The Pennsylvania State University

The Graduate School

College of the Liberal Arts

“WHAT ARE *WE* THINKING?” VERSUS “WHAT ARE *THEY* THINKING?”: SOCIAL CATEGORIZATION AND THE INTRACULTURAL ADVANTAGE IN MENTAL STATE DECODING

A Thesis in

Psychology

by

Michael T. Stevenson

Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Master of Science

December 2009

The thesis of Michael T. Stevenson was reviewed and approved* by the following:

Reginald B. Adams, Jr.
Assistant Professor of Psychology
Thesis Advisor

Theresa K. Vescio
Associate Professor of Psychology

Michael J. Wenger
Associate Professor of Psychology

Susan Mohammed
Associate Professor of Psychology
Graduate Program Chair

*Signatures are on file in the Graduate School.

ABSTRACT

The majority of social communication is conveyed through nonverbal behavior. Accordingly, nonverbal sensitivity is necessary for smooth communication and social adaptability. Interestingly, basic emotion perception has largely been shown to be universal across cultures, though small intracultural advantages have also been documented. Two theories may help explain these advantages. First, nonverbal behavior may carry with it cultural dialects, or small, physical differences in the expression of emotions and mental states that vary from one culture to the next that, coupled with culturally defined perceptual attunements to such features, may facilitate accurate decoding of same- versus other-culture members. Second, social categorization, the tendency to allocate more attentional resources to the processing of ingroup targets than to outgroup targets, may influence the ability to properly process emotional or mental state expressions. The present studies examine the latter route. It was found that, under certain conditions, the relative speed of categorization of a target as an outgroup versus an ingroup member was predictive of an ingroup advantage in mental state decoding. Methodological constraints and potential implications of this effect are discussed.

TABLE OF CONTENTS

Chapter 1: "What are *We* Thinking?" versus "What are *They* Thinking?": Social Categorization and the Intracultural Advantage in Mental State Decoding

The study of the universal nature of facial emotional expression and recognition dates back at least to Darwin (Darwin, 1872; 1965). Relatively recent empirical work supports the supposition that facial expressions of basic emotions (i.e., anger, fear, joy, sadness, disgust, and surprise) are accurately recognized across cultures (Ekman, Sorenson, & Friesen, 1969; Ekman, 1993). Some work within the last decade, however, has focused on aspects of emotional expressions that are not universal, and has identified a cultural ingroup advantage for recognition of basic emotions (e.g., greater accuracy in recognizing emotional expressions from members of one's own cultural group relative to those of members of another group, Elfenbein & Ambady, 2003a, b). The notion of nonverbal accents, or cultural dialects (synonymous terms, both adopting a linguistic analogy) in emotion expression, has emerged from this work, positing that there exist subtle differences in the way emotions are expressed across cultures, accounting for the ingroup advantage. Adams et al. (in press) have explored this phenomenon, identifying a robust ingroup advantage for complex mental state decoding as well. This finding may be due to cultural dialects (subtle variation in expression associated with culture) or differential visual processing of expression as function of social categorization. Social categorization, in the context of visual person perception, refers to differential allocation of attentional resources to a target as a function of the perceived group membership of that target, relative to the perceiver (i.e., more attention allocated to ingroup members, less to outgroup members; see Bernstein, Young, & Hugenberg, 2007). It is important to note that these social categorization processes have not been extensively studied in the domain of emotion and mental state recognition, but it has been pitted against an account that is conceptually similar to the cultural dialect theory in the literature on the own-race bias (ORB) in face memory, namely, perceptual expertise,.

The ORB, generally, refers to the phenomenon of remembering faces of members of one's own race better than members of another race. Recently, the ORB debate has been focused on two explanations of this effect: perceptual expertise and social categorization (Bernstein, Young, & Hugenberg, 2007). Perceptual expertise refers to a consequence of "social segregation," such that people tend to live and interact with others of their own groups (racial, cultural, etc.). This, in turn, grants them greater exposure to, and consequent expertise in, how faces within their ingroup may vary, resulting in better memory for ingroup faces (Sporer, 2001). This explanation is very similar to the cultural dialect theory in the domain of emotion recognition in that both are couched on the premise that greater ingroup (relative to outgroup) accuracy in face processing tasks depends on a level of familiarity with ingroup faces that is not present for outgroup faces. The perceptual expertise explanation is compelling and deserves further investigation. However, it has been recently demonstrated that the social categorization explanation implicating greater allocation of resources dedicated to processing faces of ingroup relative to outgroup members is itself sufficient to explain memory effects based on group membership (Bernstein et al.). This considered, the aim of the present studies is to examine if social categorization is also sufficient to drive the ingroup advantage in emotion recognition. Before expanding on this proposition, a brief discussion of the cultural dialect literature and its connection to the perceptual expertise explanation for ORB in face memory is warranted.

Cultural Dialects in Nonverbal Behavior

For decades, researchers have dedicated efforts to the goal of better understanding nonverbal communication across groups. Some of the earliest work defined these groups culturally. Ekman wanted to explore the possibility of the universal nature of emotional expression and recognition, predicating this assumption on Darwin's seminal work on facial and bodily expressions (Darwin, 1872; 1965). By examining expression encoding and decoding samples from several countries, Ekman (1972) provided evidence that at least some basic emotions are universally expressed and recognized (i.e., at better than chance accuracy) across cultures. From this work, Ekman put forth the notion of a *universal affect program*, or the idea that emotional communication is largely dictated and pre-determined by a culturally-consistent biologically-determined program. As a result, many early cross-cultural emotion recognition studies have focused on identifying universality, rather than variation.

A meta-analysis conducted by Elfenbein & Ambady (2002) examined nearly one hundred articles, which included several modes of nonverbal communication. Their findings supported both that emotions are recognized better than chance across cultures, but also the existence of an an intracultural advantage for emotion recognition. Elfenbein and Ambady (2003a, b) went on to posit the existence of a *specific affect program,* or adjustments to the *universal affect program,* accounting for learned differences (based on cultural membership) in the expression of emotion. Recent work has sought to more closely examine how culturally specific emotional expressions and their perception manifest themselves.

There is evidence for a right hemisphere bias in the perception and expression of culturally-specific cues (Elfenbein, Mandal, Ambady, Harizuka & Kumar, 2004; Mandal & Ambady, 2004). Specifically, the left hemiface (which, due to contralaterality in the brain, is controlled by the right hemisphere) is more susceptible to leakage of unintentional nonverbal information, including information that is more culture-specific than is the right hemiface. Since information from our left and right visual fields is processed contralaterally, these culture-specific cues are processed by the right hemisphere of an observer. This is especially interesting, as facial expressions of emotion, in general, are processed more readily through the right hemisphere. For example, emotion recognition is impaired in those with right-hemisphere damage relative to those with left-hemisphere damage (Adolphs, Damasio, Tranel, Cooper & Damasio, 2000). Clearly, past research has provided ample evidence that, when examining the expression and recognition of emotions across groups, there are actual, culturally-defined variations that can account for differential performance. However, social categorization effects may provide an even more powerful influence on these effects as well (as it does in the ORB memory literature). The following section details how social categorization affects the visual perception of targets and how this may be generalizable to emotion recognition.

Social Categorization

As alluded to earlier, social categorization refers to differential allocation of attentional resources when processing ingroup (more attention) and outgroup (less attention) members. A well-documented outcome of the social categorization process is that of outgroup homogeneity. One of the basic principles of outgroup homogeneity is that outgroup members are perceived as being more similar to one another than are ingroup members (Tajfel, 1969). When we first encounter others, we make our impressions of them based on very little information. In order to make up for this lack of information, we often fill in the gaps with stereotypic information about a category available in semantic memory (Hugenberg & Sacco, 2008). When this strategy is used, it can lead to the attribution of similar information to all outgroup members. Ingroup members, on the other hand, appear to motivate a search for individuating information (i.e., information beyond stereotypic associations), leading to a more unique and often accurate perception of the person (Ostrom & Sedikides, 1992). It has been documented that facial stimuli can provide sufficient information necessary to make such categorizations and to activate stereotypes associated with a category membership (e.g., Mason, Cloutier, & Macrae, 2006). Of specific interest for this proposal is the disparity in face recognition for ingroup versus outgroup members (which is referred to heretofore as the own-race bias).

The own-race bias for face memory (i.e., better memory for same- versus other-race faces) has historically been a robust and highly-replicable effect (Meissner & Brigham, 2001). The effect has been examined using a variety of methodologies, but the most commonly utilized method is as follows. In the encoding phase, participants are shown a variety of novel facial stimuli, some of their own race and some of another, in the context of any number of tasks that will make them process the faces. Next, there is usually a distracter interval in which participants complete an unrelated task (the length of this interval can vary greatly, still producing ORB effects). Finally, there is a retrieval phase, the simplest example of which would entail presenting participants with faces they saw in the encoding phase, as well as new faces. Their task would be simply to indicate whether or not they had seen the face before (see Sporer, 2001 for a more detailed review of these methods).

The well-documented recognition advantage and preference for ingroup members begin to emerge very early in life. When born, infants do not show a preference for own-race faces, but by three months of age, they begin to prefer faces of the same race as their primary caregiver (Kelly et al., 2005; Sangrigoli & de Schonen, 2004b). This loosely maps onto the stage of development proposed by Morton and Johnson (1991), during which children may begin to be able to extract social information from the face, as opposed to learning to pay attention to faces in general. By three years of age, children show the same own-race bias memory effects as do adults, indicating they are able to apply categorical labels when making judgments of others

(Sangrigoli and de Schonen, 2004a). Young adults also show these effects and they persist into older age (Corenblum & Meissner, 2005). There is evidence that the social cognitive mechanism driving these effects is enhanced by our basic visual machinery.

Levin (1996, 2000) found that, for White participants, a Black face in an array of White faces was identified much faster than a White face in an array of Black faces. Since luminosity was controlled for in all of the stimuli, this likely illustrates a categorization effect, and not a simple visual contrast effect. Notably, the information first reaching visual awareness tends to resemble low-pass blurry visual features from which only crude distinctions can be made based on very salient cues like hairstyle (Macrae & Martin, 2007), which favor initial categorization of faces rather than individuation. Supporting this interpretation was the finding in Levin's work that the speed of categorization of Black faces predicted subsequent asymmetrical memory performance as well (i.e., the faster a Black face was categorized by an individual, the more striking was the ORB memory effect). This suggests the allocation of fewer attentional resources to the processing of out-group members once they have been initially categorized. And since visual information more quickly informs social categories than individuating features, categorizing a face as belonging to an outgroup undermines the additional processing necessary for face memory.

That social categorization can affect the depth of processing of a face (resulting in greater individuation and subsequent memory for own-race faces) speaks to the possibility that this effect may also influence the recognition of facial expressions of emotion and complex mental states. If what determines the level to which we are able to extract subtle, nuanced cues from faces (the kind of visual information that is predictive of face memory *and* facial expression) is the extent to which we engage in the early categorization of outgroup members, it stands to reason that it would influence the extent to which we extract complex social information from them. Further supporting this notion is recent social neuroscientific literature, which provides evidence for the differential processing of ingroup versus outgroup faces.

Hemispheric differences in the processing of facial stimuli based on race have been identified (Turk, Handy & Gazzaniga, 2005). Utilizing a White, split-brain patient, White and Asian facial stimuli were presented to only one visual field at a time, and then facial recognition was assessed. An ORB for face memory was present, but only in the right hemisphere (memory performance was equal in the left hemisphere). This is particularly interesting, given previous research suggesting that the right hemisphere is where deeper, more individuated processing (the kind necessary to remember a face) takes place (Mason & Macrae, 2004).

As Levin (1996, 2000) revealed, the timecourse of social categorization can be predictive of future performance with facial stimuli, and Event-Related Potentials (ERP) research has supported this. A handful of studies have already identified effects that can distinguish the implicit categorization of ingroup versus outgroup faces (Ito & Urland, 2003, 2005, Ito, Thompson, & Cacioppo, 2004, Caldara, Rossion, Bovert, & Hauert, 2004, Caldara et al., 2003). Caldara et al. (2004) found, using both behavioral and ERP studies, that Asian faces were processed faster than White faces by White participants (the ERP difference showing up at around 240 ms, and located predominantly in medial parietal occipital regions, which they consider to be related to integrative processes and facial configuration changes, such as the P2 or P250 component). While examining mostly White participants, Ito & Urland (2003, Experiment 1) identified greater amplitude for Black relative to White facial stimuli at N100 and P200 (measured from Cz). This pattern of activation was reversed at P300 (measured from Pz), suggesting that the increased attention for Black versus White faces (N100 and P200) resulted in a designation that less effort needed to be spent in order to complete the task (P300). Together, these ERP findings speak toward the supposition that we are predisposed to categorizing faces as ingroup or outgroup members, and once we do so, motivation for subsequent processing of ingroup targets is increased, relative to outgroup targets. An ever-expanding body of work in the behavioral social cognitive person perception literature provides support for this notion.

Given that low-level visual information (e.g., gendered hairstyle) can give rise to rapid, top-down influences on the categorization of a facial stimulus, regardless of the content of the remaining features of that face (Macrae & Martin, 2007), suggests there is an inherent, if not incidental, bias to categorizing faces quickly. Applying this concept to race, Maclin and Malpass (2001) showed that racial categorization of a face stimulus is sufficient to create an ORB in memory performance when holding the actual structural make-up of the face constant. Ambiguous-race face stimuli were created, and then either stereotypical Black or Hispanic hairstyles were applied. Black and Hispanic participants displayed an ORB for the very same stimuli based solely on how the stimuli were categorized, given hairstyle information. Pauker et al. (2009), likewise, found that racial labels assigned to racially ambiguous faces predicted memory performance, based on the race of the participants. Additionally, Rule, Ambady, Adams, and Macrae (2007) identified a similar effect in the context of sexual orientation. Heterosexual and homosexual participants showed an own-group face memory bias based on how they classified the sexual orientation of the targets. That this effect can occur with ambiguously categorizable faces is especially interesting, considering that the more categorically prototypic a face is, the more quickly it is categorized and associated with stereotypes of that group (Maddox, 2004; Eberhardt, Goff, Purdie, and Davies, 2004; Locke, Macrae, & Eaton, 2005). Thus, once enough category-specific information is processed to identify a face as being an outgroup member, it appears to be processed in a qualitatively different manner than that of an ingroup member. Recently, Bernstein, Young, & Hugenberg (2007) extended this idea to face memory, showing that the same faces (all the same race as the participants) were remembered differently, based on their belonging to the same group as the participant (either university or a personality type).

