BIASED ATTENTION ORIENTING TO THE SELF-FACE DURING AN ATTENTION CAPTURE TASK
AN HONORS THESIS
SUBMITTED ON THE FIFTH DAY OF MAY, 2023
TO THE DEPARTMENT OF PSYCHOLOGY
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
OF THE HONORS PROGRAM
OF NEWCOMB-TULANE COLLEGE
TULANE UNIVERSITY
FOR THE DEGREE OF
BACHELOR OF SCIENCE
WITH HONORS IN PSYCHOLOGY
BY

Anna Wood

APPROVED:

Julie Markant, Ph.D.
Director of Thesis

Carrie Wyland, Ph.D.
Second Reader

Matthew Sumpter, Ph.D.
Third Reader
Humans exhibit biased attention orienting to faces and have a hard time ignoring faces that appear in attention tasks (Beindemann et al., 2005; Cerf et al., 2009; Riby et al., 2012; Theeuwes & Van der Stigchel, 2006; Vuilleumier, 2000). Past research suggests that one’s own face, the self-face, prompts enhanced processing biases compared to faces of strangers and familiar others because the self-face may be even more unique and meaningful than others’ faces (Brédart et al., 2006; Devue et al., 2009; Devue & Brédart, 2008). However, it is still unknown how the self-face may capture attention compared to other faces when multiple competing stimuli are present. Consequently, adults’ automatic orienting biases to the self-face compared to faces in general in complex environments is unknown. In addition, the mechanisms underlying enhanced processing of the self-face remain unclear, as researchers have argued that it may reflect motivational salience of the self-face (Bola et al., 2021; Ota & Nakano, 2021), familiarity of the self-face (Brédart et al., 2016; Jublie & Kumar, 2021; Liu et al., 2016), or positive self-evaluation (Ma & Han, 2010; Ma & Han, 2012). The current study addresses these gaps by examining adults’ automatic attention capture by the self-face versus familiar faces and stranger faces. We used an attention capture task to determine whether the presence of the self-face interferes with target detection more than the presence of a familiar face or stranger’s face. We also examined links between participants’ social anxiety and individual differences in attention capture by the self-face to extend past research showing that
positive self-evaluation may facilitate automatic orienting to the self-face (Ma & Han, 2010; Ma & Han, 2012). Finally, we conducted exploratory analyses to determine whether participants showed differential attention capture to the self-face compared to faces of other highly familiar individuals.
# Table of Contents

Introduction..............................................................................................................1

Attention Orienting..................................................................................................1

Attention to Faces and the Self-Face.........................................................................2

Mechanisms Underlying the Self-Face Processing Advantage....................................5

Present Study............................................................................................................8

Method....................................................................................................................10

Participants.............................................................................................................10

Stimuli and Materials...............................................................................................10

Attention Capture Task Stimuli ................................................................................10

Questionnaires.........................................................................................................13

Procedure................................................................................................................13

Data Processing........................................................................................................15

Attention Capture Task...........................................................................................15

Questionnaires.........................................................................................................16

Results......................................................................................................................16

Preliminary Analyses...............................................................................................16

Primary Analyses....................................................................................................17

Target Accuracy.......................................................................................................18

Target Response Time.............................................................................................19

Secondary Analyses...............................................................................................24

Target Accuracy.......................................................................................................25

Target Response Time.............................................................................................27
Discussion ..............................................................................................................................................30

Visual Search Effects ..............................................................................................................................31

Attention Capture by the Self-Face .........................................................................................................32

Mechanisms Underlying Attention Capture by the Self Face .................................................................34

Limitations and Future Directions .........................................................................................................37

Conclusion ................................................................................................................................................38

References ..............................................................................................................................................40

Appendix ................................................................................................................................................48
List of Tables and Figures

Page 11  Figure 1: Example Stimuli (Target Present, Set Size Six)
Page 17  Table 1: Preliminary bivariate correlations
Page 19  Figure 2: Accuracy During Target-Absent and Target-Present Trials
           Across Set Sizes, Plotted Separately for Each Face
Page 20  Figure 3: Overall Response Times During Self-Face Present, Face Absent, and Stranger Face Trials
Page 22  Figure 4: Relation Between Social Anxiety Scores and Face Type RT Cost Difference Scores
Page 24  Figure 5: Response Times During Self-Face, Face Absent, and Stranger Face Trials Across Set Sizes, Plotted Separately for Target-Absent and Target-Present Trials
Page 27  Figure 6: Accuracy During Self-Face, Familiar Face, Face Absent, and Stranger Face Trials Across Set Sizes, Plotted Separately for Target-Absent and Target-Present Trials
Page 29  Figure 7: Response Times During Self-Face, Familiar Face, Face Absent, and Stranger Face Trials Across Set Sizes, Plotted Separately for Target-Absent and Target-Present Trials
Biased Attention Orienting to the Self-Face During an Attention Capture Task

Attention Orienting

In a typical environment, humans are constantly bombarded with more information than they are able to process at any given time. In order to avoid overwhelming processing capacities by attending to too many stimuli at one time, people must select the information that is most relevant to current behaviors and goals (Chun et al., 2011; Riby et al., 2012). This selection of the most important information requires orienting, which involves shifting attention to an item or location to engage with that facet of the environment (Oakes & Amso, 2018; Petersen & Posner, 2012). Researchers have identified multiple mechanisms that guide this information selection. Exogenous orienting occurs when individuals select perceptually salient (e.g., bright, moving) objects and/or objects that are dissimilar from other objects (Chun et al., 2011). For example, when viewing a road full of dull-colored cars, individuals may exogenously shift attention towards a bright red car because it is perceptually salient, or dissimilar, from the other cars. Individuals can also select information by using endogenous (i.e., voluntary) control to attend to stimuli that are relevant to current task goals while also ignoring task-irrelevant information (Katsuki & Constantinidis, 2014). For example, if an individual goes to the grocery store to buy carrots, they may endogenously shift attention towards the carrots because they are relevant to current task goals, while ignoring the other vegetables because they are task irrelevant.

Researchers have developed behavioral tasks to measure attention orienting. For example, in a visual search task, participants search for one target stimulus among multiple task-irrelevant distractors, with the number of distractors in the search array (i.e.,
set size) varying across trials (e.g., Bravo & Nakayama, 1992; Wolfe, 2015). Individuals typically respond slower and/or make increased errors as the number of distractors increases, reflecting the increased difficulty of suppressing attention to the surrounding distractors as the amount of competing information increases (e.g., Wolfe, 2015). The attention capture task is comparable to a visual search task in that participants similarly search for a target among task-irrelevant distractors in search arrays. As in standard visual search tasks, participants tend to exhibit slower responses when the target is absent and as the number of distractors (set size) increases (e.g., Wolfe, 2015). However, during some trials, one of the distractors is more perceptually salient (e.g., brightly colored) than the remaining stimuli. These salient distractors tend to automatically draw participants’ attention to their location, an effect called attention capture (e.g., Yamauchi et al., 2017), resulting in slower responses to detect the target during trials in which the salient distractor is present. Therefore, slower, or less accurate responses to the target indicate a stronger bias to automatically orient to the salient distractor. Attention capture tasks can therefore indirectly measure automatic orienting biases to the salient distractor based on the extent to which the presence of this distractor interferes with task performance (e.g., Belopolsky et al., 2017).

**Attention to Faces and the Self-Face**

Faces carry important biological and social significance and meaning (Lavie et al., 2003) and often convey meaningful cues, making it adaptive to spend more time looking at faces than at other non-face stimuli (Brédart et al., 2006). As a result, faces are detected more readily than other objects and non-face stimuli (Beindemann et al., 2005; Cerf et al., 2009; Riby et al., 2012; Theeuwes & Van der Stigchel, 2006; Vuilleumier,
2000). For example, during a free-viewing eye tracking task, participants looked to faces faster and more frequently compared to both text and objects (i.e., cell phones), reflecting a bias to attend to faces (Cerf et al., 2009). Additional work has found that individuals show this attention bias to faces even when it may interfere with an ongoing task. In a series of go/no-go experiments, participants responded to a target on a screen that contained either no additional image, an upright or inverted famous face, or an image of a fruit. The presence of an upright face consistently disrupted participants’ performance, suggesting that they had difficulty disengaging attention from faces (Bindemann et al., 2005). The presence of an upright face distractor similarly hindered individuals’ ability to detect a target during an attention capture task (Langton et al., 2008; Riby et al., 2012). This increased interference from upright faces compared to inverted faces or non-face distractors suggests a stronger attention orienting bias to the face distractors (Rigy et al., 2012).

