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Parts of Me: Identity-Relevance Moderates Self-Prioritization

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Abstract

Recent research has revealed a pervasive bias for self-relevant information during decision-making, a phenomenon termed the self-prioritization effect. Focusing almost exclusively on between-target (e.g., self vs. friend) differences in task performance, however, this work has overlooked the influence stimulus factors potentially exert during decisional processing. Accordingly, based on pertinent social-psychological theorizing (i.e., Identity-Based Motivation Theory), here we explored the possibility that self-prioritization is sensitive to the identity-based relevance of stimuli. The results of three experiments supported this hypothesis. In a perceptual-matching task, stimulus enhancement was greatest when geometric shapes were associated with identity-related information that was important (vs. unimportant) to participants. In addition, hierarchical drift-diffusion modeling revealed this effect was underpinned by differences in the efficiency of visual processing. Specifically, evidence was extracted more rapidly from stimuli paired with consequential compared to inconsequential identity-related components. These findings demonstrate how identity-relevance moderates self-prioritization.

Keywords: self-prioritization; identity-relevance; perceptual matching; drift-diffusion model

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1. Introduction

Extending an extensive literature demonstrating that self-referential processing influences judgment and memory (Baumeister, 1998; Conway & Pleydell-Pearce, 2000; Heatherton, 2011; Heatherton, Macrae, & Kelley, 2004; Mezulis, Abramson, Hyde, & Hankin, 2004; Symons & Johnson, 1997), recent work has revealed potent effects of self-relevance on perceptual decision-making (Constable, Welsh, Huffman, & Pratt, 2019; Frings & Wentura, 2014; Golubickis, Falbén, Cunningham, & Macrae, 2018; Golubickis et al., in press; Macrae, Visokomogilski, Golubickis, Cunningham, & Sahraie, 2017; Macrae, Visokomogilski, Golubickis, & Sahraie, 2018; Schäfer, Wentura, & Frings, 2015; Sui, He, & Humphreys, 2012; Truong, Roberts, & Todd, 2017). Notably, stimuli associated with the self (vs. other people) are prioritized during decisional processing (Humphreys & Sui, 2016; Sui & Humphreys, 2015, 2017; Sui & Rothstein, 2019; Truong & Todd, 2017). These effects, moreover, extend to entirely inconsequential material. As demonstrated by Sui et al. (2102), after coupling arbitrary geometric shapes with various person labels (e.g., circle = you, triangle = best friend, square = stranger), participants' perceptual-matching judgments (do the items (shape + label) go together?) were fastest and most accurate for stimulus pairs associated with the self (vs. best friend or stranger), a phenomenon they termed the *self-prioritization effect* (Sui et al., 2012; Sui, Liu, Mevorach, & Humphreys, 2013a; Sui, Sun, Peng, & Humphreys, 2014).

1.1. Identity-Relevance and Self-Prioritization

Notwithstanding abundant evidence for the prioritization of self-relevant material during decisional processing (Humphreys & Sui, 2016; Sui & Humphreys, 2015, 2017), questions remain regarding the extent and basis of this effect (Constable et al., 2019; Golubickis et al., 2018; Reuther & Chakravarthi, 2017). To date, research has focused almost exclusively on the perception of material

associated with the self and other people (e.g., friend, mother, stranger) and yielded a consistent bias for self-relevant (vs. other-relevant) stimuli. However, although these self-other differences are unquestionably enlightening and theoretically important (Sui & Gu, 2017; Sui & Humphreys, 2017; Truong & Todd, 2017), they may nevertheless obscure the subtle ways in which self-relevance impacts task performance (Golubickis et al., 2017, in press; Macrae et al., 2018). In particular, just as perceptual decision-making is modulated by between-target differences (e.g., self vs. other), so too it may be responsive to the personal prominence that stimuli hold for perceivers (Conway, 2005; Conway & Pleydell-Pearce, 2000; McConnell, 2011; McConnell, Shoda, & Skulborstad, 2012). That is, within persons, self-prioritization may vary as a function of the strength of the connection between the self and to-be-judged items (i.e., degrees of "me-ness," see Oyserman, Elmore, & Smith, 2012). Lending some support to this viewpoint, Moradi, Sui, Hewstone, and Humphreys (2015) recently demonstrated group-based modulation of perceptual matching, such that soccer fans were faster to match geometric shapes and badges when the emblems were of their favorite team (i.e., in-group) compared to a rival (i.e., out-group, see also Enock, Sui, Hewstone, & Humphreys, 2018; Moradi, Sui, Hewstone, & Humphreys, 2017). Comparable effects, we suspect, may be elicited when stimuli differ in the extent to which they pertain to people's personal identities.

When exploring the self-prioritization effect, researchers have tended to adopt a characterization of the self as a unitary, monolithic cognitive structure (Humphreys & Sui, 2016; Sui & Gu, 2017; Sui & Humphreys, 2015, 2017). This viewpoint is outdated, however. Rather than comprising an undifferentiated mental representation, the self-concept is a multifaceted, dynamic construct shaped by the interplay of long-term knowledge, situational factors, and temporary processing goals (Conway, 2005; Conway & Pleydell-Pearce, 2000, Higgins, 1987; McConnell, 2011). On a moment-by-moment basis, information is associated, not with a generic representation of the self, but rather with task-specific sub-components of the self-concept — including images, memories, experiences, and sensory inputs — that access working memory and influence behavior in

a flexible, goal-directed manner (i.e., the working self/identity, see Conway & Pleydell-Pearce, 2000; Dunning & Balcetis, 2013; McConnell, 2011; Oyserman, 2007). In essence, these identities potentiate action, foster a sense of self-continuity, and serve as a framework through which the world can be construed. Of course, in shaping the process and products of self-referential thought, some identities are more important than others. As noted by Chen, Urminsky, and Bartels (2016), defining identities (vs. inconsequential identities) are richly causally interconnected with other components of the self-concept, thereby exerting potent influence on identity-based motivations for behavior (see Oyserman, 2007, 2009, Oyserman & Destin, 2010).

This nuanced conception of the self-concept and identity-relevance has direct implications for stimulus prioritization during perceptual-matching tasks (cf. Humphreys & Sui, 2016; Humphreys & Sui, 2015, 2017). Previously, the prominence of identity-related information has been shown to moderate attentional operations, such that processing resources are preferentially allocated to identity-relevant (vs. identity-irrelevant) information (Berger & Heath, 2007; Coleman & Williams, 2015; Macrae et al., 2018). By implication, one would therefore expect identity-relevance to influence perceptual matching in a similar way, notably self-prioritization should be more pronounced when stimuli are associated with identities that are important than trivial to an individual (Chen et al., 2016). In other words, rather than self-relevance exerting a standard enhancing effect on task performance (Humphreys & Sui, 2016; Sui & Humphreys, 2015, 2017), self-prioritization should be sensitive to the importance of the identity-related information with which arbitrary stimuli (e.g., geometric shapes) have been associated (Enock et al., 2018; Moradi et al., 2015, 2017). We examined this hypothesis in the current investigation.

1.2. Overview

In three experiments, using a standard perceptual-matching task (Sui et al., 2012), the effects of identity-relevance on self-prioritization were explored. Participants first associated identity-related information (Expt. 1, group memberships; Expts. 2 & 3, personality characteristics) that varied in personal importance (high or medium or low) with geometric shapes (circle, square triangle), then judged whether a subsequent series of shape-identity pairings matched or mismatched the previously learned associations. We expected the importance of the identity-related information to influence perceptual matching. Specifically, perceptual decision-making should be fastest when shapes are paired with consequential compared to inconsequential personal identities. Corroborating previous research, we expected self-prioritization to emerge only on shape-label matching (vs. non-matching) trials (e.g., Enock et al., 2018; Frings & Wentura, 2014; Reuther & Chakravarthi, 2017; Schäfer et al., 2015; Woźniak and Knoblich, 2019).

2. Experiment 1: Group Relevance and Self-Prioritization

2.1. Method

2.1.1. Participants and Design

Fifty-six undergraduates (15 males, M_{age} = 20.74, SD = 2.68) took part in the research, for which they received £5 (~$6.50).[1] All participants had normal or corrected-to-normal visual acuity. Informed consent was obtained from participants prior to the commencement of the experiment and the protocol was reviewed and approved by the Ethics Committee at the School of Psychology, University of Aberdeen, Scotland. The experiment had a 2 (Condition: experimental vs. control) X 3 (Identity-Relevance: high vs. medium vs. low) X 2 (Trial Type: matching vs. non-matching) mixed-design with repeated measures on the second and third factors.

[1] Based on previous research (Coleman & Williams, 2015; Golubickis et al., 2017; Sui et al., 2012), G*Power (η_p^2 = .25, α = .05, power = 90%) revealed a requirement of 48 participants for Experiments 1 and 2. An additional ~10% were recruited to allow for drop out.

2.1.2. Stimulus Materials and Procedure

Participants arrived at the laboratory individually, were greeted by an experimenter, told they would be performing a decision-making task, and assigned to either the experimental or a yoked-control condition. Following Sui et al. (2012), the experiment had two phases. The first phase comprised a learning task in which participants were required to associate geometric shapes (i.e., circle, square, triangle) with various groups to which they belonged. On a piece of paper, participants in the experimental condition were asked to write down, in any order, three groups with which they identified: one that was high in relevance to them (e.g., vegetarian), another that was medium in relevance (e.g., athlete), and a final group that was low in identity-relevance (e.g., musician, see Supplementary Material). Participants were then instructed to associate each of the groups with a geometric shape; specifically, a circle, a square or a triangle and had 60 seconds to complete this task (i.e., learn each shape-group pairing). The shapes were not presented during this phase of the experiment and shape-group associations were counterbalanced across the sample. Participants in the yoked-control condition learned the shape-group associations of their counterpart in the experimental condition. This condition was included to confirm it was the personal importance of the groups that influenced task performance and not simply the generation of contextually salient information given the task context.