That the core causal element of complex patterns of human interaction could be a low-level cognitive categorization speaks to the importance of identifying basic factors that influence socially inclusive versus exclusive categorization. The following Pilot Studies provide the groundwork for further exploration of this notion within the context of complex mental state decoding.

Overview of Pilot Studies 1 & 2

In an effort to extend research examining cultural influences on emotion communication, Adams et al. (in press) conducted a cross-cultural study designed to assess whether the ingroup advantage previously found for basic emotions would extend to the recognition of complex mental states. To do this, we employed a well-validated complex emotion recognition task, the Adult Reading the Mind in the Eyes Task (Baron-Cohen et al., 2001). Given evidence that the eyes are a particularly important region of face for reading mental and emotional states (see Baron-Cohen, 1997), Baron-Cohen et al. (2001) created the RME, as a measure of the socio-perceptual component of Theory of Mind, nonverbal complex emotion decoding accuracy. The test is reliable, and has been used to show mental state decoding impairments in clinical populations marked by more general difficulties with reciprocal social communication (See Appendix A). This test will play a role as a major variable of interest in each of the forthcoming studies as a means to identify an intracultural advantage for mental state decoding. Performance on the test represents the operationalization of mental state decoding.

The goal of Pilot Studies 1 and 2 was to establish the existence of an ingroup advantage for mental state decoding using the RME task, in which the original only depicted photographs of Whites. In order to do this, a new set of RME stimuli needed to be created, using stimuli depicting non-White members as targets. Also, this new test had to be created and normed solely by members of that same non-White group in order to tap into cultural variability in emotional expressions. A collaborative effort with researchers from Kyoto University made this possible. We hypothesized that there would be an intracultural advantage in complex mental state decoding such that native Japanese students would perform more accurately on the Asian-normed RME task than would native White American students, who would perform more accurately on the original, White-normed version.

Method: Pilot Study 1

Participants

Sixty-one (38 female, 23 male) native Japanese students at Kyoto University participated in this study (mean age = 23 years). Participants received either course credit or monetary compensation for their participation.

Stimuli

The “Reading the Mind in the Eyes Test” (Baron-Cohen, Wheelwright, Hill, Raste & Plumb, 2001) as well as a new, Asian stimuli, Japanese language version of the test were used to create our Cross-Cultural Reading the Mind in the Eyes Test (Adams et al. 2008). The Asian version of the test was created at Kyoto University, following closely the procedure outlined by Baron-Cohen et al. (2001). The stimuli from the RME (Baron-Cohen et al. 2001) were collected from magazines and cropped to display a rectangular region around the eyes approximately 5 X 2 inches, running the width of the face, from midway up the nose to right above the brow. The Asian stimuli were collected from the internet and manipulated in the same fashion. Four mental state terms accompany each stimulus (one target word and three foils) presented at each corner of the photograph. Target words and foils were chosen by two of the original authors and pilot tested on groups of eight raters until each item met a criterion response of at least 5 raters choosing the target word. Each of the mental state words was translated into Japanese.[1] A large number of Asian eyes stimuli were created and a group of raters chose stimuli from this to match the original target and foil mental state words, as well as the same target gender distribution. A total of 72 stimuli (36 Asian and 36 White) comprise our final test (see Figure 1).

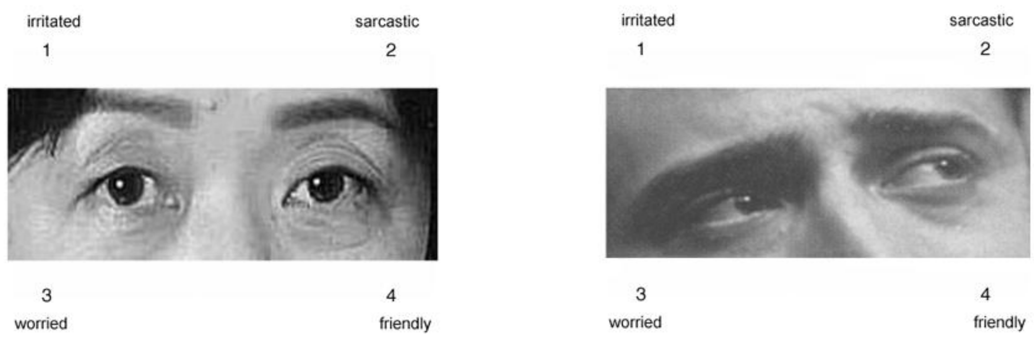

Figure 1. Example stimuli for (A) Asian and (B) Caucasian versions of the RME, where "worried" is the target response.

Procedure

Participants completed a paper and pencil version of the cross-cultural Reading the Mind in the Eyes Test. On each page of the test booklet, one stimulus was presented surrounded by four mental state words. Participants were instructed to take as much time as necessary to choose which word best described what the person in each photograph is thinking or feeling. Participants indicated their choice by circling one of the four words.

Results

As predicted, Japanese students' performance (number of correctly attributed mental states) on the Asian version of the test was significantly better than performance on the white version of the test ($M = 26.48$ vs. $M = 23.56$), $t(60) = 5.831$, $p < .000001$.

Method: Pilot Study 2

Participants

Sixty (30 female, 30 male) native white American students at the Pennsylvania State University and Tufts University participated in this study (mean age = 20 years). Participants received research credit for an introductory Psychology course.

Stimuli

A computer-based Cross-Cultural Reading the Mind in the Eyes test was created to present the stimuli and collect data. The target photographs and mental state words were identical to those described above in the paper and pencil version.

Procedure

Participants entered a room in groups ranging in size from one to four. Each participant was seated in their own cubicle containing an IBM-compatible computer with 17-inch CRT displays. The Cross-Cultural Reading the Mind in the Eyes Test was presented and responses recorded using Cedrus' SuperLab Pro 2.0. Stimuli size was approximately 10 cm x 4 cm and participants sat approximately 45 cm from the display. Mental state words were presented surrounding the eyes stimuli, and were numbered 1 through 4. Participants were instructed to take as much time as necessary to determine which word best described what the person in each photograph was thinking or feeling. A response was made by pressing the number key on a standard keyboard that corresponded with their word choice. Stimuli were presented randomly in two blocks (one Asian, one white) the order of which was counterbalanced across participants.

Results

As predicted, white American students' performance (number of correctly attributed mental states) on the white version of the test was significantly better than performance on the Japanese version of the test (M = 25.60 vs. M = 22.97), $t(59) = 4.694$, $p < .0001$.

Discussion: Pilot Studies 1 & 2

Consistent with predictions, an intracultural advantage was revealed for both the Japanese and American participants. Unfortunately, no strong conclusions as to the mechanism behind the advantage can be made from these data. The stimuli confound racial outgroup signifiers, as well as the potential existence of cultural variability in emotion expression (as defined by the decoding rules of the norming cultures). Culture implies profound differences in social experience including shared meaning systems, styles of relating, social practices and values, geographical location, religious values, language, diet, and ecology (Chiao & Ambady, 2007; see also Markus, Kitayama, Heiman, 1996). It is possible that even when cultural differences are held constant, other intergroup processes may account for the ingroup advantage for mental state decoding.

Overview of Pilot Study 3

This study was designed to examine the effects of categorization on the ingroup advantage for emotion recognition while controlling as much as possible for potential variability in the display of emotions. To do this, we chose to create a new set of RME stimuli, using Black targets instead of Japanese. The new Black stimulus set was normed by a group of African-American researchers in the same manner that the Japanese stimulus set was normed by Japanese researchers (see Figure 2). By using Black stimuli created in the U.S. (and thus imbuing them with a cultural context similar to that of our participants), the variability in emotion expression should be reduced, if not eliminated. Of course, other factors, such as race/emotion stereotypes (Hugenberg & Bodenhausen, 2003) and social power (Hall et al. 1997) may be at play, but likely do not take hold until after a stimulus has been initially categorized. Following the logic of social categorization determining the depth of processing of target faces, we predicted results similar to those of Pilot Studies 1 & 2. We hypothesized that Black participants would perform more accurately on Black RME stimuli and White participants to perform more accurately on White RME stimuli. This would provide evidence for an ingroup advantage for mental state decoding when cultural variability in emotional expression is held relatively constant.

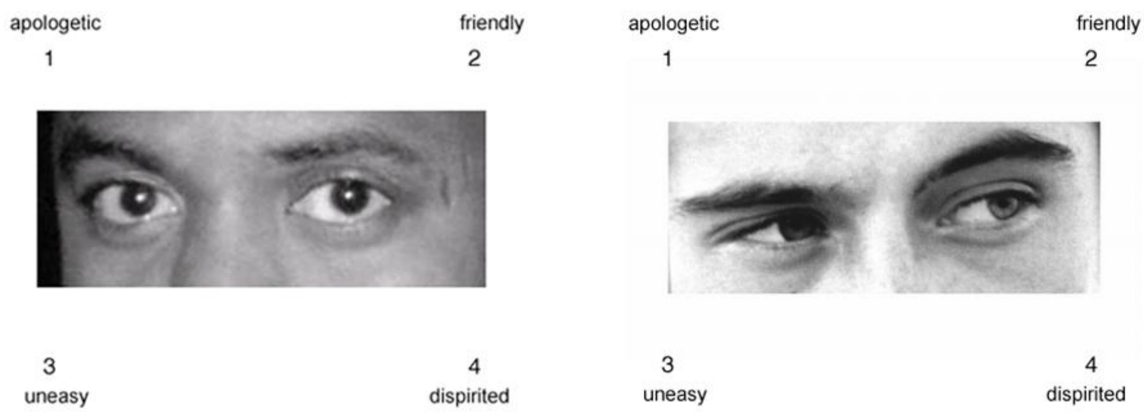

Figure 2. Example stimuli for (A) Black and (B) White versions of the RME, where “uneasy” is the target response.

Method: Pilot Study 3

Participants

Twenty-eight undergraduate participants (14 Black, 14 White) participated in this study for either partial class credit or $10.

Stimuli

The Black RME stimuli were created in the same manner as described in Study 1, except that two African-American researchers were responsible for collecting the initial stimuli to match the target words and norming the test through an iterative process with a group of eight African-American assistants until at least 70% consensus was reached for each stimulus.

Procedure

The procedure was identical to that of Pilot Study 2, except for the following differences. Participants entered a room in *same-race* groups ranging from one to four. Participants completed the task in two blocks, one containing Black stimuli, the other containing White stimuli, which were randomized within each block (for a total of 72 stimuli). Participants always completed a same-race block of trials first so as to not make racial categories initially salient.

Results

A 2(Stimulus Race: Black, White) x 2 (Participant Race: Black, Race) mixed factorial ANOVA revealed no main effects of stimulus or participant race. However, there was a significant interaction, revealing a pattern consistent with the hypothesis that participants would perform more accurately on the task for same-race members, $F(1,26) = 7.306$, $p = .012$. Inspection of the means suggest that this was due to Black participants performing more accurately on Black stimuli than White stimuli, and White participants performing more accurately on White stimuli than Black stimuli. That there were no main effects highlights a clear pattern of same-race advantage for mental state decoding.

Discussion

This study was designed to remove the effects of cross-cultural variability on the expression of emotion, in order to focus on the effects of intergroup categorization. The results replicate the ingroup advantage found in Studies 1 and 2 for groups that are ostensibly more culturally similar. This study lays the groundwork for further investigation of the effects of ingroup versus outgroup categorization on mental state decoding.

Overview of Studies

Pilot Studies 1,2, and 3 have provided evidence for an ingroup advantage for naturally occurring social categories; however the mechanism accounting for this advantage is unclear. The following studies aim to examine more precisely the role of social categorization on the ability to accurately decode mental states of ingroup versus outgroup members. Specifically, they assessed the viability of social categorization (both explicit and implicit) as a mediator, positing that the faster a face is categorized, the fewer attentional resources will be used for processing it, which would in turn result in poorer mental state decoding performance. This is the same logic behind the social categorization explanation of the ORB for face memory.

Chapter 2: Method

Study 1

Study 1 took advantage of an existing measure of explicit social categorization, as well as employed a newly-designed measure of implicit social categorization, in order to determine their relative merits as mediators of the ingroup advantage for mental state attribution. The social categorization paradigms are described below.

Explicit Social Categorization

Levin (2000) found that the faster a black face in an array of White faces was identified in a visual search paradigm, relative to a White face in an array of Black faces was predictive of performance on a face memory paradigm. Additionally, in a perceptual identification task, the faster an individual face was classified by White participants as being Black relative to being White (the other race classification advantage) was also predictive of performance on a face memory paradigm. This performance could be very well in line with the conclusions of Ito and Urland (2003, 2005), that early increased cortical activation to racial outgroup versus ingroup faces represents initial vigilance but shallower depth of processing overall (which could account for poorer outgroup memory performance). The later increase in ingroup face processing relative to outgroup face processing likely corresponds to the processing necessary for accurate person perception and memory. Study 1 adopted a similar perceptual identification paradigm as Levin (2000), and assessed social categorization speed as a predictor of mental state attribution accuracy. Though the visual search paradigm was also a predictor of deeper face processing (memory accuracy) it was not used, as it is only weakly conceptually linked to social categorization, relative to the perceptual identification task. I hypothesized that faster speed of categorization of racial outgroup faces relative to ingroup faces would predict a greater ingroup advantage for mental state decoding.

