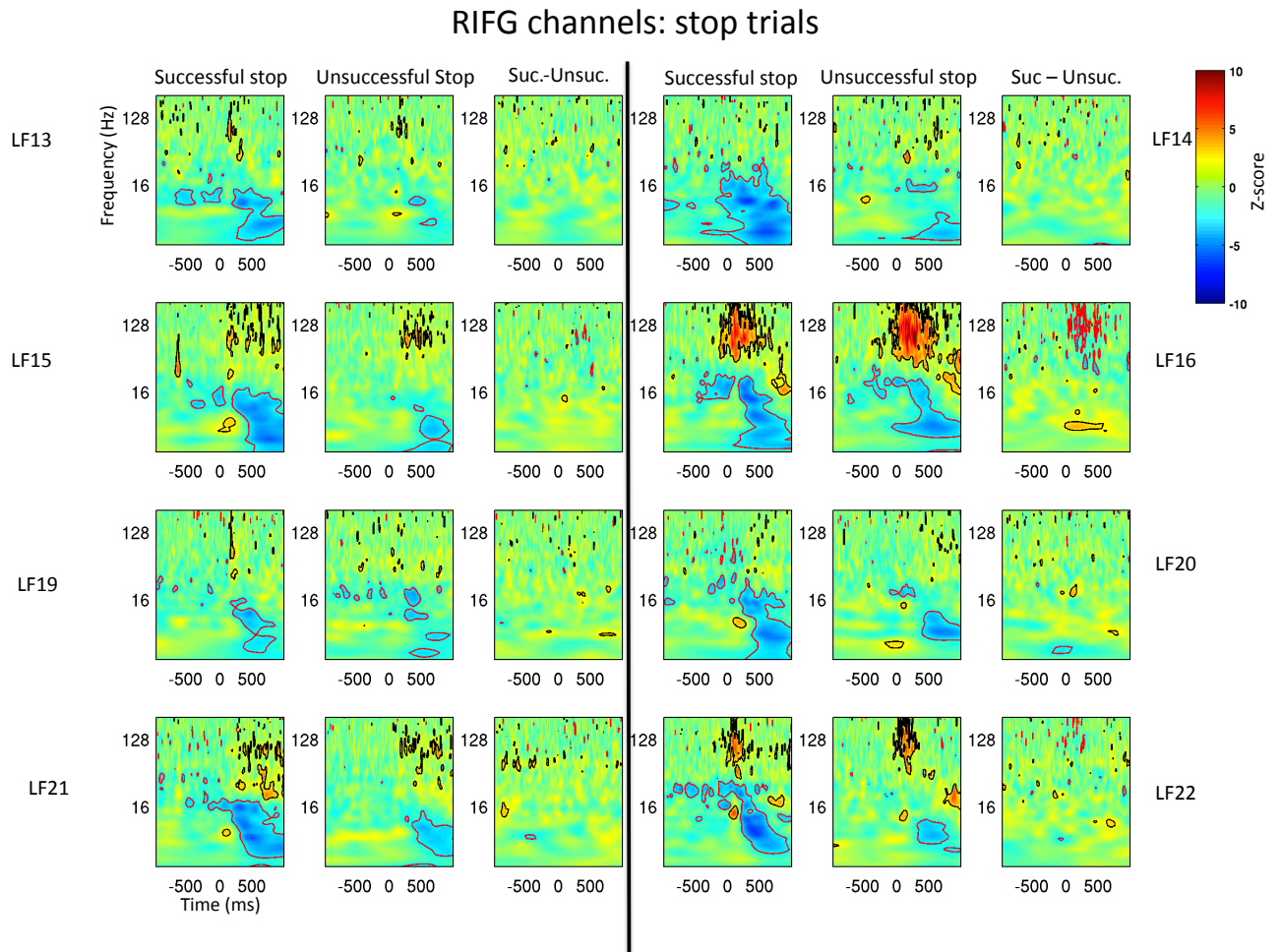
Supplementary Figure 5. Time-frequency responses for all rIFG electrodes for MS_Go and NS_Go trials and the difference between the two. Zero is the time of the MS/NS cue and 1000 ms is the time of the go signal. Z-scored amplitude is expressed in color and significance at $p < 0.01$ uncorrected is indicated with the black outline (for positive differences), or the red outline (for negative differences).



