SUPPLEMENTAL MATERIAL

An effect of congruency only suggests crude processing of magnitude (e.g. small and large) whereas an interaction between distance and congruency suggests that the magnitudes are processed in a more refined manner (Cohen Kadosh & Henik, 2006). To investigate the effect of distance on congruency, a second repeated measures analysis was conducted. To increase statistical power, data was averaged over the conditions that did not interact with congruency in the first analyses. This second repeated measures ANOVA included congruency (neutral, congruent, incongruent), distance of the relevant condition (distance 1, distance 2, distance 3) and distance of the irrelevant condition (distance 1, distance 2, distance 3) as within subject variables. These ANOVAs were conducted per contrast-sign condition (as the main analyses of the article revealed that contrast-sign interacted with congruency).

In the **number comparison task**, the stimuli *brighter* than the background, revealed a significant main effect for congruency [$F(2,22) = 22.043$, $p < 0.001$, partial $\eta^2 = 0.66$]. This congruency effect shows the faster responses for congruent compared to incongruent trials. A significant main effect was also present for number [$F(2,22) = 32.469$, $p < 0.001$, partial $\eta^2 = 0.75$] and luminance-contrast distance [$F(2,22) = 11.304$, $p < 0.001$, partial $\eta^2 = 0.51$]. Response time decreased with increasing numerical distance (472.1 to 435.5 ms) but increased with increasing luminance-contrast distance (448.9 to 467.8 ms). The two-way interaction between congruency and luminance-contrast distance was significant [$F(4,44) = 9.032$, $p < 0.001$, partial $\eta^2 = 0.45$]. This result indicates that the congruency effect increased with increasing luminance-contrast distance (35.6 to 69.2 ms). In addition, the results revealed a significant three-way interaction between congruency, numerical distance and luminance-contrast distance [$F(8,88) = 3.151$, $p = 0.003$, partial $\eta^2 = 0.22$]. This effect is caused by the

increase in congruency effect for luminance distance but the decrease of the congruency effect for number distance.

Similar as for the stimuli brighter than the background, the stimuli *darker* than the background showed a main effect for congruency [$F(2,22) = 10.331$, $p = 0.001$, partial $\eta^2 = 0.48$], number distance [$F(2,22) = 44.029$, $p < 0.001$, partial $\eta^2 = 0.80$] and luminance-contrast distance [$F(2,22) = 15.873$, $p < 0.001$, partial $\eta^2 = 0.60$]. Faster responses were given for trials that had numerically larger stimuli and a larger luminance-contrast, and response time decreased with increasing numerical distance (467.6 to 428.7 ms) but increased with increasing luminance-contrast distance (444.2 to 464.6 ms). A significant two-way interaction between congruency and luminance-contrast distance [$F(4,44) = 12.047$, $p < 0.001$, partial $\eta^2 = 0.52$] was also obtained. This interaction implicates that the congruency effect increased with increasing luminance-contrast distance (11.9 to 50.8 ms). The significant three-way interaction between congruency, numerical distance and luminance-contrast distance [$F(8,88) = 2.263$, $p = 0.030$, partial $\eta^2 = 0.17$] reflects the increase in numerical distance but decrease in luminance-contrast distance.

Together both for the stimuli brighter and the stimuli darker than the background, the magnitudes luminance-contrast and number were processed in a more refined manner.

For the **luminance comparison task**, the stimuli *brighter* than the background revealed a main effect for congruency [$F(2,22) = 11.388$, $p < 0.001$, partial $\eta^2 = 0.51$] and luminance distance [$F(2,22) = 30.112$, $p < 0.001$, partial $\eta^2 = 0.73$]. Thus faster responses were obtained when the target stimulus was darker and larger (or smaller and brighter). Both number distance [$F(4,44) = 4.569$, $p = 0.004$, partial $\eta^2 = 0.29$] and luminance distance [$F(4,44) = 9.087$, $p < 0.001$, partial $\eta^2 = 0.45$] interacted with congruency. The congruency effect increased with increasing numerical distance (16.0 to 35.4 ms) and decreased with increasing

luminance distance (54.2 to 7.8 ms). The two-way interaction between numerical and luminance distance was also significant [$F(4,44) = 2.847$, $p = 0.035$, partial $\eta^2 = 0.21$]. This is the result of a decrease in reaction time for luminance distance (431.2 to 381.6 ms) while the reaction times for number distance remained about the same (402.6 to 402.0 ms). The significant three-way interaction [$F(8,88) = 3.583$, $p < 0.001$, partial $\eta^2 = 0.25$] implicates that the congruency effect decreased with increasing luminance distance but increased with increasing number distance.

