

## Supplementary Material

### Individually-defined fROIs

Following a request from a reviewer, the data were also analysed by defining fROIs on an individual basis, rather than on a group basis (as in the main paper). Defining fROIs individually is a more common practice for the FFA and PPA, and allows for possible anatomical variability across participants in the functional organisation of their brains (see, e.g., Saxe, Brett, & Kanwisher, 2006, for further discussion). Therefore, each participant's SPM for the same localising contrast (attend faces vs. attend houses, and vice versa) was thresholded at  $p < .001$  uncorrected, and the coordinates of the maximum within left and right fusiform or parahippocampal cortices recorded.<sup>1</sup> At this threshold, the fROIs were identified in most, though not all, participants. The number of such participants, and the mean and range of their MNI coordinates, are shown in Table S1.

The response of each of these 4 fROIs across the 8 conditions in the analyses of the Attended Stimulus and of the Repetition Effects are shown in Figure S1 and S2 respectively (cf. Figures 3 and 5 in the main paper). In general, these individually-defined results are similar to the group-defined results, though there are a few notable differences. Firstly, the overall signal change in the analysis of the Attended Stimulus was greater, particularly for the FFA (Figure S1). This is probably because voxels with larger signal changes are more likely to be selected (i.e., more reliable in the localising contrast for individual participants), and hence the mean signal change across participants is likely to be greater than when this latitude is removed by matching voxels across participants in the group-analysis. Secondly, in the analysis of Repetition Effects (Figure S2), there was no longer reliable repetition suppression for faces in the attended-attended condition in the left FFA, and now repetition

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<sup>1</sup> Note that the functional images were still spatially normalised to Talairach space, as in the main paper, and that the data from these maximal voxels reflect a weighted average of nearby voxel values, given the spatial smoothing employed. Note also that our functionally-defined regions were identified by an orthogonal contrast within the same experimental session (i.e., for the same stimuli under the same task), which avoids the problems associated with using separate "localiser" sessions (Friston et al., 2006).

suppression for faces in the attended-attended condition in the right PPA reached significance. Finally, the post hoc contrasts of repetition suppression in the attended-attended condition against the mean repetition suppression effect across the remaining three conditions (see main paper) was again reliable when houses were attended on both first and second presentations, for both left and right PPA,  $t(17) = 2.58$ ,  $p < .05$  and  $t(16) = 2.07$ ,  $p < .05$  respectively. For faces however, there was no such evidence in either left or right FFA,  $t(12) = -1.35$  and  $t(15) = 0.004$  respectively.

In order to perform repeated-measures ANOVAs analogous to those in the main paper, the data were restricted to the 11 participants in which all four fROIs could be identified.

#### **Analysis of Attended Stimulus: fROI analysis**

As in group-based fROI analyses, the ANOVA with factors region (FFA vs. PPA), hemisphere (left vs. right), stimulus-category, attended hemifield and contralateral stimulus-relation showed a reliable five-way interaction,  $F(1,10) = 11.6$ ,  $p < .01$ . When decomposing this interaction into separate ANOVAs for attended faces and attended houses, there were reliable four-way interaction between region, hemisphere, attended hemifield and contralateral stimulus-relation in both cases,  $F(1,10) = 5.06$ ,  $p < .05$ , and  $F(1,10) = 9.20$ ,  $p < .05$ , respectively, also as in the main paper.

For attended faces, the subsequent three-way ANOVAs on FFA and PPA separately showed only a reliable main effect of contralateral stimulus-relation,  $F(1,10) = 7.81$ ,  $p < .05$ . This effect, of greater responses when the contralateral (ignored) stimulus-category was also a face (see Figure S1A&B), did not reach significance in the group-based analysis of the FFA, though matches the general pattern seen in the PPA. For the PPA, there was a reliable three-way interaction between hemisphere, attended hemifield and contralateral stimulus-relation,  $F(1,10) = 11.7$ ,  $p < .01$ . Follow-on analyses on left and right PPA separately showed only a main effect of contralateral stimulus-relation in both cases,  $F(1,10) > 47.3$ ,  $p < .001$ , as in the group-based analyses, plus an interaction between attended hemifield and contralateral stimulus-relation in the right PPA,  $F(1,10) = 7.5$ ,  $p < .05$ . The main effects of

contralateral stimulus-relation reflected greater responses when the contralateral (ignored) stimulus-category was different, i.e, a house (see Figure S1E&F). The interaction with hemifield in right PPA reflected greater responses to attended faces in the right hemifield.

For attended houses, the subsequent three-way ANOVAs on FFA and PPA separately showed a reliable main effect of contralateral stimulus-relation in both regions,  $F(1,10)=17.0$ ,  $p<.005$ , and  $F(1,10)=6.96$ ,  $p<.01$ , respectively. In all cases, responses were greater when the contralateral (ignored) stimulus-category corresponded to the preferred stimulus for that region (Figure S1C&D, G&H), as also found in the group-based fROI analyses. For the PPA, there was an additional two-way interaction between hemisphere and attended hemifield,  $F(1,10)=9.99$ ,  $p<.05$ , reflecting greater responses when the attended stimulus was in the contralateral hemifield.

In summary, these results support the general results from the group-based fROI analyses in the main paper, with evidence of category-specific processing of stimuli in the ignored hemifield.

