Supplementary information:

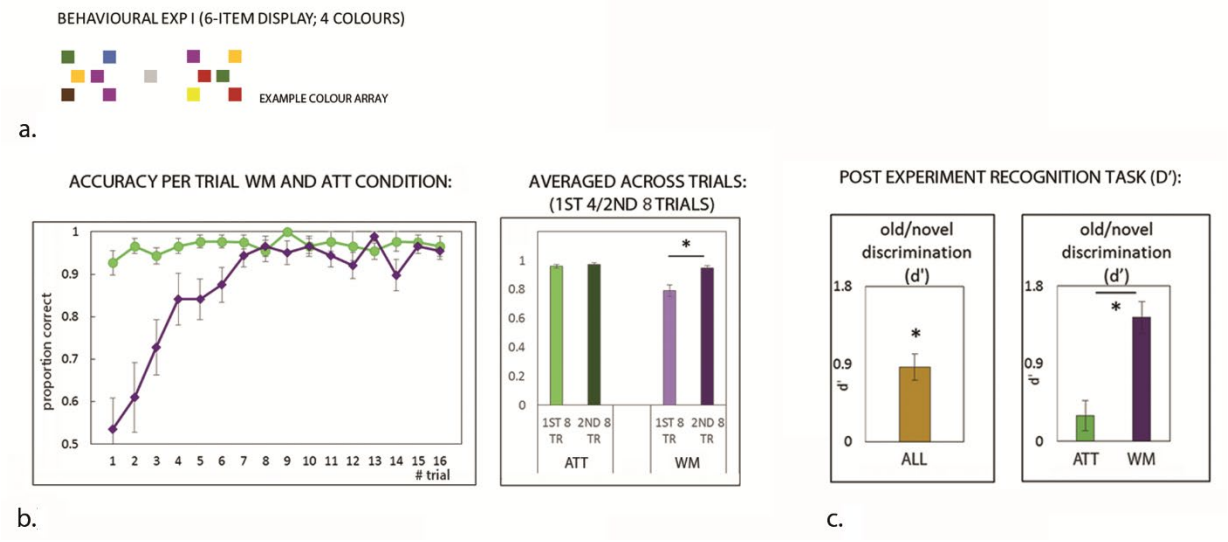


Fig. S1 behavioural experiment 1.

a.)

Example of a colour-array used in pilot experiment 1. Four different colours were randomly drawn (separately for each hemifield) from a pool of 8 highly discriminable colours and allocated to each of 6 squares of an array, with two colours being repeated.

As in the paradigm used for the EEG experiment, the two colour-arrays were bilaterally presented with one hemifield cued for covert attention at the beginning of a testing block. During this behavioural experiment, the same array-combination was repeated for 16 trials in one testing block (this was reduced to 8 during the EEG paradigm). As during the EEG paradigm, spatial locations of all squares would remain visible as white placeholders during stimulus intervals throughout the testing block. Participants had to match a central colour probe with the colour at one highlighted square in the array, either while the colour-array was still present on screen (ATT condition) or following a 2.5 second delay (WM condition). As in the EEG paradigm, the main experiment was followed by a post-hoc recognition task.

During this task, all colour-arrays that had been presented during the main task on the attended hemifield were shown again, randomly intermixed with novel array configurations made up out of the same colour pool. Participants had to indicate whether they recognized the presented arrays with a confidence above 60%.

b.)

Mean proportion correct scores are plotted for 16 consecutive trials for the ATT and the WM condition (n=11). A gradual increase in accuracy during the WM condition reached ceiling around the 8th trial, while performance for the attention condition was around ceiling throughout the testing block. In the right panel, the accuracy scores for both conditions are plotted, averaged across the first- and the second eight trials. A learning effect was observed for the WM condition between trial groups which was not observed in the ATT condition (Interaction Task x Trial Group $F(1,10)=23,7$ $p<.001$; Effect Trial Group ATT ($T(10)=-1.2$ $p=.26$ ns.; Effect Trial Group WM ($T(10)=-5.7$ $p<.001$).

c.)

