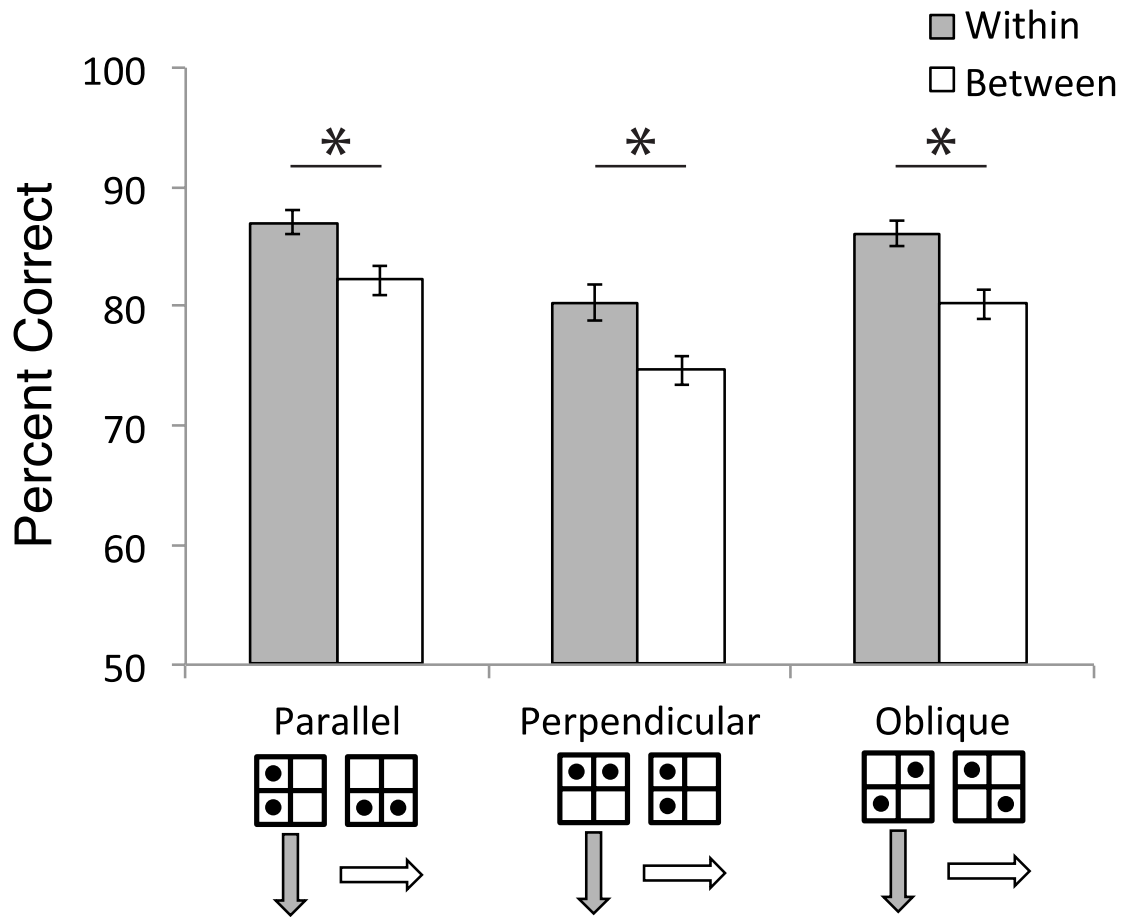


1 Appendix A1: Analysis of eye-tracking data in Experiments 1A and 1B

2 Eye-tracking data from Experiments 1A and 1B were analyzed to explore whether eye
3 movements might explain the between-hemifield crossover cost observed in these two
4 experiments. To increase the power to detect differences in eye position for within- and between-
5 hemifield trials, data from Experiments 1A (N = 16) and Experiments 1B (N = 40; cross
6 conditions) were aggregated for this analysis (no differences in statistical significance occurred
7 when analyzing each experiment separately). For each observer, we calculated average
8 horizontal eye position, vertical eye position, and distance from fixation separately for within-
9 and between- hemifield trials. No significant differences for within- versus between-hemifield
10 trials occurred for any of these metrics (horizontal position: $M_{diff} = .7$ pixels, $d_z = .21$, $p = .12$;
11 vertical position: $M_{diff} = .2$ pixels, $d_z = .05$, $p = .72$; distance from fixation: $M_{diff} = .4$ pixels, $d_z =$
12 $.20$, $p = .14$). We also tested whether individual differences in distance from fixation for these
13 two conditions might be associated with each individual's crossover cost, but did not find
14 evidence for such an association ($r(54) = -.002$, $p = .99$). Although small (.4 pixels) and not
15 statistically significant, the average distance from fixation was numerically larger for within-
16 hemifield trials than for between-hemifield trials. Therefore, we separately analyzed observers
17 who deviated more from fixation during within-hemifield trials ($n = 35$) and observers who
18 deviated more from fixation during between-hemifield trials ($n = 21$); we found a between-
19 hemifield crossover cost for both groups ($t(34) = 5.53$, $p < .001$, $d_z = .94$; $t(20) = 5.39$, $p < .001$,
20 $d_z = 1.18$). Therefore, observers' eye-tracking data do not provide evidence for eye-movements
21 being responsible for the between-hemifield crossover cost in Experiments 1A and 1B.
22