Researchers have also used attention capture tasks to begin to investigate whether this attention orienting bias to faces varies based on face type (e.g., caregiver vs. stranger faces, own- vs. other-race faces; Hunter & Markant, 2023a; Hunter & Markant 2023b). For example, 6- to 10-year-old children failed to respond more often and were slower and less accurate to respond to a target when their caregiver’s face appeared as a distractor in the search array during an attention capture task (Hunter & Markant, 2023a). These results suggest that the extent to which a face captures attention may vary based on its features or identity. However, additional work found no difference in attention orienting to own- vs. other-race faces in infancy (Hunter & Markant, 2021) or among 6- to 10-
year-old children (Hunter & Markant, 2023b). These results suggest that only some types of faces may differentially capture attention.

One’s own face, the self-face, may possess even more unique significance and meaning than a stranger’s face because it is a self-referential stimulus (Brédart et al., 2006) and is critical for one’s identity and sense of self, including one’s self-esteem and self-consciousness (Bortolon et al., 2018; Ota & Nakano, 2021). Previous literature has demonstrated that individuals show biased processing of self-cues, including one’s own name and face, compared to names and faces of strangers and familiar individuals (Alexopoulos et al., 2012; Brédart et al., 2006; Devue & Brédart, 2008; Devue et al., 2009; Harris et al., 2004; Mack & Rock, 1998, Röer & Cowan, 2021). For example, Brédart et al. (2006) asked participants to indicate whether a target word that appeared with a meaningless word in the center of the screen, flanked by either the participant’s own face, a classmate’s face, or their professor’s face, was their own name or the name of a classmate as quickly and accurately as possible. Participant’s mean correct response times revealed that participants were significantly slower to correctly identify their classmate’s name when their own face appeared as a flanker compared to identifying their own name when their classmate’s face appeared as a flanker (Brédart et al., 2006). These results suggest that the self-face was significantly more attention-grabbing than other familiar faces. However, other studies have found more mixed results. In an eye tracking study, participants heard a sound while viewing arrays containing either the self-face, familiar faces, or unfamiliar faces, and were instructed to find the face whose mouth matched the sound (Devue et al., 2009). Participants in this study did not show preferential orienting to the self-face but did spend more time looking at the self-face
compared to familiar and unfamiliar faces following initial detection. In a series of two experiments by Devue & Brédart (2008), participants were asked to indicate whether two numbers presented at the same time were equal while ignoring a face distractor. In the first experiment, either the participant’s own face, a classmate’s face, or an unfamiliar face was presented in a central position, with each number presented on either side of the face, while the faces in the second experiment were presented in a flanking position with the digits presented in a central position (Devue & Brédart, 2008). Results revealed that participants were slower to determine digit parity when the self-face, compared to the other faces, was presented in a central position, but were not significantly slower nor did they make increased errors when the self-face was presented as a flanker. These results suggest that the self-face does not automatically capture attention and instead only biases attention in certain conditions (i.e., when it is positioned in one’s focus of attention).

Overall, past work suggests that there is a processing advantage for the self-face. However, past studies have indicated mixed results, with some finding biased attention holding (i.e., duration or looking) by the self-face, some showing biased selective attention to the self-face, and others showing no differences in attention to the self-face versus other faces. As a result, it remains unclear whether the self-face automatically captures attention to a greater extent than faces in general.

**Mechanisms Underlying the Self-Face Processing Advantage**

Researchers have suggested that the observed processing advantages associated with the self-face may be due to its emotional importance and value (Brédart et al., 2006; Jublie & Kumar, 2021). Multiple classes of stimuli can capture attention when they are motivationally significant, via a mechanism known as motivated attention (Engelmann et
al., 2009; Ferrari et al., 2008). This mechanism facilitates attentional capture by motivationally significant stimuli, independent of the saliency and task-relevancy of that stimuli (e.g., Anderson et al., 2011). These classes of motivationally significant stimuli include money (e.g., Anderson et al., 2011) and positive social stimuli (Anderson, 2016). Neuroimaging studies have shown that motivated attention is driven by dopaminergic reward pathways (Anderson et al., 2017), which overlaps with neural mechanisms implicated in self-face processing (de Greck et al., 2008; Ota & Nakano, 2021). For example, Ota & Nakano (2021) found that even subliminal presentation of the self-face resulted in increased activity in neural reward regions. These results suggest that increased motivational salience may facilitate attention to and processing of the self-face.

Despite this evidence for increased motivational salience of the self-face, other researchers have argued that the self-face processing advantage may instead reflect a familiarity effect (Brédart et al., 2006; Jublie & Kumar, 2021). The self-face is necessarily more familiar due to extensive visual experience with it, whereas other faces are not visually encountered nearly as often, if at all (Bortolon et al., 2018; Brédart et al., 2006). Research studies typically investigate the role of familiarity in the self-face processing advantage by comparing participants’ responses to their own face versus a familiar face (e.g., classmate, professor, friend). Findings that the self-face biases processing to a greater degree than these familiar faces are interpreted as evidence that this bias is more strongly driven by motivational salience rather than the familiarity of the face (Ota & Nakano, 2021). For example, Bola et al. (2021) used the design described above in a dot-probe task to determine whether individuals showed differential attention orienting to the self-face versus familiar faces. In this study, familiar faces were same-
gender intra-experimentally familiar faces, meaning that participants were given an opportunity to familiarize themselves with the faces prior to starting the task (Bola et al., 2021). Neuroimaging results indicated that participants showed a larger ERP component linked to selective attention (N2pc) when their own face appeared, even when presented subliminally, compared to when either a stranger face or a familiar face was presented subliminally or explicitly (Bola et al., 2021). Work using dot-probe experiments similarly found a larger N2pc component when participants’ own faces appeared, compared to faces of strangers (Wójcik et al., 2018). Additionally, in a study by Liu et al. (2016), participants were asked to determine the orientation of a target that was cued by a face that was presented centrally and dynamically changed its orientation. Results revealed that, compared to similarly dynamically changing familiar and unfamiliar faces, the self-face produced a larger ERP component linked to the salience of stimuli (N1) which predicted a smaller ERP component linked to cue uncertainty (P3) (Liu et al., 2016). These results suggest that the dynamically changing self-face automatically attracts attention and reduces uncertainty in making decisions. These findings therefore demonstrated that participants showed a stronger attention bias to the self-face than a familiar face, suggesting that the self-face may possess unique properties that drive attention orienting that cannot be solely accounted for by extensive visual experience.

Finally, previous research has also suggested that the self-face processing advantage may be driven by a positive self-evaluation (Ma & Han, 2010; Ma & Han, 2012). For example, previous work found that during a face recognition task, participants’ faster responses to their own face compared to a familiar face were eliminated by self-concept threat priming, showing that this processing advantage was
driven by a positive association with one’s self-concept (Ma & Han, 2010). Additional work found that the self-face processing advantage was weakened when participants were primed to reflect on negative personality traits (Ma & Han, 2012). These past results suggest that positive self-evaluation may also facilitate automatic orienting to the self-face. However, previous research has not examined the possibility of links between participants’ self-esteem and self-consciousness and automatic attention capture by the self-face.