#### **Analysis of Repetition Effects: fROI analysis**

The data from the individually-defined fROI were also entered into an ANOVA on repetition effects with factors region (FFA vs. PPA), hemisphere, stimulus-category, initial condition and repeat condition. As for the group-based analyses, there was a reliable interaction between region and stimulus-category,  $F(1,10)=5.22$ ,  $p<.05$ , with greater relative repetition suppression for faces in the FFA and for houses in the PPA. Unlike the group-based analyses, there was also an interaction between region and initial condition,  $F(1,10)=5.95$ ,  $p<.05$ , with a greater effect of initial attention in the PPA than in the FFA. There was also a reliable four-way interaction between hemisphere, stimulus-category, initial condition and repeat condition,  $F(1,10)=6.42$ ,  $p<.05$ . This was followed-up with separate ANOVAs for faces and houses. When faces were the critical stimulus, the only reliable effect was the two-way interaction between hemisphere and initial condition,  $F(1,10)=5.16$ ,

$p < .05$ , which reflected greater effects of attention to first presentations in the right than left hemisphere. When houses were the critical stimulus, there were no reliable effects. Given that these latter two effects were not found in the group-based analyses, they are not interpreted further.

### **Summary**

In general, the results from the individually-defined fROIs are not as clear cut as in the group-defined fROIs. This may reflect the practical difficulty in identifying the FFA or PPA in some participants. Though maxima within the fusiform or parahippocampal cortices might have been identified for all participants by lowering the statistical threshold, this causes ambiguity for other participants in which multiple such maxima emerge. Moreover, although lowering the threshold might restore the statistical power to that of the group-defined analyses, it may also introduce more random noise into the data. Alternatively, the anatomical variability in the location of the FFA and PPA may not, in fact, be large relative to the spatial smoothness of the present data, in which case the group-defined fROIs will be more sensitive. Whatever the reason for the differences in the group-defined and individually-defined fROI analyses, the general conclusions of the main paper would not appear to be disputed.

### **Behavioural Data**

The RTs for the analysis of the Attended Stimulus and for the Repetition Effects in analysis of the Critical Stimulus, are shown in Tables S2 and S3 respectively.

Table S1. Individually-defined fROIs. n = Number of participants in which at least one voxel within fusiform or parahippocampal cortex survived  $p < .001$  uncorrected in the localising contrast of faces vs. houses. Mean, Min and Max give idea of central tendency and range across participants of the MNI coordinates for the maxima of these contrasts.

	Left FFA	Right FFA	Left PPA	Right PPA
n	12	15	17	16
Mean	-39 -48 -18	+39 -50 -19	-25 -48 -13	+28 -44 -11
Min	-48 -63 -24	+33 -66 -24	-33 -60 -21	+18 -51 -21
Max	-30 -36 -12	+45 -33 -12	-21 -39 -6	+36 -39 -6

Table S2. Mean (M) and Standard Error of Mean (SEM) for Reaction Times (ms) as a function of condition in the analysis of the Attended Stimulus. The condition label 'Ff' indicates an attended face on the left and an ignored face on the right; the condition label 'fH' indicates an ignored face on the left and an attended house on the right, etc.

	<b>Ff</b>	<b>Fh</b>	<b>fF</b>	<b>hF</b>	<b>Hh</b>	<b>Hf</b>	<b>hH</b>	<b>fH</b>
M	561	581	561	564	594	593	584	585
SEM	36	40	38	38	43	42	37	37

Table S3. Mean (M) and Standard Error of Mean (SEM) for Repetition Effects (control minus repeat trials) in Reaction Times (ms) as a function of condition in the analysis of the Critical Stimulus. The condition label '**F/F**' indicates a face attended on both initial and repeat presentations; the condition label '**h/H**' indicates a house ignored on its initial presentation but attended on its repeat presentation, etc.

	<b>F/F</b>	<b>F/f</b>	<b>f/F</b>	<b>f/f</b>	<b>H/H</b>	<b>H/h</b>	<b>h/H</b>	<b>h/h</b>
<b>M</b>	4	3	-10	12	-13	-2	11	-3
<b>SEM</b>	9	13	7	6	7	11	8	8

Figure S1. Individually-defined Functional Region-of-Interest (fROI) analyses of the attended stimulus (cf. Figure 3 in main paper). Responses are shown in four brain regions, left and right fusiform face area (FFA) and parahippocampal place area (PPA), whose coordinates are determined from the maxima of the main effect of attended faces vs. attended houses for each participant separately. Plots show % signal change relative to the mean across voxels and scans for the 8 conditions of interest. Error bars show 95% confidence intervals. The condition label '**Ff**' indicates an attended face on the left and an ignored face on the right; the condition label '**fH**' indicates an ignored face on the left and an attended house on the right, etc. Grey fill illustrates the main pattern of greater activity when the preferred stimulus is in the ignored hemifield.

Figure S2. Individually-defined Functional Region-of-Interest (fROI) analyses of repetition effects (critical stimulus; cf. Figure 5 in main paper). Responses are shown in four brain regions, left and right fusiform face area (FFA) and parahippocampal place area (PPA), whose coordinates are determined from the maxima of the main effect of attended faces vs. attended houses for each participant separately. Plots show % signal change for repeat minus initial presentations across the 8 conditions of interest (collapsing across hemifield and contralateral relation). Error bars show 95% confidence intervals. The condition label '**F/F**' indicates a face attended on both initial and repeat presentations; the condition label '**h/H**' indicates a house ignored on its initial presentation but attended on its repeat presentation, etc. Grey fill illustrates reliable repetition suppression, which tends to be only for stimuli preferred by the given region and that were attended on both initial and repeat presentations.