Next, participants were seated in front of a desktop computer and informed they would be performing a perceptual-matching task. Using 2 buttons on the keyboard (i.e., N & M), participants had to report whether a series of shape-group pairings (e.g., circle & high-relevance group, square & medium-relevance group, triangle & low-relevance group) were correct (or incorrect) on the basis of the associations learned previously. Group labels were transformed to comprise only the first three letters of the respective identity (e.g., vegetarian = VEG, athlete = ATH, musician = MUS). Each trial began with the presentation of a central fixation cross for 500 ms, followed by the pairing of a shape (i.e., circle, square, triangle) and group (e.g., VEG, ATH, MUS) above and below the fixation cross,

respectively, for 100 ms. After each shape-group pairing was presented, the screen turned blank for 1100 ms during which participants were required to judge the accuracy of the pairings (i.e., whether they matched or mismatched the associations learned earlier) by pressing the corresponding button as quickly as possible. Following Sui et al. (2012), this response deadline was adopted to encourage fast responses and discourage strategic responding. The meaning of the response buttons was counterbalanced across participants. Feedback (i.e., correct or incorrect response) was given on the screen for 500 ms at the end of each trial and participants were also informed of their overall accuracy at the end of each block of trials (Sui et al., 2012). Participants initially performed 12 practice trials, followed by seven blocks of 60 trials in which groups high, medium, and low in identity-relevance and re-paired stimuli occurred equally often in a random order. In total, across all the blocks, there were 70 trials in each condition (i.e., high-relevance/matching, high-relevance/non-matching, medium-relevance/matching, medium-relevance/non-matching, low-relevance/matching, low-relevance/non-matching).

On completion of the perceptual-matching task, a manipulation check was administered to assess the importance (i.e., identity-relevance) of the groups participants in the experimental condition had generated. On a sheet of paper, all participants rated the personal importance of the groups on a 15-point scale (i.e., 1 = not at all important to me; 8 = quite important to me; 15 = very important to me). Finally, participants were debriefed, thanked, and dismissed.

2.2. Results and Discussion

2.2.1. Group Importance

A 2 (Condition: experimental vs. control) X 3 (Identity-Relevance: high or medium or low) mixed-model analysis of variance (ANOVA) was conducted on the data. This yielded main effects of Condition [$F(1, 54) = 37.66$, $p < .001$, $\eta_p^2 = .41$] and Identity-Relevance [$F(2, 108) = 155.60$, $p < .001$, $\eta_p^2 = .74$], and a significant Condition X Identity-Relevance [$F(2, 108) = 122.80$, $p < .001$, $\eta_p^2 = .70$]

interaction. Further analysis of the interaction revealed a simple effect of Identity-Relevance in the experimental condition [$F(2, 108) = 277.42$, $p < .001$]. Post-hoc *t*-tests confirmed that high-relevance groups ($M = 13.82$, $SD = 1.22$) were rated as more important than medium-relevance groups ($M = 8.04$, $SD = 0.84$, $t(27) = 19.67$, $p < .001$, $d = 3.72$, 95% CI = [5.25, 6.32]), and medium-relevance groups were more important than low-relevance groups ($M = 2.32$, $SD = 0.95$, $t(27) = 19.91$, $p < .001$, $d = 3.76$, 95% CI = [5.18, 6.25]). No differences in the ratings of the groups emerged in the control condition [$F(2, 108) = 1.01$, $p = .368$; high-relevance $M = 6.07$, $SD = 2.65$; medium-relevance $M = 5.61$, $SD = 2.60$; low-relevance $M = 5.39$, $SD = 3.00$].

2.2.2. Perceptual-Matching Task

Responses faster than 200 ms were excluded from the analysis, eliminating less than 1% of the overall number of trials. A multilevel model was used to examine the response time (RT) and accuracy data. Analyses were conducted with the R package 'lmer4' (Pinheiro, Bates, DebRoy, Sarkar, & R Development Core Team, 2015), with participants as a crossed random effect. Analysis of the RTs yielded a main effect of Trial Type ($b = -.073$, $SE = .003$, $t = -23.76$, $p < .001$) and significant Identity-Relevance X Trial Type ($b = -.008$, $SE = .004$, $t = -2.25$, $p = .024$) and Condition X Identity-Relevance X Trial Type ($b = -.017$, $SE = .006$, $t = -3.09$, $p = .002$) interactions. To further explore the 3-way interaction, separate Identity-Relevance X Trial Type analyses were conducted for responses in the experimental and control conditions (see Figure 1 Panel A). In the experimental condition, this revealed a main effect of Trial Type ($b = -.068$, $SE = .003$, $t = -21.54$, $p < .001$) and an Identity-Relevance X Trial Type ($b = -.026$, $SE = .004$, $t = -6.64$, $p < .001$) interaction. On matching trials, a simple main effect of Identity-Relevance indicated that RTs were faster for stimuli that were high than medium or low in personal importance ($b = -.027$, $SE = .003$, $t = -9.96$, $p < .001$). No differences were observed on non-matching trials. In the control condition, the analysis yielded only

an effect of Trial Type (b = -.073, SE = .003, t = -23.01, p < .001), such that responses were faster on matching (M = 668 ms, SD = 84 ms) than non-matching (M = 734 ms, SD = 81 ms) trials.

A multilevel logistic regression analysis on the accuracy of responses yielded main effects of Identity-Relevance (b = -.082, SE = .038, z = -2.16, p < .031) and Trial Type (b = .187, SE = .045, z = 4.16, p < .001) and significant Condition X Trial Type (b = .235, SE = .065, z = 3.60, p < .001) and Condition X Identity-Relevance X Trial Type (b = .257, SE = .080, z = 3.21, p = .001) interactions. To further explore the 3-way interaction, separate Identity-Relevance X Trial Type analyses were conducted for responses in the experimental and control conditions (see Figure 1 Panel B). In the experimental condition, this revealed a main effect of Trial Type (b = .423, SE = .047, z = 8.94, p < .001) and an Identity-Relevance X Trial Type (b = .362, SE = .058, z = 6.25, p < .001) interaction. On matching trials, a simple main effect of Identity-Relevance indicated that responses were more accurate for stimuli that were high than medium or low in personal importance (b = .327, SE = .043, z = 7.63, p < .001). No differences were observed on non-matching trials. In the control condition, the analysis yielded only an effect of Trial Type (b = .187, SE = .045, z = 4.16, p < .001), such that accuracy was greater on matching (M = 77%, SD = 15%) than non-matching (M = 74%, SD = 15%) trials.[2]

[2] To address the possibility that the process of generating items, hence the order in which identities were produced (vs. personal relevance), accounted for the observed effects, an additional Order X Trial Type multilevel model analysis was conducted. This yielded only a main effect of Trial Type on RTs (b = -.035, SE = .002, t = -21.85, p < .001) and accuracy (b = .206, SE = .024, z = 8.73, p < .001), thereby confirming that the order in which items were generated did not influence task performance.

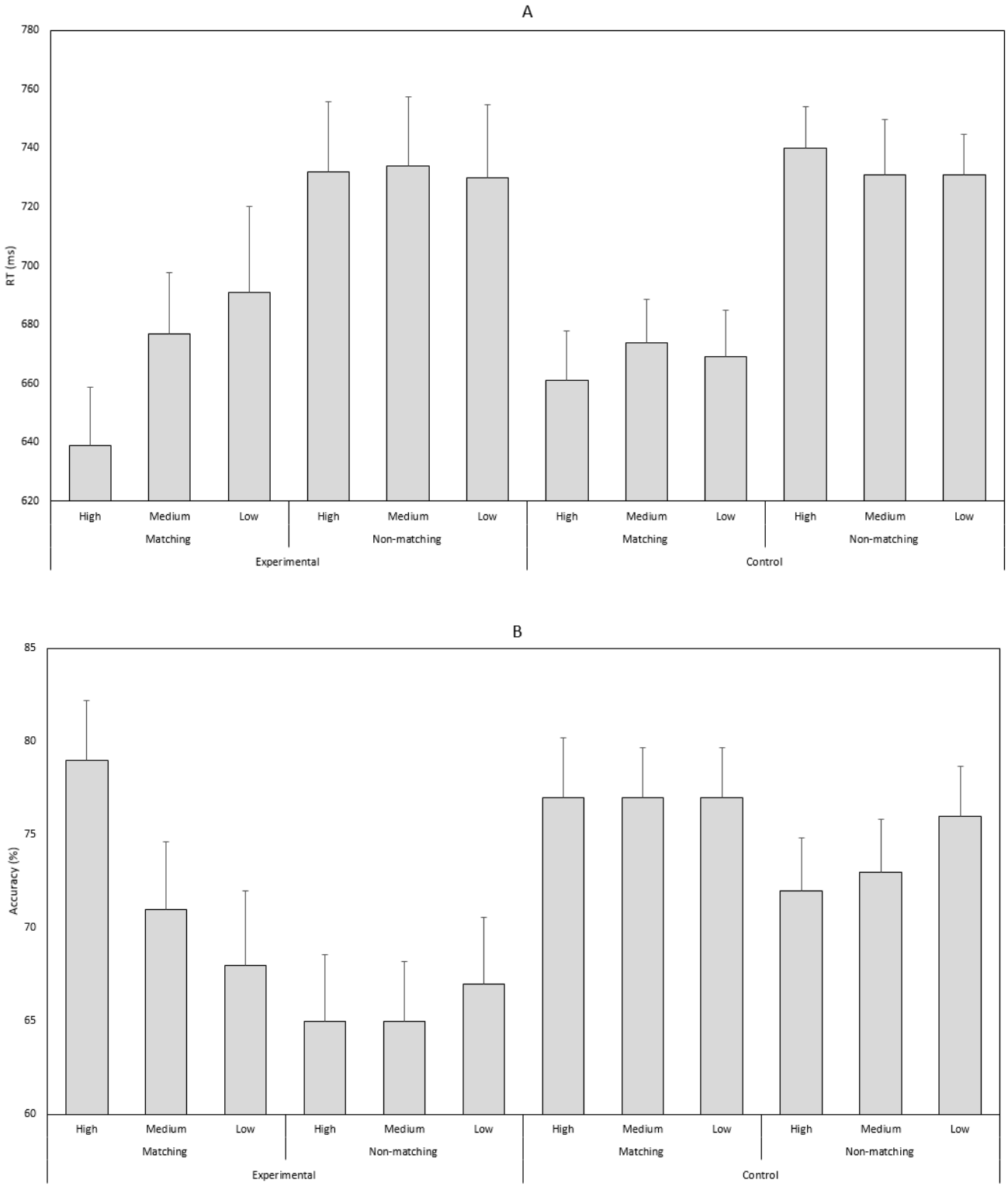

Figure 1. Mean reaction time (RT; Panel A) and accuracy (Panel B) as a function of condition, identity-relevance and trial type (Expt. 1). Error bars represent +1 SEM.