Implicit Social Categorization

Along with the explicit measure of categorization, I collected an implicit measure of social categorization. This measure was included to examine the extent to which facial stimuli are categorized in the absence of a task that explicitly requires categorization, and in turn the extent to which this type of implicit categorization then could predict subsequent mental state decoding accuracy. The implicit task followed the logic of a lexical decision task with sequential priming, combining the visual aspects of a flanker task. Lexical decision tasks have been shown to effectively determine the activation of semantic knowledge associated with words or faces (Bargh, et al. 1995; Gilbert & Hixon, 1991; Macrae, Hood, Milne, Rowe, & Mason, 2002). Specifically, the brief presentation of a face can decrease reaction times to classifying stereotypic words as words relative to counterstereotypic words (where stereotype congruence is determined by the face). In a typical sequential priming task, stimuli meant to activate a category are presented very briefly (or even subliminally). In order to parallel the experience of the RME task, we wanted to present the faces for the entire duration of the lexical decision task. This led to the flanker task methodology, where a centrally presented target is meant to be processed by the participant while ignoring peripherally presented stimuli. These flanker stimuli can affect the processing of the target stimulus. For example, Mason, Cloutier, and Macrae (2006) found that participants were able to categorize gender stereotypic names more quickly when they were flanked by faces of the same gender and more slowly when they were flanked by faces of the opposite gender.

In order to allow our task to tap into implicit racial social categorization processes as much as possible, we decided that the explicit categorization of stereotypic names would be detrimental. Instead, participants saw stimuli containing stereotypical black or white names, as well as non-words flanked by black or white faces. In the style of classical lexical decision task research, they were asked to simply indicate, via button press, whether or not the centrally presented letter string is a word (name). Reaction times were measured as the dependent variable of interest.

Since all of our participants were white, there existed the possibility that there would be greater familiarity with stereotypic White names than with stereotypic Black names, which could result in a consistently biased pattern of reaction times, such that Black names take longer to process and respond to relative to White names. In order to address this issue, participants also completed the lexical decision task in the absence of flanker faces, allowing for a baseline measure of the processing of the words.

In line with past research (Mason, Cloutier, & Macrae, 2006), it was expected that the flanker faces would activate the semantic knowledge associated with its racial category, which would include stereotypic names. Thus, on congruent trials (same race represented by target word and flanker faces), participants would make their decisions faster than on incongruent trials. I hypothesized that the presence of Black flanker faces would activate semantic knowledge more quickly than would White flanker faces, which would in turn result in faster reaction times to Black face/name congruent trials than to White face/name congruent trials. The quicker access to semantic knowledge elicited by Black flanker faces should also result in slower reaction times to trials with White names and Black faces than to Black names and White faces. This effect of Black flanker faces relative to White flanker faces was expected to mediate participants’ performance on the RME task, as it represents an implicit analogue to the explicit categorization task. Specifically, it was expected that the greater influence of Black faces on the processing of target names (both in terms of facilitation for congruent pairs and interference for incongruent pairs) relative to White faces, would predict decreased performance on black RME stimuli relative to white RME stimuli.

Participants

Forty-eight (26 female, 22 male) White American students from the Pennsylvania State University participated in this study (mean age = 19). Participants received research credit for an introductory Psychology course.

Procedure

Participant entered a room in pairs. They were seated at IBM-compatible computers in individual cubicles. Participants were randomly assigned to either complete the Black/White RME task described in Pilot Study 3 first or complete the social categorization tasks first. Participants always completed the implicit task first, followed by the explicit task, in order to reduce the salience of race categorization.

The implicit categorization task is a modification of the task described by Mason, Cloutier, and Macrae (2006, Experiment 1). On each trial, participants saw a fixation cross for 500 ms, and then a centrally presented stereotypical Black or White name (50 names, all male, taken from Greenwald, McGhee, & Schwartz, 1998) or a string of letters that were not names (or words) for 1,500 ms, or until a response was made. The non-name letter strings were made by scrambling each one of the names. The names or non-word letter strings were flanked by four faces that were either all Black or all White (the average Black and White male faces used by Levin, 1996, Experiment 6). In order to control for potential attentional effects based on the contrast of Black versus White facial stimuli on a white background, the average luminosity for the faces was calculated, and this was used as the background color. Participants were asked to indicate, via key press, whether the centrally presented word is a name or not a name, and that they should ignore any images that would flank the names. Stimuli were constructed so that each name and non-name was presented once for each race condition and once without any flankers (See Figure 3), resulting in 300 total trials.

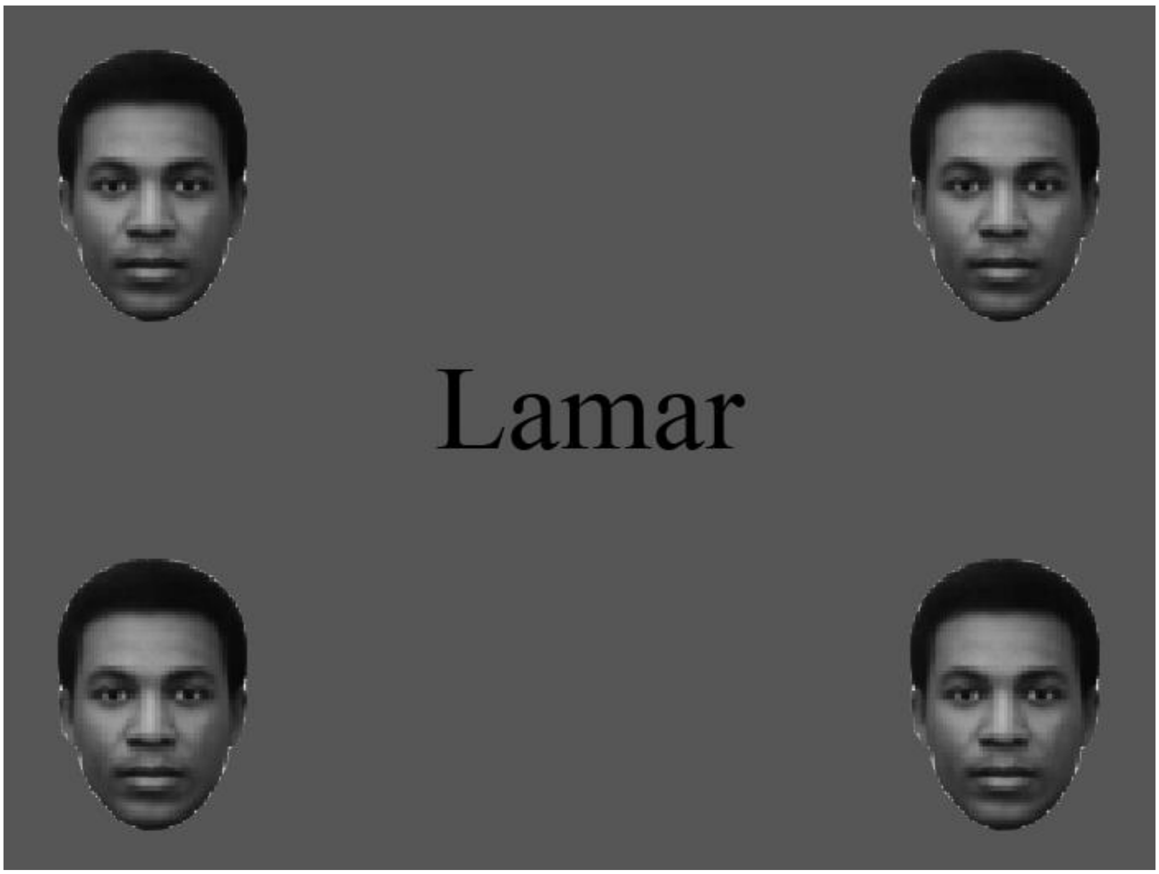

Figure 3. Example flanker stimuli for implicit categorization task for Study 1

The explicit social categorization task was based on the perceptual identification task described by Levin (1996, 2000). In this task, faces (an average Black or average White face) were presented with participants completing a go/no-go task, pressing a key as quickly as possible when a target face appeared and doing nothing when the target was absent. Participants completed two blocks of this task (counterbalanced), one in which Black faces were the target, and one in which White faces were the target. In each block, the target face and non-target face were each shown twenty times.

Results

Response Latency Pre-Processing

Before analyzing data, response latencies for the implicit and explicit social categorization tasks were examined in order to identify any potential outliers. Incorrect trials were removed, as well as trials that were more than three standard deviations above or below the mean. Data were then log-transformed. Normality of the distribution was assessed by computing 95% confidence intervals around the skewness and kurtosis statistic, and it the presence of three outliers was determined, who were removed. Using the same criteria, no outliers were identified for the RME accuracy data. All subsequent analyses, then, were conducted on forty-five (24 female, 21 male) participants. For ease of interpretation, all response latencies were transformed back to, and are reported in, milliseconds (ms).

RME Task

A 2 (task order) x 2 (stimulus race) mixed factorial ANOVA was conducted to examine both performance on the RME task, as well as any potential order effects. There were no main effects of stimulus race ($F(1,43) = .383$, $p = .539$), task order ($F(1,43) = .103$, $p = .750$), and no interaction ($F(1,43) = 1.640$, $p = .207$). This suggests that no ingroup advantage for mental state attribution was observed; participants performed equally on Black faces (M = .686) and White faces (M = .693), and the order in which tasks were performed did not have an effect (see Figure 4).

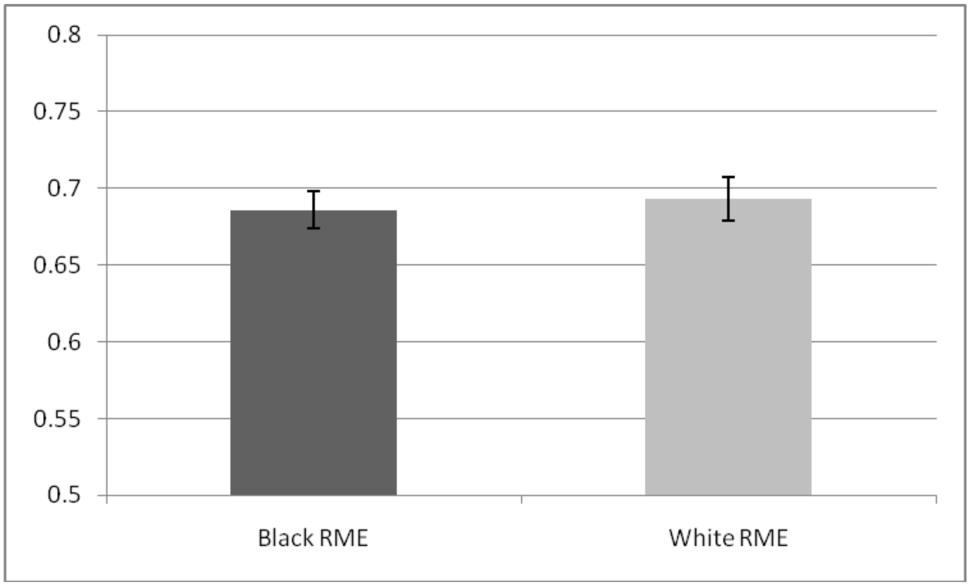

Figure 4. Study 1 Reading the Mind in the Eyes task performance (proportion correct) as a function of stimulus race.

Explicit Social Categorization Task

A 2 (task order) x 2 (stimulus race) mixed factorial ANOVA was conducted to examine both performance on the explicit social categorization task, as well as any potential order effects. There was a trend for participants to categorize Black faces (M=1021.88ms) more quickly than White faces (M=1035.99ms), $F(1,43) = 3.238$, $p < .079$ (see Figure 5), and no main effect of task order, $F(1,43) < .001$, $p = .999$. There was a significant interaction of stimulus race and task order ($F(1,43) = 4.084$, $p < .05$), such that participants who completed the RME task first categorized Black faces more quickly than White faces ($t(22) = 2.922$, $p = .008$), but those who completed the categorization tasks first showed no difference ($t(21) = .886$). When comparing categorization performance for each race as a function of task order, no differences were found (all *p*s. > .40).

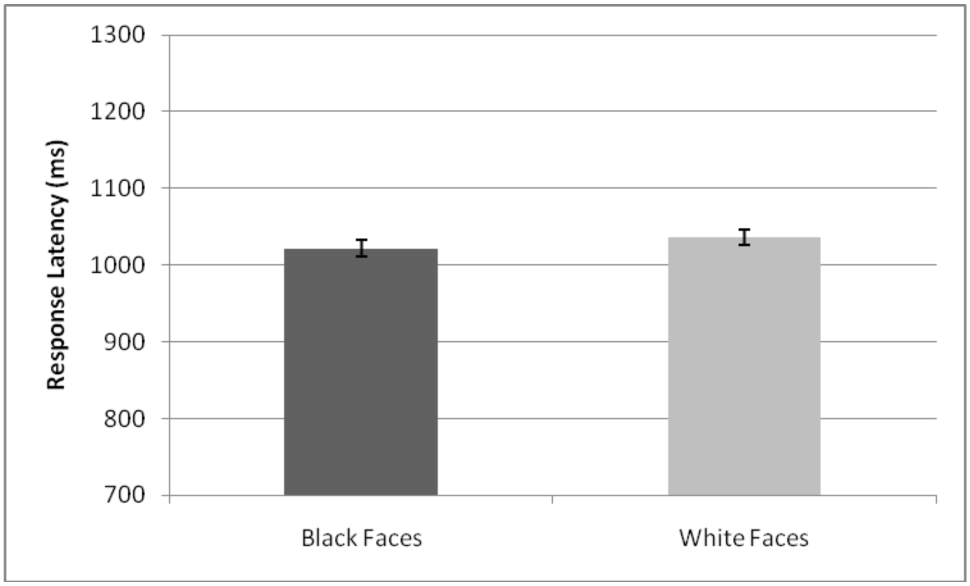

Figure 5. Study 1 mean response latencies (in ms) for the explicit social categorization task as a function of stimulus race.

