Supplementary Material

Localizer task 1: stimulus, design and analyses

We used a block design experiment to localize color specific brain areas in order to compare their locations with the activations found for shape, texture and color adaptations in Experiment 2. Stimuli were 14 color and grayscale pictures of famous abstract and realist paintings (for example: *Starry Night* by Vincent Van Gogh; *Yellow, Red and Blue* by Wassily Kandinsky; *Sunrise* by Claude Monet; *Le Jardin de Monet*; *Les Iris*, by Claude Monet) cropped and re-sized to be equal in terms of overall shape and size. The sequence of blocks within a given run was organized quasi-randomly such that every block category was separated from the following block category by a 14 s fixation period (which was then used as the baseline condition). In each block, stimuli were presented for 800ms and separated by a 200ms-duration blank white screen. Each block consisted of 13 unique stimuli. Because we asked participants to perform a one-back task, one of the stimuli in each block was randomly repeated.

Each subject undertook 2 runs of localizer tasks (either at the beginning or at the end of the scanning session) which were organized into 18 blocks of experimental stimuli and 10 blocks of fixation, all lasting 14 s, for a total duration of 6:32 minutes. During the fixation period a 0.54° x 0.54° black cross was presented on a white background.

Stimuli were presented in the center of the screen and measured 15x8 cm at a viewing distance of 60cm. Participants were instructed to look at the fixation point during the baseline period, but to move their eyes freely if they so desired when the experimental stimuli were presented. They were also asked to perform a one-back task by pressing a button with the right index finger.

Data collection (imaging parameters and set-up) and analysis (pre-processing, 3D alignment and statistics) were similar to Experiment 2. Unlike Experiment 2, the GLM model included 2 experimental predictors (color and grayscale) and 6 motion correction predictors (x, y, z for translation and for rotation). Color areas were localized by comparing color versus grayscale pictures. Statistical activation maps for averaged data were set to reliable threshold levels using a false rate discovery of p=0.001 (available in *BrainVoyager QX*) to verify that our regions of interest were unlikely to have arisen by chance as a consequence of multiple comparisons. As for the single-subject imaging maps, significant activations were defined in each individual by contrasting conditions (using separate study predictors in order to weight for the contribution of each run) at a threshold of $p<0.001$, uncorrected.

Localizer task 2: stimulus, design and analyses

We used a block design experiment to localize category specific brain areas such as the fusiform face area (FFA) and parahippocampal place area (PPA), in order to compare their locations with the activations found for shape, texture and color adaptations in Experiment 2. Stimuli were grayscale pictures of faces (front view, with and without emotions), places (exterior/interiors of houses and panoramic scenes), objects (both manipulable and non-manipulable objects), textures (resembling stones, bricks, fabric, grass, etc.), patterns (grids, gratings, mosaics, lines, spider nets, etc.) and scrambled version of these same pictures. It is important to underline that the set of texture stimuli used in the localizer were 2D pictures of the surface material of real objects and therefore differed from the stimuli used in the main experiments, particularly in that the latter did include variations in pigmentation. Stimuli were organized into six blocks accordingly to their category (face, place,

object, texture, pattern and scrambled). The sequence of blocks within a given run was organized quasi-randomly such that every block category was accompanied by its scrambled version and was separated by the following block category by a 14 s fixation period (which was then used as the baseline condition). In each block, stimuli were presented for 800ms and separated by a 200ms-duration blank white screen. Each block consisted of 13 unique stimuli. Because we asked participants to perform a one-back task, one of the stimuli in each block was randomly repeated.

Each subject undertook 2 runs of localizer tasks (either at the beginning or at the end of the scanning session) which were organized into 18 blocks of experimental stimuli and 10 blocks of fixation, all lasting 14 s, for a total duration of 6:32 minutes. During the fixation period a 0.54° x 0.54° black cross was presented on a white background.

Stimuli were presented in the center of the screen and measured 6x6 cm at a viewing distance of 60cm. Participants were instructed to look at the fixation point during the baseline period, but to move their eyes freely if they so desired when the experimental stimuli were presented. They were also asked to perform a one-back task by pressing a button with the right index finger.