Supplementary Figure 6. Time-frequency responses for all preSMA electrodes MS_SS trials, MS_US trials, and the difference between the two. Zero is the time of the stop signal. Z-scored amplitude is expressed in color and significance at $p < 0.01$ uncorrected is indicated with the black outline (for positive differences), or the red outline (for negative differences).



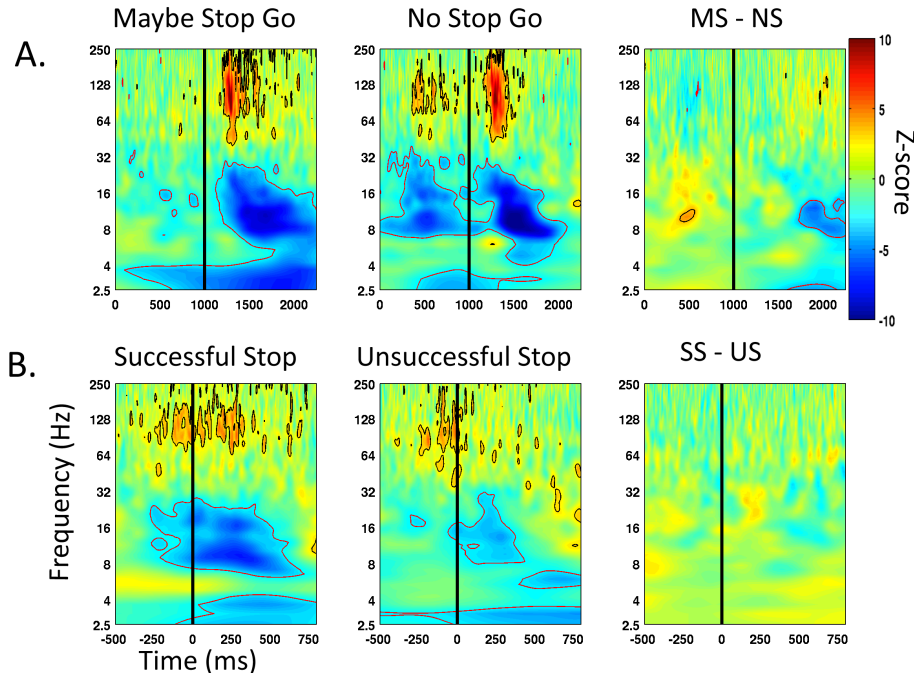
Supplementary Figure 7. Time-frequency responses for all rIFG electrodes MS_SS trials, MS_US trials, and the difference between the two. Zero is the time of the stop signal. Z-scored amplitude is expressed in color and significance at $p < 0.01$ uncorrected is indicated with the black outline (for positive differences), or the red outline (for negative differences).



Supplementary Figure 8. Superior parietal ECoG from electrode indicated in Figure 6.

A. Preparing to stop. High gamma amplitude increases for the superior parietal electrode began roughly 200 ms after the go signal for the MS_Go trials, and about 500 ms before the go signal for NS_Go trials. (However, this early activation was weaker). The high gamma amplitude increase in preSMA was also about 500 ms before the go signal, but only for the MS Go trials. In short, the superior parietal and preSMA electrodes show different activity patterns, but it is difficult to say that one precedes the other. Zero ms is the time of the MS/NS cue and 1000 ms is the time of the go signal (indicated by the solid black line). Z-scored amplitude is expressed in color. All results significant at $p < 0.05$, FDR corrected are outlined (black indicates significance in positive direction, red indicates negative direction).

