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Influence of Others on Cross-Race Identifications:

Social Facilitation and the Cross-Race Effect

by:

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Abstract

Influence of Others on Cross-Race Identification:

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Jesse N. Rothweiler

The purpose of this study was to examine how the presence of an audience affects same and cross-race identifications from a lineup. Our participants completed both same-race and other-race simultaneous lineups. Participants completed these lineups either in the presence of others or in a room alone. We found that other-race identifications produced less accuracy and less confidence than same-race identifications. While less accurate and less confident, other-race identifications required a longer amount of time to respond to than same-race identifications. Although these findings provide additional support for the cross-race effect, they were also limited. Additional data can improve the scope of these findings. Despite these limitations, the findings provide evidence of the cross-race effect in simultaneous lineup identifications. Together, these findings can inform the criminal justice system on the disparities of cross-race lineup identifications.

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Chapter One:

Introduction

Identification of others is a process experienced daily. As we encounter many faces, we can distinguish friends from people we do not know. For many years, facial recognition has been argued to be different from other types of object recognition (Tanaka & Farah, 1993). For example, non-face objects (e.g., houses) are processed by identifying the separate features of an object, whereas faces are processed by identifying the whole face. Thus, the processing of faces is unique in that faces are processed holistically, meaning that a face is stored in memory as an entire unit instead of as a set of separate features (e.g., eyes, nose, mouth). If the person is of a different race, our ability to identify their face is usually worse than if the person is of the same race as us; this is known as the cross-race effect (CRE: Meissner & Brigham, 2001). A majority of the literature on the CRE has been focused on why the effect occurs, rather than how it is applied to real-world scenarios (Levin, 2000; Michel & Caldara, 2006).

Recently, the CRE and confidence in identifications have been studied in lineup scenarios, similar to those used in criminal investigations (Dodson & Dobolyi, 2015). One factor that may influence the CRE in real-world situations is the presence of an audience. An audience has the ability to improve or worsen performance on a task, known as social facilitation, and it is brought about by a change in arousal (Bond & Titus, 1983). The current study investigated how the presence of an audience affects cross-race identifications. To elaborate upon how an audience may affect cross-race identifications several areas of research are addressed. First, a landmark study in facial processing is discussed as a foundation for understanding facial recognition and identification (Tanaka & Farah, 1993). Next, the current body of literature on the CRE is described, which includes explanations and support for various theories of the CRE, followed by how the CRE is applied. In addition to investigating the CRE, theories explaining social facilitation are examined. Furthermore, the CRE and social facilitation bodies of literature are merged in order to understand the effects that an audience may have on cross-race identifications, something that has not previously been examined.

Facial Processing

In a landmark study of facial processing, Tanaka and Farah (1993) determined that processing of a normal face is different from non-face objects, scrambled faces, and inverted faces. Tanaka and Farah compared feature-based processing and holistic processing approaches to facial recognition. In feature-based processing, identification of a face would be possible from viewing one feature (e.g., the nose) separate from the context of the face. Comparatively, holistic processing considers the entire face to be a single representation. Thus, the identification of an individual would not be probable using one feature removed from the context of the entire face. In a series of experiments, Tanaka and Farah's participants viewed normal faces, scrambled faces (all facial features were present, but in non-normal locations), inverted faces (the features were in the correct placement on the face, but faces were upside down), and non-face objects (i.e., houses) prior to testing. Faces that were learned during this time were given a name (e.g., Larry). During testing, participants viewed previously learned faces at the same time as an altered face (see Figure 1). From these images participants had to indicate which face belonged to one of the previously learned people (e.g., Larry). Tanaka and Farah determined that facial identification was better when the entire (normal) face was presented, compared to scrambled faces, inverted faces, and houses. Additionally, when faces were identified using one feature, they were better identified when the feature was within the context of the normal whole-face. Comparatively, faces learned in a scrambled format were better identified when a single feature was presented outside of the context the face. These findings suggested that faces are processed as a whole, and importantly, that holistic processing does not expand to scrambled faces, inverted faces, and objects. While Tanaka and Farah's study is considered a landmark study in facial recognition literature, the holistic processing of faces has been expanded to explain the differences in facial identification of people of the same race (SR) and of other races (OR).

The Cross-Race Effect

Findings differentiating the ability to accurately identify people of the SR and of OR have been documented for over 100 years (Feingold, 1914). In recent years, the impaired identification of OR faces compared to SR faces has been termed the cross-race effect (CRE) and is also known as the other-race effect and the same-race bias (Meissner & Brigham, 2001). Memory for OR and SR faces are compared in order to examine the CRE, in which memory for OR faces is worse than SR faces (Dodson & Dobolyi, 2015; Michel & Caldara, 2006). The difference in identification ability has been explained by two main theories: perceptual expertise theory and social-cognitive theory (Tullis, Benjamin, & Liu, 2014). The perceptual expertise theory is based on the experience and contact that the person being tested has with members of OR groups. Accordingly, less contact with OR groups would be related to a higher CRE. In comparison, the social-cognitive theory suggests that the CRE is caused by differences in the ability to process OR faces, suggesting that the encoding of faces is different when the face is from an OR. A highlight of social-cognitive theory is cognitive disregard, in which identification of

OR faces begins by determining that the face is from an "out-group" and that attending to the features within the face is unnecessary (Bernstein, Young, & Hugenberg, 2007).

One of the most impactful studies in the area of CRE was focused on determining if the perceptual expertise theory is responsible for the CRE (Levin, 2000). Within this study, it was determined that expertise with SR faces does not explain the CRE, as demonstrated by the ability to locate an OR face in a group otherwise consisting of SR faces. These findings were expanded by having participants detect changes in SR and OR faces on a spectrum, which ranged from stereotypical "Black" features on a Black face to less stereotypical "Black" features on a Black face, and stereotypical "White" features on a White face to less stereotypical "White" features on a White face. Participants were presented two faces and had to determine which was closer to one of the stereotypical end points. Half of the faces presented were White and half were Black. Overall, Levin (2000) determined that the more stereotypical the OR face, the easier it was to categorize the face as similar to the stereotypical OR end point. Easier detection was proposed to be due to the familiarity with stereotypical face representations of OR faces. Levin offered that having more interactions with stereotypical facial features opposed to non-stereotypical features allowed for better OR identifications, which provided support for the perceptual expertise theory.

Additional support for the perceptual expertise theory has been demonstrated through self-paced learning tasks and composite face task procedures (Tullis et al., 2014; Michel & Caldara, 2006). When people are provided with an unlimited amount of time to learn a face (and knowing that later they will be tested on facial recognition), the CRE is still observed (Tullis et al., 2014). Furthermore, when examining composite faces, or faces formed by combining several faces into one image, Michel and Caldara (2006) found that the processing of aligned faces (faces shown as a whole face) were better than processing of misaligned faces. This composite-effect was found for both SR and OR faces, suggesting that facial processing is holistic for both SR and OR. In addition, the aligned faces were better identified for SR faces. Michel and Caladara suggested that this difference is because the holistic representations of SR faces are more defined in memory because more interactions with SR faces reinforced these representations.

Horry, Cheong, and Brewer (2015) attempted to determine if the CRE was causing differences in holistic processing of OR faces. Tanaka and Farah (1993) used only White male participants to analyze the processing of White male faces, thus determining that SR faces are processed holistically, but not indicating that all faces (including OR faces) are processed holistically. Horry et al. utilized a composite face task in which participants learned male and female faces then completed a recognition task that utilized composite faces. The composites were always combined at the middle of the face (dividing upper and lower face regions). There were four possible options of recognition task: (1) the upper and lower of the face were both from a target face; (2) both the upper and lower face were from a non-target face (congruent); (3) the upper part of the face was from the target and the lower part of the face was from a non-target; and (4) the upper part of the face was from a non-target and the lower part of the face was from a target (incongruent; see Figure 2). All participants made judgements on the top portion of the face. They then indicated if they recognized the face as a target face. Overall, participants were best at identifying target faces if both the upper and lower portion were from the target (Option 1). Similar to Tanaka and Farah's results, Horry et al. demonstrated that facial processing is holistic in nature (the entire face was needed to make the most accurate identification). Horry et al. also established that overall, discriminability was worse for OR faces than for SR face. Unexpectedly, no CRE was found when comparing congruent to incongruent faces, indicating that both SR and OR faces are processed holistically. Horry et al.'s results counter the social-cognition theory of the CRE, indicating that the difference between SR and OR identification is not due to a difference in processing ability.

Even with the findings of Horry et al. (2015) there is disagreement in the literature that defines the CRE as occurring due to a difference in holistic processing. Wang et al. (2015) sought to determine if the regions of the face (upper or lower) made a difference in the ability to process OR and SR faces. They manipulated both featural components (i.e., size of eyes and mouth) and configural components (i.e., spacing between eyes and spacing between nose and mouth). Participants determined if there was a difference in the face shown as compared to target faces that were previously learned. Overall, Wang et al. determined that there was a difference between OR and SR faces in ability to detect a change (both featural and configural), demonstrating the CRE. More specifically, both configural and featural changes were more difficult to detect in the upper region of the face for OR faces. Comparatively, in the lower region of the face configural differences did not impact detection, and the featural changes produced inconsistent results across levels of change; only minute changes produced a CRE in which OR faces were more challenging to detect differences. Thus, Wang et al. determined that even if facial processing is holistic, different regions (upper and lower) of the face have different impacts on the CRE. Horry et al. failed to provide support that the

CRE is caused by a difference in holistic processing of OR faces. However, Wang et al. reforms these findings, by indicating that processing of faces may be different for OR faces, but only for the upper region of the face.

Conflicting support between perceptual expertise and social-cognitive theories of the CRE has been coupled with methodological differences in studying the CRE. Meissner and Brigham (2001) conducted a meta-analysis of 39 studies in order to determine contributing factors of the CRE. They tried to identify if the CRE has been reliable over time, if experience with other races influences the ability to identify OR faces (perceptual expertise), and if racial attitudes influence the CRE. Overall, support for the CRE has been reliable across methods and time indicating that individuals were 1.4 times more likely to correctly identify a person of the SR than OR. Moreover, individuals were 1.56 times more likely to wrongly identify someone of OR than SR. The combination of these findings demonstrated that the CRE has been present and reliable across the 30 years of literature analyzed. Additionally, it was determined that White individuals were less able to identify people of OR (greater CRE) than Black individuals. Further, the authors wanted to determine if how an individual feels about people of OR impacts their ability to identify OR faces. Although these findings have changed over time (i.e., more influence on CRE in older literature), negative feelings towards OR individuals have been determined not to affect the CRE. Meissner and Brigham suggested that experience with OR faces may not be causing the differences in identification as the perceptual expertise theory of CRE would imply. To further support this, Meissner and Brigham determined the amount of variability in the CRE determined by contact (experience) with OR faces. They demonstrated that only 2% of all variability of the CRE is explained by experience with OR people. Such results do not support the perceptual expertise theory of CRE, signifying that the CRE is due to a difference in ability to process faces of a different race better explained by the social-cognitive theory.

More recently, the CRE literature has advanced to having participants identify target faces in a lineup format rather than a sequential recognition task (Dodson & Dobolyi, 2015; Jackiw, Arbuthnott, Pfeifer, Marcon, & Meissner, 2008). There are two types of lineups that are often used in identification literature, simultaneous and sequential (Lindsay & Wells, 1985; Cutler & Penrod, 1988). Simultaneous lineups involve having participants make an identification while viewing multiple suspects at once (McQuiston-Surrett, Malpass, & Tredoux, 2006). Typically, research using simultaneous lineups will present the participant with six images. The participants then identify the perpetrator or indicates that they are not present. It is believed that participants make relative judgements in facial identification when using simultaneous lineups. Comparatively, sequential lineups present the same number of images overall, but these images are presented one at a time. Participants view a series of images that may contain the perpetrator to which they must respond “yes, this is the perpetrator” or “no, this is not the perpetrator” for each image. Lindsay and Wells suggested that sequential lineups are superior to simultaneous lineups, in that they may increase correct identifications while also decreasing false identifications. Steblay, Dysart, Fulero, and Lindsay (2001) conducted a meta-analysis examining studies that compare simultaneous and sequential lineups to provide insight into the effectiveness of sequential lineups. They demonstrated that improvements in sequential lineup identification are not as robust as Lindsay and Wells suggested. When comparing the large body of published and unpublished literature, sequential lineups only improve identifications when the perpetrator is absent from the lineup. When the perpetrator is present, simultaneous lineups produce better accuracy. McQuiston-Surrett et al. noted that the published literature promotes the use of sequential lineups, however, only certain methodologies produce a sequential lineup effect (Steblay et al., 2001). For example, if the lineup procedure ended after any identification was made (i.e., the stopping rule), accuracy of the identification was lower than if the lineup procedure continued. McQuiston-Surrett et al. warned that before sequential lineups become standard, a greater understanding of why the difference in ability to make identifications is needed.