These results support the hypothesis that identity relevance-influences self-prioritization (Oyserman, 2007, 2009; Oyserman & Destin, 2010). During a standard perceptual-matching task (Sui et al., 2012), on matching trials, responses to geometric shapes were faster and more accurate as a function of increasing identity-relevance (i.e., experimental condition). Replicating previous research, no such effects were observed on non-matching trials (Enock et al., 2018; Frings & Wentura, 2014; Reuther & Chakravarthi, 2017; Schäfer et al., 2015; Woźniak and Knoblich, 2019). In addition, performance was not impacted when the shape-label associations were irrelevant to participants (i.e., yoked-control condition), other than responses were faster and more accurate on matching than non-matching trials.

In our next study, we sought to replicate and extend these findings. Rather than exploring stimulus relevance on the basis of group membership, on this occasion we considered another core identity-related aspect of the self-concept, traits (i.e., personality characteristics) that participants possessed (Markus, 1977; Owens, Robinson, & Smith-Lovin, 2010; Roberts & Donahue, 1994). Specifically, participants associated geometric shapes with traits that varied in identity-relevance (i.e., high vs. medium vs. low), after which they performed a perceptual-matching task on shape-trait pairings (Sui et al., 2012). Much like group-relevance, we expected trait-relevance to influence perceptual matching such that, on shape-label matching (vs. non-matching) trials, processing benefits would be most pronounced for stimuli associated with consequential (vs. inconsequential) identity-related information.

3. Experiment 2: Trait-Relevance and Self-Prioritization

3.1. Method

3.1.1. Participants and Design

Fifty-six undergraduates (13 males, M_{age} = 20.89, SD = 3.88) took part in the research, for which they received £5 (~$6.70). All participants had normal or corrected-to-normal visual acuity.

Informed consent was obtained from participants prior to the commencement of the experiment and the protocol was reviewed and approved by the Ethics Committee at the School of Psychology, University of Aberdeen, Scotland. Two participants (1 male) in the experimental condition failed to follow the instructions by responding with invalid key presses, thus were excluded from the statistical analysis. This resulted in the exclusion of their yoked counterparts from the control condition. The experiment had a 2 (Condition: experimental vs. control) X 3 (Identity-Relevance: high vs. medium vs. low) X 2 (Trial Type: matching vs. non-matching) mixed-design with repeated measures on the second and third factors.

3.1.2. Stimulus Materials and Procedure

The study closely followed Experiment 1, but with an important modification. On this occasion, during the learning phase, participants in the experimental condition associated geometric shapes (i.e., circle, square, triangle) with self-generated positive personality characteristics that varied in relevance to them (i.e., high, medium, low, see Supplementary Material). In all other respects, the procedure was identical to Experiment 1. On completion of the perceptual-matching task and manipulation check, participants were debriefed, thanked, and dismissed.

3.2 Results and Discussion

3.2.1. Trait Importance

A 2 (Condition: experimental vs. control) X 3 (Identity-Relevance: high or medium or low) mixed-model analysis of variance (ANOVA) was conducted on the data. This yielded main effects of Condition [$F(1, 50) = 47.09$, $p < .001$, $\eta_p^2 = .48$] and Identity-Relevance [$F(2, 100) = 197.10$, $p < .001$, $\eta_p^2 = .80$], and a significant Condition X Identity-Relevance [$F(2, 100) = 167.50$, $p < .001$, $\eta_p^2 = .77$] interaction. Further analysis of the interaction revealed a simple effect of Identity-Relevance in the

experimental condition [$F(2, 100) = 363.28$, $p < .001$]. Post-hoc t-tests confirmed that high-relevance traits ($M = 14.04$, $SD = 0.91$) were rated as more important than medium-relevance traits ($M = 9.07$, $SD = 1.02$, $t(25) = 17.19$, $p < .001$, $d = 3.37$, 95% CI = [4.55, 5.60]), and medium-relevance traits were more important than low-relevance traits ($M = 3.23$, $SD = 1.37$, $t(25) = 20.26$, $p < .001$, $d = 3.97$, 95% CI = [5.21, 6.36]). No differences in the ratings of the traits emerged in the control condition [$F(2, 100) = 1.27$, $p = .284$; high-relevance $M = 6.31$, $SD = 2.26$; medium-relevance $M = 5.69$, $SD = 2.36$; low-relevance $M = 5.85$, $SD = 2.69$].

3.2.2. Perceptual-Matching Task

Responses faster than 200 ms were excluded from the analysis, eliminating less than 1% of the overall number of trials. A multilevel model analysis of the RTs yielded a main effect of Trial Type ($b = -.067$, $SE = .003$, $t = -20.37$, $p < .001$) and a significant Condition X Identity-Relevance X Trial Type ($b = -.034$, $SE = .006$, $t = -5.97$, $p < .001$) interaction. To further explore the 3-way interaction, separate Identity-Relevance X Trial Type analyses were conducted for responses in the experimental and control conditions (see Figure 2 Panel A). In the experimental condition, this revealed main effects of Identity-Relevance ($b = .007$, $SE = .003$, $t = 2.35$, $p = .019$) and Trial Type ($b = -.059$, $SE = .003$, $t = -18.67$, $p < .001$) and an Identity-Relevance X Trial Type ($b = -.029$, $SE = .004$, $t = -7.54$, $p < .001$) interaction. On matching trials, a simple main effect of Identity-Relevance indicated that RTs were faster for stimuli that were high than medium or low in personal importance ($b = -.022$, $SE = .003$, $t = -8.27$, $p < .001$). In contrast, on non-matching trials, a simple main effect of Identity-Relevance indicated that RTs were slower for stimuli that were high than medium or low in personal importance ($b = .007$, $SE = .003$, $t = 2.45$, $p = .014$). In the control condition, the analysis yielded only an effect of Trial Type ($b = -.067$, $SE = .003$, $t = -19.72$, $p < .001$), such that responses were faster on matching ($M = 672$ ms, $SD = 56$ ms) than non-matching ($M = 738$ ms, $SD = 56$ ms) trials.

A multilevel logistic regression analysis on the accuracy of responses yielded a main effect of Trial Type (b = .170, SE = .050, z = 3.40, p < .001) and significant Condition X Trial Type (b = .162, SE = .070, z = 2.32, p = .020) and Condition X Identity-Relevance X Trial Type (b = .260, SE = .085, z = 3.05, p = .002) interactions. To further explore the 3-way interaction, separate Identity-Relevance X Trial Type analyses were conducted for responses in the experimental and control conditions (see Figure 2 Panel B). In the experimental condition, this revealed a main effect of Trial Type (b = .333, SE = .048, z = 6.86, p < .001) and an Identity-Relevance X Trial Type (b = .320, SE = .059, z = 5.39, p < .001) interaction. On matching trials, a simple main effect of Identity-Relevance indicated that responses were more accurate for stimuli that were high than medium or low in personal importance (b = .277, SE = .043, z = 6.43, p < .001). No differences were observed on non-matching trials. In the control condition, the analysis yielded only an effect of Trial Type (b = .170, SE = .050, z = 3.39, p < .001), such that accuracy was greater on matching (M = 80%, SD = 12%) than non-matching (M = 77%, SD = 12%) trials.[3]

[3]An Order X Trial Type multilevel model analysis was conducted to establish if the sequence in which items were generated influenced task performance. As in Experiment 1, this analysis yielded only an effect of Trial Type on RTs (b = -.030, SE = .002, t = -18.98, p < .001) and accuracy (b = .164, SE = .024, z = 6.79, p < .001).

