**Simon Task**

Materials and Methods

Participants were randomly assigned to one of four versions of the task. Upon return they were assigned to either the same version with the same assignment of response keys to color or a different version with different stimuli in different colors. For two versions the stimuli consisted of a red and a blue square. For the other two versions the stimuli consisted of a yellow and green circle. The stimuli were resized to 20% of the screen height. The experiment consisted of 8 practice trials and 92 critical trials. Participants were instructed to respond as accurately and quickly as possible to the color of the stimulus. They used the Z-key on their keyboard for one color and the /-key for the other color. Assignment of color to key was counterbalanced between participants. A trial started with a central fixation cross (+) in the center of the screen for 500 ms. Then the fixation cross was replaced with the stimulus. The stimulus was vertically centered and horizontally placed at 15% from the left or right side of the screen and remained visible until the participant pressed one of the response keys. If the response was incorrect, the message “Incorrect” was displayed for 500 ms. The inter trial interval was 1000 ms. During the practice and critical wave, trials for each color in the left or right position were equally likely and presented in randomized order.

**Results**

In total 172 participants completed both waves (.61 return rate[[1]](#footnote-1)). We selected the data of the first 20 participants in each counterbalanced version so that the total number of participants included in the analyses was 160 (91 females, 1 other, mean age = 39.9 (range 19-71)).

Mean reaction times for correct responses that fell within three standard deviations of the participant’s mean for that wave were included in the analyses (3.72% errors, 1.66% outliers). Mean reaction times per condition are shown in Table S1. A 2 (congruency) by 2 (wave) by 2 (similarity) mixed factor ANOVA showed a congruency effect, participants responded faster on congruent trials than on incongruent trials, *F*(1,158) = 406.07, *p* < .001, *partial* *η*2 = .72. We also calculated the JZS Bayes Factor (*BF*), which is the ratio of *p*(D│H0 ), the probability of observing the data under the null hypothesis, and *p*(D│H1 ), the probability of observing the data under the alternative hypothesis[[2]](#footnote-2) (Rouder, Speckman, Sun, Morey, & Iverson, 2009), using the JASP software (JASP Team, 2017). This analysis showed very strong evidence for a congruency effect, *BF10* > 10,000. Participants were not faster on wave 2 than wave 1, *F*(1,158) = 2.45, *p* = .120, *partial* *η*2 = .02, *BF01 =* 1.20. The size of the congruency effect was not affected by wave, *F*(1,158) = 0.84, *p* = .360, *partial* *η*2 = .01, *BF01 =* 6.63 nor by similarity, *F*(1,158) = 0.84, *p* = .360, *partial* *η*2 = .01, *BF01* = 6.88*,* nor by the interaction between wave and similarity, *F*(1,158) = 1.59, *p* = .210, *partial* *η*2 = .01, *BF01* = 4.32.

**Raw Data**

The raw data and files used in the analyses for each experiment can be found at: <https://osf.io/ghv6m/>.

**Response accuracy**

We calculated the accuracy rates when the main analysis was performed on the reaction times. In general, the accuracy rates showed the same patterns as the reaction times – when reaction times were faster, accuracy was higher – indicating no speed-accuracy trade-off. Given that our predictions focused on reaction times, we only report descriptive statistics for the accuracy data for the Simon task (S11), the flanker task (S12), motor priming (S13), associative priming (S14), repetition priming (S15), and shape simulation (S16).

**Demographics**

At the end of wave 1 of each experimental task participants provided demographic information and answered questions concerning their environment and self-perceived performance. These data are summarized in Table S17.