Data collection (imaging parameters and set-up) and analysis (pre-processing, 3D alignment and statistics) were similar to Experiment 2. Unlike Experiment 2, the GLM model included six experimental predictors (face, place, object, texture, pattern and scrambled) and 6 motion correction predictors (x, y, z for translation and for rotation). Face, place, and object areas were localized by comparing face versus place, place versus face, and object versus scrambled objects respectively. Statistical activation maps for averaged data were set to reliable threshold levels using a false discovery rate of p=0.001 (available in *BrainVoyager QX*) to verify that our regions

of interest were unlikely to have arisen by chance as a consequence of multiple comparisons. As for the single-subject imaging maps, significant activations were defined in each individual by contrasting conditions (using separate study predictors in order to weight for the contribution of each run) at a threshold of $p<0.001$, uncorrected.

Table 3 supplementary materials:
LO=Lateral occipital; pIPS=posterior intraparietal sulcus; pCoS=posterior collateral sulcus; aCoS=anterior collateral sulcus; LG=lingual gyrus; FG=fusiform gyrus; DPLC=dorsolateral prefrontal cortex; mIPS= medial intraparietal sulcus; preSMA=pre-supplementary motor area; a=anterior; p=posterior. *SC*=shape change, *TC*=texture change, *CC*=color change, *NC*=no change.

Brain Areas	**Hemisphere**	**Talairach Coordinates**			**Volume mm^3**
		x	*y*	*z*	
		SC>TC			
LO	Left	*-44*	*-76*	*-2*	1458
	Right	*43*	*-71*	*-3*	3608
pIPS	Right	*18*	*-88*	*16*	493
		SC>CC			
LO	Left	*-49*	*-78*	*-6*	1124
	Right	*44*	*-71*	*-5*	3192
		TC>SC			
pCoS	Left	*-21*	*-86*	*-13*	1528
	Right	*17*	*-88*	*-1*	2770
		TC>CC			
pCoS	Left	*-20*	*-85*	*-19*	1291
	Right	*14*	*-84*	*-7*	1753
		CC>TC			
aCoS	Left	*-30*	*-50*	*-11*	378
	Right	*25*	*-55*	*-8*	871
LG	Left	*-11*	*-70*	*-11*	837
DLPC	Left	*-38*	*1*	*36*	450
	Right	*32*	*-2*	*32*	565
mIPS	Left	*-32*	*-56*	*36*	737
preSMA		*-3*	*13*	*51*	650
		CC>SC			
aCoS	Left	*-30*	*-51*	*-18*	382
	Right	*25*	*-53*	*-18*	727
LG	Left	*-11*	*-71*	*-10*	524
DLPC	Left	*-35*	*1*	*35*	450
	Right	*32*	*-2*	*32*	565
Anterior Insula	Left	*-32*	*-22*	*15*	737
	Right	*31*	*-18*	*12*	3132
preSMA		*-3*	*9*	*49*	3132
		Color > Grayscale			
aCoS	Left	*-27*	*-50*	*-12*	369
LG	Left	*-23*	*-70*	*-11*	489
mIPS	Right	*29*	*-59*	*41*	775
	Left	*-28*	*-54*	*42*	392

Table 4 supplementary materials:
LO=lateral occipital area; calcD=dorsal calcarine; n.a.= not applicable
Other abbreviations as in Table 3.

Brain Areas	Hemisphere	Talairach Coordinates			t value
		x	y	z	
		SC>TC			
Patient MS					
LO	Left	*-58*	*-56*	*-4*	3
calcD	Right	*5*	*-80*	*7*	3
mIPS	Left	*-30*	*-60*	*53*	3
	Right	*26*	*-67*	*48*	3
Patient DF		n.a.			
		SC>CC			
Patient MS					
LO	Left	*-58*	*-57*	*-4*	3
calcD	Right	9	*-86*	*1*	3
Patient DF		n.a.			
		TC>SC			
Patient DF					
pCoS	Left	*-14*	*-86*	*-21*	3
pLG	Right	*-11*	*-89*	*-13*	3
Patient MS		n.a.			
		TC>CC			
Patient DF					
pCoS	Left	*-12*	*-86*	*-23*	3
pLG	Right	*-18*	*-81*	*-11*	3
Patient MS		n.a.			
		CC>TC			
Patient DF					
aCoS	Left	*-31*	*-55*	*-20*	3
	Right	*32*	*-53*	*-19*	3
LG	Left	*-35*	*-74*	*-19*	3
Anterior Insula	Left	*-29*	*17*	*9*	3
DLPC	Left	*-43*	*22*	*31*	3
	Right	*40*	*24*	*25*	3
mIPS	Left	*-41*	*-50*	*31*	3
	Right	*-39*	*-48*	*29*	3
preSMA		*-2*	*7*	*46*	3
Patient MS		n.a.			
		Color>Grayscale			
aCoS	Left	*-34*	*-51*	*-20*	3
	Right	*32*	*-58*	*-20*	3
LG	Left	*-33*	*-73*	*-19*	3
	Right	*-22*	*-77*	*-21*	3
mIPS	Left	*-29*	*-49*	*32*	3
preSMA		*2*	*25*	*41*	3
Patient MS		n.a.			