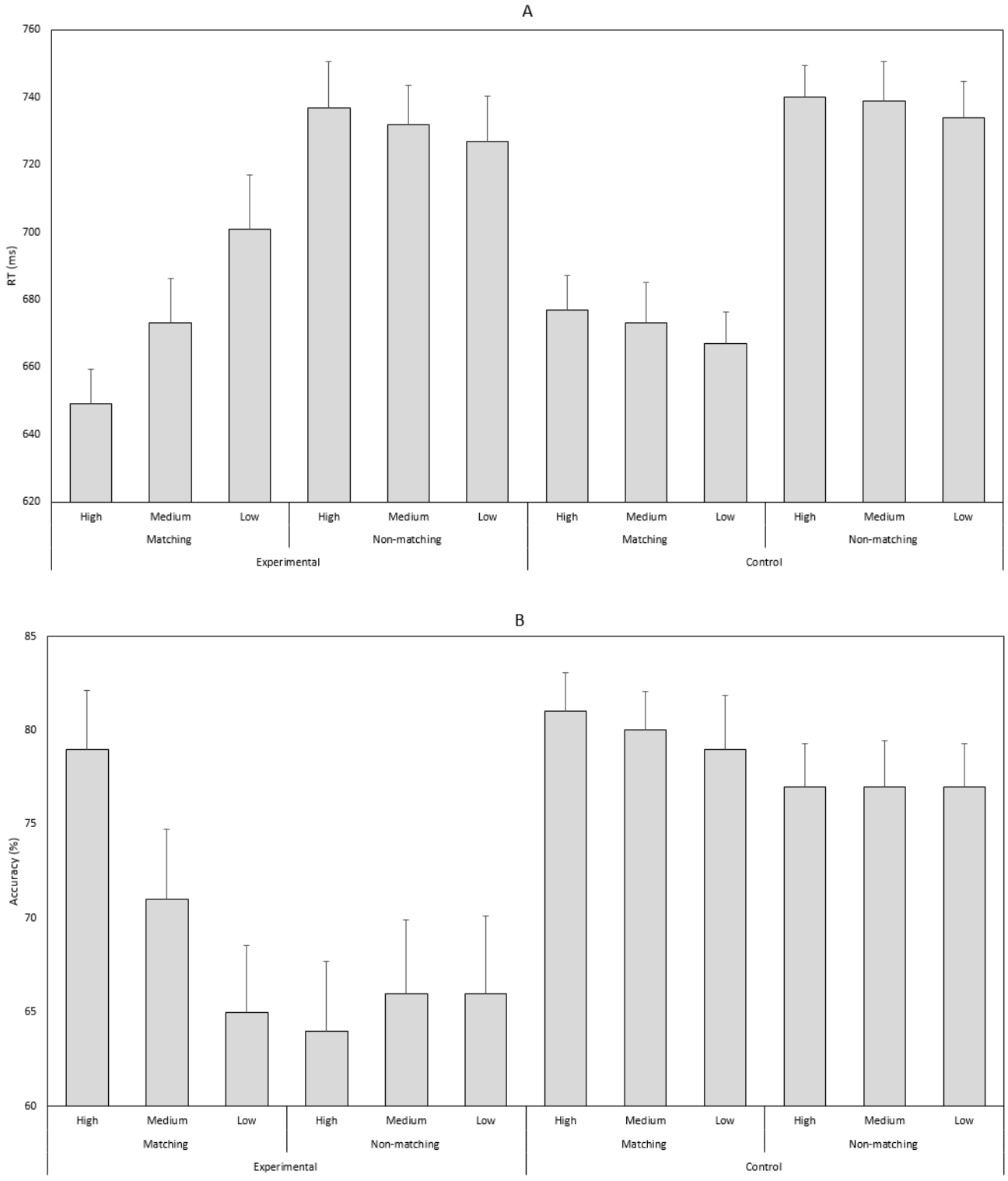

Figure 2. Mean reaction time (RT; Panel A) and accuracy (Panel B) as a function of condition, identity-relevance and trial type (Expt. 2). Error bars represent +1 SEM.

Replicating and extending Experiment 1, these results provide further evidence that identity-relevance modulates self-prioritization during decisional processing (Oyserman, 2007, 2009; Oyserman & Destin, 2010). Specifically, on matching trials, responses were faster and more accurate when shapes were paired with identity-related information that was consequential (vs. inconsequential) to participants (i.e., experimental condition). Unlike Experiment 1, however, differences were also observed on non-matching trials, notably responses were slower when shapes were high than medium or low in identity-relevance. Although unexpected, this effect is consistent with a couple of studies in which self-relevance has been shown to impede performance for non-matching stimuli (Enock et al., 2018, Expt. 2; Payne, Tsakiris, Maister, 2017, Expt. 1). As in Experiment 1, when the shape-label associations were irrelevant to participants (i.e., yoked-control condition), responses were faster and more accurate on matching than non-matching trials.

4. Experiment 3: How Does Identity-Relevance Influence Self-Prioritization?

Thus far, Experiments 1 and 2 have demonstrated that identity-relevance influences the emergence of the self-prioritization effect during decisional processing (Humphreys & Sui, 2016; Sui & Humphreys, 2015). Whether manipulated at the level of group memberships (Expt. 1) or personality traits (Expt. 2), self-prioritization was most pronounced when shapes were paired with aspects of the self that were high (vs. medium or low) in identity-relevance (Chen et al., 2016; Oyserman, 2007, 2009; Oyserman & Destin, 2010). What is not yet known, however, is the underlying origin of this effect. Specifically, through which cognitive pathway does stimulus relevance facilitate task performance? This important process-related question remains a topic of continued debate in work on this topic (e.g., Constable et al., 2019; Golubickis et al., 2018; Reuther & Chakravarthi, 2017; Sui et al., 2012, 2014). According to the Self-Attention Network (SAN) model, self-relevance influences the perceptual operations that underpin decision-making (Humphreys & Sui, 2016; Sui & Humphreys, 2015). In the current experimental context, this suggests that stimulus relevance should influence the

efficiency of visual processing operations, such as the rate of information uptake (i.e., evidence gathering). That is, a bias in the efficiency of stimulus processing underpins the effect of stimulus relevance on task performance (White & Poldrack, 2014). Interestingly, the theory of Identity-Based Motivation advances a similar prediction, with identity-relevance believed to impact perceptual/attentional operations during stimulus appraisal (Oyserman, 2007, 2009).

It is possible, however, that stimulus relevance may influence other aspects of decisional processing, notably response-related operations (Ditto & Lopez, 1992). For example, performance may be impacted by an asymmetry in the amount of evidence that is required to make a judgment, such that less information is needed for responses to stimuli that are high (vs. medium or low) in personal importance (Golubickis et al., 2018, 2019). In other words, a bias in information-sampling requirements underpins the effect of stimulus relevance on task performance (White & Poldrack, 2014). Given these competing possibilities, the ability to decompose decision-making and isolate the specific pathway (or pathways) through which stimulus relevance influences task performance is of considerable theoretical importance. Crucially, in the context of binary decision tasks, the drift-diffusion model affords just such an opportunity (Ratcliff, 1978; Ratcliff & Rouder, 1998; Ratcliff, Smith, Brown, & McKoon, 2016; Voss, Nagler, & Lerche, 2013; Voss, Voss, & Lerche, 2015). The advantage of this analytic approach resides in the ability of the model to distinguish between biases in stimulus and response-related processes. In the drift diffusion framework these biases are conceptually distinct, with different underlying origins and theoretical interpretations (Ratcliff et al., 2016; White & Poldrack, 2014).

During binary decision-making (e.g., does a shape-label stimulus pair match or mismatch a previously learned association?), information is continuously accumulated from a stimulus until sufficient evidence is acquired to make a response. In terms of underlying cognitive operations, drift rate (v) estimates the speed and quality of evidence gathering (i.e., larger drift rate = faster information uptake), thus is interpreted as a measure of the efficiency of visual processing during decision-making.

Estimates of drift rate are important in the current investigation given the contention that personally important inputs are enhanced during stimulus appraisal (Coleman & Williams, 2015; Dunning & Balcetis, 2013; Sui et al., 2012; Oyserman, 2007). What this implies is that, during decisional processing, drift rates should be larger for stimuli associated with consequential compared to inconsequential identity-related information (i.e., the quality/efficiency of evidence gathering varies as a function of identity-relevance). Threshold separation (a) estimates the distance between the two decisional boundaries, thus indicates how much evidence is considered before a judgment is made (i.e., larger (smaller) values indicate more conservative (liberal) responding). The starting point (z) defines the position between the response thresholds (a) at which information accumulation begins. If z (ranging from 0 to 1) is not centered between the thresholds ($z = .5$), this indicates an a priori bias in favor of the response closer to the starting point (i.e., less evidence is required to reach the preferred threshold). In the current investigation, it is possible that less evidence may be required when responding to stimuli paired with consequential versus inconsequential identity-related information (i.e., information-sampling requirements vary as a function of identity-relevance). Finally, the duration of all non-decisional processes is given by the additional parameter t_0, which is taken to indicate differences in stimulus encoding and response execution.

As these parameters reveal, drift-diffusion modeling is useful as it can identify the pathway(s) through which stimulus relevance influences self-prioritization during perceptual decision-making (Golubickis et al., 2018, 2019; Macrae et al., 2017). Accordingly, a hierarchical drift diffusion model (HDDM) analysis will be used to interrogate the current data (Wiecki, Sofer, & Frank, 2013). To elucidate the operations through which identity-relevance impacts stimulus prioritization, we modified the perceptual-matching task used previously (Expts. 1 & 2). Participants first associated identity-related information (i.e., personality traits) with geometric shapes (e.g., circle, square, triangle), then judged whether a subsequent series of shape-identity pairings matched or mismatched the previously learned associations. On this occasion, however, the shape-identity pairings were presented

sequentially (i.e., shape first or label first) during the perceptual-matching task (Moradi et al., 2015; Sui et al., 2014). This methodology was adopted for a couple of reasons. First, it enabled optimal estimation of the extent to which the effects of identity-relevance on self-prioritization were underpinned by differences in processing efficiency and/or information sampling requirements (i.e., prior presentation of the stimuli may (or may not) shift the starting point toward the upper or lower response boundary). Second, it revealed whether shapes or labels provided better access to the event files (i.e., shape-label associations) that drive self-prioritization (Hommel, 2004).

4.1. Method

4.1.1. Participants and Design

Thirty undergraduates (10 males, M_{age} = 21.10, SD = 2.51) took part in the research.[4] All participants had normal or corrected-to-normal visual acuity. One participant (female) failed to follow the instructions by responding with invalid key presses, thus was excluded from the analyses. Informed consent was obtained from participants prior to the commencement of the experiment and the protocol was reviewed and approved by the Ethics Committee at the School of Psychology, University of Aberdeen, Scotland. The experiment had a 3 (Identity-Relevance: high vs. medium vs. low) X 2 (Stimulus Order: shape-first vs. label-first) X 2 (Trial Type: matching vs. non-matching) repeated-measures design.

4.1.2. Stimulus Materials and Procedure

Participants arrived at the laboratory individually, were greeted by an experimenter, and told they would be performing a decision-making task. The study closely followed Experiment 2, but with

[4] Based on related research (Coleman & Williams, 2015; Golubickis et al., 2018; Sui et al., 2012), G*Power (η_p^2 = .25, α = .05, power = 95%) revealed a requirement of 26 participants. An additional ~10% were recruited to allow for drop out.

a couple of modifications (see Supplementary Material for details of the traits generated by participants). First, as responses in Experiments 1 and 2 were unaffected by identity-relevance in the yoked-control condition, this condition was dropped in the current study. Second, on this occasion, stimuli were presented sequentially during the perceptual-matching task (Moradi et al., 2015; Sui et al., 2014). Whereas on half the trials, the geometric shape preceded the verbal label (i.e., shape-then-trait), on the remaining trials the order of stimuli was reversed (i.e., trait-then-shape). A trial commenced with a central fixation cross for 500 ms, followed by centrally presented shape (or label) which remained on screen for 100 ms, followed by a label (or shape) appeared centrally for 100 ms. On completion of the perceptual-matching task and manipulation check, participants were debriefed, thanked, and dismissed.