Currently, as the CRE literature is applied to lineup identifications, simultaneous lineups are being used (Dodson & Dobolyi, 2015). In addition to using lineups, confidence is also measured for CRE identifications. These two modifications in studying the CRE have advanced the field by proceeding past understanding what causes the difference between SR and OR identifications, to focusing on how the CRE impacts confidence in identifications. Participants in Dodson and Dobolyi's study learned six White target faces and six Black target faces. After learning, the faces were placed into lineups of six people. Half of the lineups had a target-face present whereas the other half were target-absent. Participants identified which of the people in the lineup they learned previously or identified if they were not present. Dodson and Dobolyi found that no matter how confident a person was, the likelihood of the CRE was constant. Thus, even when people were very confident, they were just as likely to wrongly identify someone of the OR. Further, when choosing a person out of a lineup (any response other than "Not Present") people were overconfident in their responses for OR identifications, indicating that people were not adjusting their confidence levels for races that they were less able to identify (e.g., identify the wrong OR person, but is still confident in response). In contrast, this pattern was not found when participants answered “Not Present”; participants were neither overconfident nor under confident in their response for both OR and SR faces. To develop the application of the CRE, the lineup method used by Dodson and Dobolyi could be expanded. To extend this research the impact of others on these identifications could be measured.

Social Facilitation

The influence of others present during identification on cross-race identifications and confidence in one’s identifications is something that has not yet been examined. It is not common for a CRE study to report if there were any other people in the room when the task was completed, which may be a factor affecting identifications. The mere presence of other people can have a profound effect on our ability to complete a task. More specifically, performing a well learned (or simple) task in front of an audience would increase arousal and should increase performance, whereas performance would suffer when completing an unlearned (or complex) task in front of an audience, even though arousal is high (Cottrell, Sekerak, Wack, & Rittle, 1968; Zajonc & Sales, 1966). For example, a person who is a talented speaker should demonstrate strong speaking skills in front of an audience, whereas people who lack public speaking skills, would likely flounder presenting in front of others.

Social facilitation has been defined as a change in task performance when the task is completed in front of other people due to an increase in arousal levels (Aiello & Douthitt, 2001; Baron, 1986) and has been examined for over a century. The earliest form of social facilitation explored how the presence of an audience led to increased performance due to competition (Triplett, 1898). Triplett, examined what was later coined “co-action”, in which the participant directly interacts with the spectators. Although Triplett was the first to examine the effects of others on performance, the term social facilitation was not coined until Allport (1920) examined the difference between working as a group and working alone. Upon discovering that performance of the group was better than performance alone, Allport termed the phrase social facilitation to indicate that performance was aided when others were near. Although important to the development of social facilitation, the early works completed by Triplett and Allport, do not embody the current use of the term. From these early understandings of the influence of others on an individual’s performance, research has been divided into three main theories: drive theory, social comparison theory, and cognitive processing theory.

The earliest of these theories is drive theory, brought about by Zajonc and Sales (1966). They argued that all of the former literature on social facilitation could be explained by the increase in drive experienced in the presences of others. Drive theory is derived from Spence’s (1956) theory in which drive is explained by an overall increase in arousal. According to Zajonc and Sales, drive increases dominant responses. These dominant responses can be correct or incorrect, in that if a task is well-learned, then the dominant response should be the correct response. Consequently, in an unlearned task, dominant responses should be incorrect responses. In Zajonc and Sales’s study, participants learned nonsense words at various frequencies. These words were then presented during a pseudo-recognition task in which distorted visual stimuli were presented. Participants indicated which of the previously learned words was presented on the screen. Unknown to the participants, the distorted image was not always a previously learned word. Overall, words learned at a higher frequency, were produced more often during the pseudo-recognition task when the participant completed the task in the presence of an audience compared to completing the task in a room alone. Words that were learned at a lower rate were produced less frequently when in the presence of an audience than when the pseudo-recognition task was completed without an audience. Zajonc and Sales interpreted these results as the presence of others producing dominant responses, which would be correct (high frequency words) or incorrect (low frequency words). A main attribute of drive theory, is that social facilitation will occur in the mere presence of others. If mere presence is enough to elicit social facilitation, the audience does not need to be watching or evaluating the performance of the participant, they only need to be present.

The mere presence of others has since been disputed by Cottrell et al. (1968) who used a similar pseudo-recognition task as Zajonc and Sales (1966), but manipulated the type of audience. Participants completed the pseudo-recognition task in one of three conditions: alone, mere presence, and with an audience. In the audience condition, spectators viewed and evaluated the performance of the participants. In the mere presence condition, spectators were blindfolded and sat in the same room as the participants. Cottrell et al. found that the mere presence of others did not have a social facilitation effect on the task, however, having an active audience did. They argued that while drive is still the underlying cause of social facilitation, social comparison in the form of evaluation apprehension produces the drive (arousal) needed to demonstrate social facilitation effects. Baron (1986) furthered the findings of Cottrell et al., by suggesting that an audience produces deficits in cognitive processes. Specifically, the presence of an audience is a distraction from the task itself and provides pressure to complete the task.

It is important to note that both social comparison and cognitive processing theories evolved from the original drive theory (Zajonc & Sales, 1966). Due to the consistent debate surrounding the cause of social facilitation, Bond and Titus (1983) conducted a meta-analysis of 241 studies. From this analysis, it was shown that simple (or well-learned) tasks did not reliably produce social facilitation, in that the presence of an audience does not always increase performance of simple tasks. However, the presence of others does consistently impair performance on complex tasks. Notably, based on the debate laid out by Zajonc and Sales, and Cottrell et al. (1968), the meta-analysis compared the mere presence of others to an evaluative audience. It was determined that the mere presence of others does produce a social facilitation effect on simple tasks. However, there was no significant differences found when comparing audience types on complex tasks; both mere presence and an active audience produce equal detriments in complex task performance.

At the time of Bond and Titus’s (1983) meta-analysis, physiological recordings were just beginning to be used in social facilitation research. There were concerns about the term arousal being the basis for drive theory, but arousal was never directly measured (Aiello & Douthitt, 2001). With the use of psychophysiological measures, there has been a shift from solely drive-based theories, which suggest that the presence of others produces overall increases in arousal levels, to social facilitation as a product of two distinct motivational states of arousal: challenge and threat (Blascovich, Mendes, Hunter, & Salomon, 1999). According to Blascovich et al., challenge is produced when a participant has the cognitive resources needed to complete the task. Related to earlier literature (Baron, 1986; Cottrell et al., 1968), challenge states should be produced during simple or well-learned tasks. Threat is produced when a participant does not have the resources needed to complete a task, similar to complex or unlearned conditions. These two states produce different physiological reactions. Overall, both challenge and threat increase cardiac activity, but threat also increases vascular resistance (i.e., more difficult to pump blood into the veins; Blascovich & Tomaka, 1996). Blascovich et al. used various cardiovascular measures (e.g., impedance cardiography, electrocardiography, and blood pressure) to determine if social facilitation placed participants in physiological arousal states of challenge or threat. Participants completed a well-learned and an unlearned task either alone or in the presence of others. As expected, accuracy increased in the presence of others during the learned task, but decreased during the unlearned task. The presence of an audience increased states of arousal, partially supporting the drive-based theories (Baron, 1986; Cottrell et al., 1968; Zajonc & Sales, 1966). Further, during the well-learned task, participants demonstrated cardiovascular responses representing challenge, but their physiological reactions during the unlearned task was related to threat.

No single theory has fully explained the underlying cause of social facilitation (Park & Catrambone, 2007; Wolf, Bazargani, Kilford, Dumontheil, & Blakemore, 2015), yet the literature is expanding into application. For example, recently Wolf et al. examined how social facilitation may affect adolescents more so than adults, specifically when their peers are the audience. Moreover, with the rise of technology and virtual realities, the effects of a virtual audience on task performance has begun to be explored.

Park and Catrambone have determined that a virtual audience has similar abilities to produce social facilitation. As demonstrated by social facilitation literature, the presence of others may negatively affect our performance, yet these detriments may go unnoticed (Baron, 1986; Blascovich et al., 1999; Zajonc & Sales, 1966). In high stakes performances, such as eyewitness lineup identifications, an audience, in the form of law officials, is often present, but the direct effects of an audience on lineup identification remain unexamined.

Present Study

Similar to Dodson and Dobolyi (2015), the current study analyzed accuracy, reaction time, and confidence for SR and OR lineups. In addition, we studied the presence of an audience to determine how it may influence the CRE. In social facilitation research, the presence of an audience has been demonstrated to increase the performance of tasks that participants are experienced with and hinder the performance of tasks that the participant is less skillful with (Blascovich et al., 1999; Cottrell et al., 1968; Zajonc & Sales, 1966). Participants in this study completed two phases: learning and testing. During the learning phase, participants viewed White and Black faces and were expected to become familiar with the faces for a later testing. Following a brief distraction task, participants then completed the testing phase. The testing phase required participants to identify the faces they had viewed previously from simultaneous lineups of six faces. Participants made these identifications in front of an audience, or they completed the identification task in a room alone.

Based on the social facilitation theory and the social-cognitive theory of the CRE, we hypothesized that when there is an audience present, participants will be more accurate at identifying a person of the SR, while accuracy will decrease for OR identifications. Additionally, the confidence of the participant was also measured. Based on the results of Dodson and Dobolyi (2015), we expected that confidence would be higher for identification of SR lineups compared to OR lineups without an audience present. It was also predicted that confidence for SR identifications would increase in the presence of an audience, similar to performance accuracy. However, it was predicted that confidence for OR identifications would be similar to confidence for SR identifications, despite the predicted low accuracy levels. It was proposed that the CRE in this study would be produced by social-cognitive differences with OR faces and not due to perceptual expertise differences. The difference in processing of OR and SR faces mirrored the differences in cognitive processes of well-learned versus unlearned tasks used in social facilitation literature.

Chapter Two:

Method

Participants

A total of 99 participants (83 women) completed this study (M_{age} = 20.61). Participants were recruited using the Towson University's Psychology Department Research Pool. This program allows students enrolled in a psychology course to participate in research studies for course credit. All participants indicated their race as Caucasian/White or African American/Black during the prescreen process to be selected for participation. The initial sample contained 72 White participants and 27 Black participants. Four participants were excluded from the analyses due to a technical malfunction at time of testing. Of the remaining 95 participants (M_{age} = 20.53; 81 women and 14 men), 27 identified as Black/African American, while 68 identified as White/Caucasian. Despite being predominantly White, our sample was closer to an equal proportion of Black to White individuals (1:2.52) than both the United State population (1:5.50; United States Census Bureau, 2010) and Towson University's population (1:3.93; United States Department of Education, 2014). Prior to completing the study, all participants signed an informed consent form (Appendix A), agreeing to participate.

Materials

Learning phase. Photos were collected from the Meissner Face Database. Six White faces and six Black faces were selected as targets (Appendix B). White targets were selected from materials used by Meissner, Tredoux, Parker, and MacLin (2005). Six Black targets were selected from the Meissner Face Database for this study. Similar to Dodson and Dobolyi (2015), during the learning phase, all target faces were presented in casual clothing with positive facial expressions. Images were presented on a computer screen using E-prime 2.0. To conclude the learning phase, a distraction task was provided. This task included basic mazes and math problems (Appendix C).

Testing phase. Due to the current use of simultaneous lineups when studying the CRE (Dodson & Dobolyi, 2015) and the warnings that sequential lineups need to be further investigated before being applied (McQuiston-Surrett et al., 2006), target faces and foils were entered into simultaneous lineups. The White lineups were used previously in Meissner et al. (2005). The creation of Black lineups occurred during pilot testing and were created following the steps outlined by Malpass and Lindsay (1999). Black faces were selected from the Meissner Face Database. A total of 20 participants provided modal descriptions of these faces. From these descriptions, five individuals sharing similar facial descriptions were selected from the database for each target. These faces were randomly placed into simultaneous lineups. A new set of participants (n = 125) were provided verbal descriptions of the target faces and then were asked to identify the targets from the lineups. Across these lineups, the average proportion that the targets were selected was .28 [95% CI: .19, .38].

The lineups consisted of six faces of one race. Six lineups contained White individuals and six contained Black individuals. A total of six lineups were target-present (i.e., three White lineups and three Black lineups) and six were target-absent. Target-present lineups contained one target and five foils, whereas target-absent lineups contained six foils. Target faces and foils were randomly assigned to a position in the lineup, and the order of the lineups were randomized. Within the lineups, the target faces and foils were shown with a neutral facial expression and were wearing identical maroon sweatshirts (Appendix D). The testing phase also required participants to rate their confidence in their identifications. Based Dodson and Dobolyi's confidence-scale comparisons, the scale ranged from 0% confident to 100% confident in increments of 10% (i.e., 11-point scale; see Appendix E). Participants completed this measure after every identification. Lineups and confidence scales were presented using Qualtrics. To conclude the testing phase, participants completed a manipulation check (Appendix F). This Likert-style scale measured to what extent participants experienced various states of arousal (i.e., nervous, anxious, relaxed, evaluated, and calm). The scale ranged from 1 (*not at all*) to 5 (*very much*). This scale was used as a manipulation check to determine that participants in the audience present condition experienced greater arousal levels than participants in the audience absent condition, consistent with social facilitation literature (Blascovich et al., 1999).