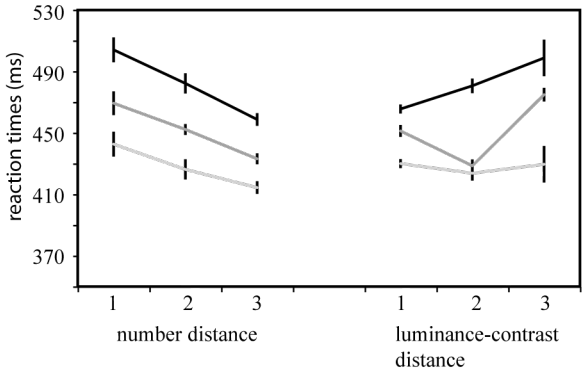
For the stimuli *darker* than the background, a significant congruency [$F(2,22) = 5.283$, $p = 0.013$, partial $\eta^2 = 0.32$] and luminance distance effect was present [$F(2,22) = 28.010$, $p < 0.001$, partial $\eta^2 = 0.32$]. Luminance distance interacted with congruency [$F(4,44) = 2.701$, $p = 0.043$, partial $\eta^2 = 0.20$] but the interaction only showed a trend towards significance for congruency and number distance [$F(4,44) = 2.152$, $p = 0.090$, partial $\eta^2 = 0.16$].

Together, a main effect for luminance distance and an interaction between luminance distance and congruency were obtained. In contrast, no main effect for number distance was shown. The absence of this distance effect can be easily explained: opposite RT results for incongruent (an increase in RT with increasing numerical distance) and congruent trials (a decrease in RT with increasing numerical distance) are expected. These opposite effects would necessarily result in the absence of a number distance main effect but the presence of an interaction between number and congruency. An interaction between number distance and congruency was present for the stimuli brighter than the background and a trend was visible for the stimuli darker than the background. These results indicate that number was indeed encoded and did influence performance in the luminance comparison task.

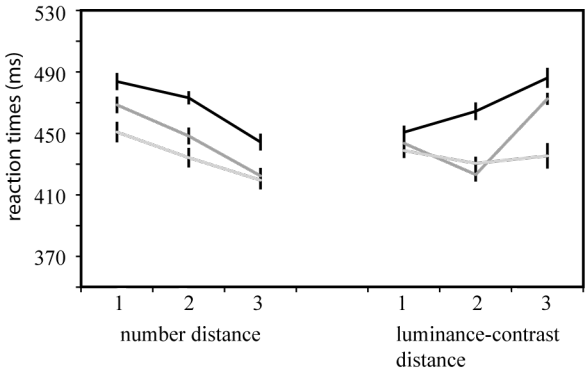
-figure 3-

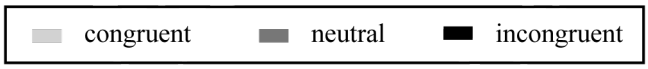
Fig3. The interaction between distance and congruency for the number comparison tasks (a and b) and the luminance comparison tasks (c and d). The upper panels reveal the congruency effect for number as well as luminance-contrast distance. These congruency effects are presented for the stimuli brighter (a) and darker (b) than the background. Similarly, the lower panels reveal the congruency effect for each number as well as luminance distance, for the stimuli brighter (c) and darker (d) than the background. Note that for the upper panels the congruency effect is explained by luminance-contrast (numerically larger stimuli are associated with the larger luminance-contrast stimulus) while the congruency effect in the lower panels is explained by luminance (numerically larger stimuli are associated with darker stimuli). The error bars present the 95% confidence interval (Loftus & Masson, 1994).

a number comparison task:
stimuli brighter than background

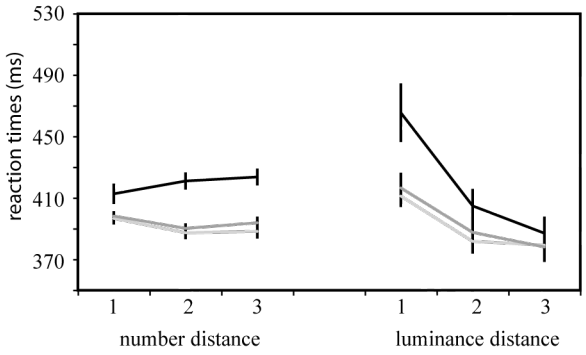


b number comparison task:
stimuli darker than background





c luminance comparison task:
stimuli brighter than background



d luminance comparison task:
stimuli darker than background