Accuracy scores on the post-hoc recognition task are plotted as d' scores across conditions (left panel) and separated for colour-arrays, that had previously been shown during the ATT or the WM condition (right panel). The d' score across conditions was greater than zero ($T(10)=5.7$ $p<.001$), which indicates a long-term consolidation of the memory-trace. Note that the colour-arrays that had been presented during the WM condition in the main experiment were significantly better remembered than those presented during the ATT condition ($T(10)=-6.29$ $p<.001$).

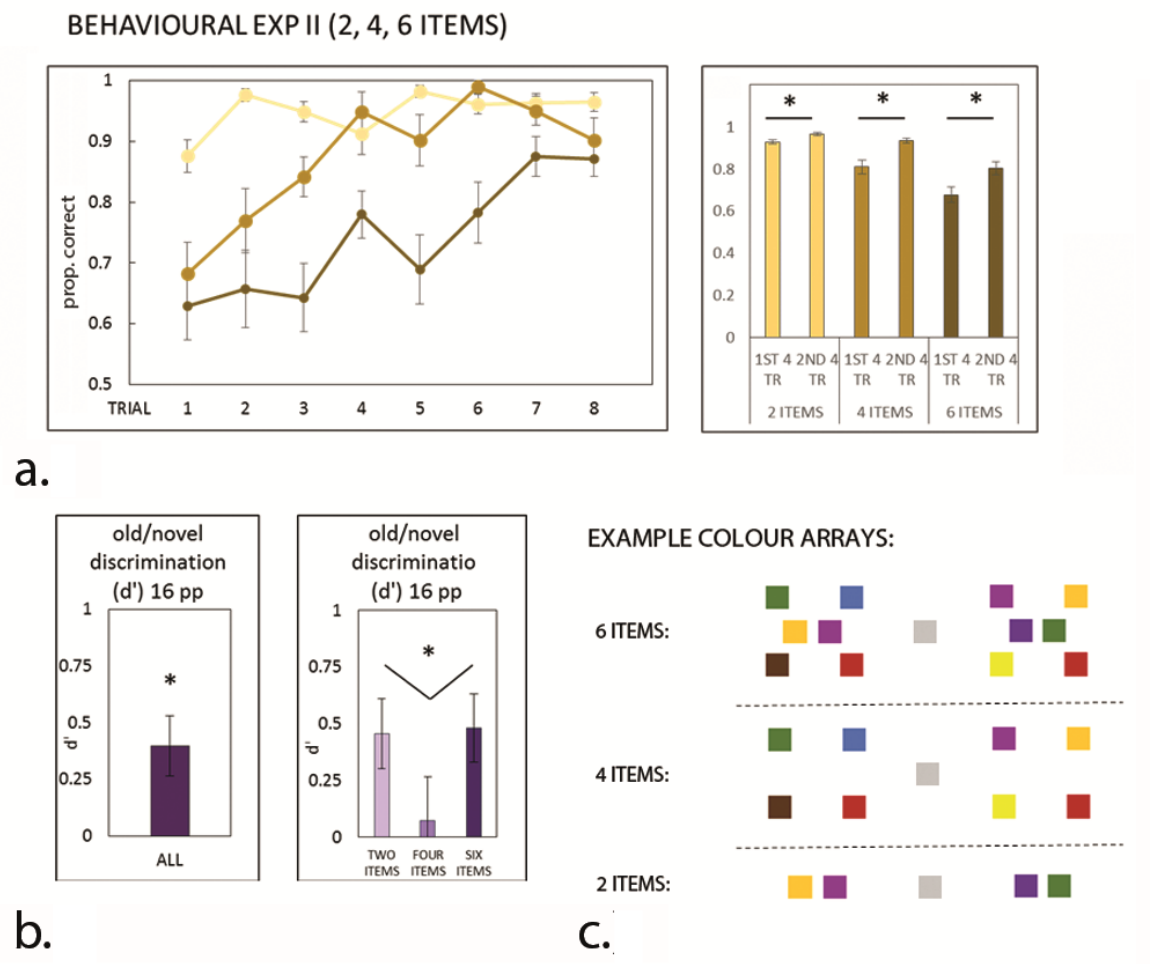


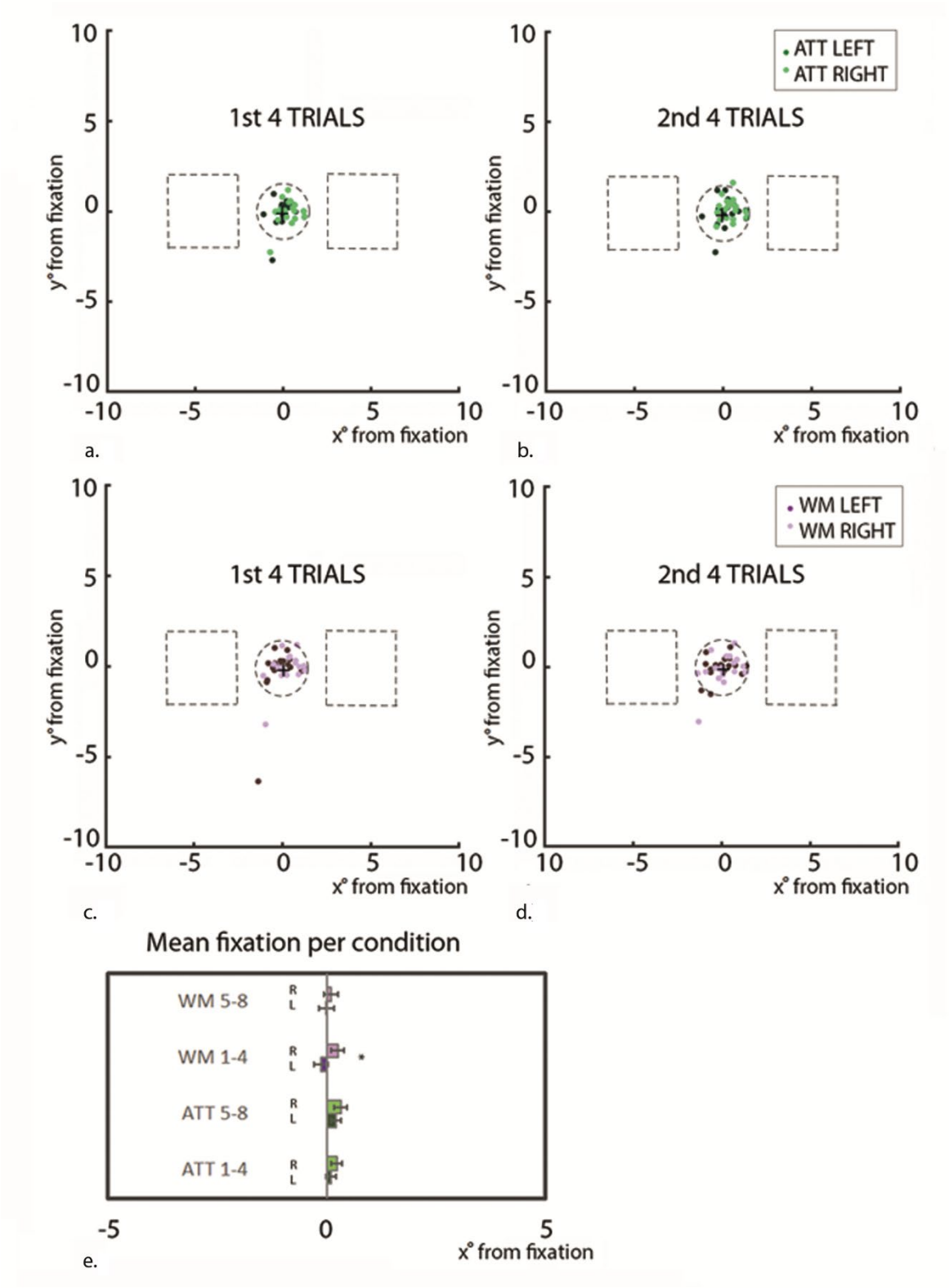
Fig. S2 behavioural experiment 2.

