

Black and White or shades of gray:
Individual differences in automatic race categorization

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Abstract

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This dissertation focuses on *automatic race categorization* (ARC), or *the tendency* for people to perceive others as falling into discrete racial groups rather than perceiving more continuous racial variation. Traditional research approaches treat race categorization as a binary process and assume that people perceive race as falling into discrete categories. In contrast, this research conceives of race categorization as a continuum where a person can perceive the boundary between races as strong and distinct, weak and non-existent, or anything in-between. First, I introduce a new method of measuring ARC (Sedlins, Malahy, Plaks, & Shoda, 2012). The data support the idea that people tend to see racial continua as falling into discrete categories (chapter 1: studies 1-3) and provide evidence

that there are significant individual differences in how strongly people tend to perceive discrete race boundaries (chapter 1: study 1). The present research then examines several individual difference predictors of ARC strength: political ideology (Chapter 2: studies 1-2), beliefs about genetic variation (Chapter 3: studies 1-2), and multiracial salience (Chapter 4: studies 1-2). Finally, the present research provides evidence that strength of ARC predicts race bias. Those with strong ARC (i.e., perceiving races as highly discrete; strong race categorizers) show greater racial bias than weaker race categorizers (Chapter 3: study 2). Together these studies provide a new approach and method to research race categorization and suggest new ways to approach prejudice and discrimination in intergroup contexts. These findings are discussed in terms of their implications for psychological science and social policy.

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Introduction

On his comedy show, Steven Colbert jokes that he “doesn’t see race.” His statement is funny because people presume that everyone does in fact see race in so far as everyone sees physical traits (e.g., skin tone, nose shape). And presumably, at least in America, these physical traits form highly salient racial categories. Colbert’s humor relies on the idea that it may seem nearly impossible not to notice another’s race. Along with gender and age, race is one of the first traits noticed about another individual (Fiske, 1998). In fact, scientists have discovered that race is the first trait perceived in the brain (Ito & Urland, 2003), occurring at 120 milliseconds.

But what happens when people notice traits typically associated with race (e.g., skintone, hair color, nose width)? Can people see these characteristics of an individual without mentally imposing a specific race category on that person? In other words, if you see a man with light brown skin, brown eyes, and a wide nose, would you automatically see that man as Black or White? Indeed, the physical features typically associated with specific racial groups vary continuously (e.g., skin tone), and can combine with each other in infinite combinations (e.g., blue eyes with light skin, blue eyes with dark skin). Yet people typically treat race as consisting of categories (e.g., Black, White), rather than these continuous variations.

“Asian-American is more a scale or a gradient than a discrete combination,” says Amalia Halikias, a Yale freshman whose mother is Chinese and father is Greek (Associated Press, 2011). Her understanding of race categorization is in stark contrast to how race is typically perceived in America, as falling into discrete groups. Her perception of race as continuous also defies how social psychologists typically treat race

categorization. But, is Halikias' continuous racial perception an anomaly? How much do individuals vary in how strongly they perceive race as falling into discrete groups?

To the best of this researcher's knowledge, these questions have not been fully addressed in a social psychological context. Yet they are important in light of the fact that race is accorded special significance, particularly in America where a person's race may dictate economic (e.g., job opportunities), political (e.g., power, social policy, resource distribution), social (e.g., interpersonal friendliness), or psychological (e.g., stereotype threat) advantages or disadvantages (e.g., Ayres & Siegelman, 1995; Bertrand & Mullainathan, 2004; Black, Kolesnikova, Sanders, & Taylor, 2009; Blumstein, 1993; Bonilla-Silva, 1999; Eberhardt, Goff, Purdie, & Davies, 2004; Kaiser, Drury, Malahy, & King, 2011; Maddux, Galinsky, Cuddy, & Polifroni, 2008; Sanchez & Bonam, 2009; Steele & Aronson, 1995). One's race can even determine the difference between life and death (Baldus, Woodworth, Zuckerman, Weiner, & Broffitt, 1998; Correll, Park, Judd, & Wittenbrink, 2002).

For example, Correll and his colleagues (2002) found that people were more likely to shoot someone holding a gun if that individual was Black rather than White. However, Ma and Correll (2011) found this shooter race bias occurred only for race-prototypic targets (i.e., those individuals that are most easily perceived as falling into discrete race groups; e.g., Freeman, Pauker, Apfelbaum, & Ambady, 2010; MacLin, Peterson, Hashman, & Flach, 2009). For non-prototypic race targets, the shooting bias reversed. People were more likely to shoot gun-wielding non-prototypic White targets than non-prototypic Black targets. These investigations only begin to scratch the surface of differences in perception of and behavior toward non-race-prototypic individuals.

What happens when people perceive and react to stimuli sampled from throughout the racial continuum? These important ramifications underscore the importance of research that examines the full race continuum. Such research can increase understanding of whether and how strongly race is automatically categorized.

This dissertation addresses questions such as: How do people typically parse continuous race stimuli? How strong is the tendency to divide people into separate and distinct races? Is there evidence that people with ambiguous race-relevant features are nonetheless seen as members of a traditional racial category, or are they seen as representing a position somewhere in-between? Are some people more likely than others to place ambiguous-race others into categories? And, is a weaker tendency to automatically categorize others into discrete groups associated with a reduction in racial bias?

Specifically, this dissertation focuses on *automatic race categorization* (ARC), or *the tendency* for people to perceive others as falling into discrete racial groups rather than perceiving more continuous racial variation. The current research focuses on measuring a person's automatic, perceptual processes rather than one's explicitly held views on racial categories. People with strong ARC (i.e., those who perceive races as highly discrete, strong race categorizers) are expected to confuse two people with *very different physical features* if their features fall into the same perceived race category (e.g. Black), but do not confuse two people who are *physically quite similar* but fall into different subjective categories (e.g., Black and White). On the other hand, those with weak ARC (i.e., those who perceive race as fairly continuous) are expected to have a more continuous perception of race and are more likely to confuse faces equally across the race continuum.

Do People Tend to Perceive Race Categorically (chapter 1)?

Definition and operationalization of categorical perception. To understand race categorization, we must first discuss how to define categorization more generally. According to Rosch (1977), categorical perception occurs when continuously varying stimuli are perceived as falling into discrete groups and when stimuli within each group are seen as interchangeable (i.e., all group stimuli are perceived as more or less equivalent to each other). For instance, most Japanese speakers do not perceive the difference between English /r/ and /l/ sounds (e.g., the words “rock” and “lock” sound the same; McClelland, Fiez, & McCandliss, 2002). In their minds, /r/ and /l/ belong to the same category of sounds. However, for English speakers, the two sounds are clearly distinguishable, even though they are physically similar (Slawinski, 1999). Thus, stimuli that fall near each other on a physical continuum, such as /r/ and /l/, can be automatically perceived either as the same or different, depending on the categories they are sorted into by an individual’s perceptual system. Using this understanding of categorization, one can examine whether people tend to perceive race categorically.

Why people categorize. Indeed categorization is an important area of study, because people may be strongly disposed to use categories to disentangle the enormous amount of information and stimuli encountered in their daily lives (Allport, 1954; Fiske & Taylor, 1984; Fiske, 2000; Ito & Urland, 2003; James, 1890; Macrae & Bodenhausen, 2001; Macrae, Milne, & Bodenhausen, 1994; Stangor et al., 1992; Taylor et al., 1978; Taylor, 1981; Tajfel, 1969). Fiske and Taylor (1984) characterized people as ‘cognitive misers’ who use categories to minimize the effort spent processing stimuli by relying on

pre-existing knowledge about traits and behaviors of different groups. In fact, some might argue that humans' perceptual and cognitive systems were built to use social categories. Evolutionary psychologists suggest humans evolved to categorize ingroup and outgroup members to recognize who would benefit versus detract from one's likelihood of survival (Cosmides, Tooby, & Kurzban, 2003; Kurzban, Tooby, & Cosmides, 2001). In fact, evidence supports the idea that there are specific regions of the brain (i.e., the fusiform face area) that activate more when a person sees an ingroup rather than outgroup member (Golby, Gabrieli, Chiao, & Eberhardt, 2001). Given the important role of social categorization in peoples' everyday experience, understanding how race is automatically categorized is of particular interest to social psychologists.

Past race research, viewed through the lens of weak vs. strong ARC.

Researchers in social psychology tend to approach race categorization as a binary process, assuming that people perceive race as falling into discrete categories, with a focus on whether and when a race category is activated and applied (e.g., Devine, 1989; Gilbert & Hixon, 1991; Lepore & Brown, 1997; for review see Fiske, 1998; Macrae & Bodenhausen, 2000). For example, Gilbert and Hixon's (1991) work has been cited in discussions of when race stereotype activation can be turned off (i.e., with cognitive busyness). They had participants complete word fragment cards held by an Asian or White target. Half of the participants rehearsed an 8-digit number while completing the fragments (i.e., inducing cognitive load). They found that participants not under cognitive load completed the word fragments in a manner more consistent with Asian stereotypes when the target was Asian than when the target was White. Participants under cognitive load showed no difference in stereotype activation across target race. While this research

focused on the automaticity of racial stereotype activation, this study has been interpreted as evidence for the automaticity of race categorization itself (Lepore & Brown, 1997; Macrae & Bodenhausen, 2000). All participants, regardless of cognitive load condition, were able to identify the cardholder's race. Thus, this research fits Bargh's (1994) description of preconscious automaticity, which occurs when a stimulus (e.g., the Asian or White card holder) initiates unconscious processes (e.g., race categorization of the card holder) that occur quickly and efficiently and without intent (e.g., even under conditions of cognitive busyness).

Other evidence referenced in discussions of automatic race categorization comes from the Who-Said-What task (Taylor, Fiske, Etcoff, & Ruderman, 1978). In this paradigm, participants saw a purported conversation among a group of individuals that varied in race (i.e., Black or White). Participants read statements made by each individual in the group, paired with a picture of that individual. At the end, participants were asked to match each group member with his statement. The results indicated that statements by two Black individuals were more likely to be confused than those made by a Black individual and a White individual, suggesting that race categories were activated without explicitly prompting participants to attend to race information.

But, it is difficult to interpret past race research as evidence that people have strong ARC tendencies because these paradigms tended to ignore the continuous nature of race and examined race or race stereotype activation using only the ends of the racial continuum (e.g., prototypically White or Black faces; Taylor et al., 1978; Fazio, Jackson, Dunton, & Williams, 1995; Greenwald & Banaji, 1995; Macrae & Bodenhausen, 2000; Martin & Macrae, 2007; Crisp, Hewstone, & Rubin, 2001; Crisp & Hewstone, 2007; Hall

& Crisp, 2005). In fact, using prototypic category exemplars is more likely to activate categorization and category knowledge than less prototypic category exemplars (Heider, 1972; Mervis & Rosch, 1981; Rosch, 1974; Rosch, 1975). Indeed, the interchangeability among targets of the same race in the Who-Said-What task (Taylor et al., 1978) can easily occur even when race perception is continuous, because without actively insuring that faces represent the full race continuum, two Black individuals are likely to be much more closely located on a Black-White continuum than a White individual and a Black individual who are on the opposite ends of the continuum. Likewise, the cross-race effect (CRE), the idea that people are more likely to confuse members of other races than members of their own race (Malpass & Kravitz, 1969), can also occur even if race perception is continuous, as long as one makes greater individuation closer to the end of the continuum that is closest to one's own race. Without examining perceptions of a spectrum of faces that vary from one race to another, it would have been impossible to test for ARC strength.

Some researchers have examined perception faces toward the center of the race spectrum (i.e., ambiguous-race faces; e.g., Freeman et al., 2010; Peery & Bodenhausen, 2008; MacLin & Malpass, 2001; Pauker & Ambady, 2009; Willadsen-Jensen & Ito, 2006), but interpreting this research in terms of ARC is also difficult given the nature of the tasks used and the stimuli themselves. For example, the tasks used may have actually primed categorical perception. In many studies that include ambiguous-race targets, participants are presented with race category labels (e.g., "Black", "White", "Not Black"). For example, MacLin and colleagues (2009) trained a laboratory participant explicitly indicate whether each face along the continuum belonged to a given race category (e.g.,

“Is this face Caucasian?”) for multiple stimulus sets and different presentation orders.

The researchers found that using this method, ambiguous-race faces toward the middle of the continuum were always easily categorized as White or Black. Similarly, in another set of studies, participants were asked to click on the category (i.e., White or Black) that a given face belonged to (Freeman et al., 2010). Faces were either Black-to-White morphs (study 1) or pictures of multiracial and monoracial individuals (study 2). Before clicking the appropriate category, participants’ mouse trajectories showed influence of the other (not chosen) racial category such that the mouse trajectory appeared to be pulled more toward the opposing category when a face morph included a higher percentage of that race category.

The results of these studies can only suggest that continuously varying racial features influence perception on the way to categorization, but not that race perception is inherently categorical or continuous. In fact, research by Eberhardt, Dasgupta, and Banaszynski (2003) suggest that using race category labels in ambiguous race research may be problematic. The researchers presented participants with ambiguous-race faces labeled either as Black or White. Participants who believed that personality traits are fixed, rather than changeable, later drew the presented face as being more prototypically representative of its assigned label (i.e., either White or Black). This research indicates that providing monoracial category labels with ambiguous-race faces may lead some individuals to assimilate their judgments toward these distinct categories, whether they would have spontaneously seen them that way or not. More importantly, it is worth noting that using two either/or category labels (e.g., Black, White) removes the possibility that ambiguous-race faces may fall into a perceived third category (e.g.,

multiracial, or an ‘emergent third race’; MacLin & MacLin, 2011) or at a point on the continuum between the two categories.

In addition, many studies using ambiguous-race faces do not include faces ranging along a full continuum of race-relevant features. For example, some use only faces composed of 50% of one race and 50% of another race (Maclin & Malpass, 2001; Pauker & Ambady, 2009; Willadsen-Jensen & Ito, 2006). For example, in one set of ERP studies, participants were exposed to either monoracial White or Black faces or a 50%/50% Black-White face morph (Willadsen-Jensen & Ito, 2006). The researchers found that the waveforms P200 and N200 which typically have differential responses to White and Black faces indicated that these mixed-race faces were perceived similarly to White faces. But, results based on studies using only one type (e.g., 50% morphs) of racially ambiguous face may not accurately reflect what responses to faces of other proportions might look like. By limiting the range of stimuli presented, researchers may obscure category boundaries that do exist (e.g. if faces are viewed according to the “one drop rule,” then the boundary would be close to the “White” end of the spectrum).

Reviewing the literature, there are two studies that sought more direct evidence race is perceived categorically. The first study by Maclin and colleagues (2009), mentioned above, used a single participant to determine whether race is perceived in a more categorical versus continuous fashion. However, because their research used only one participant, it is difficult to discern whether their results would generalize to the population in general. Levin and Angelone (2002) also sought to demonstrate that people treat race continua as having discrete thresholds or boundaries between race categories. They suggested (and hypothesized) that in order to determine whether race was perceived

categorically, it would be necessary to show that people are more likely to confuse faces morphed between two traditional race categories than faces morphed within the same race category (e.g., two White individuals morphed together to create a continuum of faces; cf. Levin & Beale, 2000). Their hypotheses were supported and suggested that people have a stronger tendency to impose categories on continuously varying faces that cross traditional race boundaries than on faces that vary continuously within a traditional race category.

Notably, neither the Levin & Angelone (2002) nor Maclin and colleagues (2009) studies examined contexts or individual differences that may elicit weaker rather than stronger ARC strength, nor did they investigate the social implications of weak versus strong ARC. Even if one accepts claims made in past research that race is automatically categorized, research on social categories has not adequately addressed the question: is there variation in ARC strength?

The research in chapter 1 builds on this past research by systematically examining the magnitude of ARC tendencies using a new method and stimuli that vary across the racial continuum. Chapter 1, study 1 provides evidence that people tend to view racial continua in terms of discrete categories using a meta-analysis of nine studies and 799 participants. Study 2 makes the case that ARC is important because of its inherently social nature. This study examines whether people have stronger categorical tendencies with stimuli that vary in race rather than similar monotonic stimuli. Finally, study 3 in this chapter shows that the strong ARC tendency also among stimuli that vary from Asian-to-White, suggesting it is not a phenomenon based solely on skin-tone differences. Importantly, the data from this chapter also indicate the potential to find significant

individual variation in ARC strength. Thus, the rest of the dissertation focuses on identifying several of these individual difference predictors.

Predicting Differences in ARC Strength (chapter 2-4)

Some individuals may chronically perceive race more or less continuously. Discrete racial categories may be particularly important to some individuals more than others. Some may see the physical characteristics associated with race more in terms of “Black and White,” while others automatically perceive race as more continuous. Chapters 2 through 4 examine three predictors of ARC strength: 1) political ideology, and 2) beliefs about genetic variation, and 3) multiracial salience. I briefly introduce these potential predictors here and go into greater depth within the chapters themselves.

Political ideology (chapter 2). Political ideology is a set of beliefs and attitudes that outline how social policy and politics should operate, and is a construct that is typically thought of as running from left-to-right, liberal-to-conservative (Jost, 2006). Notably, political ideology is associated with interracial bias. For example, greater conservatism is associated with greater anti-Black bias (Lambert & Chasteen, 1997). Conservatives even tend to show greater interracial bias than liberals even on implicit tasks (Jost, Nosek, & Gosling, 2008). These differences are related to top-down beliefs about social hierarchies (Pratto, Sidanius, Stallworth, & Malle, 1994; Sidanius & Pratto, 1999) and justification of the current social order (Jost & Banaji, 1994; Jost et al., 2008). But, I suggest that political ideology’s association with interracial bias may also be related to ARC. That is to say, political ideological differences may be related to how strongly one perceives the boundary between races. Chapter 2 tests this idea by

examining the association between political ideology and ARC. I predict and find that more conservative individuals tend to have stronger ARC than more liberal individuals.

Chapter 2, study 2 also examines two potential mediators for this relationship: need for closure and need for cognition. Need for closure is a measure of how uncomfortable an individual feels with uncertainty and ambiguity (de Zavala & Van Bergh, 2007; Federico & Deason, 2012; Kirton, 1978) and is associated with greater conservatism (Jost, 2006). I predict that those who find ambiguity particularly threatening will be more likely to strongly group ambiguous-race faces in the middle of the racial continuum into discrete race categories (strong ARC), and that this construct may account for a relationship between political ideology and ARC.

On the other hand, need for cognition, or one's inclination to enjoy effortful thinking, is associated with increased liberalism (Jost, Glaser, Kruglanski, & Sulloway, 2003) and greater cognitive complexity (Cacioppo & Petty, 1982). This ability to process more complex information is related to increased cognitive rigidity and stereotyping (Suedfeld, Tetlock, & Streufert, 1992). Thus, I hypothesize that those with higher need for cognition will be less likely to group ambiguous-race stimuli into traditional, discrete race categories.

Genetic beliefs (chapter 3). This chapter examines how beliefs about genetic differentiation between races and among individuals can predict ARC strength. Allport (1954) theorized “that groups that look (or sound) different will seem to *be* different, often more different than they are.” Chapter 3 investigates Allport's prediction with regards to beliefs about differences at the biological level. Specifically, these studies

address whether those who tend to see races as more discrete also tend to believe that members of different races tend to be more genetically distinct from one another.

Biological beliefs about differences between groups often underlie many of the essentialist beliefs held about groups (Haslam, Rothschild, & Ernst, 2000; Hoffman & Hurst, 1990; Williams & Eberhardt, 2008). For example, manipulating participants into believing that groups are biologically-based rather than socially-constructed leads to seeing the groups as having greater inductive potential, as seen via increased use of group stereotypes (Hoffman & Hurst, 1990). Other work from my lab is consistent with this idea that inductive potential can be in part derived from biological beliefs. Leading participants to believe that races are genetically similar rather than genetically distinct leads to less implicit race bias (Plaks, Malahy, Sedlins, & Shoda, 2012). Moreover, group membership is seen as being unchangeable and mutually exclusive when one believes that a group is biologically-based and natural (Mahalingam, 2003; Rothbart & Taylor, 1992). Thus, in the present dissertation two studies examine the prediction that believing in greater genetic overlap between the races should be associated with weaker ARC.

Multiracial salience (chapter 4). A final investigation of ARC predictors examines how awareness of the concept of multiracialism (i.e., multiracial salience), the idea that people can descend from and/or identify with more than one traditional race group, may be an important predictor of ARC strength. Multiracial salience undermines traditional and essentialist views of race, or ideas that discrete race categories are natural (as opposed to socially constructed) kinds of categories (Medin & Ortony, 1989). Indeed, exposure to multiracial faces reduces essentialist belief endorsement in adults. Pauker, Weisbuch, and Ambady (in prep) exposed White participants to one of two visual

environments: either a screen with mostly prototypically White faces or a screen composed of mostly biracial faces. Controlling for preexisting essentialist beliefs, those who were exposed to the biracial environment showed decreased endorsement of race essentialism (e.g., “racial groups are categories with clear and sharp boundaries: People either belong to one group or another” and “racial groups and the characteristics that define them have remained the same throughout human history”) relative to those exposed to the White environment. Similarly, kids growing up in an environment with a high multiracial population (i.e., Hawaii) compared to those growing up in an environment with a low multiracial population tend to exhibit less essentialist reasoning about race (Pauker, Ambady, & Xu, in prep). The negative relation between multiracial salience and essentialism is important for ARC, since essentialism is typically associated with beliefs that groups are unchangeable and mutually exclusive (i.e., discrete; Rothbart & Taylor, 1992). Based on this prior research, we predict (and examine in chapter 4) that increased multiracial salience will be related to weaker ARC.

Why Should We Care About ARC Variation and Its Predictors? How Does ARC Strength Relate to Implicit Race Bias? (chapter 3, study 2)

Allport (1954) said, “the human mind must think with the aid of categories (the term is equivalent here to generalizations). Once formed, categories are the basis for normal prejudice. We cannot possibly avoid this process. Orderly living depends on it.” Allport suggested that people use categories to predict category members’ traits and behavior (i.e., generalizations or stereotypes about group members). Certainly, as described above, essentialized groups especially, are seen as rich in inductive potential.

But beyond holding stereotypes based on group membership, theorists have argued that categorization leads to intergroup bias, defined as a preference for the ingroup relative to an outgroup. Social Identity Theory (Tajfel & Turner, 1986), for instance, suggests that this bias occurs because one wants to see the self positively, and seeing one's ingroup as more positive than the outgroup is one way this self-positivity is accomplished. For example, even categorizing people based on inconsequential attributes (e.g., dot estimation or enjoyment of Kandinsky paintings more than Klee paintings) leads to ingroup bias (Billig & Tajfel, 1973; Brewer, 1979; Locksley, Ortiz, & Hepburn, 1980; Sherif, 1961; Tajfel, 1970; Tajfel, Billig, Bundy, & Flament, 1971). In one study, participants were told based on their preferences for various abstract paintings that they were classified into groups based on shape or color (Turner, Brown, & Tajfel, 1979). Participants were asked to dictate how much money participants in the various groups would receive for participating in the study. The results showed that participants chose payment schemes that maximized the gain for their ingroup relative to the outgroup. In similar vein, Locksley and colleagues (1980) randomly assigned participants to Phi and Gamma groups based on a lottery system (i.e., pulling group assignment from a bowl of tickets). This assignment strategy strengthened the minimal group findings by removing perceptions of apparent similarity to among group members. Participants were allowed to distribute up to 100 tokens to each group. Even though group assignment was entirely random, participants were more likely to distribute the tokens unequally, giving their own group significantly more tokens than the outgroup. Thus, merely categorizing people into groups appeared to lead to discrimination based on group memberships.

Still, some researchers dispute the claim that the relationship between category boundary strength and race bias has been sufficiently shown (Park & Judd, 2005; see also Deffenbacher, Park, Judd & Correll, 2009). They argue that minimal group paradigms (e.g., Brewer, 1979; Locksley et al., 1980; Tajfel, 1970; Tajfel et al., 1971; Turner et al., 1979) typically divided participants into groups without actually examining how strongly participants perceive the boundaries between the arbitrary groupings. In addition, researchers' discomfort with past research claiming positive associations between category boundary strength and bias stems from a difficulty in how past research operationalized category boundary strength (Deffenbacher et al., 2009; Park & Judd, 2005). They suggest that although it is common to measure category boundary strength via measures of perceived group similarity, it is a problematic practice since similarity to the self is also known to affect attitudes (i.e., people tend to like those who are seen as more similar to themselves; Buss, 1984; Byrne, 1971; Sunnafrank, 1983).

In fact, some research indicates there may be no relation between category boundary strength and bias. A meta-analysis of 60 studies examining perceptions of group distinctiveness measures of bias showed no overall relationship between distinctiveness and bias (Jetten, Spears, & Postmes, 2004). Similarly, Deffenbacher and his colleagues (2009) found that increasing perceived boundary strength did not lead to increased intergroup bias. In one study, they used a dot estimation paradigm to classify participants into minimal groups. Category boundary strength was increased in one condition by asking participants to sort 16 individuals into overestimator and underestimator piles based on personality descriptions of each individual and of overestimators and underestimators as a group. In the weakened category boundary

condition, participants categorized these same individuals based on hobbies ignoring overestimator/underestimator distinctions. Relative to participants in the weak category boundary condition, participants in the strong category boundary perceived greater between- and less within-category variation among over- and underestimators. However, this difference in category strength was unrelated to differences in warmth or preference toward group members. All participants preferred the ingroup to the outgroup. Thus, at least some research seems to suggest that category boundary strength is not related to intergroup bias.

The variability in findings regarding categorization strength and bias may be due to how ARC is measured. The present investigation has the advantage of using a cleaner measure of ARC than in previous research (see Chapter 1 describing the Automatic Race Categorization Test; ARCAT; Sedlins, Malahy, Plaks, & Shoda, 2012). The ARCAT allows measurement of category boundary strength without asking participants explicitly about perceived similarity between outgroups and ingroups. The chapter examining genetic beliefs as an ARC predictor (chapter 3) explores the connection between ARC strength and implicit race bias. Previous research found that believing in high rather than low genetic overlap between the races led to less implicit race bias (Plaks et al., 2012). The final study in chapter 3 extends this research by examining whether ARC can account for the link between genetic beliefs and implicit race bias.

Chapter 1: Automatic Race Categorization: More Categorical or Continuous?

Measuring Automatic Race Categorization: The Automatic Race Categorization Test (ARCAT)

As mentioned in the introduction, past methods used to examine race categorization in social psychology were not always best-suited for ARC investigations using ambiguous faces, or faces across the full race continua. Many of these methods required the participant to categorize ambiguous-race stimuli into monoracial categories (e.g., Freeman & Ambady, 2010; Maclin et al., 2009; Peery & Bodenhausen, 2008).

In addition, much of the past research only sampled from the ends of the race continua (i.e., highly prototypic monoracial faces) with some studies including one type of ambiguous-race face (typically a face composed of 50% of one race and 50% of another). This practice of using a limited range of the race continua may in fact hinder finding category boundaries if the category boundary does not occur in the objective middle or endpoints of the digitally-constructed race continuum.

