Research Article

Does Self-Associating a Geometric Shape Immediately Cause Attentional Prioritization?

Comparing Familiar Versus Recently Self-Associated Stimuli in the Dot-Probe Task

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Abstract. In many cognitive tasks, stimuli associated with one's self elicit faster responses than stimuli associated with others. This is true for familiar self-representations (e.g., one's own name), for new self-associated stimuli, and for combinations of both. The current research disentangles the potential of self- versus stranger-representations for familiar, new, and paired (familiar + new) stimuli to guide attention. In Study 1 (*N* = 34), responses to familiar and new self- versus other representations were tested in a dot-probe task with a short stimulus-onset asynchrony (SOA; 100 ms). Study 2 (*N* = 31) and Study 3 (*N* = 35) use a long SOA (1,000 ms) to test whether the findings are mirrored in inhibition of return (IOR). We observe significant performance differences for targets following self- versus stranger-associated stimuli (i.e., a cuing effect or IOR depending on the SOA length), yet only when familiar representations are present. This indicates that, under conditions of attentional competition between self- and stranger-representations, familiar self-representations impact the distribution of attention while new self-representations alone do not.

Keywords: self-relevance, self-prioritization, spatial cuing, inhibition of return

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Our cognitive system receives a constant stream of information from which it must select the most relevant stimuli for further processing. The degree to which a stimulus is associated with the self is an important indicator of "relevance." Namely, self-associated stimuli have been found to be preferentially processed at different stages of cognitive information processing. For example, one's own name (Alexopoulos et al., 2012; Yang et al., 2013) or face (Brédart et al., 2006; Wójcik et al., 2018) tends to be quickly and accurately recognized.

In experimental psychology, spatial cuing tasks represent an established paradigm to measure the impact of self-relevance on cognitive information processing (Alexopoulos et al., 2012; Dalmaso et al., 2019; Sui et al., 2009; Wójcik et al., 2018). These tasks consist of responding to targets which appear at locations that are either cued by a stimulus of interest (valid trials) presented shortly before the target (i.e., with a short stimulus-onset asynchrony [SOA], ≤ 200 ms) or not (invalid trials). Research using such spatial cuing tasks has shown that salient stimuli facilitate responses on valid trials compared to invalid trials – an effect known as spatial cuing (e.g., Alexopoulos et al., 2012; Posner, 1980). In detail, responses have been demonstrated to be faster toward targets presented on locations cued by one's own name than to targets presented on locations cued by other names (Alexopoulos et al., 2012). Similarly, responses are generally faster toward targets presented on locations cued by a picture of one's own face than to targets presented on locations cued by the picture of another face (Liu et al., 2016; Wójcik et al., 2018). Such results have been interpreted as prioritized cognitive processing of self-associated stimuli versus other-associated stimuli in attention. That is, due to their association with one's self, one's own name and face are rendered highly relevant and consequently lead to faster responses toward targets cued by self-representations versus other-representations.

Importantly, in the studies described so far, self-associated stimuli have been represented by highly

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familiar items like one's own name or face. Hence, it cannot be clearly differentiated whether the observed effects are caused by self-relevance or by familiarity. To control for effects of familiarity, Sui et al. (2012) introduced the following paradigm: First, participants are instructed to associate geometric shapes (e.g., a triangle, a circle, and a square) with the self, a close other, and an unknown or neutral other. Afterward, a matching task is presented: Participants indicated whether or not a shape–label pair, comprising random combinations of geometric shapes and word labels (i.e., "self," "friend," etc.), matches the initial instructions. Typically, response times (RTs) are significantly faster when confirming the correct combination of the self-associated shape and label than when responding to any other shape–label combination in this task. This enhanced performance toward the self-associated stimulus combination is called self-prioritization effect (SPE; see Humphreys & Sui, 2015).

The SPE has been interpreted as evidence that even a short association of a previously neutral stimulus with the self can yield in prioritization of said stimuli in subsequent processing (e.g., Humphreys & Sui, 2015; Sui et al., 2012). Crucially though, in the matching task, newly self- versus other-associated shapes are always presented *in combination* with word labels referencing the self versus the other instances – thus still involving highly familiar self- versus other-associated stimuli. For this reason, the potential of new self- versus other-associated stimuli to yield prioritization effects has been tested in other cognitive tasks. For example, Sui et al. (2009) associated colors with the self versus a friend and presented arrows in the associated colors at the center of the screen, pointing either toward (valid trial) or away from (invalid trial) the subsequent target location. Remarkably, the self-associated arrow was more efficient in guiding attention than the friend-associated arrow (see Zhao et al., 2015, for limitations of this effect). Likewise, in an oculomotor task, saccades toward targets positioned away from self- versus other-associated shapes were initiated more slowly (Dalmaso et al., 2019). In visual search, the cuing of target locations by new self-associated stimuli enhanced target detection in some studies (Wade & Vickery, 2018), but not in others (Siebold et al., 2015). That is, although it has been concluded from the SPE as observed in the matching task that the salience of a previously neutral geometric shape increases through its association with the self, the specific evidence for this assumption is – to the best of our knowledge – quite scarce. A systematic comparison of the potential of familiar versus new self-associated stimuli to influence cognitive information processing is lacking.

In our study, we will combine the matching task with the dot-probe task (MacLeod et al., 1986). This is a spatial cuing task where two prime stimuli differing in salience compete for attentional resources: The stimuli are simultaneously presented on opposite sides of the screen, followed by a target which participants must locate as fast as possible by pressing one of two keys (one for each side). Importantly, the target can occur at either one of the locations that had been occupied by the preceding prime stimuli. When SOAs are short, responses are typically facilitated when the target occurs on the side of the more salient stimulus (Wójcik et al., 2018). The dot-probe task has previously been used to investigate attentional prioritization of one's own face versus others' faces, showing faster RTs for targets following one's own versus others' faces (Wójcik et al., 2018). However, it remains an open issue whether new self-associated stimuli – as opposed to stimuli newly other-associated – also shorten RTs when used as cues in a dot-probe task. In Study 1, we will specifically compare the potential of self- versus stranger-associated stimuli to serve as cues in the dot-probe task and to thus induce attentional prioritization effects separately for familiar and new stimuli. When SOAs are long in the dot-probe task, responses to targets at locations cued by salient stimuli are usually delayed versus responses to targets at uncued locations (SOA ≥ 300 ms; Klein, 2000), an effect known as inhibition of return (IOR; Posner & Cohen, 1984; Posner et al., 1985). In Study 2, we will compare the potential of familiar and new self- versus stranger-associated stimuli to induce IOR.

In the current study, participants will first associate geometric shapes with the labels "I" and "stranger." We will then use the familiar labels, the recently associated shapes, or shape–label pairs as cues in the dot-probe task to compare their effectiveness in guiding attention. If newly established self-associations have the same potential to guide attention as highly familiar self-associations, the size of the effect of the self- versus other-cues should not differ as a function of their representation format. If, however, familiarity plays a role for prioritization under conditions of attentional competition, then the size of the cuing effect should be larger for the labels/pairs than for the shapes. The evidence indicating an advantage for the information processing of highly familiar self-associated stimuli compared to other-associated stimuli is compelling (Alexopoulos et al., 2012; Bargh, 1982; Yang et al., 2013), whereas the evidence indicating advantages of new self-associated shapes in information processing is mixed (Dalmaso et al., 2019; Siebold et al., 2015; Sui et al., 2009; Wade & Vickery, 2018; Zhao et al., 2015). Therefore, we assume that the attentional benefit of the self- compared to the stranger-associated cues in the dot-probe task is more pronounced when familiar cues (i.e., labels "I" and "stranger") are presented compared to when the self and the stranger are represented by newly associated cues (i.e., shapes).