In the second pilot experiment, a similar visual WM paradigm was used as in behavioural experiment 1, except that three set-size conditions were tested. Example of colour-arrays used in behavioural experiment 2. Six, four or two different colours were randomly drawn (separately for each hemifield) from a pool of 8 highly discriminable colours and allocated to each square of a six, four or two square-array (shown in c), depending on the WM condition of the testing block. These set-sizes were chosen deliberately around the visual WM capacity limit (around 4) as it was hypothesized that a set-size beyond the capacity limit (6) would enforce a strategy that relied more on LTM-supporting brain-structures. Importantly, we expect that an enhanced reliance on the LTM system for holding a mental representation

online during the WM condition, would result in a stronger memory consolidation. This should be reflected in a higher accuracy score during a post-test recognition task.

We found indeed support for this hypothesis with 2- and 6-item arrays being better remembered in a post-hoc recognition task than 4-item arrays (shown in b; quadratic effect d' between ITEM nr. conditions $F(1,15)=8,1$ $p=.012$; Main effect d' across all ITEM nr. conditions $T(15)=2.7$ $p=.016$).

The different learning curves (n=16) are shown for the 2,4 and 6-item arrays during the 8-trial visual WM task in a, left panel. Averaging across first- and second four trials showed significant learning effects for all conditions (a, right panel; $p<.005$).



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62 **Fig. S3 Eye fixation.**

63 Mean fixation coordinates were within 1.5º from the center for all participants (indicated by the

64 dashed circle) in all conditions (a-d). Dashed squares indicate the location of the colour-arrays

on screen. Across participants a slight hemifield bias was observed during the first 4 trials of the WM condition, and not in any other condition (e; R=right hemifield trials; L=left hemifield trials). The small magnitude of this (<.3º on average) is not thought to have any substantial impact on the CDA measurements (see methods).