Furthermore, even methods employed in cognitive psychology that maintain a full spectrum of race stimuli to examine ARC may have additional disadvantages. For instance, in both Levin and Angelone (2002) and Maclin and colleagues (2009) methodologies, the participants were likely aware that they were viewing digitally-morphed race stimuli. In Levin and Angelone (2002), participants were presented with two adjacent faces along the morphed-race continuum (with a 20% difference between the faces), simultaneously, side by side (face A and face B), from a given stimulus set for 1000 ms. Then, a face X appeared for 1000 ms. Face X was randomly chosen to be

identical to either face A or face B. After the face disappeared, the participant was asked to identify whether face X matched face A or face B. The outcome of interest was the percentage of discrimination accuracy for each face along the continuum (e.g., how often was face 1 presented and incorrectly matched?). One would expect that discrimination accuracy would improve at the boundary between categories such that participants would correctly match face X to the preceding faces A and B when A and B were perceived to fall into separate racial categories.

While this methodology was certainly a useful first step in examining race categorization using a more complete set of stimuli from the race continuum, it is possible that this procedure may have undermined a sense of psychological realism. Because this task presented two very similar morphed faces side by side to the participant, the participant likely construed these photos as ones that were constructed to be two slightly different photos of the same person. Thus, the task asks participants to focus on any perceptual differences between the two photos. This experience is arguably different than the psychological experience of racially categorizing an ambiguous-race individual in everyday life.

Similar arguments can be made about the procedure used by Maclin and colleagues (2009) to examine race categorization along the race continuum. In their paradigm, participants were sequentially presented with a morphed-race face from a race continuum in a step-wise fashion, starting at one end of the race continuum. For each face along the morphed-race continuum, the participant indicated whether the face was Caucasian (or African-American). Again, such a task requires participants to notice

perceptual differences between face stimuli as they step through the race continua, but does not address the present question of how participants mentally represent race.

To address these potential concerns, the present research uses newly developed method of assessing ARC that improves upon these past methods by focusing on participants' mental representation of race (see Sedlins et al., 2012 for measure validation and in-depth rationale behind its construction). This task capitalizes on confusion patterns using a modified two-back memory task (Smith, Jonides, Marshuetz & Koeppel, 1998). Faces perceived to be in the same category are more likely to be confused with one another (Stangor, Lynch, Duan, & Glass, 1992; Taylor et al., 1978; Taylor, 1981). In this task, participants view digitally morphed faces, one face at a time, interlaced with numbers (see Figure 1.1). Participants are asked to recall whether the presented face is the same as the last face presented.

On the first trial, a number from 1 to 7 is selected at random and displayed for 1000 ms, followed by a 500 ms display of a blank screen. On the second trial, a face selected at random from the digitally morphed face continuum is displayed for 1000 ms followed by a 500 ms display of a blank screen. This alternating sequence of face and number stimuli continues throughout the task. On each subsequent trial, the target (either a number or a face) remains on the screen until the participant indicates whether it is the same as the last stimulus of that type. For example, if the stimulus on a given trial is a face, participants are asked to indicate if it is identical to the last face presented. On each trial involving faces, the computer draws from a seven-face morphed race continuum randomly assigned to each participant. Participants are encouraged to respond quickly; if

their average RT across any three trials exceeds 1,500 ms, a prompt appears on the screen asking them to respond faster. After each trial, a blank screen is presented for 500 ms.

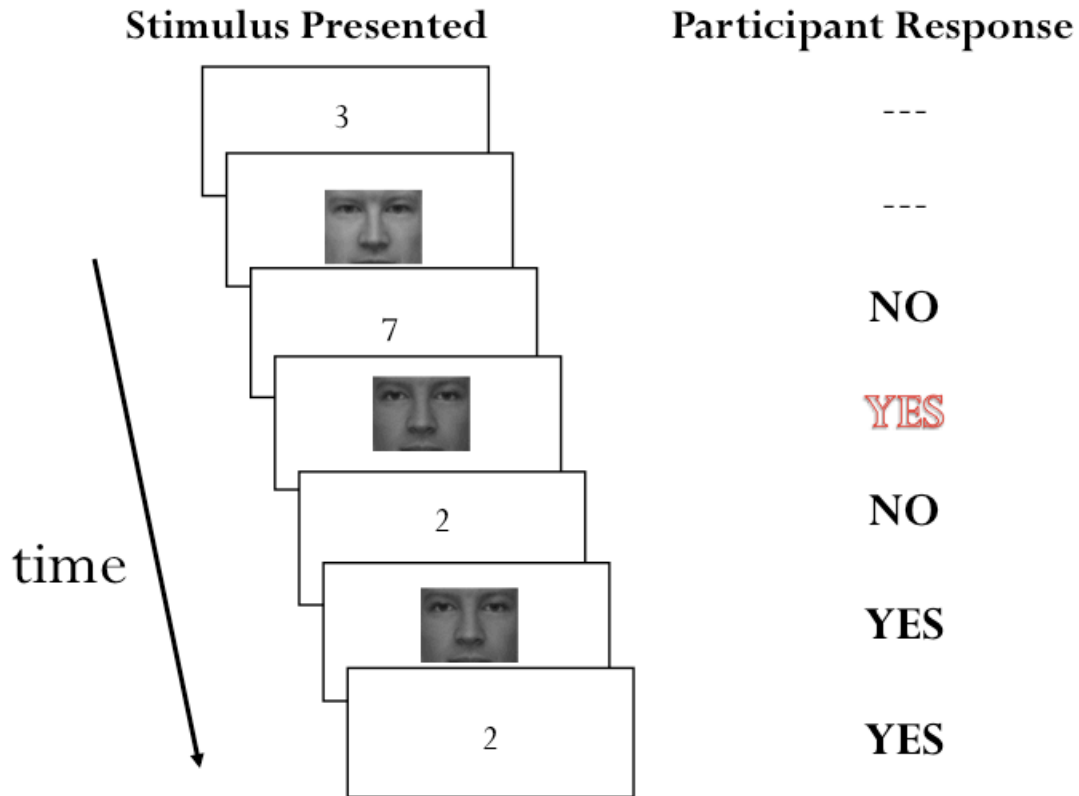


Figure 1.1. ARCAT Time Sequence

ARCAT stimuli.

Black to White morphs. Nine Black to White morphed race continua were created from real photos of Black and White male individuals. Black and White male faces collected at Stanford University (Goff, Eberhardt, Williams, & Jackson, 2008) were digitally morphed to create stimuli for the task. Eight Black and White face pairs were chosen from this set based on pre-testing data. Each chosen face was rated as highly

stereotypic of its racial category to ensure a full racial range for each morphed-race continuum. The faces were of approximately equal age and attractiveness.

These Black and White faces were morphed together to form a continuum ranging from prototypically Black to prototypically White. This resulted in a seven-face continuum made from each pair of Black and White faces: face 1 (100% White), face 2 (83.3% White/16.7% Black), face 3 (66.7% White/33.3% Black), face 4 (50% White/50% Black), face 5 (33.3% White/66.7% Black), face 6 (16.7% White/83.3% Black), and face 7 (100% Black). The faces were cropped from the eyebrows to the upper lip (see Figure 1.2 for sample morphed stimuli).

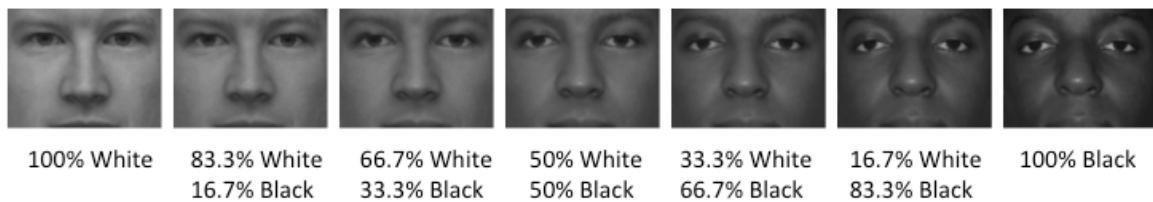


Figure 1.2. Example White-to-Black face stimuli morphed using FantaMorph

Additional Black to White morphed race continua were created using FaceGen Modeller software (Singular Inversions, Inc., 2004). FaceGen uses data from the population (Blanz & Vetter, 1999) to generate characteristics (e.g., nose shape, lip size) associated with race, gender, and age. FaceGen gives researchers control to manipulate any of these parameters while holding the other parameters at constant values. Using FaceGen is particularly useful for manipulating race along a continuum while holding these other aspects of the face constant (cf., Freeman et al., 2010). Additionally, FaceGen keeps face stimuli size the same for each continuum.

Four sets of Black to White face morphs were created using FaceGen. Two of these sets were male Black to White face morphs, and two sets were female Black to White face morphs. Each set of Black to White face morphs consisted of seven faces equally spaced along a continuum from highly prototypically Black to highly prototypically White. See Figure 1.3 for the FaceGen stimuli.

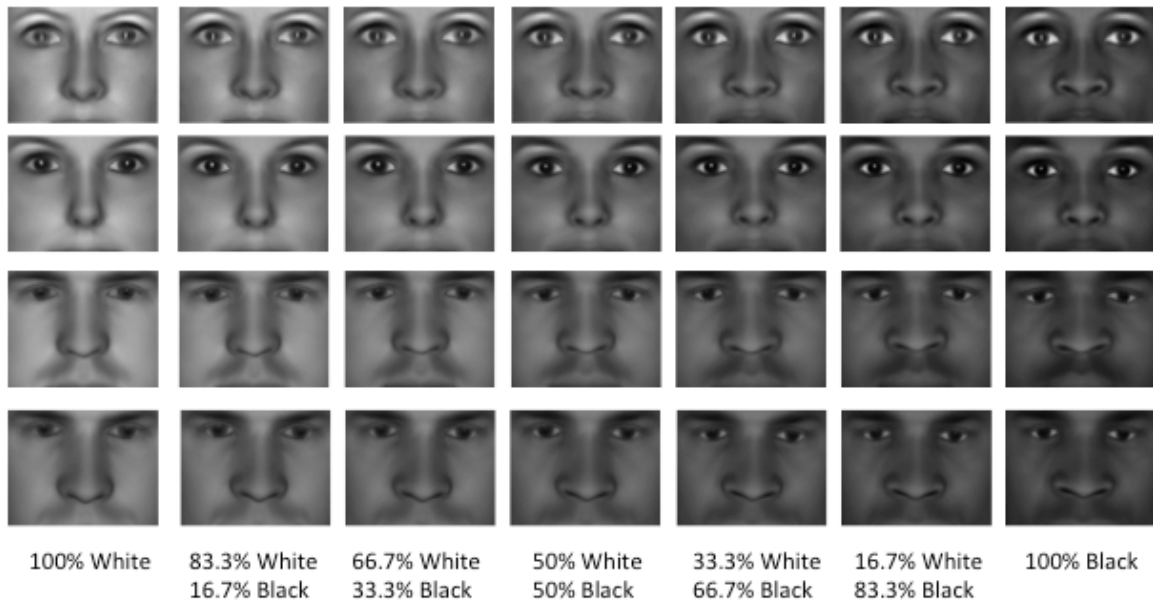


Figure 1.3. White-to-Black morphed race face stimuli created with FaceGen Modeller.

Top two rows are female stimuli. Bottom two rows are male stimuli.

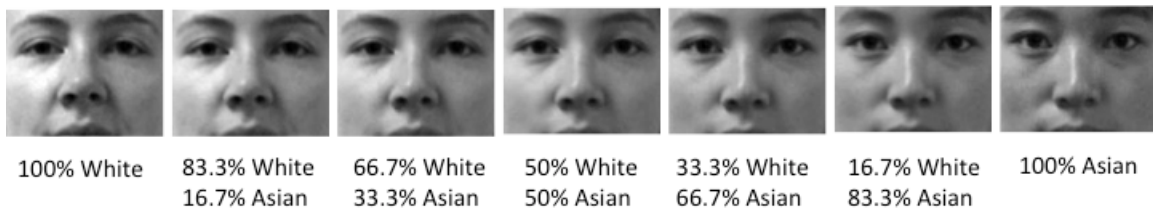


Figure 1.4. Example White-to-Asian morphed race face stimuli created using FantaMorph.

Asian to White face morphs. Asian and White male faces rated as highly prototypical of their race (Goff et al., 2008) were used to create Asian to White morphs. The same process was used to create the Asian to White morphed race continuum as was used to create the Black to White Fantamorph morphed race continuums.

Interpreting the ARCAT.

The dependent variable in the ARCAT is the extent to which participants confuse one morphed face with another morphed face. This rate of confusion is indicative of subjective similarity between the two faces. Specifically, by examining how often a given face is confused with its neighboring faces (e.g., how often face 3 is confused with face 2 or how often face 3 is confused with face 4), one can determine perceptual categorical boundaries.

In theory, strictly categorical race perception (strong ARC) would have a threshold point on the continuum where all faces before the threshold are seen as White, and all faces after the threshold are seen as Black. For example, if a person perceived all faces composed of 50% or more of the Black face as Black, then confusion between faces 3 and 4 would be low because they would be perceived as belonging to separate racial categories. On the other hand, faces 4, 5, 6, and 7 would have relatively high confusion rates because they would be perceived as belonging to the same racial category: Black. This would result in a “V” shaped graph when confusion rates are plotted against confused face pairs, as illustrated on the bottom graph of Figure 1.5. In contrast, perfectly continuous race perception (the weakest possible level of ARC) should result in equal confusion rates for each pair of adjacent faces, as shown on the top of Figure 1.5.

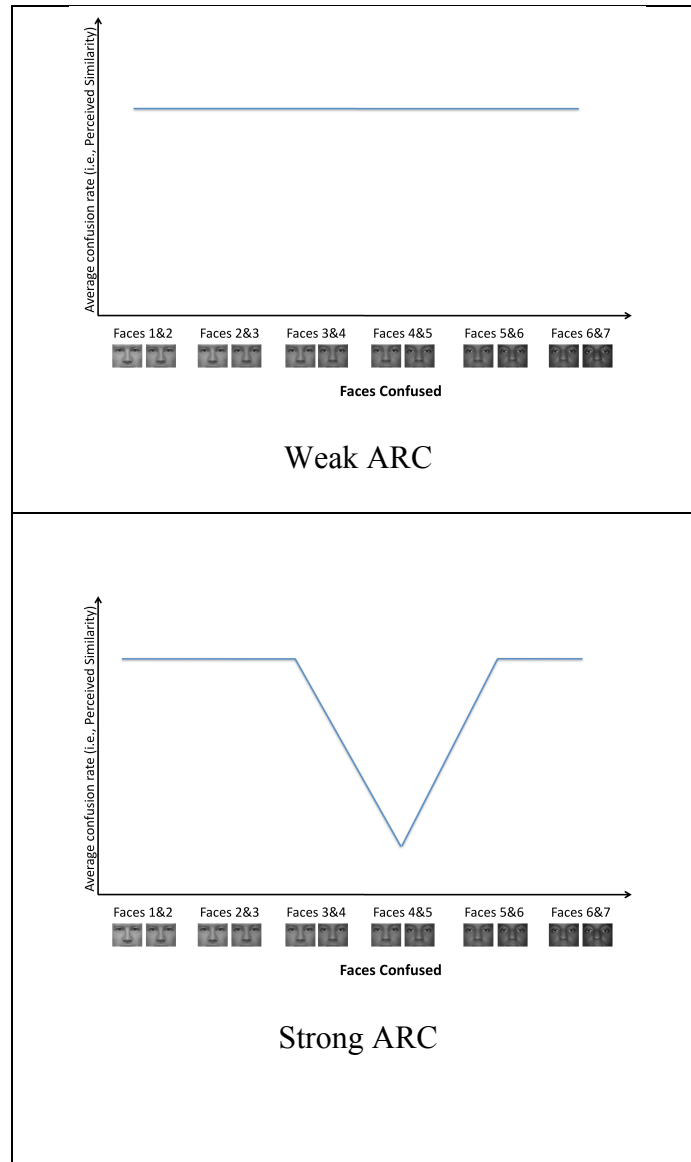


Figure 1.5. Hypothetical face confusion data for a weak ARC or a strong ARC

Using multidimensional scaling (MDS), data from this task can also be used to map each stimulus face to a location on a participant's "subjective space" of the Black-White race continuum in such a way that best accounts for the confusion rate between each pair of faces. When plotted against objective (i.e., digitally morphed) levels of 'Blackness' or 'Whiteness' of mixed-race faces, the data show a distinctive threshold function (see Figure 1.6); their subjective race perception changed abruptly from being close to the

"White" end to close to the "Black" end, as the morphed face increasingly reflected a prototypical Black face. This data pattern demonstrates categorical perception.

Does the ARCAT achieve greater psychological realism than previous tasks?

Data suggest that the ARCAT parallels how people mentally represent race in real life than previous tasks that relied on participants to use perceptual discrimination (i.e., Levin & Angelone, 2002; Maclin et al., 2009). In the ARCAT, participants must use their mental representation of a previous face (including how that face was racially classified) to compare it to the current face in order to complete the task. Additionally, because the ARCAT relies on participants' memory for the faces presented, it is not obvious to participants that they were seeing a continuum of morphed-race stimuli. Although participants were randomly presented with 1 of 7 faces on each trial, when asked, participants (N = 48) most often report seeing four individuals (M = 5.00, SD = 1.79) during the ARCAT. While not definitive, this suggests that participants are perceptually collapsing some of these 7 faces together, perceiving them as one individual. This pattern of recall is consistent with categorical representation. Moreover, participants in debriefing spontaneously referred to 'the person' or 'people' they saw in the ARCAT. Thus, psychologically, ARCAT seems to capture how participants mentally represent and racially categorize individuals.

Evidence for Strong Automatic Race Categorization

Across multiple ARCAT data sets and analytic strategies, I have found that people tend to automatically create two distinct race categories in memory: 'Black' and 'White.' For example, in a community sample (N = 86), we found a significant V-shaped pattern of confusion rates, reflected in a significant quadratic contrast in repeated

measures ANOVA, $F(1,66) = 33.64, p < .001$ (Malahy et al., 2010; see also chapter 4, study 1 of this dissertation).

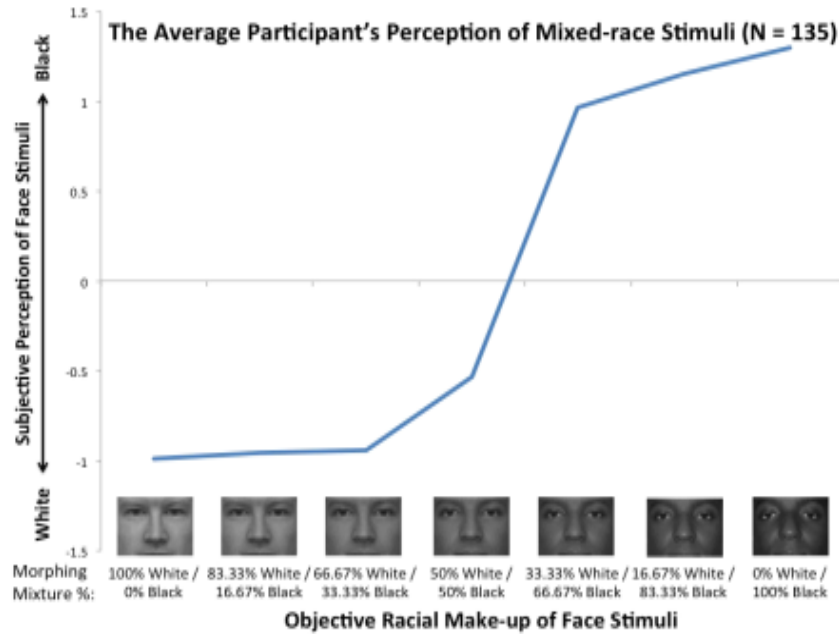


Figure 1.6. A multidimensional scaling psychological map of the White-to-Black race continuum

Over the past few years, eight additional studies in my lab included ARCAT data. Although the goals and ARCAT stimuli varied from study to study, all studies tended to show significantly categorical data patterns see Figure 1.7 and Table 1.1 for graphs and sample information, respectively. Throughout this dissertation, I will examine data from these studies. Some samples may be used in multiple chapters to offer support for different theoretical questions regarding ARC predictors. The present study uses data from all the samples to examine ARC patterns and strength.

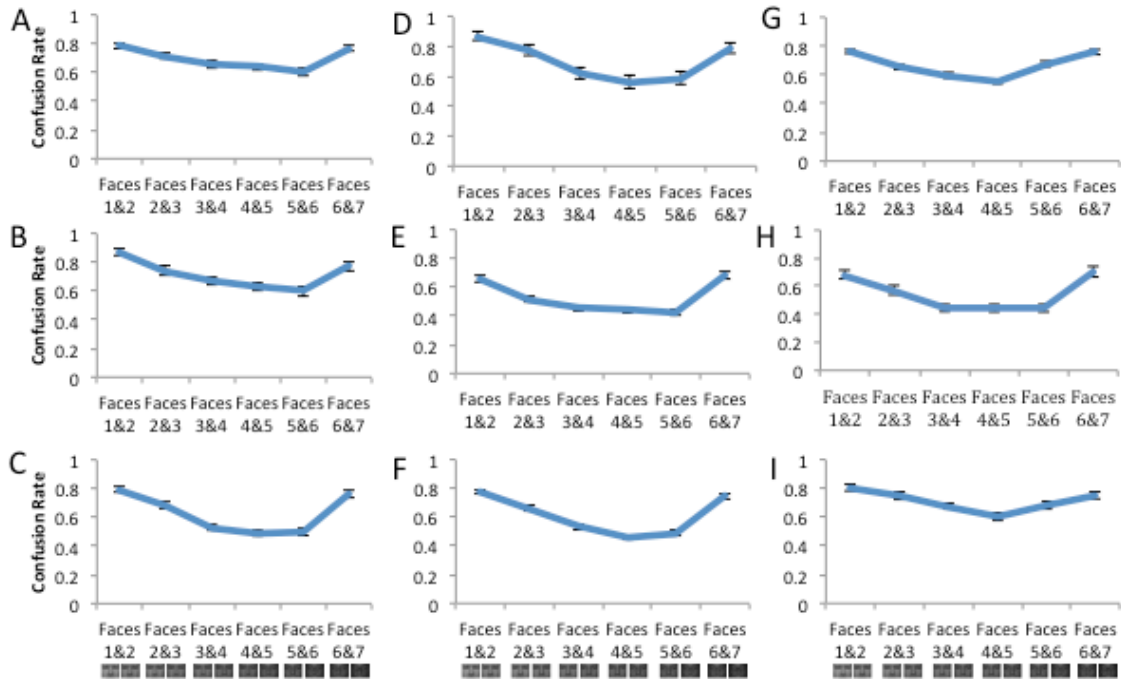


Figure 1.7. Confusion rate across morphed-race continuum for studies in the unabbreviated meta-analysis. Each figure represents the ARC data pattern for each of the nine samples, averaged across participants within each sample.

Study 1: Do People Tend to Automatically Perceive Race as Falling into Discrete Categories? And Are There Individual Differences in ARC Strength?

To more accurately examine whether this effect was observed across all samples and to confirm that these effects hold at the individual level, I conducted an unabbreviated meta-analysis across these samples using Hierarchical Linear Modeling (HLM) with ARCAT data. While traditional meta-analytic methods use effect sizes across samples, this practice is usually conducted because researchers do not have access to the actual data from all studies in a meta-analysis. In contrast, because all of the studies were conducted in my laboratory, I have access to all the data points from each study. Thus, the unabbreviated meta-analysis in the present study has the benefit of greater

power and accuracy than traditional meta-analyses, because we can incorporate and examine individual data points from all studies to determine whether our findings hold across individuals and methods.

Sample	N	Age (SD)	Sex	Race Demographics	Quadratic Contrast (from SPSS ANOVA)	Mean Quadratic Coefficient (SD)	Study Notes
A	74	30.30 (10.51)	51 F	23 Asian, 4 Black, 1 Latino, 38 White, 7 Multiracial	$F(1, 73) = 42.39$, $p = 8.31 \times 10^{-9}$	.02 (.04)	Community sample, multisession study averaged over at least 3 sessions
B	104	19.73 (1.69)	53 F	19 Asian, 1 Black, 8 Latino, 53 White, 20 Multiracial, 3 other	$F(1, 103) = 37.07$, $p = 1.98 \times 10^{-8}$	.03 (.05)	College sample
C	92	18.70 (1.00)	57 F	51.1% Asian, 2.2% Black, 37% White, 9.8% Multiracial	$F(1, 91) = 185.352$, $p = 1.136 \times 10^{-23}$	.05 (.03)	College sample
D	77	19.64 (1.88)	51 F	36% Asian, 1.3% Black, 5.3% Latino, 48% White, 9.3% Other	$F(1, 76) = 77.37$, $p = 3.28 \times 10^{-13}$	.04 (.04)	College sample
E	77	19.51 (3.86)	56 F	39% Asian, 1.3% Black, 1.3% Latino, 1.3% Native American, 50.6% White, 6.5% Other	$F(1, 76) = 238.35$, $p = 3.87 \times 10^{-25}$	.04 (.02)	College sample; multisession study averaged over at least 3 sessions
F	113	19.12 (1.41)	69 F	49.6% Asian, 1.8% Black, .9% Latino, 42.5% White, 5.3% other	$F(1, 112) = 253.41$, $p = 1.57 \times 10^{-30}$	.05 (.03)	College sample
G	122	19.53 (1.52)	78 F	57% Asian, 2.5% Latino, 30.6% White, 10% other	$F(1, 121) = 151.45$, $p = 4.56 \times 10^{-23}$	.03 (.03)	College sample; male and female Black to White morphed-race stimuli
H	40	n/a	n/a	n/a	$F(1, 39) = 118.28$, $p < .0001$	.04 (.02)	College sample; 2 session study
I	157	19.20 (1.76)	101 F	27.2% White, 56.3% Asian, 16.5% other	$F(1, 153) = 25.353$, $p < .0001$	.02 (.06)	College sample; Asian to White morphed-race stimuli

Table 1.1. Demographic and inferential statistic information for all samples in the unabbreviated meta-analysis. Note: due to computer error not all participants had usable ARCAT data. Only those with ARCAT data were included in the unabbreviated meta-analysis.

Method. The list of studies, sample sizes, and type of sample included in the unabbreviated meta-analysis can be found in Table 1.1. For samples with data across

multiple sessions, each participant's confusion rate for a given face pair was averaged across sessions for a minimum of three sessions. The model was constructed using three levels: repeated measures within individual participants (level 1), individual difference factors (e.g., sex; level 2), and sample (level 3). I outline the full model below.