4.2. Results and Discussion

4.2.1. Trait Importance

A single factor (Identity-Relevance: high or medium or low) repeated-measures ANOVA confirmed differences in the importance of the selected traits [$F(2, 56) = 429.3$, $p < .001$, $\eta_p^2 = .94$], such that high-relevance traits ($M = 13.93$, $SD = 1.33$) were rated as more important than medium-relevance traits ($M = 9.24$, $SD = 1.53$, $t(28) = 16.18$, $p < .001$, $d = 3.01$, 95% CI = [4.10, 5.28]), and medium-relevance traits were more important than low-relevance traits ($M = 3.72$, $SD = 2.02$, $t(28) = 16.64$, $p < .001$, $d = 3.09$, 95% CI = [4.84, 6.20]).

4.2.2. Perceptual-Matching Task

Responses faster than 200 ms were excluded from the analysis, eliminating less than 1% of the overall number of trials. A multilevel model analysis of the RTs yielded a main effect of Identity-Relevance ($b = -.009$, $SE = .001$, $t = -6.23$, $p < .001$), such that responses were faster for stimuli that

were high (M = 639 ms, SD = 69 ms) than medium (M = 652 ms, SD = 69 ms) or low (M = 654 ms, SD = 71 ms) in personal relevance. In addition, main effects of Stimulus Order (b = -.007, SE = .001, t = -6.40, p < .001) and Trial Type (b = -.031, SE = .001, t = -27.45, p < .001) revealed that responses were faster when the initial stimulus was a shape (M = 640 ms, SD = 71 ms) than a label (M = 655 ms, SD = 68 ms) and during matching (M = 618 ms, SD = 77 ms) than non-matching (M = 677 ms, SD = 62 ms) trials. Finally, a significant Identity-Relevance X Trial Type interaction (b = -.004, SE = .001, t = -2.94, p = .003) was also observed (see Figure 3 Panel A). Further analysis of the interaction revealed that, on matching trials, RTs decreased as a function of increasing identity-relevance (b = -.013, SE = .002, t = -6.46, p < .001). On non-matching trials, a similar effect was observed (b = -.005, SE = .002, t = -2.33, p = .020).

A multilevel logistic regression analysis on the accuracy of responses yielded a main effect of Identity-Relevance (b = .127, SE = .028, z = 4.47, p < .001), such that accuracy was greater for stimuli that were high (M = 88%, SD = 10%) than medium (M = 84%, SD = 13%) or low (M = 85%, SD = 9%) in personal relevance. In addition, a significant Identity-Relevance X Trial Type interaction (b = .065, SE = .028, z = 2.31, p = .021) was also observed (see Figure 3 Panel B). Further analysis of the interaction revealed that, on matching trials, accuracy improved as a function of increasing identity-relevance (b = .193, SE = .040, z = 4.87, p < .001). No such effect emerged on non-matching trials (b = .061, SE = .040, z = 1.51, p = .131).[5]

[5] As in Experiments 1 and 2, an Order X Trial Type multilevel model analysis was conducted to establish if the sequence in which items were generated influenced task performance. This analysis yielded only an effect of Trial Type on RTs (b = -.003, SE = .001, t = -27.40, p < .001).

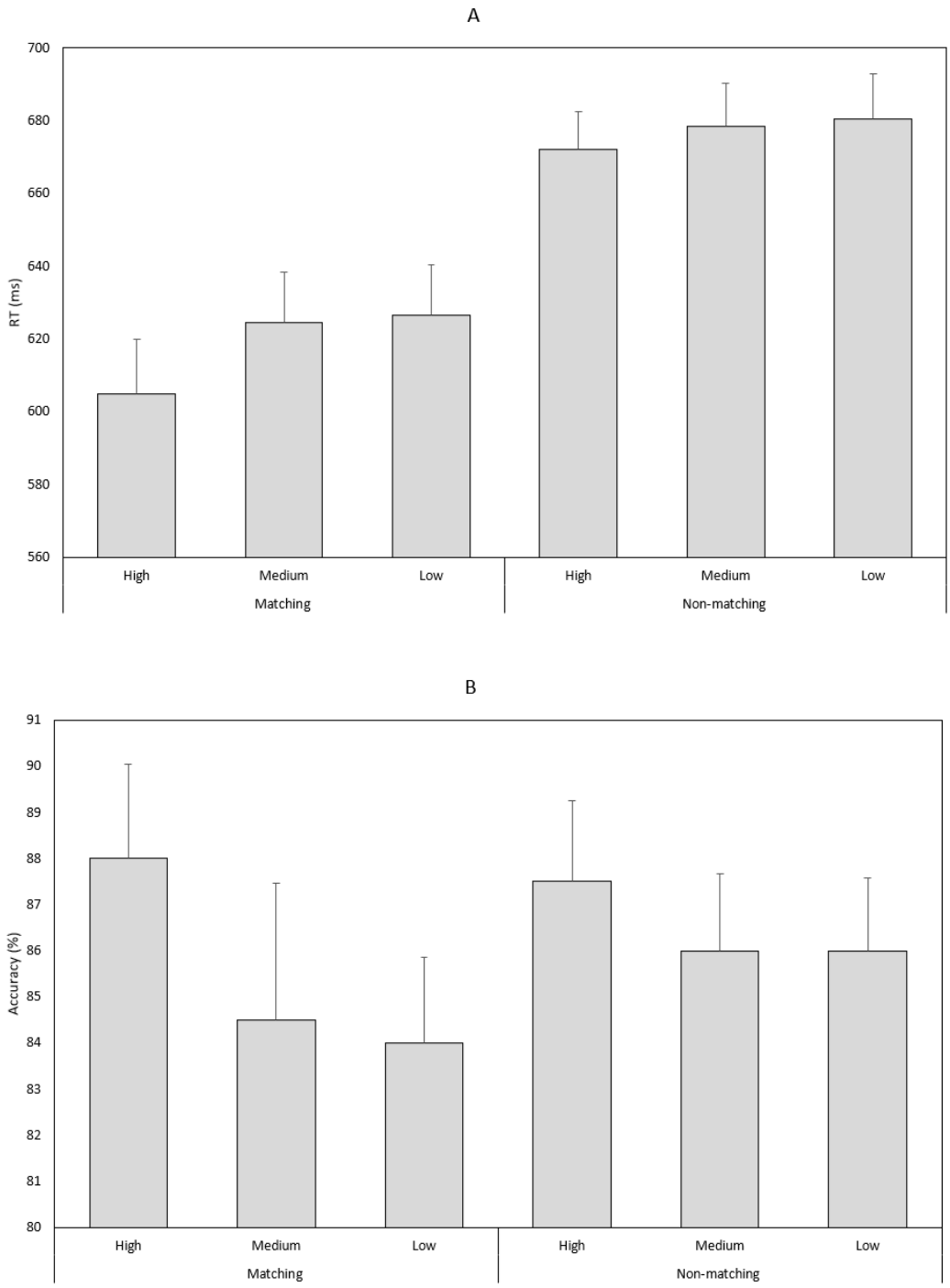

Figure 3. Mean reaction times (RT; Panel A) and accuracy (Panel B) as a function of identity-relevance and trial type (Expt. 3). Error bars represent +1 SEM.

4.2.3. Diffusion Modelling

To further explore task performance, data were submitted to an HDDM analysis. HDDM is an open-source software package written in Python for the hierarchical Bayesian estimation of drift diffusion model parameters (Wiecki et al., 2013). This approach assumes that the model parameters for individual participants are random samples drawn from group-level distributions and uses Bayesian statistical methods to estimate all parameters at both the group- and individual-participant level (Vandekerckhove, Tuerlinckx, & Lee, 2011). An HDDM approach has several advantages over a traditional analysis of mean RT and accuracy (Ratcliff, 1978; Ratcliff & McKoon, 2008; Voss et al., 2013; Wagenmakers, 2009). First, in modeling task performance, the analysis is able to account for changes in both RT and accuracy simultaneously. Second, the model considers the entire RT distribution for both correct and incorrect responses. Third, the model allows estimation of the latent psychological processes (i.e., stimulus and response biases) that underpin task performance.

Models were response coded, such that the upper threshold corresponded to a matching response and the lower threshold to a non-matching response (Golubickis et al., 2017). Twelve models were estimated for comparison to establish which parametrization of our experimental conditions best fit the observed data (see Table 4). First, we investigated whether a bias in the starting point (z) of evidence accumulation between matching and non-matching responses — with four combinations of drift rate (v) varying across experimental conditions — could fit the data (models 1-4). Second, we examined whether identity-relevance shifted the starting point of evidence accumulation towards either matching or non-matching responses. This was also estimated with four combinations of drift rate varying across experimental conditions (models 5-8). Third, we examined whether stimulus order (i.e., shape-first or label-first) with four combinations of drift rate varying across conditions could explain the data (see models 9-12). Bayesian posterior distributions for each parameter were modeled using a Markov Chain Monte Carlo (MCMC) with 10,000 samples (following 1,000 burn in samples). Outliers (5% of trials) were removed by the HDDM software (Ratcliff & Tuerlinckx, 2002).

As can be seen in Table 1, model 11 yielded the best fit (i.e., smallest Deviance Information Criterion (DIC) value). The DIC was adopted as it is routinely used for hierarchical Bayesian model comparison (Spiegelhalter, Best, Carlin, & van der Linde, 1998). As diffusion models were fit hierarchically rather than individually for each participant, a single value was calculated for each model that reflected the overall fit to the data at the participant- and group-level. Lower DIC values favour models with the highest likelihood and least number of parameters. To further evaluate the best fitting model, a standard model comparison procedure used in Bayesian parameter estimation — Posterior Predictive Check (PPC) — was performed (Wiecki et al., 2013). For model 11, the posterior distributions of the estimated parameters were used to simulate data sets. We then assessed the quality of model fit by plotting the observed data against the simulated data for the .1, .3, .5, .7, and .9 response-time quantiles for each experimental condition (Krypotos, Beckers, Kindt, & Wagenmakers, 2015). This revealed good model fit (see Supplementary Material for associated plots).

