

Supplementary material: Learning effects analysis

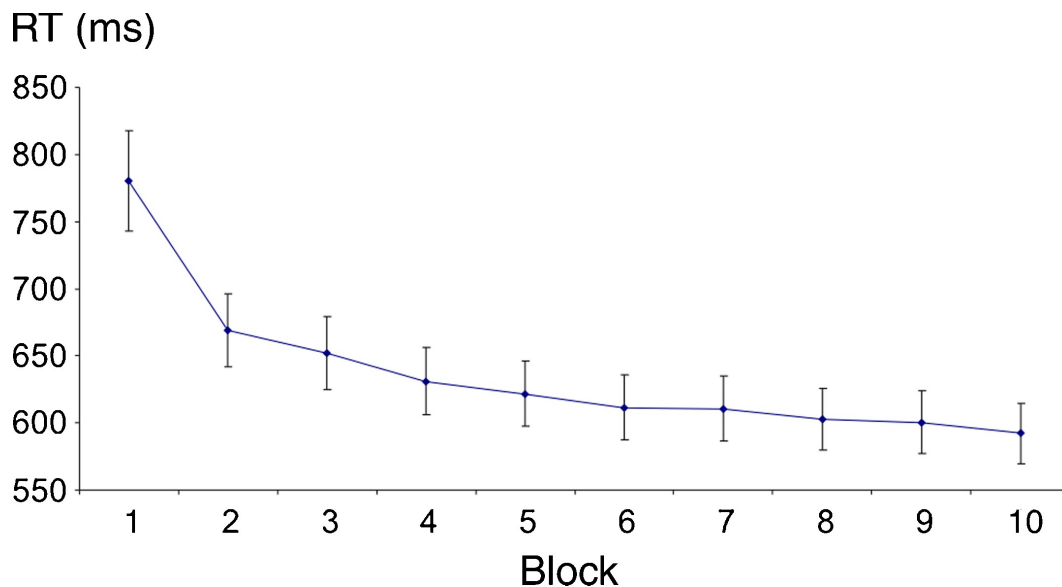
In addition to the analyses reported in the main text, we also investigated potential learning effects within the experimental session. To assess whether there was an improvement in performance as a function of time, we broke down the experimental conditions (level of expertise, MI level and object category of the fragment) by blocks. We took advantage of the fact that the experiment comprised of 1500 unique fragments (3 object categories, 5 MI levels) that were randomly distributed across 10 blocks (150 fragments in each block). Thus, we added Block as another independent variable in our experimental design, culminating in a 2x3x5x10 (Group, Category, MI level, Block) mixed design. The additional factor allowed us to examine whether there was a general learning effect within a session and more importantly, whether learning within session was modulated by any of the other independent variables. Of particular interest were the interactions between Group and Block and other interactions of these two factors with Category and MI level. For example, one might expect the car experts to demonstrate faster learning for the car fragments relative to the novices.

For the current RT analysis only the correct responses were included, with outlier trials removed (trials longer than 2000 ms or shorter than 200 ms).

1. *General learning effect within a session*

The mean RTs for each block across the all other independent variables are presented in Supplementary Figure 1. A general effect of learning was evident in a highly significant Block effect ($F(9,180) = 18.62$, $MSE = 44017$, $p < .0001$); As can be seen in

Supplementary Figure 1, there was general decrease in RTs as a function of time, with a significant linear trend ($F(1,20) = 23.60$, $MSE = 197,808$, $p < .0001$). Further analysis revealed that the only significant difference between pairs of consecutive blocks was the difference between the first and second block (Bonferroni pairwise comparisons, $p < .05$) and that the stimuli in the first block were more slowly categorized relative to all other blocks (Bonferroni pairwise comparisons, $p < .05$). While indeed the most dramatic improvement in speed of response occurred at the start of the experimental session (i.e., between the first and second block), a similar analysis with the first block removed showed that it was not solely the first block that was driving the learning effect, because there was still a main effect of Block ($F(8,176) = 6.1838$, $MSE = 26,986$, $p < .001$), showing a significant linear trend ($F(1,22) = 14.38$, $MSE = 83,274$, $p < .001$).