Because the confusion rate data from the ARCAT is based on the proportion of times a participant incorrectly confuses two faces out of all times those faces were presented in succession, a binomial sampling model was used. This model uses the logit function to take into account the odds of obtaining a given number of confusions based on the number of trials presented. The first model is specified as follows:

Within-participant equation

Level-1 Model

$$\eta = \log[P/(1-P)] = P_0 + P_1*(FACEPAIR) + P_2*(FACEPAIR^2) \quad (1)$$

where *FACEPAIR* is a centered variable indicating a given face pair along the continuum. The values on this variable were -2.5, -1.5, -.5, .5, 1.5, and 2.5 representing the 6 face pairs ranging from the “whitest” to “blackest”. *FACEPAIR²* is the square of centered *FACEPAIR*, thus its values were 6.25, 2.25, .25, .25, 2.25, and 6.25, corresponding to the 6 face pairs. This centering was done to reduce collinearity between these terms. η is the log of the odds of confusion, which is a function of *FACEPAIR* and *FACEPAIR²*. *P₁* and *P₂* represent the strength (i.e., the coefficient) of the linear and quadratic trends, respectively, in the confusion data across face pairs. *P₀* is the average confusion rate for an individual.

Participant level equation

Level-2 Model

$$P0 = B00 + R0 \quad (2)$$

$$P1 = B10 + R1 \quad (3)$$

$$P2 = B20 + R2 \quad (4)$$

The second level represents individual-level variables that could influence the slope of *FACEPAIR* (i.e., *P1*) or *FACEPAIR2* (i.e., *P2*) or the individual's average confusion rate *P0*.

Study level equation

Level-3 Model

$$B00 = G000 + U00 \quad (5)$$

$$B10 = G100 + U10 \quad (6)$$

$$B20 = G200 + U20 \quad (7)$$

The third level models the sample-level variation. Given the variety of recruitment, experimenters, stimuli, etc. that varied between samples, it is possible that some samples might have stronger or weaker ARC. Thus in the full model, within-individual measures are nested within individuals who are nested within samples. In both level-2 and level-3 equations, I allowed error terms to vary to examine whether there were significant

individual difference and sample difference patterns, respectively (see Figure 1.8 for a graphical overview of the nested structure of the data).

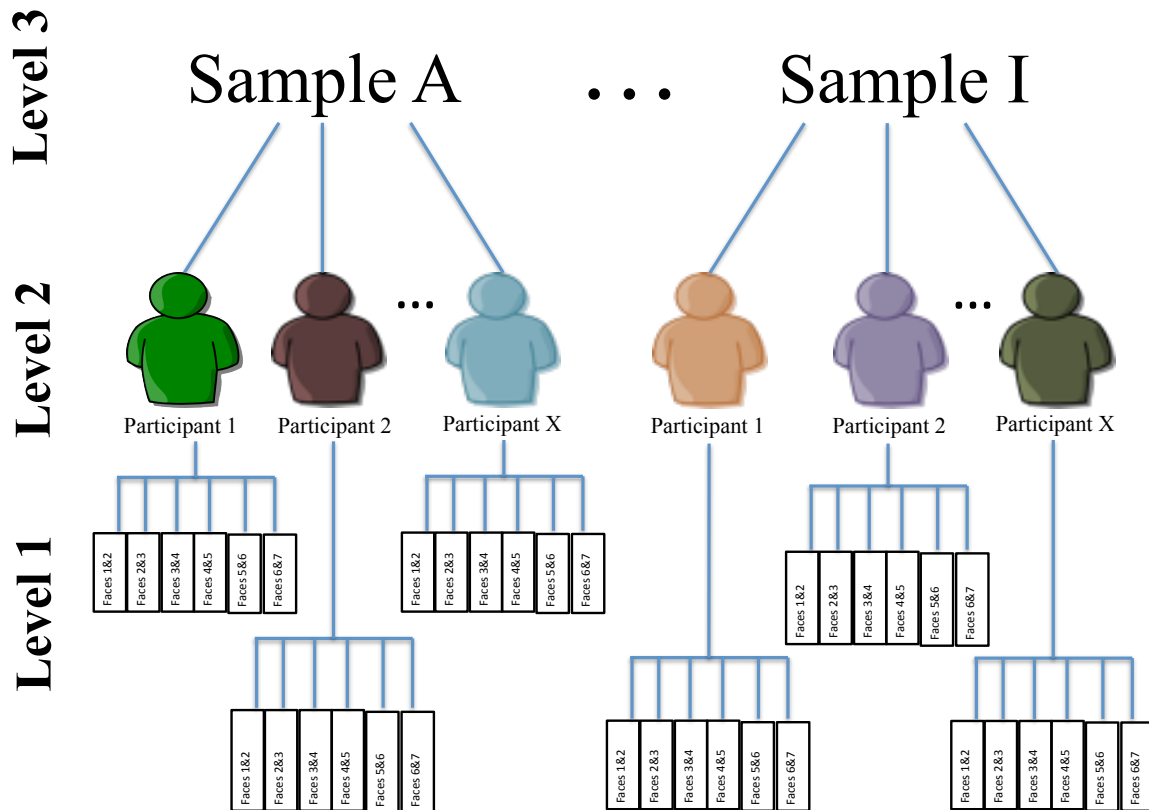


Figure 1.8. A graphical overview of the nested structure of the unabbreviated meta-analysis.

Study 1 results and discussion. Table 1.2 presents the estimated fixed effects and random effects the level-2 variables of the model. Importantly, these analyses show significant coefficients for FACEPAIR2 across all studies, indicating that on average participants showed a significantly categorical pattern of data (i.e., quadratic) (see Figure 1.9 for a plot of this data pattern). This finding is in line with past theory and research

suggesting that people are strongly oriented toward detecting and using categories as a way to efficiently create order and meaning in their world (Allport, 1954; Arcuri, 1982; Fiske & Taylor, 1984; Fiske, 2000; Ito & Urland, 2003; James, 1890; Macrae, Milne, & Bodenhausen, 1994; Stangor et al., 1992; Taylor et al., 1978; Taylor, 1981).

Sample		Fixed Effects (i.e., coefficient central tendency)	Random Effects SD of coefficients
Sample A	Intercept	.57 ($F(76) = 41.54, p < .0001$)	.55 ($\chi^2(76) = 150.95, p < .0001$)
	Linear trend	-.07 ($F(76) = 5.28, p = .024$)	.11 ($\chi^2(76) = 91.26, p = .112$)
	Quadratic trend	.10 ($F(76) = 32.36, p < .0001$)	.03 ($\chi^2(76) = 73.85, p > .500$)
Sample B	Intercept	.48 ($F(87) = 14.84, p < .0001$)	1.01 ($\chi^2(87) = 327.63, p < .0001$)
	Linear trend	-.33 ($F(87) = 22.71, p < .0001$)	.29 ($\chi^2(87) = 359.09, p < .0001$)
	Quadratic trend	.27 ($F(87) = 48.54, p < .0001$)	.09 ($\chi^2(87) = 330.46, p < .0001$)
Sample C	Intercept	-.14 ($F(83) = 4.61, p = .034$)	.30 ($\chi^2(83) = 101.45, p = .082$)
	Linear trend	-.12 ($F(83) = 16.08, p < .0001$)	.15 ($\chi^2(83) = 117.67, p = .008$)
	Quadratic trend	.24 ($F(83) = 157.48, p < .0001$)	.07 ($\chi^2(83) = 93.06, p = .211$)
Sample D	Intercept	.31 ($F(79) = 6.64, p = .012$)	.89 ($\chi^2(79) = 255.21, p < .0001$)
	Linear trend	-.26 ($F(79) = 20.25, p < .0001$)	.40 ($\chi^2(79) = 238.54, p < .0001$)
	Quadratic trend	.30 ($F(79) = 78.29, p < .0001$)	.22 ($\chi^2(79) = 216.27, p < .0001$)
Sample E	Intercept	-.37 ($F(81) = 28.60, p < .0001$)	.54 ($\chi^2(81) = 301.24, p < .0001$)
	Linear trend	-.03 ($F(81) = 3.03, p = .085$)	.07 ($\chi^2(81) = 103.57, p = .046$)
	Quadratic trend	.17 ($F(81) = 241.74, p < .0001$)	.05 ($\chi^2(81) = 112.03, p = .013$)
Sample F	Intercept	-.13 ($F(106) = 4.00, p = .048$)	.41 ($\chi^2(106) = 162.69, p = .001$)
	Linear trend	-.11 ($F(106) = 26.68, p < .0001$)	.04 ($\chi^2(106) = 102.15, p > .50$)
	Quadratic trend	.21 ($F(106) = 184.42, p < .0001$)	.05 ($\chi^2(106) = 103.07, p > .50$)
Sample G	Intercept	.29 ($F(114) = 20.84, p < .0001$)	.46 ($\chi^2(114) = 180.75, p < .0001$)
	Linear trend	-.01 ($F(114) = .06, p = .805$)	.16 ($\chi^2(114) = 169.21, p = .001$)
	Quadratic trend	.16 ($F(114) = 126.68, p < .0001$)	.05 ($\chi^2(114) = 98.83, p > .50$)
Sample H	Intercept	.22 ($F(39) = 4.61, p = .038$)	.61 ($\chi^2(39) = 238.76, p < .0001$)
	Linear trend	-.04 ($F(39) = 2.08, p = .157$)	.10 ($\chi^2(39) = 55.70, p = .040$)
	Quadratic trend	.19 ($F(39) = 101.24, p < .0001$)	.06 ($\chi^2(39) = 47.46, p = .166$)
Sample I	Intercept	.52 ($F(125) = 27.14, p < .0001$)	.96 ($\chi^2(125) = 443.25, p < .0001$)
	Linear trend	-.16 ($F(125) = 12.52, p = .001$)	.41 ($\chi^2(125) = 381.35, p < .0001$)
	Quadratic trend	.27 ($F(125) = 52.58, p < .0001$)	.35 ($\chi^2(125) = 530.01, p < .0001$)

Table 1.2. Level 2 results examining the central tendency as well as variation across

participants. Note: Coefficients are estimates of parameters of the following level-1

model: $\eta = \log[P/(1-P)] = P_0 + P_1*(FACEPAIR) + P_2*(FACEPAIR^2)$

ARC Variation: Central Tendency

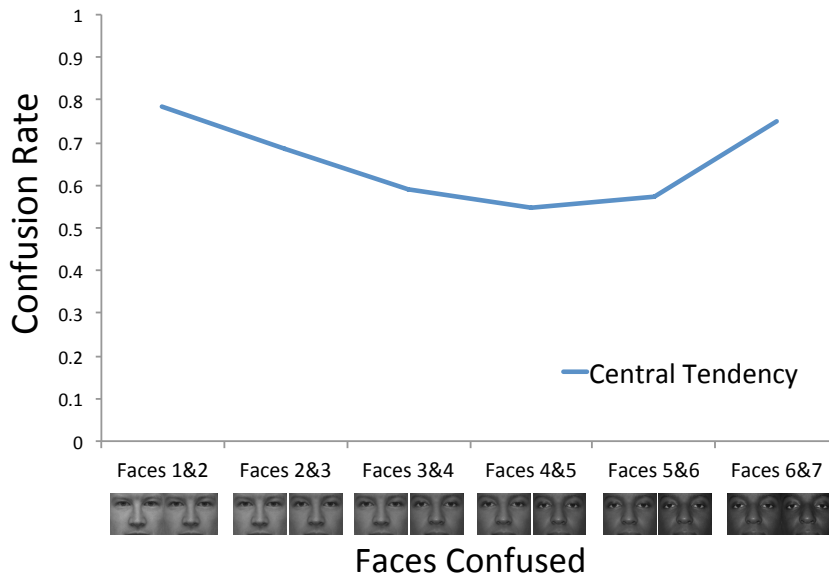


Figure 1.9. Participants’ average data pattern indicated a categorical pattern of race perception via its V-shape.

In addition, four out of nine samples showed significant random effects for FACEPAIR2 at level-2, suggesting that there is a possibility of detecting significant stable individual differences in ARC strength using the ARCAT. Figure 1.10 shows the variation of individual participants’ ARC data patterns. Some individuals display stronger ARC than the average (see Figure 1.11), whereas other participants display weaker ARC patterns, making similar amount confusions across the race continuum (see Figure 1.12). It is important to consider this individual difference variation when examining ARC. For example, Maclin, Peterson, Hashman, and Flach (2009) observed an ‘emergent’ third category at the middle of their morphed-race continua. But because their data came from one participant, it is possible that their participant happened to have a 3-category ARC

pattern. Such a pattern may not necessarily be generalizable for all people. Further examination of a few of these individual-level difference predictors continues in chapters 2 thru 4 of this dissertation.

ARC Variation: Many Individual Differences

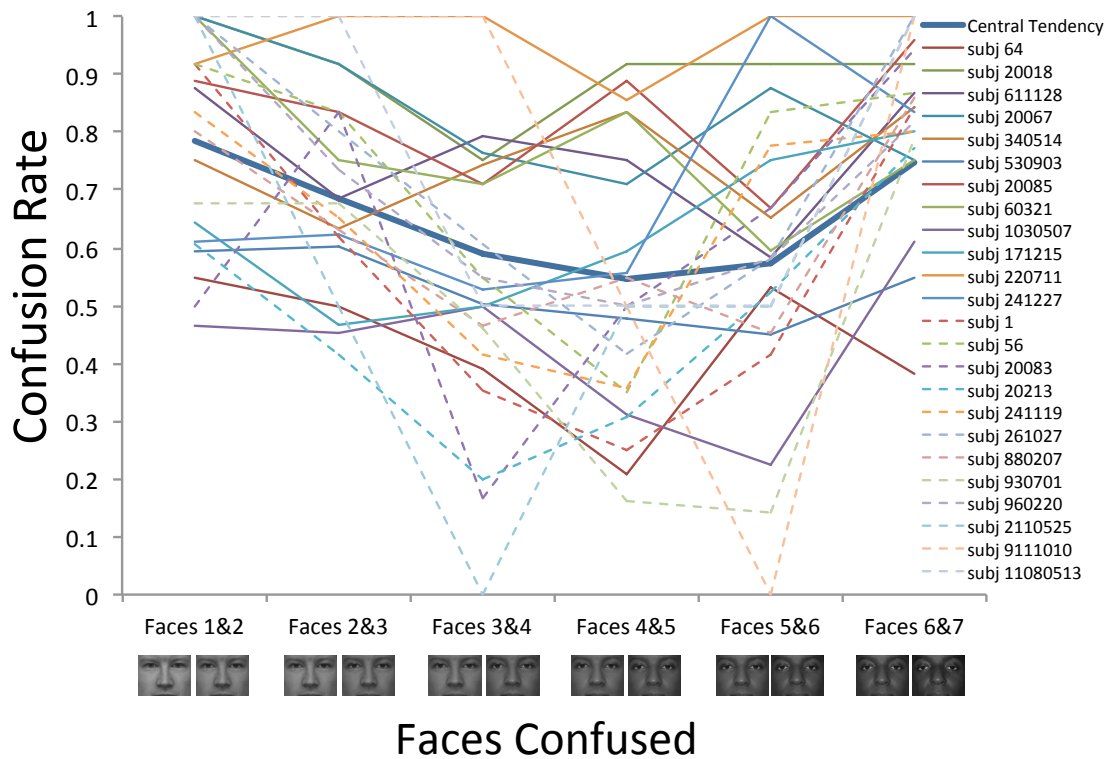


Figure 1.10. The central tendency of the confusion patterns is indicated by the bold, solid, blue line. But, individual patterns of data varied widely, with some participants displaying stronger or weaker ARC patterns than average.

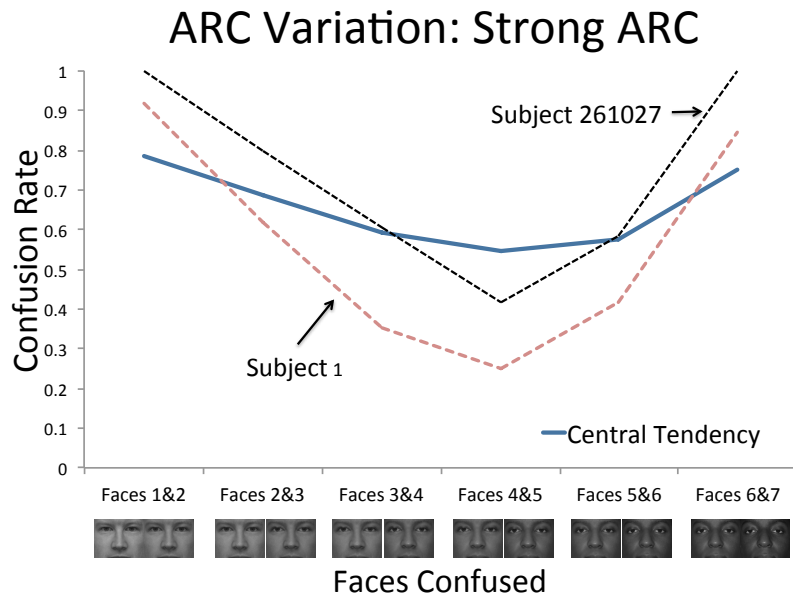


Figure 1.11. Some participants' showed stronger ARC data patterns than the average participant, as evidenced by the more pronounced V-shape pattern of confusions.

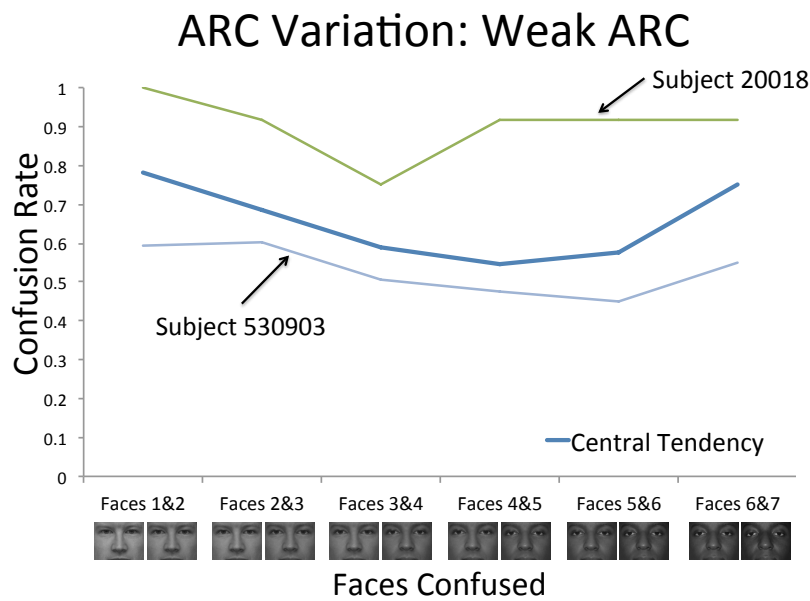


Figure 1.12. Some participants' data patterns indicated weaker ARC than the average, as indicated by the flatter, less pronounced V-shape confusion pattern.

There were also significant random effects for FACEPAIR2 at level-3 (see Table 1.3). These significant level-3 random effects (i.e., sample variation in ARC) suggest that context may also play a role in shaping ARC strength. Indeed past research suggests that social categorization is malleable; individuals can be easily induced, at least for short periods of time, to create categories, shift category boundaries, re-categorize or even eliminate categories (Brewer, 1991; Brewer & Miller, 1984; Gaertner, Dovidio, Anastasio, Bachman, & Rust, 1993; Pauker et al., 2009; Tajfel & Turner, 1979; Wilder, 1978). Moving beyond elimination, creation, or movement of category boundaries, future research could identify contextual antecedents that weaken or strengthen ARC.

	Fixed Effects Coefficients	Random Effects SD of coefficients
Intercept	.14 ($t(8) = 1.21, p = .26$)	.34 ($\chi^2 = 160.83, df=8, p < .001$)
Linear trend	-.10 ($t(8) = 4.48, p = .002$)	.06 ($\chi^2 = 36.92, df=8, p < .001$)
Quadratic trend	.18 ($t(8) = 15.36, p < .001$)	.03 ($\chi^2 = 26.31, df=8, p = .001$)

Table 1.3. Level 3 results examining the central tendency as well as variation across 9

samples. Coefficients are estimates of parameters of the following level-1 model:

$$\eta = \log[P/(1-P)] = P_0 + P_1*(FACEPAIR) + P_2*(FACEPAIR2)$$

Study 2: Is Automatic Categorization Stronger for Race than Stimuli that Vary in Luminance?

I argue that my data suggest that people tend to be strong automatic race categorizers. But do the results indicate that people are categorizing features of human face, or could it be that they are simply responding to non-social aspects of the stimuli, such as the overall luminance of the photos? Due to the economics of processing large amounts of information in their environment, people are fundamentally built to use

categories to simplify cognitive processing (Allport, 1954; Fiske & Taylor, 1984). The goal of the present study is to show that race is a particularly important spectrum for categorization – that people have particularly strong categorization tendencies with race relative to stimuli that vary continuously in luminance. Moreover the present study address concerns that a strong v-shaped data pattern is merely an artifact of the MCT.

Categorization of continuous stimuli is seen as a necessary way to order the world, employed even by low level invertebrates like crickets (Wytenbach, May, & Hoy, 2006). Like crickets, people categorize stimuli to create a sense of order and predictability in their world (Allport, 1954; Fiske & Taylor, 1984). Many forms of continuous stimuli are perceived categorically: phonemes (Ganong, 1980; Liberman, Harris, Hoffman, & Griffith, 1957; McMurray, Tanenhaus, & Aslin, 2002; Wood, 1976), color spectrum (Bornstein & Korda, 1984; Franklin, Clifford, Williamson, & Davies, 2004; Harnad, 1987), etc. But, the importance of face processing and face recognition may make automatic face categorization tendencies stronger than for non-social continuously varying stimuli.

People may be motivated to categorize social stimuli as a way to successfully navigate their social environment. People are motivated to foster relationships with others (Baumeister & Leary, 1995), and categorization of other people may help identify potential affiliations (e.g., ingroup members; Tajfel, 1981; Tajfel & Turner, 1986; Turner & Oakes, 1989). In addition, people are motivated to recognize ingroup and outgroup members in order to maximize beneficial outcomes for their ingroup (see Dovidio & Gaertner, 1993; Fiske, 1998; Tajfel, 1981; Tajfel & Turner, 1986; Turner & Oakes, 1989). In fact, some theorists argue that categorizing others into groups has become hard-wired

as a result of evolutionary pressures to detect those within and outside one's coalitional alliances for one's survival (Cosmides, Tooby, & Kurzban, 2003; Kurzban, Tooby, & Cosmides, 2001).

Indeed there is evidence that suggests that humans are built to perceive faces as a particularly important type of stimulus in the environment. For example, newborn infants attend to face and face-like stimuli more than non-face stimuli (Fantz, 1963; Valenza, Simion, Cassia, & Umilta, 1996). Furthermore, at the biological level, scientists have identified specific regions of the brain that appear to be especially tuned to processing face stimuli separate from other object stimuli (Sergent, Ohta, & MacDonald, 1992). In case studies of patients with agnosia, the inability to recognize objects, patients can still recognize faces (Behrmann, Moscovitch, & Winocur, 1994). Similarly, patients with prosopagnosia, the inability to recognize faces, can still process objects (Sorger, Goebel, Schiltz, & Rossion, 2007). This evidence supports the idea that faces are given special attention and processing apart from other stimuli in the environment.

One factor that varies among faces that range from White to Black is the relative lightness and darkness of each image along the continuum. Study 2 examines whether automatic categorization tendencies of continuously varying morphed-race faces is stronger than automatic categorization tendencies of continuously varying scrambled gray images. I hypothesized that automatic categorization of the race continuum would be stronger than automatic categorization of the scrambled gray continuum, indicated by a significant quadratic contrast on the interaction effect.

Method. Forty participants signed up to participate in the study at the University of Washington. Participants came to the lab for two study sessions. Each session, participants completed a Black to White morphed-race ARCAT.

The ARCAT. In this version of the ARCAT, the stimuli interlaced with the morphed-race faces were scrambled versions of each face stimuli from the Black to White morphed-race continuum. Each scrambled image was created by randomly re-ordering the pixels of a morphed-race face along the continuum. Thus, for any morphed-race face stimulus, there was a corresponding scrambled stimulus composed of the exact same pixels. Since the faces along the morphed-race continuum ranged from light to dark (i.e., White to Black), the continuum of scrambled images formed a continuum of grey rectangles also ranging from light to dark (see Figure 1.13 for examples of morphed-race face stimuli and their corresponding scrambled stimuli). The continuum of scrambled images offers a useful comparison point to the morphed-race continuum. If indeed automatic categorization is stronger for social than for non-social stimuli, removing the social context from the images by scrambling the pixels should lead to a weaker quadratic pattern of confusion rates for scrambled vs face stimuli.

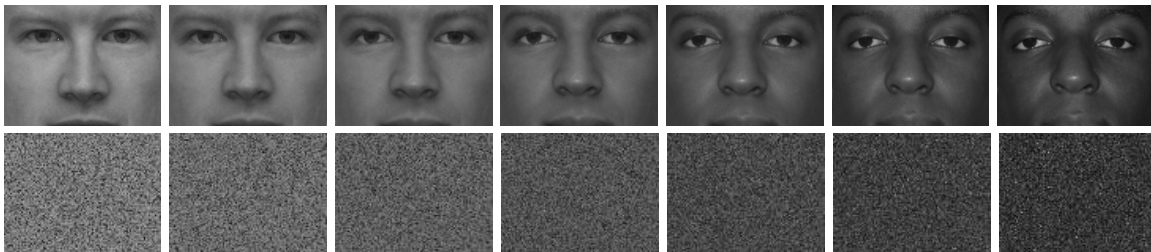


Figure 1.13. Sample morphed-race and corresponding scrambled stimuli

Results. There were no significant interactions of session with confusion rates for face pairs (quadratic contrast: $F(1, 39) = 2.20, p = .15$) or for scrambled pairs ($F(1, 39) = .69, p = .41$). Thus, subsequent analyses were collapsed across session.

A 6 (adjacent stimulus pair) x 2 (stimuli type: faces vs scrambles) within subject ANOVA was conducted. There was a main effect of adjacent stimulus pair, quadratic contrast: $F(1, 39) = 112.42, p = 4.75 \times 10^{-13}$ ($M_{quadratic\ coefficient} = .03, SD_{quadratic\ coefficient} = .03$). This effect showed that overall, participants tended to view the continuously varying stimuli as falling into two distinct categories. There was a significant interaction effect between adjacent stimulus pair and stimuli type, $F(1, 39) = 40.50, p = 1.62 \times 10^{-7}$. Consistent with the hypothesis, participants' confusion rates revealed a large effect of automatic categorization for the morphed-race continuum, $F(1, 39) = 118.28, p = 2.25 \times 10^{-13}$ ($M_{quadratic\ coefficient} = .04, SD_{quadratic\ coefficient} = .02$). On the other hand, there was only a small effect of automatic categorization for the scrambled continuum, $F(1, 39) = 14.79, p = 4.33 \times 10^{-4}$ ($M_{quadratic\ coefficient} = .01, SD_{quadratic\ coefficient} = .02$), see Figure 1.14.