24

25 **Figure A2:** Results of mirror-image confusion analysis for Experiment 2A. Observers performed
 26 better for within-hemifield movements than between hemifield movements no matter if the dots
 27 in the probed grid were originally positioned parallel, perpendicular, or oblique to the direction
 28 of the grid’s movement. Error bars represent within-subject *SEM* (Cousineau, 2005).

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32 We interpreted the between-hemifield crossover cost in Experiment 2A as evidence of
 33 hemifield-specific control of spatial working memory. A possible alternative explanation is that
 34 maintaining a representation in one hemifield automatically generates a laterally mirrored
 35 representation in the opposite hemifield, due to inter-hemispheric connections between the
 36 laterally symmetric hemispheres of the brain (Rollenhagen & Olson, 2000). For example,
 37 consider a 2 x 2 grid (like those in Experiment 2A) appearing in the bottom-left quadrant of the
 38 screen with dots in its upper-left and lower-left cells. If maintaining this grid in working memory
 39 resulted in the activation of a laterally-mirrored right-hemifield representation (of a grid with
 dots in its upper-right and lower-right cells), interference between these two representations

40 might occur when the grid moved horizontally between the hemifields, but would not occur
41 when the grid moved vertically within its original hemifield. If this explanation is responsible for
42 the between-hemifield crossover cost in Experiment 2A, the crossover cost should *not* occur for
43 grids that are laterally symmetric (e.g., a grid with dots in its upper-left and upper-right cells
44 moving horizontally to a new hemifield), as the laterally-mirrored representation would be
45 identical to the original representation.

46 To test whether a laterally-mirrored representation or target information produced the
47 between-hemifield crossover cost, we grouped trials into whether the original layout of dots in
48 the probed grid was A) parallel to the direction of movement (vertically aligned dots in a grid
49 moving vertically within-hemifield, or horizontally aligned dots in a grid moving horizontal
50 between-hemifield), B) perpendicular to the direction of movement (vertically aligned dots in a
51 grid moving horizontally between-hemifield, or horizontally aligned dots in a grid moving
52 vertically within-hemifield), or C) oblique to the direction of movement (diagonally aligned dots
53 in a grid moving either vertically within-hemifield or horizontally between-hemifield; see Figure
54 A2 for examples). Critically, trials where dots are aligned parallel to the direction of motion
55 would not have a conflicting representation during between-hemifield movements, as the
56 laterally mirrored representation would be identical to the original representation. Trials where
57 the layout was perpendicular or oblique to the direction of movement would have different
58 laterally-mirrored representations, and therefore potential conflict during between-hemifield
59 movements. Therefore, if the crossover cost is the result of lateral mirror-confusion during
60 between hemifield movements, a crossover cost should be found for perpendicular and oblique
61 trials, but not for parallel trials.

62 A separate dependent-measures t-test for each layout type revealed that a between-
63 hemifield crossover cost occurred for all three types of trials (parallel: $p = .01$; perpendicular: $p <$
64 $.01$; oblique: $p = .002$), indicating that differences between lateral and vertical mirror confusion
65 cannot be the explanation of the between-hemifield crossover cost. Additionally, the magnitude
66 of the crossover cost (difference between within- and between-hemifield trials) was not
67 significant differently when comparing parallel trials to either perpendicular ($p = .78$) or oblique
68 trials ($p = .70$), further indicating that mirror-confusion is not the cause of the between-hemifield
69 crossover cost for spatial working memory.

70

71 Reference:

72 Rollenhagen, J. E., & Olson, C. R. (2000). Mirror-image confusion in single neurons of the
73 macaque inferotemporal cortex. *Science*, 287(5457), 1506-1508.

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