**Present Study**

In sum, previous research has found that individuals show biased processing of the self-face compared to faces of strangers and familiar others. This self-face processing bias may be driven by motivated attention mechanisms which facilitates attentional capture by motivationally significant stimuli. Alternatively, the self-face processing advantage may reflect a familiarity effect or implicit positive association with one’s self-concept. However, past research investigating attention biases to the self-face has yielded mixed results. For example, previous work demonstrated that selective attention was biased to the self-face (Brédart et al., 2006), whereas other work found that the self-face elicited biased attention holding compared to familiar and unfamiliar faces (Devue et al., 2009) but not preferential or automatic attention orienting (Devue & Brédart, 2008; Devue et al., 2009). These past studies have not used tasks that can clearly determine whether the self-face automatically captures attention when multiple competing stimuli are present. To investigate this, we examined the extent to which the self-face automatically captured attention within search arrays that contained multiple competing stimuli. In addition, we examined familiarity and positive self-evaluation as potential
mechanisms underlying the attention bias to the self-face. Specifically, we examined the extent to which the self-face and a familiar face differentially captured attention to address the role of face familiarity and examined links between participants’ self-esteem and self-consciousness and individual differences in attention capture by the self-face. The current study will therefore contribute to our understanding of how attention orienting varies based on face type. More broadly, given that attention orienting is a very important mechanism for learning, addressing whether our own face automatically captures our attention contributes to our comprehension of this mechanism, facilitating a better understanding of how we interact with and learn from the world.

To address these questions, we used an attention capture task to determine whether the presence of the self-face as a task-irrelevant distractor interfered with target detection more than a familiar or stranger’s face. In this attention capture task, the top-down, or goal-driven task is to look for a target in a search array. During some trials either the self-face, a familiar face, or a stranger’s face also appeared in the search array as a task-irrelevant distractor. Slower or less accurate target detection denoted increased distraction by the face distractor, indicating automatic orienting to the face. We predicted that the presence of the self-face would capture attention and interfere with target detection to a greater extent than a stranger face. In addition to the attention capture task, participants completed questionnaires to report on their self-esteem, private and public self-consciousness, and social anxiety (Rosenberg, 1965; Scheier & Carver, 1985). Past research has proposed that a positive self-evaluation or a positive association with one’s self-concept may drive the self-face processing advantage (Ma & Han, 2010; Ma & Han, 2012). We therefore predicted that individuals with a more positive self-evaluation (i.e.,
lower self-consciousness and higher self-esteem scores) would show more robust attention capture by the self-face.

**Method**

**Participants**

Fifty-one adults between the ages of 18 and 35 years (23 F; $M_{age} = 20.87$ years, $SD = 3.79$ years) completed the study. An *a priori* power analysis (alpha = 0.05, power = 0.8) indicated that a minimum of 24 participants were needed to identify previously observed effects (i.e., $\eta^2_p = .18$; Riby et al., 2012). We excluded individuals with known uncorrected visual or auditory impairments (e.g., vision loss, color blindness, amblyopia, hearing loss) or neurological/pervasive developmental diagnoses (e.g., Down’s Syndrome, Autism Spectrum Disorders, Attention Deficit Hyperactivity Disorder, or Fetal Alcohol Syndrome) from the study. Based on self-report, 82.8% of participants were White/Caucasian, 8.6% were Hispanic, 5.8% were Asian, and 2.8% were Multiracial. We tested 16 additional participants but excluded them from analyses because they did not submit a photo of themselves (N = 10), they did not complete all questionnaires (N = 5), or due to technical errors during the attention capture task (N = 1). All participants provided informed consent prior to participation and received either payment or academic course credit for participating in the study. All study methods were approved by the local Institutional Review Board.

**Stimuli and Materials**

**Attention Capture Task Stimuli**

Figure 1 illustrates the attention capture task. Participants searched for a target image within 3 x 3 grid search arrays, with each square in the grid measuring 200 x 200
The search arrays contained either three, six, or nine images (150 x 150 pixels). Potential targets were three unique butterfly images and non-face distractors consisting of images of shoes, shells, plants, houses, flowers, and fruits. All non-face distractor images were obtained from royalty-free stock photo search engines (e.g., pixaby.com).

During some trials, a face appeared in the search array as a distractor image. Across trials the face distractor was an image of either the participant (self-face), their selected close friend or acquaintance (familiar face), or a stranger.

Figure 1

Example Stimuli (Target Present, Set Size Six)

Note. Trials contained (A) no face distractor, (B) a self-face distractor, (C) a familiar face distractor, or (D) a stranger face distractor. Examples of target absent and set size three and nine search arrays can be viewed at: https://docs.google.com/presentation/d/1_Cy1cnwXYVXrpYpfUiRFhJEz8O0E2GvAHCFczGJWk/edit?usp=sharing

Prior to their appointment, participants were asked to submit one to three color photographs of themselves in good lighting with a neutral expression, and without accessories. After the participant agreed to submit images, they received a link to send to a person they identified as a non-romantic friend or acquaintance so that this person could
upload images following the same guidelines. Participants only received the link to send to a friend or acquaintance if they first uploaded their own images.

For both the self-face and familiar face stimuli, we selected the image in which the face was most visible, and we cropped out external features (e.g., hair, ears). To minimize variations in low-level visual properties across the three face types, we used each photo once as the self-face stimulus and again as the stranger stimulus for one other participant when possible. More than half of participants were used as the stranger stimulus for only one other participant (N = 18) while others were used as the stranger stimulus for two other participants (N = 7) because we prioritized race and gender matching. Some participants were never used as the stranger stimuli for another participant because they did not match future participants on race or gender (N = 8), not consenting to the use of their photos as stimuli in other participants’ tasks (N = 1) and being the final participant (N = 1). We also matched the self-face, familiar face, and stranger face on race and gender when possible (N = 28). We informed participants that their images would be used during the computer task, but we did not provide further details about how their face would appear during the task.

We were unable to acquire the familiar face photos for a subset of participants (N = 18). For these participants who did not provide a familiar face stimulus, we used a previous gender- and race-matched participant as the “familiar” face so that the task could successfully run. Therefore, these participants did not have familiar face trials, and instead saw more stranger face trials (54 face absent trials, 18 self-face trials, and 36 stranger face trials). Because of these missing stimuli, our primary analyses used data from all participants (N = 35) to only examine differences in attention capture across the
self versus stranger faces. We also conducted a secondary analysis with the more limited sample (N = 17) that had stimuli for all face types to preliminarily examine differences in attention capture across the self, familiar, and stranger faces.

**Questionnaires**

In addition to the attention capture task, participants completed two questionnaires, including the Rosenberg Self-Esteem Scale (Rosenberg, 1965) and the Self-Consciousness Scale–Revised (Scheier & Carver, 1985). The Rosenberg Self-Esteem Scale is a 10-item scale that measures global self-esteem, defined as the extent to which the individual holds a positive or negative attitude toward the self (Rosenberg, 1965). Participants indicated whether they agreed with each statement on the questionnaire (e.g., “On the whole, I am satisfied with myself”) using a 0 (“Strongly Disagree”) to 3 (“Strongly Agree”) Likert scale (see Appendix for full questionnaire). A fifth response option, “Prefer not to answer” was also available for each statement. The Self-Consciousness Scale–Revised (Scheier & Carver, 1985), is a 23-item scale that measures individual differences in private and public self-consciousness based on participants’ responses across three subscales, including private self-consciousness (9 items), public self-consciousness (7 items), and social anxiety (6 items). Participants responded to each statement (e.g., “I’m always trying to figure myself out”) using a 0 (“Not like me at all”) to 3 (“A lot like me”) Likert scale (see Appendix for full questionnaire). Participants also had the option of selecting “Prefer not to answer” for each statement. See data processing for full scoring procedure.

**Procedure**
Participants first completed the attention capture task, which was presented using PsychoPy on a full-screen 23”x13” desktop computer. During each trial, participants viewed a single search array and were instructed to indicate whether the butterfly target was present or absent. At the beginning of each trial, the blank search array grid appeared for 500 ms, after which the images were displayed in the grid for 3000 ms. Participants could respond at any time during the 3000 ms period in which the stimuli were visible. During the inter-stimulus interval (ITI), a blank, white screen appeared for 1000 ms.

