

Supplementary Material:

1 Signal Modality: Visual Stopping + Auditory Stopping

A conjunction analysis was also performed between the current Stopping contrast (Successful Signal - Correct Go for the Stop task) and the Stopping contrast from a previous study of response inhibition (Aron and Poldrack, 2006) that used a tone as the stop signal.

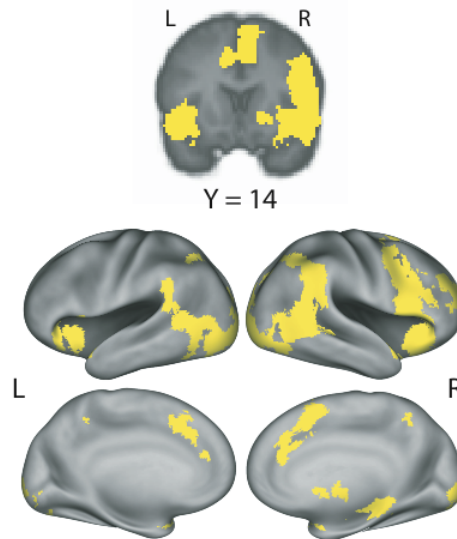


Figure 1: Positive neural activity common to the current stopping task and a previous stopping task with an auditory stop signal (Aron and Poldrack, 2006), based on the contrast of Successful Signal - Correct Go.

This analysis was performed in order to determine which regions had active voxels that were common to both versions of the stopping task (Figure 1). Commonly activated bilateral regions consisted of a large region of IFG, insula, and OFC extending to the amygdala, in addition to ACC, preSMA, TPJ, and occipital cortex. There was more extensive activation in the right hemisphere than the left hemisphere for all frontal regions. Right-lateralized regions of common activation included the frontal pole and dorsolateral PFC, caudate, accumbens, putamen, thalamus, midbrain, and MTL. These regions are consistent with the proposal that response inhibition is supported by a network including right IFG, StN, and preSMA (Aron and Poldrack, 2006; Aron et al., 2007). They also suggest that the temporoparietal activation seen in previous studies using auditory stop signals is general to visual stop signals as well, and may reflect the operation of stimulus-driven attention processes (Corbetta and Shulman, 2002) rather than auditory-specific processing.

References

Aron AR, Behrens TEJ, Smith S, Frank MJ, Poldrack RA (2007) Triangulating a cognitive control network using diffusion-weighted magnetic resonance imaging (mri) and functional mri. *J Neurosci* 27:3743–52.

Aron AR, Poldrack RA (2006) Cortical and subcortical contributions to stop signal response inhibition: role of the subthalamic nucleus. *J Neurosci* 26:2424–33.

Corbetta M, Shulman GL (2002) Control of goal-directed and stimulus-driven attention in the brain. *Nat Rev Neurosci* 3:201–15.

2 Contrast activation clusters:

Cluster peak and regions within each cluster

Cluster coordinates are computed using FSL’s `cluster` command thresholded at $z = 3.5$. Regional peaks within the cluster are computed by listing the regions in the Harvard-Oxford Probabilistic Atlas (thresholded at 25%) that fall within the cluster mask. Clusters with fewer than 10 voxels are not reported.