Notably, the size of the SPE in the matching task increases when two self-associated shapes are presented on matching trials compared to when one self-associated shape is presented (Sui & Humphreys, 2015a). Similarly, in the current study, the simultaneous presentation of two self-associated stimuli – namely, the self-associated shape and the self-associated label – might lead to faster processing compared to the presentation of only the self-associated shape or label (see Lockhead, 1966, for redundancy gains). That is, self-associated shape–label pairs might serve as more efficient cues than the shape or label only.

In summary, in the span of three experiments, we will use the dot-probe task to investigate whether prioritization effects of familiar self versus other-related stimuli can be comparably elicited by newly associated stimuli when the self and other-related stimuli compete for attentional resources. With a short SOA of 100 ms (Study 1), we expect that responses to a target will be faster when it occurs at the location previously occupied by self-associated stimuli as opposed to that previously occupied by stranger-associated stimuli. Additionally, we will manipulate the way in which the self and stranger are represented (shape vs. label vs. pair). Thus, we will test (1) whether self-associated stimuli also influence responses to targets when only the self- versus stranger-associated shapes (i.e., newly associated stimuli) are used as cues and (2) whether the effect of self-association on responding is stronger for shape–label pairs than for the label only. We expect the beneficial effect of self- versus stranger-associated cues to be more pronounced when the familiar label is present than when it is not.

To the best of our knowledge, the available body of research for both familiar and new self- versus other-associated stimuli is restricted to the investigation of the stimuli's potential to modulate responses when SOAs are short. In Studies 2 and 3, we will use a longer SOA (1,000 ms) to test for the first time whether self-associated stimuli yield greater IOR than stranger-associated stimuli. As in Study 1, we will compare three different representation formats (shapes vs. labels vs. pairs). We expect greater IOR for the self- versus stranger-associated stimuli, especially for familiar stimuli. The results will provide insights on the potential of new and familiar self- versus other-representations to impact responses to cued targets in a context where self- versus other-representations compete for attention.

Study 1

In Study 1, we measured the attentional impact of new and familiar self- versus other-representations on responses in the dot-probe task. We expected faster responses toward targets following self- versus stranger-associated stimuli (i.e., a cuing effect). Specifically, we expected such differences to be enhanced by the familiarity of the type of representation (i.e., stronger cuing effects for familiar than for newly established self- vs. other-representations).

Method

All studies were carried out according to the principles of the Declaration of Helsinki on the basis of informed consent. For all statistical analyses throughout this paper, a significance level of $\alpha = .05$ was specified.

Participants

A priori power calculations were made using G*Power (Faul et al., 2007) to establish a minimum sample size. In previous studies, the SPE has been reported as medium to large in effect size ($dz > 0.81$ in Sui et al., 2012 and $dz \geq 0.58$ in Schäfer et al., 2016), and previous studies using face stimuli in a dot-probe task reported a large effect size for congruency between target location and self-associated stimuli ($\eta_p^2 = .19$ in Wójcik et al., 2018). Based on this, we expected a medium effect size of $f = .25$ (Cohen, 1988) for the effect of self-prioritization in the dot-probe task. For a repeated-measures multivariate ANOVA (MANOVA; see O'Brien & Kaiser, 1985) of mean RTs with one group, six measurements (2 [target location: self vs stranger] × 3 [type of representation: label vs. shape vs. pair]), $\alpha = .05$, and correlation among the measures = .50, a minimum sample size of $N = 28$ is needed to detect an effect with a power effect of $1 - \beta = .90$. A total of 38 participants (29 female, $M_{age} = 23$, $SD_{age} = 4.53$) were tested to allow for dropouts and exclusion of outlier responses. Data from four participants were excluded because their average RTs in the dot-probe task represented outliers when compared to the sample distribution (Tukey, 1977).

Design

The study consisted of a 2 (target location: self vs. stranger) × 3 (type of representation: label vs. shape vs. pair) within-participants design. The assignment of shapes to labels was randomized and counterbalanced throughout participants, and the target position was randomized and counterbalanced throughout trials.

Apparatus and Materials

The experiment was conducted on Acer Aspire E15 35-573G-54SK 15.6″ laptops using standard computer mice, and it was run on E-Prime 2.0. All stimuli were presented in white color against a black background and at a viewing distance of 50 cm. The visual geometric shapes were presented at a visual angle of approximately 5° × 5°. All verbal stimuli were represented in Courier New font size 18 at a visual angle of about 0.7°.

Procedure

At the beginning of the experiment, participants were asked to associate geometric shapes (triangle and square) with the labels "I" and "stranger" ("Ich" and "Fremder" in German) with the following instructions presented on the computer screen: "You are a [shape 1] and a stranger will be represented by a [shape 2]." The images of the shapes were not presented during this association phase. Participants were to press any key to continue with the experiment after familiarizing themselves with the instructions.

Following, participants completed 84 trials of the dot-probe task (see Figure 1). Each trial began with a fixation cross in the center of the screen (500 ms), followed by the stimuli representing the self and a stranger on opposite sides of the screen (left and right, located on 25% and 75% of the horizontal line of the screen and on 50% of the vertical line of the screen, 100 ms). Representations were a label, a geometric shape, or a matching shape–label pair. The order in which these cues were presented was random. After the cues, a target consisting of an asterisk (*) was presented on either the left or right side of the screen (on 25% or 75% of the horizontal line of the screen, respectively, and on 50% of the vertical line of the screen) until participants responded "d" or "k" to indicate whether the target was located on the left or right side of the screen. The location of the target was randomized between trials. Moreover, the target occurred at the location of the self-associated cue (valid trials) on half of the trials whereas on the other half, it occurred at the location previously occupied by the stranger-associated cue (invalid trials). A 1,000-ms pause with a black screen proceeded before the next trial started.

Finally, the matching task was presented to test whether the self-association and stranger-association of shapes yield the SPE, as established in the literature (Sui et al., 2012). Each trial began with a black screen (500 ms) followed by a fixation cross (500 ms). A pair consisting of a shape with a label underneath was followingly presented and remained on the screen until the participant responded, or for a maximum of 1,500 ms. There were two possible responses: Participants had to press "d" to indicate that the shape–label pair matched the mapping learned during the association phase and "k" to indicate