Procedure

Learning phase. Upon arrival, participants were randomly assigned to either the audience or no audience condition. All participants then began the learning phase. Participants always completed the learning phase alone (no audience). This task consisted of each participant learning the 12 target faces. Participants were instructed "At this time, you will be viewing several images of faces. These images will automatically appear on the screen one at a time and some of these images may be repeated. Please pay careful attention because your memory for these faces will be tested at a later time." These instructions were taken directly from Dodson and Dobolyi (2015). During the learning phase, faces were presented on the computer screen one at a time for 3 s. There was 1 s between the presentations of each face. Similar to Dodson and Dobolyi the faces were presented in randomized order as an attempt to prevent primacy and recency effects. Moreover, following Dodson and Dobolyi's procedure, each face was presented twice. To conclude the learning task, participants competed 5 min of a distraction task.

Testing phase. Following the distraction task, participants entered a separate room and were seated at a computer. At this time, if the participant was in the audience present condition, they were told instructions that were similar to those used by Blascovich et al. (1999). Specifically, participants were told, "during this task, another researcher will be entering the room to help me observe your performance on the task." Participants were then provided the instructions for the lineup identification tasks. Based on the instructions provided to participants by Dodson and Dobolyi, participants were told, "You will now go through a series of lineups in which your goal is to determine whether or not one of the people you saw earlier is present in each lineup. Lineups will consist of six faces shown together. In each lineup, only *one* face may correspond to someone you saw earlier, but be aware that the photo will not be identical. It is possible for all six people in a lineup to be ones you have not seen earlier. Either way, focus on just the faces: all lineup faces will be shown with identical clothing and a neutral facial expression. If you recognize a person in a lineup, select the number that corresponds to its position on the Response Guide. If you do not recognize any of the people, select the "Not Present" option. Following every lineup you will be asked to rate your confidence in your selection. You will rate your confidence on a scale from 0 -100%."

During the identification task, participants viewed a total of 12 lineups: Six white lineups and six Black lineups. Participants were given as much time as needed to complete this task. On the screen, participants viewed a lineup consisting of six people and an option that read “Not Present.” Number options were presented below the lineup representing each possible selection (see Appendix G). In front of the computer was a Response Guide that provided a number that represented the location of a response in the lineup (see Appendix H). In order to make a response on the identification task, participants were required to select the number from the Response Guide that corresponded to the image they wanted to select. Following every lineup identification, participants completed a confidence rating. The presentation order of lineups was counterbalanced. After responding to the 12 lineups and their corresponding confidence ratings, participants completed the manipulation check to ensure that participants in the audience-present condition experienced higher levels of arousal than participants in the audience-absent condition. Following the manipulation check, participants were debriefed and were granted course credit.

Chapter Three:

Results

Manipulation Check

To test the assumption that the audience condition elicited arousal, we measured self-report of nervousness, anxiety, and the feeling of being judged. An independent samples *t*-test indicated that there was not a significant difference in reports of nervousness, $t(93) = 1.69$, $p = .094$. However, as seen in Figure 3, participants in the audience-present condition ($M = 2.74$, $SD = 1.21$) were significantly more anxious than participants in the audience-absent condition ($M = 2.13$, $SD = 1.14$), $t(93) = 2.57$, $p = .012$, Cohen's $d = 0.53$ [95% CI: 0.29, 0.76]. Similarly, the presence of an audience significantly impacted self-reports of feeling judged, $t(93) = 4.98$, $p < .001$, Cohen's $d = 1.03$ [95% CI: 0.81, 1.26]. Participants in the audience-present condition ($M = 2.81$, $SD = 1.26$) felt significantly more judged than participants in the audience absent condition ($M = 1.67$, $SD = 0.95$; see Figure 4).

Accuracy

In line with Signal Detection Theory (Tanner & Swets, 1954), there were four possible responses in the facial identification task. Target present lineups allow for three response types within Signal Detection Theory: hits, misses, and false alarms. A hit indicated that a participant selected the target from the lineup, whereas, a miss indicated that the participant selected "Not Present." Within target-present lineups, false alarms occur when a foil is selected from the lineup instead of the target. However, false alarms from target-present lineups are not used in analyses. Lineups that do not present a target (i.e., target-absent lineups) allow for two responses in line with Signal Detection Theory:

false alarms and correct rejections. A false alarm (FA) occurred when a participant incorrectly selected a foil in an audience absent lineup. In contrast, a correct rejection occurred when a participant correctly selected “Not Present” in a target absent lineup. These four responses were used to create Hit rates and FA rates. The formulas are as follows:

$$\text{Hit Rate} = \frac{\text{Hits}}{\text{Hits+Misses}}$$

$$\text{False Alarm Rate} = \frac{\text{False Alarms}}{\text{False Alarms + Correct Rejections}}$$

These formulas represent the overall accuracy of selecting the correct person from a lineup (Hit Rate) compared to the overall inaccuracy of selecting an incorrect person from a lineup (False Alarm Rate).

A 2 (Audience: Present vs. Absent) x 2 (Identification Type: Other-race vs. Same-race) mixed design ANOVA was computed to examine the impact of the presence of an audience on Hit Rate for OR and SR facial identifications. Parametric analyses were used because sphericity was assumed as there were only two levels of the Identification Type factor. Further, Levene’s Test of Equality of Error Variances for OR identifications, $F(1, 85) = 1.17$, $p = .282$, and SR identifications, $F(1, 85) = 0.02$, $p = .877$, were not violated. Therefore, parametric analyses were appropriate for the between-subjects factor, Audience. A main effect of Identification Type was not found, $F(1, 85) = 2.07$, $p = .154$, power = .30. In addition, a main effect of Audience was not found, $F < 1$, power = .12.

Similarly, the interaction between Audience and Identification Type did not reach significance, $F < 1$, power = .08.

A 2 (Audience) x 2 (Identification Type) mixed design ANOVA was computed to examine the impact of the presence of an audience on False Alarm Rate for OR and SR identifications. Levene's Test of Equality of Error Variances were not violated for OR identifications, $F(1, 93) = 0.21$, $p = .652$, or SR identifications, $F(1, 93) = 0.59$, $p = .445$. Therefore, we proceeded with parametric analyses. A significant main effect of Identification Type was found, $F(1, 93) = 45.53$, $p < .001$, $\eta^2_p = .33$ [90% CI: .20, .44], power = 1.00. As illustrated in Figure 5, participants had a significantly higher False Alarm Rate on OR identifications ($M = .60$, $SD = .30$) than SR identifications ($M = .35$, $SD = .29$). In contrast, a main effect of Audience was not found, $F(1, 93) = 1.94$, $p = .167$, power = .28. The interaction between Audience and Identification Type did not reach significance, $F < 1$, power = .13.

Hit Rates and False Alarm Rates do not provide an overall representation of accuracy. To create a measure of discriminability, *d′* was computed. The discriminability measure (*d′*) reports the difference between correctly identifying a target (hit) and incorrectly identifying a foil in when the target is absent (false alarm). To have a high *d′* (discriminability), participants need to have a high Hit Rate while maintaining a low False Alarm Rate. To calculate *d′*, Hit Rates and False Alarm Rate are transformed to z-scores. The formula for d′ is as follows:

$$d' = Z_{\text{Hits}} - Z_{\text{False Alarms}}$$

The transformed data (*d′* scores) were analyzed in a 2 (Audience) x 2 (Identification Type) mixed-design ANOVA. These analyses were appropriate as Levene's Test of

Equality of Variance was not violated for OR facial identifications, $F(1, 85) = 0.31$, $p = .580$, or SR facial identifications, $F(1, 85) = 0.74$, $p = .391$. A main effect of Identification Type was found, $F(1, 85) = 21.20$, $p < .001$, $\eta^2_p = .20$ [90% CI: .09, .32], power = 1.00 (see Figure 6). Overall, participants demonstrated greater discriminability for SR identifications ($M = 0.39$, $SD = 0.44$) than OR identifications ($M = 0.06$, $SD = 0.49$). No main effect of Audience was found, $F(1, 85) = 3.71$, $p = .057$, power = .48 (see Figure 7). The Audience by Identification Type interaction was not significant, $F < 1$, power = .08.

Reaction Time

Upon an initial analysis of normality of the reaction time data, it was discovered that this data was significantly skewed. To normalize the data, a log transformation was applied. Following the log transformation, a maximum-likelihood exploratory factor analysis was computed to determine if each of the six OR identification reaction times can be factored together to report a singular reaction time score. The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, KMO = .74. An initial analysis was run to obtain the eigenvalues for each factor in the data. Two factors had eigenvalues larger than 1; together they accounted for 27.14% of the variance. The scree plot was ambiguous and justified retaining 1 or 2 factors. However, Factor 1 accounted for 22.05% of the variance and was maintained for further analyses, while Factor 2, accounting for only 5.09% of the variance, was not. Table 1 shows the factor loadings for each reaction time measurement onto the factor. All OR reaction time data clustered onto one factor, suggesting that a composite OR reaction time score would be appropriate. The six OR identification reaction values were averaged together to form a composite OR identifications reaction value.

A maximum-likelihood exploratory factor analysis was also computed for all SR reaction measures. The Kaiser-Meyer-Olkin value indicated appropriate sampling size was met, KMO = .73. The initial analysis indicated only 1 factor that accounted for 31.19% of the variance. Factor loadings for each SR reaction time can be viewed in Table 2. All reaction time measurements loaded onto this factor, therefore, a composite SR reaction time score was deemed appropriate. The log-transformed data were averaged into composite reaction time scores for OR and SR identifications. These values were then examined for normality. Upon examination of the skewness statistic, it was determined that the composite score for OR reaction times (Skew/*SE* = 2.46) and SR reaction times (Skew/*SE* = 1.68) were not significantly skewed.

The log-transformed reaction time composites were entered into a 2 (Audience) x 2 (Identification Type) mixed-design ANOVA. Levene's Test of Equality of Variances was not violated for OR, $F(1,93) = 0.00$, $p = .999$, or SR identifications, $F(1,93) = 0.28$, $p = .597$, thus justifying the use of parametric analyses. A significant main effect of Identification Type was found, $F(1, 93) = 15.06$, $p < .001$, $\eta^2_p = .14$ [90% CI: .05, .25], power = .97. Overall, less time elapsed when participants were responding to SR identification ($M = 11.94$, $SD = 1.30$) than OR identifications ($M = 13.20$, $SD = 1.30$; Figure 8). No main effect of Audience was found, $F < 1$, power = .08. The interaction between Audience and Identification Type did not reach significance, $F < 1$, power = .05.

Confidence

Similar to reaction time data, all OR confidence measures were entered into a maximum-likelihood exploratory factor analysis. The analysis reached sufficient sampling, KMO = .76. This analysis identified two factors that accounted for 52.28%. However, all measures of confidence did not load onto a single factor. Therefore, no composite measure of OR confidence could be computed. Additionally, a maximum-likelihood exploratory factor analysis of the SR confidence measurements was computed, KMO = .75. Similar to OR confidence measures, two factors were found, but all measurements did not load onto a single factor. Consequently, no composite confidence measure could be computed.

Instead of overall composite confidence scores for OR and SR identifications, the confidence ratings of the three OR target-present identifications were averaged together (skew/*SE* = 0.40). Averages were also computed for the three measurements of OR target-absent identifications (skew/*SE* = -1.10), SR target-present identifications (skew/*SE* = -2.43), and SR target-absent identifications (skew/*SE* = 0.00). This minimized the 12 confidence ratings into four measurements of average confidence. These measures were entered into a 2 (Audience) x 2 (Identification Type) x 2 (Target Presence: Present vs. Absent) mixed design ANOVA. Levene's Test of Equality of Error Variances was not violated for OR Present, OR Absent, SR Present, and SR Absent lineup identifications, all *F*s < 1.20, all *p*s > .05. A significant main effect of Identification Type was found, $F(1, 93) = 23.60$, $p < .001$, $\eta^2_p = .20$ [90% CI: .09, .31], power = 1.00. Overall, participants were more confident for SR identifications (*M* = 64.21, *SD* = 1.69) than they were for OR identifications (*M* = 57.26, *SD* = 1.72; Figure

9). Additionally, a significant main effect of Target Presence (see Figure 10) was found, $F(1,93) = 56.34$, $p < .001$, $\eta^2_p = .38$ [90% CI: .25, .48], power = 1.00. Participants were more confident when making selections from lineups that were target present (*M* = 65.64, *SD* = 1.59) than target-absent lineups (*M* = 55.84, *SD* = 1.77). However, the main effects were not qualified by an Identification Type x Target Presence interaction, $F(1,93) = 2.41$, $p = .124$, power = .34. In addition, no main effect of Audience was found, $F < 1$, power = .06, and the interaction between Identification Type and Audience was not significant, $F < 1$, power = .07. Furthermore, no interaction between Target Presence and Audience was found, $F < 1$, power = .12. Finally, the Identification Type x Target Presence x Audience interaction was not statistically significant, $F < 1$, power = .06.