Table 1: Correct Go > Baseline, Stopping Task

Cluster Peak Region	Regions Within Cluster	Voxels	Zmax	x	y	z
Left Thalamus	<i>B Putamen, B Pallidum, B Hippocampus, B Amygdala, Brain-Stem, B Caudate, B Accumbens, B Insular Cortex, B Frontal Orbital Cortex, B Inferior Frontal Gyrus, pars opercularis, B Subcallosal Cortex, L Parahippocampal Gyrus, anterior division, L Parahippocampal Gyrus, posterior division, B Frontal Operculum Cortex, B Central Opercular Cortex, B Planum Polare, L Heschl’s Gyrus, L Parietal Operculum Cortex, L Postcentral Gyrus, L Supramarginal Gyrus, posterior division, L Supramarginal Gyrus, anterior division, B Precentral Gyrus, B Superior Frontal Gyrus, L Superior Frontal Gyrus, B Supplementary Motor Cortex, B Middle Frontal Gyrus, B Anterior Cingulate Gyrus, L Posterior Cingulate Gyrus, L Superior Parietal Lobule, L Superior Lateral Occipital Cortex, L Angular Gyrus, L Planum Temporale, B Anterior Superior Temporal Gyrus, B Temporal Pole, L Posterior Superior Temporal Gyrus, B Paracingulate Gyrus, R Inferior Frontal Gyrus, pars triangularis, Right Thalamus,</i>	21810	6.5	-16	-16	6
R Frontal Pole	<i>R Inferior Frontal Gyrus, pars triangularis</i>	968	5.26	38	52	14
L Occipital Pole	<i>L Lateral Occipital Cortex, inferior division, L Inferior Temporal Gyrus, temporooccipital part, L Occipital Fusiform Gyrus</i>	791	4.68	-32	-98	-8
R Cerebellum	<i>B Temporal Occipital Fusiform Cortex, R Lingual Gyrus</i>	624	5.6	12	-56	-26

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Table 1 – Continued

Cluster Peak Region	Regions Within Cluster	Voxels	Zmax	x	y	z
R Occipital Pole		541	5.09	34	-94	-12
	<i>R Lateral Occipital Cortex, inferior division, R Occipital Fusiform Gyrus</i>					
R Angular Gyrus		208	4.12	40	-52	36
	<i>R Supramarginal Gyrus, posterior division , R Lateral Occipital Cortex, superioir division, R Parietal Operculum Cortex , R Postcentral Gyrus, R Central Opercular Cortex, R Planum Temporale, R Superior Temporal Gyrus, posterior division, R Middle Temporal Gyrus, posterior division, R Middle Temporal Gyrus, temporooccipital part, R Inferior Temporal Gyrus, posterior division, R Superior Parietal Lobule, R Temporal Fusiform Cortex, posterior division, R Parietal Operculum Cortex</i>					
R Frontal Pole		169	4.57	36	58	-14
R Precentral Gyrus		147	3.87	56	6	36
R Supramarginal Gyrus, anterior division		17	3.92	68	-26	38
	<i>R Supramarginal Gyrus, posterior division</i>					
L Cerebellum		16	3.95	-22	-58	-26
L Brainstem		12	3.95	-6	-40	-30

Table 2: Correct Go > Baseline, Switching Task

Cluster Peak Region	Regions Within Cluster	Voxels	Zmax	x	y	z
Left Putamen	<i>Left Thalamus, Left Caudate, Left Pallidum, Left Hippocampus, Left Amygdala, Left Accumbens, Brain-Stem, L Insular Cortex, L Frontal Operculum Cortex, L Inferior Frontal Gyrus, pars opercularis, L Inferior Frontal Gyrus, pars opercularis, L Frontal Orbital Cortex, B Superior Frontal Gyrus, L Middle Frontal Gyrus, L Precentral Gyrus, B Precentral Gyrus, B Cingulate Gyrus, anterior division, B Paracingulate Gyrus, L Cingulate Gyrus, posterior division, B Juxtapositional Lobule Cortex (formerly Supplementary Motor Cortex), L Temporal Pole, L Superior Temporal Gyrus, anterior division, L Superior Temporal Gyrus, posterior division, L Central Opercular Cortex, L Planum Polare, L Heschl's Gyrus (includes H1 and H2), L Planum Temporale, L Parietal Operculum Cortex, L Supramarginal Gyrus, posterior division, L Supramarginal Gyrus, anterior division, L Superior Parietal Lobule, L Postcentral Gyrus, L Angular Gyrus, L Lateral Occipital Cortex, superioir division, B Precuneous Cortex</i>	15781	6.08	-22	-8	0
Right Putamen	<i>Right Thalamus, Right Caudate, Right Pallidum, Right Amygdala, Right Accumbens, R Insular Cortex, R Frontal Operculum Cortex, R Frontal Orbital Cortex, R Inferior Frontal Gyrus, pars opercularis, R Inferior Frontal Gyrus, pars triangularis, R Temporal Pole, R Planum Polare, R Superior Temporal Gyrus, anterior division, R Central Opercular Cortex</i>	3385	6.44	22	8	0
R Lateral Occipital Cortex, superior division	<i>R Superior Parietal Lobule, R Angular Gyrus, R Supramarginal Gyrus, anterior division, R Supramarginal Gyrus, posterior division</i>	1197	4.78	34	-58	34
R Frontal Pole		695	5.15	40	38	24
L Lateral Occipital Cortex, inferior division	<i>L Inferior Temporal Gyrus, temporooccipital part, L Occipital Pole, L Occipital Fusiform Gyrus, L Cerebellum</i>	641	5.05	-48	-82	-14
R Lateral Occipital Cortex, inferior division	<i>R Inferior Temporal Gyrus, temporooccipital part, R Occipital Fusiform Gyrus, R Occipital Pole</i>	513	5.15	40	-90	-10