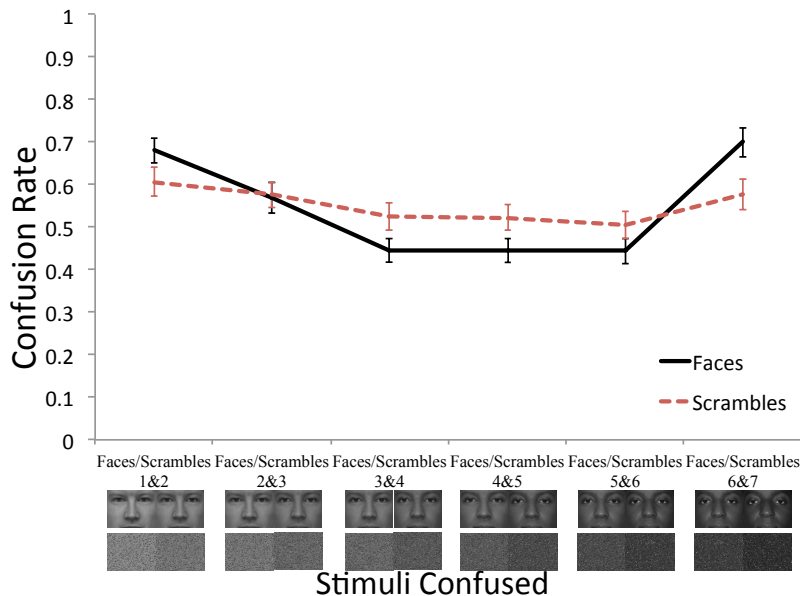


Figure 1.14. Confusion rate for faces and scrambles continuums.

Study 2 discussion. The present study demonstrated that people have weaker automatic categorization of non-social stimuli relative to social stimuli. Specifically automatic categorization of morphed-race faces was stronger than automatic categorization of similarly monotonic gray scrambled images. This finding is consistent with past work showing people have special sensitivity to and processing of faces relative to objects (Fantz, 1963; Golby, Gabrieli, Chiao, & Eberhardt, 2001; Sergent et al., 1992; Valenza et al., 1996). Given that the scrambled images had much weaker automatic categorization levels than the race stimuli, it is likely that the strong levels of automatic race categorization found in the present studies are not solely an artifact of the ARCAT itself.

It is premature to conclude from this one study that people have greater automatic categorization of all social stimuli relative to non-social stimuli. Indeed, the bulk of the research done using various types of social stimuli suggests that there is a range of automatic categorization levels for social stimuli. Additional work suggests that relative to race, other conceptually categorical social stimuli such as gender can have stronger levels of automatic categorization (Sedlins et al., in prep). However, that same study shows that conceptually continuous social stimuli such as age have weaker levels of automatic categorization relative to race. For the purposes of this dissertation, I am primarily interested in suggesting that people typically have strong levels of automatic race categorization.

The results of Study 2 provide additional evidence that people have strong levels of automatic race categorization. But the dissertation thus far, the studies of ARC use only Black to White morphed race stimuli. Is strong ARC particular White to Black

morphed race continua? It is conceivable, given the historical treatment of Blacks in America and the saliency of skin tone differences, that people may be more categorical about continua that include Black endpoints.

Study 3: Generalizing ARC Beyond Black To White Continua

To examine whether strong ARC is limited to morphed-race continua that include Black stimuli, study 3 was designed to measure ARC using Asian to White morphed race stimuli. I hypothesize that there will be evidence of strong ARC for White to Asian morphed-race faces, as indicated by a significant quadratic contrast for confusion rates across the morphed-race face continuum (hypothesis 1).

Additionally, because the participant pool tends to have a high population of Asians, study 2 can address whether there is a minority ingroup effect on ARC. Previous research suggests that people pay special attention to members of their ingroup. For example, people have better memory (Malpass & Kravitz, 1969; Meissner & Brigham, 2001) and better emotion recognition (Elfenbein & Ambady, 2002) for members of their own racial ingroup than members of outgroup races. Notably, these findings are specific to prototypical ingroup and outgroup faces. This research suggests there will be lower confusion rates for faces at the end of the continuum representing the ingroup relative to prototypically outgroup faces at the other end of the continuum (hypothesis 2). However, it is less clear how these findings relate to memory for mixed-race faces in the middle of the racial continuum. Thus, these findings do not lead to specific hypotheses regarding the strength of ARC (i.e., value of quadratic coefficient) for ingroup minority members relative to Whites.

How might minorities perceive the mixed-race faces? In one study conducted by Pauker et al., (2009), neither Black nor White participants remembered mixed-race Black/White faces as well as an ingroup race face. Instead participants' memory for ambiguous race faces was similar to their memory for outgroup race faces, indicating that ambiguous-race faces may naturally be perceived as an outgroup race member regardless of whether the participants are members of the majority or minority race.

On the other hand, memory for ambiguous-race faces is highly malleable and can change depending on contextual or motivational factors. Minority participants may treat ambiguous-race faces as an outgroup- or an ingroup-race face depending on whether the face is presented within the context of a series of outgroup or ingroup race faces, respectively (Willadsen-Jensen & Ito, 2008). Similarly, when ambiguous race faces are labeled or marked as being from one racial category or another, people treat those faces as being from that racial category. Indeed, ambiguous faces labeled as outgroup-race members are remembered less well than ambiguous race faces labeled as ingroup race members (Herrera, McQuiston, Maclin, Malpass, 2000; Pauker et al., 2009). Furthermore, labeling an ambiguous-race face as one race (e.g., Black), leads participants to remember that face as being more prototypic of that racial group than is actually the case (i.e., ambiguous faces labeled as Black were recalled as having more prototypically Black features; Eberhardt et al., 2003). Participants' memory for mixed-race faces becomes equivalent for their memory for ingroup race faces if participants are given sufficient motivation to include mixed-race faces in the ingroup (Pauker et al., 2009). Given the complex nature of this research on ingroup inclusion of ambiguous race faces, we do not

have clear hypotheses regarding main effects of confusion rates among faces in the middle of the racial continuum for minority or majority group members.

However, we can make some predictions regarding some additional participant race-related variables moderating ARC. In particular, racial identification of minority participants may be an especially promising moderator. For some people group membership is central to who they are (i.e., strong group identification), whereas for others, group membership is a less important aspect of their sense of self (i.e., weak group identification). Identification with one's group is associated with perceiving greater intergroup heterogeneity and ingroup homogeneity (Tajfel & Turner, 1986). Thus I predict that ARC will be stronger for participants who are strongly identified with their racial group (hypothesis 3).

Participants. 157 students at the University of Washington (101F; $M_{age} = 19.20$, $SD = 1.76$; 27.2% White, 56.3% Asian, 16.5% other) participated in the study in exchange for extra credit in their psychology courses.

Method. Participants came into the lab and completed the MCT using 1 of 2 randomly assigned morphed Asian to White continuum. After taking the MCT, participants completed several questionnaires. Racial identification was measured with the four-item racial group centrality measure (Luhtanen & Crocker, 1992). In this measure, participants are asked to rate their agreement with each statement from 0 Strongly Disagree to 6 Strongly Agree (i.e., “The racial/ethnic group I belong to is an important reflection of who I am”, “In general, belonging to my racial/ethnic group is an important part of my self-image”, “Overall, my racial/ethnic group membership has very little to do with how I feel about myself”, “The racial/ethnic group I belong to is

unimportant to my sense of what kind of person I am”; last two items were reverse-scored; $\alpha = .82$).

Results. Participants’ confusion rates were submitted to a 6 (face pair) x 3 (Participant race: Asian, White, or Other) repeated-measure ANOVA with participants’ racial identification entered as a centered continuous covariate. Hypothesis 1 was supported with a significant main effect of face pair with a predicted quadratic contrast: $F(1, 153) = 26.35, p < .00001$ ($M_{quadratic\ coefficient} = .02, SD_{quadratic\ coefficient} = .06$). This effect indicates that face pairs at the ends of the continuum were confused more often than face pairs toward the middle of the continuum. This pattern is interpreted as evidence of perception of two categories: White faces and Asian Faces. The interaction between face pair and participant race was non-significant, quadratic contrast: $F(2, 153) = 1.27, p = .33$ (see Figure 1.15). To examine whether ARC is moderated by racial identification, I examined the face pair by racial identification interaction effect. Contrary to hypothesis 3, the quadratic contrast for this interaction effect was non-significant suggesting that racial identification did not moderate ARC, $F(1, 153) = 2.08, p = .15$.

To examine whether the data reflect the expected increased recall for ingroup-race faces over outgroup-race faces, I focused on data from participants who identified themselves as White or Asian. In particular, I examined whether confusion rates differed for face pairs at the extreme ends of the spectrum: faces 1 and 2 (i.e., the most prototypically

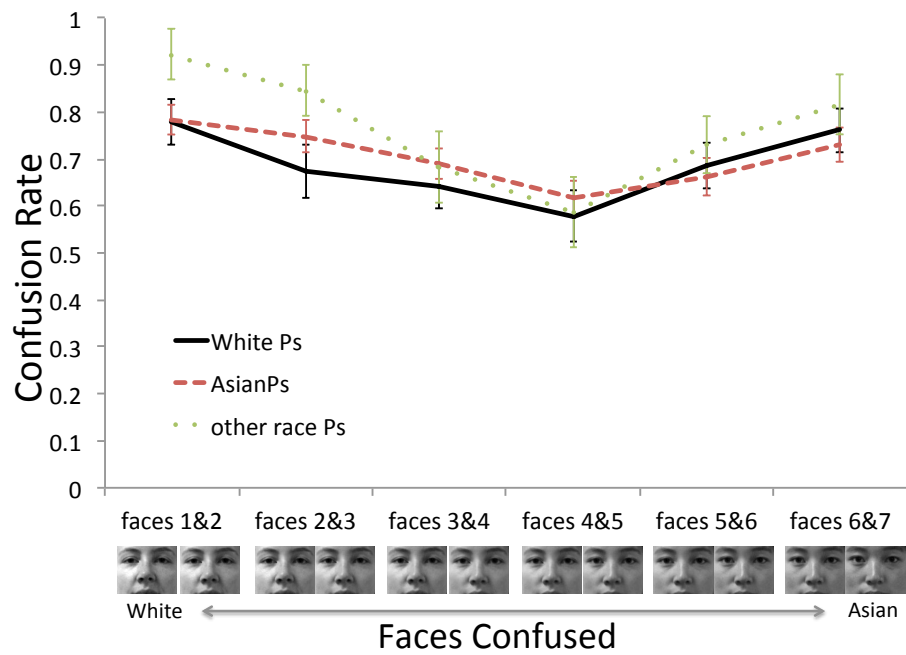


Figure 1.15. Graph of ARC for White-to-Asian continua split by participant race

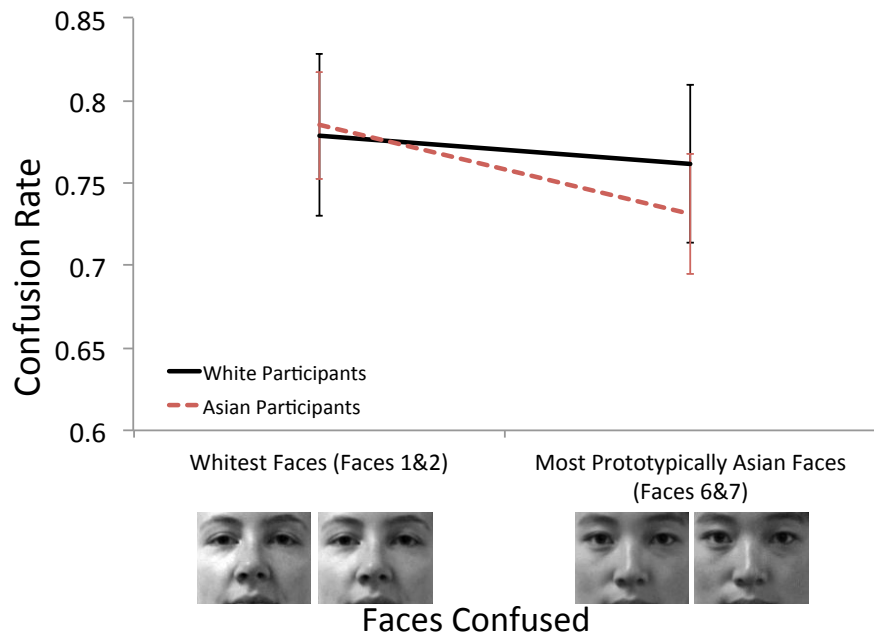


Figure 1.16. Confusion rate for the Whitest faces and for the most prototypical Asian faces for White and Asian participants

White faces) and faces 6 and 7 (i.e., the most prototypically Asian faces). Confusion rates were submitted to a 2 (participant race: White or Asian) x 2 (face pair: White or Asian) ANOVA with the latter factor within-subject. All main effects and interactions were non-significant, $F(1, 127)$'s $\leq .78$, p 's $\geq .38$ (see Figure 1.16).

Discussion. The data from Study 3 using White to Asian morphed-race continuums suggests that strong ARC is not a phenomenon limited to White to Black morphed race continuum. This finding was especially useful in ruling out effects due to skin tone differences. It is worth examining the relative strength of people's ARC for White-to-Asian faces relative to White-to-Black faces. The previous studies using White-to-Black faces had an average ARC strength (i.e., quadratic coefficient) of .04, $SD = .01$, $Min = .02$, $Max = .05$. In the present study, the average ARC strength was .02 which is at the bottom of the ARC strength range for White-to-Black faces. So although it appears that strong ARC can generalize beyond White-to-Black continua, it does seem that ARC strength tends to be stronger on average with White-to-Black continua than with White-to-Asian continua.

Evidence did not support the expected cross-race effect (CRE). White and Asian participants showed equally high confusion rates at both ends of the morphed-race continuum. It is possible that the difficulty of the ARCAT may be enough to wipe out CRE effects and limit observations to participants' natural tendencies to automatically racially categorize others. Previous CRE research showed a full line-up of faces without distractors prior to asking participants to recall whether a face was seen in the line-up or not (mimicking eye-witness testimony; Pauker et al., 2009; Malpass & Kravitz, 1969;

Meissner & Brigham, 2001). The ARCAT is a more difficult task than these prior tasks in that participants have time pressure and the task requires them to do a distractor task (i.e., number memory task) in concert with encoding and recall of the faces. Additionally, because the present face stimuli are morphed from one end to another, the faces themselves are more similar to one another than in previous CRE paradigms, a factor that also increases the difficulty level of the task.

Relatedly, both Asian and White participants had lower confusion rates for faces in the middle of the morphed-race continuum than faces at either end of the continuum. This finding is in contrast with past research showing that people have worse memory for mixed-race faces relative to ingroup race faces (Pauker et al., 2009). Here too, fundamental differences between the ARCAT and prior work may account for this departure. The ARCAT requires participants to encode one face within one second and hold that face in memory until the next comparison face. In the task by Pauker and colleagues (2009), participants had to view and encode 30 faces for 5 seconds each prior to the face recognition test. Thus, their participants had more time to pay differential attention to ingroup, outgroup, and multiracial faces. The ARCAT may in fact inhibit the greater attention allocation participants would typically spend encoding ingroup faces relative to outgroup and multiracial faces. It is possible that the differences between their task and the ARCAT allows the present work to measure category boundary strength rather than ingroup-related behavior. Future studies could examine whether extending the time participants have to encode faces leads to the appearance of ingroup memory biases relative to outgroup and multiracial faces.

Although I predicted that strongly racially identified participants would show stronger ARC than weakly identified participants, identification with one's race did not moderate ARC. One potential explanation for this null finding is that because Asians and Whites are perceived as high status racial groups in America (Junn & Masuoka, 2008), racial identification may have been less important in perceiving boundaries between groups. Previous work examining identification's effect on perceptions of intragroup variability showed an interaction with group status (Doosje, Ellemers, & Spears, 1995). When group status is low, weakly identified individuals perceive more within group variability than highly identified individuals. On the other hand, when the ingroup has high status, there are no differences between perceptions of intragroup variability. Future research could examine whether racial identification with a low status group moderates ARC.

Chapter 1 General Discussion

This chapter reviewed data suggesting that people possess a general tendency to view the racial continuum as falling into discrete race groups. Study 1 showed that this tendency for strong ARC occurred across a meta-analysis of data from nine studies, 799 individual participants, and 4866 overall data points. The meta-analysis also provided some evidence that it is possible to find stable individual differences in ARC strength. Some individuals are more likely to perceive racial variation more continuously than others. Identifying some of these factors that relate to stronger or weaker ARC data patterns may help scientists understand more about the processes associated with social processing and interactions. I will turn to such work in the subsequent chapters.

Study 2 provided additional evidence that people have strong tendencies to view continuous racial stimuli as falling into discrete groups. Data support the idea that the tendency for strong ARC is greater than the general tendency to group continuously varying stimuli in general. Participants had stronger categorical tendencies with social stimuli that varied continuously by race than with the exact same stimuli which were scrambled to remove their human identity. This supports the findings that people are particularly tuned to categorizing social stimuli in their environment (Fantz, 1963; Golby et al., 2001; Sergent et al., 1992; Valenza et al., 1996), perhaps as a way to make inferences about others and predict their behavior as one navigates their social world.

Study 3 extended the generalizability of our findings by moving beyond White-to-Black racially morphed continua. People also exhibit strong ARC tendencies with White-to-Asian racially morphed continua. This finding suggests that strong ARC does not rely solely upon differences in skintone and luminance. Furthermore, this extension was important given the history of discrimination and extreme oppression against Blacks in the United States. While one could argue, correctly, that Asians have also suffered discrimination and oppression in America, especially during the second World War, in today's society, Blacks and Asians are viewed and treated quite differently. Relative to other racial groups, Blacks are still perceived as low status in America, they occupy the prisons in numbers disproportionate to other groups (Blumstein, 1993; Pettit & Western, 2004), and they continue to be the targets of strong negative stereotypes and discrimination (e.g., Bertrand & Mullainathan, 2004; Correll et al., 2002). On the other hand, Asians are seen as fairly high status (nearly equivalent to Whites; Bobo & Zubrinsky, 1996) and are positively stereotyped as the "model minority" (Wong, Lai,

Nagasawa, & Lin, 1998). An especially illustrative example of the differences in perceptions of these two groups can be seen in the responses to national surveys conducted by the Los Angeles Times regarding which groups are discriminated against, work the hardest to succeed, and are prone to violence (see Figure 1.17). Given these disparate group associations, it is especially impressive that the present research finds strong ARC effects with both White-to-Black and White-to-Asian continuously varying stimuli.

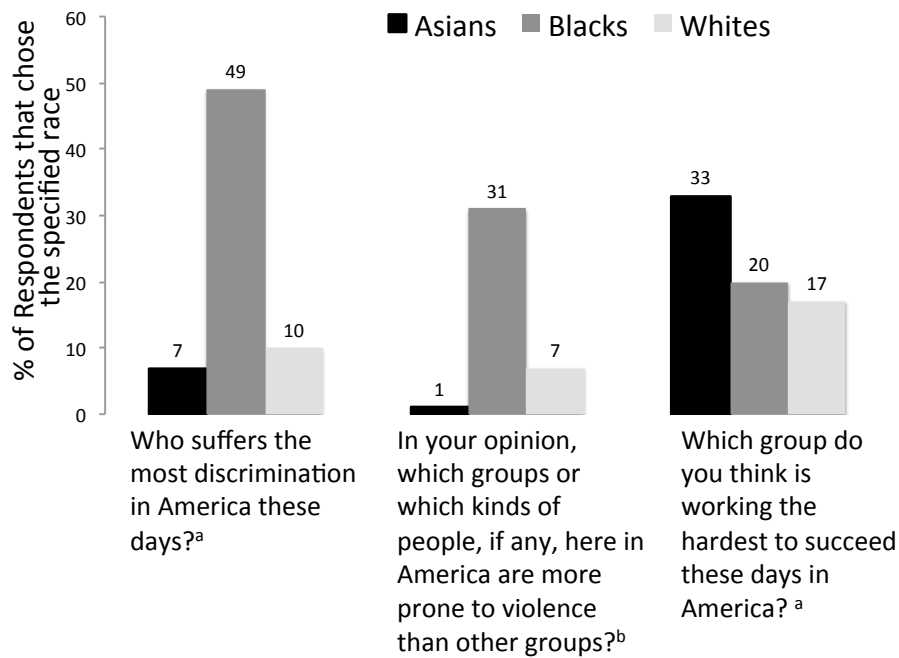


Figure 1.17. Data from national telephone surveys conducted by the Los Angeles Times in 1991^a and 2008^b (Los Angeles Times, 1991; 2008).

Finally, data from this chapter also revealed significant and reliable individual differences in ARC strength. In light of this discovery, readers may wonder why certain individuals view continuous racial variation in terms of more discrete groupings while

others refrain from automatically grouping people into socially constructed racial categories. Are there specific traits that predict one tendency or another? What are the implications of having stronger or weaker ARC? These questions are examined in greater depth over the next few chapters.

Chapter 2: Political Ideology

Following the discovery that the ARCAT can at times detect reliable individual differences in ARC, the present research investigates the nature of some of these individual difference predictors. This chapter examines whether political ideology is related to differences in ARC. Because the present research is correlational, one cannot determine whether political ideology differences cause differences in ARC or vice versa. For the purpose of argument, I suggest in this chapter that it is possible that the predilection for conservatives, more so than liberals, to display intergroup bias may in part stem from a greater likelihood to perceive their race in terms of discrete groups. I argue that without perceptions of strong group boundaries, it may be difficult to harbor and distribute such biases (see chapter 3, study 2). The current investigation examines whether individual differences in political ideology predict differences in ARC strength, and whether this relation may be due to individual differences in need for closure or need for cognition.

Political Ideology and Intergroup Bias

Political ideology is a system of beliefs that dictates how society should operate and how to achieve the ideal society (Erikson & Tedin, 2003; Jost, Federico, & Napier, 2009). The construct is generally conceived as a continuum from left-to-right or liberal-to-conservative (Jost et al., 2009).

Although political ideology research has not focused on differences in race categorization per se, a sizable body of research has examined political ideological differences in intergroup bias. This research typically finds that relative to liberals, conservative individuals tend to show greater intergroup bias (e.g., Altemeyer, 1998;

Duckitt, Wagner, du Plessis, & Birum, 2002; Federico & Sidanius 2002; Feldman & Huddy, 2005; Golec, 2002; Nail, Harton, & Decker, 2003; Lambert & Chasteen 1997; Napier & Jost, 2008; Mendelberg, 2001; Sidanius & Pratto, 1999, Sidanius, Pratto, & Bobo, 1996; Valentino, 1999; Valentino, Hutchings, & White, 2002; Whitley, 1999; Wilson, 1973). For example, liberals show greater egalitarianism than conservatives on the race IAT (see Jost et al., 2008). Similarly, Yogeeswaran and Dasgupta (2010) found greater evidence of race bias among their conservative participants than their liberal participants. They found that those who implicitly perceived Whites as most prototypically American were less likely to support a policy suggestion proposed by an Asian American writer than a White American writer. However, this relationship only held for conservative participants. Likewise, Legault, Green-Demers, Grant, and Chung (2007) found that greater conservatism was associated with less prejudice regulation (e.g., less value placed on nonprejudice and tolerance). Political ideology is even associated with racial bias in romantic desire, such that White conservatives are less likely to show interest in interracial dating than more liberal Whites (Eastwick, Richeson, Son, & Finkel, 2009). Interestingly, when race is made salient, conservatives are more likely than liberals to negatively evaluate Blacks and Latinos (Domke, 2001) suggesting that an increase in category accessibility increases the association between political ideology and racial bias.

Political ideology's relation with interracial bias may at least in part stem from differences in ARC. Indeed, greater intergroup bias has been associated with increased category salience (Tajfel, 1978; Taylor, 1981; see also chapter 3, study 3 of this dissertation). In other words, the more people are aware of categories, the more likely

they are to engage in behaviors that benefit the ingroup over an outgroup (Tajfel & Turner, 1986). It is possible that conservatives may be more likely to exhibit intergroup bias than liberals, because they are more likely to perceive race as falling into discrete categories. Stated another way, I predict that more conservative individuals may show stronger ARC than more liberal individuals.

Political Ideology, Motivation to Reduce Ambiguity, and Need for Cognition

If political ideology is associated with differences in how one treats different race groups, and (as I argue) how distinctly one perceives the boundaries between races (i.e., ARC), it would be prudent to examine why this might be the case. Knowing the mechanisms behind these relationships can help identify potential ways to mitigate political ideological influences on ARC.

While political ideology can certainly be influenced by top-down processes (e.g., reasoning, political discourse), political ideology can also be shaped by bottom-up motivations (see Jost et al., 2003 for a review). In fact, a diverse and large body of research from the past three decades is dedicated to investigating personality and trait correlates of the liberal versus conservative dimension. This investigation focuses on two correlates with political ideology germane to the idea of continuous racial variation: need for closure and need for cognition. Need for closure is an intolerance for ambiguity and a preference for order and defined categories (Kruglanski & Webster, 1996). In contrast, need for cognition is the tendency to seek out and enjoy effortful cognitive activity (Cacioppo & Petty, 1982). The present chapter examines how political ideology, and these two correlates, may alter how racial ambiguity is perceived and dealt with in the middle of the racial continuum.

Conservatism and Threat. There is strong physiological and behavioral evidence from experimental and longitudinal studies that greater conservatism is associated with a greater need or motivation to manage threat (e.g., Block & Block, 2006; Jost, 2006; Jost et al., 2009; Jost, Napier, Thorisdottir, Gosling, Palfai, & Ostafin, 2007). For example, greater conservatism is linked with mortality threats (i.e., thoughts about death; Jost et al., 2003; Landau et al., 2004; see also Bonanno & Jost, 2006 for a similar investigation). Conservatism, and support for more conservative policy, has been linked to increased physiological responses to threat such as increased blinking during the startle effect (Oxley et al., 2008). Moreover, the relationship between conservatism and motivated threat management can be observed across the lifespan. Longitudinal studies have shown that teachers' reports regarding behavior of children at age 4 predicted political ideology at age 23 (Block & Block, 2006). The children teachers rated as more "anxious in unpredictable environments," "easily victimized by other children," "immobilized when under stress," and as more "fearful and anxious" (i.e., behaviors suggestive of greater experiences of threat) grew up to be more conservative adults.

Conservatism and Ambiguity as a Threat. Feelings of uncertainty or ambiguity can also present a greater threat to conservatives than their liberal counterparts (Federico & Deason, 2012; Fibert & Ressler, 1998; Frenkel-Brunswik, 1949; Jost et al., 1999, 2003, 2007; Sorrentino & Roney, 1986; Sidanius, 1978; Wilson, Ausman, & Mathews, 1973). For example, Sidanius (1978) examined a sample of close to 200 Swedish high school students and found that those who scored higher on conservatism measures were more likely to score high on Budner's (1962) intolerance of ambiguity scale (e.g., "there is really no such thing as a problem that can't be solved"). Relatedly, conservatives show a

greater need for order and structure relative to liberals (Chirumbolo, Areni, & Sensales, 2004; Jost et al., 2003; Sidanius, 1978). Conservatism is associated with a preference for known, familiar songs over novel songs (Glasgow, Cartier, & Wilson, 1985). Based on these findings, it is unsurprising that greater conservatism has been linked with a higher need for closure (NFC), a construct that measures an individual's discomfort with uncertainty and ambiguity, where those higher in need for closure experience the greatest discomfort (Chirumbolo et al., 2004; Federico & Deason, 2012; de Zavala & Van Bergh, 2007; Kirton, 1978).