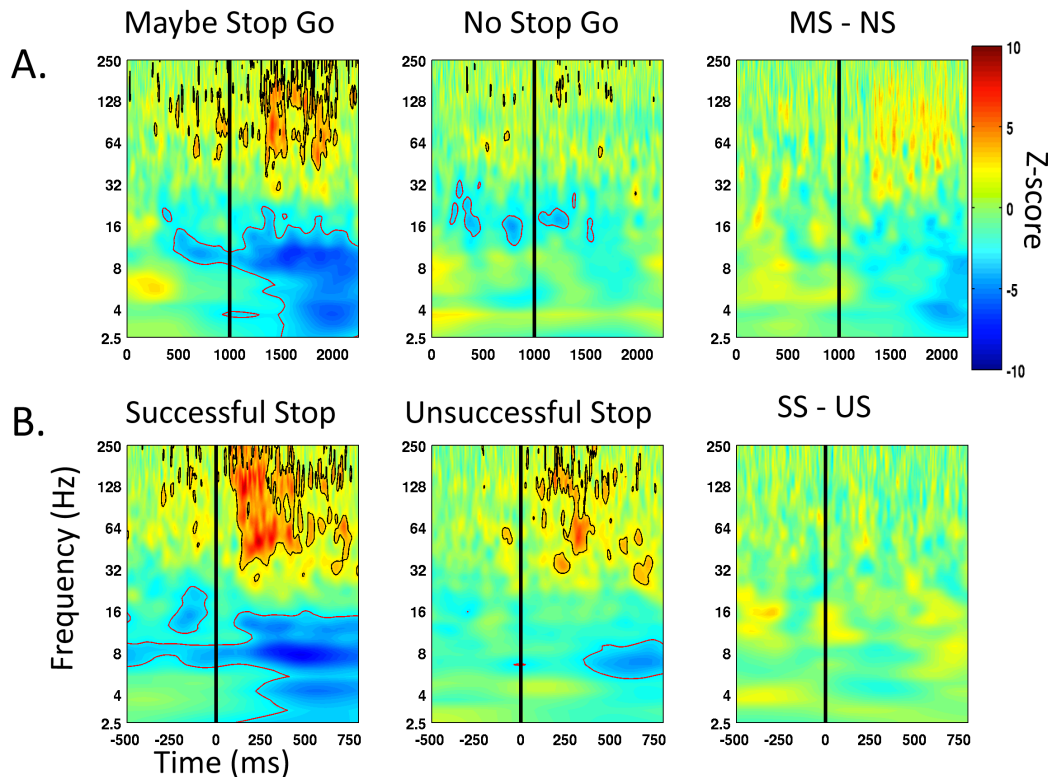
B. Outright stopping. High gamma amplitude increases for the same electrode began roughly 250 ms before the stop signal for both MS_SS and MS_US trials. The high gamma amplitude increase in preSMA was also about 250 ms before the stop signal. Again, the timing of gamma amplitude onset for these two regions is difficult to distinguish. Zero ms is the time of the stop signal. Z-scored amplitude is expressed in color. All results significant at $p < 0.05$, FDR corrected are outlined (black indicates significance in positive direction, red indicates negative direction).



Supplementary Figure 9. Temporal Parietal Junction (TPJ) ECoG from electrode indicated in Figure 6.

A. Preparing to stop. High gamma amplitude increases for the TPJ electrode began roughly 350 ms after the go signal for the MS_Go trials. The high gamma amplitude increase in preSMA was about 500 ms before the go signal for the MS Go trials, preceding the TPJ high gamma increase by about 850 ms. Zero ms is the time of the MS/NS cue and 1000 ms is the time of the go signal (indicated by the solid black line). Z-scored amplitude is expressed in color. All results significant at $p < 0.05$, FDR corrected are outlined (black indicates significance in positive direction, red indicates negative direction).

B. Outright stopping. High gamma amplitude increases for the same electrode began roughly 75 ms after the stop signal for both MS_SS and MS_US trials. The high gamma amplitude increase in preSMA began about 250 ms before the stop signal, again, the timing of gamma amplitude onset in the preSMA seems to precede that of the TPJ. Zero ms is the time of the stop signal. Z-scored amplitude is expressed in color. All results significant at $p < 0.05$, FDR corrected are outlined (black indicates significance in positive direction, red indicates negative direction).