Implicit Social Categorization Task

A 2 (task order) x 2 (name race) x 2 (flanker race) mixed factorial ANOVA was conducted. There was no main effect of task order, nor did it interact with any other factors (all *p*s > .10), thus I dropped it from subsequent analyses for this task, and conducted the proposed 2 (name race) x 2 (flanker type) within-subjects ANOVA. A main effect of name race was evident, such that White names (M=1191.50ms) were responded to more quickly than were Black names (M=1094.57ms), $F(1,44) = 211.836$, $p < .001$. The predicted name race by flanker race interaction was not significant, $F(1,44) = 1.844$, $p = .181$ (see Figure 6). The main effect of name race (faster responses for White names relative to Black names) suggests that participants were more familiar with White names than Black. This systematic difference in recognition speed may reflect a greater level of familiarity and expertise not only with names, but with people and faces that are stereotypically associated with those names. As the aim of the present set of studies was to examine social categorization as an alternative mechanism to account for the ingroup advantage in mental state decoding, I decided to covary out this difference. To do so, a difference score was calculated for each participant (mean response latency for Black names presented without flankers minus mean response latency for White names presented without flankers). The 2 (name race) x 2 (flanker race) ANOVA was then conducted again, using the Black name minus White name difference score as a covariate in order to control for name familiarity in the results. Even with this control, the covariate analysis did not bring the interaction of interest to significance (p = .056).

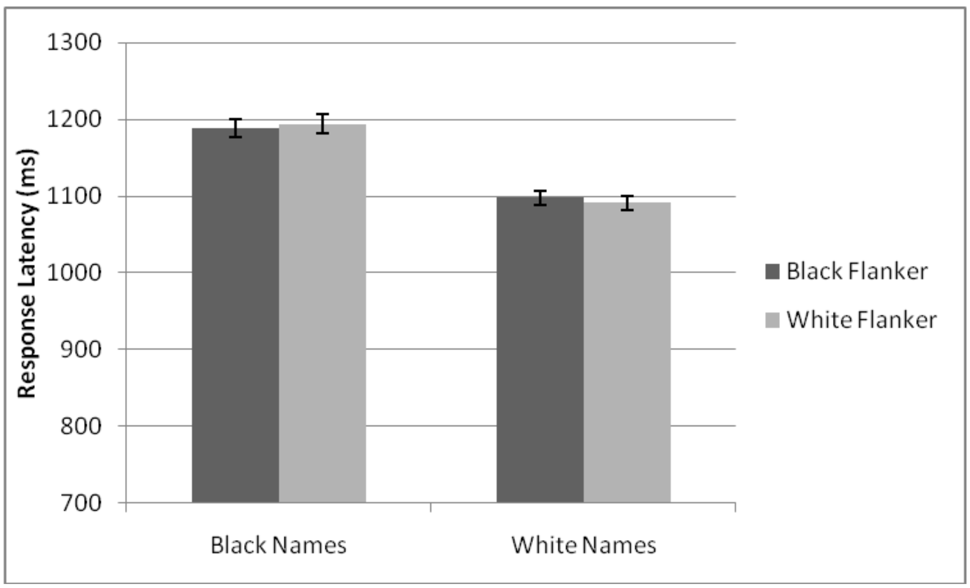

Figure 6. Study 1 mean response latencies (in ms) for the implicit social categorization task as a function of name race and flanker face race.

Mediation Analyses

To determine the viability of the proposed mediating variables (explicit or implicit social categorization), a treatment effect of the independent variable (race) must be present for both the dependent variable of interest (RME task accuracy) and the mediating variables. Since the independent variable (race) did not produce a treatment effect on the dependent variable of interest (RME task), mediation is not possible (Judd, Kenney, & McClelland, 2001). However, in order to investigate the relationships between performance on the social categorization tasks and RME performance, a series of correlations were performed. For the index of explicit social categorization, the categorization difference score (Black faces minus White faces) was not correlated with the index of the ingroup advantage for mental state attribution, the RME difference score (Black RME accuracy minus White RME accuracy), $r = .218$, $p > .15$. The implicit social categorization task index score was calculated as follows. For each participant, mean reaction times for congruent White pairings were subtracted from mean reaction times for congruent Black pairings, creating an index of congruency facilitation for social categorization (1). Then, mean reaction times of White names and Black faces were subtracted from mean reaction times for Black names and White faces, creating an index of incongruency interference for social categorization (2). Finally, (2) was subtracted from (1), creating a final index of implicit social categorization. This index was not correlated with the RME difference score, $r = -.176$, $p > .24$. Additionally, performance on the social categorization tasks were not related, $r = -.105$, $p > .49$.

Discussion

The results of Study 1 did not confirm my hypotheses. The cross-race classification advantage in the explicit categorization task (Levin, 1996; 2000) was replicated, marginally, but group differences were not obtained for either the implicit categorization task or the RME task. As a relatively exploratory exercise in combining the methodologies of a flanker task and a lexical decision task, it is not wholly surprising that the implicit categorization task was unsuccessful. It seems that stereotypical Black names took so much longer to process and respond to that even calculating difference scores for each participant to use as a covariate did not allow for the predicted interaction to emerge. What is of greater concern is the failure to replicate the ingroup advantage for the RME task found in Pilot Study 3. There was, however, one noteworthy methodological difference between Study 1 and the original task. Specifically, in Study 1, all stimuli (Black and White) were randomized into one, mixed-race block. In Pilot Study 3, where we achieved an ingroup advantage for White and Black stimuli, participants saw stimuli blocked by race, always completing a same-race block first. Previous work in our lab comparing White's performance on Asian and White RME stimuli, showed no differences, regardless of the presentation parameters. When presented with counter-balanced blocks (Asian or White), there was no main effect of block or, more importantly, a block by race interaction (ps $> .88$). As such, we suspected that presenting Black and White stimuli in a mixed-race block would not influence the effect at all. Clearly, this was not the case. Thus, the blocking versus mixed stimulus presentation issue needed to be addressed.

Study 2

Study 2 was conducted to examine the methodological concern described above, and specifically to reestablish whether an ingroup advantage for mental state attribution could be replicated using the identical procedure employed in Pilot Study 3.

Participants

Fifty-two (30 female, 22 male) white American students from The Pennsylvania State University completed this study (mean age = 19.4). Participants received research credit for an introductory Psychology course.

Stimuli

Stimuli for this study consisted of the Black and White RME computer-based task.

Procedure

Participants entered a room in groups ranging in size from one to four. Each participant was seated in their own cubicle containing an IBM-compatible computer with 17-inch CRT displays. The Black and White RME task was presented and responses recorded using Cedrus' SuperLab Pro 2.0. Stimuli size was approximately 10 cm x 4 cm and participants sat approximately 45 cm from the display. Twenty-seven participants performed the task by completing a block of all White stimuli, randomly presented, followed by a block of all Black stimuli, also randomly presented as employed in Pilot Study 3. Twenty-five participants performed the task by completing one block containing all of the stimuli, randomly presented.

Results

Data were submitted to a 2 (presentation method) x 2 (stimulus race) mixed factorial ANOVA, with presentation method as a between-subjects factor. This revealed no main effect of presentation method, $F(1,50) = .855$, $p > .35$, or stimulus race, $F(1,50) = .343$, $p > .55$. However, the presentation method by stimulus race interaction reached significance, $F(1,50) = 5.862$, $p < .02$. Simple effects analyses revealed that when stimuli were blocked by race, participants performed more accurately on White stimuli (M = .665) than Black stimuli (M = .623), $t = 2.630$, 630, $p < .015$. When stimuli were mixed in the same block, participants showed no difference in their performance for White (M = .654) and Black (.680) stimuli, $t = 1.10$, $p > .28$ (see Figure 7).

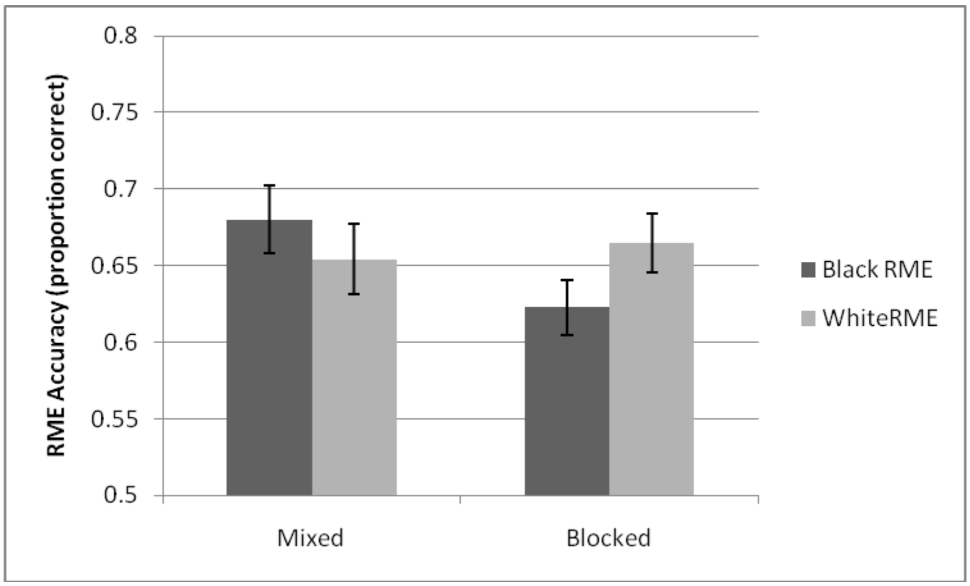

Figure 7. Study 2 Reading the Mind in the Eyes task performance (proportion correct) as a function of stimulus race and presentation method.

Discussion

The results of Study 1 and Study 2 suggest that the ingroup advantage for mental state attribution is more malleable than had been previously suspected. That performance can be dictated by how stimuli are presented for our Black and White stimuli (an effect not evident for Asian versus White stimuli performance) is meaningful. Perhaps, when stimuli are mixed together, participants are able to adopt a different strategy for completing the task. Grouping mixed-race stimuli together could provide the context of an inclusive group, thus allowing participants to not differentiate between Black and White stimuli in their mental state attribution processes. That the ingroup advantage is attenuated for mixed Black and White stimuli, but not mixed Asian and White stimuli might suggest that this inclusive group phenomenon does not generalize to Asians (they could be classified as a "double outgroup," belonging to a different race as well as potentially showing markers of non-American cultural expression; Marsh, Elfenbein, & Ambady, 2003), or that cultural influence in emotion perception is pronounced enough in our Asian stimuli that, despite a group-inclusive strategy, the differences in emotion are too great to be attenuated.

Study 3

Study 3 attempted to tease apart the effects of potential stimulus presentation-based performance, as well as re-examine explicit social categorization as a potential mediator for the ingroup advantage for mental state attribution.

Participants

Fifty-four (26 female, 28 male) White American students from The Pennsylvania State University participated in this study (mean age = 19.7). Participants received research credit for an introductory Psychology course.

Stimuli

Stimuli for this study consisted of the same explicit categorization task stimuli as described in Study 1. The implicit social categorization task was dropped, as it did not produce any significant results in Study 1, whereas the explicit social categorization task replicated the cross-race classification advantage (Levin, 1996; 2000). Additionally, the Black and White RME task was used, consisting of two single race blocks, with stimuli randomized within the blocks, given that this procedure was shown in Pilot Study 3 and Study 2 to produce ingroup advantages in mental state decoding.

Procedure

Participants entered a room in pairs. Each participant was seated in their own cubicle containing an IBM-compatible computer with 17-inch CRT displays. Participants were randomly assigned to one of four different task-counterbalancing conditions; explicit social categorization task, ingroup RME, outgroup RME; explicit social categorization task, outgroup RME, ingroup RME; ingroup RME, outgroup RME, explicit social categorization task, and; outgroup RME, ingroup RME, explicit social categorization task.

Results

Response Latency Pre-Processing

Before analyzing the data, response latency in the explicit social categorization task were examined in order to identify any potential outliers. Incorrect trials were removed, as well as trials that were more than three standard deviations above or below the mean. Data were then log-transformed. Normality of the distribution was assessed by computing 95% confidence intervals around the skewness and kurtosis statistic, and no participants were dropped as outliers for response latency or the RME task.

RME Task

Based on concerns regarding how presentation of the stimuli may effect the ingroup advantage, the RME data were submitted to a 2 (task order) x 2 (ingroup RME presentation order) x 2 (stimulus race) mixed factorial ANOVA, with task order and ingroup RME presentation order as between-subjects factors. This ANOVA revealed an ingroup RME presentation order x stimulus race interaction, $F(1,50) = 10.954$, $p = .002$, as well as a task order x ingroup RME presentation order x stimulus race interaction, $F(1,50) = 4.651$, $p = .036$.

To explicate the nature of these interaction effects, analyses were broken down to look at performance patterns of each of the four conditions described above (See Figure 8). This is especially important, given the methodological issues concerning stimulus presentation that were identified in Studies 1 and 2. For participants who completed the explicit social categorization task before the RME task, regardless of the subsequent ingroup presentation order of the RME task, there were no performance differences (Black RME first, $t(14) = 1.154$, $p = .268$; White RME first, $t(13) = .068$, $p = .947$). For participants who completed the RME task before the explicit social categorization task, each group performed more accurately on whatever RME block they performed first (Black RME first, $t(9) = 4.019$, $p = .003$; White RME first, $t(14) = 2.390$, $p = .031$).