Chapter Four:

Discussion

The purpose of the present study was to examine how the presence of an audience impacts accuracy, reaction time, and confidence of SR and OR facial identifications. Based on social facilitation theory, it was hypothesized that participants in the audience-present condition would demonstrate higher discriminability (i.e., performance) for SR faces than OR faces than participants in the audience-absent condition. Regardless of the presence or absence of an audience, however, it was determined that people are better at discriminating between correct and incorrect responses for SR lineups than OR lineups. The difference of discriminability for SR and OR identifications was likely driven by the difference in false alarm rates. Overall, participants correctly identified more SR faces than OR faces when the target was absent, but were equally accurate at identifying SR and OR targets when present.

It was further hypothesized that the audience-present condition would demonstrate elevated confidence for SR lineups compared to OR lineups, following the same trend as accuracy. While in the present study confidence was affected by the type of identification, audience presence did not affect confidence in one's identifications. Overall, participants were more confident for SR lineups than OR lineups. Additionally, confidence was greater for lineups containing the target than target-absent lineups. Further, reaction time data was measured. These analyses were exploratory, and no formal hypotheses were made for these data. Again, it was found that there was no impact of audience presence on the data. Yet, it was found that SR identifications were faster than OR identifications. Together, these findings demonstrate the power of the CRE. For accuracy, confidence, and reaction time, a difference was demonstrated for SR and OR facial identifications. In sum, participants were more accurate, more confident and faster when making SR identifications compared to OR identifications

The accuracy difference between SR and OR identifications has been well documented throughout the CRE literature (Dodson & Dobolyi, 2015; Levin, 2000; Meissner & Brigham, 2001). The present study provides further support for a difference in the discrimination index (*d′*) for SR and OR faces, expanding the literature supporting that SR identifications produce higher levels of discriminability. While the present study provides support for previous accuracy findings, this study demonstrates a different pattern for confidence in identifications. Dodson and Dobolyi reported worsened calibration between accuracy and confidence for OR identifications when using ROC curves. Their participants demonstrated heightened confidence reports and produced low discriminability for OR identifications. While, the present findings do not include measures of calibration, reported confidence was lesser for OR identifications than SR identifications, indicating that participants were aware of their diminished accuracy.

Unexpectedly, no effect of audience was found. There are two plausible explanations for these findings. First, it is possible that people are unskilled on lineup identifications regardless of the presence of an audience. Thus, participants may be experiencing a floor effect in discriminability. While there was an overall difference in discriminability for SR and OR identifications, the *d′* for both conditions (were very low OR *d′* = 0.06; SR *d′* = 0.39). Social facilitation theory poses that an audience will enhance performance on a skilled task but hinder performance on an unskilled task (Baron, 1983;

Blascovich et al., 1999; Zajonc & Sales, 1966). The ability to discriminate between foils and the target may be an unskilled task and therefore an audience would not impact SR and OR identifications differently. Presently, while not significantly different, discriminability for audience present lineups was less than for audience-absent lineups. While the impact of audience on discriminability did not reach significance, it is noteworthy that this analysis was substantially underpowered. If these results were to reach significance given more power, this may explain why no interaction between audience and identification type was found. That is, all lineups, regardless of identification type, may be an unskilled task. Additionally, as mentioned by Blascovich et al., an audience is expected to increase levels of arousal. While self-reported levels of arousal were increased for the audience-present condition, it is possible that this was masked by an overall arousal of participants completing lineup identifications. This arousal may be indicated from the nervousness self-report measure. Unlike the anxiety self-report, feelings of nervousness were not different across the audience conditions. Using self-reported nervousness as an indication of arousal may indicate that participants in both audience conditions were at equal levels of arousal. Therefore, the presence of an audience may not have contributed enough to increase the level of arousal required by drive theory to demonstrate social facilitation theory (Zajonc & Sales, 1966).

A second explanation of the present results has already been briefly mentioned, underpowered analyses. As reported above, all of the analyses that failed to reach significance were also underpowered. While obtaining adequate power may not change the overall outcome, interpreting the data of underpowered analyses might lead to overlooking an important effect. An insufficient sample size is a major limitation of this study. Presently, more data is being collected. After obtaining a better estimate of effect size from these preliminary data, an updated power analysis was computed.

A further limitation of the present study was the development of the Black lineups. As reported above, during pilot testing, participants selected the target, 28% of the time. If each face in a six-person lineup were equally likely to be chosen, the probability of choosing a face would be .17, a value not even captured by the lower bound of the confidence interval. It is possible that the Black lineups are biased, indicating that the targets may be too easily identified. The possible bias may partially explain why SR and OR faces were equally selected in target-present lineups (i.e., hit rate). Furthermore, given that our sample is majority White, this would indicate that the majority of the OR identifications were easier than anticipated by the researcher.

Given these limitations, the current findings still provided essential information. Most notably, the present study provides support for the CRE. Specifically, we replicated a diminished discriminability index for OR identifications compared to SR identifications. In line with previous findings (Dodson & Dobolyi, 2015), the difference between OR and SR identifications was characterized by an increase in false alarms for OR identifications. Moreover, the current study also demonstrated that although people take longer to make an identification for an OR lineup, they remain less accurate. Furthermore, confidence was lessened for OR identifications compared to SR identification, and confidence was lessened when the lineups were target absent compared to target present. Recalling that false alarm rates are driven by target-absent lineups and that OR identifications had increased false alarms, these data indicated that people are aware of their shortcomings and adjust their confidence appropriately. After obtaining a larger sample size, it is expected that calibrating accuracy and confidence using ROC curves would support these claims further.

The importance of these findings falls within their applications to the legal system. The CRE has been demonstrated using lineup identifications previously (Dodson & Dobolyi, 2015). The present study provides further support for findings of the CRE within simultaneous lineup identification tasks. The current findings support the need of further research on attempts to create procedures to improve the accuracy of OR identifications. Until these procedures are discovered, the results of this study can be used to inform the legal system on the decreased accuracy of OR identifications. However, it is important to note that additional data is required before asserting the impact and audience may have on OR identifications. If further data provide support for our hypothesis that an audience will facilitate SR identifications and hinder OR identifications, the present findings would have substantial implications for criminal lineup procedures. Follow-up studies further manipulating audience would be required, but these findings may be the first suggestion that having other people present (e.g., police officers and attorneys) during time of identification, may be detrimental to OR identifications.

Appendix A

Informed Consent Form

PRINCIPAL INVESTIGATOR: Jesse N. Rothweiler. PHONE: (717) 725-1853
EMAIL: jrothw3@students.towson.edu

Purpose of the study:
The purpose of the current study is to help us understand how memory capacity relates to facial processing. To be eligible to participate in this study you must be 18 years of age or older.

Procedures:
Today, you will be asked to view and learn a set of faces. You will then be asked to complete several memory tasks. Finally, you will be asked to make facial identifications in a lineup task. Your expected time commitment for this study is approximately 30 min.

Risks/Discomfort:
There are no known risks for participating in our study. Any discomfort that you experience during our study will be no different from that experienced in everyday life activities.

Benefits:
You will learn about memory and how laboratory research in psychology is conducted.
The results of our study will benefit society in that they will help us to further understand conditions that are most beneficial for facial identifications.

Alternatives to Participation:
Participation in this study is voluntary. You are free to withdraw or discontinue participation at any time. Withdrawal of participation at any time will not result in penalty or loss of benefits entitled to you.

Confidentiality:
Your privacy will be protected because you will not be identified by name as a participant in this project.
All records from this study will be kept confidential. Your responses will be kept private and we will not include any information that will make it possible to identify you in any report we might publish. Research records will be stored securely in a locked cabinet and on password protected computers. If you agree to join this study, please initial the statements and sign your name below.

_____ I have read and understood the information on this form.

_____ I have had the information on this form explained to me

____ ___________________
Subject's Signature Date

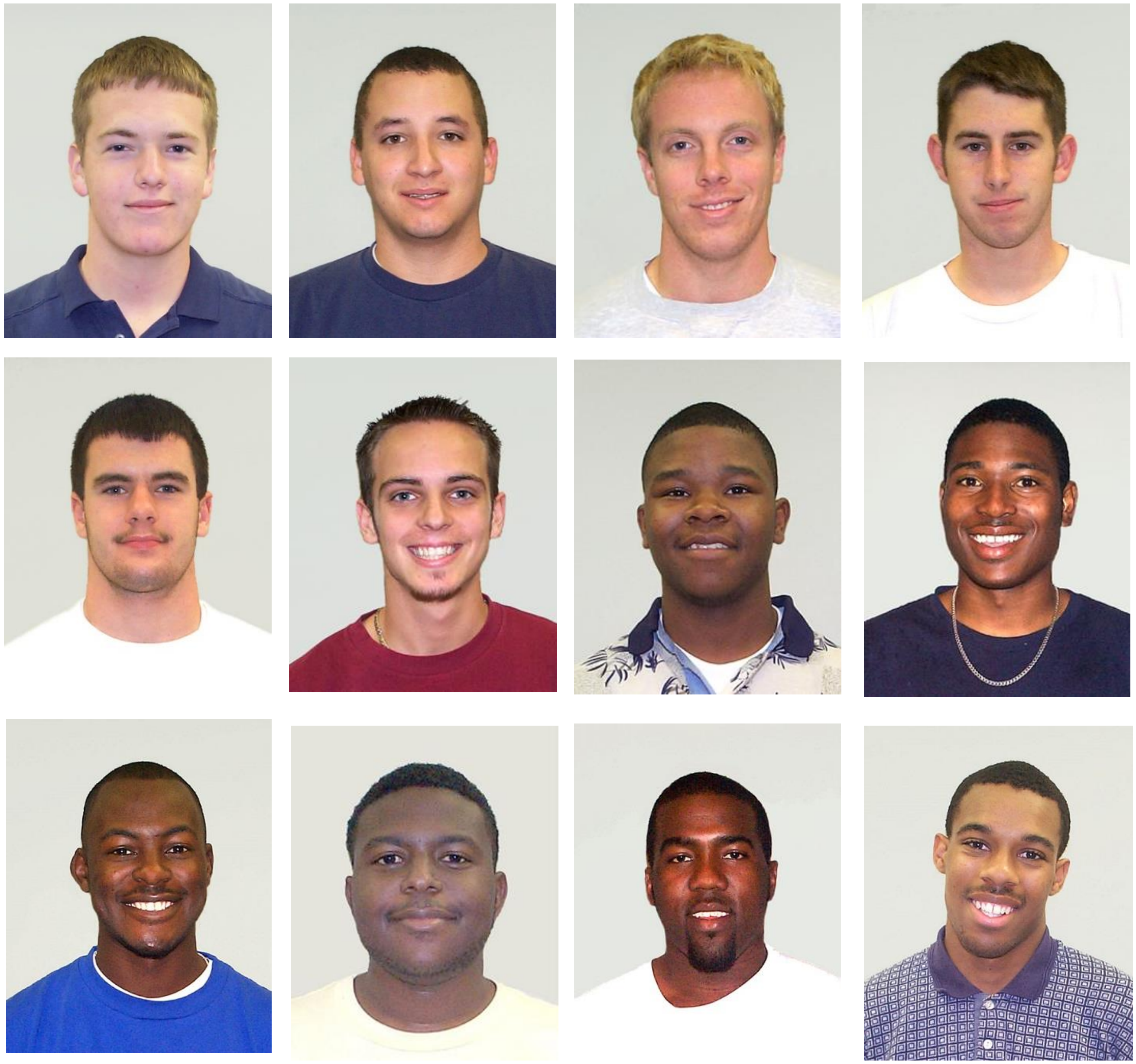
____ ___________________
Witness to Consent Procedures Date

If you have any questions regarding this study please contact Jesse Rothweiler at (717) 725-1853, faculty advisor, Dr. Kerri Goodwin at kgoodwin@towson.edu or the Institutional Review Board Chairperson, Dr. Debi Gartland, Office of University Research Services, 8000 York Road, Towson University, Towson, Maryland 21252; phone (410) 704-2236.

THIS PROJECT HAS BEEN REVIEWED BY THE INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN PARTICIPANTS AT TOWSON UNIVERSITY.
**If investigator is not the person who will witness participant's signature, then the person administering the informed consent should write his/her name and title on the "witness" line.