During each trial, participants used the “Z” or “M” keys, which were counterbalanced across participants, to indicate whether the butterfly was present or absent. Participants first completed six practice trials which provided them with audio and visual feedback so that they could confirm that they were using the correct response keys. Next, participants completed 216 trials (108 butterfly target present, 108 butterfly target absent) for the primary task. For both target-present and target-absent trials, 54 (50%) did not include a face distractor (face absent) and 54 included a face as one of the distractors (face present). The 54 trials that included a face distractor were divided evenly across each face type, with 18 trials including the self-face as a distractor, 18 trials including the familiar face as a distractor, and 18 trials including the stranger face as a distractor. Trials were also divided evenly across the three set sizes (3, 6, and 9) with 72 trials of each set size. Each type of face and butterfly image appeared in all locations of the search array an equal number of times. Non-face distractor images were randomly placed in the other locations on the grid once the locations of the butterfly target and face images were selected and appeared with equal frequency across the task. Each participant completed the 216 search trials in a random order.
After completing the attention capture task, participants were asked a series of questions to determine whether they recognized any faces presented as stimuli during the attention capture task. Participants indicated if they noticed any faces (“Did you notice a face?”; 1 = “Yes”, 2 = “No”). If they indicated that they had noticed a face, they were then asked whether they recognized the face (“Did you recognize the face?”; 1 = “Yes”, 2 = “No”). If participants indicated that they recognized the face, they were then asked to identify the face(s) (“Whose face(s) did you see”) by typing a response. They then completed a set of questions that assessed the extent to which they were familiar with and liked each face used during the task. Each face (self-face, familiar face, stranger face) was presented individually on the screen. For each face, participants first responded using a 1 (“Not familiar at all”) to 5 (“Extremely familiar”) Likert scale. Next, the same face appeared again and participants responded using a 1 (“Dislike very much”) to 5 (“Like very much”) Likert scale. The attention capture task, including the set of familiarity questions at the end, took approximately 10 to 15 minutes to complete.

After completing the attention capture task and follow-up questions, participants used REDCap on a full-screen web browser to complete the Rosenberg Self-Esteem Scale and the Self-Consciousness Scale–Revised questionnaires.

Data Processing

Attention Capture Task

We evaluated two measures from the attention capture task to examine the extent to which the presence of the face distractors disrupted participants’ ability to detect the target butterfly. First, we calculated accuracy based on the proportion of trials in which the participant correctly indicated whether the target was present or absent. We also
examined response time (RT) by computing the average time that the participant took to correctly indicate whether the target was present versus absent. We calculated RT only for trials in which participants correctly responded and we excluded trials in which participants responded faster than 200 ms or slower than 2 standard deviations above the individual mean. Poorer accuracy and/or slower RTs indicated increased distraction that hindered participants’ ability to detect the target, indicating stronger attention capture by the face distractors.

**Questionnaires**

We scored the Rosenberg Self-Esteem Scale and the Self-Consciousness Scale–Revised such that “Strongly Disagree”/ “Not like me at all” received 0 points, “Disagree”/ “A little like me” received 1 point, “Agree”/ “Somewhat like me” received 2 points, and “Strongly Agree”/ “A lot like me” received 3 points. Five of the ten items on the Rosenberg Self-Esteem Scale and two items on the Self-Consciousness Scale-Revised were reverse scored. After scoring each item we summed the total points to compute overall scores for each measure. The overall self-esteem score ranged from 0-30 and the overall self-consciousness score ranged from 0-66. We also computed scores for each subscale on the self-consciousness measure, including private self-consciousness (ranging from 0-27), public self-consciousness (ranging from 0-21), and social anxiety (ranging from 0-18).

**Results**

**Preliminary Analyses**

Preliminary analyses showed that neither age nor gender were correlated with overall task accuracy or response time ($p$’s >.5). Subscales within the Self-Consciousness
questionnaire (private self-consciousness, public self-consciousness, social anxiety) were positively correlated ($p$’s > .001). We selected the social anxiety subscale from the Self-Consciousness Scale–Revised as a measure of interest because it was also correlated with both the Self-Esteem scale, $r(34) = -.46$, $p = .006$, as well as overall response time during the attention capture task ($r(34) = -.34$, $p = .04$). See Table 1 for all bivariate correlations.

Table 1

Preliminary bivariate correlations

<table>
<thead>
<tr>
<th></th>
<th>Overall Accuracy</th>
<th>Overall RT</th>
<th>Overall S-E Score</th>
<th>Overall S-C Score</th>
<th>Private S-C Score</th>
<th>Public S-C Score</th>
<th>Social Anxiety Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.003</td>
<td>-0.002</td>
<td>0.31*</td>
<td>-0.15</td>
<td>0.04</td>
<td>-0.09</td>
<td>-0.23</td>
</tr>
<tr>
<td>Overall Accuracy</td>
<td>-</td>
<td>-0.11</td>
<td>0.07</td>
<td>-0.03</td>
<td>-0.03</td>
<td>-0.15</td>
<td>0.11</td>
</tr>
<tr>
<td>Overall RT</td>
<td>-</td>
<td>-</td>
<td>0.22</td>
<td>-0.31*</td>
<td>-0.15</td>
<td>-0.09</td>
<td>0.34*</td>
</tr>
<tr>
<td>Overall S-E Score</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-0.27</td>
<td>0.12</td>
<td>-0.17</td>
<td>-0.46**</td>
</tr>
<tr>
<td>Overall S-C Score</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.72***</td>
<td>0.73***</td>
<td>0.57***</td>
</tr>
<tr>
<td>Private S-C Score</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.53**</td>
<td>0.01*</td>
</tr>
<tr>
<td>Public S-C Score</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.02*</td>
</tr>
</tbody>
</table>

*p*.05; **p**<.01; ***p**<.001

Primary Analyses

Our primary analyses included all participants and examined differential attention capture across the self-face and stranger face. For these analyses we examined target detection performance (accuracy, RT) using repeated measures ANCOVAs with target presence (target- absent, target-present trials), set size (3, 6, 9 images), and face type (face absent, self-face, stranger) as within-subjects factors. We also included social anxiety scores as a covariate to explore the potential role of positive self-evaluation in automatic orienting to the self-face. We used Greenhouse-Geisser corrections when necessary to account for violations of sphericity.
**Target Accuracy**

Analyses revealed a main effect of target presence, $F(1, 33) = 6.78, p = .01, \eta_p^2 = .17$. Participants responded more accurately during target-absent trials ($M = .99, SD = .02$) compared to target-present trials ($M = .96, SD = .03$). There were no significant main effects of set size ($p = .57$) or face type ($p = .94$). However, there was a significant three-way interaction of target presence x set size x face type for target accuracy $F(3.08, 101.47) = 2.87, p = .04, \eta_p^2 = .08$. Follow up analyses indicated a significant target presence x face type interaction during face absent trials ($F(2, 66) = 4.16, p = .02, \eta_p^2 = .11$; Figure 2A), reflecting consistently poorer accuracy during target-present trials across all set sizes ($p$’s <.01). There was also a significant target presence x face type interaction during stranger face trials ($F(2, 66) = 3.97, p = .02, \eta_p^2 = .11$; Figure 2C). During these trials, participants were less accurate when the target was present within set size 3 ($M_{\text{Absent}} = .99, SD = .01, M_{\text{Present}} = .96, SD = .01; t(34) = 2.24, p = .032$) and set size 9 arrays ($M_{\text{Absent}} = .99, SD = .004, M_{\text{Present}} = .94, SD = .02; t(34) = 3.51, p = .001$). However, participants showed similar accuracy across target-present and target-absent trials within set size 6 trials in which the stranger face appeared as a distractor ($p = .66$). Finally, the target presence x face type interaction was not significant during self-face trials ($p = .41$). As illustrated in Figure 2B, participants showed similar accuracy across target-absent and target-present trials, regardless of set size, when the self-face appeared as a distractor.
Target Response Time

We found a main effect of target presence, $F(1, 33) = 18.35, p < .001, \eta^2_p = .36$. Participants were slower to respond during target-absent trials ($M = 812.30$ ms, $SD = 167.28$) compared to target-present trials ($M = 638.32$ ms, $SD = 114.11$). Results also showed a main effect of set size, $F(1.24, 40.75) = 25.22, p < .001, \eta^2_p = .43$, reflecting
increasingly slower responses as set size increased ($M_{SS3} = 640.36$ ms, $SD = 113.81$; $M_{SS6} = 727.09$ ms, $SD = 136.86$; $M_{SS9} = 808.46$ ms, $SD = 168.87$; all $p$’s < .001).