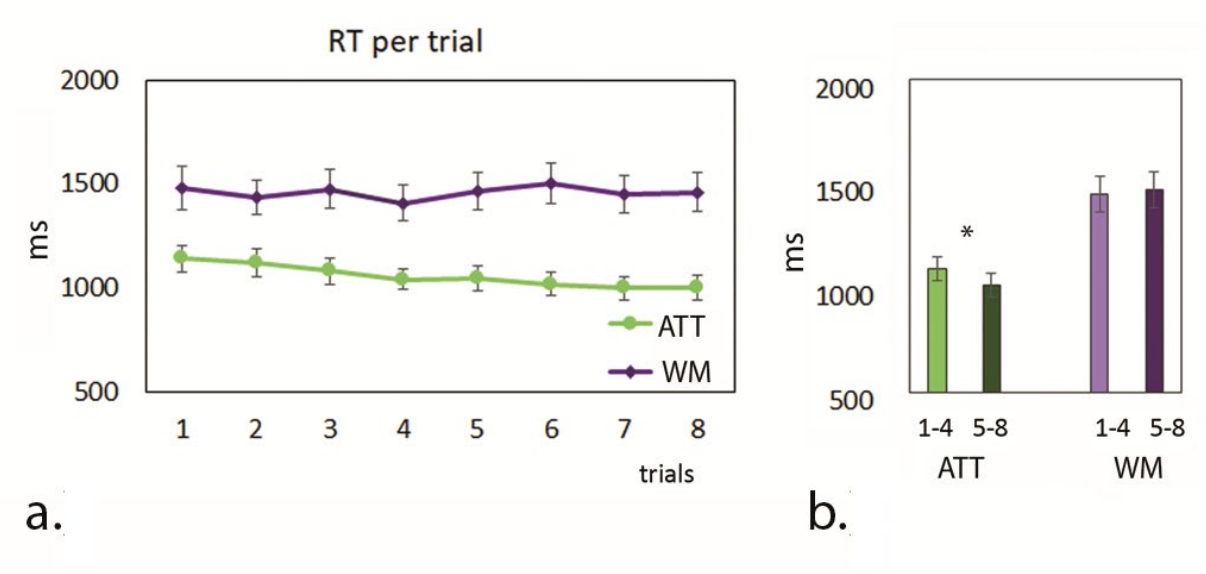
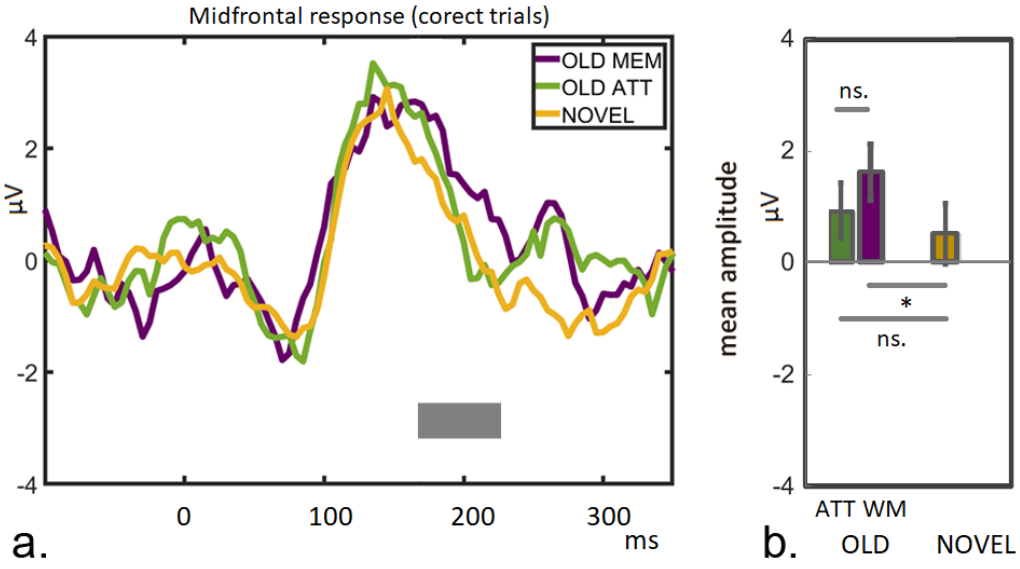


Fig. S4 Reaction Times.

Mean RT scores (calculated from array-onset (ATT condition) or cue-onset (WM condition) are plotted for 8 consecutive trials each condition. RT's got gradually faster for the ATT condition but did not change across trials for the WM condition. Overall RTs were faster for the ATT condition b.) Plotted are the RT scores for both conditions, averaged across the first- and the second four trials (Main effect Task $F(1,19)=42{,}1$ $p=.000$; Main effect Trial Group $F(1,19)=4.71$ $p=.043$; Interaction Task x Trial Group $F(1,19)=9$ $p=.007$) (ATT Trial Group $T(20)=5.5$ $p<.001$; WM Trial Group $T(20)=-.79$ $p=.44$).



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81

82 **Fig. S5 Midfrontal response during recognition task for both array conditions.**

83 The midfrontal response is shown for 350 ms post array-onset during the recognition task for
84 all conditions separately (ie. colour-arrays previously shown during the ATT- or WM condition,
85 or to newly created colour-arrays (NOVEL)) (a). Mean amplitudes at 170-230 ms post array-
86 onset (indicated by gray box in a) are plotted per condition (b).

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