This underlying need for closure may be important in understanding how political ideology can predict automatic race categorization. NFC tends to increase preference for homogenous groups (Kruglanski, Shah, Pierro, & Manetti, 2002) and tends to be associated with greater use of schemas and stereotyping (Schaller, Boyd, Yohannes, & O'Brien, 1995; Webster & Kruglanski, 1994) and ingroup-bias (Chirumbolo et al. 2004; Federico et al., 2005; Shah, Kruglanski, & Thompson, 1998; Webster, Kruglanski, & Pattison, 1997). In addition, relative to those low in NFC, those high in NFC are more likely to attend to any prototypic information to confirm an already held category (Kruglanski & Mayselless, 1988; Webster, 1993). These past findings suggest that conservatives could show much stronger ARC than liberals, preferring to place ambiguous-race faces at the center of the race continuum into traditionally-held race categories.

One study in particular may shed light on how NFC among conservatives and liberals may influence competing race category activations. Amodio, Jost, Master, and Yee (2007) measured individual differences in political ideology and measured

participants' ERP responses during a Go/No-Go task. The Go/No-Go task is designed to induce cognitive conflict by allowing a participant to habituate to a Go response before presenting them with a No-Go response trial in which they must withhold the 'Go' behavior. They found that liberals, relative to conservative participants, showed greater ERN and N2 activation, suggesting greater attention to conflict and successful inhibition of habitual response, respectively, on No-Go trials. Additionally, conservatives were more likely than liberals to continue to use the Go response on a No-Go trial. In other words, liberals tended to show greater neurocognitive awareness of conflicting response tendencies, or the point at which "one's habitual response tendency is mismatched with responses required by the current situation."

It is possible that the experience of competing response tendencies on the Go/No-Go task is similar to the competing category activation experienced at the middle of race continuum. Conflicting response tendencies are especially relevant given that ambiguous faces toward the middle of a morphed continuum likely cognitively activate both category endpoints for both race and gender-based morphed continua (Freeman & Ambady, 2009; Freeman, Ambady, Rule, & Johnson, 2008; Freeman et al., 2010). Extrapolating from Amodio and colleagues' (2007) findings, liberals may be more likely to at least be more implicitly (i.e., neurocognitively) aware of the competing activation for faces at the middle of the spectrum than conservatives. Relative to liberals, conservatives may be more likely to continue to use their dominant, natural, schematic response (i.e., categorize a face into traditional race categories). Thus, I predict that those high in NFC will likely show stronger ARC than their low NFC counterparts.

Liberalism and Need for Cognition. Political ideology is also associated with differences in need for cognition (NFCog; Jost et al., 2003). Liberals tend to engage in and enjoy greater processing of information than conservatives. For example, liberals are more likely than conservatives to pay attention to and be differentially persuaded by differences in the strength of an argument (Miller, Krochik, & Jost, 2010). Relative to conservatives, liberals have more books and a greater variety of books (Carney, Jost, & Gosling, 2008), suggesting a greater motivation to think and learn. Liberals, relative to conservatives even tend to enjoy more complex art (Wilson, et al., 1973). Similarly to NFC, evidence of NFCog's association with political ideology can be observed throughout the lifetime. Preschool children rated as more "curious and exploring" by their teachers grew up to be more liberal than conservative and were more likely to "genuinely value intellectual matters" and be "concerned with philosophical problems" as young adults (Block & Block, 2006).

Notably, those high in NFCog report enjoying more complex tasks over simple tasks, whereas those low in NFCog report the opposite enjoyment pattern (Cacioppo & Petty, 1982). In a similar vein of research, Tetlock (1983) coded speeches by liberal and conservative senators for complexity level. His results showed that liberal politicians tended to make more complex statements than their conservative counterparts, even after controlling for senators' education, age, and amount of senate experience.

NFCog's positive association with more complex cognitions may be particularly important for ARC strength. For example, multiracial classifications (i.e., multiracial, mixed-race, Black and White), which are related to weaker ARC (see chapter 4 of this dissertation), suggest an integration of two perceived categories whereas monoracial

classifications are more rigid and non-integrative. Thus, one might expect that those higher in NFCog would tend to have weaker ARC than those lower in NFCog. This hypothesis is in line with research that shows that reduced complex cognitions tend to be associated with more perceptual rigidity and increased stereotyping (Suedfeld et al., 1992).

Despite the fact that NFC and NFCog appear to represent opposite ends of a continuum, research shows NFC and NFCog are distinct constructs. Webster and Kruglanski (1994) reported that NFC and NFCog were significantly negatively correlated, ($r = .28$) but not completely overlapping constructs. Similarly, Blanchard-Fields, Hertzog, Stein, and Pak (2001) found these NFCog was significantly negatively correlated with the NFC subscales ($-.24 \geq r \geq -.34$) suggesting the constructs are related but not identical. Thus, the present investigation examines both NFCog and NFC constructs as separate mediators (in study 2).

The Present Research

Two studies examine the relation between political ideology and ARC strength. Study 2 also examines whether NFC and NFCog play a role in the relationship between political ideology and ARC.

Study 1: Relation between Political Ideology and ARC Strength

The goal of study 1 is to provide initial evidence for an association between political ideology and ARC strength. Based on past findings suggesting conservatism's positive association with intergroup bias, the following was predicted:

Hypothesis: More conservative individuals will have stronger ARC than more liberal individuals.

Participants. Seventy-four participants (51 F; $M_{age} = 30.30$, $SD_{age} = 10.51$; 52.1% White, 31.5% Asian, 9.6% Multiracial, 5.5% Black, 1.4% Latino) were recruited from the Seattle community to participate in a multisession study for pay.

Method. Participants came in for an initial questionnaire session in which they completed demographics information and various individual difference measures including a measure of political ideology. Subsequently, participants came into the lab, for six sessions approximately 1 month apart, to complete a White-to-Black ARCAT. Participants were randomly assigned to 1 of 9 White-to-Black continua for the ARCAT. Participants' ARCAT data was averaged across sessions for a minimum of three sessions attended.

Political ideology was measured with a 1-item question adapted from the American National Election Studies (ANES), "When it comes to politics, do you consider yourself to be liberal, conservative, or moderate?" Participants responded using a 5-point scale from 1 Liberal to 5 Conservative. The one-item measures commonly used across psychology and on national surveys such as the ANES have been shown to be highly predictive of behavior (e.g., voting) and beliefs and attitudes (e.g., social equality) (Jost, 2006).

Results. One participant did not complete the political ideology measure and was excluded from analyses. Participants tended to report being more liberal than conservative ($M = 1.96$, $SD = 1.12$, $Mdn = 2.00$).

To assess whether confusions rates across the racial percentage continuum varied as a function of political ideology, we followed the method suggested by Van Breukelen and Van Dijk (2007) for assessing within-subjects effects with a continuous independent

variable. Participants' confusion rates were submitted to a repeated-measures ANCOVA with the six face-pairs as the within-subjects variable and political ideology (continuous, centered) entered as a covariate. The benefit of this analysis is that it allows a continuous variable to be used as a predictor in a repeated-measure analysis without artificially splitting the continuous variable into two groups.

There was a main effect of face pair such that overall, people tended to show strong ARC, quadratic contrast: $F(1, 71) = 44.02, p = 5.45 \times 10^{-9}, M_{quadratic\ coefficient} = .02, SD_{quadratic\ coefficient} = .03$. There was no main effect of political ideology on overall confusion rates. Importantly, as predicted, the quadratic contrast showed a significant interaction between face pair and political ideology: $F(1, 71) = 5.45, p = .02$. A median split allowed a closer comparison between more liberal participants and more conservative participants in this interaction. Confirming hypotheses, more conservative participants ($n = 23, M_{quadratic\ coefficient} = .03, SD_{quadratic\ coefficient} = .03$, quadratic contrast: $F(1, 22) = 41.37, p = 1.80 \times 10^{-6}$) showed stronger ARC than more liberal participants ($n = 50, M_{quadratic\ coefficient} = .02, SD_{quadratic\ coefficient} = .03$, quadratic contrast: $F(1, 49) = 15.91, p = 2.21 \times 10^{-4}$) as evidenced by greater average quadratic coefficients) (see Figure 2.1).

Study 1 Discussion. Study 1 provides the first evidence that political ideology may be an important predictor of ARC strength. Consistent with hypotheses, the more conservative an individual, the stronger their ARC. In other words, relative to more liberal individuals, more conservative individuals in this study were more likely to perceive continuous racial variation as falling into discrete Black and White race categories.

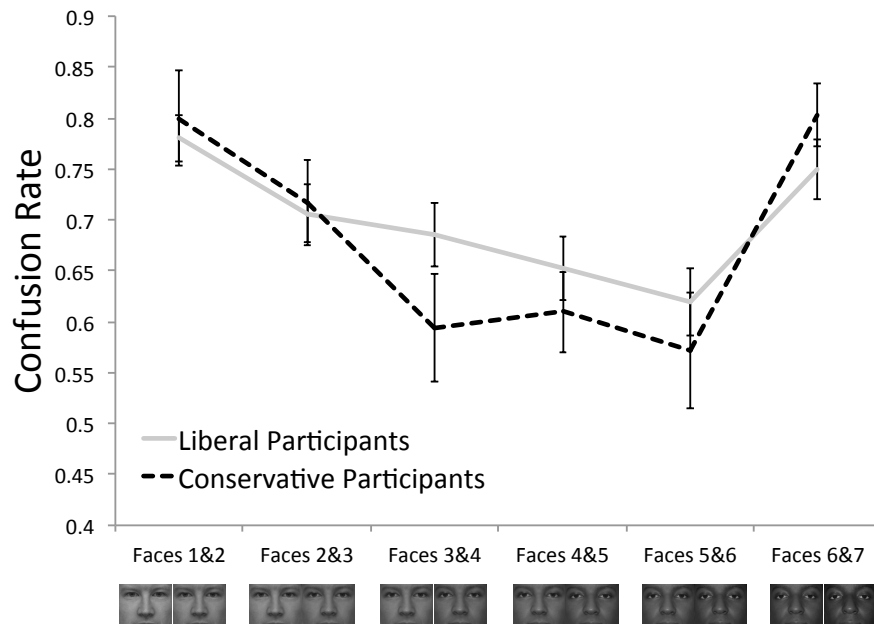


Figure 2.1. More conservative participants in study 1 showed stronger ARC than more liberal participants.

Study 2: Relation between Political Ideology, ARC strength, NFC, & NFCog

Study 2 sought to replicate the relation found in study 1 between political ideology and ARC strength. Furthermore, study 2 examined whether the relationship between political ideology and ARC could be accounted for by NFC and/or NFCog.

Hypothesis 1: More conservative individuals will perceive the racial continuum as falling into discrete groups (stronger ARC) more than liberal individuals.

Hypothesis 2: The relationship between political ideology and ARC will be mediated by need for closure such that greater conservatism may be related to an underlying trait of greater need for closure which in turn leads to greater ARC.

Hypothesis 3: The relationship between political ideology and ARC will be mediated by need for cognition such that those with greater conservatism may have less need for cognition which leads to stronger ARC.

Participants. Ninety-two students (57F; $M_{age} = 18.70$, $SD_{age} = 1.00$; 51.1% Asian, 37.0% White, 9.8% Multiracial, 2% Black) at the University of Washington signed up for a study on “Memory Games” in exchange for extra credit in their introductory psychology courses (study C sample in Table 1.1).

Method. The original purpose of this study was to manipulate mortality salience cues in an attempt to experimentally manipulate political ideology. However, because this manipulation failed to affect political ideology scores, I will not discuss this aspect of the study in detail.

Participants came into the lab and were randomly assigned to complete a White-to-Black ARCAT (using 1 of 3 sets of morphed-race continua) with neutral word distractors (i.e., deal, skill, kissed, depth, course, coffee, grape) or an ARCAT with death-related words as distractors (i.e., dead, skull, killed, death, corpse, coffin, grave). There were no differences in results between the ARCATs with different distractors ($t's \leq 1.15$, $p's \geq .25$). or face sets ($F's \leq 1.95$, $p's \geq .15$). Thus, the analyses reported below collapse across all types of ARCATs. After completing the ARCAT, participants completed several measures including political ideology, need for cognition, need for closure, and demographic information.

Measures.

Political Ideology was assessed with a one-item measure. Participants were asked to indicate which best described them on a 6 point scale from 1 Very Liberal to 6 Very Conservative.

Need for Cognition was assessed using Cacioppo, Petty, and Kao's (1984) 18-item measure. Participants were asked to indicate how much they agreed with each statement (e.g., "I would prefer complex to simple problems", "Thinking is not my idea of fun" (reverse-scored); see Appendix A for full scale on a nine-point scale) from 1 Very Strong Disagreement to 9 Very Strong Agreement ($\alpha = .84$). Items were averaged together to create a composite Need for Cognition scale. Higher scores indicate a higher need for cognition.

Need for Closure was measured using Webster and Kruglanski's (1994) 47-item measure. Participants indicated their agreement on a 6-point scale from 1 Strongly Disagree to 6 Strongly Agree with statements such as "I believe orderliness and organization are among the most important characteristics of a good student" and "I like to have friends who are unpredictable" (reverse-scored) ($\alpha = .86$). Items were averaged together to create a composite Need for Closure scale. Higher scores on this measure indicate higher need for closure.

Results. On average, participants reported a slight liberal leaning ($M = 2.93$, $SD = 1.30$, $Min = 1$, $Max = 6$). Participants on average had a slight tendency toward Need for Closure ($M = 3.83$, $SD = .48$, $Min = 2.81$, $Max = 5.19$). Participants tended to be more toward the high middle of the Need for Cognition scale ($M = 5.87$, $SD = .96$, $Min = 3.33$, $Max = 7.94$). In contrast with past research, NFC, NFCog, and political ideology were not significantly related to each other (see Table 2.1).

	M (SD)	(2)	(3)
(1) Need for Closure	3.83 (.48)	-0.046	0.142
(2) Need for Cognition	5.87 (.96)		-0.003
(3) Political Ideology	2.93 (1.30)		

Table 2.1. Descriptive statistics and bivariate correlations among Need for Closure, Need for Cognition, and Political Ideology ($N = 92$). None of the correlations reached statistical significance.

Analysis consisted of a 6 (face pair) repeated measures ANOVA entering political ideology, need for closure, and need for cognition in as continuous, centered predictors. Overall, there was a main effect of face pair, quadratic contrast: $F(1, 88) = 186.24, p = 1.95 \times 10^{-23}, M_{\text{quadratic coefficient}} = .05, SD_{\text{quadratic coefficient}} = .03$.

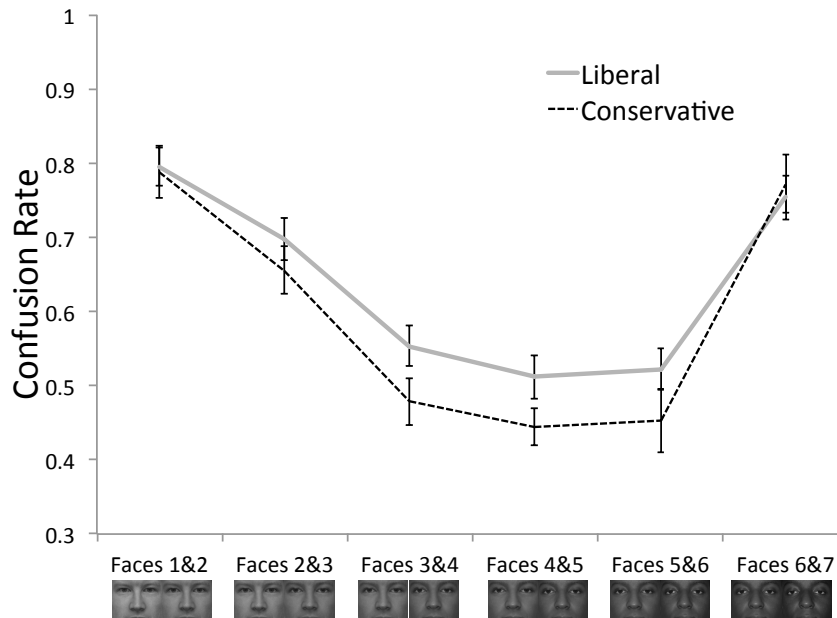


Figure 2.2. ARC differences among more liberal and more conservative participants in Study 2. More conservative participants display a tendency toward stronger ARC than more liberal participants.

Replicating study 1, there was a slight trend toward an interaction between political ideology and face pair, quadratic contrast: $F(1, 88) = 2.74, p = .10$. Because political ideology was the primary variable of interest, this interaction was further explored by entering political ideology as a median split ($Mdn = 3.00$) in a 6 (face pair) x 2 (political ideology: liberal versus conservative) ANOVA. There was a significant quadratic contrast interaction between face pair and political ideology, $F(1, 90) = 3.83, p = .05$. More conservative participants ($n = 33$) had stronger ARC ($M_{\text{quadratic coefficient}} = .05, SD_{\text{quadratic coefficient}} = .03$) than more liberal participants ($n = 59, M_{\text{quadratic coefficient}} = .04, SD_{\text{quadratic coefficient}} = .03$), as evidenced by the strength of their average quadratic coefficients (see Figure 2.2).

Contrary to hypotheses, there were no interactions between face pair quadratic contrast and Need for Cognition ($F(1, 88) = .11, p = .75$) or Need for Closure ($F(1, 88) = .35, p = .56$).

Study 2 Discussion. Replicating findings from study 1, study 2 provided additional evidence that individual differences in political ideology predict ARC strength. Greater conservatism, relative to liberalism, was associated with stronger ARC.

Unfortunately, the present data cannot determine whether the relation between political ideology and ARC could be attributed to underlying factors of NFC or NFCog. Neither NFC nor NFCog were significant predictors of ARC. One possibility for this null effect may be due to the fact that NFC and NFCog measures rely on controlled thought processes while the ARCAT captures automatic tendencies.

Additionally, and in contrast with past research (Jost et al., 2003), political ideology was not significantly correlated with NFC or NFCog in this sample. It is unclear why the present study failed to find this relationship. Meta-analyses suggest that across multiple datasets, NFC tends to be correlated at about .26 with political ideology and constructs related to NFCog, such as cognitive complexity, on average have a -.20 correlation with political ideology (Jost et al. 2003). The present study had sufficient power to find these relationships with its sample size; the study should have had power of about .71 to detect a correlation of .26. However, it is worth noting that other studies have also found null effects among political ideology and these constructs (Glasgow & Cartier, 1985; Gruenfeld, 1995; Jost et al. 2003; Sidanius, 1978; 1985; Wilson et al., 1973). It is somewhat comforting that the relations among these constructs in the present sample, although non-significant, were in the predicted direction (see Table 3.1). However, the reduced relations between these variables in the present data set may also help explain the inability to find the predicted relations between these variables and ARC.

Additional Relevant Data

To investigate the relation between Political ideology and ARC further, I examined available data from three additional studies in which the primary investigation was not interested in the relationship between ARC and political ideology. As the main conclusions drawn from the analyses from each sample did not differ, the samples will be summarized in together in this section.

Sample Characteristics.

Participants. The data were taken from samples E, F, and G from chapter 1, study 1. All participants were recruited at the University of Washington campus through the

Psychology department subject pool or via flyers on campus. Participants recruited through the subject pool (i.e., samples F and G) received course credit in their introductory psychology course for participation in the study. Sample E participants completed a multi-session study in which each participant was paid five dollars for each session attended. Only participants who had data for the political ideology measure and ARC data were included in these analyses. Thus, sample E had 53 participants, sample F had 111 participants, and sample G had 122 participants (see Table 1.1 for sample demographic information).

Political ideology. Samples E and G used the 5-point scale 1-item political ideology measure from study 1. Sample F used the same 6-point 1-item political ideology measure as study 2.

ARCAT. All participants completed ARCATS using 7-face White-to-Black morphed-race stimuli.

Results. For each sample, ARCAT scores were submitted to a 6 (face pair) ANOVA with political ideology entered as a continuous centered predictor (cf. Van Breukelen & Van Dijk, 2007). Focusing on the primary result of interest, all three samples did not show the predicted political ideology by ARC interaction (quadratic contrast): F 's < .73, p 's > .40 (see Table 2.2 for specific sample inferential statistics and the quadratic coefficient for more liberal and more conservative participants).

Sample	N	ARC x Political Ideology (Quadratic Contrast)	Liberals' Quadratic Coefficient M (SD), n	Conservatives' Quadratic Coefficient M (SD), n
E	53	$F(1, 51) = .29, p = .59$	.03 (.02), n = 30	.04 (.03), n = 23
F	111	$F(1, 109) = .01, p = .95$	.04 (.03), n = 75	.05 (.03), n = 36
G	122	$F(1, 120) = .73, p = .40$	.03 (.03), n = 82	.03 (.02), n = 40

Table 2.2. Additional samples examined measuring political ideology and ARC. The ARC by political ideology interaction inferential statistics come from a 6 (face pair) ANOVA with political ideology entered as a continuous centered predictor variable. Liberal and conservative groupings in this table were determined by a median split.

Chapter 2 General Discussion

In two studies, greater conservatism, relative to liberalism, was associated with stronger ARC. This finding suggests that differences in political ideology are related to differences in how people view the contours of race. Furthermore, these findings are in line with past research showing that greater conservatism is associated with greater intergroup bias (e.g., Domke, 2001; Eastwick et al., 2009; Jost et al., 2008; Legault et al., 2007; Yogeeswaran & Dasgupta, 2010). Future studies could examine whether ARC differences associated with political ideology could in part account for the relationship between political ideology and intergroup bias.

One concern is that while the data supported the relation between ARC and political ideology in these two studies, this relationship was non-existent in three additional samples. Why would this relation fail to emerge across all samples? It could be that the relation between the ARC and political ideology is quite small and thus may be a

difficult effect to find consistently. It is also possible that the relation between these two constructs is actually due to or moderated by some third unmeasured construct.

A third, and intriguing possibility is that it was easier to find the relation between these constructs when politicized race topics are more salient. Recall that Domke (2001) found that including race cues in policy discourse led to significant associations between political ideology and racial bias, but when the policy discourse was race-neutral, political ideology was not significantly associated with racial bias. It is possible that the samples from studies 1 and 2 were collected during times when racialized politics were highly salient in the United States. The study 1 sample was collected during the 2008 Presidential election, which highlighted Barack Obama as the first Black / Multiracial President. Study 2 data was collected during the Fall of 2010, when the Tea Party, a party espousing especially conservative views, had gained popularity and news presence following the passage of Obama's universal healthcare reform law. The law itself was seen as heavily racialized, providing healthcare to many uninsured racial minorities (Economist, 2009), and the law's connection with race increased when Tea Party protesters were accused of using the N-word against Democratic politicians supporting the law (Washington, 2010). The evidence for greater salience of racialized politics during the collection of these studies is anecdotal, but it suggests that future studies could manipulate the salience of racialized politics to determine whether it leads to increased associations between ARC and political ideology.

Finally, given the correlational nature of the present data, one cannot conclude whether political ideology leads to differences in ARC or vice versa. If the former were the true state of the world, it might suggest a top-down relationship, where people parse

the social landscape based on their ideas about how the world is organized. But it is also possible that seeing the world in discrete groups encourages greater conservatism. For example, perhaps seeing the world in terms of discrete groups is more threatening than continuous racial variation and leads to greater conservatism. Future research can further examine these questions in experimental study designs.

Chapter 3: Genetic Folk Beliefs as predictors of ARC

(Author's Note: Portions of this chapter were published in Social Psychological and Personality Science)

Where visibility does exist, it is almost always thought to be linked with deeper lying traits than is in fact the case... The visual cue, then, acts as an anchorage point to which all manner of associations are tied. Among these associations are an additional array of sensory ideas. We slip quickly from the visual perception to the thought that the "blood" of people with differing skin must be different... Thus too, the Negro is seen not only as black skinned but as black hearted, inferior, and sluggish-though none of the qualities is gene-linked to skin color. (Allport, 1954)

The notion that people use the physical characteristics associated with groups (e.g., skin tone, nose shape) to infer shared underlying traits is not a new concept; it is in fact the basis of much racial stereotyping research (e.g., Blair, Judd, Sadler, & Jenkins, 2002; Correll et al., 2002; Devine, 1989; Fazio et al., 1995; Fiske, 1998; Gaertner & McLaughlin, 1983; Greenwald, McGhee, & Schwartz, 1998; Harris & Fiske, 2006; Maddox, 2004). In fact, the idea that phenotypic differences are related to biological differences between groups has been discussed for centuries. For example, phrenology, the nineteenth century scientific study of the shape of the skull, was used to justify beliefs that blacks and other low status groups were biologically inferior to ruling classes (Gould, 1981). While phrenology itself was discredited, the idea that there is a biological basis of socially constructed groups persists.

The following chapter discusses research suggesting that beliefs about genetic variation among people provide a basis for perceiving race as a naturally occurring, essentialized kind of category (as opposed to a socially constructed category). I argue that these beliefs are not only related to differences in stereotyping, but these beliefs also affect ARC strength. I hypothesize that genetic beliefs affect how racial groups are automatically categorized. Specifically, I predict that believing in high versus low genetic overlap between people will be associated with less categorical perception of continuously varying racial stimuli.

People Believe that Social Groups Possess Essences

Rothbart and Taylor (1992) suggested that in people's minds, there are two types of categories in the world: 1) natural kinds of categories (i.e., an essentialized category), and 2) socially constructed kinds of categories. Natural kinds are perceived to be inherent to the world; they are not perceived as socially constructed (i.e., artifact kinds).

According to the theory, people believe socially constructed kinds of categories would not exist without human culture e.g., the boundaries between countries. In contrast, people believe natural kinds of categories would exist even in the absence of human culture; e.g., without humans, boundaries between countries would cease to exist, but the land masses that constitute the continents would still remain.

Natural kinds are a type of essentialized category (i.e., a category that whose membership is determined by some set of necessary or essential features; Haslam et al., 2000). Natural kinds of categories are non-arbitrary categories believed to possess a naturally occurring underlying essence that makes them distinct from one another. For example, two cats may look quite different. One cat may be black, long-haired, and stout

while the other cat is calico-colored, hairless, and svelte. But, there is an underlying essential 'cat-ness' that makes each of these creatures belong to the same category: cats. The essential category-ness may be perceived as relating to an underlying shared bone structure or warm-bloodedness. This essence makes members of the same category similar to one another (e.g., other cats) and different from members of other categories (e.g., dogs, raccoons).

Even though race is a socially constructed category, people tend to treat racial categories as natural kinds (Hirschfeld, 1996; Medin & Ortony, 1989; Rothbart & Taylor, 1992; Yzerbyt, Corneille, & Estrada, 2001). For instance, Haslam and his colleagues (2000) asked participants to rate 20 various social categories (e.g., 'White people,' 'Black people,' 'vegetarians,' 'ugly people') on essentialist dimensions (e.g., informativeness, uniformity, naturalness). Their results revealed that racial and ethnic groups were perceived as highly natural and fairly informative. A study in a similar vein found that racial groups and their members are also perceived as fairly cohesive and similar to one another (Lickel, Hamilton, Wieczorkwska, Lewis, Sherman, & Uhles, 2000). Furthermore, perceiving race as a natural kind begins early in life. Children as young as 3 or 4 years of age show tendencies to treat race as essential and informative, recognizing it as a grouping more informative than color of clothing, profession, or body shape (Hirschfeld, 1996).