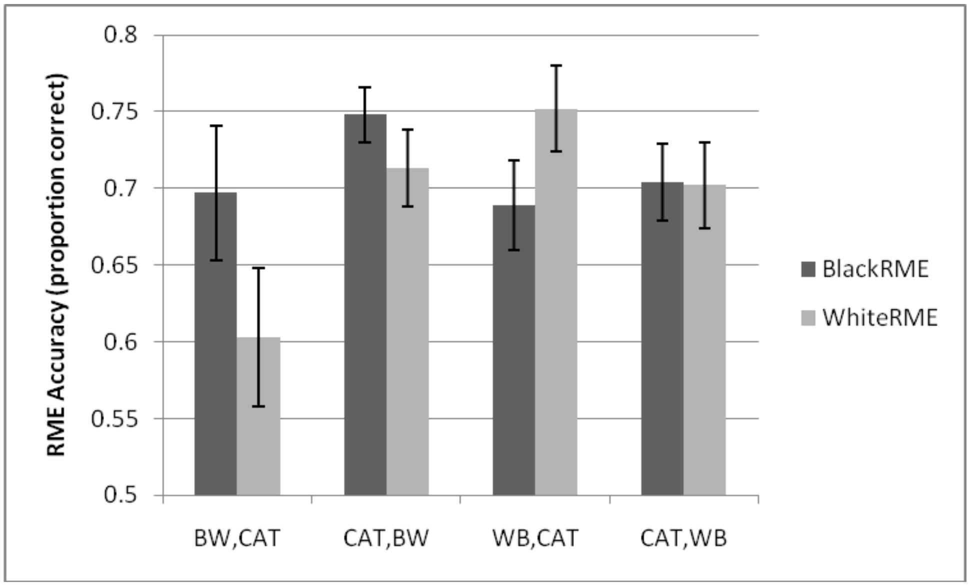

Figure 8. Study 3 Reading the Mind in the Eyes task Performance (proportion correct) as a function of stimulus race and presentation method.

Explicit Categorization Task

A paired-samples t-test was conducted to determine if the cross-race classification advantage was replicated across all participants. It was, as Black faces (M=1058.21ms) were categorized more quickly than were White faces (M=1114.34ms), $t(53) = 3.418$, $p = .001$. In light of the RME task performance differences described above based on each of the four conditions, the explicit social categorization data were also subjected to a 2 (task order) x 2 (ingroup RME presentation order) x 2 (stimulus race) mixed factorial ANOVA, with task order and ingroup RME presentation order as between-subjects factors. Along with the main effect for race (Black faces categorized more quickly than White faces, $F(1,50) = 14.151$, $p < .001$), a three-way interaction ($F(1,50) = 23.769$, $p < .001$) was revealed. Thus, the explicit social categorization data were examined based on condition, as described in the RME task data (see Figure 9).

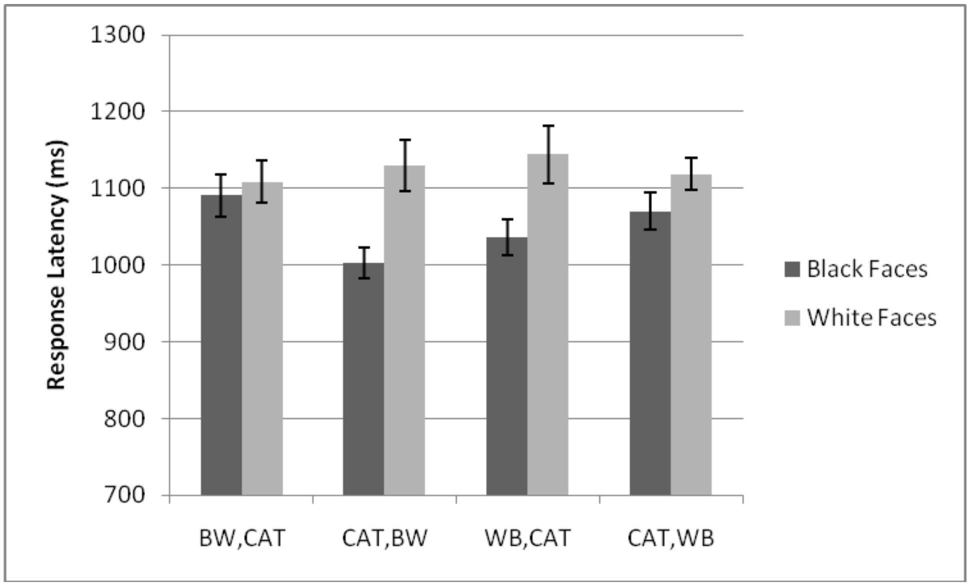

Figure 9. Study 3 mean response latencies (in ms) for the explicit social categorization task as a function of stimulus race and presentation method.

Participants who completed the explicit social categorization task first, followed by the Black then White RME task, showed the cross-race classification advantage, $t(14) = 5.528$, $p < .001$, whereas those who completed the White then Black RME task showed a trend in the same direction, $t(13) = 1.923$, $p = .077$. For participants who first completed the White then Black RME task followed by the explicit social categorization task last, the cross-race classification advantage was also evident, $t(14) = 3.654$, $p = .003$, but for those who completed the Black then White RME task, the explicit social categorization task, there was no difference in speed of categorization based on race, $t(9) = .610$, $p = .557$.

Mediation Analyses

Following the conditions for within-subjects mediation described by Judd, Kenny, and McClelland (2001), there needs to be a treatment effect of the independent variable (in this case, race) for both the mediator variable (explicit social categorization task) and the outcome variable (RME task accuracy). Mediation across all participants is not possible, as there was not an overall RME task effect. However, one of the four presentation conditions did show RME task effects, as well as the cross-race classification advantage. This condition consisted of those who completed the White RME task, the Black RME task, and then the explicit social categorization task. In terms of the RME task, this group is the only one for whom the procedure was identical to that of Pilot Study 3, thus accounting for the ingroup advantage for the RME task. Since they also showed the cross-race identification advantage, mediation analysis was possible. Following Judd et al.'s procedure, the difference score of the dependent variable (RME accuracy) was regressed on the difference score of the mediator variable (explicit categorization) resulting in a significant finding, $\beta = .584$, $p < .023$.

Discussion

The results of Study 3 are informative in a number of ways. First, it is clear that the manner in which tasks and stimuli are presented influences performance. When participants were presented with White RME stimuli first, they showed an ingroup advantage for the RME task. Additionally, this effect was mediated by performance on the social categorization task, such that the extent they categorized Black faces more quickly relative to White faces predicted greater ingroup advantage on the RME task. The pattern of results suggests that the presentation Black stimuli (either in the social categorization task or the RME task) allows participants to adjust their performance according to what be considered a more socially desirable manner. This also helps explain why the ingroup advantage was not apparent when all stimuli were mixed (i.e., as in Study 2).

Further participants who completed the social categorization before the RME task showed a cross-race classification advantage, but no differences in RME accuracy across race. Perhaps the categorization of Black and White faces was enough to lead participants to believe that the subsequent tasks were designed to assess performance as a function of race. As such, in a desire to not fall prey to the “White racist” stereotype (Goff, Steele & Davies, 2008), they may have been motivated to perform at a higher level on Black stimuli (or lower level on White stimuli) to not show an ingroup bias. That this does not seem to affect our Asian and White stimuli paradigms could suggest that if participants are trying to correct, the culturally-based emotion differences are too great to be overcome by motivated performance. Alternatively, it could suggest that the “White racist” stereotype may only become salient when making Black versus White comparisons, as this particular intergroup relationship has special history throughout the history of the United States.

Following this same pattern, participants who completed the Black RME task first showed an outgroup advantage for mental state attribution. Looking at the means, this appears to be a function of accuracy for White stimuli decreasing dramatically (accuracy was at only around 60%, by far the lowest of any other condition), as opposed to accuracy for Black stimuli increasing. If this was a self-corrective measure brought on by the nature of the first task, the correction carried over into the subsequent social categorization task, as this was the only group of participants not to show the cross-race classification advantage. Interestingly, completion of the RME task before the explicit social categorization task did not result in the same pattern of correction. This is likely a function of the categorization task being a speeded reaction time task, leaving the participant with little time to deliberate over their responses. Since the distribution of response latencies for the task was normal, it appears this was the case, however it warrants future investigation.

Chapter 3: General Discussion

The series of studies described above were designed to identify ingroup versus outgroup categorization of a target as a sufficient means to account for the ingroup advantage in mental state decoding. Indeed, Study 3 showed that, given specific conditions, the extent to which one categorizes outgroup members more quickly than ingroup members is predictive of an ingroup advantage for mental state decoding. However, one of the more interesting findings of the present studies is that the order in which the tasks and stimuli were presented to participants dramatically affected their performance. Of particular interest is the pattern of results in Study 3.

When presented first with a task that made the evaluation of Black targets salient, participants failed to show the previously evident ingroup advantage for mental state attribution, and in one case, even showed an outgroup advantage and erased the outgroup classification advantage. If this was, in fact, a result of participants recognizing that the comparison of interest was that of their performance between Black and White stimuli, then the implications are relevant to the literature regarding White's behavior when they are aware of being possibly being evaluated as a "White racist." Much of this work has focused on the ironic effects of this phenomenon. This has manifested itself in the form of decreased executive resources (Trawalter & Richeson, 2006), stronger implicit bias against Blacks relative to Whites (Frantz et al. 2004) and increased social distancing from outgroup members (Goff, Steele & Davies, 2008). These studies all incorporated an explicit manipulation of awareness of the "White racist" stereotype, though it does not seem out of the question that such an awareness could be made salient by the nature of the tasks employed in the present studies, as the evaluation of racial outgroup members is not likely a common occurrence for many of our participants. Future work should be devoted to investigating the extent to which people can alter their mental state attribution performance as a function of their motivation (i.e., motivation to not appear racist). Beyond this possibility, there are additional aspects of the present studies that should be considered in terms of its generalizability.

By focusing on mental states as depicted solely by the eye region of the face, we were able to produce more pronounced ingroup advantage effects than those reported in the past (e.g., Elfenbein & Ambady, 2003a,b). There is a limitation to our choice of stimuli, that being potential group differences in strategies for perceiving emotions from faces. For example, Yuki, Maddux, and Masuda (2007) found that when viewing full-face expressions of emotion, Native Japanese participants derived more information from the eyes than did White American participants, who focused on mouths. This seems to contrast with the findings of Baron-Cohen et al. (1997), who concluded that White participants were able to extract equal emotional information from the eyes as from a full face, with the mouth being a poorer source of information. It should be noted that these comparisons considered eyes and mouths in isolation, whereas in the study by Yuki, Maddux, and Masuda (2007), features were always presented in the context of an entire face. Also, Baron-Cohen et al. (1997) made their conclusion of the importance of the eyes to emotion perception by comparing participants with high-functioning autism and Asperger Syndrome to a control sample. It should be noted that in Pilot Studies 1 & 2, Native Japanese participants performed more accurately than White American participants, but this pattern was not significant ($p > .16$).

What has not been examined extensively in the literature is whether these different strategies also vary as a function of the target being examined. In the study by Yuki, Maddux, and Masuda (2007) participants from both cultures saw only photographs of White faces. This might suggest that Japanese participants in Pilot Studies 1 & 2 would have an advantage in extracting emotional information from the eyes, but this was not the case. In fact, Japanese participants performed significantly worse on White faces than did White American participants ($p < .001$). Clearly, there is a mechanism at play in this task that is overcoming pre-existing attunements to information from specific features. Below I briefly discuss several avenues for further research regarding this question.

One promising avenue regards the study of cross-categorical studies, or studies in which the assignment of people, at random, into groups can affect how those individuals are processed. These groups can function in the same ways as more traditionally defined groups (e.g., by race). This has been addressed by Kurzban, Cosmides, and Tooby (2001). In their study, participants viewed interactions among people of different races. In a situational memory task, it was shown that how people were classified influenced subsequent distinction among group members. Importantly, when a non-racially defined group membership was manipulated (with group makeup being interracial), this group membership became a more salient categorization factor, and subsequent memory effects were not a function of race, but of this group membership.

The authors argue that this should not be a particularly surprising effect. From an evolutionary standpoint, gender and age are logical social categories (for mating purposes) but race, as a categorical distinction, is not. On the evolutionary timeline, humans have been exposed to members of other races for an insufficient period of time to make it a biologically salient category. Instead, it is more likely that race is being conflated with more general group affiliation (Cosmides, Tooby, & Kurzban, 2003). Race is a social construct marked by an environmentally dictated phenotypic difference (Cosmides, Tooby, & Kurzban, 2003) that makes it salient. This construct is then imbued with negative stereotypes that further influence cognitive visual processing of out-group members, and subsequently colors complex social interactions. Given the findings of Bernstein, Young, & Hugenberg (2007) described above, it seems that exploring the effects of assigning meaningful group memberships to stimuli of different races on mental decoding is a viable road for future study.

Another avenue of future research draws upon the work describing holistic (integrating facial features into a whole representation) versus featural face processing, a processing difference that is likely involved in the ORB for face memory. One special aspect of faces that may be partly responsible for memory is that they appear to be processed holistically (Farah, Wilson, Drain, and Tanaka, 1998). Indeed, simply inverting a face to break up holistic processing (and increase reliance on feature-based processing) results in poorer performance on a face recognition task (Yin, 1969). Similarly, it has been shown that inversion of faces produces the opposite effect in prosopagnosiacs (a group marked by a profound memory deficit for faces), resulting in slightly better memory performance (Farah, Wilson, Drain, and Tanaka, 1995).

Interestingly, research has shown that other-race faces tend to be processed less-holistically than own-race faces. Similar to work with prosopagnosiacs (Farah, Wilson, Drain, and Tanaka, 1995), inverting an out-group face has been shown to disrupt memory performance to a lesser degree than inverting an in-group face in adults (Rhodes, Brake, Taylor, & Tan, 1989) and children (Sangrigoli and de Schonen, 2004a). Michel et al. (2006) extended this effect, finding that in a modified Own-Race Bias memory task, it was harder to recognize the top part of own-race faces when the bottom is connected (holistic presentation) and different than if they are split (feature-based processing). This did not occur for other-race faces. On a behavioral level, the evidence clearly suggests that other-race faces are processed differently than own-race faces. Holistic processing is often associated with a perceptual expertise or experience explanation, however this has yet to be completely clarified in the ORB literature (Michel et al. 2006).