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Table 2 – Continued

Cluster Peak Region	Regions Within Cluster	Voxels	Zmax	x	y	z
R Cerebellum		380	5.71	6	-64	-22
R Precentral Gyrus	<i>R Middle Frontal Gyrus</i>	378	4.49	30	-4	48
R Postcentral Gyrus / R Supramarginal Gyrus, anterior division	<i>R Planum Temporale, R Central Opercular Cortex, R Parietal Operculum Cortex, R Superior Temporal Gyrus, posterior division</i>	39	3.74	64	-20	20
L Frontal Pole		34	4.14	28	58	-18
R Supramarginal Gyrus, anterior division		25	3.73	62	-22	32
L Temporal Occipital Fusiform Cortex		18	3.88	-38	-58	-24
R Precentral Gyrus		17	3.69	56	8	34

Table 3: Successful Signal > Correct Go, Stopping Task

Cluster Peak Region	Regions Within Cluster	Voxels	Zmax	x	y	z
R Lateral Occipital Cortex, inferior division	<i>B Lateral Occipital Cortex, superior division, B Intracalcarine Cortex, B Inferior Temporal Gyrus, temporooccipital part, B Middle Temporal Gyrus, temporooccipital part, B Occipital Pole, B Lingual Gyrus, B Occipital Fusiform Gyrus, B Temporal Occipital Fusiform Cortex, R Middle Temporal Gyrus, posterior division, R Middle Temporal Gyrus, posterior division, R Superior Parietal Lobule, B Temporal Fusiform Cortex, posterior division, L Lateral Occipital Cortex, inferior division, L Cuneal Cortex</i>	8559	6.4	44	-72	-4
R Insular Cortex	<i>R Inferior Frontal Gyrus, pars triangularis, R Inferior Frontal Gyrus, pars opercularis, R Middle Frontal Gyrus, R Frontal Orbital Cortex, R Frontal Operculum Cortex, R Precentral Gyrus, R Frontal Pole, R Precentral Gyrus, R Central Opercular Cortex, R Temporal Pole, Right Putamen, Right Thalamus</i>	1958	5.16	32	20	-4
L Frontal Orbital Cortex	<i>L Temporal Pole, L Insular Cortex, L Frontal Pole, L Inferior Frontal Gyrus, pars triangularis, L Inferior Frontal Gyrus, pars opercularis, L Parahippocampal Gyrus, anterior division, L Frontal Operculum Cortex, Left Hippocampus, Left Amygdala</i>	1324	4.93	-36	20	-12
R Angular Gyrus	<i>R Supramarginal Gyrus, posterior division</i>	806	5.6	58	-50	30
L Supramarginal Gyrus, posterior division	<i>L Angular Gyrus, L Supramarginal Gyrus, anterior division, L Superior Temporal Gyrus, posterior division, L Middle Temporal Gyrus, posterior division, L Inferior Temporal Gyrus, posterior division, L Superior Parietal Lobule, B Precuneous Cortex</i>	778	4.98	-60	-50	30
L Middle Frontal Gyrus	<i>L Superior Frontal Gyrus</i>	251	4.48	-44	22	28
L Lateral Occipital Cortex, superior division		205	4.05	-22	-74	36
Right Hippocampus	<i>R Parahippocampal Gyrus, posterior division, R Parahippocampal Gyrus, anterior division, Right Thalamus, Right Putamen, Right Amygdala, Brain-Stem</i>	201	4.29	32	-12	-18