A consequence of viewing groups as naturally occurring and essentialized is that people tend to treat these categories as though they are unchangeable and mutually exclusive (Rothbart & Taylor, 1992). Therefore, it is unlikely that people conceptualize continuous variation of essential category features. Instead, people may comprehend

strong category boundaries that separate these groups. A striking example of the perceived exclusivity between essentialized groups comes from a study of caste members in India. Mahalingam (2003) found that Indians who belonged to India's upper caste, Brahmins, essentialized the upper class whereas the lower class was not seen as essentialized; a member of the upperclass would always be upperclass and other group members could not become upperclass. Upperclass respondents believed that a rich man who received a brain from a poor man would not change, but a poor man who received the brain of a rich man would change to act like a rich man.

Similarly, because race is viewed as an essentialized category, races are conceptually seen as more distinct from each other and non-interchangeable than is actually the case. For example, Hirschfeld (1996) presented children with a "switched at birth" story, in which a White baby and Black baby are accidentally switched at birth and raised by the outgroup-race family as its own child. When asked which child belonged to which family, children overwhelmingly placed the child with the racially-matched family. Indeed, historically in America, races were often kept legally distinct and separate through anti-miscegenation laws and rules of hypodescent – rules indicating that a person with both White and Black heritage was classified as Black. Recent work by Ho, Sidanius, Levin, and Banaji (2011) shows that even when participants have knowledge that an individual has White and minority (i.e., Black or Asian) heritage, participants are likely to follow the rule of hypodescent (i.e., categorizing a mixed-race individual by their racial minority heritage) both explicitly and on an automatic level.

An additional consequence of viewing race and other social groups as natural and distinct is an associated increase in stereotyping and prejudice (Bastian & Haslam, 2006;

Condit, 2008; Haslam et al., 2000; Rothbart & Taylor, 1992). When people believe that groups are biologically based, they are much more likely to stereotype those groups (Hoffman & Hurst, 1990). Presumably, the more group distinctions are perceived to be fixed and clear, the more group traits (i.e. stereotypes) are perceived to possess high descriptive power. Hoffman and Hurst (1990) presented participants with two fictional groups described as either biologically-based or socially-based groupings. These groups were also described as typically corresponding to one of two distinct roles in society – either care-givers or city workers. When the groups were presented as biologically-based rather than socially-based, participants were more likely to stereotype, attributing additional role-congruent traits (i.e., care-giver or city-worker attributes) to the respective groups. Indeed, it is possible that believing the groups were biologically based actually motivated participants to seek out or provide additional ways to distinguish the groups from one another and emphasize these between-group differences. Indeed, two of the primary cognitive hallmarks of stereotyping are an exaggerated tendency to perceive between-group heterogeneity (Tajfel, 1978; Taylor, 1981) and within-group homogeneity (Park & Judd, 1990; Ryan, Park, & Judd, 1996).

Some scientists theorize that social groupings such as race and their associated stereotypes naturally evolved as a way to justify group status differences in a society (Jost & Banaji, 1994; Jost & Hamilton, 2005; Yzerbyt, Rocher, & Schandron, 1997). The more people agree that social groups are biologically based, discrete, and informative (i.e., predictive of personality and behavior), the more they endorse racial stereotypes (Bastian & Haslam, 2006). In a separate set of studies, Keller (2005) found that those who hold

strong essentialist beliefs endorse more stereotyping, prejudice, and social dominance beliefs.

People May Attribute Essential Differences Between Groups to Genetics

Although considerable research has documented how concepts such as essence (Haslam & Whelan, 2008; Keller, 2005) and entitativity (Lickel et al., 2000) are related to group stereotyping, surprisingly little research has attempted to identify specific beliefs about human biology that might underlie the perceived naturalness of racial categories. The closest examples are studies indicating that belief in race as a generally biological (versus socially-constructed) concept predicts greater prejudice (No et al., 2008; Williams & Eberhardt, 2008).

It is possible that perceivers' tendency to view racial groups as natural kinds is based in genetic beliefs about all people and that these genetic beliefs constitute a specific form of essentialist beliefs. Reviewed earlier, research on essentialism has indicated that the "inductive potency" (Rothbart & Taylor, 1992) of a social category is associated with the perception that it is biologically-based (Haslam et al., 2000). And, it is possible that in people's minds, DNA may be precisely what causes a racial group to have discrete boundaries and high inductive potential (i.e., perceive race as a more categorical rather than continuous dimension). Although shared genetic material is by no means the sole basis that people use to classify populations (e.g., culture, occupation, age), there is good reason to believe that people consider genetics to be a particularly compelling basis for group differences. In particular, people appear to ascribe greater immutability and less control over traits attributed to genetic causes than to situational or behavioral causes (Monterosso, Royzman, & Schwartz, 2005; Schnittker, 2008). For example, Dar-

Nimrod and Heine (2006) found that women who were provided with a genetic explanation for sex differences in math achievement exhibited stronger stereotype threat effects than those who were provided with an experience-based explanation. Presumably, the perceived immutability of genetic (vs. experiential) causes contributed to this phenomenon.

Lay Genetic Beliefs and Their Perceived Relation to Traits and Group Differences

Although genetics may seem confined to the realm of scientific discourse, there is reason to believe that lay perceptions of genetics exist, and that people believe their understanding of genetics is fairly strong (despite evidence to the contrary).

Discussion of genetics is relatively common in American society. Creationists notwithstanding, American school children are often taught about the Origin of the Species (1859), Charles Darwin's evolutionary account of species development via natural selection. These lessons may lay the groundwork for their understanding of heritability, the idea that living things pass various traits to their offspring. In fact, American second grade curriculum specifies that students learn that children physically resemble their parents because of shared genes (Addorizio & Palmer, 2011). An example of this requirement can be found in the national standards for science education on "reproduction and heredity." In this section, second graders are expected to learn that

Hereditary information is contained in genes, located in the chromosomes of each cell. Each gene carries a single unit of information. An inherited trait of an individual can be determined by one or by many genes, and a single gene can

influence more than one trait. A human cell contains many thousands of different genes (Addoriso & Palmer, 2011, p. 5).¹

Outside the classroom, genetics come into everyday discourse via the media. The Human Genome Project, cloning, and genetic testing provide fodder for genetics discussion in the media. People are inundated with stories about scientific discoveries like “Scientists find the ‘recovery gene’” (Duffy, 2011) and “Coffee love inherited; Caffeine has genetic links” (Toronto Sun, 2011). In the month prior to writing this section introduction, the word ‘gene’ was mentioned 2,682 times in the news in the LexisNexis News database (retrieved April 14, 2011).

Despite people’s growing familiarity with genetic discussion and education (Singer, Corning, & Lamias, 1998), people are surprisingly misinformed when pressed for their understanding of basic genetics. When asked what it means for something to be ‘genetic,’ responses range from beliefs about specific etiology of features (e.g., “I think that when we’re talking about genes we’re talking about appearance, about features, about size, eye color, body build that kind of thing”) to confusions of personal experience with genetics (e.g. “I suppose you could consider education to be partly genetics”) (Lanie et al., 2004). Furthermore, more than 50% of adults surveyed in a national phone survey

¹ I recognize there are large disparities in educational systems across the country. Having a national educational standard curriculum does not in itself mean that all children actually receive this information in schools. However, despite this variation, the mere suggestion that genetics be part a standard education curriculum is informative. First, it underscores the importance placed on understanding genetics in everyday discourse. Additionally, the fact that this information was not retained by many of students in the present samples at the university level (a group who likely had some of the better access to good education to get to their current level) suggests that this genetics training is getting lost or miscommunicated.

reported not knowing where genes are located, commonly citing places like “the brain,” “the bloodstream,” or genitalia (Lanie et al., 2004).

These genetic misconceptions extend to beliefs about group differences. College students in the present samples estimate an average of 56% overlap in genetic material between any two random people in the world (Plaks et al., 2012). In fact, modern genomic science has indicated that people share all but a minuscule portion of their genetic information with everyone else on the planet (Feldman, Lewontin, & King, 2003). Moreover, when comparing across groups of people, e.g. based on race or religion, researchers have found that the genetic variability that does exist tends to be greater within than between groups (e.g., Marks, 2002). Lay genetic overlap estimates are even more surprising when taken in the context of genetic overlap with other species. For example, humans share 96% of their DNA with chimpanzees (Spencer, 2005).

One possible explanation for the discrepancy between education standards and lay understanding of genetics could be a failure to grasp the complexity of the material. Because genetic expression is complicated, children who learn that the environment interacts with gene expression may instead reduce this lesson to the simpler idea that ‘traits are genetically based.’ Additionally, teachers often use Mendel and his pea experiments to model genetic expression. But, Mendel’s experiments in particular can serve to reinforce the misconception that there is always a one-to-one correspondence of having a gene and trait expression (aka the OGOD idea – one gene one disorder) (Conrad, 1999). Indeed, such misinterpretations can lead to blame and finger-pointing toward specific family members as ‘the ones’ who ‘gave’ a disorder to other family members (Parrott et al., 2005).

People also use genetic explanations to account for behavioral traits (Dar-nimrod & Heine, 2010). For example, one study found that people believe genetics account for 41% of a person's mental abilities (Parrott, Silk, & Condit, 2003). Fifty percent of White adults in a national survey believed genes accounted for some of the racial differences in "the drive to succeed," "math ability," "the tendency to act violently," and "intelligence" (Jayaratne et al., 2006; 2009). Indeed, the idea that genetics underlie group behavioral differences is still argued by a few scholars today (Rushton & Jensen, 2005). But, even though some research supports the idea that genetics can play a role in behavior (e.g., sensation seeking, political ideology; Bouchard, 2004), it is likely laypeople overestimate the magnitude of this role (Conrad, 1997).

Genetic Beliefs About Differences Among People

Given people's relatively weak understanding of genetics (Lanie et al., 2004; Singer et al., 1998), it seems that people may possess widely differing beliefs about what the genomic record actually says about human differences. A "low genetic overlap" perspective holds that although people with different ancestral origins may share enough DNA to qualify as members of the same species, they also possess significant genetic differences. These differences are presumably expressed across a broad range of physical traits (e.g., skin and hair color) and psychological traits (e.g., intelligence, aggression). Others, however, may hold the "high genetic overlap" perspective that all humans possess highly similar genetic profiles. According to a strong version of this perspective, similarity among any two people in the world is already so close to 100% that any added effect of group membership is negligible. Thus, those who adopt this perspective would

consider traditional race categories to be less useful when it comes to classifying and understanding specific individuals.

The following sections argue that people believe that genetic differences among individuals and groups offer compelling explanations for physical and behavioral differences associated with social groups. I propose that beliefs about genetic overlap among individuals may in fact relate to differences in ARC strength. Individuals who believe that groups and individuals are generally genetically distinct will have stronger ARC than those with high genetic overlap beliefs, who may perceive race as a more continuous dimension.

Genetic Beliefs and ARC

The purpose of the present studies was to examine whether such beliefs predict differences in the encoding of race-related information. Because race-phenotypic features vary continuously between groups (Marks, 2002), many individuals appear racially ambiguous. Just as the mind efficiently disambiguates stimuli that are perceptually ambiguous (e.g., a Necker cube), perceivers often categorize ambiguous-race targets into discrete categories with little effort or awareness (e.g., Halberstadt, Sherman, & Sherman, 2010; Peery & Bodenhausen, 2008). The accumulated data also suggest, however, that there are individual differences associated with this tendency (e.g., Eberhardt et al., 2003; Malahy et al., 2010).

Why might different a priori assumptions about genetic overlap predict differences in the racial categorization of faces? It is possible that believing that people in the world are genetically quite different from one other might lead one to selectively perceive more differences between individuals. Indeed, one's expectations and beliefs

can shape perception through confirmation bias – this is the tendency for people to selectively attend to information that confirms their prior beliefs and expectations (Greenwald, 1980; Kuhn, 1970; Mischel, Ebbesen, & Zeiss, 1973; Snyder & Uranowitz, 1978). For example, one study (not focused on genetics) found that participants were likely to recall information that confirmed their prior beliefs about a person’s sexual orientation (Snyder & Uranowitz, 1978). Participants were told about the life of a woman, Betty K.. Some participants were later told that Betty K. was a lesbian. When asked to recount facts they had learned about Betty K’s life, those who were told she was a lesbian recalled more stereotypically gay information about Betty K’s life than participants who were not told her sexuality. In a conceptually similar study, Eberhardt and her colleagues (2003) showed that believing that an ambiguous-race face was Black led to remembering that person as having more stereotypically Black features than when the same face was labeled as White.

The present investigation builds on this long tradition of research indicating that assumptions and expectancies help perceivers to disambiguate ambiguous stimuli (e.g., Bruner & Minturn, 1955; Palmer, 1975) and shape perception and memory (Greenwald, 1980; Kuhn, 1970; Mischel et al., 1973; Snyder & Uranowitz, 1978). The present research suggests that the assumption that races are genetically distinct may create an expectancy of clear between-category boundaries. This, in turn, should establish a comparatively firm perceptual threshold where one category ends and the other category begins. The “either/or” nature of this threshold should encourage the assimilation of racially ambiguous targets into one category or the other.

In contrast, perceivers with a high overlap belief consider racial categories to be comparatively fuzzy and indistinct. It is likely that knowing that there is 99% overlap between two categories makes the categories seem less inductively rich (i.e., the category labels become relatively non-diagnostic). Thus, high overlap participants should be less inclined to ‘shoehorn’ ambiguous faces into a specific racial category.

It is important to note that although I detailed theoretical arguments suggesting that differences in genetic beliefs lead to differences in ARC, it is quite possible that causal direction occurs in reverse. In other words, perceiving physical differences between groups could also likely lead to believing in underlying genetic differences between groups. The present research does not take a strong stance suggesting one causal order over the next. It is likely that both pathways occur and are mutually reinforcing. The hypothesis at hand is in regards to the relation between genetic beliefs and ARC rather than about causal direction.

Study 1 tested whether beliefs about genetic overlap would predict degree of continuous vs. discrete racial categorization (i.e., weak versus strong ARC). In study 2 I examine whether ARC is in fact associated with increased racial bias. I predicted that high overlap genetic beliefs would predict stronger ARC than low overlap beliefs (studies 1-2) and that stronger ARC would be associated with more evidence of racial bias (study 2).

Study 1: Relation Between Genetic Beliefs and ARC Strength

The first study examines whether genetic folk beliefs predicted differences in ARC strength. I hypothesized that those individuals who believe that the differences among groups of people are reflected at the level of the DNA would have a stronger ARC

than those who believed that people are highly genetically similar. This study consisted of a pre-questionnaire and four follow-up ARCAT sessions. The additional sessions increased the reliability of the data.

Procedure. Fifty-three participants (35 Female; $M_{age} = 19.55$ years; 41.5% Asian, 47.2% White, 9.4% multiracial, 1.9% other) were recruited via flyers posted around the University of Washington campus for a paid study on “Face Perception.”

Participants first completed an online questionnaire. This questionnaire used a two-item measure of genetics beliefs (i.e., “If you chose any two people in the whole world, what percentage of genetic material would they have in common? (0—100%)”, “If you chose any two people from different races, what percentage of genetic material would they have in common? (0—100%)”, $\alpha = .97$, Plaks et al., 2012). Participants also completed the Need for Cognition Scale ($\alpha = .89$; Cacioppo & Petty, 1982), the Need for Closure scale ($\alpha = .86$; Webster & Kruglanski, 1994), a 1-item political orientation item (1= very liberal to 7=very conservative) and measures of pro-minority ($\alpha = .82$), and anti-minority attitudes ($\alpha = .87$; Katz & Hass, 1988). (see Appendix A for these items). These measures were included to investigate whether beliefs about genetic variation would predict differences in implicit racial categorization independently of these variables known to predict processes related to stereotyping and prejudice. All measures were completed on the computer. Participants were then scheduled for four in-lab sessions in which they completed a Black-to-White morphed-race 7-face ARCAT. Each participant was randomly assigned to one face continuum that was used in the ARCAT across all four sessions. Participants were paid five dollars for completing each session.

Results. Participants had a mean genetic overlap beliefs of 53.86% ($SD = 38.05$, $Min = 1.50$, $Max = 100$). See Table 3.1 for all means and correlations of variables.

	M (SD)	(2)	(3)	(4)	(5)	(6)
(1) Political Ideology	2.79 (1.26)	-.29*	-0.13	-.29*	0.24 [#]	-0.02
(2) NFCog	17.36 (15.78)		-0.06	0.00	-.28*	0.13
(3) NFC	14.87 (24.00)			-0.06	0.18	-0.22
(4) Pro-Minority	.41 (.87)				-0.21	0.02
(5) Anti-Minority	-.64 (1.01)					0.11
(6) Genetic Beliefs	53.86 (38.05)					

Table 3.1. Study 1 correlations between individual difference variables ($N = 53$)

[#] $p < .10$, * $p < .05$, ** $p < .01$.

A 6 (face pair) x 4 (session) repeated-measures ANOVA was first conducted to examine if there was an interaction effect. There was not a significant quadratic contrast interaction between face pair and session, $F(1, 15) = 4.02$, $p = .06$, so the following analyses collapsed across session.

To assess whether confusions rates across the racial percentage continuum varied as a function of belief in genetic overlap, the analytic procedure followed the method suggested by Van Breukelen and Van Dijk (2007) for assessing within-subjects effects with a continuous independent variable. Participants' confusion rates were submitted to a repeated-measures ANCOVA with the six face-pairs as the within-subjects variable and genetic overlap belief (continuous, centered) entered as a covariate. The benefit of this analysis is that it allows a continuous variable to be used as a predictor in a repeated-measure analysis without artificially splitting the continuous variable into two groups.

Need for closure, need for cognition, political ideology and participant sex were entered as additional covariates.

Replicating previous findings, there was a significant main effect of face pair, quadratic contrast, $F(1, 47) = 6.01, p = .02, M_{quadratic\ coefficient} = .04, SD_{quadratic\ coefficient} = .02$. This result indicated an overall tendency to perceive the morphed-race continuum faces as falling into two groups (e.g., White and Black). There was a trend toward an interaction between face pair and genetic belief on the quadratic contrast, $F(1, 47) = 2.86, p = .097$ (see Figure 3.1).² A median split on the genetics beliefs scores was used to examine this relationship further, splitting participants into low overlap ($n = 28$) and high overlap ($n = 25$) groups. These groups were entered into a 6 (face pair) x 2 (genetic overlap) ANOVA. Examining the data this way shows that the quadratic coefficients (i.e., ARC strength) for the groups were in the predicted direction. Low genetic overlap believers showed stronger ARC levels ($M_{quadratic\ coefficient} = .04, SD_{quadratic\ coefficient} = .03$) than those who endorsed high genetic overlap beliefs showed weaker ARC levels ($M_{quadratic\ coefficient} = .03, SD_{quadratic\ coefficient} = .02$).

² There was a marginally significant main effect of Need for Closure, $F(1, 47) = 3.86, p = .06$. There was also a significant linear ($F(1, 47) = 4.41, p = .04$) and cubic ($F(1, 47) = 4.21, p = .05$) contrast for the interaction between face pair and Need for Closure.

Study 1: Interaction between ARC and Genetics Beliefs

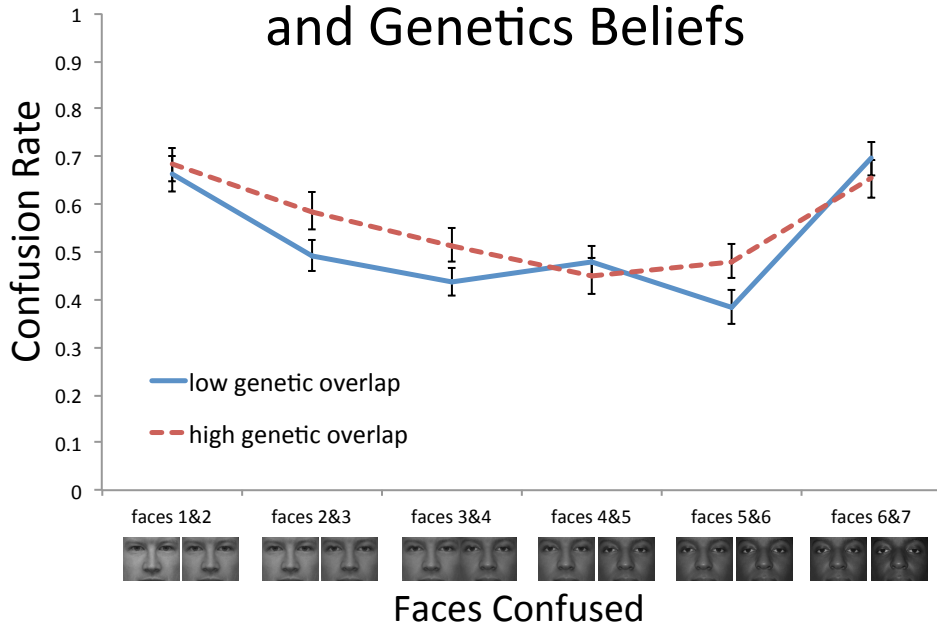


Figure 3.1. Those participants in study 1 who endorsed high genetic overlap beliefs show a non-significant trend toward weaker ARC than those who endorsed low genetic overlap beliefs. Results are averaged across four sessions and graphed using median split of genetics beliefs into low overlap ($n = 28$) and high overlap ($n = 25$) groups.

Discussion. This pattern provided initial evidence that beliefs about the percentage of shared genetic material predict ARC. The more pronounced V-shaped pattern of confusions exhibited by those with the low genetic overlap beliefs may be taken to reflect a more dichotomous representation of the categories Black and White. That these results were not explained by a relationship between the genetic beliefs item and the other predictors of stereotyping suggests that such beliefs represent an independent influence on race categorization.

Study 2: Relation between ARC Strength, Genetic Beliefs and Evaluative Biases

Thus far, I have suggested that stronger ARC may be associated with greater intergroup biases. Data from my research group has shown that genetics beliefs predict ARC (study 1 from this section; path a on Figure 3.2) and that manipulating genetics beliefs can actually cause differences in implicit race biases (Plaks et al., 2012 ; see path b on Figure 3.2). However, there is not yet direct evidence examining the relation between ARC and implicit race biases. Study 2 was designed to address this question.

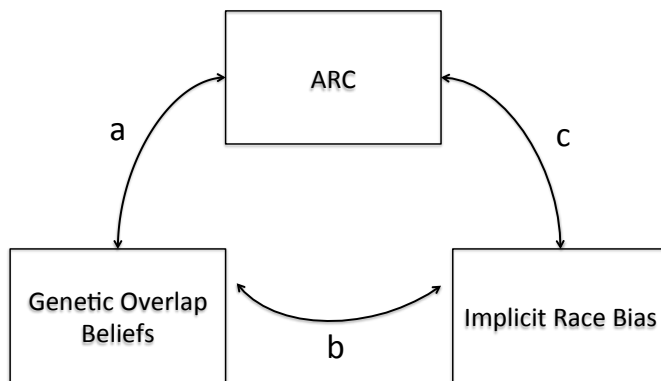


Figure 3.2. Predicted model for relation between genetics beliefs, implicit race bias, and ARC

Additionally, study 2 goes beyond other studies by examining whether target gender moderates ARC strength. Recent research suggests that there are gender differences in racial stereotyping (Eagly & Kite, 1987; Ho et al., 2011; Navarrete, McDonald, Molina, & Sidanius, 2010; Navarrete et al., 2009; Purdie-Vaughns & Eibach, 2008; Wilkins, Chan, & Kaiser, 2011). Specifically, some researchers suggest that evolutionary pressures created the outgroup bias response only (or at least most strongly) for out-group race

male targets (i.e., the subordinate male hypothesis; Sidanius & Veniegas, 2000). They reason that evolutionary pressures make outgroup men the greatest physical and sexual competition. In one study, Navarrete and his colleagues (2009) conditioned their Black and White participants to have a fear response to ingroup and outgroup race male and female faces. In line with the subordinate male hypothesis, they found that while fear responses to ingroup race men and women and outgroup race women extinguished over time, fear responses to outgroup race men did not extinguish. Similarly, Asian males are the target of racial bias more so than their female counter parts. One study found that Whites' racial stereotyping predicted reduced attractiveness ratings for Asian male targets but not Asian female targets (Wilkins et al., 2011). In light of the evidence that racial bias may be distributed more toward males than females, study 2 examines whether there is weaker ARC and race bias with female targets rather than male targets in the current study.

Participants. One hundred twenty-two students at the University of Washington (78F; *M age* = 19.53, *SD* = 1.52; 57% Asian, 30.6% White, 8.3% multiracial, 4.3% other) completed the study in exchange for course credit.

Method. Participants completed an online questionnaire assessing demographic information and the two genetic overlap items from the previous studies ($\alpha = .93$).

During the lab session, participants completed the ARCAT and evaluative priming task in randomized order. Each participant was randomly assigned one of 4 face sets. Two of the four face sets were male White-to-Black morphs and the other two face sets were female White-to-Black morphs. The assigned face set was used throughout both of the participant's tasks: the ARCAT and the evaluative priming task.

ARCAT. The two female and two male White-to-Black morphed-race continua were created using FaceGen Modeller (see Chapter 1, Figure 1.3). Participants completed a Black-to-White morphed 7-face ARCAT as described in previous studies using the morphed faces generated from FaceGen.

Evaluative priming task. Participants also completed an evaluative priming task adapted from Fazio and colleagues (1995) as a measure of implicit race bias. In this task, participants are briefly shown a face or a neutral prime (e.g., “AAAA”, “CCCC”) before being asked to categorize a word (e.g., lazy, intelligent) as either positive or negative. Traditionally, this task has been used with monoracial White and Black faces, with the typical result indicating that seeing a Black face makes it easier to subsequently categorize a negative word (and inhibits positive word categorization). The current task used morphed White-to-Black faces from a 7-face continuum as face primes. Using a spectrum of morphed-race stimuli allows examination of how each face along the continuum is associated with relative positivity or negativity. See Appendix A for all word stimuli used in the task.

Results. Participants had a mean genetic overlap beliefs of 53.65% ($SD = 37.76$).