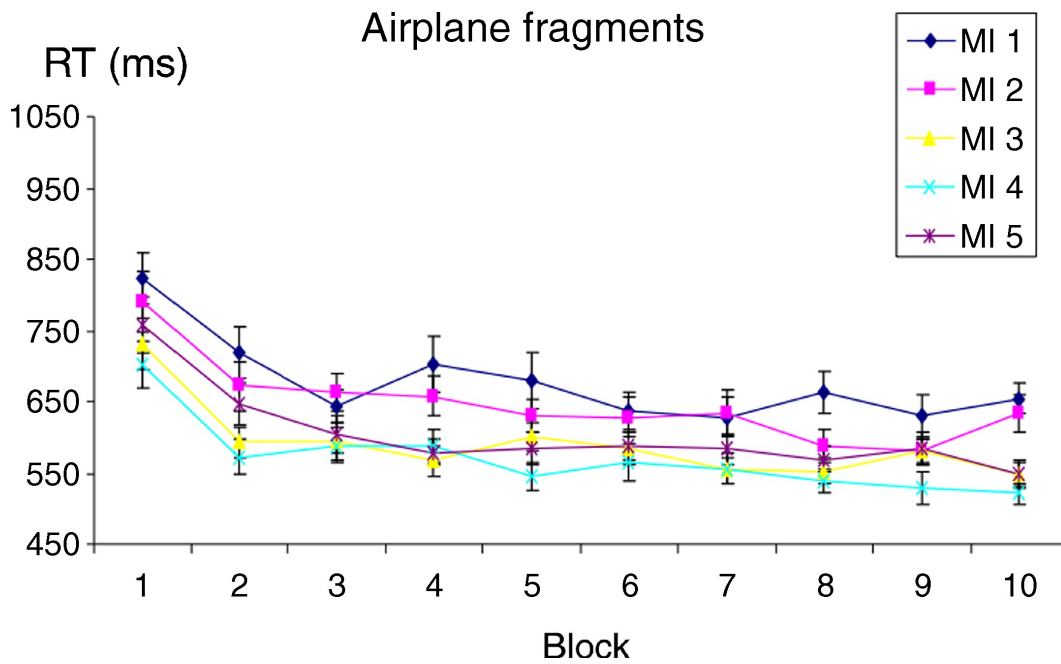
Supplementary Figure 1. Mean reaction times (RTs) of fragment categorization as a function of within-session blocks, averaged across fragment category, MI level and group.

2. Modulation of learning by Group, Category and MI level

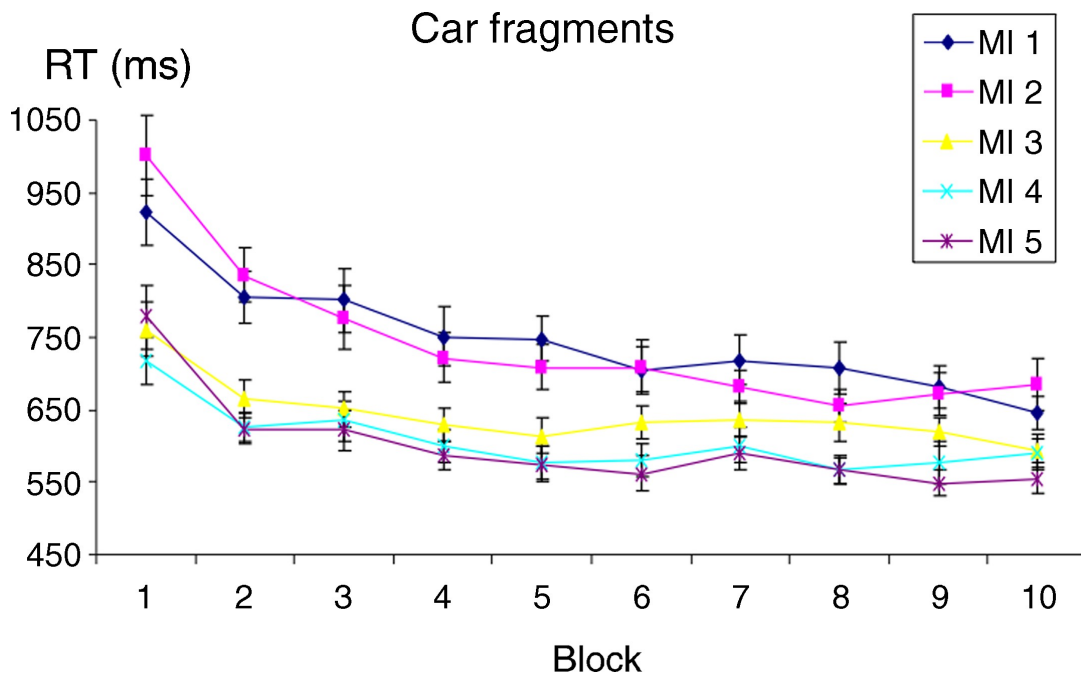
Following the finding that across the length of the experiment participants showed a general improvement in speed of response, we next assessed whether this learning effect was expressed differentially for the two groups of participants. Complementing the RT analysis reported in the main text, the current analysis allowed testing the hypothesis that experts utilize category-specific information faster than novices for basic-level categorization. However, in contrast to this hypothesis *none* of interactions involving Block and Group was significant (Group x Block ($F(9,180) < 1.00$); Group x Block x MI level ($F(36,720) < 1.00$); Group x Block x Category interaction ($F(18,360) < 1.00$); Group x Block x Category x MI level ($F(72,1440) = 1.54$, $MSE = 10,643$, $p < .01$). The lack of any Group x Block interactions further supports the conclusion that experts are not more sensitive to the information conveyed by the fragments from their category of expertise relative to novices.