Table 1. Deviance Information Criterion (DIC) for each model.

Model	Trial Type	Identity-Relevance	Stimulus Order	DIC
1.	*z*	-	-	-843
2.	*z*	*v*	-	-1370
3.	*z, v*	*v*	-	-2510
4.	*z, v*	*v*	*v*	-2158
5.	*z*	*z*	-	-1357
6.	*z*	*z, v*	-	-1932
7.	*z, v*	*z, v*	-	-2563
8.	*z, v*	*z, v*	*v*	-2500
9.	*z*	-	*z*	-869
10.	*z*	*v*	*z*	-1408
11.	*z, v*	*v*	*z*	-2574
12.	*z, v*	*v*	*z, v*	-2343

Note. *z* = starting point, *v* = drift rate. A DIC difference of 10 is strong evidence for a model (Kass & Raftery, 1995). In models 1, 5, & 9 the drift rate is fixed across conditions (i.e., a single *v* is estimated).

Interrogation of the posterior distributions (see Table 2) revealed that, on matching trials, there was moderate evidence that information accumulation (i.e., drift rate) was faster when stimuli were high than medium in identity-relevance (p_{Bayes}[high > medium] = .10) and strong evidence that information uptake was faster when stimuli were high than low in identity-relevance (p_{Bayes}[high > low] = .027)[6]. In addition, there was suggestive evidence that information uptake was faster when stimuli were medium compared to low in identity-relevance (p_{Bayes}[medium > low] = .250). No such differences were observed on non-matching trials. Comparison of the observed starting values (*z*) with

[6] Bayesian *p* values quantify the degree to which the difference in the posterior distribution is consistent with the hypothesis under consideration. For example, a Bayesian *p* of .10 indicates that 90% of the posterior distribution supports the hypothesis.

no bias (z = .50) indicated extremely strong evidence of a prior bias toward matching judgments (vs. non-matching) in both stimulus-order blocks (i.e., shape-first, M = .64, p_{Bayes}[bias > 0.50] < .001; label-first, M = .62, p_{Bayes}[bias > 0.50] < .001). Also, there was strong evidence that less information was required (i.e., the starting value was larger) when the initial stimulus was a shape than a label (p_{Bayes}[shape > label] = .019).

Table 2. Parameter means and the upper (97.5q) and lower (2.5q) quantiles of the best fitting model (Expt. 3)

		Quantile	
Diffusion Model Parameter	Mean	2.5q	97.5q
$v_{high\ matching}$	3.107	2.726	3.459
$v_{medium\ matching}$	2.766	2.387	3.122
$v_{low\ matching}$	2.577	2.199	2.967
$v_{high\ non\text{-}matching}$	-2.316	-2.678	-1.939
$v_{medium\ non\text{-}matching}$	-2.191	-2.574	-1.822
$v_{low\ non\text{-}matching}$	-2.211	-2.576	-1.802
$z_{shape\text{-}first}$	0.642	0.629	0.657
$z_{label\text{-}first}$	0.622	0.609	0.632

Replicating Experiments 1 and 2, the current results corroborated the effects of identity-relevance on self-prioritization (Oyserman, 2007, 2009). Using a modified paradigm, on both matching and non-matching trials, responses were faster when stimuli were associated with consequential compared to inconsequential identity-related information (Humphreys & Sui, 2016; Sui

& Humphreys, 2015). In addition, on matching trials, accuracy improved as a function of increasing identity-relevance. Importantly, a drift-diffusion modeling analysis identified the origin of self-prioritization (Golubickis et al., 2018; White & Poldrack, 2014; Wiecki et al., 2013). During decisional processing, evidence was accumulated more efficiently when stimuli were associated with aspects of the self that were high than both medium and low in personal relevance. Finally, the HDDM analysis also revealed a confirmatory bias during decisional processing, such that less evidence was required to generate matching than non-matching responses (Gilbert, 1991; Rajsic, Taylor, & Pratt, 2017), an effect that was larger when shapes preceded labels than vice versa. This latter finding demonstrates that, in the context of a perceptual-matching task, geometric shapes serve as a stronger trigger than personality characteristics for the event files (i.e., shape-label associations) that support task performance (Hommel, 2004).

5. General Discussion

A rapidly expanding literature has revealed a pervasive bias for self-relevant stimuli during decision-making (Humphreys & Sui, 2016; Sui & Humphreys, 2015). Following association with the self (vs. friend or stranger), otherwise meaningless geometric shapes are processed with enhanced speed and accuracy. Exploring this effect in greater detail, here we considered the possibility that self-prioritization is sensitive to identity-relevance — specifically, the aspects of the self with which geometric shapes have been associated (Chen et al., 2016; Oyserman, 2007, 2009). Across three experiments, on shape-label matching trials, a consistent finding emerged. Stimulus enhancement was most pronounced when shapes were paired with identity-related information that was high (vs. medium & low) in personal relevance, an effect that emerged when this information pertained both to the groups to which participants belonged (Expt. 1) and the traits they possessed (Expts. 2 & 3). On shape-label non-matching trials, in contrast, an inconsistent pattern of results was observed.

Specifically, a self-prioritization effect emerged in only one of the reported experiments (i.e., Expt. 3), with self-relevance impairing performance in another study (i.e., Expt. 2; see also Payne et al., 2017). In this respect, the current work corresponds with previous studies that have failed to yield a consistent stimulus prioritization effect in the non-matching condition (e.g., Enock et al., 2018; Frings & Wentura, 2014; Reuther & Chakravarthi, 2017; Schäfer et al., 2015; Schäfer, Frings, & Wentura, 2016; Sui et al., 2012). To account for this failure, Woźniak and Knoblich (2019) have speculated that self-prioritization for novel stimuli (e.g., geometric shapes) is a weak effect that is easily eliminated in tasks requiring increased cognitive effort, such as detecting non-matching stimulus pairs.

Inspection of Figures 1 and 2 (i.e., Experiments 1 & 2) yields an interesting observation. Compared to performance in the control condition on shape-label matching trials, accuracy was impaired as a function of self-relevance, at least for items (i.e., identities & traits) that were medium or low in personal importance. Quite why this was so is uncertain. One possible explanation may reside in the differential familiarity of the labels (i.e., letter cues) that were used (Schäfer, Wentura, & Frings, 2017; Wade & Vickery, 2017). Elsewhere, it has been shown that self-prioritization is reduced when labels are presented in a foreign language (Ivaz, Costa, & Duñabeitia, 2016; Ivaz, Griffin, & Duñabeitia, 2019), thereby indicating that the familiarity of self-relevant stimuli impacts perceptual matching. In a task context in which participants are presented with multiple self-relevant cues that vary in familiarity — as was potentially the case in Experiments 1 and 2 — it is therefore conceivable that visual attention prioritizes information as a function of its relative salience (i.e., items low in identity-relevance are processed least effectively). Alternatively, the differential accessibility of shape-label associations in working memory may provide another pathway through which accuracy is impaired for self-relevant stimuli (Janczyk, Humphreys, & Sui, 2019; Reuther & Chakravarthi, 2017). A useful way to explore this issue further would be to consider the effects of identity-relevance (vs. identity-irrelevance) on the accuracy of perceptual matching using fully unfamiliar stimuli (Woźniak & Knoblich, 2019).

5.1. The Self and Decisional Processing

In highlighting the effects of identity-relevance on self-prioritization, the current research extends prior work on this topic (Humphreys & Sui, 2016; Sui & Humphreys, 2015, 2017; Sui & Rothstein, 2019). Most notably, here we demonstrated the effects of stimulus relevance on perceptual matching (Enock et al., 2018; Golubickis et al., 2017; Moradi et al., 2015, 2017). In so doing, these findings resonate closely with related research documenting how components of the self-concept modulate thinking and doing (McConnell, 2011; McConnell et al., 2012; Oyserman, 2007, 2009). Driving this line of inquiry is the assumption that only knowledge associated with contextually-relevant components of the self is activated (and applied) during social-cognitive functioning (e.g., Barden, Maddux, Petty, & Brewer, 2004; Biernat & Vescio, 1993; Casper, Rothermund, & Wentura, 2010, 2011; Hugenberg & Bodenhausen, 2004; Macrae, Bodenhausen, & Milne, 1995; Mendoza-Denton, Park, & O'Connor, 2008; Quinn & Macrae, 2005; Sinclair & Kunda, 1999; Wittenbrink, Judd, & Park, 2001). For example, Hugenberg and Bodenhausen (2004) showed that information pertaining to membership in a sorority was only accessible following activation of the specific component of the self. Similarly, the accessibility of idiosyncratic (i.e., non-group related) attributes only benefits from the targeted activation of people's self-concept (Brown & McConnell, 2009; McConnell, Rydell, & Brown, 2009).

Extending previous work on self-referential processing, here we identified the cognitive pathway through which stimulus relevance impacts the emergence of the self-prioritization effect during a perceptual-matching task (Moradi et al., 2015, 2017). Previously, it has been suggested that self-prioritization is underpinned by differences in the efficiency of visual processing (Humphreys & Sui, 2016; Sui & Humphreys, 2015, 2017). Noting that perception can be modified by characteristics of the observer (e.g., beliefs, goals, expectations), self-relevance has been argued to exert a similar effect on stimulus processing (Sui et al., 2012, 2014). As it turns out, however, evidence for this viewpoint is limited, with several researchers questioning whether self-prioritization is a perceptual

phenomenon at all (Constable et al., 2019; Golubickis et al., 2018, 2019; Reuther & Chakravarthi, 2017; Stein, Siebold, & van Zoest, 2016). Here, at least in the context of the operations underpinning decisional processing, we observed evidence for just such an effect (see also Golubickis et al., 2017). Specifically, an HDDM analysis revealed that identity-relevance moderated the efficiency of visual processing, such that evidence extraction was faster when stimuli were associated with consequential compared to inconsequential identity-related information. Not only does this finding corroborate the contention that self-relevance influences the perceptual component of decisional processing (Sui & Humphreys, 2015, 2017), it also confirms a fundamental tenet of the theory of Identity-Based Motivation that personally meaningful information is preferentially processed during stimulus appraisal (Oyserman, 2007, 2009; Oyserman & Destin, 2010).