Appendix B

Learning Phase: Target Faces

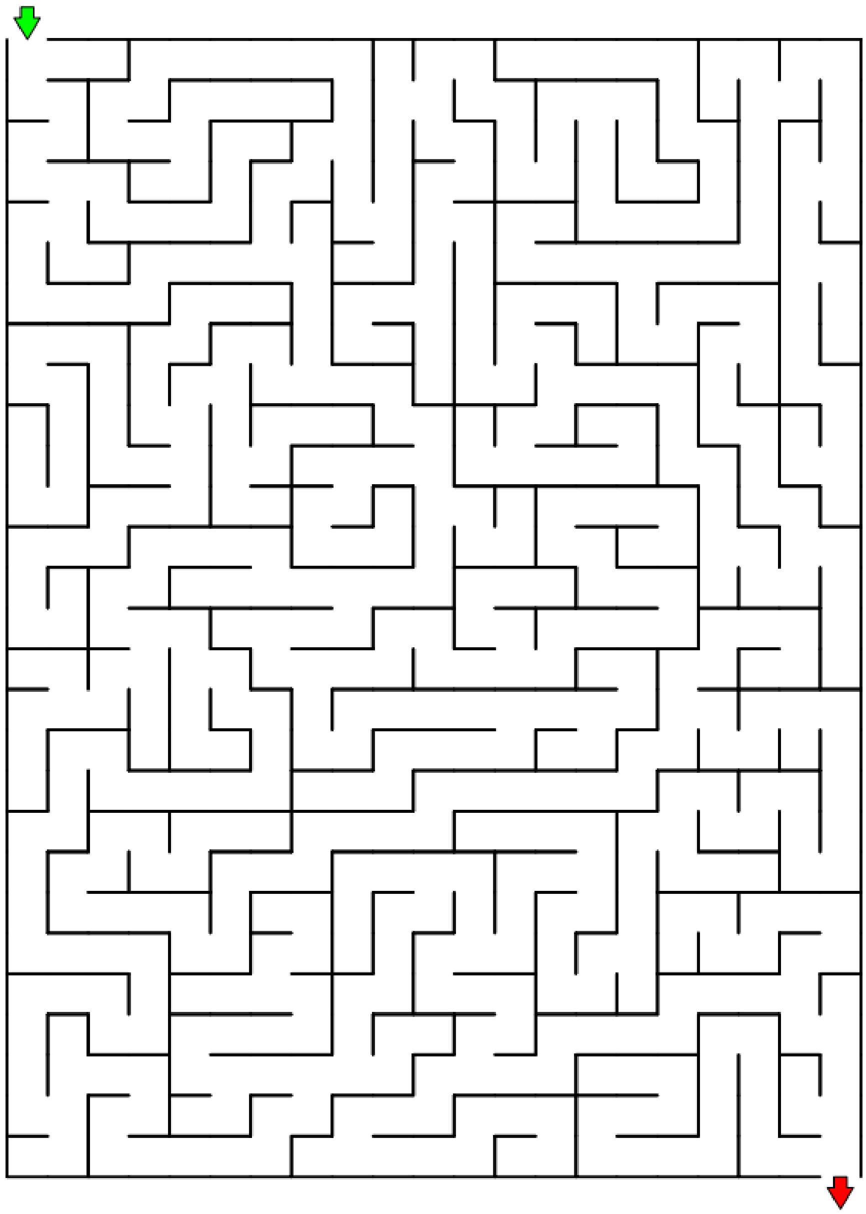


Note. All images came from the Meissner Face Database

Appendix C

Distraction Task

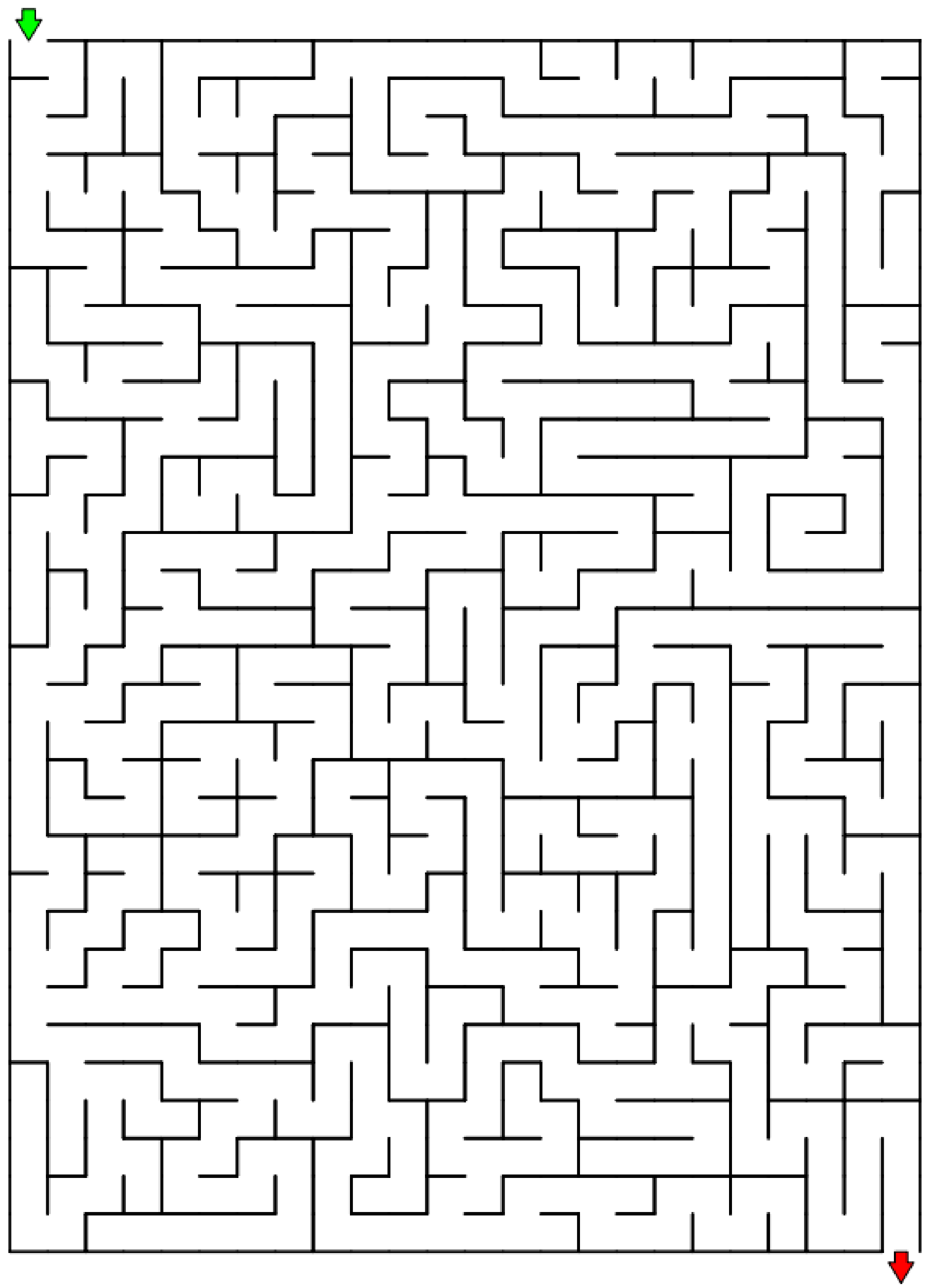
Please complete these tasks with as few errors as possible. Your errors on these tasks will be calculated and scored.



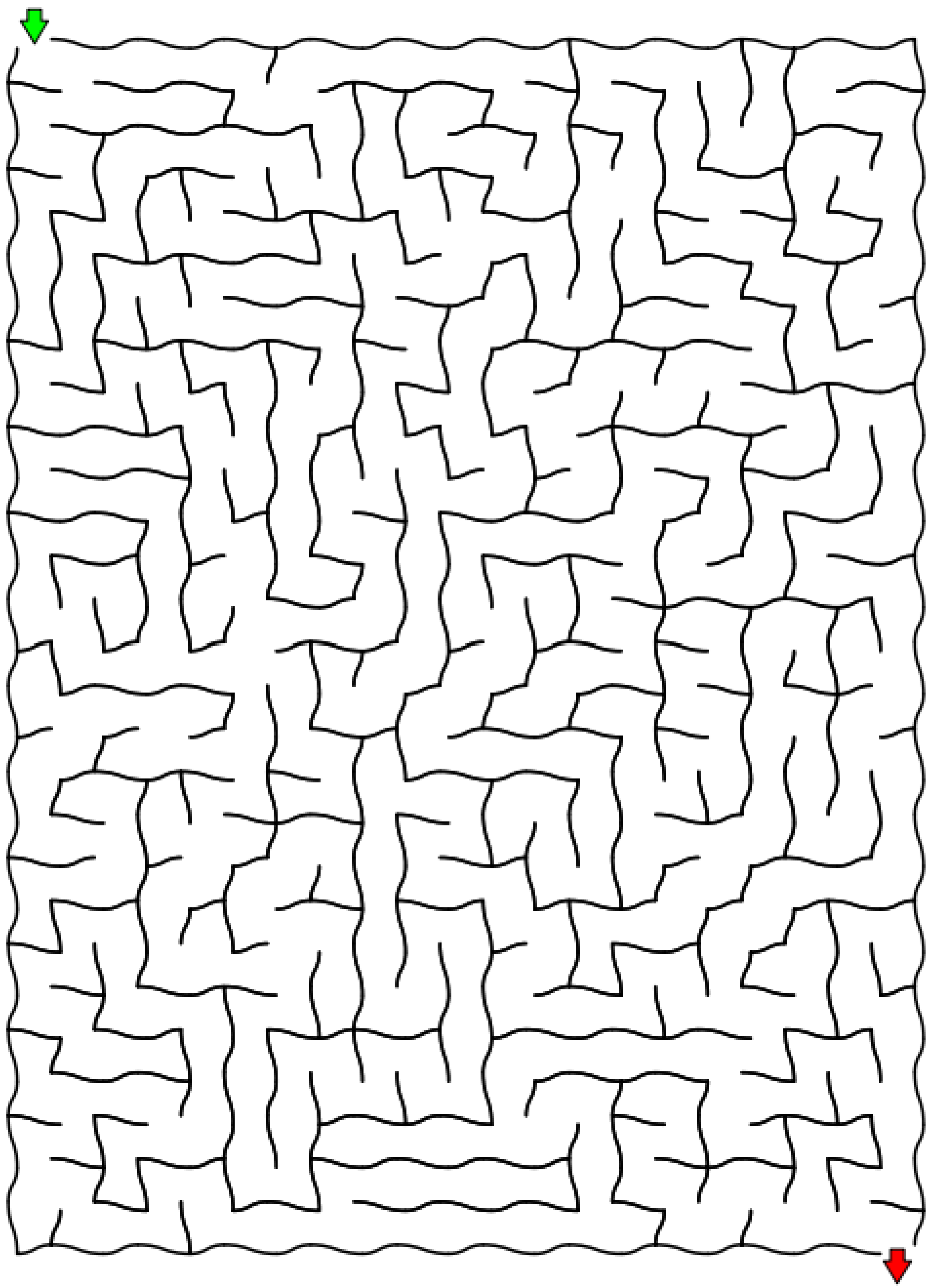
Please complete these tasks with as few errors as possible. Your errors on these tasks will be calculated and scored.

433 +9	886 +49	944 +13	537 +4	50 +55
524 +28	231 +14	159 +66	607 +84	506 +51
933 +15	218 +72	499 +91	800 +32	873 +76
915 +15	884 +31	645 +8	604 +35	264 +46
310 +89	186 +2	601 +55	234 +97	898 +36
262 +1	527 +83	484 +54	456 +81	540 +2

Please complete these tasks with as few errors as possible. Your errors on these tasks will be calculated and scored.



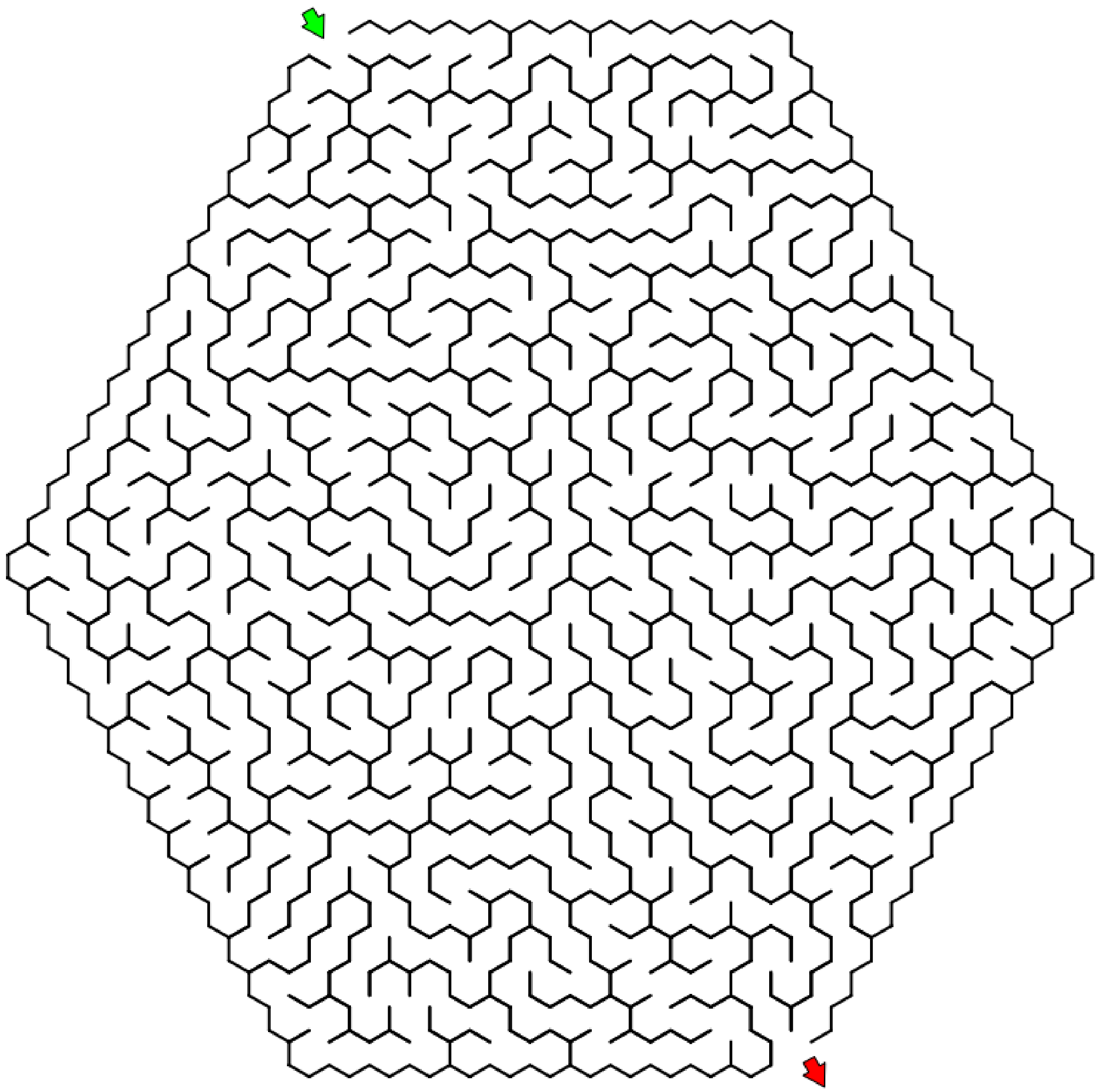
Please complete these tasks with as few errors as possible. Your errors on these tasks will be calculated and scored.