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Table 3 – Continued

Cluster Peak Region	Regions Within Cluster	Voxels	Zmax	x	y	z
R Paracingulate Gyrus	<i>B Cingulate Gyrus, anterior division, L Paracingulate Gyrus, L Superior Frontal Gyrus</i>	148	4.05	6	32	30
L Precentral Gyrus		137	4.3	-46	8	30
Right Caudate	<i>Right Accumbens, Right Pallidum</i>	105	4.3	14	4	8
R Superior Frontal Gyrus	<i>B Supplementary Motor Cortex</i>	68	4.02	12	10	60
R Paracingulate Gyrus		22	4	6	14	44
L Frontal Pole		22	3.81	-46	38	-24

Table 4: Successful Signal > Correct Go, Switching Task

Cluster Peak Region	Regions Within Cluster	Voxels	Zmax	x	y	z
L Superior Parietal Lobule	<i>L Postcentral Gyrus, B Precuneous Cortex, L Angular Gyrus, L Parietal Operculum Cortex, L Supramarginal Gyrus, anterior division, L Supramarginal Gyrus, posterior division, L Lateral Occipital Cortex, superior division, L Lateral Occipital Cortex, inferior division, L Occipital Pole, L Occipital Fusiform Gyrus, B Cuneal Cortex, L Planum Temporale, L Superior Temporal Gyrus, posterior division, L Inferior Temporal Gyrus, temporooccipital part, L Lingual Gyrus, L Temporal Occipital Fusiform Cortex, L Central Opercular Cortex, L Paracingulate Gyrus, L Anterior Cingulate Gyrus, L Posterior Cingulate Gyrus, L Precentral Gyrus, L Superior Frontal Gyrus, L Middle Frontal Gyrus, L Supplementary Motor Cortex</i>	9575	5.88	-36	-54	52
R Lateral Occipital Cortex, superior division	<i>R Lateral Occipital Cortex, inferior division, B Intracalcarine Cortex, R Occipital Fusiform Gyrus, R Occipital Pole, R Temporal Occipital Fusiform Cortex, R Inferior Temporal Gyrus, temporooccipital part, R Inferior Temporal Gyrus, posterior division, R Middle Temporal Gyrus, posterior division, R Middle Temporal Gyrus, temporooccipital part, R Superior Temporal Gyrus, posterior division, R Planum Temporale, R Supramarginal Gyrus, posterior division, R Supramarginal Gyrus, anterior division, R Angular Gyrus, R Superior Parietal Lobule, R Parietal Operculum Cortex, R Postcentral Gyrus, R Superior Frontal Gyrus, R Middle Frontal Gyrus, R Precentral Gyrus, R Supplementary Motor Cortex, R Paracingulate Gyrus, R Cingulate Gyrus, anterior division, R Cingulate Gyrus, posterior division</i>	3679	5.3	34	-78	16
L Temporal Pole	<i>L Insular Cortex, L Inferior Frontal Gyrus, pars triangularis, L Inferior Frontal Gyrus, pars opercularis, L Central Opercular Cortex, L Frontal Operculum Cortex, L Frontal Orbital Cortex, L Frontal Pole, L Precentral Gyrus, L Middle Frontal Gyrus, L Superior Temporal Gyrus, anterior division, L Planum Polare</i>	1742	5	-50	10	-12
R Subcallosal Cortex		795	4.89	34	18	-2