Analyses also revealed a main effect of face type for target response time, $F(2, 66) = 15.72$, $p < .001$, $\eta^2_p = .32$; Figure 3. Follow up paired comparisons indicated that participants responded more slowly when the self-face appeared as a distractor ($M = 747.34$ ms, $SD = 144.11$) compared to trials in which a stranger appeared as a distractor ($M = 719.86$ ms, $SD = 134.82$; $t(34) = 5.05$, $p < .001$) as well as those in which no face appeared ($M = 708.71$ ms, $SD = 126.48$; $t(34) = 6.32$, $p < .001$). Participants also responded more slowly overall when the stranger face appeared as a distractor compared to trials in which there was no face present ($t(34) = 2.24$, $p = .032$).

**Figure 3**

*Overall Response Times During Self-Face Present, Face Absent, and Stranger Face Trials*

![Figure 3](image)

*Note.* Participants were slowest to respond during self-face present trials compared to both face absent and stranger face trials. Error bars represent standard error of the mean. * $p < .05$.

Finally, we also found a main effect of social anxiety, $F(1, 33) = 5.07$, $p = .031$, $\eta^2_p = .13$, reflecting a negative relationship between social anxiety scores and overall task
response time. These results indicate that participants with higher social anxiety scores were overall faster to detect the target.

In addition to these main effects, results also revealed a significant target presence x set size interaction for target response time, $F(1.57, 51.66) = 8.14, p = .002, \eta^2_p = .20$. To further examine this interaction, we calculated the target-absent RT cost score (i.e., overall RT during target absent trials – overall RT during target present trials) within each of the set sizes. Higher scores indicated increased slowing of response time during target-absent trials compared to target-present trials. Paired samples t-tests indicated that target-absent RT cost scores were significantly higher during set size 6 trials ($M = 166.18$ ms, $SD = 112.09$) compared to set size 3 trials ($M = 86.66$ ms, $SD = 66.40$; $t(34) = 4.91, p < .001$). Target-absent RT cost scores were also higher during set size 9 trials ($M = 269.12$ ms, $SD = 168.57$) compared to both set size 3 and set size 6 trials ($t_{SS3}(34) = 7.05, p < .001; t_{SS6}(34) = 5.02, p < .001$). These results indicate that participants experienced larger RT costs during target-absent trials as set size increased.

We also found a significant face type x social anxiety interaction, $F(2, 66) = 4.29, p = .02, \eta^2_p = .12$. To further examine this interaction, we calculated three face type RT difference scores: self-face – face absent RT difference score (i.e., overall RT during self-face trials – overall RT during face absent trials), stranger face – face absent RT difference score (i.e., overall RT during stranger face trials – overall RT during face absent trials), and self-face – stranger face RT difference score (i.e., overall RT during self-face trials – overall RT during stranger face trials). There were significant negative correlations between participants’ social anxiety scores and both the self-face vs. face absent RT cost scores ($r(34) = -.40, p = .02; Figure 4A$) and the self-face vs. stranger face
RT cost scores ($r(34) = -.37, p = .03$; Figure 4B). In both cases, participants with lower social anxiety scores responded more slowly during trials when the self-face appeared as a distractor. This performance cost reflects more robust attention capture by the self-face, compared to a stranger face or no face, among participants with lower social anxiety scores. Social anxiety scores were not related to the stranger face vs. face absent RT cost scores ($p > .05$; Figure 4C).

**Figure 4**

*Relation Between Social Anxiety Scores and Face Type RT Cost Difference Scores*

![Graphs showing the relationship between social anxiety scores and face type RT cost difference scores.](image)

*Note.* Participants who reported lower social anxiety were slower to respond during (A) Self-face present trials compared to face absent trials and during (B) Self-face present trials compared to stranger face present trials. (C) Social anxiety scores were not related to differences in response times during stranger face and face absent trials. Trendlines represent best-fit lines.
Finally, analyses revealed a significant three-way target presence x set size x face type interaction for response time, $F(4, 132) = 2.60, p = .04, \eta^2_p = .07$. Follow-up tests indicated that the set size x face type interaction was not significant within target-absent trials ($p = .34$; Figure 5A). In contrast, this interaction was marginally significant within target-present trials, $F(2.47, 132) = 2.65, p = .07, \eta^2_p = .07$; Figure 5B. Within these target-present trials, we found a reliable effect of face type only within set size 6 trials, $F(2, 66) = 8.46, p < .001, \eta^2_p = .20$. During these set size 6 trials, participants responded more slowly when the self-face appeared as a distractor ($M = 684.28$ ms, $SD = 137.40$) compared to trials in which the stranger face appeared as a distractor ($M = 577.75$ ms, $SD = 99.56$; $t(34) = 8.86, p < .001$). Participants also responded more slowly during face absent trials ($M = 669.98$ ms, $SD = 122.70$) compared to trials in which the stranger face appeared as a distractor ($t(34) = 7.56, p < .001$). However, participants showed no difference in response times during trials in which the self-face appeared as a distractor and those in which no face was present ($p = .28$). We did not find a reliable effect of face type within set size 3 or set size 9 trials ($p$’s > .11).
Secondary Analyses

Researchers have argued that the self-face processing advantage may reflect a familiarity effect (Brédart et al., 2006; Jublie & Kumar, 2021) rather than motivational salience of the self-face. To consider this possibility, we also included trials in the attention capture task in which a familiar face (e.g., friend, classmate) appeared as a distractor in the search array. However, only a subset of participants (N = 17) provided stimuli for both the self-face and familiar face trials. To begin examining the role of familiarity in attention capture by faces, we conducted secondary exploratory analyses with this smaller subset of participants. For these analyses we examined participants’ target detection performance (accuracy, RT) using repeated measures ANOVAs with
target presence (target-absent, target-present trials), set size (3, 6, 9 images), and face
type (face absent, self-face, familiar face, stranger face) as within-subjects factors. Unlike
in our primary analyses, we did not include social anxiety scores as a covariate in these
secondary analyses due to lack of power. We used Greenhouse-Geisser corrections when
necessary to account for violations of sphericity.

**Target Accuracy**

Like in our primary analyses, we found a main effect of target presence ($F(1, 16)$
$= 18.92, p < .001, \eta^2_p = .52$) with participants exhibiting more accurate responses during
target-absent trials ($M = .99, SD = .02$) than target-present trials ($M = .96, SD = .04$). We
found no main effects of set size ($p = .75$) or face type ($p = .69$).

We also found a marginal set size x face type interaction for target accuracy,
$F(2.51, 40.1) = 2.82, p = .06, \eta^2_p = .15$ Follow-up analyses indicated a significant effect
of face type during set size 9 trials ($F(3, 48) = 3.28, p = .029, \eta^2_p = .17$). Within set size 9
trials, participants were significantly more accurate during trials in which the self-face
appeared as a distractor ($M = .99, SD = .02$) compared to trials in which the familiar face
appeared ($M = .96, SD = .05; t(16) = 2.75, p = .01$). Participants were also significantly
more accurate during self-face present trials compared to stranger face present trials ($M =
.96, SD = .06; t(16) = 2.13, p = .049$). There were no significant differences in response
accuracy during face absent trials compared to self-face present trials ($p = .15$), familiar
face present trials ($p = .10$), or stranger face present trials ($p = .15$). Participants were also
not significantly more accurate in their responses during trials in which the familiar face
appeared as a distractor compared to trials in which the stranger face appeared as a
distractor ($p = 1.0$). There was no effect of face type during set size 3 trials ($p = .55$) or set size 6 trials ($p = .18$).