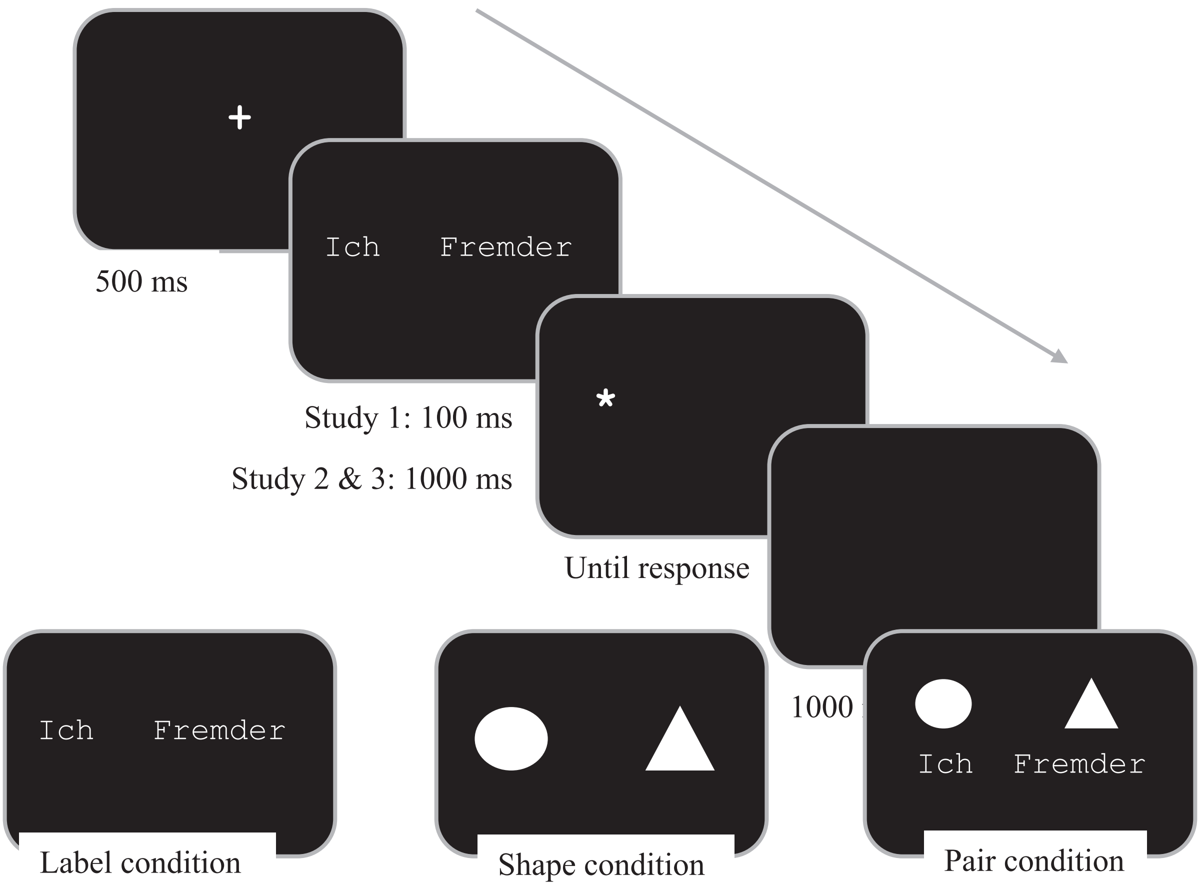

Figure 1. Schematic depiction of one trial of the dot-probe task (above) and example displays of the different types of representation conditions (label vs. shape vs. pair; below). The study used the German labels "Ich" and "Fremder" ("I" and "Stranger," respectively).

that it did not match the learned mapping. Participants received feedback if their response was incorrect or exceeded 1,500 ms ("incorrect" and "please respond faster"). Initially, four trials were administered as a practice phase, followed by 128 experimental trials of the matching task.

Finally, participants were thanked, debriefed, and compensated with €4 or class credit.

Results

For RT analyses, only correct responses with RTs above 100 ms and below one and a half interquartile ranges above the third quartile of the overall individual RT distribution were used (Tukey, 1977). Exclusions of trials were performed separately for the matching task and the dot-probe task. The data and analysis script are available on the Open Science Framework (OSF; https://osf.io/3ke4f/).

Matching Task

As a manipulation check, we first analyzed performance in the matching task considering both RTs and the signal detection index *d*' as a measure of accuracy.

Average RTs

The RT data (see Figure 2) were subjected to a 2 (shape: self-associated vs. stranger-associated) × 2 (trial type: matching vs. nonmatching) within-participants MANOVA. The main effects of shape, $F(1, 33) = 52.48$, $p < .001$, $\eta_p^2 = .61$, and trial type, $F(1, 33) = 15.00$, $p < .001$, $\eta_p^2 = .31$, were both significant. The interaction of shape and trial type, $F(1, 33) = 18.99$, $p < .001$, $\eta_p^2 = .37$, was also significant. To follow up on this interaction effect, RTs from matching trials were submitted to a one-factorial (shape: self-associated vs. stranger-associated) within-participants MANOVA to specifically analyze the SPE. The analysis revealed a significant main effect, $F(1, 33) = 50.73$, $p < .001$, $\eta_p^2 = .61$, indicating a significant SPE. That is, responses were faster for matching self-associated shape–label pairs ($M = 686$, $SD = 171$) than for matching stranger-associated shape–label pairs ($M = 874$, $SD = 218$). The MANOVA on the RTs from nonmatching trials revealed a significant main effect, $F(1, 33) = 7.68$, $p = .009$, $\eta_p^2 = .19$. This indicates that responses were faster for nonmatching trials comprising the self-associated shape (and other-associated label; $M = 806.88$, $SD = 157.98$), compared to those comprising the stranger-associated shape (and self-associated label; $M = 858.12$, $SD = 215.27$). Hence, the significant interaction effect is attributable to a larger RT benefit for self-associated as compared to other-associated shapes on matching trials compared to nonmatching trials.

Sensitivity Measure *d*'

Signal detection sensitivity indices for each shape condition were used to analyze error rates (Schäfer et al., 2015, 2016; Sui et al., 2012). To this end, we defined responses in the following way: In matching trials, correct responses were considered hits, and incorrect responses were considered misses; in nonmatching trials, correct responses were considered correct rejections, and incorrect responses were considered false alarms. The loglinear approach was used to account for cases with 100% hits or 0% false alarms, meaning that 0.5 was added to the number of hits and the number of false alarms, and 1 was added to the number of signal trials and the number of noise trials before calculating the rates for hits and false alarms (see Hautus, 1995; Stanislaw & Todorov, 1999). We then computed *d*', the measure of sensitivity, and submitted it to a one-factorial (shape: self-associated vs. stranger-associated) MANOVA. A significant main effect of shape was observed, $F(1, 33) = 28.95$, $p < .001$, $\eta_p^2 = .47$, indicating a higher sensitivity for self- than for stranger-associated shapes (i.e., a significant SPE in the sensitivity measure; see Table 1).

In sum, the analyses regarding the matching task revealed a significant SPE, showing that our manipulation

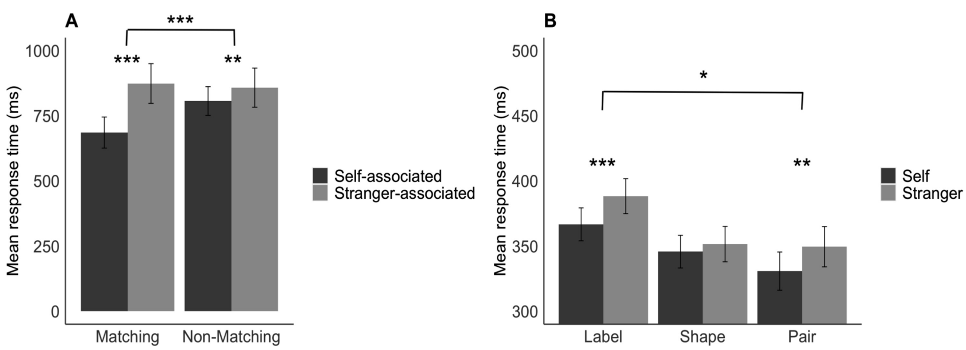

Figure 2. Mean RTs in the matching task (A) as a function of shape (self-associated vs. stranger-associated) and trial type (matching vs. nonmatching), and mean RTs in the dot-probe task (B) as a function of target location (self vs. stranger) and type of representation (label vs. shape vs. pair) in Study 1. Error bars represent standard errors. ****p* < .001, ***p* < .01, **p* < .05. RT = response time.

induced a self- and other-association of simple geometric shapes successfully.