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Table 4 – Continued

Cluster Peak Region	Regions Within Cluster	Voxels	Zmax	x	y	z
	<i>R Frontal Pole, R Insular Cortex, R Temporal Pole, R Frontal Orbital Cortex, R Inferior Frontal Gyrus, pars triangularis, R Inferior Frontal Gyrus, pars opercularis, R Precentral Gyrus, R Middle Frontal Gyrus, R Frontal Pole, R Superior Temporal Gyrus, anterior division, R Frontal Operculum Cortex, R Central Opercular Cortex, R Planum Polare</i>					
Right Pallidum		429	4.26	14	0	0
	<i>Right Putamen, Right Caudate, Right Thalamus, Right Hippocampus, Right Amygdala, Right Accumbens, Right Hippocampus, R Parahippocampal Gyrus, posterior division, R Lingual Gyrus</i>					
Brain-Stem		375	4.69	-8	-28	-8
	<i>Left Thalamus, Left Putamen, Left Hippocampus, Left Amygdala, L Parahippocampal Gyrus, posterior division</i>					
L Middle Temporal Gyrus, temporooccipital part		74	4.12	-52	-58	2
L Occipital Pole		37	4.08	-14	-98	-8
Brain-Stem		22	3.91	6	-36	-26
Left Pallidum		19	3.83	-14	2	-2
	<i>Left Accumbens, Left Caudate</i>					
L Postcentral Gyrus		11	3.69	-36	-28	70
Left Thalamus		11	3.76	-6	-22	6
R Lingual Gyrus		11	3.8	14	-86	-8
Brain-Stem		11	3.8	-2	-36	-26

Table 5: Successful Signal > Correct Go, Switching Task > Stopping Task

Cluster Peak Region	Regions Within Cluster	Voxels	Zmax	x	y	z
L Postcentral Gyrus	<i>L Superior Parietal Lobule, L Precuneous Cortex, L Supramarginal Gyrus, anterior division, L Supramarginal Gyrus, posterior division, L Angular Gyrus, B Precentral Gyrus, B Anterior Cingulate Gyrus, B Posterior Cingulate Gyrus, B Supplementary Motor Cortex, B Superior Frontal Gyrus, B Middle Frontal Gyrus, L Superior Temporal Gyrus, posterior division</i>	4315	6.43	-42	-22	52
R Cerebellum	<i>B Lingual Gyrus</i>	471	5.35	12	-58	-24
L Planum Temporale	<i>L Parietal Operculum Cortex, L Supramarginal Gyrus, posterior division, L Heschl's Gyrus</i>	253	4.81	-62	-24	14
L Central Opercular Cortex	<i>L Temporal Pole, L Planum Polare, L Insular Cortex, L Superior Temporal Gyrus, anterior division, L Precentral Gyrus</i>	153	4.88	-48	-4	2
Left Thalamus	<i>Left Putamen, Left Putamen, Left Pallidum, Left Amygdala, Brain-Stem</i>	44	3.97	-8	-22	-4
R Supramarginal Gyrus, posterior division	<i>R Superior Temporal Gyrus, posterior division, R Postcentral Gyrus, R Superior Parietal Lobule, R Supramarginal Gyrus, anterior division, R Angular Gyrus, R Lateral Occipital Cortex, superior division, R Planum Temporale</i>	28	4.1	46	-44	54
L Lateral Occipital Cortex, superior division		22	3.74	-28	-62	60
R Precentral Gyrus		21	3.79	30	-10	68
R Parietal Operculum Cortex	<i>R Central Opercular Cortex, R Supramarginal Gyrus, posterior division</i>	11	3.72	56	-24	20
L Planum Temporale		10	3.74	-50	-34	16