Instead, this type of processing could be a direct consequence of the categorization of a stimulus as belonging to a meaningful group, and thus activating the type motivation necessary to properly process a face. Michel, Cornielle, & Rossion (2007) extended this idea and found that how a racially ambiguous face was categorized did in fact predict how a face was processed, according to their definition of holism (using a composite-face task). This finding fits nicely with the notion of holism being a decisionally-defined aspect of face processing (Richler, Gauthier, Wenger, & Palmeri, 2008) if this decision is made at the semantic level (i.e., a category activation prompts holistic versus feature-based processing according to the ingroup or outgroup status of the stimulus), or perhaps even a motivated decisional level (i.e., adjusting a perception strategy to make one's behavior deflect a "White racist" stereotype).

The next avenue to consider is a phenomenon that can be considered a special type of outgroup homogeneity, that of infrahumanization. Infrahumanization refers to the belief that the human nature (or essence, encompassing such qualities as intelligence, language, and emotionality) of ingroup members is qualitatively different than that of outgroup members (Leyens et al. 2001). Of particular interest is the topic of emotionality. In a number of studies, (Paladino et al. 2002, Vaes, Paladino, & Leyens, 2006), participants associated primary (or non-uniquely human) emotions more with outgroup members and complex (or uniquely human) emotions with ingroup members. My search for a link between this phenomenon and emotion recognition from facial stimuli returned nothing, and so I conducted a brief study. White participants were shown the Asian and White RME stimuli, minus the emotion choice words, and were asked to simply describe what the person in each photograph was thinking or feeling. Analyses revealed that the proportion of complex emotion words to primary emotion words (Ekman's "Big Six") was significantly higher for White faces than for Asian faces, $t(12) = 4.393$,

$p < .001$. Since the infrahumanization literature suggests that outgroup members are not considered to have the same capacity for emotional complexity as that of ingroup members, our use of a complex emotion recognition task could explain why our ingroup advantage effects are far more pronounced than those described in the cultural dialects literature (which largely focuses on primary emotion recognition). A clear future direction is to pursue the connection between categorization, tendency to infrahumanize, and how this affects the ability to accurately decode mental states.

Yet another avenue to be explored is motivation driving social inclusivity, or the tendency to categorize others as ingroup versus outgroup members. Since categorization likely happens very early in our visual stream, the differences in inclusivity must be driven by a pre-existing tendency or specific strategy to include or exclude, which then directs early visual cells to use the information for an inclusionary or exclusionary strategy of person perception. Johnson and Fredrickson (2005) examined the role of emotional state on remembering other-race faces. Expanding on Fredrickson's broaden and build theory (Fredrickson, 2001), it was found that inducing positive emotion in participants before encoding and recognition phases of an Own-Race Bias memory task resulted in the elimination of the effect, relative to a negative or neutral mood induction. The authors cited the tendency of people feeling joy to endorse social inclusion (possibly reducing the tendency to categorize by race) as an interaction schema, thus allocating more attention for encoding identity information and increasing memory performance. Priming emotions in others has the implications of obscuring emotion recognition accuracy (need reference), in a way that is less likely to affect face memory, but there certainly must be other factors that would affect the tendency to be socially inclusive versus exclusive (e.g. prejudice) that need to be explored, and could produce a great body of research in the future.

References

Adams, Jr., R. B., Rule, N. O., Franklin, R. G., Wang, E., Stevenson, M. T., Yoshikawa, S., Nomura, M., Sato, W., Kveraga, K., & Ambady, N. (in press). Cross-cultural reading the mind in the eyes: An fMRI investigation. *Journal of Cognitive Neuroscience.*

Adolphs, R., Baron-Cohen, S., & Tranel, D. (2002). Impaired recognition of social emotions following amygdala damage. *Journal of Cognitive Neuroscience, 14(8),* 1264-1274.

Adolphs, R., Damasio, H., Tranel, D., Cooper, G., & Damasio, A. R. (2000). A role for somatosensory cortices in the visual recognition of emotion as revealed by three-dimensional lesion mapping. *Journal of Neuroscience, 20(7),* 2683-2690.

Bargh, J. A., Raymond, P., Pryor, J. B., & Strack, F. (1995). Attractiveness of the underling An automatic power → sex association and its consequences for sexual harassment and aggression. *Journal of Personality and Social Psychology, 68(5),* 768-781.

Baron-Cohen, S., Jolliffe, T., Mortimore, C., & Robertson, M. (1997). Another advanced test of theory of mind: Evidence from very high functioning adults with autism or Asperger syndrome. *Journal of Child Psychology and Psychiatry, 38(7),* 813-822.

Baron-Cohen, S., Ring, H., Chitnis, X., Wheelwright, S., Gregory, L., Williams, S., Brammer, M., & Bullmore, E. (2006). fMRI of parents of children with Asperger Syndrome: A pilot study. *Brain and Cognition, 6,* 122-130.

Baron-Cohen, S., Ring, H. A., Wheelwright, S., Bullmore, E. T., Brammer, M. J., Simmons, A., & Williams, S. C. R. (1999). Social intelligence in the normal and autistic brain: An fMRI study. *European Journal of Neuroscience, 11,* 1891-1898.

Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y. & Plumb, I. (2001). The "reading the mind in the eyes" test revised version: A study with normal adults, and adults with asperger syndrome or high-functioning autism. *Journal of Child Psychology and Psychiatry, 42,* 241-251.

Baron-Cohen, S., Wheelwright, S., & Jolliffe, T. (1997). Is there a "language of the eyes? Evidence from normal adults, and adults with autism or asperger syndrome. *Visual Cognition, 4,* 311-331.

Baron-Cohen, S., Wheelwright, S., Spong, A., Scahill, V., & Lawson, J. (2001). Are intuitive physics and intuitive psychology independent? A test with children with asperger syndrome. *Journal of Developmental and Learning Disorders, 5,* 47-78.

Bernstein, M. J., Young, S. G., & Hugenberg, K. (2007). The cross-category effect: Mere social categorization is sufficient to elicit an own-group bias in face recognition. *Psychological Science, 18*, 706-712.

Bora, E., Vahip, S., Gonul, A. S., Akdeniz, F., Alkan, M., Ogut, M., & Eryavuz, A. (2005). Evidence for theory of mind deficits in euthymic patients with bipolar disorder. *Acta Psychiatrica Scandinavica, 112,* 110-116.

Caldara, R., Rossion, B., Bovet, P., & Hauert, C. (2004). Event-related potentials and time course of the 'other-race' face classification advantage. *Neuroreport, 15(5),* 905-910.

Caldara, R., Thut, G., Servoir, P., Michel, C. M., Bovet, P., & Renault, B. (2003). Face versus non-face object perception and the 'other-race' effect: A spatio-temporal event-related potential study. *Clinical Neurophysiology, 114,* 515-528.

Calder, A. J., Lawrence, A. D., Keane, J., Scott, S. K., Owen, A. M., Christoffels, I., & Young, A. W. (2002). Reading the mind from eye gaze. *Neuropsychologia, 40,* 1129-1138.

Chiao, J.Y. & Ambady, N. (2007). Cultural neuroscience: Parsing universality and diversity across levels of analysis, 237-254. In Kitayama, S. and Cohen, D. (Eds.) Handbook of

Cultural Psychology, Guilford Press, NY.

Clegg, J., Hollis, C., Mawhood, L., & Rutter, M. (2005). Developmental language disorders – a follow-up in later adult life. Cognitive, language, and psychosocial outcomes. *Journal of Child Psychology and Psychiatry, 46(2),* 128-149.

Corenblum, B. & Meissner, C. A., (2006). Recognition of in-group and out-group children and adults. *Journal of Experimental Child Psychology, 93,* 187-206.

Cornish, K., Kogan, C., Turk, J., Manly, T., James, N., Mills, A., & Dalton, A. (2005). The emerging fragile X premutation phenotype: Evidence from the domain of social cognition. *Brain and Cognition, 57,* 63-60.

Cosmides, L., Tooby, J., & Kurzban, R. (2003). Perceptions of race. *Trends in Cognitive Sciences, 7(4),* 173-179.

Craig, J. S., Hatton, C., Craig, F. B., & Bentall, R. P. (2004). Persecutory beliefs, attributions and theory of mind: Comparison of patients with paranoid delusions, Asperger's syndrome and healthy controls. *Schizophrenia Research, 69,* 29-33.

Darwin, C. (1872; 1965). *The expression of the emotions in man and animals.* Chicago: University of Chicago Press.

Dolan, M. & Fullam, R. (2004). Theory of mind and mentalizing ability in antisocial personality disorders with and without psychopathy. *Psychological Medicine, 34,* 1093-1102.

Dorris, L., Espie, C. A. E., Knott, F., & Salt, J. (2004). Mind-reading difficulties in the siblings of people with Asperger's syndrome: Evidence for a genetic influence in the abnormal development of a specific cognitive doman. *Journal of Child Psychology and Psychiatry, 45(2),* 412-418.

Duchaine, B. C., Yovel, G., Butterworth, E. J., & Nakayama, K. (2006). Prosopagnosia as an impairment to face-specific mechanisms: Elimination of the alternative hypotheses in a developmental case. *Cognitive Neuropsychology, 23(5),* 714-747.

Dziobek, I., Fleck, S., Kalbe, E., Rogers, K., Hassenstab, J., Brand, M., Kessler, J., Woike, J. K., Wolf, O. T., & Convit, A. (2006). Introducing MASC: A movie for the assessment of social cognition. *Journal of Autism and Developmental Disorders, 36,* 623-636.

Eberhardt, J. L., Goff, P. A., Purdie, V. J., & Davies, P. G. (2004). Seeing black: Race, crime, and visual processing. *Journal of Personality and Social Psychology, 87(6),* 876-893.

Ekman, P. (1972). Universals and cultural differences in facial expressions of emotion. In J. Cole (Ed.), *Nebraska Symposium on Motivation; 1971* (Vol. 19. pp. 207–282). Lincoln: University of Nebraska Press.

Ekman, P. (1993). Facial expression and emotion. *American Psychologist, 48(4),* 384-392.

Ekman, P., Sorenson, R. E., & Friesen, W. V. (1969). Pan-cutltural elements in facial displays of emotion. *Science, 164(3875),* 86-88.

Elfenbein, H. A. & Ambady, N. (2002). On the universality and cultural specificity of emotion recognition: A meta-analysis. *Psychological Bulletin, 128(2)*, 203-235.

Elfenbein, H. A. & Ambady, N. (2003a). Universals and cultural differences in recognizing emotions. *Current Directions in Psychological Science, 12(5)*, 159-164.

Elfenbein, H. A. & Ambady, N. (2003b). When familiarity breeds accuracy: Cultural exposure and facial emotion recognition. *Journal of Personality and Social Psychology, 85(2),* 276-290.

Elfenbein, H. A., Mandal, M. K., Ambady, N., Harizuka, S., & Kumar, S. (2004). Hemifacial differences in the in-group advantage in emotion recognition. *Cognition and Emotion, 18(5),* 613-629.

Frantz, C. M., Cuddy, A. J. C., Burnett, M., Ray, H., & Hart, A. (2004). A threat in the computer. The Race Implicit Association Test as a stereotype threat experience. *Personality and Social Psychology Bulletin, 30,* 1611-1624.

Farah, M. J., Wilson, K. D., Drain, H. M., & Tanaka, J. R. (1995). The inverted face inversion effect in prosopagnosia: Evidence for mandatory, face-specific perceptual mechanisms. *Vision Research, 35(14),* 2089-2093.

Farah, M. J., Wilson, K. D., Drain, M., & Tanaka, J. N. (1998). What is "special" about face perception. *Psychological Review, 105(3),* 482-498.

Farrant, A., Morris, R. G., Russell, T., Elwes, R., Akanuma, N., Alarcon, G., Koutroumanidis, M. (2005). Social cognition in frontal lobe epilepsy. *Epilepsy & Behavior, 7,* 506-516.

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist*, 56, 218–226.

Fu, T., Koutstaal, W., Fu, C. H. Y., Poon, L., & Cleare, A. J. (2005). Depression, confidence and decision: Evidence against depressive realism. *Journal of Psychopathology and Behavioral Assessment, 27(4),* 243-252.

Gauthier, I., Tarr, M. J., Anderson, A. W., Skudlarski, P., & Gore, J. C. (1999). Activation of the middle fusiform "face area" increases with expertise in recognizing novel objects. *Nature Neuroscience, 2,* 568–573.

Gilbert, D. T. & Hixon, J. G. (1991). The trouble of thinking: Activation and application of stereotypic beliefs. *Journal of Personality and Social Psychology, 60(4),* 509-517.

Goff, P. A., Steele, C. M., & Davies, P. G. (2008). The space between us: Stereotype threat and distance in interracial contexts. *Journal of Personality and Social Psychology, 94(1),* 91-107.

Golan, O. & Baron-Cohen, S. (2006). Systemizing empathy: Teaching adults with Asperger syndrome or high-functioning Autism to recognize complex emotions using interactive media. *Development and Psychopathology, 18,* 591-617.

Golan, O., Baron-Cohen, S., & Hill, J. (2006). The Cambridge mindreading (CAM) face-voice battery: Testing complex emotion recognition in adults with and without Asperger syndrome. *Journal of Autism and Developmental Disorders, 36(2),* 169-183.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measureing individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology, 74(6),* 1464-1480.

Gregory, C., Lough, S., Stone, V., Erzinclioglu, S., Martin, L., Baron-Cohen, S., & Hodges, J. R. (2002). Theory of mind in patients with frontal variant frontotemporal dementia and Alzheimer's disease: Theoretical and practical implications. *Brain, 125,* 752-764.

Hall, J. A., Halberstadt, A. G., & O'Brien, C. E. (1997). "Subordination" and nonverbal sensitivity: A study and synthesis of findings based on trait measures. *Sex Roles, 37,* 295–317.

Harkness, K. L., Sabbagh, M. A., Jacobson, J. A., Chowdrey, N. K., & Chen, T. (2005). Enhanced accuracy of mental state decoding in dysphoric college students. *Cognition and Emotion, 19(7),* 999-1025.

Havet-Thomassin, V., Allain, P., Etcharry-Bouyx, F., & Le Gall, D. (2006). What about theory of mind after severe brain injury? *Brain Injury, 20(1),* 83-91.