Results also revealed a significant target presence x set size x face type interaction for target accuracy, ($F(3.23, 51.59) = 2.73, p = .05, \eta^2_p = .15$). Within target-absent trials, there was no set size x face type interaction ($p = .39$; Figure 6A). However, there was a significant set size x face type interaction within target-present trials ($F(2.78, 44.55) = 3.23, p = .03, \eta^2_p = .17$; Figure 6B). Within these target-present trials, we found no effect of face type within set size 3 trials ($p = .79$) or set size 6 trials ($p = .09$). There was an effect of face type within set size 9 trials, ($F(3, 48) = 3.58, p = .02, \eta^2_p = .18$). Within these set size 9 trials, participants were significantly more accurate during self-face present trials ($M = 1.00, SD = 0.00$) compared to face absent trials ($M = .96, SD = .05$; $t(16) = 2.86, p = .01$), familiar face present trials ($M = .93, SD = .10$; $t(16) = 2.75, p = .01$), and stranger face present trials ($M = .93, SD = .10$; $t(16) = 2.75, p = .01$). Participants’ response accuracy was not significantly different during face absent trials compared to either familiar face present trials ($p = .23$) or stranger face present trials ($p = .23$). Lastly, participants were not significantly different in the accuracy of their responses during familiar face present trials compared to stranger face present trials ($p = 1.00$).
Analyses revealed main effects of target presence ($F(1, 16) = 50.05, p < .001, \eta^2_p = .76$) and set size ($F(1.28, 20.49) = 39.38, p < .001, \eta^2_p = .71$), similar to those we found in our main analyses. Participants were significantly slower on target-absent trials ($M = 758.87$ ms, $SD = 151.53$) compared to target-present trials ($M = 614.53$ ms, $SD = 98.84$) and showed increasingly slower responses as set size increased ($p$’s > .001).

Results also indicated a main effect of face type ($F(3, 48) = 4.2, p = .01, \eta^2_p = .21$). Follow-up paired comparisons indicated that participants responded more slowly overall when the self-face was present ($M = 701.23$ ms, $SD = 128.86$) compared to when no face was present ($M = 669.38$ ms, $SD = 112.37; t(16) = 3.37, p = .004$). Participants
were also significantly slower to respond when the familiar face was present \((M = 696.8 \text{ ms}, SD = 131.97)\) compared to when no face was present \((t(16) = 2.47, p = .03)\). There were no differences in response times across familiar face present trials and either self-face present \((p = .76)\) or stranger face present \((p = .12)\) trials. Participants also showed similar response times during trials in which the stranger face appeared as a distractor and those in which no face was present \((p = .15)\).

We also found a significant set size x face type interaction for target response time \((F(3.57, 57.11) = 5.17, p = .002, \eta^2_p = .24)\), which was further moderated by a marginally significant target presence x set size x face type interaction \((F(2.79, 44.69) = 2.71, p = .06, \eta^2_p = .15)\). Follow-up analyses revealed that the set size x face type interaction was not significant during target-absent trials \((p = .55; \text{Figure 7A})\), but this interaction was reliable during target-present trials \((F(6, 96) = 10.19, p < .001, \eta^2_p = .39; \text{Figure 7B})\). Within these target present trials, there was a significant effect of face type during all set sizes \((p’s < .01)\). However, the direction of effects differed across set sizes. Within set size 3 trials, participants responded more slowly when the familiar face appeared \((M_{\text{Familiar}} = 631.05 \text{ ms}, SD = 147.40 \text{ ms})\) compared to all other face types \((M_{\text{Absent}} = 560.87 \text{ ms}, SD = 96.39 \text{ ms}, t(16) = 2.54, p = .011; M_{\text{Self}} = 564.71 \text{ ms}, SD = 108.07 \text{ ms}, t(16) = 2.83, p = .006; M_{\text{Stranger}} = 573.58 \text{ ms}, SD = 88.58 \text{ ms}, t(16) = 2.01, p = .031)\). However, there were no differences in response times across the face absent, self-face present, or stranger face present trials \((p’s > .4)\). Results indicated a similar pattern within set size 9 trials, with the slowest response times during familiar face trials \((M_{\text{Familiar}} = 713.97 \text{ ms}, SD = 145.89 \text{ ms})\) compared to all other face types \((M_{\text{Absent}} = 633.69 \text{ ms}, SD = 114.01 \text{ ms}, t(16) = 4.48, p < .001; M_{\text{Self}} = 651.95 \text{ ms}, SD = 126.36 \text{ ms}, \)
However, within set size 6 trials, participants responded more slowly when either no face was present ($M_{\text{Absent}} = 633.69$ ms, $SD = 114.01$ ms) or when the self-face appeared ($M_{\text{Self}} = 651.57$ ms, $SD = 107.33$ ms) compared to both familiar face trials ($M_{\text{Familiar}} = 569.23$ ms, $SD = 110.00$ ms, $t_{\text{Familiar-Absent}}(16) = 2.92$, $p = .005$, $t_{\text{Familiar-Self}}(16) = 2.83$, $p = .006$) and stranger face trials ($M_{\text{Stranger}} = 552.46$ ms, $SD = 87.30$ ms, $t_{\text{Stranger-Absent}}(16) = 4.16$, $p < .001$, $t_{\text{Stranger-Self}}(16) = 7.44$, $p < .001$). There were no differences in response times across the face absent and self-face present trials ($p = .36$) or across the familiar face and stranger face trials ($p = .40$).

Figure 7
Response Times During Self-Face, Familiar Face, Face Absent, and Stranger Face Trials Across Set Sizes, Plotted Separately for Target-Absent and Target-Present Trials

![Figure 7](image)

Note. (A) The set size x face type interaction was not reliable during target-absent trials. (B) Response times varied by face type and set size during target-present trials. Within set size 3 and set size 9 trials, participants responded more slowly during familiar face trials compared to self-face, face absent, and stranger face trials. Within set size 6 trials, participants responded more slowly during face absent and self-face trials compared to familiar face and stranger face trials. Error bars represent standard error of the mean.

* $p < .05$. 
Discussion

The present thesis aimed to determine whether the self-face automatically captures attention to a greater extent than faces in general. While previous research has found that individuals show enhanced processing of and selective attention to the self-face compared to faces of strangers and familiar others (e.g., Brédart et al., 2006), other studies suggest that the self-face processing advantage may only disrupt target performance temporarily and observable only in certain conditions (Devue & Brédart, 2008), or may be limited to specific attention processes (i.e., duration of looking/attention holding; Devue et al., 2009). As a result, it remains unclear whether the self-face elicits an automatic attention orienting bias to a greater extent than faces in general.

In the present study, we used an attention capture task to examine the extent to which the self-face disrupted task performance compared to other types of faces (a stranger’s face and a familiar face), revealing if the self-face prompts an automatic attention orienting bias. Compared to face absent trials, participants were overall slower to respond to the target during trials in which the self-face appeared as a distractor. However, the extent to which the self-face captured attention was also influenced by the size of the search array, the presence versus absence of the butterfly target, and individual differences in participants’ self-reported social anxiety. Specifically, compared to trials in which a stranger’s face appeared, participants were slower to respond during self-face trials when the butterfly target was present within set size six search arrays. In addition, participants who had lower social anxiety scores showed slower response times to the target during self-face present trials compared to face absent and stranger face present trials, suggesting increased attention capture by the self-face. Finally, secondary analyses
based on only a subset of participants similarly indicated that the extent to which the self-face captured attention was influenced by the size of the search array and the presence versus absence of the butterfly target. Specifically, when the butterfly target was present, participants were more accurate in their responses during self-face present trials compared to face absent, familiar face present, and stranger present trials within set size nine search arrays. Participants also exhibited differential response times across self-face present trials and familiar face present trials, but this also depended on the size of the search array. Specifically, when the butterfly target was present, participants exhibited slower response times when the self-face was present compared to familiar face present and stranger face present trials during set size six search arrays, suggesting increased attention capture by the self-face.

