

Supplementary Material

Experiment S1a

Methods

Twenty new students (9 males and 11 females) between 18 and 25 years old (21 years on average) were recruited and paid about \$1 to participate in this experiment. The stimuli and procedure were the same as those of Experiment 1, except that only the handshake condition was included.

Results

As shown in Table S3, similar to Experiment 1, the cue effect in the horizontal alignment was weaker than that in the vertical alignment. To examine this observation, the RT data were submitted to a repeated-measures ANOVA with validity (3 levels: valid vs. invalid horizontal-hand vs. invalid vertical-hand) as a factor. Consistent with the inspection, the main effect of validity was significant ($F(2, 38) = 126.42, p < .001, \eta_p^2 = 0.87$). Post-hoc analyses with Bonferroni correction revealed that all pairwise comparisons reached significance (valid vs. invalid horizontal-hand: $p < .001, 95\% \text{ CI} = [-231, -144]$; valid vs. invalid vertical-hand: $p < .001, 95\% \text{ CI} = [-256, -167]$; invalid horizontal-hand vs. invalid vertical-hand: $p = .025, 95\% \text{ CI} = [-46, -3]$). Hence, this experiment replicated the results of Experiment 1, indicating that the handshaking hands are selected as an object by attention.

The same analyses that were conducted with the accuracy data revealed that the main effect of validity was not significant ($F(2, 38) = 2.54, p = 0.105, \eta_p^2 = 0.12$). Thus, the RT results cannot be attributed to the trade-off between response speed and response accuracy.

Experiment S1b

Methods

Twenty new students (7 males and 13 females) between 18 and 26 years old (21 years on average) were paid about \$1 to participate in this experiment; none had participated in the previous experiments. The stimuli and procedure were the same as those of Experiment S1a, except that the hands never performed the approaching action and always remained still for 700 ms before the cue flashed, similar to in Experiment 2.

Results

Table S3 shows the mean RTs of the correct trials in all conditions. To check the cue effect, a repeated-measures ANOVA with the validity as a factor was employed with the RT data. It revealed that the main effect of validity was significant ($F(2, 38) = 73.67, p < .001, \eta_p^2 = 0.80$). Post-hoc tests found that the RTs of the valid trials were faster than those of both invalid horizontal-hand trials ($p < .001, 95\% \text{ CI} = [-181, -113]$) and invalid vertical-hand trials ($p < .001, 95\% \text{ CI} = [-193, -108]$), which confirms the existence of the cue effect, whereas no significant difference was found between the invalid horizontal-hand and invalid vertical-hand conditions ($p = 1.000, 95\% \text{ CI} = [-38, 31]$).

The same analysis was conducted with the accuracy data. It did not yield a significant main effect of validity ($F(2, 38) = 2.50, p = .110, \eta_p^2 = 0.12$). Therefore, the RT results cannot be explained by the trade-off between response speed and response accuracy.

Experiment S2

Methods

Twenty new students (7 males and 13 females) between 18 and 25 years old (21 years on average) were recruited and paid about \$2 to participate in this experiment. The stimuli and procedure were the same as those of Experiment 1, except that the reversed-hand condition was replaced with the reversed-handshake condition. The reversed-handshake condition was that both hands with handshaking was shown upside-down.

Results

As shown in Table S4, similar to Experiment 1, the cue effect in the horizontal alignment was weaker than that in the vertical alignment. The RT data were submitted to a repeated-measures ANOVA with display type (2 levels: handshake vs. reversed-handshake) and validity (3 levels: valid vs. invalid horizontal-hand vs. invalid vertical-hand) as factors. It was found that, the main effect of validity ($F(2, 38) = 39.36, p < .001, \eta_p^2 = 0.67$) and the interaction effect between the two factors ($F(2, 38) = 4.40, p = .026, \eta_p^2 = 0.19$) were both significant, but the main effect of display type did not reach significance ($F(1, 19) = 2.12, p = .162, \eta_p^2 = 0.10$).

Post-hoc tests with Bonferroni correction confirmed that RTs in valid trials were faster than those in both invalid horizontal-hand trials ($p < .001, 95\% \text{ CI} = [-188, -77]$) and invalid

vertical-hand trials ($p < .001$, 95% CI = [-196, -82]), which reflects facilitation induced by the attention cue. To analyze the interaction effect, the cue effect was calculated by subtracting the mean RT of the valid trials from that of each type of invalid trial for both display types. In the handshake condition, it was found that the cue effect in the horizontal alignment ($M = 118$ ms) was smaller than in the vertical alignment ($M = 141$ ms; $t(19) = 2.96$, $p = .008$, $d = 0.66$, 95% CI = [-40, -7]), and no significant difference ($M = 146$ ms in the horizontal alignment; $M = 138$ ms in the vertical alignment) was observed in the reversed-hand condition ($t(19) = 0.96$, $p = .351$, $d = 0.21$, 95% CI = [-10, 27]); thus, an object-specific attentional advantage was shown on the handshaking hands. The findings indicate that two hands approaching to perform an interactive handshake are treated as an attentional object. Furthermore, compared with Experiment 1, the object-specific attentional advantage was smaller in the current study. This may be because of the settings for the control condition, as the reversed-handshake can be mentally rotated to the normal handshake, and subjects may have felt confused about the two sets of conditions in the current study.