Figure 6 supplementary materials: Overlay activity from paired-comparisons in Experiment 2 and independent localizer 1 in neurological intact controls.

a) Overlay activity for the paired comparisons of *SC* vs *TC* (depicted in red), *SC* vs *CC* (depicted in orange), *TC* vs *SC* (depicted in dark blue), *TC* vs *CC* (depicted in light blue), *CC* vs *TC* (depicted in light green), *CC* vs *SC* (depicted in bright green) in Experiment 2 and for color vs grayscale paintings (depicted in dark green) in Localizer 1 are shown for the neurological intact controls group. The group activation map is based on the Talairach averaged group results using odd runs only (for Experiment 2), shown for clarity on a single subject's anatomical scan. **b)** Averaged beta weights (β) extracted for even runs only measured in each brain areas for *SC*, *TC*, *CC* and *NC* blocks. Brain activity in LO was extracted for the comparison of *SC* vs *TC*, in aCoS and LG for the comparison of Color vs Greyscale paintings and in pCoS for the comparison of *TC* vs *CC*. Bars represent standard error. For abbreviations, please see Figure 3.

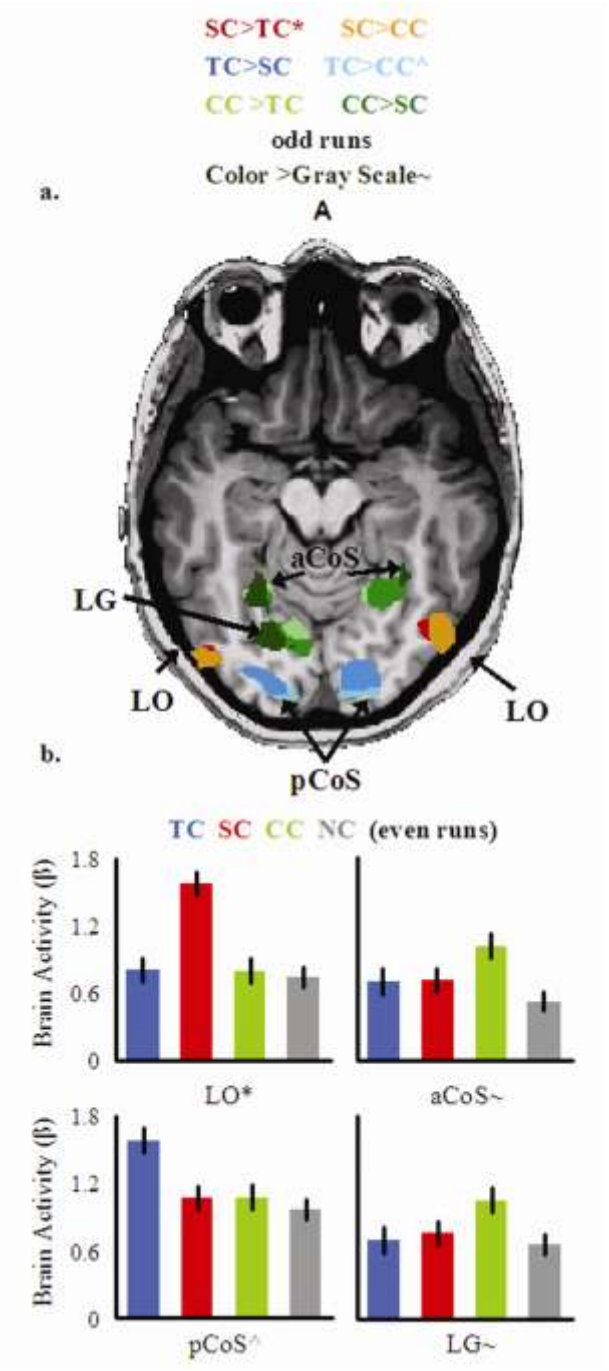
SC>TC*
SC>CC
TC>SC
TC>CC^
CC>TC
CC>SC
odd runs
Color >Gray Scale~
a.
A
aCoS
LG
LO
LO
pCoS
b.
TC SC CC NC (even runs)
Brain Activity (β)
1.8
1.2
0.6
0
LO*
aCoS~
pCoS^
LG~

Figure 7 supplementary materials: Single-subject activation maps for *SC*, *TC* and *CC* discrimination.