Dot-Probe Task

Average RTs

Average RTs in the dot-probe task were subjected to a 2 (target location: self vs. stranger) × 3 (type of representation: label vs. shape vs. pair) within-participants M-ANOVA. As expected, responses were faster when the target was presented at the location previously occupied by the self-representation (M = 347.73, SD = 36.18) than when the target was presented at the location previously occupied by the stranger-representation (M = 363.11, SD = 38.01), $F(1, 33) = 16.97$, $p < .001$, $\eta_p^2 = .34$. Furthermore, a significant main effect of type of representation was observed, $F(2, 66) = 97.86$, $p < .001$, $\eta_p^2 = .75$. Mean RTs were significantly slower for targets following the self- and other-associated stimuli as represented by labels (M = 377.49, SD = 34.63) than for targets following the self- and other-associated stimuli as represented by shapes (M = 348.63, SD = 36.18), $t(33) = 10.21$, $p < .001$, $dz = 1.75$. Furthermore, mean RTs were significantly slower for targets following cues represented by shapes (M = 348.63, SD = 36.18) than targets following cues represented by pairs (M = 340.15, SD = 39.17), $t(33) = 2.837$, $p = .008$, dz = 0.49. The expected interaction of Target location × Type of representation, $F(2, 66) = 4.45$, $p = .015$, $\eta_p^2 = .12$, was also significant. Pairwise t-tests revealed that responses were significantly faster for targets following the self-representation than for targets following the stranger-representation, irrespective of whether the instances were represented by labels, $t(33) = 4.49$, $p < .001$, $dz = 0.77$, or by shape–label pairs, $t(33) = 3.01$, $p = .005$, $dz = 0.52$ (see Figure 3). The size of the cuing effect did not differ significantly for cues represented by labels and pairs, $t(33)$ = 0.55, $p = .584$, $dz = 0.09$. Crucially though, no significant cuing effect was observed for the shape-representation condition, $t(33) = 1.71$, $p = .098$, $dz = 0.29$. That is, in comparison to the shape-representation condition, the cuing effect was significantly larger when the self and the stranger were represented by labels, $t(33) = 3.02$, $p = .005$, $dz = 0.52$, or by shape–label pairs, $t(33) = 1.99$, $p = .055$, $dz = 0.34$.

Error Rates

Mean error rates were submitted to a 2 (target location: self vs. stranger) × 3 (type of representation: label vs. shape vs. pair) MANOVA (for descriptive statistics, see Table 2). As expected, responses were more accurate when responding to targets presented on the position previously occupied by the self-representation (M = 0.44, SD = 1.19) than when responding to targets presented on the position previously occupied by the stranger-representation (M = 0.87, SD = 1.13), $F(1, 33) = 11.38$, $p = .002$, $\eta_p^2 = .26$. Additionally, a significant main effect of type of representation, $F(2, 66)$ = 12.42, $p < .001$, $\eta_p^2 = .27$, indicated that responses to the different types of representations differed significantly in accuracy. The expected interaction of Target location × Type of representation, $F(2, 66) = 8.41$, $p = .001$, $\eta_p^2 = .20$, was also significant: Responses were significantly more accurate for targets occurring at the location previously occupied by the self-representation (M = 0.59, SD = 1.28) than for targets occurring at the location previously occupied by the stranger-representation (M = 1.47, SD = 1.76) when they were represented by labels, $t(33) = 3.23$, p = .003, $dz = 0.55$, or by shape–label pairs (M = 0.29, SD = 1.06 for self-representations and M = 0.88, SD = 1.43 for stranger representations), $t(33) = 4.00$, $p < .001$, $dz = 0.69$. Yet, no such cuing effect was observed when the self and stranger had been represented by the corresponding shapes, $t(33) = -1.14$, $p = .263$, $dz = 0.20$ (M = 0.44, SD = 1.44 for self-representations and M = 0.26, SD = 0.75 for stranger-representations). The cuing effect in error rates did not differ significantly for targets following the self- and stranger-stimuli as represented by labels and those following self- and stranger-stimuli as represented by pairs, $t(33) = 1.09$, $p = .282$, $dz = 0.19$. Yet, the cuing effect was smaller when the self and the stranger were represented by shapes than when labels, $t(33) = 1.76$, $p = .001$, $dz = 0.40$, or shape–label pairs were used, $t(33) = 3.42$, p = .002, $dz = 0.34$.

Table 1. Mean sensitivity measure *d'* as a function of shape (self-associated vs. stranger-associated) in the matching task in Study 1

Study	Shape	*d'* (*SD*)
Study 1	Self-associated	2.95 (1.13)
	Stranger-associated	2.22 (1.13)
Study 2	Self-associated	3.03 (1.87)
	Stranger-associated	2.41 (1.75)
Study 3	Self-associated	2.92 (1.77)
	Stranger-associated	2.30 (2.14)

Discussion

Study 1 aimed to directly compare the cuing effect of new self-representations versus familiar self-representations versus pair self-representations on the distribution of attention under conditions of attentional competition between self- and other-related stimuli in a dot-probe task. In addition, a matching task tested whether participants indeed associated the geometric shapes with the self and stranger as instructed.

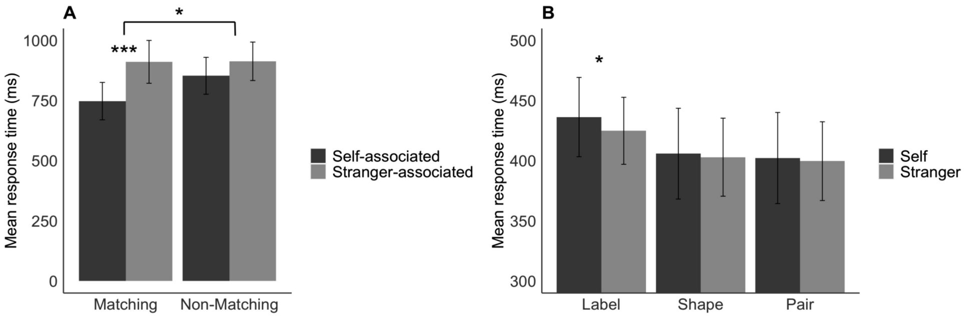

Figure 3. Mean RTs in the matching task (A) as a function of shape (self-associated vs. stranger-associated) and trial type (matching vs. nonmatching), and mean RTs in the dot-probe task (B) as a function of target location (self vs. stranger) and type of representation (label vs. shape vs. pair) in Study 2. Error bars represent standard errors. ***$p < .001$, *$p < .05$. RT = response time.