ARC. As in study 1, a 6 (face pair) x 2 (target gender) ANOVA with genetic beliefs entered as a continuous centered predictor variable was conducted following the procedure established by Van Breukelen and Van Dijk (2007). There was no effect of target gender nor were there any interactions with target gender, all F 's < 1.73 , p 's $> .19$. Replicating past studies, there was a main effect of face pair such that participants showed a strong quadratic trend indicative of strong ARC, quadratic contrast: $F(1, 120) = 150.63$, $p < .001$, $M_{quadratic\ coefficient} = .03$, $SD_{quadratic\ coefficient} = .03$. This effect was modified

by the predicted significant interaction of face pair by genetics beliefs, quadratic contrast: $F(1, 120) = 5.21, p = .02$. To further examine this interaction, a median split on genetic beliefs was conducted to examine high and low genetic overlap believers separately. While both groups perceived race categorically, those that thought that the genetic overlap between people in the world is low had a more categorical implicit race perception ($F(1, 61) = 96.91, p = 3.24 \times 10^{-14}, M_{quadratic\ coefficient} = .04, SD_{quadratic\ coefficient} = .04$) than those who believed people share most of their genetics ($F(1, 59) = 59.12, p = 1.84 \times 10^{-10}, M_{quadratic\ coefficient} = .03, SD_{quadratic\ coefficient} = .02$) (see Figure 3.3).

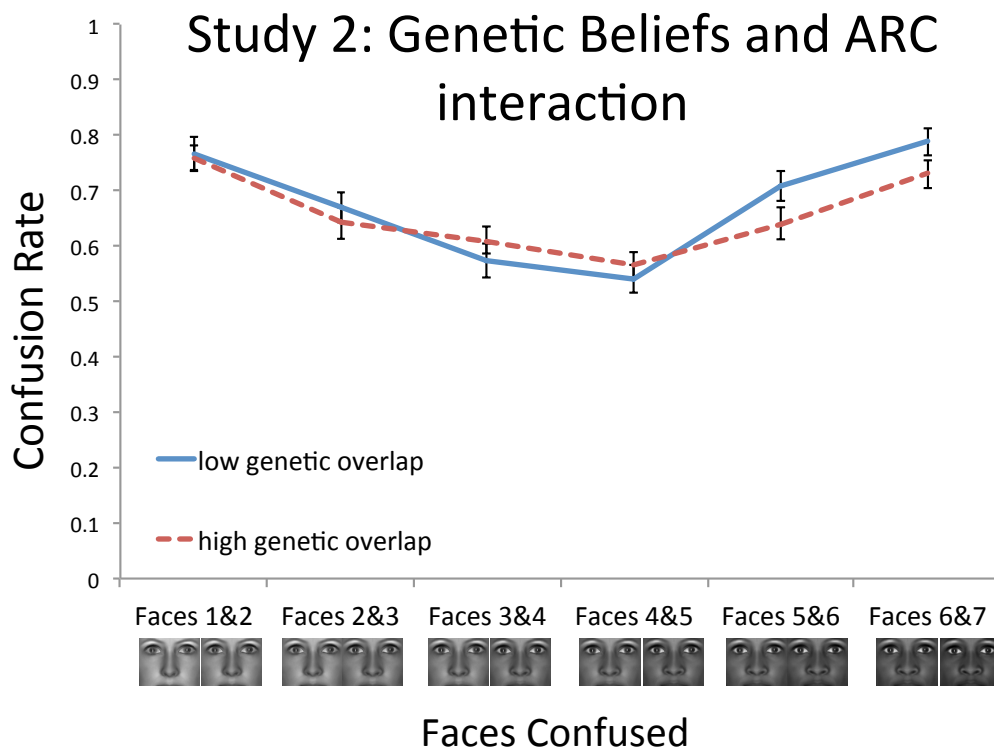


Figure 3.3. Participants who endorsed low genetic overlap beliefs displayed stronger ARC patterns than those who endorsed high genetic overlap beliefs

Implicit race bias. Due to computer error, sixteen participants were unable to complete the evaluative priming task. Thus, the following analyses were conducted with the remaining 106 participants.

Separate facilitation scores were created for positive and negative word categorization using the following procedure: 1) all reaction times (RTs) were log transformed, 2) reaction times (RTs) following a neutral letter string were used as baseline categorization times for each word, 3) RTs were calculated for each word following a given face prime (e.g., RT for categorizing ‘intelligent’ when it followed Face 5), 3) for each face prime, facilitation scores were created for each word by subtracting its baseline RT from its RT following the face prime, 4) average positive and negative word facilitation scores were generated for each face prime by averaging the facilitation scores for all its positive words and negative words, respectively.

Is ARC strength predictive of implicit bias? To calculate peoples’ ARC strength, a quadratic curve was fitted to each participant’s ARCAT data. Each participant’s coefficient from the quadratic equation was used as a score indicating his or her ARC strength. Twelve participants (10% of subjects) had negative quadratic coefficients indicating that they differentiated Blackest faces from one another and Whitest faces from one another, but confused ambiguous race faces. This pattern of confusion represents a psychologically different perceptual framework for the present investigation. The present dissertation’s conceptual framework rests upon the idea that most people confuse faces within races but not between races. Thus, for analyses using ARCAT quadratic coefficients as a predictor participants with negative quadratic coefficients were

excluded. Participants' quadratic coefficients ranged from a minimum of 0 and a maximum of .09 ($M = .03$, $SD = .02$).

This analysis examined whether ARC strength predicts implicit race bias by conducting a 7 (face prime) x 2 (target gender) ANCOVA with centered and continuous ARC strength entered as covariate for positive word facilitation scores. This analysis was completed for positive facilitation scores only since participants' biases were primarily reflected in positive word categorization speeds (see section following this).

Examining positive word facilitation scores, there was a main effect of face prime such that positive words took longer to categorize following Blacker faces than following Whiter faces, linear contrast: $F(1, 95) = 5.59$, $p = .02$. There was a marginally significant interaction effect of target gender and face prime such there was greater implicit bias when the target was female rather male, linear contrast: $F(1, 95) = 3.04$, $p = .08$.

Importantly, there was also a trend toward an interaction effect between ARC strength and face prime, linear contrast: $F(1, 95) = 9.02$, $p = .09$. This trend was further explored by looking at those with strong versus weak ARC levels (via median split) separately in a 7 (face prime) x 2 (target gender) ANOVA on positive word facilitation scores. Those with weak ARC showed no effect of face prime, linear contrast: $F(1, 46) = .001$, $p = .98$. All other main and interaction effects were also non-significant, $F(1, 46) < 2.03$, $p > .16$.

In contrast, those with strong ARC showed a main effect of face prime such that it was harder to categorize positive words following Blacker faces than following Whiter faces, linear contrast: $F(1, 48) = .9.76$, $p = .003$. No other main or interaction effects were significant, $F(1, 48)$'s < 2.45 , p 's $> .12$.

Do genetic beliefs predict implicit race bias? Previous research showed that genetic beliefs cause differences in implicit race bias (Plaks et al., 2012). The following section examines whether this relation between genetic beliefs and implicit race bias replicates in the present sample.

Positive words. Positive facilitation scores were examined in a 7 (face prime) x 2 (target gender) analysis of variance with genetics beliefs entered as a centered continuous predictor variable. There was a main effect of face prime such that the Blacker the face, the harder it was to categorize positive words, linear contrast: $F(1, 103) = 9.30, p = .003$. There was a non-significant trend toward an interaction between face prime and target gender, linear contrast: $F(1, 103) = 2.46, p = .12$ (see Appendix B for figure and additional examination).

Using the centered continuous genetic beliefs, the predicted face prime by genetics beliefs interaction effect was non-significant, linear contrast: $F(1, 103) = 1.84, p = .18$. But because the hypothesized interaction was central to the present investigation, a median split was implemented on genetics beliefs to create high versus low genetic overlap belief groups. Low genetic overlap participants showed greater difficulty categorizing positive words following Blacker faces than following Whiter faces, linear contrast: $F(1, 53) = 9.75, p = .003$. Whereas high genetic overlap participants showed no such effect, linear contrast: $F(1, 49) = 1.29, p = .26$. See Figure 3.4.

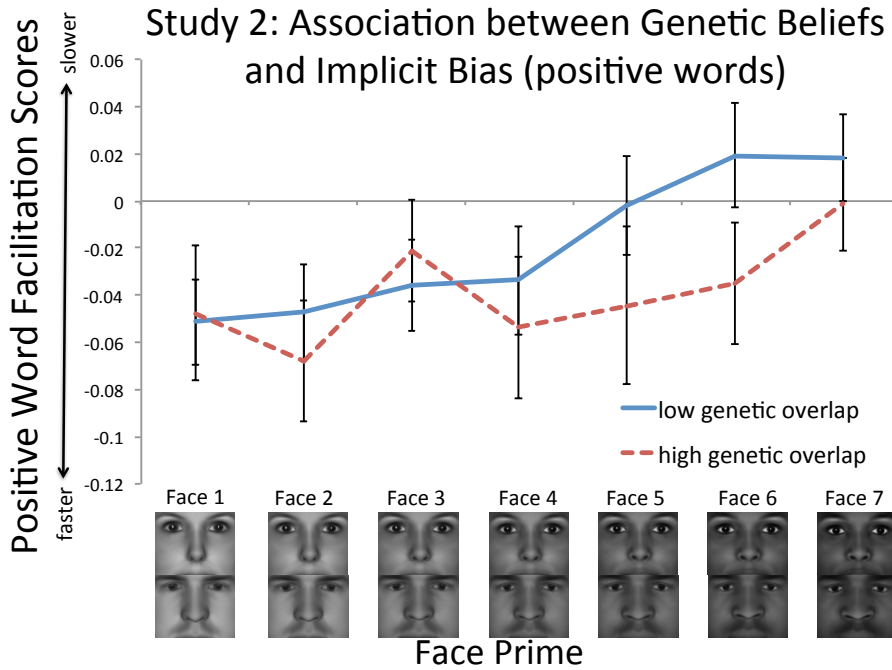


Figure 3.4. Those who endorsed low genetic overlap showed implicit race bias while those endorsing high genetic overlap did not display such biases.

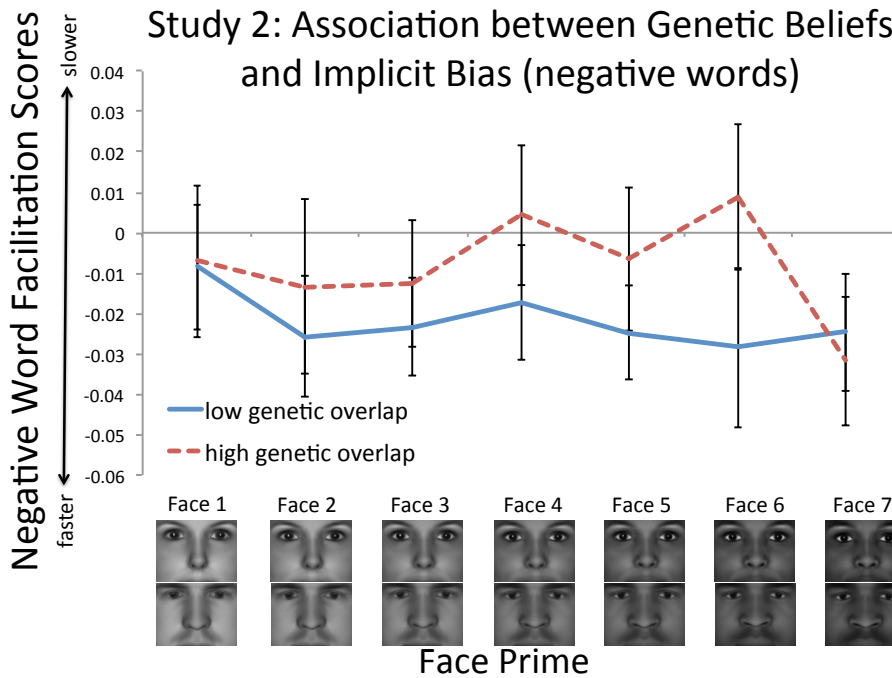


Figure 3.5. There were no differences in implicit race bias between those with low and high genetic overlap for negative word classification

Negative Words. The analysis on negative word facilitation scores revealed no significant effects, $F(1, 101) < 1.54, p's > .22$ (see Figure 3.5).

Does ARC also account for some of variance in relationship between genetic beliefs and implicit race bias? To answer this question, a 7 (face prime) x 2 (target gender) x 2 (high vs low genetic beliefs) x 2 (strong versus weak ARC) ANOVA on positive facilitation scores was conducted. There was a main effect of faces such that people are slower to categorize positive words following Blacker faces, linear contrast: $F(1, 90) = 5.82, p = .018$. There was a trend toward an interaction effect between face and target gender such that individuals showed more implicit bias when the target was female than when the target was male, linear contrast: $F(1, 90) = 3.03, p = .085$. In this new analysis, where both ARC and genetic beliefs are entered as predictors, the relationship between genetic beliefs and implicit bias was non-significant when controlling for ARC, linear contrast: $F(1, 90) = 1.07, p = .305$; but the relationship between ARC and implicit bias remained highly significant when controlling for genetic beliefs, linear contrast: $F(1,90) = 4.62, p = .034$. This effect occurred in the predicted direction such that those with stronger ARC showed implicit race bias (linear contrast: $F(1, 47) = 8.93, p = .004$) while those with weak ARC showed no evidence of bias (linear contrast: $F(1, 45) = .02, p = .90$), see Figure 3.6.³

³ The results were similar when these analyses were conducted with both ARC and genetic beliefs entered as continuous centered predictors. The main effect of face prime remained significant showing that people overall were slower to associate Blacker faces than Whiter faces with positive words, linear contrast: $F(1, 94) = 5.43, p = .02$. There was a significant interaction between face prime and target gender, linear contrast: $F(1, 94) = 3.84, p = .05$. Such that individuals showed more implicit bias when the target was

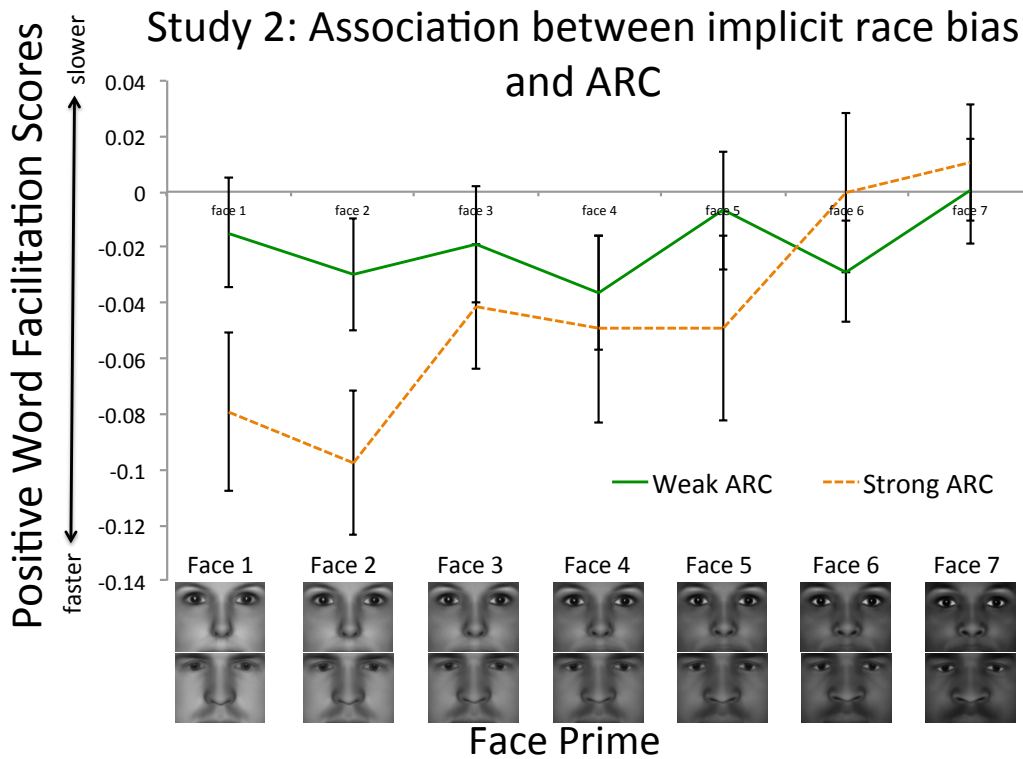


Figure 3.6. ARC strength predicts implicit race bias. ARC is graphed using a median split. Those with strong ARC exhibit implicit race bias while those with weak ARC show no implicit bias.

Study 2 and general discussion. Across two studies, beliefs about genetic overlap predicted individuals' level of ARC. Believing that there are large genetic differences among people in the world was related to stronger ARC levels. Study 2 examined how genetic overlap beliefs are related to both ARC and implicit race bias.

female than when the target was male. The interaction effect between face prime and genetic beliefs was non-significant, linear contrast: $F(1, 94) = 1.15, p = .29$. However, the interaction effect between face prime and ARC was trending in the predicted direction, linear contrast: $F(1, 94) = 2.31, p = .13$.

Lower estimates of genetic overlap between people were associated with stronger implicit race biases. These studies add to the previous work (Plaks et al., 2012) showing that specific beliefs about underlying genetics are a particularly compelling form of essentialism and may lay the groundwork for group stereotyping and prejudice.

Importantly for the present examination of ARC, study 2 showed that stronger ARC was related to greater implicit biases. Although the present data did not replicate Fazio and colleagues' (1995) race bias for negative word categorization, the present research is in line with other studies showing that intergroup bias can occur via withheld positivity, rather than directed negativity (Allport, 1954; Brewer, 1979; Fiske, 1998).

This finding is in line with Social Identity Theory (Billig & Tajfel, 1973; Tajfel, 1978; Tajfel & Turner, 1986) which suggests that categorization leads to increased intergroup bias. The present work addresses measurement concerns regarding the relationship between categorization and bias (Park & Judd, 2005). The current data supports and strengthens the argument that categorization relates to an increase in intergroup bias by using a measure of automatic categorization strength – the ARCAT.⁴ This research further adds to this literature by demonstrating that it is important to consider a more nuanced approach to categorization, i.e., it is not just a question of whether one categorizes or not. The present investigation conceives of ARC as varying in strength. While researchers typically conceive of categorization as an 'on' or 'off'

⁴ I would not go so far as to insist that categorization is necessary for bias. Recent work (Freeman et al., 2009) shows that bias can occur in parallel with categorization. Nor do I believe categorization must always lead to bias. In fact, Gilbert & Hixon (1991) showed that under cognitive load, people can racially categorize others without activating group stereotypes. The present data suggests only that sometimes greater categorization is related to increased bias.

process, it is unlikely that categorization will ever truly be ‘off’ given that people are highly prone to categorize stimuli (Allport, 1954; Fiske & Taylor, 1984; James, 1890; see also chapter 1, study 2). In other words, by focusing on categorization as a binary process, researchers may be missing much of the individual variation in categorization strength that occurs when categorization is ‘on.’ Indeed, the present research demonstrates that these individual differences in ARC strength are important. A person can have stronger or weaker ARC and this level of ARC is related to more or less implicit race bias, respectively.

Additionally, these studies underscore peoples’ lack of genetic knowledge and understanding. Mean estimates of between-person genetic overlap hovered around 50% even among highly-educated individuals (i.e., college students). It is unclear from these studies whether beliefs about underlying genetic differences among individuals lead to perceived differences in race categorization, or whether other cognitions about group differences or perceived physical group differences alter genetic beliefs. It is likely that multiple processes occur and feed off of one another. Still, as previous work manipulating genetic overlap beliefs suggests (Plaks et al., 2012), altering these beliefs may be a promising avenue for disrupting intergroup biases. But it may be that individual differences in ARC are learned at an early age and resistant to change thereafter. Future work could examine whether strong manipulations of genetic overlap beliefs can alter ARC.

There were no differences in ARC based on target gender (i.e., both female and male race continua were perceived categorically) in this data set. While previous work (Navarrette et al., 2010; Navarrette et al., 2009) showed race-based target gender effects,

the focus was on bias rather than categorical perception. The current research suggests that the target-gender race bias effect may thus occur after initial categorization. This theory is a possibility given that race categorization and race bias can occur in parallel (Freeman et al., 2009).

On the other hand, study 2 showed an effect of target gender on implicit race bias. Surprisingly, in the present work, race bias was stronger toward female targets than toward male targets in our sample. This finding is in contrast with past work examining the outgroup male hypothesis (Navarette et al., 2009; 2010) which typically finds racial bias is directed toward male rather than female targets. It is possible that something particular to our stimuli induced the race bias toward female but not male faces. The present study used FaceGen to generate two male and two female morphed target sets. Future studies should examine the target gender effect with more stimulus sets and morphed race sets using real face end points.

Chapter 4: Saliency of Multiracial Concept

(Author's Note: Portions of this chapter was published in the Analyses of Social Issues and Public Policy special issue on "The Social Psychology of the 2008 U.S. Presidential Election.")

The previous chapter outlined how essentialist beliefs may be integral for understanding how people automatically categorize race. The present chapter explores another way in which these essentialist beliefs may be undermined, leading to ARC differences. I examine whether greater accessibility of the concept of multiracialism can predict underlying differences in how people mentally represent and visually perceive the boundaries between racial categories.

Multiracialism Undermines Essentialist Beliefs

If a category is perceived as having an essential nature, it is seen as mutually exclusive, informative, and naturally occurring in the world, outside the imposition of human culture (Hirschfeld, 1996; Medin & Ortony, 1989; Rothbart & Taylor, 1992). Acknowledging the mere existence of multiracialism undermines this essential nature by accepting that these category boundaries are permeable and that multiple categories are simultaneously applicable.

The literature supports this theory by showing that exposure to multiracialism reduces essentialist belief endorsement in adults. Pauker, Weisbuch, and Ambady (in prep) exposed White participants to one of two visual environments: either a screen with mostly prototypically White faces or a screen composed of mostly biracial faces. Controlling for preexisting essentialist beliefs, those who were exposed to the biracial

environment showed decreased endorsement of race essentialism (e.g., “racial groups are categories with clear and sharp boundaries: People either belong to one group or another” and “racial groups and the characteristics that define them have remained the same throughout human history”) relative to those exposed to the White environment.

Similarly, children growing up in an environment with a high multiracial population (i.e., Hawaii) compared to those growing up in an environment with a low multiracial population tend to exhibit less essentialist reasoning about race (Pauker, Ambady, & Xu, in prep).

Given the evidence that multiracial salience affects how people think about and perceive race, one might hypothesize that actually being multiracial may be an important ARC predictor. Multiracial individuals may be especially conscious that race does not necessarily fit neatly into one categorical ‘checkbox.’ For example, multiracial individuals often report being asked “What are you?” (i.e., what race category do they fit into) due to their ambiguous-race appearance (Jackson, 2010). For multiracial individuals, these experiences may be a consistent reminder that race is not categorical. Thus, mixed-race heritage may chronically increase multiracial salience and change how one conceives of race.

In fact, there is some evidence that those with multiracial heritage view race less discretely than those from monoracial backgrounds. Pauker and Ambady (2009) examined both multiracial and monoracial participants’ memory for Asian/White multiracial faces. Of the multiracial faces presented, half the faces were labeled as White while the other half was labeled as Asian. Monoracial Asian and White participants displayed the typical cross-race recognition deficit; they recalled multiracial faces that

were labeled as being part of the ingroup better than outgroup-labeled multiracial faces. In contrast, multiracial participants remembered multiracial faces the same amount regardless of racial label. This study provided some initial evidence that multiracial individuals process race differently than monoracial individuals. However, it is unclear whether monoracial participants' cross-race memory deficits would have occurred in the absence of outgroup-race category labeling, which can alter perception of a face to be more prototypic of that race (Eberhardt et al., 2003). Furthermore, while the researchers used faces that were seen as ambiguous-race, they did not take steps to insure that the stimuli used represented the full race continuum. Thus, it is unclear whether multiracial participants, relative to monoracial participants, have better memory for ambiguous-race faces across the entire race continua (i.e., at all levels of racial ambiguity).

There may also be other factors that lead to multiracial individuals experiencing race differently from monoracial individuals. Sociological evidence suggests that multiracial individuals may experience more racial diversity in their everyday lives than their monoracial peers (Bennett, 2011). For example, multiracial individuals are more likely than their monoracial minority peers to live in neighborhoods with a greater proportion of Whites (Bennett, 2011). Moreover, multiracial individuals' neighborhoods are more racially diverse than those of monoracial Whites. Some research suggests that increased neighborhood racial diversity is associated with less race stereotyping (Charles, 2000). In Charles' study, participants were more likely to say they wanted greater racial diversity in their ideal neighborhood when participants more strongly rejected negative racial stereotypes (e.g., "preference for welfare dependence," "involvement in drugs and gangs"). Similarly, a meta-analysis of intergroup contact with 713 data samples

suggested that in general, increased intergroup contact tended to be associated with reduced intergroup bias (Pettigrew & Tropp, 2006). These studies speak to how differences in neighborhood diversity are associated with differences in intergroup bias. But they do not speak to how differences in neighborhood diversity are associated with differences in race categorization. But given the finding from the last chapter that intergroup bias is positively associated with ARC strength, one might extrapolate from these studies that being around greater racial diversity may be associated with weaker ARC for multiracial individuals.

The Present Research

The studies in this chapter examine whether multiracial salience or multiracial heritage is related to ARC strength. I hypothesize that greater multiracial salience will predict weaker ARC. Similarly, I predict that multiracial individuals will display weaker ARC than their monoracial counterparts.

Study 1: Multiracial Heritage And ARC

Study 1 examines whether having a mixed-race background predicts weakened ARC strength. I hypothesize that those with multiracial heritage (for whom the concept of multiracialism is likely salient) will have weaker ARC than those with monoracial heritage.

Participant samples. Studies run through the University of Washington Psychology Subject Pool typically only have a small portion of multiracial participants per study. Thus, the present analysis took advantage of data from multiple samples to examine a larger group of multiracial participants. The present data set includes five-hundred and seven participants ($M_{age} = 19.29$, $SD_{age} = 1.61$; 306 F; 47.9% Asian, 37.1%

White, 10.8% Multiracial, 2.4% Latino, 1% Black, .8% Other) 55 of which were multiracial and 452 were monoracial participants. These participants were recruited to a variety of studies that included an ARCAT with 7-face set that varied continuously from one prototypical race to another prototypical race.

Analysis. One drawback to the current study is that in order to attain a sizeable number of multiracial participants for analysis, data was pooled from multiple samples. The procedures and timeline for data collection varied widely across studies. This variation possibly increased the noise in the data, potentially creating enough variability to obscure the hypothesized ARC differences. This noise may have been especially challenging for the present study if the ARC differences between multiracial and monoracial individuals are small.

To potentially address this, an unabbreviated meta-analysis was conducted to examine whether the relationship between multiracial heritage and ARC varied across samples. This analysis mirrors the set-up of the unabbreviated meta-analysis in chapter 1, study 1. The difference is that the present analysis includes participant's monoracial or multiracial heritage and an individual difference variable at level 2. The list of studies, sample sizes, and type of sample included in the unabbreviated meta-analysis can be found in Table 1.1 (chapter 1). For samples with data across multiple sessions, each participant's confusion rate for a given face pair was averaged across sessions for a minimum of three sessions. The model was constructed using three levels: repeated measures within individual participants (level 1), individual difference factors (i.e., multiracial or monoracial heritage; level 2), and sample (level 3). I outline the full model below.