It is worth noting that self-prioritization can be underpinned by a quite different mechanism. Albeit in the context of an object-ownership task, Golubickis et al. (2018, 2019) demonstrated that self-other differences in stimulus prioritization originated in a response bias (i.e., starting point of evidence gathering), such that less evidence was required to respond to items owned by the self than to comparable items owned by either a friend or stranger. What this therefore suggests is that, depending upon the manner in which self-referential processing is implemented, the self can influence decisional processing via quite distinct cognitive pathways (Ratcliff et al., 2016; Wagenmakers, 2009; White & Poldrack, 2014). Whereas information-sampling requirements underpin stimulus prioritization when the self is contrasted with other targets (e.g., friend/mother); comparison among elements of the self-concept influence decision-making through variation in the efficiency of visual processing. In other words, as a function of the task context and how the self is operationalized, self-relevance influences different aspects of decisional processing (Oyserman, 2007, 2009; Sui & Gu, 2017; Sui & Humphreys, 2017).

A longstanding debate has focused on the psychological standing of self-referential processing. For some researchers, the self has been accorded a special cognitive status, such that the processing of

self-relevant stimuli is distinct from other classes of information, including material pertaining to other people (e.g., Kelley et al., 2002; Kircher et al., 2000; Northoff & Bermpohl, 2004; Vogeley et al., 2001). For others, however, this claim is unwarranted (see Gillihan & Farah, 2005; Hommel, 2018). According to Hommel (2018), for example, "Representations of oneself and others do not seem to differ qualitatively from representations of other, non-social events" (p. 329). This latter viewpoint has interesting implications for the specificity of the self-prioritization effect. Put simply, in principle, comparable effects should be engendered by any class of stimuli. Corroborating this contention, Wade and Vickery (2017) recently demonstrated effects resembling self-prioritization by manipulating the concreteness of non-self-relevant labels. What this therefore suggests is that effects of the sort reported in the current investigation could potentially be generated by any categorical class of stimuli that vary in relevance/importance (hence accessibility) for people (Larochelle & Pineau, 1994). Take, for example, vegetables. If participants generated and then associated good (e.g., carrot), average (e.g., parsnip), and bad (e.g., rice) exemplars of the class with geometric shapes, it is possible that a vegetable-prioritization effect may emerge during perceptual matching, with responses speeded toward good (vs. bad) exemplar/geometric shape stimulus pairs. To extend the current inquiry and elucidate the specificity of self-prioritization effects, a useful task for future research will be to explore this possibility.

5.2. The Self-Concept and Stimulus Prioritization

Beyond manipulations of the importance of identity-related information, a multifaceted characterization of the self has implications for a range of everyday outcomes (McConnell, 2011; McConnell et al., 2012). In particular, people's general affective states (e.g., mood, self-esteem) are sensitive to the composition of the self-concept and which aspects of this representation are activated at any given moment. For example, individuals with a large number of positive self-aspects report higher levels of self-esteem and more positive moods than their counterparts with fewer such self-

related components (McConnell et al., 2009). Relatedly, activation of favorable (vs. unfavorable) self-aspects elevates self-esteem, which in turn influences people's evaluations of others (Harmon-Jones et al., 1997). A multifaceted characterization of the self also has prominent ramifications for goal pursuit and self-regulatory functioning (Oyserman et al., 2017). Specifically, if behavioral proclivities are represented in memory as core components of self-aspects, then one would expect contextual activation of these aspects to guide behavior in an identity-consistent manner (Higgins, 1997; McConnell, 2011). For example, depending upon which component of a person's self-concept has been activated (e.g., fitness fanatic vs. dessert aficionado), a common stimulus (e.g., crème brûlée) should trigger divergent behavioral outcomes (e.g., restraint vs. indulgence; see Spears, Gordijn, Dijksterhuis, & Stapel, 2004). Finally, given the relational character of self-knowledge (i.e., important others are connected to the self; e.g., Aron, Aron, & Smollan, 1992; Markus & Kitayama, 1991; Markus & Nurius, 1986), it is probable that significant others are accorded their own self-aspects in memory, thus are directly integrated within one's self-concept. As demonstrated herein, once activated, the identity-relevance of these self-aspects may determine how much influence is exerted on thinking and doing (McConnell, 2011; Oyserman, 2007, 2009).

The demonstration that identity-relevance influences self-prioritization sits comfortably with theoretical accounts of how the self regulates social-cognitive functioning (e.g., Conway, 2005; Conway & Pleydell-Pearce, 2000; Wheeler, DeMarree, & Petty, 2007). According to Conway and Pleydell-Pearce (2000), the active self comprises a temporary hierarchy of goal states in working memory that drive behavior from one moment to the next. Critically, this active (or working) self does not comprise a unitary, fixed construct, but rather whichever sub-components of the self are contextually relevant given the immediate task environment and prevailing processing objectives (Chen et al., 2016; McConnell, 2011; Oyserman, 2009). For example, when deciding on a new jogging route, one's athletic-identity would serve as a better processing guide than one's romantic-identity, unless of course one is running on a date. According to this viewpoint, perception shapes

performance as a function of how sensory inputs make contact with (and in turn modify) the active self, enabling components of the self to shift rapidly in response to external stimuli and changing goal states (Conway & Pleydell-Pearce, 2000; Wheeler et al., 2007). In this respect, multiple identities that vary in their degrees of 'me-ness' and causal significance across tasks and contexts provide the flexibility that optimal information processing demands (Chen et al., 2016; Oyserman, 2007, 2009).

Central to a coherent sense of self, people's identities extend well beyond the groups to which they belong and the personality characteristics they possess. Indeed, self-concepts comprise a complex fabric of interconnected identity-related material (Chen et al., 2016; McConnell, 2011; McConnell et al., 2012; Reed, Forehand, Putoni, & Warlop, 2012). For example, to highlight some of the most salient components, identities can be related to group memberships (e.g., woman, Buddhist), social roles (e.g., boss, aunt), interpersonal relationships (e.g., partner, friend), personality attributes (e.g., optimistic, flamboyant), affective states (e.g., happy, angry), and goal states (e.g., truth seeker, time waster), along with a host of less tangible (but nevertheless significant) representations (e.g., ideal self, future self). Whereas some of these identities are unchanging, others shift in accordance with situational demands and the temporary goals of the individual. Of interest, therefore, is the question of whether different identities (e.g., stable vs. transitory, real vs. hypothetical) exert comparable effects on stimulus processing. In particular, if the self serves to bolster the stability of its core components via enhanced stimulus processing (Oyserman, 2007, 2009), then one might expect this effect to be attenuated (or perhaps eliminated) when fleeting or imaginary personal identities are operating. An important task for future research will be to explore how different elements of the self-concept impact self-prioritization during decisional processing.

Consideration should also be given to the neuroanatomical structures through which stimulus relevance enhances processing. According to the SAN model (Humphreys & Sui, 2016; Sui & Humphreys, 2015), self-prioritization is supported by activity in regions of the brain associated with self-representation (i.e., vmPFC, Kelley et al., 2002; Mitchell, Macrae, & Banaji, 2006) and social

attention (i.e., pSTS, Allison, Puce, McCarthy, 2000; DiQuattro & Geng, 2011). For example, using the standard perceptual-matching paradigm, Sui, Rothstein, and Humphreys (2013b) reported that coupling strength between vmPFC and pSTS predicts the emergence of the self-prioritization effect in behavior. Of interest to the current investigation, whereas vmPFC was sensitive only to the presence of the self-label, both the self-associated shape and the self-label elicited activity in the pSTS. From these findings, Sui et al. (2013b) concluded that coupling between vmPFC and pSTS reflects a neural network that registers the social salience of a stimulus based on its self-relevance (see also Sui, Enock, Ralph, & Humphreys, 2015). Extending this account, the current results suggest that stimulus relevance may modulate activity in components of the SAN (Humphreys & Sui, 2016; Sui & Humphreys, 2015). In particular, as stimuli increase in personal significance (e.g., as a function of identity relevance), so too may activity in vmPFC (but see Schäfer & Frings, 2019). If operating, such an effect would underscore the dynamic and flexible character of self-referential processing in the brain.

6. Conclusion

Here we demonstrated an important determinant of self-prioritization during decision-making (Sui et al., 2012, 2014). Consistent with the theory of Identity-Based Motivation, processing was sensitive to identity-relevance, such that self-prioritization was most pronounced when stimuli were paired with identity-related information that was important (vs. trivial) to participants (Chen et al., 2016; Oyserman, 2007, 2009). This effect, moreover, was underpinned by differences in the efficiency of stimulus processing. During decision-making, evidence was extracted more rapidly from stimuli pertaining to consequential compared to inconsequential identity-related information. Thus, not only is self-prioritization modulated by between-target differences (e.g., self vs. stranger) in stimulus processing (Golubickis et al., 2018, 2019; Sui et al., 2012, 2014), so too it is sensitive, within persons, to the importance that material holds for participants (Enock et al., 2018; Golubickis et al., 2017;

Moradi et al., 2015, 2017). Whether comparable effects extend to other aspects of the self-concept and how stimulus relevance modulates activity in the cortical regions that support self-referential processing (Sui & Gu, 2017; Sui & Humphreys, 2015, 2017; Truong & Todd, 2017), however, has yet to be established. Resolving these issues will further explicate the extent and origin of self-prioritization during decision-making.

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Supplementary Material

Experiment 1

	Identity-Relevance		
Group Type	High	Med	Low
personal	46%	61%	43%
social	54%	39%	57%
Total	**100%**	**100%**	**100%**

Table S1. Percentage of identity-relevant groups generated by participants (Expt. 1). Personal groups pertained to hobbies, pastimes, and family/friends (e.g., rower, daughter), social groups to broader categories (e.g., German, female).

Experiment 2

	Identity-Relevance		
OCEAN Dimension	High	Med	Low
openness to experience	7%	19%	28%
conscientiousness	19%	19%	19%
extraversion	12%	34%	31%
agreeableness	62%	28%	22%
Total	**100%**	**100%**	**100%**

Note. Traits classified according to the Big-Five trait taxonomy (John & Srivastava, 1999). No traits were associated with neuroticism.