Regarding the matching task, we replicated the effects observed in former studies in both RTs and sensitivity measures (Humphreys & Sui, 2015; Schäfer et al., 2016, 2015; Sui et al., 2012), indicating a significant SPE. In the dot-probe task, responses toward targets following self-representations were faster than responses toward targets following stranger-representations when these instances were represented by labels or shape–label pairs. That is, we observed a significant cuing effect for labels and pairs; the size of the effect did not differ between these two representation conditions. Importantly, no significant cuing effect was observed when shapes were used as cues. That is, the new self-associated shapes did not differ from other-associated shapes in their impact on the distribution of attention in the dot-probe task.

To test whether this finding generalizes from cuing to IOR, Study 2 tested the effect in a second dot-probe task experiment.

Table 2. Mean error rates as a function of target location (self vs. stranger) and type of representation (label vs. shape vs. pair) in the dot-probe task

Study	Target location	Type of representation	Error rates (%)
Study 1	Self	Label	0.6 (1.2)
		Shape	0.4 (1.4)
		Pair	0.3 (1.0)
	Stranger	Label	1.5 (1.7)
		Shape	0.3 (0.8)
		Pair	0.8 (2.4)
Study 2	Self	Label	0.0 (0.2)
		Shape	0.1 (0.3)
		Pair	0.0 (0.0)
	Stranger	Label	0.2 (0.4)
		Shape	0.0 (0.0)
		Pair	0.0 (0.2)
Study 3	Self	Label	0.7 (1.0)
		Shape	0.5 (0.9)
		Pair	0.2 (0.5)
	Stranger	Label	0.9 (1.2)
		Shape	0.4 (0.6)
		Pair	0.3 (0.8)

Note. SD presented within parentheses.

Study 2

In Study 2, we aimed to extend the results from Study 1 by measuring the effect of self- versus other-association and representation type on responses in the dot-probe task as reflected by IOR. With long SOAs of 1,000 ms, we expected slower responses toward targets following self- versus stranger-associated stimuli (i.e., IOR). This difference was again expected to be more pronounced for familiar representations than for newly established representations.

Method

Participants

Study 1 observed a large effect size for the interaction between target location and type of representation ($\eta_p^2 = .34$). Based on this, a priori power calculations were made using G*Power (Faul et al., 2007) to establish a minimum sample size, modestly calculating for a medium effect size of $f = .25$ (Cohen, 1988) for the effect of self-prioritization in the dot-probe task. For a repeated-measures MANOVA of mean RTs with one group, six measurements (2 [target location: self vs stranger] × 3 [type of representation: label vs. shape vs. pair]), $\alpha = .05$, correlation among the measures = .50, and nonsphericity correction $\varepsilon = 1$, a minimum sample size of $N = 28$ is needed to detect an effect with a power effect of $1 - \beta = .90$. A total of 33 participants (26 female, $M_{age} = 23$, $SD_{age} = 4.85$) completed Study 2. Data from two participants were excluded because their mean RTs in the dot-probe task were categorized within Tukey's (1977) definition of an extreme outlier when compared to the sample distribution.

Design and Procedure

The study had the same design and procedure as Study 1, with the exception that the SOA between the cue stimuli and the target was 1,000 ms in the dot-probe task (instead of 100 ms).

Results

Data cleansing was done as in Study 1. The data and analysis script are available on OSF (https://osf.io/3ke4f/).

Matching Task

Average RTs

The RT data (see Figure 3) were subjected to a 2 (shape: self-associated vs. stranger-associated) × 2 (trial type: matching vs. nonmatching) within-participants MANOVA. The main effects of shape, $F(1, 30) = 40.58$, $p < .001$, $\eta_p^2 = .58$, and matching condition, $F(1, 30) = 6.02$, $p = .020$, $\eta_p^2 = .17$, were both significant. The interaction of Shape × Matching condition, $F(1, 30) = 6.42$, $p = .017$, $\eta_p^2 = .18$, was also significant. The follow-up one-factorial (shape: self-associated vs. stranger-associated) within-participants MANOVA on RTs from matching trials revealed that responses were faster for matching self-associated shape–label pairs (M = 765.45, SD = 211.50) than for matching stranger-associated shape–label pairs (M = 934.10, SD = 256.74), $F(1, 30) = 29.72$, $p < .001$, $\eta_p^2 = .50$, indicating a significant SPE. As expected, submitting RTs from nonmatching trials to the same analysis revealed a statistically nonsignificant result, $F(1, 30) = 2.67$, $p = .113$, $\eta_p^2 = .08$.

Sensitivity Measure *d'*

Measures of sensitivity *d'* were computed as described in Study 1. The one-factorial (shape: self-associated vs. stranger-associated) MANOVA indicated a higher sensitivity for self- than for stranger-associated shapes (see Table 1), $F(1, 30) = 13.95$, $p = .001$, $\eta_p^2 = .32$, that is, a significant SPE in the sensitivity measure.

To summarize, the analyses regarding the matching task demonstrate that the manipulation to induce self- and other-associations of simple geometric shapes was successful.

Dot-Probe Task

Average RTs

Average RTs from the dot-probe task were analyzed by means of a 2 (target location: self vs. stranger) × 3 (type of representation: label vs. shape vs. pair) within-participants MANOVA (see Figure 3). The main effect of target location was nonsignificant, $F(1, 30) = 1.93$, $p = .175$, $\eta_p^2 = .06$, but there was a significant main effect of type of representation, $F(2, 60) = 51.47$, $p < .001$, $\eta_p^2 = .63$. In detail, Helmert contrasts revealed that mean RTs were slower (M = 416.27, SD = 44.17) when the self/stranger were represented by labels than the mean of both other representation types (M = 388.50, SD = 53.23 for shapes, M = 385.82, SD = 54.57 for shape–label pairs), $p < .001$, reflecting that label representations generally yielded higher IOR (for both self- and stranger-associated stimuli) than shapes and shape–label pairs. Mean RTs did not differ significantly for targets following cues represented by shapes or shape–label pairs, $p = .401$. Contrary to what was expected and previously observed in Study 1, the type of representation × target location interaction was not significant, $F(2, 60) = 1.42$, $p = .249$, $\eta_p^2 = .05$.

Note that IOR effects were used for the first time in this context, so this approach represents an innovative, but vulnerable attempt to test self-association effects in attention. Thus, treating Study 2 as a pilot study, we explored in further analyses whether Study 2 yielded any indicative evidence in the expected direction. Specifically, we tested – separately for each type of representation – whether the target detection speed differed as a function of its location. In line with the expectation, when labels were used, responses were significantly faster for targets occurring at the previous "stranger" position (M = 411.10, SD = 44.99) than for those occurring at the position previously occupied by the label "self" (M = 421.45, SD = 47.38), $t(30) = 2.13$, $p = .042$, $dz = 0.38$. No such difference was observed for shapes (M = 388.61, SD = 53.62 for targets following self-representations and M = 388.39, SD = 54.94 for targets following stranger-representations), $t(30) = 0.06$, $p = .953$, $dz = 0.01$, or shape–label pairs (M = 386.00, SD = 61.89 for targets following self-representations and M = 385.65, SD = 50.86 for targets following stranger-representations), $t(30) = 0.07$, $p = .949$, $dz = 0.01$. Thus, the pattern is in line with the findings of Study 1 but should be interpreted with care, as the overall interaction was nonsignificant.