**Visual Search Effects**

The current study replicated effects of target presence and set size that are consistent with extensive past research using both visual search tasks (e.g., Moher, 2020; Yamauchi & Murakami, 2017) and similar versions of this attention capture task (e.g., Hunter & Markant 2023a, Hunter & Markant 2023b; Riby et al., 2012). Across all analyses, as set size increased, participants showed increasingly slower responses, regardless of whether the butterfly target was absent or present. This reflects the idea that as the number of distractors increases, it becomes more difficult to ignore surrounding distractors (e.g., Duncan & Humphreys, 1989; Treisman & Gelade, 1980). Participants were also overall slower but more accurate in their responses when the butterfly target was absent. This slower responding may have allowed participants to respond more accurately (Godwin et al., 2015). This pattern likely reflects different search strategies.
across target absent and target present trials (Peltier & Becker, 2016). The present study also demonstrated that the size of the search array influenced the extent to which the absence of the target slowed participants’ responses. In our primary analyses, participants showed larger response time costs during target absent trials as set size increased. Similarly, in our secondary analyses, participants’ responses during target absent trials were slowest within set size nine.

**Attention Capture by the Self-Face**

In addition to these classic visual search effects, the current study also demonstrated that adults were overall slower to respond, but not less accurate, when the self-face was present as a distractor in the search array. In our primary analysis, the size of the search array and the presence versus absence of the target influenced the extent to which the self-face slowed target response time. These performance costs indicate that participants’ attention was automatically captured by their own face, resulting in slower response times. Therefore, the current results suggest that attention capture was stronger for the self-face compared to stranger faces. This finding is consistent with past research demonstrating that individuals show enhanced processing of and attention to the self-face (e.g., Brédart et al., 2006; Devue & Brédart, 2008; Devue et al., 2009). For example, in a search task by Brédart et al. (2006) and in an eye tracking study by Devue et al. (2009), participants spent more time looking at the self-face once they detected it compared to familiar and unfamiliar faces. However, these past studies have not used tasks that can clearly determine whether the self-face automatically captures attention to a greater extent than faces in general. The current study extends this past work by revealing preferential and automatic orienting to the self-face compared to strangers. This reveals
that in addition to attention holding biases and a general self-face processing advantage, the self-face elicits automatic orienting compared to faces of others when multiple other competing stimuli are present.

The current results also converge with prior research that has examined attention capture across different face types. For example, previous research using a similar attention capture task investigated whether 6- to 10-year-old children automatically oriented attention to their caregiver’s face versus a stranger’s face (Hunter & Markant, 2023a). Like in the current study, the goal-driven task was to search for a target within search arrays that contained either no face, the caregiver face, or a stranger face, and non-face distractors. In Hunter & Markant (2023a), children showed consistently poorer accuracy when their caregiver’s face appeared, regardless of target presence or set size. In addition, children were slower to respond during caregiver present trials compared to trials in which a stranger’s face appeared. However, this response time cost associated with caregiver faces was specific to set size 6 trials in which the target was present Hunter & Markant (2023a). Results of the current study mirrored this past work. Adults showed poorer accuracy during trials in which the self-face appeared, regardless of set size, and were overall slower to respond during self-face present trials compared to stranger face trials. In addition, this response time cost for self-face trials was most pronounced within set size 6 trials in which the target was present. Participants were also slower to respond during self-face trials compared to familiar face and stranger face trials specifically when the target was present within set size 6 trials. Thus, the current findings that the self-face captured attention to a greater extent than stranger faces converge with
Hunter & Markant (2023a)’s findings that caregiver faces captured attention to a greater extent than unfamiliar faces.

**Mechanisms Underlying Attention Capture by the Self-Face**

Researchers have suggested that processing advantages associated with the self-face may be due to its emotional importance and value (Brédart et al., 2006; Jublie & Kumar, 2021). Motivationally salient stimuli can capture attention via a mechanism called motivated attention (Engelmann et al., 2009; Ferrari et al., 2008), independent of the task-relevancy or perceptual salience of the stimuli (e.g., Anderson et al., 2011). For example, motivationally significant stimuli that elicit attention capture via motivated attention mechanisms include money (e.g., Anderson et al., 2011) and positive social stimuli (Anderson, 2016). In the current study attention capture was likely not due to physical salience because the self-face was not inherently more physically salient than surrounding stimuli. Additionally, the face was presented as a distractor, and therefore attention capture was not due to goal-directed (endogenous) orienting mechanisms. Therefore, it is more likely that this automatic attention capture was driven by the motivational salience of the self-face. Prior research has revealed dopaminergic reward pathways that drive motivated attention (Anderson et al., 2017), which overlap with neural mechanisms implicated in self-face processing (Ota & Nakano, 2021). Additionally, similar findings across the current study and past research investigating attention capture to caregiver faces (Hunter & Markant, 2023a) suggest that multiple types of motivationally salient faces may elicit increased attention capture. Overall, the current results are consistent with motivational salience as a mechanism that facilitates attention to and processing of the self-face.
However, some researchers have argued that the self-face processing advantage may instead reflect a familiarity effect rather than motivational salience of the face (Brédart et al., 2006; Jublie & Kumar, 2021). Studies typically compare participants’ responses to the self-face versus a familiar face (e.g., a classmate or friend) to investigate the potential role of familiarity in the self-face processing advantage. Because the self-face holds a similar level of familiarity compared to the familiar face, findings that the self-face biases attention to a greater degree than familiar faces can be interpreted as evidence that this attention bias is more strongly driven by motivational salience rather than familiarity (Ota & Nakano, 2021). To address the role of familiarity in attention capture the self-face, we conducted secondary analyses with the subset of participants who provided both self-face and familiar face stimuli. These secondary analyses showed that participants were more accurate to respond during target-present trials when the self-face was present within the largest set size, set size 9, compared to face absent, familiar face present, and stranger face present trials. Participants showed differential response times to self-face trials compared to familiar face trials that similarly depended on set size. Specifically, participants were slower when the self-face appeared as a distractor compared to trials in which the familiar face appeared as a distractor during target-present, set size 6 trials. These preliminary results suggest that there may be some differential responding when the self-face vs. a familiar face appears as a distractor. However, the smaller sample used for these secondary analyses may not have had sufficient power to detect effects across all face types. As a result, we were unable to fully address the question of whether increased attention capture by the self-face may reflect a familiarity effect rather than motivational salience.
Finally, past research has also suggested that a positive self-evaluation or an implicit positive association with one’s self-concept may drive the self-face processing advantage (Ma & Han, 2010). For example, when participants were primed to reflect on negative personality traits, the self-face processing advantage was weakened (Ma & Han, 2012). However, past research has not examined links between automatic attention capture by the self-face and individual differences in self-esteem or self-consciousness. We specifically focused on social anxiety scores based on initial analyses indicating that this measure was highly correlated with the other self-consciousness subscales as well as self-esteem scores. Previous research has identified similar links between social anxiety and self-esteem (e.g., He, 2022). Social anxiety reflects a focus on the public parts of the self, but which must be accompanied by uneasiness of being judged by others (Scheier & Carver, 1985). In the current study, lower social anxiety was associated with a more robust automatic attention capture by the self-face compared to either no face or a stranger face. Although we did not have a priori hypotheses about the specific subscales within the Self-Consciousness Scale–Revised, based on this previous research, we predicted that individuals who report lower self-consciousness and higher self-esteem would show more robust attention capture by the self-face. Those with a positive self-evaluation are less likely to be uneasy about the possibility of being judged by others, reflected in low social anxiety levels. Because lower social anxiety may be an indicator of more positive self-evaluation, this finding is consistent with previous evidence that positive self-evaluation may facilitate automatic orienting to the self-face (Ma & Han, 2010; Ma & Han, 2012). It is also possible that individuals with low social anxiety may have shown more robust attention capture by the self-face because their self-esteem and
positive self-evaluations remained unscathed, therefore allowing the dopaminergic pathways that mediate both reward and self-face processing to facilitate increased attention to the self-face.