Supplementary Table 1: Preparing to stop fMRI values. Positive x-values correspond to right hemisphere and negative ones the left.

Contrast	Z	x	y	z	cluster size
MS-Go vs. NS-Go					
Frontal Pole	5.01	28	44	20	8844
Anterior cingulate gyrus	4.96	8	18	36	
Insular cortex	4.83	36	24	-2	
Frontal orbital cortex	4.81	40	22	-6	
Paracingulate gyrus	4.62	8	22	42	
Pre-supplementary motor area	4.33	6	24	54	
Inferior frontal gyrus, pars opercularis	4.51	48	18	2	
Angular gyrus	5.08	54	-54	38	3166
Angular gyrus	4.69	50	-50	30	
Supramarginal gyrus	4.51	60	-46	36	
Supramarginal gyrus	4.46	62	-42	36	
Supramarginal gyrus	4.31	50	-46	46	
Angular gyrus	4.21	56	-44	22	
Supramarginal gyrus	4.14	-56	-48	18	1895
Supramarginal gyrus	4.05	-58	-44	16	
Middle temporal gyrus	3.92	-56	-48	4	
Supramarginal gyrus	3.91	-58	-46	8	
Supramarginal gyrus	3.9	-54	-48	24	
Supramarginal gyrus	3.88	-58	-46	24	
Insular cortex	4.13	-32	22	0	843
Inferior frontal gyrus, pars opercularis	4.11	-40	14	2	
Frontal orbital cortex	4.03	-30	24	-8	
Insular cortex	3.97	-34	16	0	
Precentral gyrus	2.95	-52	4	10	
Frontal orbital cortex	2.91	-32	16	-16	
Middle frontal gyrus	3.93	-38	28	24	631
Middle frontal gyrus	3.67	-38	34	26	
Frontal Pole	3.23	-30	42	14	
Frontal Pole	3.16	-30	38	24	
Frontal Pole	2.54	-40	48	20	
Frontal Pole	2.52	-40	30	36	

Supplementary Table 2: Outright stopping fMRI values. Positive x-values correspond to right hemisphere and negative ones the left.

Contrast	Z	x	y	z	cluster size
MS-SS vs. MS-Go					
Superior temporal gyrus	5.08	56	-36	4	3946
Middle temporal gyrus	5.05	62	-34	0	
Middle temporal gyrus	4.8	50	-40	0	
Middle temporal gyrus	4.47	48	-36	-2	
Superior temporal gyrus	4.37	64	-18	-4	
Supramarginal gyrus	4.26	62	-44	20	
Supramarginal gyrus	3.95	-52	-50	14	1924
Supramarginal gyrus	3.87	-60	-42	40	
Supramarginal gyrus	3.85	-58	-42	36	
Middle temporal gyrus	3.85	-64	-56	0	
Angular gyrus	3.75	-62	-54	28	
Supramarginal gyrus	3.69	-64	-46	8	
Frontal orbital cortex	3.92	32	18	-16	829
Inferior frontal gyrus, pars triangularis	3.66	54	20	-6	
Insula cortex	3.58	36	16	-16	
Inferior frontal gyrus, pars opercularis	3.54	50	14	14	
Inferior frontal gyrus, pars triangularis	3.52	50	32	2	
Frontal orbital cortex	3.49	42	36	-8	