The exact location of *SC* (in red), *TC* (in light blue) and *CC* (in green) voxels are shown in the clearest axial slice in all control participants (young: 1-10 and age-matched: 11,12). The collateral sulcus (CoS) is marked as an anatomical landmark using a white dotted line. Significant activations were defined in each participant by contrasting conditions (using separate study predictors in order to weight for the contribution of each run) at a minimum threshold of $p<0.0001$, uncorrected. SC voxels were localized near the lateral occipital cortex (LO) using the following conjunction contrast: [(*SC*>*NC*)&(*SC*>*TC*)&(*SC*>*CC*)]. *TC* voxels were localized at the posterior end of the CoS using the following conjunction contrast: [(*TC*>*NC*)&(*TC*>*SC*)&(*TC*>*CC*)]. *CC* voxels were localized within the anterior portion of the CoS using the following conjunction contrast: [(*CC*>*NC*)&(*CC*>*TC*)&(*CC*>*SC*)]. *SC*=shape change, *TC*=texture change, *CC*=color change, *NC*=no change.

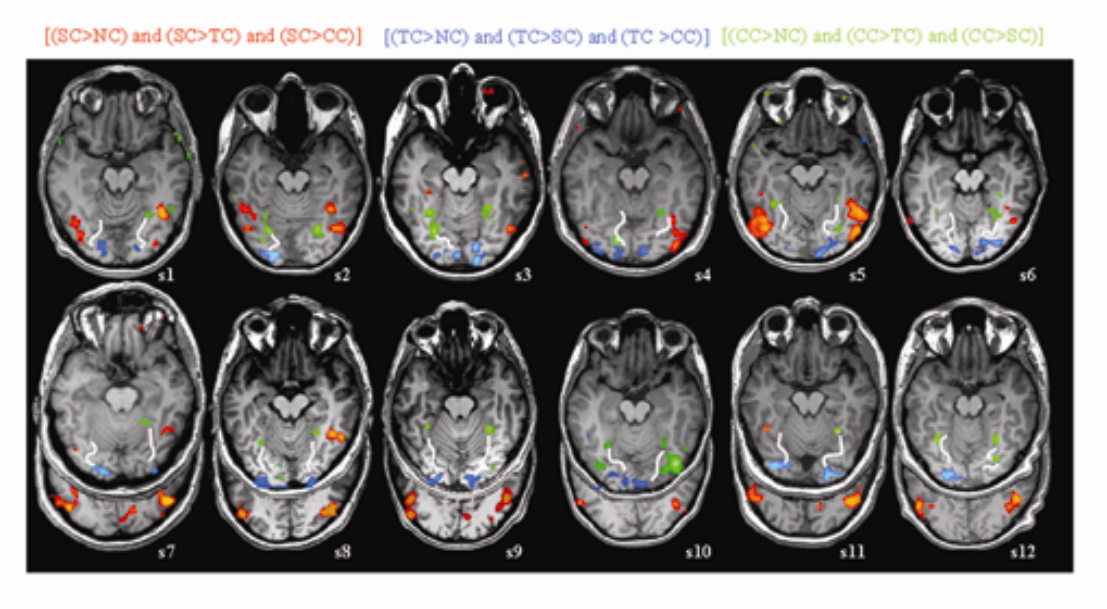

Figure 8 supplementary materials: Overlay activity from paired-comparisons in Experiment 2 and independent localizer 1 in patients DF and MS.

a) Overlay activity for the paired comparisons of *SC* vs *TC* (depicted in red), SC vs CC (depicted in orange), *TC* vs *SC* (depicted in light blue), TC vs CC (depicted in dark blue), *CC* vs *TC* (depicted in light green) in Experiment 2 and for Color vs Grayscale paintings (depicted in dark green) in Localizer 1 are shown for patients DF and MS. **b)** Averaged beta weights (β) measured in each brain areas for *SC*, *TC*, *CC* and *NC* blocks. Brain activity in LO was extracted for the comparison of *SC* vs *TC*, in aCoS and LG for the comparison of Color vs Greyscale paintings and in pCoS for the comparison of *TC* vs *SC*. Bars represent standard error. For abbreviations, please see Figure 5.