Please complete these tasks with as few errors as possible. Your errors on these tasks will be calculated and scored.

438 -9	726 -25	421 -1	664 -35	295 -14
631 -21	39 -36	570 -28	103 -95	481 -34
482 -45	345 -49	952 -58	791 -50	661 -13
103 -55	45 -12	512 -34	276 -84	84 -27
40 -6	597 -64	452 -31	5 -4	399 -60
12 -11	349 -41	242 -67	990 -17	278 -14

Please complete these tasks with as few errors as possible. Your errors on these tasks will be calculated and scored.



Please complete these tasks with as few errors as possible. Your errors on these tasks will be calculated and scored.

40 x48	34 x33	82 x17	13 x47	65 x29
66 x5	87 x0	91 x73	45 x73	63 x40
84 x90	73 x55	86 x96	16 x68	92 x4
31 x90	36 x77	77 x59	17 x87	27 x40
60 x15	96 x20	82 x39	77 x87	41 x85
39 x97	22 x2	77 x35	18 x91	30 x75

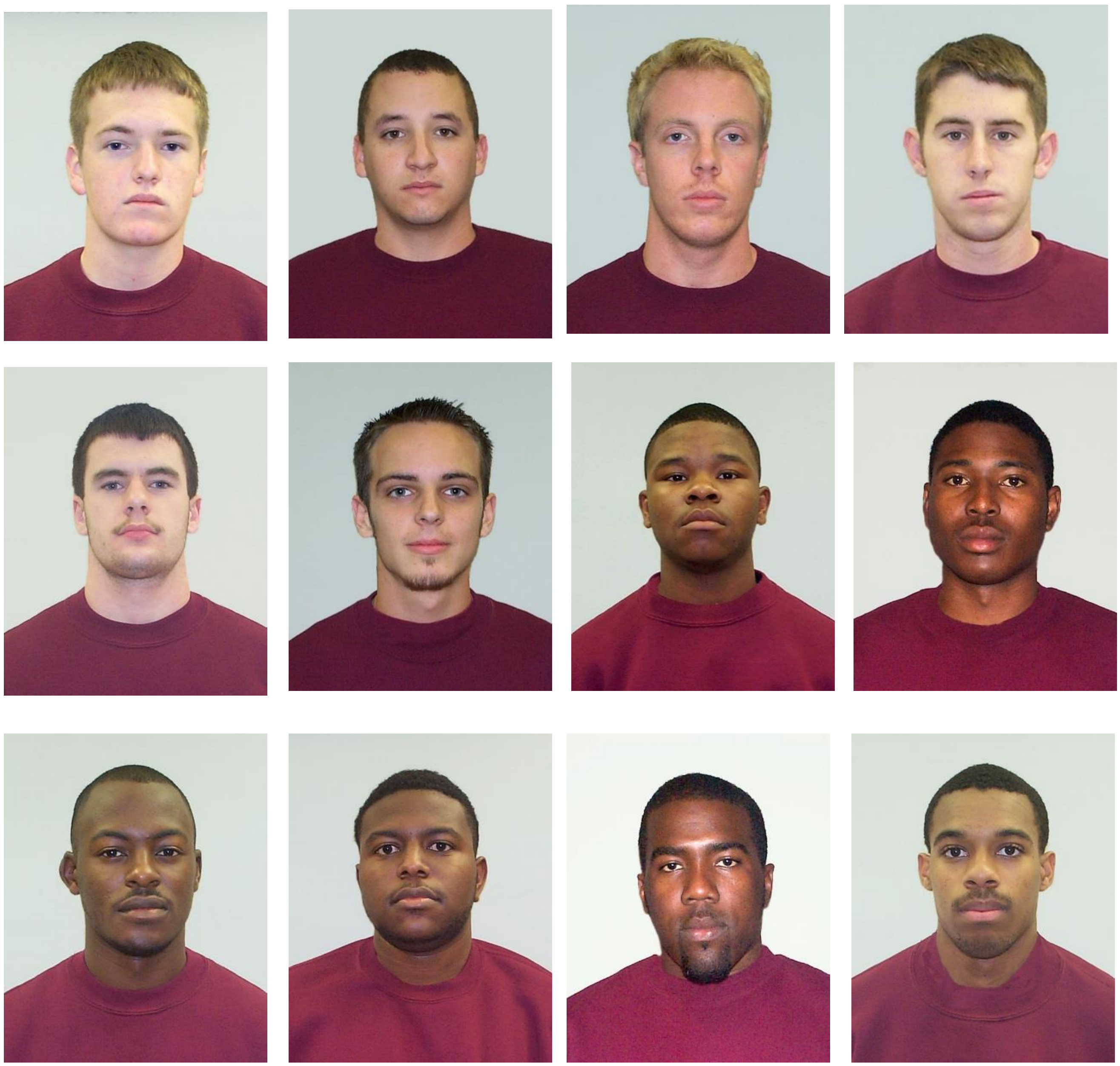
Please complete these tasks with as few errors as possible. Your errors on these tasks will be calculated and scored.

$8\overline{)48}$	$6\overline{)84}$	$10\overline{)0}$	$7\overline{)0}$	$4\overline{)68}$
$7\overline{)70}$	$5\overline{)60}$	$8\overline{)24}$	$7\overline{)84}$	$2\overline{)14}$
$5\overline{)20}$	$8\overline{)24}$	$5\overline{)30}$	$7\overline{)0}$	$8\overline{)72}$
$1\overline{)59}$	$2\overline{)56}$	$8\overline{)16}$	$2\overline{)52}$	$1\overline{)38}$
$1\overline{)15}$	$1\overline{)90}$	$3\overline{)63}$	$7\overline{)49}$	$10\overline{)20}$
$8\overline{)80}$	$4\overline{)0}$	$7\overline{)0}$	$8\overline{)56}$	$2\overline{)24}$
$9\overline{)27}$	$4\overline{)52}$	$7\overline{)70}$	$2\overline{)82}$	$3\overline{)39}$

Note. The above task was designed to prevent participants from thinking about the learned faces. Additionally, multiple tasks were provided to ensure that no participant completed this task.

Appendix D

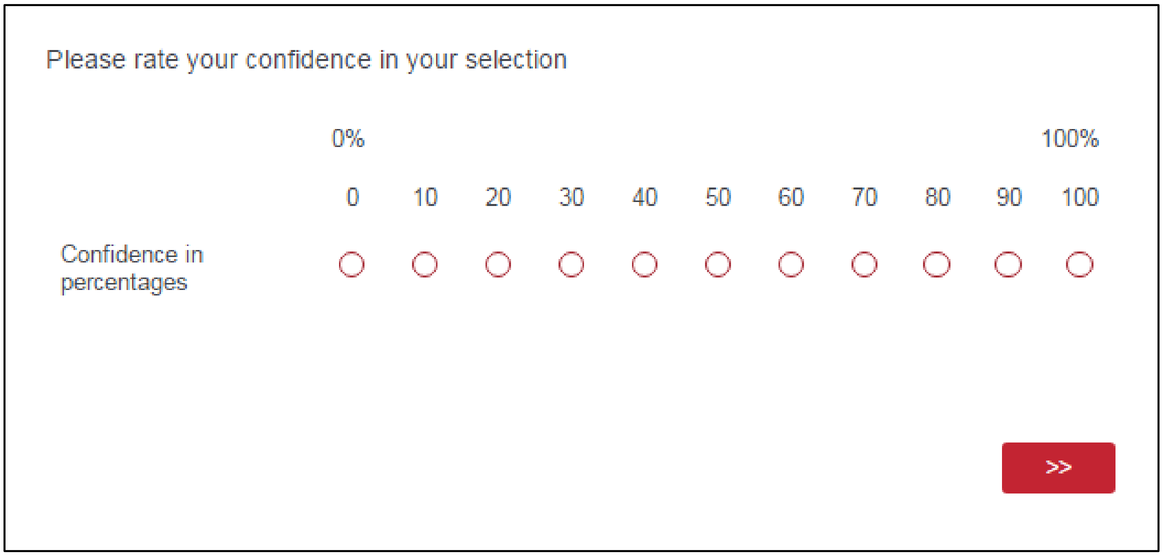
Testing Phase: Target Faces



Note. All images came from the Meissner Face Database

Appendix E

Confidence Rating Scale



Appendix F

Manipulation Check

Please reflect on your time completing the lineup identification. Indicate on the scale below the level at which you felt these emotions while making identifications.

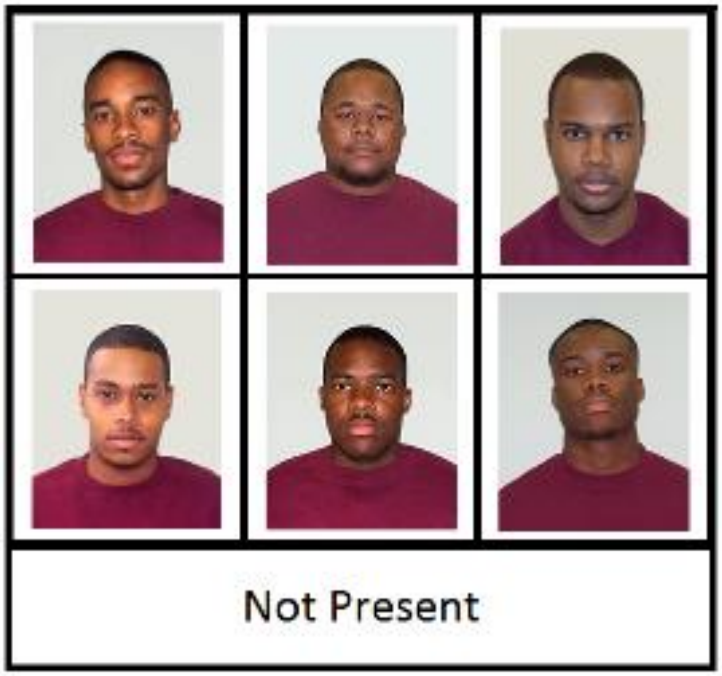
Please circle your response to the following questions.

To what extent were you feeling:	Not at all				Very much
Nervous	1	2	3	4	5
Anxious	1	2	3	4	5
Relaxed	1	2	3	4	5
Judged	1	2	3	4	5
Calm	1	2	3	4	5

The above scale was given to all participants after completing all 12 lineups. This scale was used to determine the level of evaluation apprehension and arousal participants were feeling during the identification process.

Appendix G

Identification Task



Please use the Response Guide to make your selection

1

2

3

4

5

6

Not Present

Appendix H

Response Guide

<table>
<tr><td>1</td><td>2</td><td>3</td></tr>
<tr><td>4</td><td>5</td><td>6</td></tr>
<tr><td colspan="3">Not Present</td></tr>
</table>

Note. The Response Guide was printed on a white sheet of paper. Unlike the format of this page, the Response Guide was printed on a landscape format.

Appendix I

IRB APPROVAL FORM

IRB Protocol Approval # 1609004521 Thesis x

Taylor, Amy L. <altaylor@towson.edu> 9/20/16

to me, Kerri

Dear

The IRB has approved your protocol "Influence of Others on Cross-Race Identification: Social Facilitation and the Cross-Race Effect" effective 9/13/2016 as Exempt, category 2

Your IRB protocol can now be viewed by your faculty advisor in MyOSPR. For more information, please visit: http://www.towson.edu/academics/research/sponsored/myospr.html

If you should encounter any new risks, reactions, or injuries to subjects while conducting your research, please notify IRB@towson.edu. Should your research extend beyond one year in duration, or should there be substantive changes in your research protocol, you will need to submit another application.