Hefter, R. L., Manoach, D. S., & Barton, J. J. S. (2005). Perception of facial expression and facial identity in subjects with social developmental disorders. *Neurology*, *65,* 1620-1625.

Henry, J. D., Phillips, L. H., Crawford, J. R., Ietswaart, M., & Summers, F. (2006). Theory of mind following traumatic brain injury: The role of emotion recognition and executive dysfunction. *Neuropsychologia, 44,* 1623-1628.

Hugenberg, K. & Bodenhausen, G. V. (2003). Facing prejudice: Implicit prejudice and the perception of facial threat. *Psychological Science, 14(6),* 640-643.

Hugenberg, K. & Sacco, D. F. (2008). Social categorization and stereotyping: How social categorization biases person perception and face memory. *Social and Personality Psychology Compass. 2(2),* 1052-1072.

Iddon, J. L., Morgan, D. J. R., Loveday, C., Sahakian, B. J., & Pickard, J. D. (2004). Neuropsychological profile of young adults with spina bifida with or without hydrocephalus. *Journal of Neurology, Neurosurgery, and Psychiatry, 75,* 1112-1118.

Irani, F., Platek, S. M., Panyavin, I. S., Calkins, M. E., Kohler, C., Siegel, S. J., Schachter, M., Gur, R. E., & Gur, R. C. (2006). Self-face recognition and theory of mind in patients with schizophrenia and first-degree relatives. *Schizophrenia Research, 88,* 151-160.

Ito, T. A., Thompson, E., & Caioppo, J. T. (2004). Tracking the timecourse of social perception: The effects of racial cues on event-related brain potentials. *Personality and Social Psychology Bulletin, 30,* 1267-1280.

Ito, T. A., & Urland, G. R. (2003). Race and gender on the brain: Electrocortical measures of attention to the race and gender of multiply categorizable individuals. *Journal of Personality and Social Psychology, 85(4),* 616–626.

Ito, T. A. & Urland, G. R. (2005). The influence of processing objectives on the perception of faces: An ERP study of race and gender perception. *Cognitive, Affective, & Behavioral Neuroscience, 5(1),* 21-36.

Johnson, K. J. & Fredrickson, B. L. (2005). “We all look the same to me”: Positive emotion eliminate the own-race bias in face recognition. *Psychological Science, 16(11),* 875-881.

Judd, C. M., Kenny, D. A., & McClelland, G. H. (2001). Estimating and testing mediation in moderation in within-subjects designs. *Psychological Methods, 6(2),* 115-134.

Kelly, D. J., Quinn, P. C., Slater, A. M., Lee, K., Gibson, A., Smith, M., Ge, L., & Pascalis, O. (2005). Three-month-olds, but not newborns, prefer own-race faces. *Developmental Science. 8(6),* F31-F36.

Kraemer, B., Delsignore, A., Gundelfinger, R., Schnyder, U., & Hepp, U. (2005). Comorbidity of Asperger syndrome and gender identity disorder. *European Child & Adolescent Psychiatry, 14(5),* 292-296.

Kurzban, R., Tooby, J., & Cosmides, L. (2001) Can race be erased? Coalitional computation and social categorization. *Proc. Natl. Acad. Sci. U. S. A., 98*, 15387–15392.

Lawrence, K., Campbell, R., Swettenham, J., Terstegge, J., Akers, R., Coleman, M., & Skuse, D. (2003). Interpreting gaze in Turner syndrome: Impaired sensitivity to intention and emotion, but preservation of social cueing. *Neuropsychologia, 41,* 894-905.

Lee, L., Harkness, K. L., Sabbagh, M. A., Jacobson, J. A. (2005). Mental state decoding abilities in clinical depression. *Journal of Affective Disorders, 86,* 247-258.

Levin, D. T. (1996). Classifying faces by race: The structure of face categories. *Journal of Experimental Psychology: Learning, Memory and Cognition, 22(6),* 1364-1382.

Levin, D. T. (2000). Race as a visual feature: Using visual search and perceptual discrimination tasks to understand face categories and the cross-race recognition deficit. *Journal of Experimental Psychology: General, 128(4),* 559-574.

Leyens, J., Rodriguez-Perez, A., Rodriguez-Torres, R, Gaunt, R., Paladino, M., Vaes, J., & Demoulin, S. (2001). Psychological essentialism and the differential attribution of uniquely human emotions to ingroups and outgroups. *European Journal of Social Psychology, 31*, 395-411.

Locke, V., Macrae, C. N., & Eaton, J. L. (2005). Is person categorization modulated by exemplar typicality? *Social Cognition, 23(5),* 417-428.

Losh, M. & Piven, J. (2007). Social-cognition and the broad Autism phenotype: Identifying genetically meaningful phenotypes. *Journal of Child Psychology and Psychiatry, 48(1).* 105-112.

Maclin, O. H., & Malpass, R. S. (2001). Racial categorization of faces: The ambiguous race face effect. *Psychology ,Public Policy, and Law, 7(1),* 98-118.

Macrae, C. N., Hood, B. M., Milne, A. B., Rowe, A. C., & Mason, M. F. (2002). Are you looking at me?: Eye gaze and person perception. *Psychological Science, 13(5),* 460-464.

Macrae, C. N. & Martin, D. (2007). A boy primed sue: Feature-based processing and person construal. *European Journal of Social Psychology, 37,* 793-805.

Maddox, K. B. (2004). Perspectives on racial phenotypicality bias. *Personality and Social Psychology Review, 8(4),* 383-401.

Mandal, M. K. & Ambady, N. (2004). Laterality of facial expressions of emotion: Universal and culture-specific influences. *Behavioral Neurology, 15,* 23-34.

Markus, H., Kitayama, S., & Heiman, R. (1996). Culture and "basic" psychological principles. In

E.T. Higgins & A.W. Kruglanski (Eds.) *Social psychology: Handbook of basic principles*. New York: Guilford.

Marsh, A. M., Elfenbein, H. A., & Ambady, N. (2003). Nonverbal “accents”: Cultural differences in facial expressions of emotion. *Psychological Science*, *14(4),* 373-376.

Mason, M. F., Cloutier, J., & Macrae, C. N. (2006). On construing others: Category and stereotype activation from facial cues. *Social Cognition*, *24(5),* 540-562.

Mason, M. F. & Macrae, C. N. (2004). Categorizing and individuating others: The neural substrates of person perception. *Journal of Cognitive Neuroscience, 16(10),* 1785-1795.

Meissner, C. A., & Brigham, J. C. (2001). Thirty years of investigating the own-race bias in memory for faces: A meta-analytic review. *Psychology ,Public Policy, and Law, 7(1),* 3–35.

Michel, C., Corneille, O., & Rossion, B. (2007). Race categorization modulates holistic face encoding. *Cognitive Science*, *31,* 911-924.

Michel, C., Rossion, B., Han, J., Chung, C., & Caldara, R. (2006). Holistic processing is finely tuned for faces of one’s own race. *Psychological Science*, *17(7),* 608-615.

Milders, M., Fuchs, S., & Crawford, J. R. (2003). Neuropsychological impairments and changes in emotional and social behaviour following sever traumatic brain injury. *Journal of Clinical and Experimental Neuropsychology, 25(2)*, 157-172.

Morton, J., & Johnson, M. H. (1991). CONSPEC and CONLERN: A two-process theory of infant face recognition. *Psychological Review, 98(2),* 164-181.

Murphy, D. (2006). Theory of mind in Asperger syndrome, schizophrenia, and personality disordered forensic patients. *Cognitive Neuropsychiatry*, *11(2)*, 99-111.

Ostrom, T. M. & Sedikides, C. (1992). Out-group homogeneity effects in natural and minimal groups. *Psychological Bulletin, 112(3),* 536-552.

Paladino, M., Leyens, J., Rodriguez, R., Rodriguez, A., Gaunt, R., & Demoulin, S. (2002). Differential association of uniquely and non uniquely human emotions with the ingroup and outgroup. *Group Processes & Intergroup Relations, 5(2),* 105-117.

Pauker, K., Ambady, N., Weisbuch, M., Sommers, S.R., Adams, R.B., Jr, Ivcevic, Z. (2009). Not so Black and White: Memory for ambiguous group members. *Journal of Personality and Social Psychology, 96,* 795-810.

Platek, S. M., Fonteyn, L. C. M., Myers, T. E., Izzetoglu, M., Ayaz, H., Li, C., & Chance, B. (2005). Functional near infrared spectroscopy reveals differences in self-other processing as a function of schizotypal personality traits. *Schizophrenia Research, 73,* 125-127.

Platek, S. M., Keenan, J. P., Gallup Jr., G. C., & Mohamed, F. B. (2004). Where am I? The neurological correlates of self and other. *Cognitive Brain Research, 19,* 114-122.

Rhodes, G., Brake, S., Taylor, K., & Tan, S. (1989). Expertise and configural coding in face recognition. *British Journal of Psychology, 80*, 313–331.

Richell, R. A., Mitchell, D. G. V., Newman, C., Leonard, A., Baron-Cohen, S., Blair, R. J. R. (2003). Theory of mind and psychopathy: Can psychopathic individuals read the ‘language of the eyes’? *Neuropsychologia, 41,* 523-526.

Richler, J. J., Gauthier, I., Wenger, M. J., & Palmeri, T. J. (2008). Holistic processing of faces: Perceptual and decisional components. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 34(2),* 328-342.

Rosenthal, R. & Rosnow (1991). *Essentials of Behavioral Research.* New York: McGraw-Hill.

Rule, N.O., Ambady, N., Adams, R.B., Jr., & Macrae, C.N. (2007). Us and them: Memory advantages in perceptually ambiguous groups. *Psychonomic Bulletin & Review, 14,* 687–692.

Russell, T. A., Rubia, K., Bullmore, E. T., Soni, W., Suckling, J., Brammer, M. J., Simmons, A., Williams, S. C. R., Sharma, T. (2000). Exploring the social brain in schizophrenia: Left prefrontal underactivation during mental state attribution. *American Journal of Psychiatry, 157,* 2040-2042.

Sabbagh, M. A., Moulson, M. C., & Harkness, K. L. (2004). Neural correlates of mental state decoding in human adults: An event-related potential study. *Journal of Cognitive Neuroscience, 16(3),* 415-426.

Sangrigoli, S., & de Schonen, S. (2004). Effect of visual experience on face processing: A developmental study of inversion and non-native effects. *Developmental Science, 7(1),* 74-87.

Sangrigoli, S., & de Schonen, S. (2004). Recognition of own-race and other-race faces by three-month-old infants. *Journal of Child Psychology and Psychiatry, 45(7),* 1219-1227.

Shaw, P., Bramham, J., Lawrence, E. J., Morris, R., Baron-Cohen, S., & David, A. S. (2005). Differential effects of lesions of the amygdala and prefrontal cortex and recognizing facial expressions of complex emotions. *Journal of Cognitive Neuroscience, 17(9),* 1410-1419.

Skwerer, D. P., Verbalis, A., Schofield, C., Faja, S., & Tager-Flusberg, H. (2006). Social-perceptual abilities in adolescents and adults with Williams syndrome. *Cognitive Neuropsychology, 23(2),* 338-349.

Slessor, G., Phillips, L. H., & Bull, R. (2007). Exploring the specificity of age-related differences in theory of mind tasks. *Psychology and Aging, 22(3)*, 639-643.

Sporer, S.L. (2001). Recognizing faces of other ethnic groups: An integration of theories. Psychology, Public Policy, and Law, 7, 36–97.

Stone, V. E., Baron-Cohen, S., Calder, A., Keane, J., & Young, A. (2003) Acquired theory of mind impairments in individuals with bilateral amygdala lesions. *Neuropsychologia, 41,* 209-220.

Tajfel, H. (1969). Cognitive aspects of prejudice. *Journal of Social Issues, 25(4),* 79-97.

Torralva, T., Kipps, C. M., Hodges, J. R., Clark, L., Bekinschtein, T., Roca, M., Calcagno, M. L., & Manes, F. (2007). The relationship between affective decision-making and theory of mind in the frontal variant of fronto-temporal dementia. *Neuropsychologia, 45,* 342-349.

Trawalter, S., & Richeson, J. A. (2006). Regulatory focus and executive function after interracial interactions. *Journal of Experimental Social Psychology, 42,* 406-412.

Turk, D. J., Handy, T. C., & Gazzaniga, M. S. (2005). Can perceptual expertise account for the own-race bias in face recognition?: A split-brain study. *Cognitive Neuropsychology, 22(7),* 877-883.

Uhlhaas, P. J., Phillips, W. A., Schenkel, L. S., & Silverstein, S. M. (2006). Theory of mind and perceptual context-processing in schizophrenia. *Cognitive Neuropsychiatry, 11(4),* 416-436.

Vaes, J., Paladino, M. P., & Leyens, J. (2006). Priming uniquely human emotion and the in-group(but not the out-group) activates humanity concepts. *European Journal of Social Psychology, 36,* 169-181.

Woodbury-Smith, M. R., Clare, I. C. H., Holland, A. J., Kearns, A., Staufenberg, E., & Watson, P. (2005). A case-control study of offenders with high functioning autistic spectrum disorders. *The Journal of Forensic Psychiatry & Psychology, 16(4),* 747-763.

Yin, R. K. (1969). Looking at upside-down faces. *Journal of Experimental Psychology 81*, 141–145.

Yuki, M., Maddux, W. W., & Masuda, T. (2007). Are the windows to the soul the same in the east and west? Cultural differences in using the eyes and mouth as cues to recognize emotions in japan and the united states. *Journal of Experimental Social Psychology, 43,* 303-311.

Notes

[1] Each of the Japanese words was later back-translated into English by an independent translator. This revealed a very few words that were not literal translations, yet were functionally synonymous (e.g. “fantasizing” became “daydreaming.” We considered this to be successful, and continued with the original translation.