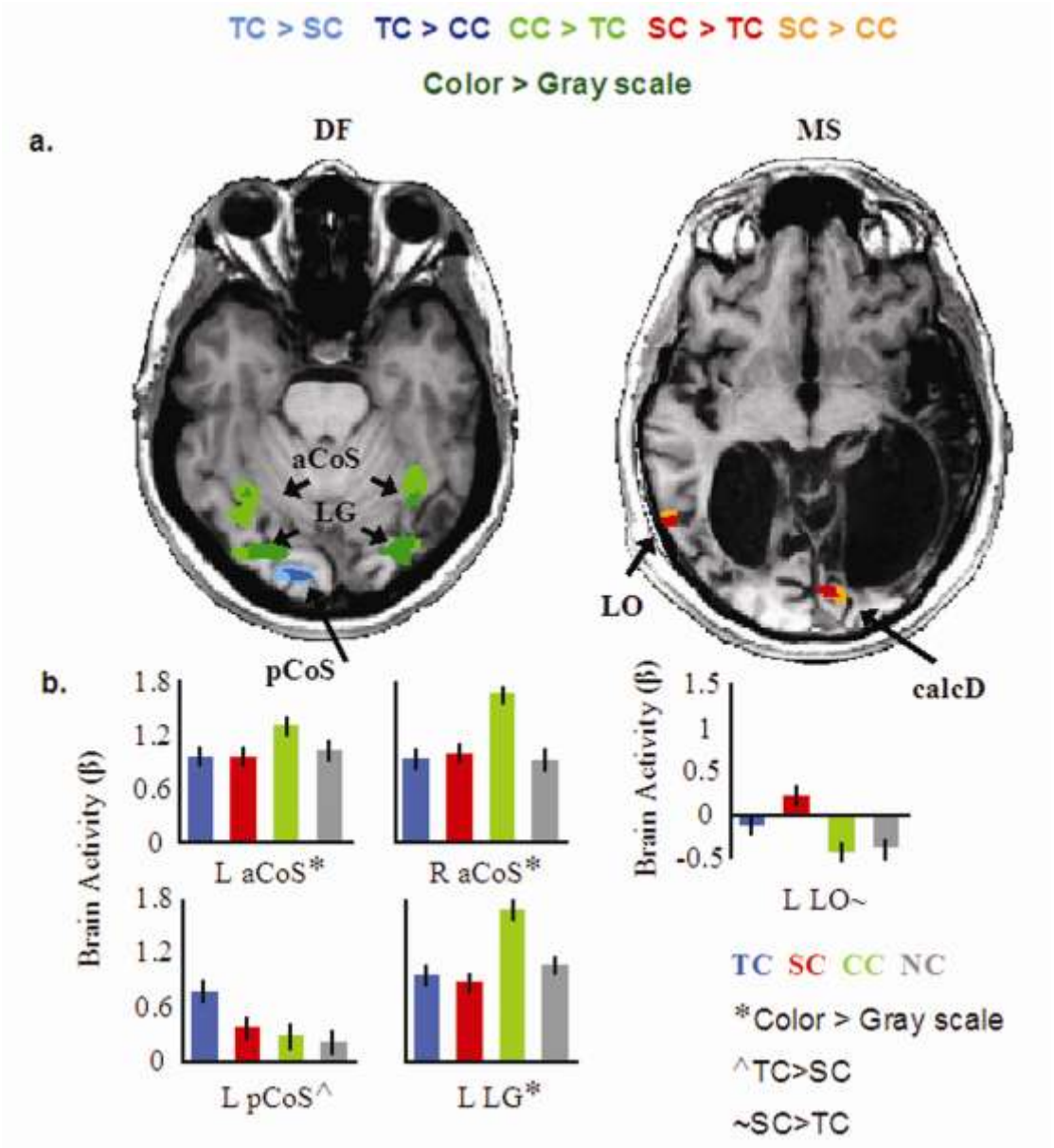
TC > SC
TC > CC
CC > TC
SC > TC
SC > CC
Color > Gray scale
a.
DF
MS
aCoS
LG
pCoS
LO
calcD
b.
Brain Activity (β)
1.8
1.2
0.6
0
L aCoS*
R aCoS*
L pCoS^
L LG*
1.5
1
0.5
0
-0.5
L LO~
TC SC CC NC
*Color > Gray scale
^TC>SC
~SC>TC

Figure 9 supplementary materials: Overlay activity for Experiment 2 and independent Localizer 2.