**Limitations and Future Directions**

Present results indicate that the self-face automatically captures attention to a greater extent than faces of strangers. The increased salience of the self-face may facilitate adults’ automatic orienting towards this face, even when it competes with multiple inputs. In a world partially driven by online meetings and lectures, the present study may give us insight into one factor that may drive efficacy of these meetings (e.g., when is it beneficial for people to keep their cameras on/see their own face). Because attention orienting is so important to how we interact with and learn from the world, future work can use eye tracking to systematically determine whether automatic orienting biases to the self-face compared to faces in general generalize to naturalistic settings. For example, previous work has used eye tracking to examine the role of exogenous orienting in attention orienting, specifically to faces, across development, in natural scenes in the environment (Amso et al., 2014). Similarly, the design of the task in the current study was such that the only person viewing the participants’ face in the task while it was being completed was the participant themselves. It is possible that a social context might modulate current findings, thus future work should aim to investigate automatic orienting to the self-face in social contexts. Because the present study did not have complete power to fully investigate the role of familiarity in attention biases to the self-face, future work is needed to distinguish the role of familiarity in adults’ orienting to the self-face. Current work and past work using similar versions of this attention capture task (Hunter &
Markant, 2023a) suggests that the observed orienting biases may be sensitive to task context. Additional research is also needed to further investigate how set size or search strategies modulate the effects of automatic orienting in attention capture tasks. Although we used neutral expressions for all faces in the task and attempted to minimize variations in low-level visual properties across the three faces, adults may have interpreted the neutral expression in the photo of their own face differently than that of the other faces. For example, past work found that positive (i.e., happy) faces are detected more quickly than negative (i.e., disgusted, or sad) faces in a face categorization task (Kirita & Endo, 1995) and in a face recognition task (Leppänen & Hietanen, 2004). This past research suggests that in the present study, facial expressions may have had an impact on participants’ orienting responses, so future work is needed to rule out a potential role of different facial expressions. The present study also had a larger number of female participants than male participants, so future work should attempt to investigate automatic attention capture of the self-face across a more generalizable population. To investigate the role of positive self-evaluation in automatic attention capture by the self-face, participants completed self-reports. Given that self-report data can be limited by several biases, such as response bias, future work investigating links between individuals’ self-evaluation and attention to the self-face should include objective, non-self-reported self-evaluative data (e.g., Rosenman et al., 2011).

**Conclusion**

Humans use attention orienting when examining the world around them, which allows them to shift their attention to engage with selected relevant information in the environment. Previous research has shown that humans are biased to orient to faces (e.g.,
Riby et al., 2012) because they carry important biological and social significance and meaning (Lavie et al., 2003), and it is therefore adaptive to look at faces more than other non-face stimuli (Brédart et al., 2006). The current study expands upon previous research investigating whether automatic orienting to faces varies based on face type (e.g., Hunter & Markant, 2023a; Hunter & Markant, 2023b). Past research has demonstrated enhanced processing of and attention to the self-face compared to faces of strangers and familiar individuals. However, while some research indicates that selective attention was biased to the self-face (Brédart et al., 2006), others suggest that the self-face advantage is limited to attention holding (i.e., duration or looking; Devue et al., 2009) or may occur only transiently or under specific conditions (Devue & Brédart, 2008). Furthermore, it is unclear whether the self-face processing advantage reflects the motivational salience of the self-face (Bola et al., 2021; Ota & Nakano, 2021), a familiarity effect (Brédart et al., 2006; Julie & Kumar, 2021), or a positive association with one’s self-concept (Ma & Han, 2010; Ma & Han, 2012). The current study expands upon previous findings by demonstrating that the self-face captures adults’ attention to a greater extent than stranger faces and suggests that this processing advantage may be driven by motivational salience. These findings converge with previous studies demonstrating that individuals exhibit automatic orienting to other motivationally salient faces, such as caregivers (e.g., Hunter & Markant, 2023a). The current study also identified a link between lower social anxiety and enhanced attention capture to the self-face, suggesting that automatic orienting to the self-face is driven by positive self-evaluation. Finally, although we found some evidence that participants differentially responded when the self-face and familiar faces appeared, it remains possible that this orienting bias to the self-face may be driven by familiarity.
Overall, the present study indicates that the self-face automatically captured attention to a greater extent than stranger faces, meaning that our own face might be distracting.

References


https://doi.org/10.1038/s41593-018-0152-y.

https://doi.org/10.3758/BF03206442.


https://doi.org/10.3758/BF03211642.

https://doi.org/10.1080/17470210500343678.


https://doi.org/10.1016/j.neuroimage.2007.11.006


https://doi.org/10.1016/j.cognition.2009.01.003.


Ferrari, V., Codispoti, M., Cardinale, R., & Bradley, M. M. (2008). Directed and


https://doi.org/10.1177/20416695211032993

https://doi.org/10.1177/1073858413514136

https://doi.org/10.1016/0001-6918(94)00021-8

https://doi.org/10.1016/S1364-6613(00)01452-2

https://doi.org/10.1016/j.cognition.2007.07.012

https://doi.org/10.1111/1467-9280.03453

https://doi.org/10.1007/s00426-003-0157-2

https://doi.org/10.1080/17588928.2015.1044428


party phenomenon: One’s name captures attention, unexpected words do not.
*Journal of Experimental Psychology: Learning, Memory, and Cognition, 47*(2),


for use with general populations. *Journal of Applied Social Psychology, 15*(8),

irrelevant singletons. *Journal of Experimental Psychology: Human Perception
and Performance, 24*(5), 1342–1353. https://doi.org/10.1037/0096-
1523.24.5.1342.

https://doi.org/10.1080/13506280500410949.


RSE

Please record the appropriate answer for each item, depending on whether you
Strongly agree, agree, disagree, or strongly disagree with it.

1 = Strongly agree
2 = Agree
3 = Disagree
4 = Strongly disagree

_____ 1. On the whole, I am satisfied with myself.
_____ 2. At times I think I am no good at all.
_____ 3. I feel that I have a number of good qualities.
_____ 4. I am able to do things as well as most other people.
_____ 5. I feel I do not have much to be proud of.
_____ 6. I certainly feel useless at times.
_____ 7. I feel that I'm a person of worth.
_____ 8. I wish I could have more respect for myself.
_____ 9. All in all, I am inclined to think that I am a failure.
_____ 10. I take a positive attitude toward myself.
SCSR

Please answer the following questions about yourself by darkening in an appropriate circle on your IBM answer sheet. For each of the statements, indicate how much each statement is like you by using the following scale:

3 = a lot like me
2 = somewhat like me
1 = a little like me
0 = not like me at all

Please be as honest as you can throughout, and try not to let your responses to one question influence your response to other questions. There are no right or wrong answers.

1. I'm always trying to figure myself out.
2. I'm concerned about my style of doing things.
3. It takes me time to get over my shyness in new situations.
4. I think about myself a lot.
5. I care a lot about how I present myself to others.
6. I often daydream about myself.
7. It's hard for me to work when someone is watching me.
8. I never take a hard look at myself.
9. I get embarrassed very easily.
10. I'm self-conscious about the way I look.
11. It's easy for me to talk to strangers.
12. I generally pay attention to my inner feelings.
13. I usually worry about making a good impression.
14. I'm constantly thinking about my reasons for doing things.
15. I feel nervous when I speak in front of a group.
17. I sometimes step back (in my mind) in order to examine myself from a distance.
18. I'm concerned about what other people think of me.
19. I'm quick to notice changes in my mood.
20. I'm usually aware of my appearance.
21. I know the way my mind works when I work through a problem.
22. Large groups make me nervous.