Error Rates

Mean error rates were submitted to a 2 (target location: self vs. stranger) × 3 (type of representation: label vs. shape vs. pair) MANOVA (see Table 2). No significant effects of target location, $F(1, 30) = 1.00$, $p = .325$, $\eta_p^2 = .03$, or type of representation, $F(2, 60) = 2.44$, $p = .096$, $\eta_p^2 = .08$, were observed. The Target location × Type of representation interaction was also not significant, $F(2, 60) = 3.21$, $p = .097$, $\eta_p^2 = .10$.

Discussion

Building on Study 1, in Study 2, we set out to test whether new self- versus other-associated stimuli are less likely to impact the distribution of attention as measured in a dot-probe task than familiar self- versus other-representations. Importantly, we increased the SOA between the presentation of the cue and the to-be-located target, thus producing the conditions for IOR: Instead of facilitation, we now expected a delay of responses toward targets that followed self-associated stimuli as an indicator of attention.

A significant SPE in the matching task in both RTs and sensitivity measures indicated that participants had associated specific geometric shapes to themselves and a stranger as instructed. Contrary to what was expected regarding the dot-probe task, it was only found that labels revealed a higher IOR effect compared to shapes and pairs. The effect of target location and the interaction of type of representation and target location were not significant. Explorative analyses, however, revealed that responses for targets cued by self-representations were slower than responses for targets cued by stranger-representations only when the self and stranger were represented by familiar stimuli. Thus, the nonsignificant data pattern reflects something similar to IOR for self-representations when familiar stimuli were used, but we did not observe a (clear) general impact on IOR for self- versus stranger-representations in newly associated stimuli. This effect is, nevertheless, only descriptive and does not reach conventional levels of significance.

The use of IOR as a dependent measure for the attentional impact of self-associated stimuli is an innovative, but sensitive method. IOR effects may be vulnerable to small methodological changes (Klein, 2000), and there is still a lot of research necessary to fully understand the effect. One might argue that the power in Study 2 was not sufficient to detect the predicted effect for IOR. Simmons et al. (2011) suggests that to test IOR, 20 trials per cell are needed to achieve sufficient power.[1] We therefore conducted a third study with a higher number of trials to test whether the nonsignificant pattern of self-association (vs. stranger-association) on IOR in a dot-probe task experiment is replicated.

Study 3

In Study 3, we aimed to replicate Study 2 with an increased number of trials. We expected responses to be slower toward targets following self- versus stranger-associated stimuli, and for this difference to be enhanced in trials using familiar representations in comparison to trials using new representations – reflecting IOR.

Method

Participants

We applied the same power considerations as reported for Study 2. A total of 36 participants (29 female, M_{age} = 25, SD_{age} = 3.47) completed Study 3. Data from one participant were excluded because they reported having already participated in Study 1 or 2. Data from one participant were excluded because the mean RTs in the dot-probe task were categorized within Tukey's (1977) definition of an outlier when compared to the sample distribution.

Design and Procedure

Study 3 generally followed the same procedure of Study 2, with two modifications. To rule out the possibility that the self-association of shapes measured in the matching task was *produced* by the completion of the dot-probe task rather than through the manipulation, we presented the matching task before the dot-probe task. As a second modification, we presented 24 practice trials and 240 experimental trials to increase the statistical power of the results.

Results

For RT analyses, only correct responses with RTs above 100 ms and not falling within Tukey's (1997) categorization of an outlier were used. Exclusions of trials were performed separately for the matching task and the dot-probe task. The study was preregistered in the OSF (https://osf.io/4rm6d). The data and analysis script are available on OSF (https://osf.io/umv5p/).

Matching Task

Average RTs

The RT data (Figure 4) were subjected to a 2 (shape: self-associated vs. stranger-associated) × 2 (trial type: matching vs. nonmatching) within-participants M-ANOVA. As expected, the main effects of shape, $F(1, 33) = 22.97$, $p < .001$, $\eta_p^2 = .41$, and matching condition,

[1] We thank an anonymous reviewer for pointing out the potential lack of power in Study 2.

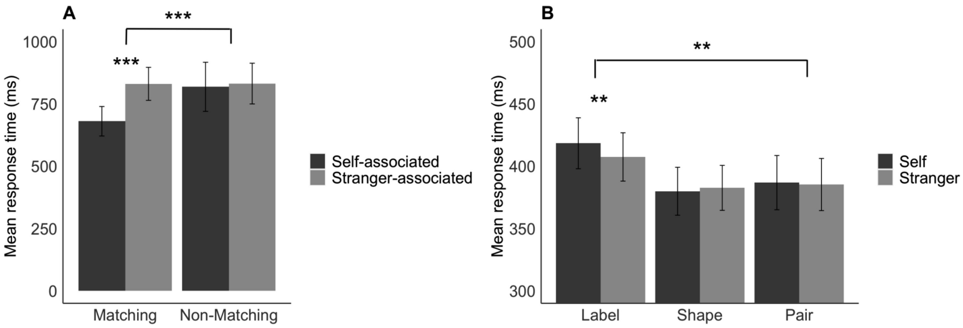

Figure 4. Mean RTs in the matching task (A) as a function of shape (self-associated vs. stranger-associated) and trial type (matching vs. non-matching), and mean RTs in the dot-probe task (B) as a function of target location (self vs. stranger) and type of representation (label vs. shape vs. pair) in Study 3. Error bars represent standard errors. ***$p < .001$, **$p < .01$. RT = response time.

$F(1, 33) = 4.819$, $p = .035$, $\eta_p^2 = .13$, were both significant. The interaction of Shape × Matching condition, $F(1, 33) = 28.88$, $p < .001$, $\eta_p^2 = .47$, was also significant. Analysis of RTs from matching trials in a one-factorial (shape: self-associated vs. stranger-associated) within-participants MANOVA revealed that responses were faster for matching self-associated shape–label pairs ($M = 680.79$, $SD = 169.65$) than for matching stranger-associated shape–label pairs ($M = 830.94$, $SD = 189.83$), $F(1, 33) = 49.59$, $p < .001$, $\eta_p^2 = .60$, reflecting a significant SPE. Submitting RTs from nonmatching trials to the same analysis revealed a statistically nonsignificant result, $F(1, 33) = 0.54$, $p = .543$, $\eta_p^2 = .01$.

Sensitivity Measure *d*'

As described in Study 1, measures of sensitivity *d*' were computed and submitted to a one-factorial (shape: self-associated vs. stranger-associated) MANOVA. Again, as expected and as observed in Study 1, a significant main effect of shape was observed, $F(1, 33) = 5.99$, $p = .020$, $\eta_p^2 = .154$, indicating a higher sensitivity for self- than for stranger-associated shapes (i.e., a significant SPE in the sensitivity measure; Table 1).

To summarize, analyses of the matching task demonstrate that our manipulation inducing the association of shapes with the self and a stranger was successful. A significant SPE was observed – even with an inverted task order – as a consequence of the manipulation.