Supplementary Table 3: CCEPs and DTI results from the whole brain reveal functional/structural connections between the preSMA and the rIFG in particular. The table shows CCEP and DTI values for all the electrodes shown in Figure 6 (all electrodes over right lateral and medial cortex) that had structural (revealed by DTI) or functional (revealed by the CCEPs) connections to the preSMA (electrodes IH 11-12). Electrodes that show both a structural and functional connection to the preSMA (i.e. have both non-zero CCEP **and** non-zero DTI values) are shown in bold. Note that these electrodes are all in the rIFG region, with the exception being IH 1 (in the preSMA). Note also that electrodes LF 15 and 16 show the strongest connections with preSMA in terms of the 'path value' metric (see below) and the strongest CCEP responses of all the electrodes except IH 1 (in the preSMA). 'CCEP max' refers to maximum CCEP voltage following stimulation of electrodes IH 11-12. 'CCEP onset time' refers to the latency of voltage change after stimulation. 'Distance from stim' refers to the distance from the stimulation site (i.e. from electrodes IH 11-12). 'Number of tracts' refers to number of DTI fiber tracts. 'Tract Length' refers to length in mm of the path between electrodes IH 11-12 and each indicated electrode. 'Tract Average FA' refers to the average fractional anisotropy for each path connecting IH 11-12 to the indicated electrode. 'Path value' is a measure of connection strength, computed as a scalar cross-product of average FA (fractional anisotropy) along each streamline and mean length of the streamlines connecting electrode IH 11-12 to the indicated electrodes. See Supplementary Figure 2 for electrode locations not shown in Figure 2.

Electrode	CCEP max (μ V)	CCEP onset time (ms)	Distance from stim. (mm)	Number of tracts	Tract Length (mm)	Tract Average FA	Path value (Avg. FA x length)
*IH1-AV	966.75	11	9.65	1135	76.3	0.46	35.22
*IH13-AV	0	0	10.48	829	74.99	0.5	37.85
*IH14-AV	0	0	20.56	83	67.59	0.47	31.94
*IH15-AV	0	0	30.61	86	89.23	0.51	45.48
*IH16-AV	0	0	40.27	72	92.63	0.51	47.44
*IH17-AV	0	0	49.92	9	110.78	0.52	57.9
*IH18-AV	0	0	60.42	8	112	0.54	61.03
*IH19-AV	0	0	69.61	3	118.67	0.52	61.8
*IH2-AV	0	0	9.23	905	67.16	0.47	31.72
*IH3-AV	0	0	13.94	1243	86.62	0.52	44.96
*IH4-AV	0	0	22.72	557	81.79	0.52	42.18
*IH5-AV	0	0	31.84	92	89.07	0.51	45.7
*IH6-AV	0	0	41.2	33	96.39	0.54	52.51
*IH7-AV	0	0	50.85	27	97.78	0.56	54.39
*IH8-AV	0	0	60.97	4	117	0.53	61.66
*LF1-AV	139.81	29	55.25	0	0	0	0
*LF10-AV	135.33	20	57.27	0	0	0	0
*LF14-AV	46.29	32	65.68	16	173.13	0.53	91.44
*LF15-AV	141.77	21	65.79	16	176.94	0.54	95.16
*LF16-AV	169.91	19	66.67	15	176.4	0.54	94.89
*LF17-AV	30.43	21	68.15	0	0	0	0
*LF20-AV	66.83	27	70.82	21	155.29	0.51	78.94
*LF21-AV	67.41	20	69.98	21	155.29	0.51	78.94
*LF22-AV	0	0	71.91	15	176.4	0.54	94.89
*LF3-AV	230.22	31	51.62	0	0	0	0
*LF4-AV	89.03	17	51.13	0	0	0	0
*LF5-AV	64.86	20	53.47	0	0	0	0

*LF8-AV	86.5	37	59.73	0	0	0	0
*LF9-AV	141.57	27	58.95	0	0	0	0
*LP10-AV	23.35	21	71.62	0	0	0	0
*LTO38-AV	16.27	30	113.67	0	0	0	0
*SPC1-AV	35.97	13	54.22	0	0	0	0
*SPC2-AV	35.72	13	54.45	0	0	0	0
*SPC3-AV	25.27	12	54.32	0	0	0	0
*SPC4-AV	17.69	12	54.58	0	0	0	0
*SPC5-AV	18.04	11	58.72	0	0	0	0