We are offering training and orientation sessions for faculty in the fall, I encourage you to sign up for one of the sessions: http://fusion.towson.edu/www/signupGeneric/index.cfm?type=OSPR

Regards,
Towson IRB

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150 years TOWSON UNIVERSITY

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Table 1

OR Reaction Time Factor Loadings

Measurement	OR RT
CR Absent 2	.57
CR Present 2	.53
CR Absent 1	.50
CR Absent 3	.48
CR Present 3	.40
CR Present 1	.31
Eigenvalue	2.05
% of variance	22.05

Table 2

SR Reaction Time Factor Loadings

Measurement	OR RT
SR Absent 3	.66
SR Absent 2	.66
SR Absent 1	.59
SR Present 2	.56
SR Present 3	.51
SR Present 1	.32
Eigenvalue	2.53
% of variance	31.19

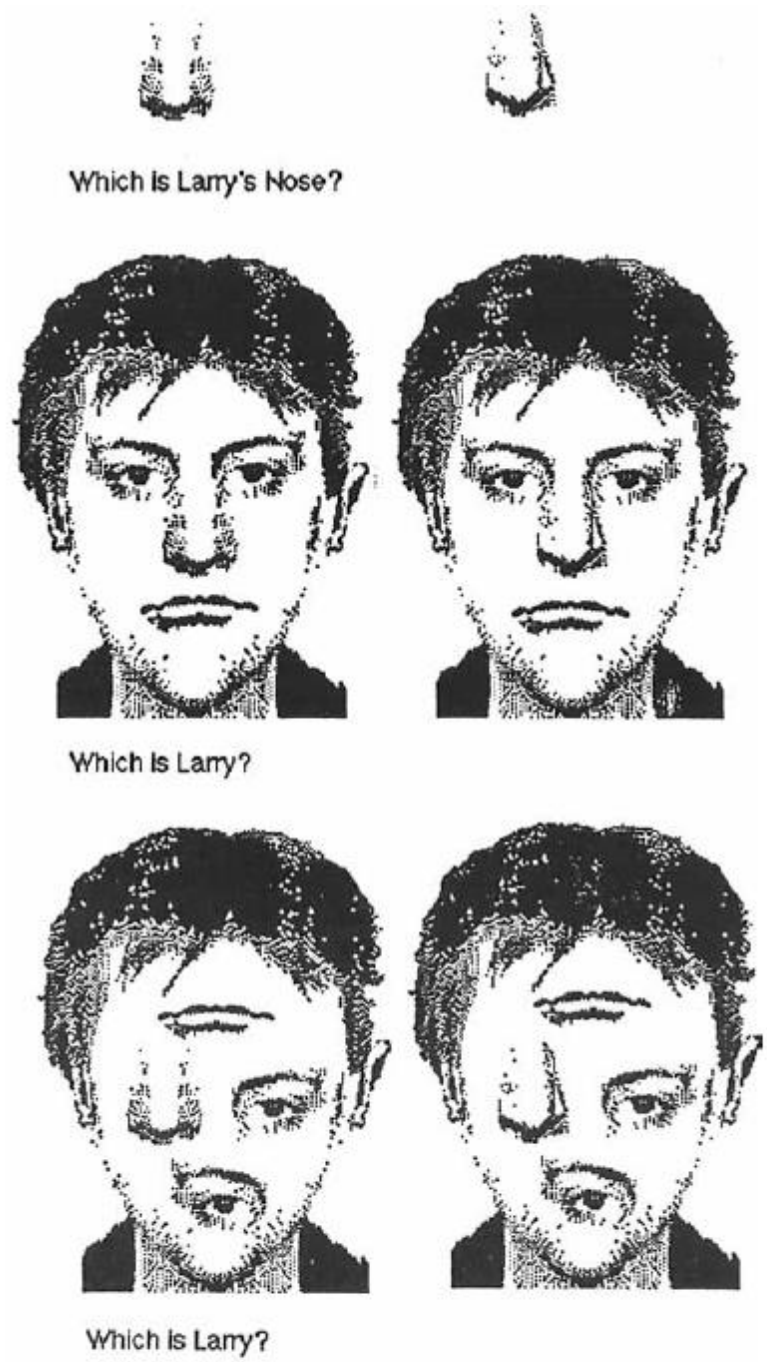

Figure 1. A representation of the identification task used by Tanaka and Farah (1993).

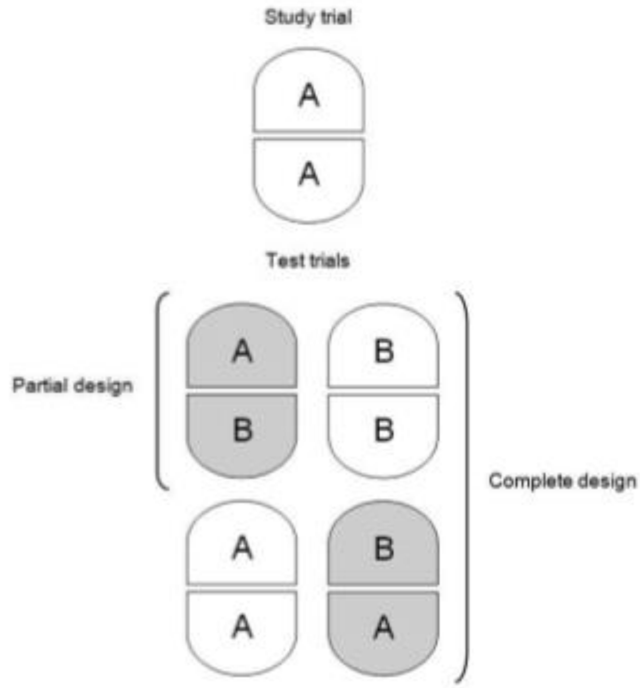

Figure 2. This figure demonstrates the options in the facial recognition task from Horry et al. (2015). Horry et al. provided images of faces that were either congruent (top and bottom were from the same face) or incongruent (top and bottom were from different faces). Faces were either previously learned “A” or not previously learned “B.” When asked to make a judgment about the face, participants were instructed to make that judgment about the top portion of the face.

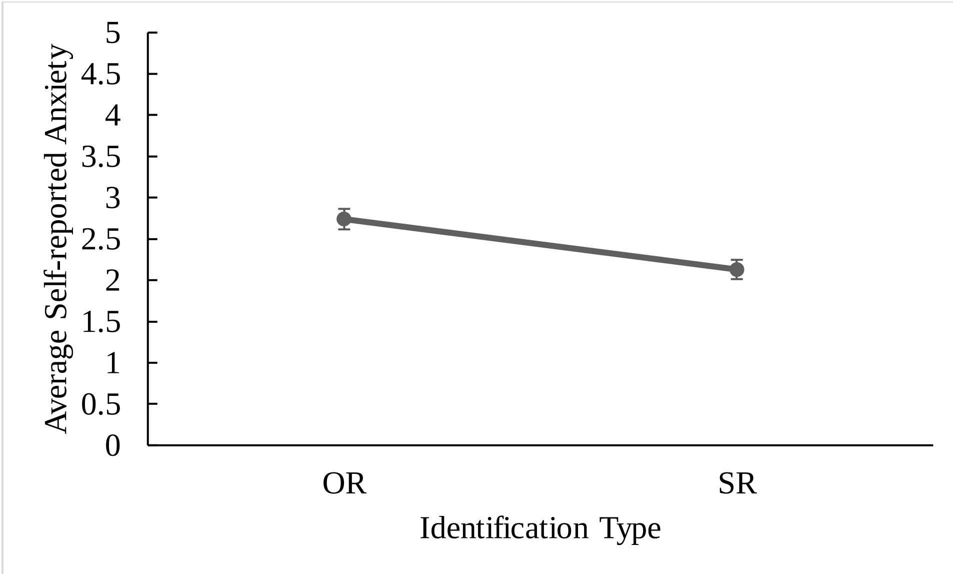

Figure 3. The above figure demonstrates the significant difference in self-reported anxiety for participants in the audience-present and the audience-absent condition. The error bars represent standard error for each level of Identification Type.

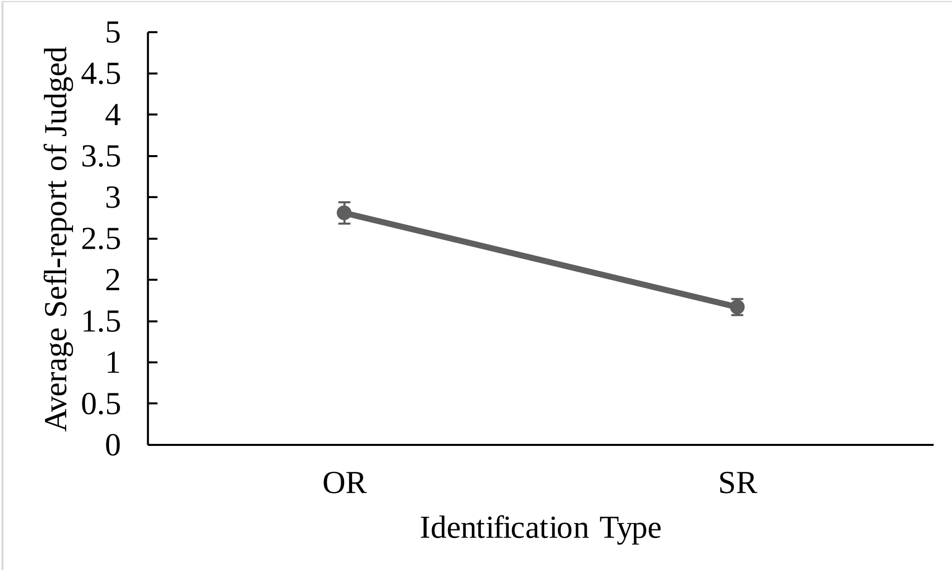

Figure 4. The above figure demonstrates the significant difference in self-reports of feeling judged for participants in the audience-present and the audience-absent conditions. The standard error bars are represented by the lines extending from the marks on the figure.

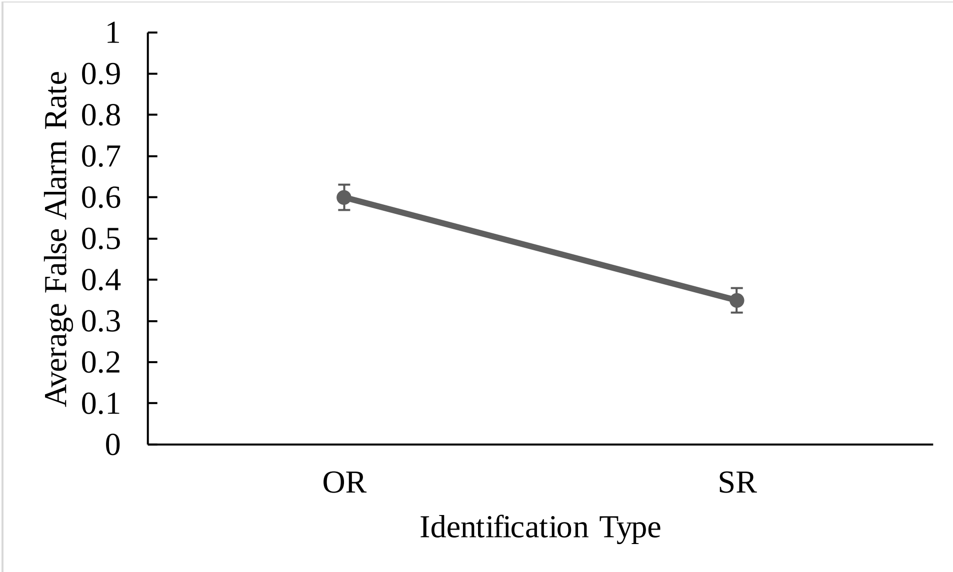

Figure 5. The above graph depicts the significant increase of false alarms for OR identifications compared to SR identifications. Standard error is represented through the bars extending from each point on the graph.

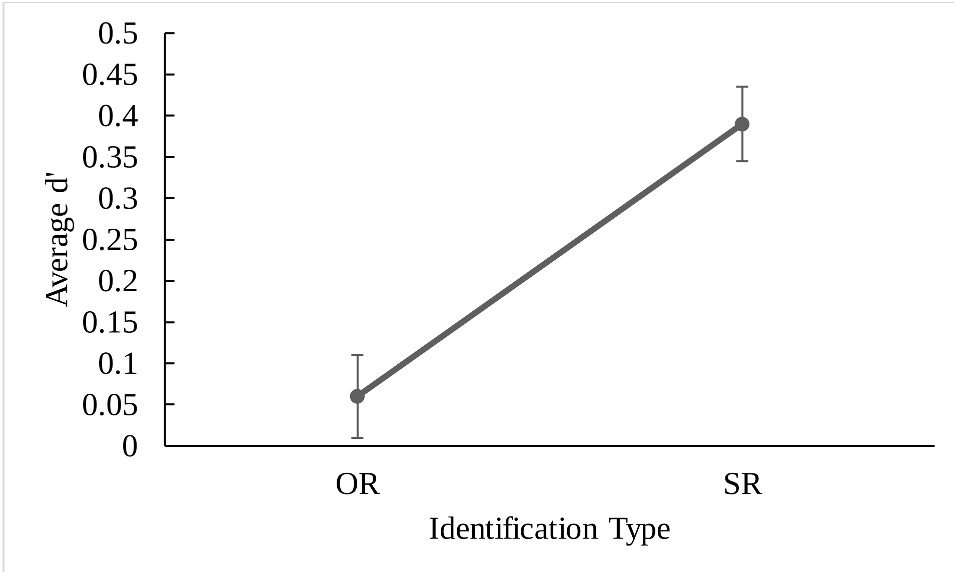

Figure 6. Overall, participants demonstrated decreased d′ for OR identification compared to SR identifications. Standard error is indicated by lines extending for either point on the graph.