Dot-Probe Task

Average RTs

Average RTs from the dot-probe task were analyzed in a 2 (target location: self vs. stranger) × 3 (type of representation: label vs. shape vs. pair) within-participants M-ANOVA (Figure 4). The main effect of target location, $F(1, 33) = 2.80$, $p = .104$, $\eta_p^2 = .08$, was nonsignificant. Furthermore, the analysis revealed a significant main effect of type of representation, $F(2, 66) = 52.29$, $p < .001$, $\eta_p^2 = .61$. Helmert contrasts revealed that, when label representations were used, mean RTs were generally slower ($M = 412.99$, $SD = 56.25$) than mean RTs of both other representation types ($M = 381.31$, $SD = 52.85$ for shapes, $M = 386.12$, $SD = 60.69$ for shape–label pairs), $p < .001$. There was no significant difference between mean RTs in trials where shapes or shape–label pairs were presented as cues, $p = .204$. Furthermore, the expected Type of representation × Target location interaction was significant, $F(2, 66) = 6.39$, $p = .003$, $\eta_p^2 = .16$. Pairwise *t*-tests revealed that responses were significantly slower for targets following the self-representation ($M = 418.47$, $SD = 58.62$) than for targets following the stranger-representation ($M = 407.50$, $SD = 55.61$) when these were labels, $t(33) = 3.21$, $p = .003$, $dz = 0.55$, but not when they were shapes ($M = 379.94$, $SD = 55.15$ for self-associated, $M = 382.68$, $SD = 51.73$ for stranger-associated), $t(33) = -0.98$, $p = .332$, $dz = -0.17$, or shape–label pairs ($M = 386.88$, $SD = 62.39$ for self-associated, $M = 385.35$, $SD = 60.00$ for stranger-associated), $t(33) = 0.57$, $p = .576$, $dz = 0.10$.

Error Rates

Submitting mean error rates (Table 2) to a 2 (target location: self vs. stranger) × 3 (type of representation: label vs. shape vs. pair) MANOVA revealed a significant effect of type of representation, $F(2, 66) = 8.50$, $p = .001$, $\eta_p^2 = .21$. The effect of target location, $F(1, 33) = 0.10$, $p = .754$, $\eta_p^2 = .003$, however, was not significant. The Target location × Type of representation interaction was also not significant, $F(2, 66) = 0.75$, $p = .476$, $\eta_p^2 = .02$.

Discussion

In Study 3, we aimed to replicate Study 2 with higher power – achieved by increasing the number of trials in the dot-probe task. That is, we tested the impact of new and familiar self- versus other-associated stimuli on IOR. Again, reflecting the effectiveness of our manipulation, a significant SPE was observed in both RTs and sensitivity measures. More importantly, as expected in the dot-probe task, we observed slower responses for targets cued by self-representations than for targets cued by stranger-representations when the self and stranger were represented by familiar stimuli – reflecting a significant impact on IOR. Contrary to Study 1, this pattern was not replicated in the analysis of the error rates. This may, again, reflect the sensitivity of the effect to methodological specifications. Future research focusing on whether self-association impacts IOR only in speed performance, but not accuracy, is necessary.

The present study is thus the first to demonstrate that (only) familiar self-associated stimuli (compared to other-associated stimuli) impact IOR, representing a specific stage in attention. Unlike Study 2, which might have been under-powered, Study 3 confirms the expected RT pattern and, importantly, confirms that the self-prioritization of familiar stimuli can be found in both cuing effects and IOR effects.

General Discussion

The first aim of this research was to systematically compare the attentional prioritization of familiar, new, and paired self- (vs. stranger-) representations under conditions of attentional competition between self- and other-related stimuli. We thus compared the size of cuing effects elicited by familiar, new, and paired self- versus stranger-associated stimuli in a dot-probe task with a short SOA (100 ms). The second aim was to investigate whether such attentional prioritization effects could also be observed in IOR, in which case self-prioritization would reflect in delayed RTs to targets cued by self-representations at longer SOAs (1,000 ms). To confirm whether participants associated the geometric shapes with themselves, they completed the matching task (Sui et al., 2012) to measure the SPE.

As expected, when using a short SOA in the dot-probe task (Study 1), participants were faster and more accurate in locating targets cued by self-representations than targets cued by stranger-representations. Furthermore, this difference was significant only when representations included familiar labels. This suggests that, in a situation of attentional competition between familiar self- and stranger-related stimuli, the self-associated stimulus captures and holds attention to its location. As a result, locating targets occurring at this location (as compared to targets occurring at the location of the familiar stranger-associated cues) is facilitated. Namely, familiar self-associated stimuli elicit a spatial cuing effect. Accordingly, significant cuing effects were also observed when the self and stranger were represented by shape–label pairs. However, a significant spatial cuing effect was not observed in RTs or error rates when the self and the stranger were represented by shapes. Still, a significant SPE in RTs and sensitivity measures was observed in the matching task (Humphreys & Sui, 2015). Thus, it can be assumed that the geometric shapes were adequate representations for the self and stranger in the dot-probe task. The observed pattern aligns with our hypothesis that familiar self-associated cues elicit attentional prioritization, but recently established self-associated cues do not. Notably, shape–label pairs were no more efficient in eliciting cuing effects than labels. Hence, the simultaneous presentation of the new self-associated shape and the familiar self-associated label did not increase the prioritization of the self-compared to the other-representation.

When using a long SOA in the dot-probe task (Study 3), as expected, participants' responses were slower when responding to targets following familiar self- versus stranger-representations. Still, we observed no *general* RT difference in detecting targets following self- versus stranger-associated cues; RTs did not differ as a function of target location when new or paired representations were used. Nonetheless, the difference in responses toward targets following self- versus stranger-associated labels reflects IOR. Thus, in line with our expectation, the beneficial effect of self- versus other-associated stimuli on the distribution of attention for a short SOA (Study 1) turned into a disadvantage for a long SOA (Study 3). Notably, we also used a long SOA in Study 2 and only observed indicative evidence for an impact of the representation type in IOR, potentially due to a lack of power in this study. We conclude from our findings that, upon the simultaneous presentation of familiar self- and stranger-associated stimuli, the self-associated stimulus is prioritized in information processing. Thus, we provide original evidence that familiar self-associated stimuli hold the potential to modulate early information processing under conditions of attentional competition, whereas recently self-associated stimuli do not, as reflected in both a study using spatial cuing and a study using IOR.

Our findings regarding familiar self-associated stimuli are well in line with previous studies, showing that familiar self-associated stimuli capture attention more easily than corresponding other-associated stimuli (Alexopoulos et al., 2012; Wójcik et al., 2018). Furthermore, they extend prior research demonstrating the attentional capture of familiar self-relevant information (Alexopoulos et al., 2012; Brédart et al., 2006; Wójcik et al., 2018; Yang et al., 2013), highlighting that such effects also transfer into other early information processing phenomena such as IOR (see Klein, 2000).