All the same analyses were conducted with the accuracy data. Only the main effect of validity was significant ($F(2, 38) = 6.59$, $p = .006$, $\eta_p^2 = 0.26$); neither the main effect of display type ($F(1, 19) = 3.02$, $p = .099$, $\eta_p^2 = 0.14$) nor the interaction effect ($F(2, 38) = 0.53$, $p = .557$, $\eta_p^2 = 0.03$) reached significance. Post-hoc tests with Bonferroni correction showed that accuracies in valid trials were higher than those in both invalid horizontal-hand trials ($p = .022$, 95% CI = [0.004, 0.058]) and invalid vertical-hand trials ($p = .005$, 95% CI = [0.007, 0.042]), which reflects the facilitation induced by the attention cue. Thus, the RT results cannot be attributed to the trade-off between response speed and response accuracy.

Experiment S3

Methods

Twenty new students (10 males and 10 females) between 18 and 26 years old (22 years on average) were recruited and paid about \$2 to participate in this experiment. The stimuli and procedure were the same as those of Experiment 1, except that the whole display was rotated clockwise with 90° . In this case, two hands performed handshaking in the vertical, and two hands in the horizontal moved synchronously. To make participants familiar with the

upward handshake (and upward reversed-hand condition), they had 1 minute to familiarize how the handshake/reversed-hand looks like after rotating it clockwise with 90° .

Results

The mean response times (RTs) for the correct responses are shown in Table S5. The RT data were submitted to a repeated-measures ANOVA with display type (2 levels: handshake vs. reversed-hand) and validity (3 levels: valid vs. invalid horizontal-hand vs. invalid vertical-hand) as factors. It revealed that the main effect of display type ($F(1, 19) = 3.08, p = .010, \eta_p^2 = 0.14$) was not significant; furthermore, both the main effect of validity ($F(2, 38) = 54.13, p < .001, \eta_p^2 = 0.74$) and the interaction effect between the two factors ($F(2, 38) = 4.71, p = .017, \eta_p^2 = 0.20$) reached significance.

Post-hoc tests with Bonferroni correction confirmed that RTs in valid trials were faster than those in both invalid horizontal-hand trials ($p < .001, 95\% \text{ CI} = [-194, -93]$) and invalid vertical-hand trials ($p < .001, 95\% \text{ CI} = [-263, -135]$), which reflects facilitation induced by the attention cue. In addition, the responses in the invalid horizontal-hand trials were faster than in the invalid vertical-hand trials ($p = .002, 95\% \text{ CI} = [-92, -19]$). To analyze the interaction effect, the cue effect was calculated by subtracting the mean RT of the valid trials from that of each type of invalid trial for both display types. In the handshake condition, the cue effect in the horizontal alignment ($M = 142 \text{ ms}$) was smaller than that in the vertical alignment ($M = 181 \text{ ms}; t(19) = 2.47, p = .023, d = 0.55, 95\% \text{ CI} = [-72, -6]$), and such an effect ($M = 145 \text{ ms}$ in the horizontal alignment; $M = 217 \text{ ms}$ in the vertical alignment) was also observed in the reversed-hand condition ($t(19) = 4.63, p < .001, d = 1.04, 95\% \text{ CI} = [-105, -40]$). Further, the cue effect in the vertical alignment was smaller when the vertical hands formed a handshaking display than when they formed a reversed-hand display ($t(19) = 3.10, p = .006, d = 0.69, 95\% \text{ CI} = [-61, -12]$), although such an effect was not observed in the horizontal alignment ($t(19) = 0.25, p = .806, d = 0.06, 95\% \text{ CI} = [-31, 24]$). To some extent, an object-specific attentional advantage was shown on the vertical handshaking hands; otherwise, the cue effect of the vertical alignment in the handshake condition would be equal to (even larger than) that in the reversed-hand condition. Hence, the conclusion that the attention operates on the object of the grouped hands by a social interaction can be extended to the vertical as well. The smaller cue effect on the horizontally synchronized hands may be

due to the perceptually grouped hands with common fate and the weaker social interaction information in the vertical alignment

All of the same analyses were conducted with the accuracy data. Only the main effect of validity was significant ($F(2, 38) = 5.18, p = .018, \eta_p^2 = 0.21$); neither the main effect of display type ($F(1, 19) = 0.09, p = .765, \eta_p^2 = 0.01$) nor the interaction effect ($F(2, 38) = 1.94, p = .342, \eta_p^2 = 0.05$) reached significance. Post-hoc tests with Bonferroni correction showed that accuracies in valid trials were higher than those in both invalid horizontal-hand trials ($p = .035, 95\% \text{ CI} = [0.002, 0.072]$) and invalid vertical-hand trials ($p = .005, 95\% \text{ CI} = [0.009, 0.052]$), which reflects facilitation induced by the attention cue. Thus, the RT results cannot be attributed to the trade-off between response speed and response accuracy.