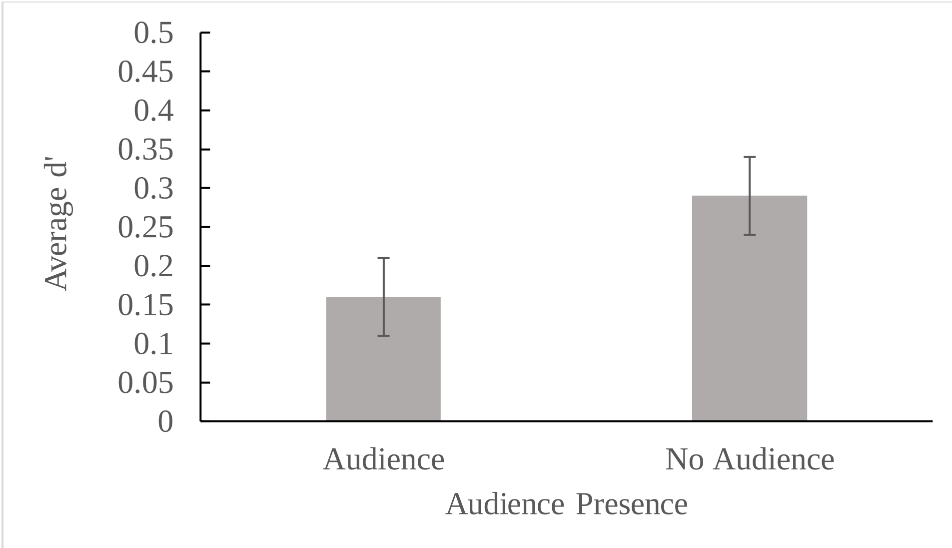

Figure 7. The above figure provides the average d' scores for participants in the audience-present and audience-absent conditions. As noted in the overlap of standard error bars, this was not a significant difference.

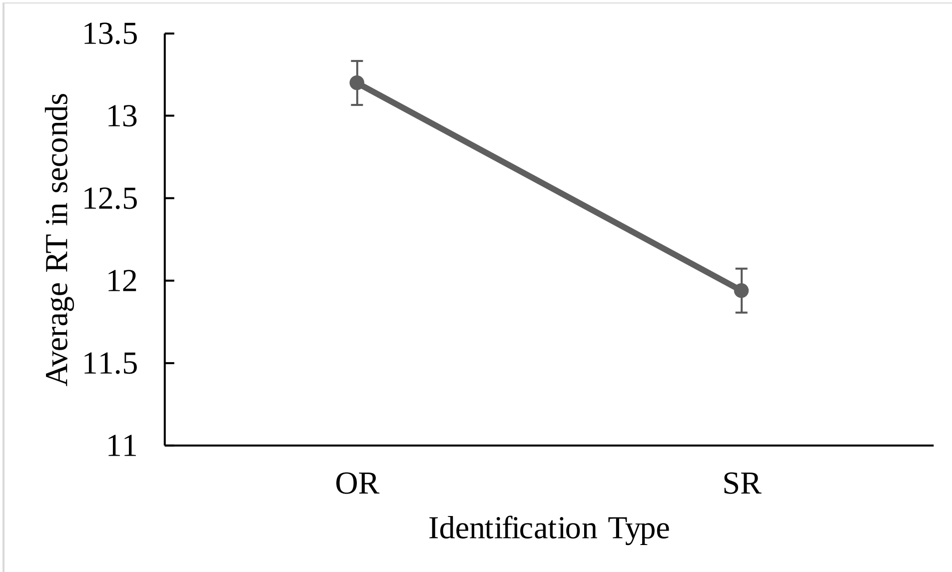

Figure 8. The above graph demonstrates the difference in reaction time for SR and OR identifications. Overall, SR identifications required significantly less time to complete. Standard error is represented through the error bars.

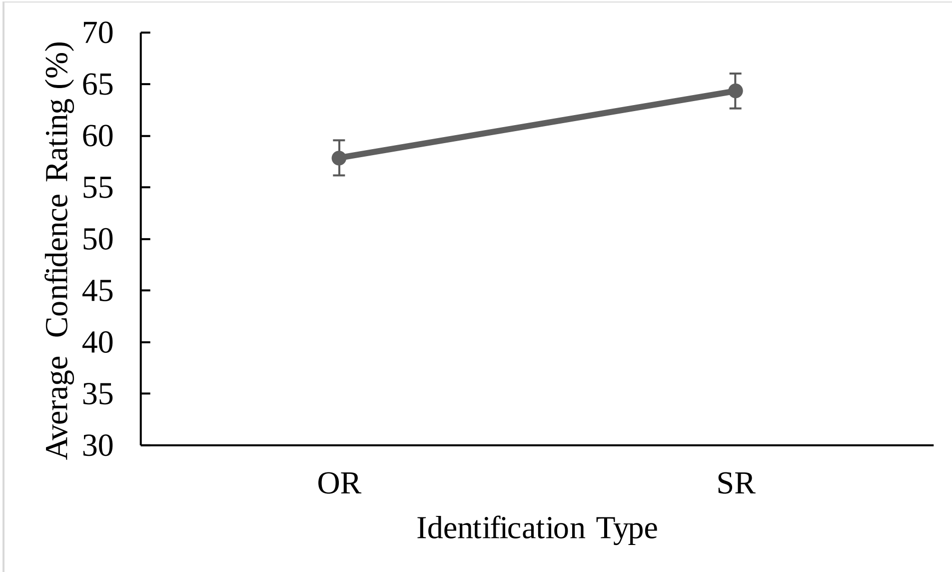

Figure 9. Overall, participants were significantly more confident when making SR identifications than OR identifications. The error bars represent standard error for each level of Identification Type.

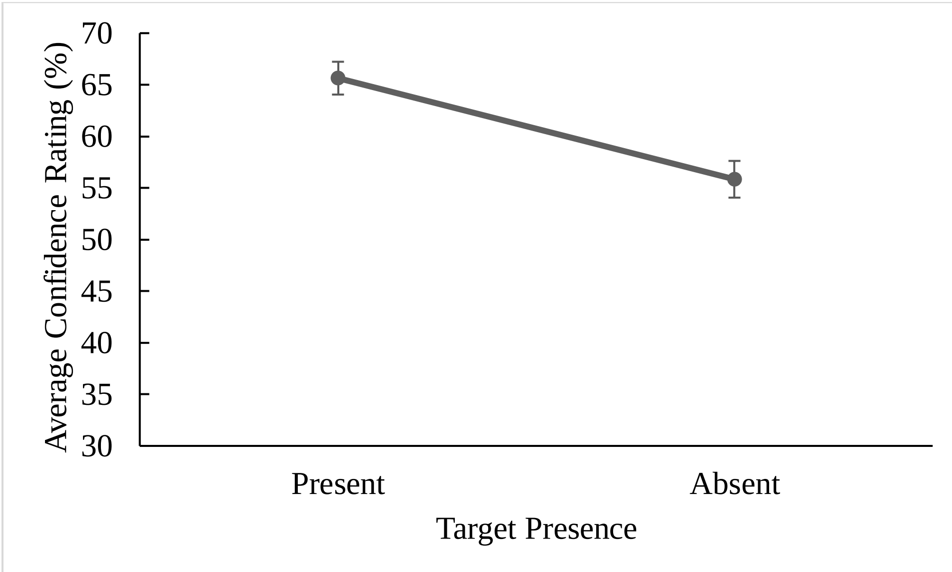

Figure 10. The above graph illustrates the differences in confidence for target-present and target-absent identifications. The standard error bars are represented by the lines extending from the marks on the figure.

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Jesse N. Rothweiler

[redacted]

Education

Current **M.A., Experimental Psychology,** Towson University
GPA: 4.00
Thesis: *Influence of Others on Cross-Race Identification: Social Facilitation and the Cross-Race Effect*
Advisor: Dr. Kerri Goodwin

May 2015 **B.A., Psychology,** *magna cum laude,* Bloomsburg University of Pennsylvania
Overall GPA: 3.84
Minor: Anthropology
Undergraduate Thesis: *Using Rejection-inhibiting Training to Buffer the Effects of Ostracism on Attention*
Advisor: Dr. Jennifer Johnson

Academic Honors

2014 Phi Kappa Phi National Honors Society
2013 Psi Chi, The International Honors Society in Psychology, President
2012-15 Dean's List, Bloomsburg University

Research Interests

Cognitive and social influences on memory and attention. Including, individual differences of working memory abilities on memory interferece, and restorative and protective properties of attention. Further expanding to social influences on memory; how race affects processing of facial memory and how external social factors may further hinder this ability.

Research Experience

Current Towson University Psychology Department, Memory Lab, *Research Assistant*

Current Towson University Psychology Department, Psychology and Law Lab, *Research Assistant*

2013-15 Bloomsburg University Psychology Department, Johnson Lab, *Research Assistant*

Research Software & Hardware

Highly skilled in SPSS statistical software, Microsoft Word, Excel, and PowerPoint. Experienced in E-Prime software packages and Qualtrics. Familiar with Biopac 150 and Biopac Acqknowledge analysis software used for measuring and analyzing Electrodermal Activity, Respiration, Electrocardiography, and Impedance Cardiography.

Conferences

Rothweiler, J. N., Goodwin, K. A., & Kotansky, L. J. (2016) *Working memory capacity and proactive interference across visual and auditory modalities.* Poster presented at the annual meeting of the Psychonomic Society, Boston, MA.

Haines, K., Jamil, N., **Rothweiler, J. N.**, & McGinley, J. (2016). *Watch out! Responses induced by a new set of standardized contemporary emotion-eliciting films.* Poster presented at Towson University's Undergraduate/Graduate Research and Performance Expo, Towson, MD.

Rothweiler, J.N., Johnson, J. A., & Dandeneau, S. (2015). *Using rejection-inhibiting training to buffer the effects of ostracism*. Poster presented at the annual meeting of the Eastern Psychological Association, Philadelphia, PA.

Updegrove, N., **Rothweiler, J. N.,** Kaur, M., & Johnson, J. A. (2015). *Failure to replicate the attention restoration effect using a variety of natural settings*. Poster presented at the annual meeting of the Eastern Psychological Association, Philadelphia, PA.

Rothweiler, J. N., Dunn, C.M., & Johnson, J. A. (2014). *Influence of nature and affective state on the restoration of attention.* Poster presented at the annual meeting of the Eastern Psychological Association, Boston, MA.

Rothweiler, J. N. (2013). *Transgender adolescence: Discovering identity while avoiding victimization*. Speech presented at annual meeting of the Frederick Douglas Conference, Bloomsburg, PA.

Manuscripts

Rothweiler, J. N. & Goodwin, K. A. (MS in Prep). *Working memory capacity and proactive interference across visual and auditory modalities*

Rothweiler, J. N., Updegrove, N., & Johnson, J. A. (MS in Prep). *Failure to replicate the attention restoration effect using a variety of natural settings.*

Grants & Awards

2016 Graduate Teaching Assistantship, Towson University ($4,000)

	Graduate Student Association Travel Grant, Towson University ($500)
2015	Graduate Teaching Assistantship, Towson University ($4,000)
	Travel Grant, Bloomsburg University ($400)
2014	Board of Governor's Scholarship, Bloomsburg University ($6,000)
	Undergraduate Research, Scholarship, and Creative Activities ($6,000)
	Travel Grant, Bloomsburg University ($450)
2013	Board of Governor's Scholarship, Bloomsburg University ($6,000)
2012	Board of Governor's Scholarship, Bloomsburg University ($6,000)

Teaching Interests

Intro to Psychology; Experimental Psychology; Cognitive Psychology; Introductory Statistics; Advanced Statistics; Memory

Teaching & Tutoring Experience

2017	Teaching Assistant, Research Methods, Towson University (Psyc 314)
	Teaching Assistant, Behavioral Statistics, Towson University (Psyc 212)
2016	Teaching Assistant, Behavioral Statistics, Towson University (Psyc 212)
	Teaching Assistant, Cognitive Psychology, Towson University (Psyc 461)
2015	Teaching Assistant, Behavioral Statistics, Towson University (Psyc 212)
	Student Instructor, GRE Prep Course, Bloomsburg University
	Tutor, Behavioral Statistics, (Psych 160)
2014	Teaching Assistant, General Psychology, Bloomsburg University (Psych 101)
	Student Instructor, GRE Prep Course, Bloomsburg University
	Tutor, Behavioral Statistics, (Psych 160)
2013	Student Instructor, GRE Prep Course, Bloomsburg University.

Membership in Professional Organizations

2016	The Psychonomic Society
	Association for Psychological Science (APS)
2014-2016	Eastern Psychological Association (EPA)

University Involvement

2016-2017	CLA Graduate Student Advisory Panel
	Graduate Assistantship Advisory Committee Council