Appendix. Overview of studies utilizing the Adult Reading the Mind in the Eyes Task (Baron Cohen et al. 2001)

Study Type	Article	Populations	Task	Outcome	Brain Areas	Culture	Special Pop. Mean (SD)	Control Pop. Mean (SD)
Lesions	Adolphs, Baron-Cohen & Tranel, 2002	30 Unilateral Amygdala Damage (16 left, 14 right), 2 Bilateral Amygdala Damage, 47 brain damaged controls, 19 normal	Modified RME – match 14 eyes stim to a list of mental states (4 *social*)	Normals were best. Amygdala patients were only worse than brain damaged controls when the eyes stim were expressing *social* complex mental states	amygdala	Not sure, but probably U.S. (Adolphs and Tranel at Iowa)		
Lesions	Farrant et al. 2005	14 Frontal Lobe Epilepsy, 14 controls	RME	Impairment	Frontal Lobe	UK (England)	22.79 (6.02)	27.86 (3.78)
Lesions	Havet-Thomassin et al. 2006	17 TBI, 17 controls	RME (French)	Impairment		France	20.6 (4)	27.6 (2.7)
Lesions	Henry et al. 2006	16 TBI, 17 controls	RME (37 stim)	Impairment		UK (Scotland)	22.4 (6.49)	25.9 (4.06)
Lesions(?)	Iddon et al. 2007	47 Spina Bifida w/Hydrocephalus, 18 Spina Bifida, 50 controls	RME (25 item)	No impairment		UK (England)	Hydro/SB = 19.8 (2.9) SB = 19.8 (2.9)	19.8 (2.1)
Lesions	Milders, Fuchs & Crawford, 2003	17 severe TBI, 17 controls	Older RME (25 item, 2 Choice)	Marginal impairment (*p* = .62)		UK (Scotland)	18.18 (2.77)	19.71 (1.72
Lesions	Shaw et al. 2005	54 Temporal Lobe Damage (27 L, 27 R), 31 Frontal Lobe Damage (16 R, 15 L) 91 controls	RME	Temporal lobe (LT and RT) impairment and RF	Amygdala, VMPFC	UK (England)	RT = 22.2, LT = 24.48, RF = 24.24, LF = 27.6	28.08

Appendix continued.

Study Type	Article	Populations	Task	Outcome	Brain Areas	Culture	Special Pop. Mean (SD)	Control Pop. Mean (SD)
Lesions	Stone et al. 2003	2 Bilateral Amygdala damage, 34 controls (10 British, 24 American)	Older RME (25 item, 2 Choice)	One patient was impaired, the other wasn't	Bilateral Amygdala	Mix of British and American	16, 17	19.8
Clinical	Baron-Cohen & Hammer, 1997	30 parents of children with Asperger Syndrome, 30 parents of children without Asperger or autism	Older RME (25 item, 2 Choice)	Control Mothers > AS-Mothers, Control Fathers > AS-Fathers		UK (England)	F = 18.9 (2.1) M = 17.3 (1.6)	F = 22.1 (2.0) M = 19.5 (2.6)
Clinical	Baron-Cohen, Jolliffe, Mortimore & Robertson, 1997	16 Autism/Asperger, 50 controls, 10 Tourette Syndrome	Older RME (25 item, 2 Choice	AS Impairment, no TS Impairment		UK (England)	AS = 16.3 (2.9) TS = 20.4 (2.63)	20.3 (2.63)
Clinical	Baron-Cohen et al. (2001)	15 Autism/Asperger, 239 controls (122 Gen. Pop., 103 Students, 14 IQ match)	RME	Impairment		UK (England)	21.9 (6.6)	GP = 26.2 (3.6) S = 28 (3.5) IQ = 30.9 (3)
Clinical	Baron-Cohen et al. 1997	15 Male children with Asperger Syndrome, 103 control children (mixed gender)	Children's RME (28 stim, 4 Choice)	Impairment		UK (England)	12.6 (3.3)	17.35
Clinical	Baron-Cohen, Wheelwright & Jolliffe, 1997	16 Autism/Asperger, 16 controls	Complex eyes stim (10 eyes, 2 Choice)	Impairment		UK (England)	6 (.67)	9.4 (.73)
Clinical	Bora et al. 2005	43 Euthymic Clinical with Bipolar Disorder, 30 controls	RME (First 27 stim)	Impairment		Turkey (translated?)	16.86 (3.43)	18.97 (2.8)

Appendix continued.

Study Type	Article	Populations	Task	Outcome	Brain Areas	Culture	Special Pop. Mean (SD)	Control Pop. Mean (SD)
Clinical	Clegg, Hollis, Mawhood & Rutter, 2005	17 developmental language disorder males, 16 controls (siblings), 17 IQ match controls	Older RME (25 item, 2 choice)	No impairment		UK (England)	16.6 (3.3)	Sib = 18.3 (2.7) IQ = 19.4 (2.3)
Clinical	Cornish et al. 2005	22 males with Fragile X Syndrome, 22 controls from FXS families, 22 controls with no family FXS	RME (35 items)	Impairment of FXS, no difference btw controls		UK (England)	Not reported	Not reported
Clinical	Craig et al. 2004	16 paranoid delusions clinical, 17 Asperger, 16 controls	RME	Impairment of PD and AD (no difference btw)		UK (England)	PD = 18.19 (6.65) AS = 19.88 (6.10)	27.63 (4.33)
Clinical	Dolan & Fullam, 2004	84 Male Antisocial Personality Disorder (56 Non-psychopaths, 28 Psychopaths, 20 Male controls	Complex eyes stim (10 eyes, 2 Choice)	No Impairment		UK (England)	Non-P = 8 (1.54) P = 8.17 (1.13)	8.41 (1.39)
Clinical	Dorris, Espie, Knott & Salt, 2004	27 child siblings of Asperger's Syndrome, 27 control children	Children's RME	Impairment		UK (Scotland)	18.26 (3.61)	20.04 (4.35)
Clinical	Duchaine, Yovel, Butterworth & Nakayama, 2006	1 Prosopagnosiac, 14 controls	RME (28 item, 4 choice)	Impairment		Not sure, but first author is in England	Ed = 17	28.3 (4.1)
Clinical	Dziobek et al. 2006	19 Asperger Syndrome, 20 controls	RME (24 items)	Impairment		US	16.1 (3.1)	20 (1.8)

Appendix continued.

Study Type	Article	Populations	Task	Outcome	Brain Areas	Culture	Special Pop. Mean (SD)	Control Pop. Mean (SD)
Clinical	Fu et al. 2005	15 Major Depression, 22 controls, 15 recovered Depression	RME (modified to 2 choice)	No differences		UK (England)	D = 29.88 RD = 28.08	29.88
Clinical	Golan & Baron-Cohen, 2006							
Clinical	Golan, Baron-Cohen & Hill, 2006							
Clinical	Gregory et al. 2002	19 frontal variant frontotemporal dementia, 12 Alzheimer's, 12 control	Older RME (25 item, 2 Choice)	fvFTD impaired vs. Alzheimer's and controls		UK (England)	fvFTD = 16 Alz = 19.75	19.75
Clinical	Harkness et al. 2005	16 Dysphoric females, 27 Nondysphoric females	RME	Dysphoric performed more accurately		Canada		
Clinical	Hefter, Manoach & Barton 2005	26 with a social developmental disorder (autism, Asperger's, socioemotional processing disorder, and combos), 15 controls	RME, but used it as part of a composite facial expression recognition score	SDDs were all the same, no mention of controls results		US		
Clinical	Irani et al. 2006	10 Schizophrenia, 10 first-degree relatives, 10 controls	RME	Impairment for Schizophrenia vs. controls, first-degree relatives differed from neither group		US	Need to write for data	

Appendix continued.

Study Type	Article	Populations	Task	Outcome	Brain Areas	Culture	Special Pop. Mean (SD)	Control Pop. Mean (SD)
Clinical	Kelemen et al. 2005	52 Schizophrenia (mixed), 30 controls	RME (29 items)	Impairment		Hungary	18.5 (5.2)	22.5 (2.9)
Clinical	Kelemen et al. 2006	79 (65 unaffected, 14 affected) first-degree relatives of Schizophrenics, 40 controls	RME	No Impairment for unaffected, impairment for affected		Hungary	Unaffected = 28.6 (5.2) Affected = 21.5 (4.4)	27.8 (5.0)
Clinical	Kraemer et al 2005	1 comorbid gender identity disorder and asperger patient, controls not described	RME	Impairment		Switzerland	15	26 (3) – this figure not accounted for in text
Clinical	Lawrence et al. 2003	43 Turner Syndrome, 35 female controls	RME	Impairment		UK (England)	68.2% (12.2%)	77.9% (12.6%)
Clinical	Lee, Harkness, Sabbagh & Jacobson, 2005	52 Female Unipolar Depression, 30 female controls	RME	Impairment		Canada	Need to write for data	
Clinical	Losh & Piven, 2007							
Clinical	Murphy, 2006	13 Asperger's, 13 Schizophrenia, 13 Personality Disorder	RME	PD better than AS and SC (no difference btw these two)		UK (England)	PD = 77.3% AS = 60.4% SC = 52.9%	
Clinical	Richell et al. 2003	19 Psychopathic Males, 18 male controls	RME	No impairment		UK (England)	23.9 (5.3)	26.3 (4.3)
Clinical	Skwerer et al. 2006	43 Williams Syndrome, 42 Mixed Learning Disabilities, 46 controls	Modified RME (32 item, 2 choice)	Impairment for both clinical groups (no differences btw these groups)		U.S.	WMS = 16.07 (4.27) LID = 15.33 (5.40)	24.04 (3.15)

Appendix continued.

Study Type	Article	Populations	Task	Outcome	Brain Areas	Culture	Special Pop. Mean (SD)	Control Pop. Mean (SD)
Clinical	Tager-Flusberg, Boshart & Baron-Cohen, 1998	13 Williams Syndrome, 13 Prader-Willi Syndrome, 25 control	Older RME (25 item, 2 Choice)	Controls > Williams > Prader-Willi		U.S.	WMS = 17.3 (3.8) PWS = 14.8 (3.1)	19.6 (2.2)
Clinical	Torralva et al. 2007	20 Frontal variant of fronto-temporal dementia, 10 controls	Older RME (17 item, 2 choice)	Impairment		Argentina	11.9 (2)	14.4 (1.4)
Clinical	Uhlhaas, Phillips, Schenkel & Silverstein, 2006							
Clinical	Woodbury-Smith et al. 2005	21 Austism Spectrum Disorder offenders, 23 ASD non-offenders, 23 controls.	RME	Impairment for ASD non-offenders relative controls. No differences for offenders		UK (England)	ASD Offenders = 23.78 (1.05) ASD Non-offenders = 21.16 (.89)	24.65 (.99)
Neuro	Baron-Cohen et al. 2006	12 parents of children with Asperger Syndrome, 12 controls	Older RME (30 item, 2 choice)	No task accuracy differences	Controls vs. Parents: more mid temporal gyrus and inferior frontal gyrus Males vs. Females: more angular gyrus and dorsolateral prefrontal cortex Females vs Males: more bilateral IFG.	UK (England)	Fathers = 80.6 (4.9) Mothers = 82.2 (6.2)	Males = 83.3 (7.6) Females = 87.2 (7.7)

Appendix continued.

Study Type	Article	Populations	Task	Outcome	Brain Areas	Culture	Special Pop. Mean (SD)	Control Pop. Mean (SD)
Neuro	Baron-Cohen et al. 1999	6 Autism, 12 controls	fMRI, Older RME (30 item, 2 choice)	Impairment	Autism: greater bilateral superior temporal gyrus Controls: greater left inferior frontal gyrus, right insula, and left amygdala	UK (England)	74% (1.8)	83% (7.3)
Neuro	Platek et al. 2005	21 controls, correlate with Schizoptypal Personality Questionnaire	fNIRS, RME	Performance negatively correlated with SPQ – need to write for data	Increased frontal lobe oxygenation positively correlated with SPQ	U.S.		
Neuro	Platek, Keenan, Gallup, Jr. & Mohamed, 2006	5 controls	fMRI, Modified RME (36 item, no words – asked to think about the mental state depicted in the photo)	No accuracies to report	Right Hemisphere: middle frontal gyrus, superior frontal gyrus. Medial superior frontal gyrus. Left Hemisphere: Middle frontal gyrus, superior temporal gyrus/temporal pole	U.S.	N/A	N/A

Appendix continued.

Study Type	Article	Populations	Task	Outcome	Brain Areas	Culture	Special Pop. Mean (SD)	Control Pop. Mean (SD)
Neuro	Sabbagh, Moulson, & Harkness, 2004	18 controls	ERP, Modified RME ("does the word match the face?" 72 trials, one match, one mismatch per stim)		ERP: More N270-400 over right inferior frontal and right anterior temporal sites, more P300-500 over bilateral parietal sites LORETA-KEY suggests right oribitofrontal and right anterior medial temporal cortex	Canada		77.2%
Neuro	Russell et al. 2000	5 Schizophrenia, 7 controls	fMRI, Older RME (30 item, 2 choice)	Accuracy deficit	Areas for controls: left inferior frontal gyrus (into insula and medial frontal lobe), left middle and left superior temporal gyrus. Less activation for Schizophrenics: left middle/inferior frontal cortex (near insula)	U.K. (England)	17.4	23.86

Appendix continued.

Study Type	Article	Populations	Task	Outcome	Brain Areas	Culture	Special Pop. Mean (SD)	Control Pop. Mean (SD)
Neuro	Calder et al. 2002	9 female controls	PET, Eyegaze manipulated photos (full face)	N/A	Averted gaze: increased medial prefrontal, middle temporal gyrus, Direct gaze: right middle temporal gyrus, superior temporal gyrus	U.K. (England)		
Other	Slessor, Phillips & Bull 2007	40 young (16-40yrs), 40 old (60-74yrs)	25 item, 4 choice	Older group impaired		U.K. (Scotland)	72.3(10.58)	66.70(11.15)
Other	Matyassy et al. 2006	30 6 month sober alcohol dependent ps and 30 controls	RME (29 item)	No impairment		Not sure, but probably Hungary	22.4 (3.4)	22.5 (2.9)