Across the two groups, however, the within-session learning effects were modulated by both MI level and Category, expressed primarily by a significant Block x Category x MI level interaction ($F(72,1440) = 1.54$, $MSE = 10,643$, $p < .003$). We followed up this interaction by conducting separate two-way ANOVAs for each category of fragments with Block and MI as independent variables (Supplementary Figures 2, 3, and 4). In the airplane fragments, significant effects of Block ($F(9,234) = 19.33$, $MSE = 21,926$, $p < .0001$) and MI level ($F(4,104) = 38.25$, $MSE = 14,237$, $p < .0001$) were evident without a further interaction ($F(36,936) < 1.00$), demonstrating again the effects of MI level on speed of categorization as well as learning across the experiment (Supplementary Figure 2). In the car fragments (Supplementary Figure 3) and in the face

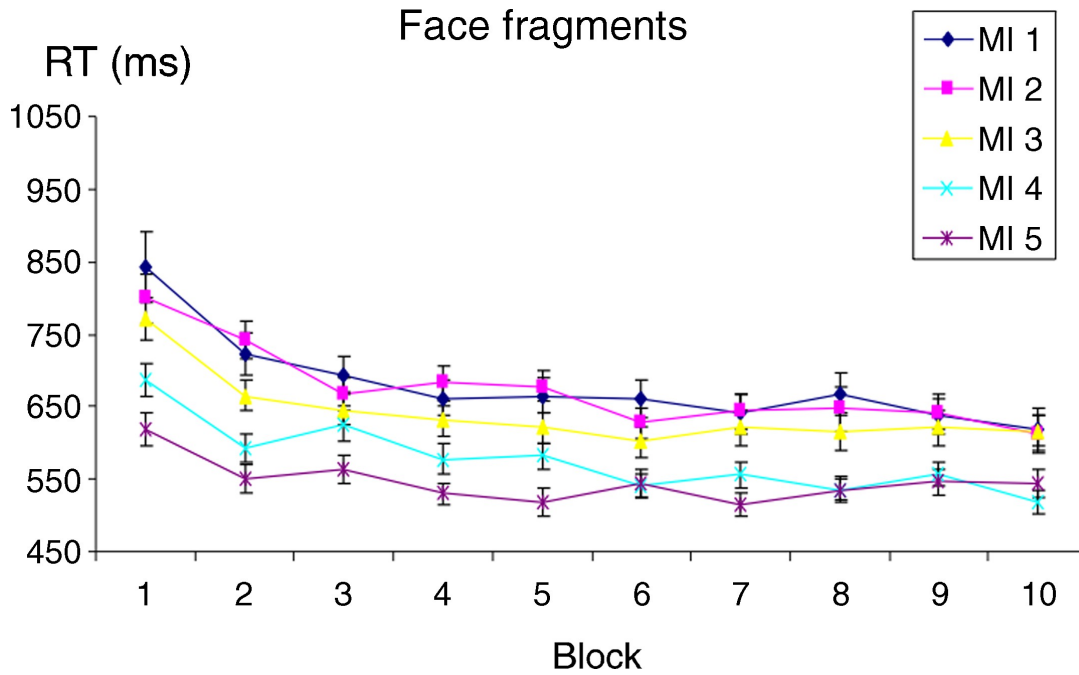
fragments (Supplementary Figure 4) there were also significant effects of MI level (cars: $F(4,88) = 59.80$, $MSE = 22,821$, $p < .0001$; faces: $F(4,104) = 90.02$, $MSE = 10,694$, $p < .0001$) and Block (cars: $F(9,198) = 17.55$, $MSE = 26,8471$, $p < .0001$; faces: $F(9,234) = 16.83$, $MSE = 16,196$, $p < .0001$). Notably, these main effect were qualified by significant interactions (Cars: ($F(36,792) = 2.51$, $MSE = 12,725$, $p < .0001$; Faces: ($F(36,936) = 1.57$, $MSE = 11,705$, $p < .02$). Following these interactions, we calculated an index of learning within a session for each of the two categories for each of the separate MI levels. As a gross measure of within-session learning, the index was calculated as the difference in RTs between the first and last block of the experiment. The results showed a slightly different effect of MI level on learning for each of the fragment categories. In the car fragments post-hoc tests following a significant MI level effect ($F(4, 92) = 3.78$, $MSE = 47,498$, $p < .001$) revealed varying effects of MI level on learning with no significant differences between any pairs of MI level. In contrast, in the face fragments post-hoc analyses following the significant MI level main effect ($F(4, 104) = 3.15$, $MSE = 22,071$, $p < .021$) showed a main difference between the first MI level and fifth MI level in the degree of learning ($p < .05$, Bonferroni pairwise comparisons). In other words, improvement in speed of performance was more evident for face fragments with lower Mi level than in face fragments with high MI level.



Supplementary Figure 2. Mean RTs for airplane fragment categorization as a function of within-session blocks and MI level averaged across groups.



Supplementary Figure 3. Mean RTs for car fragment categorization as a function of within-session blocks and MI level averaged across groups.



Supplementary Figure 4. Mean RTs for face fragment categorization as a function of within-session blocks and MI level averaged across groups.

In summary, we found general effect of learning within the experimental session that was mostly, although not exclusively, pronounced between the first and second blocks. Critically, the learning effect was not affected by expertise and was expressed slightly differently as a function of MI in the different fragment categories.