Supplemental Material

Method

Participants

HC participants were recruited using flyers, local newspaper advertisements and internet postings. Additional exclusion criteria for the HC group included histories of Axis I disorders or illicit drug use or current use of psychotropic medications. While matching efforts resulted in HC subjects on average participating at a later date, all scanning occurred over a two-year period during which standard and frequent quality assurance measures were in place to maintain magnet stability and reliability.

Exclusion criteria for participation in fMRI across both groups included being pregnant, color-blind, left-handed, or having an MR-incompatible medical condition/implant.

Stroop Task design

All participants completed six three-minute runs of a Stroop color-word interference task. Stimuli consisted of a single word printed in either the congruent color (e.g., “red” displayed in red font) or incongruent color (e.g., “red” displayed in blue font). Each stimulus was presented for 1300 ms with an interstimulus interval of 350 ms. Incongruent stimuli were presented pseudorandomly every 13-16 congruent stimuli, with a total of seven incongruent events in each run of 105 total events. For fMRI acquisition, participants were instructed to respond silently to minimize head motion. Prior to scanning, all participants completed two runs of the task aloud with an experimenter present to confirm the task instructions were understood. Immediately following scanning, participants completed a maximum of five additional runs, responding aloud to assess behavioral performance (reaction times, error rates).

Image acquisition and processing

Localizer images were acquired for prescribing the functional image volumes (repetition time/echo time: 200/2.47 ms, flip angle: 60°, field of view: 24 cm x 24 cm, 256 x 256 matrix, 0.9 mm x 0.9 mm in-plane resolution, 5mm + 0mm gap slice thickness, 24 slices).. Functional images were collected aligning the eighth slice parallel to the plane transecting the anterior and posterior commissures using an echo-planar image gradient-echo pulse sequence (repetition time/echo time 1500/27 ms, flip angle 60°, field of view 22 cm x 22 cm, 64 x 64 matrix, 3.4 mm x 3.4 mm in-plane resolution, 4mm + 1mm gap slice thickness, 25 slices). Each of the six stimulus runs consisted of 124 volumes, including an initial rest period of nine seconds that allowed T1 effects to stabilize and was removed from subsequent analyses.

Functional images were preprocessed using SPM2 (Wellcome Functional Imaging Laboratory, London, United Kingdom). Each run was realigned separately using INRIAlign (Freire, Roche, & Mangin, 2002) and examined for motion in excess of one acquisition voxel. A mean functional image was constructed for each run using the realigned volumes. This image was used to determine parameters for spatial normalization into Montreal Neurological Institute (MNI) standardized space, resulting in an isometric voxel size of $4\times4\times4$ mm^3. Normalized images were then smoothed with a nine-mm full-width-at-half-maximum Gaussian filter.

Supplemental Table S1

Treatment conditions, comorbid diagnoses, and treatment history in the cocaine-dependent sample

Variable	N (of 20)	%
Treatment Conditions		
Study1		
CBT + TAU	5	25
TAU	3	15
Study2		
CBT + Placebo	4	20
CBT + Disulfiram	4	20
CBT + Placebo + CM	3	15
CBT + Disulfiram + CM	1	5
Diagnosis		
Current Depressive Disorder	0	0
Lifetime Depressive Disorder	10	50
Anti-social Personality Disorder	4	20
Lifetime Alcohol Dependence/Abuse	11	55
Current Alcohol Dependence/Abuse	4	20
Lifetime Marijuana Dependence/Abuse	12	60
Current Marijuana Dependence/Abuse	2	10
Lifetime Opioid Dependence/Abuse	4	20
Current Opioid Dependence/Abuse	3	15
Treatment History		
Previous outpatient treatment	15	75
Previous inpatient treatment	13	65
No previous treatment	4	20

Note: CBT=Cognitive Behavioral Therapy; TAU=Treatment as Usual; CM=Contingency Management.

Supplemental Table S2

Regions comprising the five interference components.

Com	Region/Gyrus	BA	k	t	Z	x	y	z
A	L Inferior Frontal, Superior temporal, insula	13, 22, 38, 47	509	24.57	8.52	-36	24	0
	R Inferior Frontal, Superior temporal, insula	13, 22, 38, 47	496	23.49	8.46	40	24	-8
	R/L Medial/superior frontal, cingulate	6, 8, 24, 32	945	19.14	8.16	4	8	56
	L Inferior Parietal	40	33	9.35	6.70	-60	-40	36
	•R Frontal lobe, white matter		50	11.82	7.31	24	32	16
B	R/L Superior/inferior parietal, precuneus	7, 19, 39, 40	1267	21.38	8.33	44	-52	52
	L Middle/Inferior frontal	6, 9, 10, 46	466	15.43	7.82	-44	48	-4
	R Middle/Inferior frontal	6, 8, 9, 46	294	14.52	7.71	48	16	40
	L Middle/Inferior temporal, fusiform	21,37	127	13.17	7.53	-52	-68	-16
	R/L Caudate		38	12.24	7.38	8	8	4
	R/L Medial frontal	8	67	10.88	7.12	-4	24	48
	R Middle/Inferior temporal, fusiform	21,37	87	10.86	7.11	64	-48	-16
	R Middle frontal	10	47	10.49	7.03	36	56	-4
	•R Insula, putamen	13	106	14.17	7.67	32	0	12
	•L Temporal lobe, white matter		34	11.55	7.26	-40	-52	0
	•L Insula	13	78	11.06	7.16	-32	0	20
	•R Postcentral	40	31	9.24	6.66	60	-28	24
C	R/L Middle/superior frontal, cingulate	9,10,24, 32	1142	24.06	8.49	0	40	24
	L Insula	13	38	11.00	7.14	-44	-8	16
	R Insula, Postcentral	13	70	10.77	7.09	52	-28	20
	R/L Cuneus		26	9.89	6.87	4	-84	20
	•L Inferior parietal, precuneus	19, 39	65	10.82	7.10	-44	-72	44
	•R Middle/Superior temporal	21, 22, 38	30	9.41	6.72	56	-4	-12
	•L Middle/Superior temporal	21, 22, 38	26	9.35	6.70	-60	-4	-8
	•L Putamen		41	9.15	6.63	-28	-12	-8
D	R/L Striatum, thalamus, parahippocampal		1586	29.26	8.75	12	8	8
	R Parahippocampal, amygdala		21	10.11	6.93	24	-12	-20
	L Inferior frontal	44	22	8.67	6.43	-52	12	32
E	R Supramarginal	40	23	9.14	6.62	44	-48	32
	•R/L Medial frontal, cingulate, ventral striatum		803	14.21	7.67	0	24	-8

Note: Peak voxel coordinates (x,y.z), t score (t) and Z-score (Z) listed for each

suprathreshold cluster. Com=component, BA=Brodmann area, k=cluster size in number of contiguous voxels, R=right, L=left. A=fronto-parietal network, B=cingulo-opercular network, C=fronto-cingular network, D=subcortical network, E= fronto-striatal network. Coordinates shown are in MNI standard space. • = Region displays negative signal integration into component network.

Supplemental References

Freire, L., Roche, A., Mangin, J.F. (2002). What is the best similarity measure for motion correction in fMRI time series? *IEEE Transactions on Medical Imaging, 21*, 470–84. doi: 10.1109/TMI.2002.1009383