Overlay activity for shape, texture and color areas active in Experiment 2, and face, place and object activations in the independent Localizer 2 are shown for DF, MS and the control group average. Rebound from adaptation for shape change trials [(*SC>NC*)&(*SC>TC*)&(*SC>CC*)] are depicted in red, for texture change trials [(*TC>NC*)&(*TC>SC*)&(*TC>CC*)] in blue, and for color change trials [(*CC>NC*)&(*CC>TC*)&(*CC>SC*)] in green. Activations for faces versus places are depicted in pink, for places versus faces in dark brown and for object versus scrambled in plain and dotted orange. As before, the group activation map is based on the Talairach averaged group results, shown for clarity on a single subject's anatomical scan. Face-selective voxels were localized within FFA (in neurologically intact controls and in DF) and within OFA (in controls only). Place-selective voxels were localized within PPA and more caudally within the lingual gyrus (pLG) (Epstein et al., 2007) in both neurological intact controls and in patient DF. Object selective voxels were localized within the more dorsolateral portion of the lateral occipital complex (LO, in both MS and in neurological intact controls), and in the more ventral portion of the lateral occipital complex (posterior fusiform sulcus, pFs, in the neurological intact controls only). Object versus scrambled activation encompassed FFA, OFA, PPA, LO and the more anterior portion of the color area in the aCoS, excluding color voxels in the LG and texture activation in the pCoS. This pattern of results might be related to the fact that the pictures of objects we used in the localizer were simple gray scale representation, and therefore did not signal the material properties of objects through both color and texture. L=left, R=right, a=anterior, p=posterior, LO=lateral occipital cortex, FFA=fusiform face area,

PPA=parahippocampal place area, pLG=posterior lingual gyrus; aCoS=anterior collateral sulcus, pCoS=posterior collateral sulcus. *SC*=shape change, *TC*=texture change, *CC*=color change, *NC*=no change.

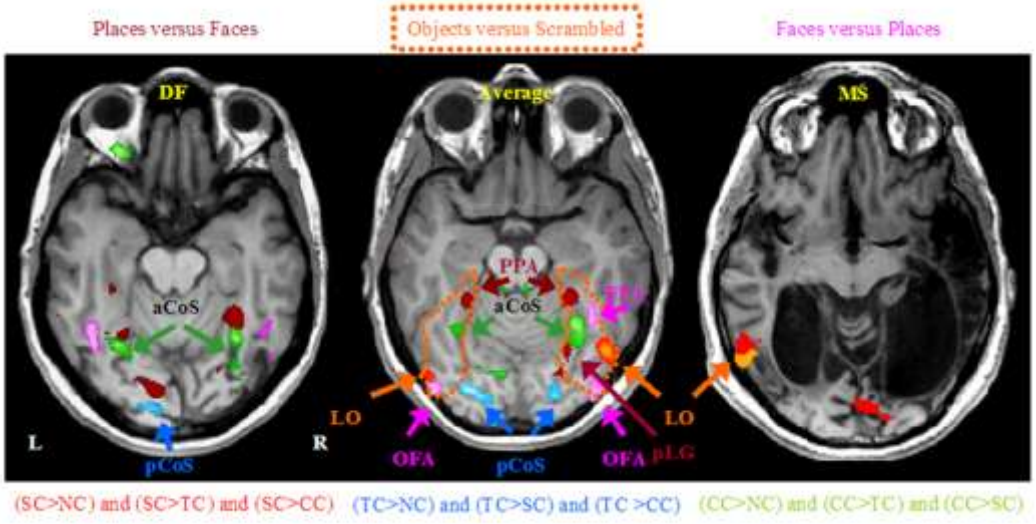

Figure 10 supplementary materials: variability of the spatial frequency content of the three sets of images.

The amount of variability in the spatial frequency content of the three sets of images (*SC, TC* and *CC*) can be summarised in terms of the coefficient of variation (α/μ) of their power spectra. There is no evidence that the variability in the power of the texture stimuli across spatial frequencies is consistently greater than that of the other types of stimuli. α =standard deviation of power; μ: mean of power.