The current finding that new self- versus stranger-associated shapes yielded no benefit in responding when SOA is short, nor IOR when the SOA is long, relates to some studies testing the efficiency of directional self- versus stranger-associated cues in directing attention in Posner's cuing task (though with mixed results; Sui et al., 2009; Zhao et al., 2015). Furthermore, in relation to the capture and holding of attention, both Dalmaso et al. (2019) and Wade and Vickery (2018) had observed an attentional impact of self- versus other-associated shapes, whereas Siebold et al. (2015) did not. Importantly, Siebold et al. (2015) presented neutral, self-, and stranger-associated shapes on the same visual search display, whereas the oculomotor task used by Dalmaso et al. (2019) presented *only* a self- *or* an other-associated cue on a given trial. Thus, Dalmaso et al.'s task did not test the prioritization of self-related stimuli in situations where the self- and other-related stimuli compete for attention. Considering the fact that individuals have to select relevant information in a complex surrounding, it is important to test stimuli both separately and when competing against other stimuli. The dot-probe task used in our study presented self- and stranger-associated cues simultaneously. As the cognitive processes underpinning the SPE are not yet completely clear, it is important to consider these methodological differences when interpreting the data. Our study extends previous research on the potential of self-relevance to guide information processing into contexts in which self- and stranger-associated stimuli compete for cognitive resources. Although the self-associated shape is assumed to be more relevant, the manipulation also induces some degree of social relevance to the stranger-associated shape (i.e., it does not remain a neutral stimulus). Taken together, our results and those observed by Siebold et al. (2015) suggest that – though attentional effects of new self- versus stranger-associated stimuli have been observed when self-associated stimuli were presented among neutral stimuli (see Dalmaso et al., 2019; Sui et al., 2009; Wade & Vickery, 2018) – they may not yield attentional prioritization in a task where self- and other-related stimuli compete for attentional resources.

Contrary to the reasoning that redundancy gains (Lockhead, 1966) induced by the presentation of the shape–label pair would enhance the effect of self-relevance (vs. presenting only the label or shape; see Sui & Humphreys, 2015b), the size of the cuing effect in Study 1 did not differ between labels and shape–label pairs, indicating that attentional capture of the self-associated label did not increase by the addition of the self-associated shape. Still, with a short SOA, RTs were generally faster for targets following shape–label pairs as compared to targets following shapes or labels. Thus, it seems possible that the faster RTs for pairs compared to shapes or labels reflect a beneficial effect of redundancy gains (in the sense of facilitated information processing when two cues referring to each instance are presented, instead of only one) that is independent from the prioritization of self-associated stimuli.

Furthermore, unlike Study 1, we found no difference in RTs toward targets following pair self-representations than pair stranger-representations with a long SOA in Studies 2 and 3. This might, however, be attributed to our experimental set-up: Whereas the location of targets was the exact location of the preceding cues when representations were shapes or labels only, in the pair condition, the target was presented *in between* the locations of both components of the cue. It remains an open question whether IOR hinges more strongly upon the repetition of the exact location from the cue to the target than spatial cuing effects – perhaps explaining why RTs toward targets following self-associated pairs did not differ significantly from those following other-associated pairs. Moreover, the larger size of the shape in comparison to the label and the presentation of the shape above the label may have led to a larger impact of the shape as a cue in the pair condition, thus diminishing the potential of the self-associated label to elicit IOR. In general, further research is needed to clarify the degree to which these features influenced the potential of self-associated shape–label pairs to induce cuing and IOR.

In the matching task, we observed a significant SPE as reflected in RTs and sensitivity measures (Sui et al., 2012; Schäfer et al., 2015, 2016). In this task, each trial comprises both a newly associated shape and a highly familiar label, with some trials presenting only self- *or* other-associated information (matching) and others presenting both self- *and* other-associated information (nonmatching). The latter also holds for the dot-probe task in which self- and stranger-related information compete for attentional resources on each prime display. Yet, the SPE is measured on matching trials, where effects may – at least to some degree – hinge upon the presentation of shape–label pairs. Across studies, results on nonmatching trials are less systematic. In Study 1, we generally observe faster RTs on trials comprising the self-associated shape than on trials comprising the stranger-associated shape – on both matching and nonmatching trials (see Sui et al., 2012; also see Schäfer et al., 2016; Sui & Humphreys, 2015a). This indicates that information processing of the recently self-associated shape, compared to the stranger-associated shape, is actually benefitted in the matching task: Nonmatching trials comprising the self-associated shape and stranger-associated label elicit faster responses than those comprising the self-associated label and the stranger-associated shape; matching trials comprising the self-associated shape and label elicit faster responses than those comprising the stranger-associated shape and label. The current study does not allow to preclude whether an attentional effect may underpin the advantage of the self-associated shape compared to the stranger-associated shape in the matching task. However, we can conclude that there is no advantage of the self-associated shape compared to the stranger-associated shape when it comes to attention. In the matching task, the shape and label both need to be considered when responding, whereas the shapes (i.e., the cues) are rather task-irrelevant in the dot-probe task. Future research should thus investigate whether the relevance of the shapes determines whether or not their (self- or other-) association impacts the distribution of attention.

As previously mentioned, methodological differences are relevant to consider when comparing the results of studies testing the impact of self- versus other-association in cognitive tasks. Hence, the results from our studies are constrained to our particular use of the dot-probe task, which presents a context of attentional competition – with both stimuli presented simultaneously. Research testing the attentional impact of self- and other-associated stimuli in isolation might produce different results. Similarly, one might argue that the mere presence of familiar labels may override any effects of newly associated stimuli, so that testing the effects of familiar versus newly associated stimuli in a between-subjects design seems worthwhile. Additionally, the current research compared self- versus other-associated stimuli that competed for attentional resources within a trial but never compared familiar versus new self-associated stimuli within the same trial. Thus, the cuing/IOR effect for self- versus other-related stimuli can be compared across familiar, new, and combined stimuli, but the different representations regarding the same entity have not been tested against each within a common trial. All in all, future research that compares different conditions and contexts of attention will have to provide further insights into the impact of self- versus other-association on information processing.

The current combination of cuing and IOR effects suggests that self-prioritization takes place at different stages of information processes. Using IOR in this context is innovative, but the current research is by no means exhaustive. First, the nonsignificant results in Study 2 highlight that IOR is a complex phenomenon which is not easily unveiled. Second, the findings provide an insight on the attentional impact of self-association on cuing and IOR through a qualitative comparison across studies where SOA is either short or long in the dot-probe task. Thus, the evidence for differences between long and short SOAs is indirect: Instead of comparing different SOAs across experiments, future research should manipulate the SOA as an independent between-subjects factor within one study and investigate whether the RTs show the systematic inversion of the pattern that the current research suggests. In doing so, the SOAs could be systematically varied in their time (e.g., more than two different SOAs), to gain a better understanding of when attention is drawn (away) from salient stimuli. Taken together, further research is needed to clarify how self- versus stranger-associated stimuli impact IOR. Ideally, this research would be accompanied with eye tracking measures to confirm the eye movements expected in IOR.

Furthermore, it must be noted that the use of words as familiar representations and pictorial stimuli (shapes) as new representations may represent a confound. Namely, task demands may differ between label and shape processing and thus play a role in the observed results. While our intent with using such stimuli was to use the materials used in prior research as a base, overcoming this difference should also be considered in future research.

Despite these limitations, our data yield insights into effects of self-relevance on information processing. That is, familiar self-associated stimuli have the potential to influence early information processing and produce both a cuing effect and IOR. For new self- versus other-associated stimuli, we observed no such effects. Summing up, our results provide evidence that established self-representations robustly impact early attentional processing, whereas new self-representations may not be sufficient to induce such an effect when self-associated stimuli need to compete for attentional resources with other-associated stimuli.

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Open Data
The data and analysis script for Studies 1 and 2 are available on the Open Science Framework OSF, https://osf.io/3ke4f/. Study 3 has been preregistered in the OSF (https://osf.io/4rm6d). The data and analysis script are available on OSF (https://osf.io/umv5p/).

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