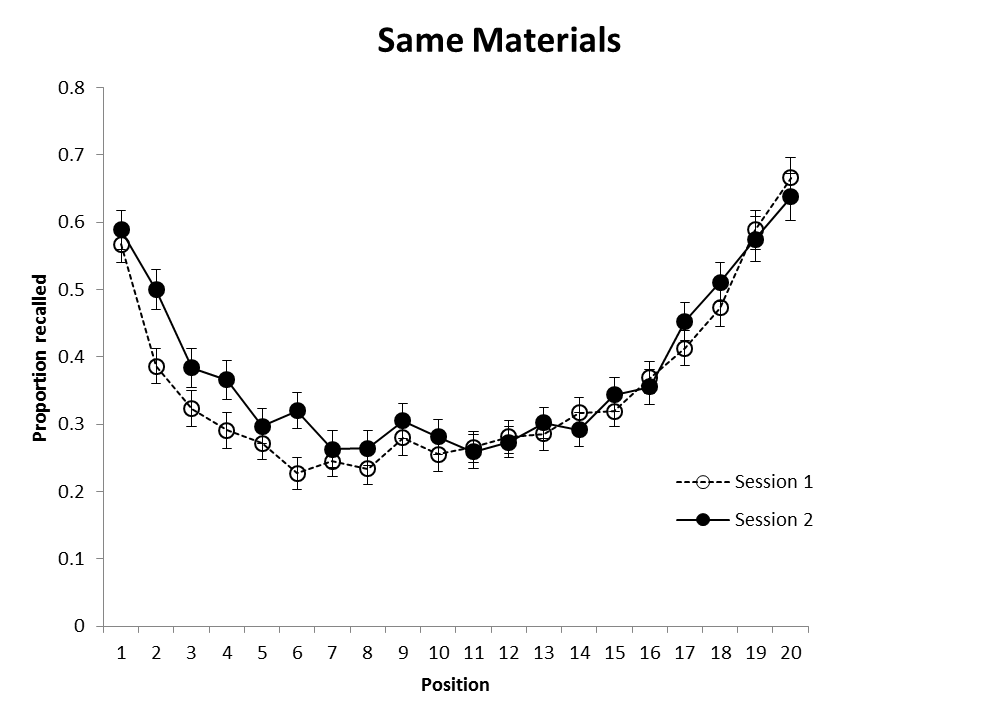


Fig. S1.

Proportion correct recall for each study position with same materials being used

across the two waves. Error bars are SE of the mean.

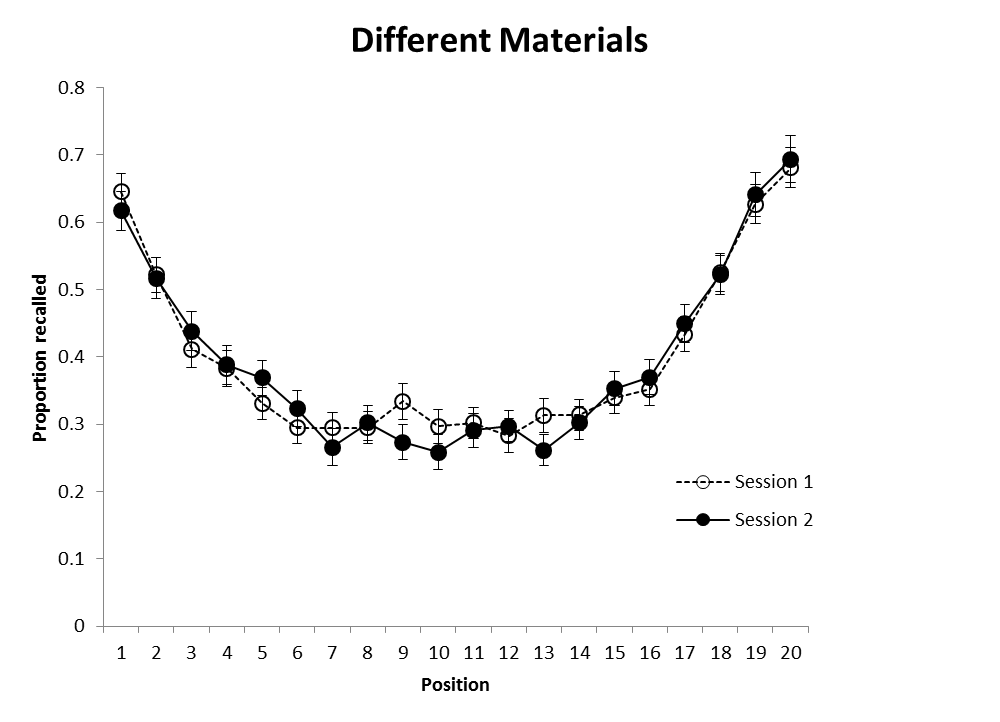


Fig. S2

Proportion correct recall for each study position with different materials being used across the two waves. Error bars are SE of the mean.

Table S1.

Mean Reaction Times on Congruent and Incongruent Trials in the Simon Task (SE in Parentheses; Effect Size in Cohen’s *d*)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Congruent | Incongruent | Simon effect | Effect size |
| Same stimuli |  |  |  |  |
| Wave 1 | 422 (8.0) | 462 (8.0) | 39 (3.4) | 1.30 |
| Wave 2 | 428 (10.0) | 461 (9.9) | 33 (3.2) | 1.16 |
|  |  |  |  |  |
| Different stimuli |  |  |  |  |
| Wave 1 | 424 (8.0) | 457 (8.0) | 32 (3.4) | 1.07 |
| Wave 2 | 436 (10.0) | 469 (9.9) | 33 (2.7) | 1.40 |

**Table S11.**

Mean Accuracy on Congruent and Incongruent Trials in the Simon Task (SE in Parentheses)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Congruent | Incongruent | Simon effect |
| Same stimuli |  |  |  |
| Wave 1 | .975 (.003) | .946 (.006) | .029 (.006) |
| Wave 2 | .983 (.003) | .945 (.005) | .038 (.005) |
|  |  |  |  |
| Different stimuli |  |  |  |
| Wave 1 | .98 (.003) | .94 (.006) | .041 (.006) |
| Wave 2 | .98 (.003) | .95 (.005) | .025 (.005) |