Table S2. Percentage of identity-relevant traits generated by participants (Expt. 2).

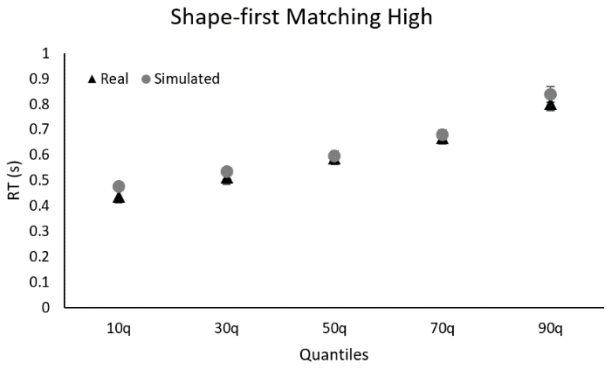
Experiment 3

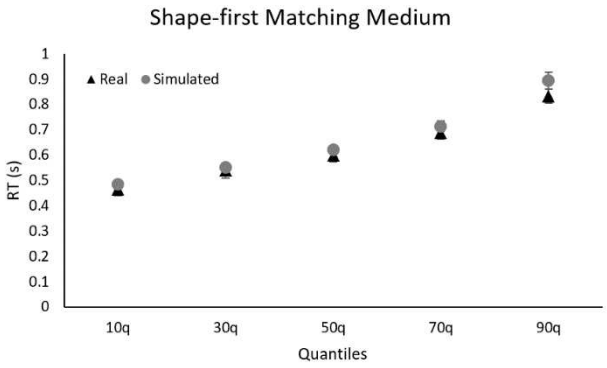
	Identity-Relevance		
OCEAN Dimension	High	Med	Low
openness to experience	10%	24%	10%
conscientiousness	21%	21%	31%
extraversion	14%	21%	35%
agreeableness	55%	27%	7%
neuroticism	0%	7%	17%
Total	**100%**	**100%**	**100%**

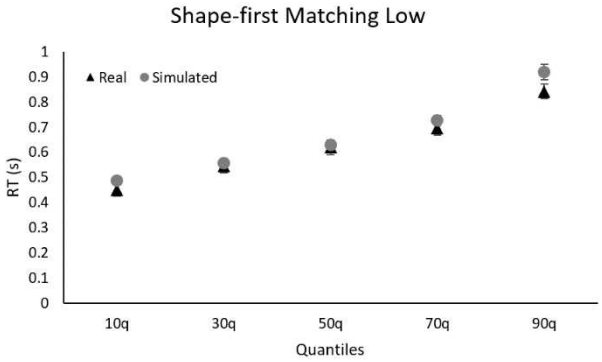
Note. Traits classified according to the Big-Five trait taxonomy (John & Srivastava, 1999).

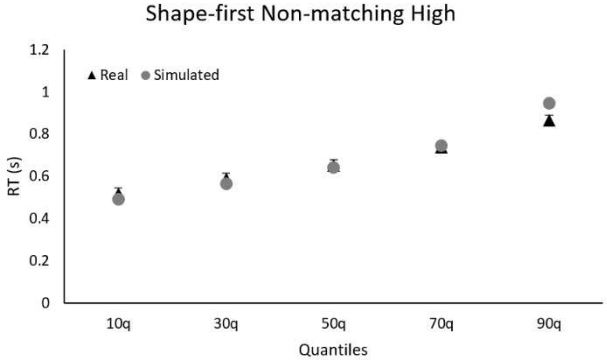
Table S3. Percentage of identity-relevant traits generated by participants (Expt. 3).

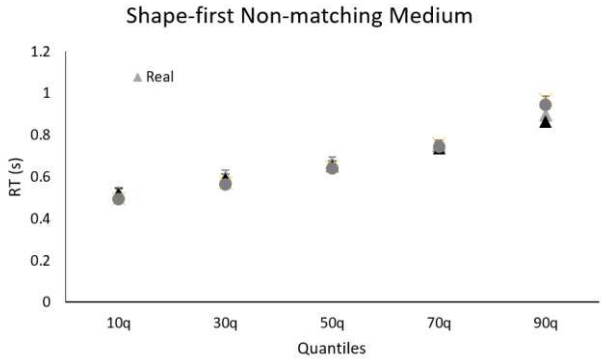
Experiment 3: Posterior Predictive Check

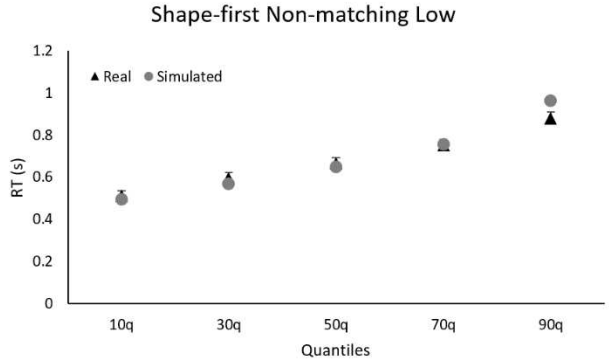


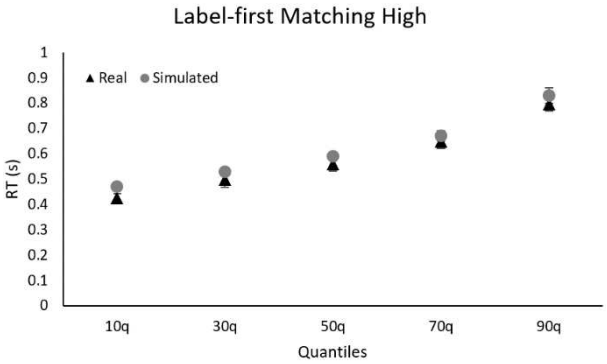


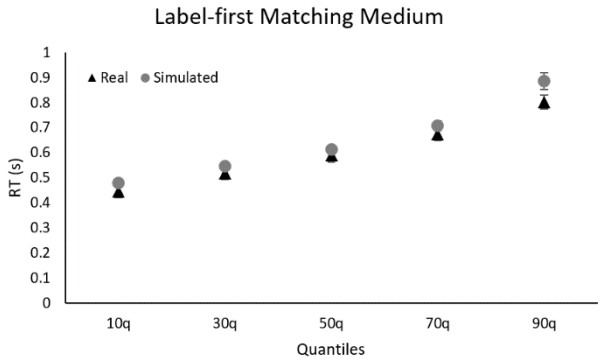












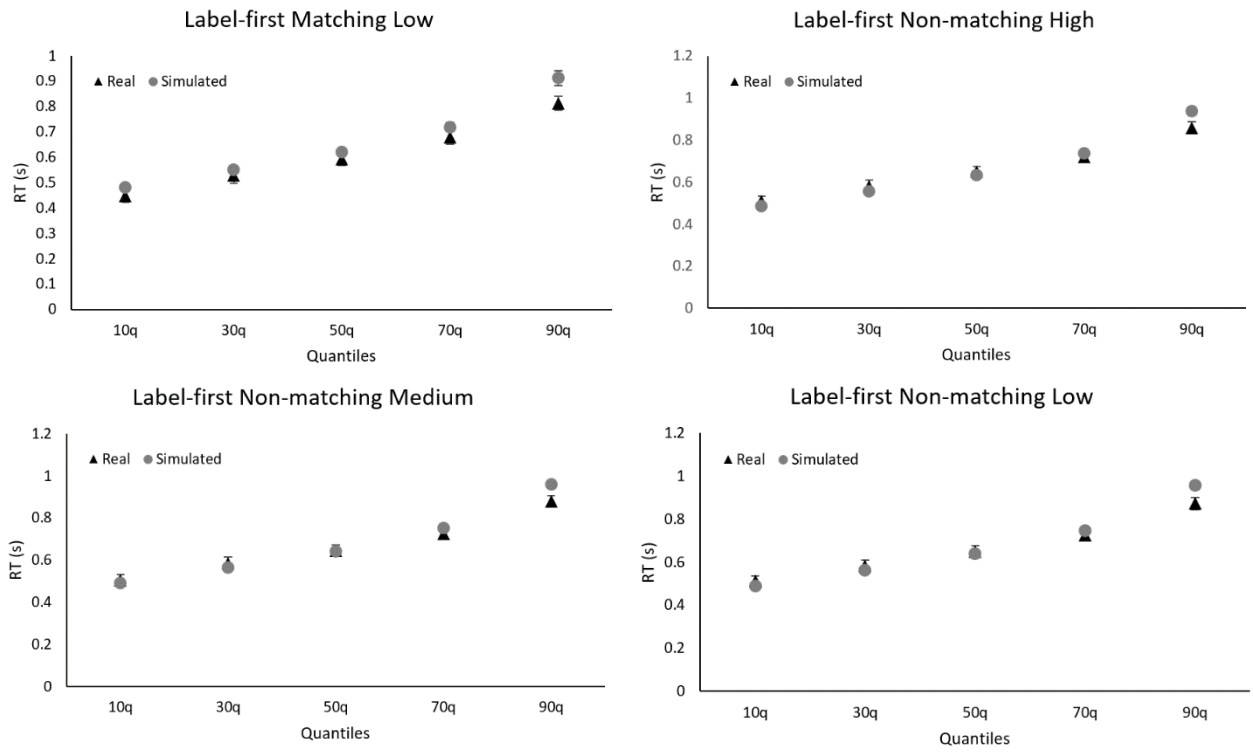


Figure S1. Comparison of simulated data generated by the best fitting model and the observed data for each experimental condition for the .1, .3, .5, .7, .9 RT quantiles. Error bars represent standard error of the means (Experiment 3).

Supplementary References

John, O. P., & Srivastava, S. (1999). The Big-Five trait taxonomy: History, measurement, and theoretical perspectives. In L.A. Pervin & O.P. John (Eds.), *Handbook of Personality: Theory and Research* (2nd ed., pp. 102-138). New York: Guilford Press.