**Table S17.**

Proportion Responses to Exit Questions for Each Experiment.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Experiment | | | | | | | | | | |
|  |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Education | |  |  |  |  |  |  |  |  |  |
|  | High school | .12 | .13 | .09 | .13 | .11 | .09 | .13 | .11 | .13 |
|  | College, no degree | .27 | .31 | .24 | .19 | .23 | .19 | .29 | .22 | .21 |
|  | Associate's degree | .11 | .09 | .08 | .09 | .09 | .12 | .08 | .10 | .11 |
|  | Bachelor's degree | .36 | .28 | .43 | .41 | .43 | .38 | .36 | .37 | .36 |
|  | Graduate degree | .15 | .19 | .16 | .18 | .14 | .22 | .14 | .20 | .20 |
| Noisy environment | |  |  |  |  |  |  |  | | |  |  |
|  | Not at all | .91 | .91 | .88 | .92 | .90 | .89 | .93 | .94 | .92 |
|  | Somewhat | .09 | .09 | .11 | .08 | .09 | .10 | .07 | .06 | .07 |
|  | Very much | .00 | .00 | .01 | .00 | .01 | .00 | .01 | .00 | .01 |
| Many distractions | |  |  |  |  |  |  |  | | |  |  |
|  | Not at all | .93 | .93 | .91 | .92 | .93 | .87 | .94 | .94 | .94 |
|  | Somewhat | .07 | .07 | .08 | .08 | .07 | .13 | .06 | .06 | .06 |
|  | Very much | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 |
| Busy environment | |  |  |  |  |  |  |  | | |  |  |
|  | Not at all | .97 | .97 | .95 | .95 | .95 | .96 | .98 | .99 | .96 |
|  | Somewhat | .03 | .03 | .05 | .05 | .05 | .04 | .02 | .01 | .03 |
|  | Very much | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| Clear instruction | |  |  |  |  |  |  |  | | |  |  |
|  | Not at all | .00 | .00 | .01 | .01 | .01 | .00 | .00 | .00 | .01 |
|  | Somewhat | .01 | .02 | .05 | .07 | .03 | .04 | .07 | .03 | .12 |
|  | Very much | .99 | .98 | .94 | .93 | .96 | .96 | .93 | .97 | .88 |
| Interesting task | |  |  |  |  |  |  |  | | |  |  |
|  | Not at all | .12 | .14 | .21 | .02 | .02 | .05 | .09 | .09 | .03 |
|  | Somewhat | .56 | .59 | .47 | .31 | .48 | .38 | .44 | .54 | .50 |
|  | Very much | .32 | .28 | .32 | .67 | .51 | .56 | .47 | .37 | .48 |
| Followed instruction | |  |  |  |  |  |  |  | | |  |  |
|  | Not at all | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|  | Somewhat | .02 | .01 | .03 | .03 | .03 | .04 | .01 | .01 | .02 |
|  | Very much | .98 | .99 | .97 | .98 | .98 | .96 | .99 | .99 | .98 |
| Difficult | |  |  |  |  |  |  |  |  |  |
|  | Not at all | .64 | .69 | .47 | .27 | .23 | .11 | .48 | .43 | .55 |
|  | Somewhat | .35 | .30 | .49 | .65 | .58 | .45 | .50 | .54 | .43 |
|  | Very much | .01 | .01 | .04 | .08 | .19 | .44 | .03 | .03 | .02 |
| Did my best | |  |  |  |  |  |  |  | | |  |  |
|  | Not at all | .00 | .01 | .01 | .00 | .00 | .00 | .00 | .00 | .00 |
|  | Somewhat | .02 | .04 | .03 | .02 | .04 | .03 | .03 | .05 | .02 |
|  | Very much | .98 | .95 | .97 | .98 | .96 | .97 | .97 | .95 | .98 |
| I was distracted | |  |  |  |  |  |  |  | | |  |  |
|  | Not at all | .93 | .94 | .90 | .92 | .95 | .87 | .94 | .94 | .95 |
|  | Somewhat | .07 | .06 | .09 | .08 | .05 | .13 | .06 | .06 | .05 |
|  | Very much | .00 | .01 | .01 | .00 | .00 | .01 | .00 | .00 | .00 |

1. Return rates are proportions of participants invited after completing wave 1 who actually returned and finished wave 2. [↑](#footnote-ref-1)
2. Throughout this paper we report BF01 if the evidence is in favour of H0 and BF10 if the evidence is in favour of H1. For all analyses we used the default r scale = 1 for random effects. [↑](#footnote-ref-2)