Because the confusion rate data from the ARCAT is based on the proportion of times a participant incorrectly confuses two faces out of all times those faces were presented in succession, a binomial sampling model was used. This model uses the logit function to take into account the odds of obtaining a given number of confusions based on the number of trials presented. The first model is specified as follows:

Within-participant equation

Level-1 Model

$$\eta = \log[P/(1-P)] = P_0 + P_1*(FACEPAIR) + P_2*(FACEPAIR^2) \quad (1)$$

where *FACEPAIR* is a centered variable indicating a given face pair along the continuum. The values on this variable were -2.5, -1.5, -.5, .5, 1.5, and 2.5 representing the 6 face pairs ranging from the “whitest” to “blackest”. *FACEPAIR²* is the square of centered *FACEPAIR*, thus its values were 6.25, 2.25, .25, .25, 2.25, and 6.25, corresponding to the 6 face pairs. This centering was done to reduce collinearity between these terms. η is the log of the odds of confusion, which is a function of *FACEPAIR* and *FACEPAIR²*. *P₁* and *P₂* represent the strength (i.e., the coefficient) of the linear and quadratic trends, respectively, in the confusion data across face pairs. *P₀* is the average confusion rate for an individual.

Participant level equation

Level-2 Model

$$P_0 = B_0 + B_1*(HERITAGE) + R_0 \quad (2)$$

$$P1 = B10 + B11*(HERITAGE) + R1 \quad (3)$$

$$P2 = B20 + B21*(HERITAGE) + R2 \quad (4)$$

The second level represents individual-level variables that could influence the slope of *FACEPAIR* (i.e., *P1*) or *FACEPAIR2* (i.e., *P2*) or the individual's average confusion rate *P0*. HERITAGE is the variable indicating whether the participant has monoracial (coded as 0) or multiracial (coded as 1) heritage.

Study level equation

Level-3 Model

$$B00 = G000 + U00 \quad (5)$$

$$B01 = G010 + U01 \quad (6)$$

$$B10 = G100 + U10 \quad (7)$$

$$B11 = G110 + U11 \quad (8)$$

$$B20 = G200 + U20 \quad (9)$$

$$B21 = G210 + U21 \quad (10)$$

The third level models the sample-level variation. Given the variety of recruitment, experimenters, stimuli, etc. that varied between samples, it is possible that some samples might have stronger or weaker ARC. Thus in the full model, within-individual measures are nested within individuals who are nested within samples. In both level-2 and level-3 equations, I allowed error terms to vary to examine whether there were significant

individual difference and sample difference patterns, respectively (see chapter 1, Figure 1.8 for a graphical overview of the nested structure of the data).

Results. Table 4.1 presents the estimated fixed effects of the model. As expected, these analyses show significant coefficients for FACEPAIR2, indicating that on average participants tended to view racial continua in terms of two discrete categories. In contrast with predictions, there was no significant fixed effect of HERITAGE on FACEPAIR2, indicating that multiracial versus monoracial heritage did not moderate ARC strength (see B21, G210 in Table 4.1).

	Fixed Effects Coefficient (SE)
Intercept	
Intercept: P0, B00, G000	.21 (.12), $F(7) = 3.13, p = .12$
Heritage: B01, G010	-.16 (.07), $F(7) = 4.39, p = .07$
Linear trend	
Intercept: P1, B10, G100	-.11 (.02), $F(7) = 19.70, p = .003$
Heritage: B11, G110	.01 (.04), $F(7) = 0.08, p = .78$
Quadratic trend	
Intercept: P2, B20, G200	.18 (.02), $F(7) = 133.40, p < .001$
Heritage: B21, G210	.04 (.03), $F(7) = 1.82, p = .22$

Table 4.1. Fixed Effects (central tendency) for the unabbreviated meta-analysis examining multiracial versus monoracial participants ARC strength.

As in the analyses from chapter 1 study 1, there were significant individual differences in ARC indicated by significant random effects for FACEPAIR2 at level 2 (see Table 4.2). Also in line with results from chapter 1, there were significant random effects for FACEPAIR2 at level-3 (see Table 4.2), suggesting significant variation ARC strength by sample.

There was a non-significant trend for sample variation to influence the relationship between multiracial heritage and ARC strength, as indicated by random variation in U21 at level-3 (see Table 4.2). There were too few multiracial participants per sample to present meaningful estimated fixed effects and random effects the level-2 variables of the model separated by study.

Random Effects SD of coefficients	
Level 1 and Level 2	
Intercept, R0	.57 ($\chi^2 = 1565.62, df=727, p < .001$)
Linear trend, R1	.18 ($\chi^2 = 1188.11, df=727, p < .001$)
Quadratic trend, R2	.12 ($\chi^2 = 1165.19, df=727, p < .001$)
Level 3	
Intercept, U00	.32 ($\chi^2 = 124.67, df=7, p < .001$)
Intercept, U01	.14 ($\chi^2 = 4.31, df=7, p > .50$)
Linear trend, U10	.06 ($\chi^2 = 32.01, df=7, p < .001$)
Linear trend, U11	.08 ($\chi^2 = 7.72, df=7, p = .36$)
Quadratic trend, U20	.04 ($\chi^2 = 30.10, df=7, p < .001$)
Quadratic trend, U21	.07 ($\chi^2 = 12.68, df=7, p = .08$)

Table 4.2. Level-1, level-2, level-3 results examining the random variation across individuals and samples.

Study 1 Discussion. The evidence from study 1 did not support the hypothesis that those from mixed-race heritage display weaker ARC than their monoracial counterparts. Instead, multiracial participants and monoracial participants exhibited similarly strong ARC data patterns. However, analyzing this data in a nested hierarchical linear model somewhat supported the idea that variations from sample-to-sample may have influenced the relationship between ARC strength and multiracial heritage. This sample variation may have occluded ARC differences between monoracial and

multiracial individuals. Thus, future studies could focus on collecting larger samples of multiracial individuals within one study to minimize such variation.

This result is in contrast with previous research by Pauker and Ambady's (2009) finding that multiracial individuals tend to have a more flexible perception of race. But, it is notable that they found multiracial participants' better memory for ambiguous-race faces was due to differences in implicit theories. Biracial participants tended to endorse a more incremental theory (i.e., the idea that people can change themselves and grow, rather than the idea that traits are fixed for a given individual; Levy & Dweck, 1999) of about human traits, and this endorsement accounted for their better memory for ambiguous-race faces. The present samples did not measure participants' implicit theories, and thus one cannot determine whether this accrued sample of multiracial participants happened to endorse incremental theories less than the multiracial participants in Pauker and Ambady (2009).

Unfortunately, the present data sample did not have a measure of multiracial salience. So while it was predicted that having a multiracial background would increase multiracial salience, there was no data to suggest that this was actually the case. Thus, it is possible that one reason the present study failed to find a difference in ARC strength among multiracial and monoracial participants is that for many of our multiracial participants, multiracialism was not more salient than it was for monoracial individuals.

Additionally, it may be important not only to examine whether someone has a multiracial background, but also whether a given multiracial individual identifies as being multiracial. It is possible that only those who identify as multiracial experience increased salience of multiracialism and display weakened ARC. In this regard, a person's specific

racial background may be important in determining whether a given multiracial individual will identify as monoracial or multiracial. For instance, Townsend, Fryberg, Wilkins, and Markus (2012) found that both Black/White and Latino/White biracial individuals were more likely to identify with their monoracial minority heritage (i.e., Black or Latino, respectively) than Asian/White biracial individuals. Other research suggests that biracial individuals may be more likely to identify as a monoracial minority if they phenotypically match the prototypical minority group (Brunsma & Rockquemore, 2001) or if they feel more connected with the minority group (Good, Chavez, & Sanchez, 2010). Future directions for ARC research could examine whether these factors play a role in multiracial individuals' ARC strength.

Study 2: Is Increased Multiracial Salience Related To ARC Strength?

The results of study 1 were non-conclusive regarding whether there is a relation between multiracial salience and ARC. One weakness of study 1 was that multiracial salience was inferred (via multiracial heritage) but not measured. Study 2 addresses one drawback from study 1 by using a direct measure of multiracial salience.

The present research capitalized on the prominence and multiracial heritage of U.S. 2008 presidential election candidate Barack Obama to examine whether individual differences in classifying him as Black or as multiracial corresponded to differences in ARC strength. The 2008 U.S. presidential election brought candidate Barack Obama's mixed-race heritage into the public eye. Extensive media coverage informed the public that Obama was the son of a Black father from Kenya and a White mother from Kansas; pictures of a young Obama with his White grandmother illustrated Obama's mixed-race

heritage. Yet despite this knowledge, some people classify Obama as Black rather than multiracial.

Greater spontaneous use of the term “Black” may reflect an underlying binary representation of race – one that does not include the category “multiracial.” In contrast, greater spontaneous use of terms such as “multiracial” or “biracial” may reflect an underlying representation of race that allows for gradations and multiple-categorization. Thus, I hypothesized that those who classified well-known multiracial individuals as monoracial would have stronger ARC compared to those who classified those celebrities as multiracial.

Method.

Participants. Eighty-nine participants ($M_{age} = 30.51$ years, $SD_{age} = 10.73$; 23 M, 58 F; 53.1% White, 29.6% Asian, 17.2% Other; 8 participants did not provide this information) from the Seattle area were recruited via flyers and online advertisements for a longitudinal study of social relations. Participants were paid \$10 for a preliminary questionnaire session, \$18 for each study session, and a \$50 bonus if they attended the questionnaire session and all five subsequent study sessions. Seventy-seven subjects continued through the five sessions. However, due to subject error, missed sessions, and computer malfunction, the final sample consisted of sixty-six participants (20 M, 46 F; 54.5% White, 28.8% Asian, 6.1% Black, 1.5% Latino, and 9.1% multiracial) with useable data from at least three sessions.

Procedure. All study sessions were conducted in the Psychology Department of the University of Washington. Participants were run in groups of up to eight people. Every participant completed one questionnaire session which assessed demographic

information and classification of multiracial celebrities' race. Participants were randomly assigned to one of nine Black-to-White face morphed sets. Each participant completed the ARCAT using this assigned stimulus set in all sessions, and their data were averaged across the sessions. Results indicated that the findings were consistent across different stimulus sets. Thus the following reports the overall results, collapsing across stimulus sets.

Measures.

Multiracial celebrities' race classification. Participants completed an open-ended question regarding how they racially categorized seven well-known multiracial individuals: Barack Obama, Halle Berry, Mariah Carey, Vin Diesel, Derek Jeter, Alicia Keys, and Lenny Kravitz (i.e., "I would racially categorize Barack Obama as _____"). If a participant uses the term multiracial at least once to describe a multiracial public figure, one could infer that the concept of "multiracial" is available to some extent to this individual. In contrast, never using the term "multiracial" for any of these public figures suggests the concept is not very accessible to that individual. Based on this reasoning, responses were coded as monoracial ($n = 26$) or multiracial ($n = 40$) classifications.

ARCAT. This study used an ARCAT (Sedlins et al., 2012) with a 7-face White-to-Black morphed race continuum ranging from prototypically White to prototypically Black faces. The continua were created from real faces rated as prototypically White and Black and equal in age and attractiveness (Goff et al., 2008). The faces were cropped from the eyebrows to the upper lip.

Results. A 6 (face pair) x 2 (racial classification of celebrities: multiracial versus monoracial) mixed model ANOVA revealed a main effect of face pair $F(5, 320) = 11.16$,

$p = 6.35 \times 10^{-10}$, with a significant quadratic contrast, $F(1, 64) = 46.82$, $p = 3.51 \times 10^{-9}$ ($M_{quadratic\ coefficient} = .02$, $SD_{quadratic\ coefficient} = .03$). This effect indicates that participants were more prone to confuse two non-identical faces as identical when both faces came from the same end of the morphed face continuum (i.e., confusions between the ‘Whiter’ faces such as faces 1 and 2, or between the ‘Blacker’ faces such as faces 6 and 7) compared to their confusion rates between more mixed-race faces (e.g., between faces 3 and 4 or between 4 and 5) (see Figure 4.1 for confusion rates between faces). This confusion rate pattern is in line with findings from chapter 1 showing that ARC has a somewhat categorical nature.

Analyses also revealed that, compared with people who classified mixed-race celebrities as multiracial, people who classified these celebrities as monoracial displayed more confusions for pairs of ‘Blacker’ faces (i.e., faces 6 and 7) and ‘Whiter’ faces (i.e., faces 1 and 2) and fewer confusions for pairs of mixed-race faces. The interaction between classification of celebrities’ race and the quadratic trend for the pairs of faces confused was statistically significant $F(1, 64) = 8.18$, $p = .006$ (see Figure 4.1). Those participants who used monoracial classifications had stronger ARC ($M_{quadratic\ coefficient} = .04$, $SD_{quadratic\ coefficient} = .03$) than those who used multiracial classifications ($M_{quadratic\ coefficient} = .01$, $SD_{quadratic\ coefficient} = .03$). These results suggest that the tendency to use more discrete categories of race (e.g., “Black” vs. “White”) corresponds to a propensity to perceive faces with varying racial features as belonging to one racial category or another, rather than as varying mixtures of racial heritage.

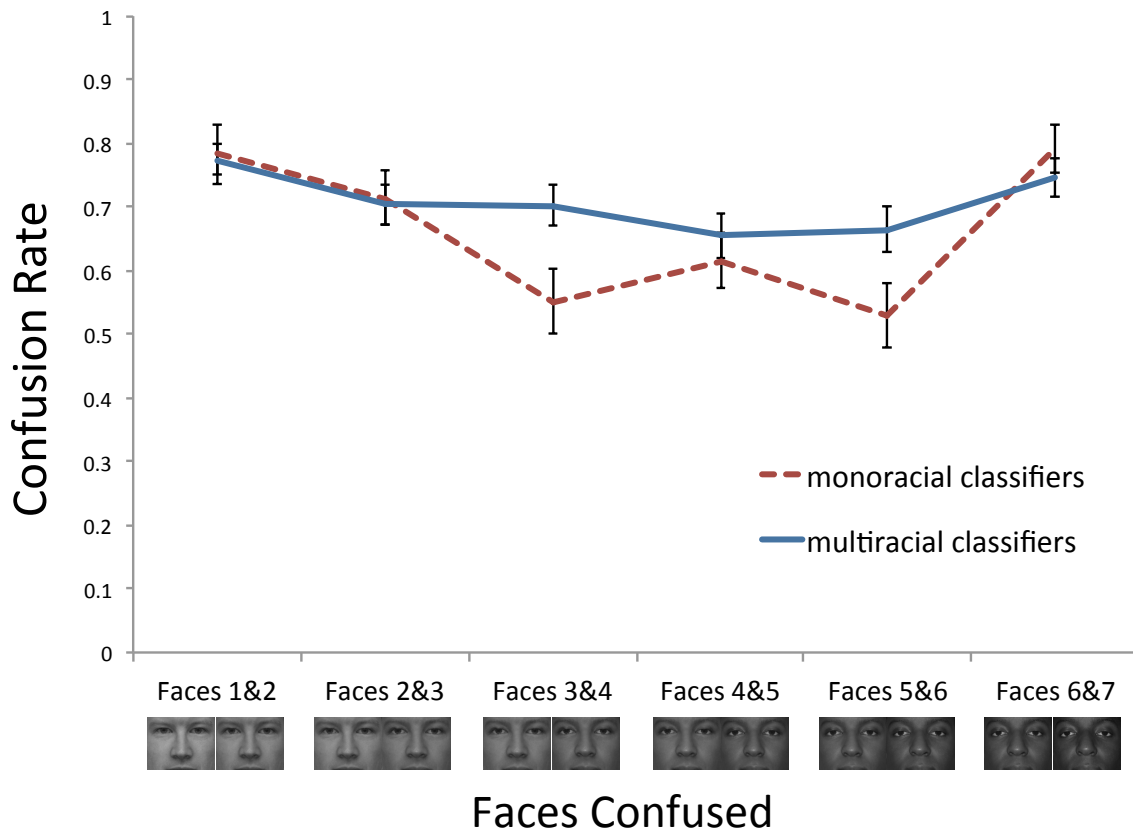


Figure 4.1. Relative to people who classified mixed-race celebrities as multiracial ($n = 40$), people who classified mixed-race celebrities as monoracial ($n = 26$) had a stronger tendency toward confusing faces at the ends of the spectrum than faces in the middle of the spectrum. The bars represent standard error.

Note this analysis included all participants for whom data from at least three data collection sessions were available. I also examined subsets of participants who had data from more than three data collection sessions, making it possible to average across a greater number of data points to obtain a more reliable assessment of ARC. The interaction effect between celebrity classification \times quadratic trend for face pairs confused was significant for those participants with valid data from at least four sessions

($F(1, 55) = 7.99, p = .007, N = 57$; multiracial classifiers $n=34$, monoracial classifiers $n = 23$) and for those with valid data from all five sessions ($F(1, 39) = 8.21, p = .007, N = 41$; multiracial classifiers $n=28$, monoracial classifiers $n = 13$).

Discussion. The current research suggests that peoples' propensity to label a mixed-race figure as monoracial or multiracial corresponds to ARC. People who classified mixed-race celebrities as monoracial showed stronger ARC than people who used multiracial classifications. The present work adds to the growing base of research on multiracial perception (Hugenberg & Bodenhausen, 2004; Hutchings & Haddock, 2008; Maclin & Malpass, 2001; Willadsen-Jensen & Ito, 2006) and extends it by demonstrating an association between use of self-generated explicit race labels and ARC.

The present research indicates that individual differences in the use of multiracial over monoracial labels are associated with weaker ARC. It may be that explicit labels such as 'multiracial' are related to a perception that physical features are no longer useful for categorization. This argument is similar to the possibility that multiple dimensions for categorization leads to less implicit bias via de-categorization (Crisp et al., 2001; Hall & Crisp, 2005). However, the current work examines cross-categorizations within a single domain (i.e., race), presenting a departure from past research which almost exclusively examines multiple categorization across multiple domains (e.g., race and gender) (see Crisp & Hewstone, 2007 for a review).

This research used morphed faces rather than photographs of multiracial people. It is possible that the phenotypic variability of the morphed faces differs from that found naturally among multiracial individuals with differing amounts of mixed-race heritage. Thus generalization from the present findings would benefit from future research using

real multiracial faces. The morphed faces used looked as realistic as un-morphed faces. Specifically, another sample of twenty-two participants was recruited to rate the morphed faces on realism (i.e., “How realistic is this face?”). The morphed faces did not differ significantly with regard to perceived realism ($F(6, 20) = 1.23, p = .30$).

The findings presented in this paper focus on explicit racial classification of multiracial celebrities. But since the data were collected during the US 2008 Presidential Election, is it possible that the present ARC findings are specific to Obama? Data suggest that explicit racial classification of Obama as multiracial is related to explicit classification of the other multiracial figures: Halle Berry, Mariah Carey, Vin Diesel, Derek Jeter, Alicia Keys, and Lenny Kravitz. Of the 23 participants who referred to Obama as multiracial, 20 of them (87%) also referred to at least one of the celebrities as multiracial, even though the racial backgrounds of these figures are not as widely known as is Obama’s heritage. Additionally, if exclude Obama classifications from the presented analyses, the pattern remains the same, but the magnitude of the difference is weaker, $F(1, 64) = 3.61, p = .06$ (multiracial classifiers $n = 37$, monoracial classifiers $n = 29$).

Thus the data provide reasonably strong support for the hypothesis that ARC may be related to the salience of the “multiracial” concept. The effect is stronger when we include explicit race labels participants provided for Obama. The difference, however, is not strong enough to draw conclusions about the unique psychological meaning of referring to Obama as multiracial, as separate from individual differences in the salience of the concept of “multiracial” in general.

Because the present research relied on peoples’ natural tendency to classify Obama’s race, it is difficult to determine the causal relationship between explicit

categorizations and ARC. Future work could examine the directionality of the effect: Does the tendency to see race discretely cause greater use of race labels or does greater use of race labels cause people to see race more discretely? To answer this question, one could manipulate explicit labeling of a multiracial person's race to determine if this could shape implicit race perception. Such an effect would have great implications for how the media racially characterize mixed-race figures.

The present research capitalized on the prominence and multiracial heritage of US 2008 Presidential election candidate, Barack Obama, to examine whether individual differences in classifying him as Black or multiracial corresponded to differences in ARC. In doing so, this work has added to the small but growing multiracial and ambiguous-race literature by demonstrating that individual differences in explicit racial classification correspond to actual differences in perceptual encoding. In an ever-increasing multiracial world, understanding how race is viewed and encoded can provide insight into intergroup interactions and policies regarding how race is categorized the media.

Discussion

What Can We Conclude

New evidence for strong ARC tendencies. The nine studies examined in this dissertation support the idea that people have a strong tendency to automatically group individuals of continuously varying race into separate and distinct race categories. This finding is in line with previous research and scientific thinking suggesting that people perceive social categories quickly and categorically (Allport, 1954; Fiske & Taylor, 1984; Fiske, 1998; Ito & Urland, 2003; Taylor et al., 1978; Zárate & Smith, 1990). Importantly, the data presented suggest that this tendency to categorize according to race is stronger than a more general tendency to categorize continuously varying non-social stimuli (as seen in chapter 1, study 2).

In addition, several of the present studies suggest that strong ARC is not limited to White-to-Black male continua. Strong ARC also occurred with stimuli that varied from White-to-Asian (chapter 1, study 3). Furthermore, strong ARC occurred regardless of the gender of the continuously varying race stimuli (chapter 3, study2). This latter finding indicates that while females may be subject to different or varying strengths of racial stereotypes than males (Eagly & Kite, 1987; Ho et al., 2011; Navarette et al., 2009; 2010; Purdie-Vaughns & Eibach, 2008; Wilkins et al., 2011), there is no evidence to support the idea that females and males are differentially racially categorized. While this may seem surprising given that intergroup bias and group categorization are often discussed as going hand-in-hand (Macrae & Bodenhausen, 2000; Tajfel & Turner, 1986), recent research suggests that categorization and intergroup bias can occur in separate processes. Such work showing that evaluation can happen in parallel with (rather than depend on)

categorization strength (Deffenbacher et al., 2009; Park & Judd, 2005) is consistent with the present finding that strong ARC occurs across stimulus gender (chapter 3, study 2) despite the fact that interracial bias and gender tend to interact (e.g., Navarette et al., 2009; 2010).

Highlights new social categorization measurement tool. The present research used a new tool for investigating automatic race categorization, the ARCAT, which had several advancements over previous tools. First, the ARCAT is better suited to capture the psychological experience of race categorization than other measures of social categorization used in social and cognitive psychology research (Freeman et al., 2010; Levin & Angelone, 2002; Maclin et al., 2009; Peery & Bodenhausen, 2008). Past methods sometimes only sampled from the ends of the race continua (i.e., highly prototypic monoracial faces). Other studies sampled from the middle of the race continua by including one type of ambiguous-race face (typically a face composed of 50% of one race and 50% of another). This practice of using a limited range of the race continua may in fact hinder finding category boundaries if the category boundary does not occur in the objective middle or endpoints of the digitally-constructed race continuum.

Furthermore, methods employed in cognitive psychology that maintain a full spectrum of race stimuli to examine ARC have additional disadvantages. The tasks by Levin and Angelone (2002) and Maclin and colleagues (2009) may have undermined a sense of psychological realism. Their tasks relied on asking people to detect perceptual differences between two similar stimuli along the racial continuum. For example, recall that in Levin and Angelone's (2002) task participants were required to judge which of two simultaneously presented stimuli (spaced 20% apart along the continuum) was the

same as a previously presented stimulus. Such procedures are well suited for examining a participant's ability at perceptual discrimination, but this experience likely does not capture the psychological experience of racially categorizing an ambiguous-race individual in everyday life.

In contrast, the ARCAT can examine how people mentally represent race. Participants must use their mental representation of a previous face (including how that face was racially classified) to compare it to the current face in order to complete the task. Additionally, because the ARCAT relies on participants' memory for the faces presented, it is not obvious to participants that they were seeing a continuum of morphed-race stimuli. Recall that although participants were randomly presented with 1 of 7 faces on each trial, when asked, participants most often report seeing four individuals during the ARCAT (see Chapter 1 introduction). While not definitive, this suggests that participants are perceptually collapsing some of these 7 faces together, perceiving them as one individual. This pattern of recall is consistent with categorical representation. Moreover, participants in debriefing spontaneously referred to 'the person' or 'people' they saw in the ARCAT. Thus, psychologically, ARCAT seems to capture how participants mentally represent and racially categorize individuals.

An additional benefit of the ARCAT is that it captured categorization *strength*, an innovation beyond most social psychological paradigms which tend to approach categorization as a binary process. In other words, these previous methods assumed that people use discrete race categories and thus often presented participants with the task of explicitly sorting stimuli into two distinct race categories (e.g., Black, White; Freeman & Ambady, 2010; Greenwald et al., 1998; Peery & Bodenhausen, 2008). In effect, these

tasks precluded examination of whether some individuals view race more continuously or perceive racial continua as falling into more than two categories. In contrast, the ARCAT can investigate these varying individual differences in ARC by going outside participants' explicit categorizations and observing evidence of categorization through participants' confusion patterns. In fact, the use of the ARCAT in this dissertation enabled the identification of several predictors of individual differences in ARC strength. These methodological developments underscore the importance of not always assuming strong categorization tendencies as some individuals perceive more continuous racial variation.

Identification of ARC strength predictors. This dissertation focused on three hypothesized predictors of ARC strength: political ideology, genetic beliefs, and multiracial salience. Data from two studies supported the notion that liberalism can be associated with weaker ARC than conservatism (chapter 2). This finding is consistent with research that emphasizes conservatives' increased need for closure (Amodio et al., 2007; Chirumbolo et al., 2004; Federico & Deason, 2012; Jost et al., 2003; Sidanius, 1978; Webster & Kruglanski, 1994). Similarly, this association is consistent with research showing liberals' increased need for cognition (Block & Block, 2006; Jost et al., 2003). However, in the present data set, need for closure and need for cognition were not related to ARC strength. Beyond potential measurement error or general variability within the data, it is also quite possible that NFC and NFCog are not the best constructs to examine as mediators between political ideology and ARC. In fact, there are numerous related but distinct constructs (see Cacioppo & Petty, 1982; Jost et al., 2003; Webster & Kruglanski, 1994) that might be fruitful mediators of the relation between political ideology and ARC. It is possible that liberals' increased cognitive complexity (Gruenfeld,

1995; Suedfeld, Tetlock, & Streufert, 1992; Sidanius, 1985; Tetlock, 1983; Wilson et al., 1973) and openness to new experiences (Carney et al., 2008) or conservatives' heightened intolerance for ambiguity (Fibert & Ressler, 1978; Jost et al., 2003; Sidanius, 1978) might mediate this relationship. Future research could closely examine these constructs and their relation with ARC.

As Allport (1954) theorized, “groups that look (or sound) different will seem to *be* different, often more different than they are.” The research presented here support this notion that stronger categorization tendencies are associated with beliefs about differences between groups. For example, high multiracial salience (chapter 4, study 2) and believing in high genetic overlap among individuals (chapter 3, studies 1 and 2), appeared to disrupt essentialist beliefs about race by highlighting the permeability and blurring of boundaries between races. Thus, both variables predicted weaker ARC strength. This evidence is in line with past research showing that essentialist beliefs are related to perceiving groups as discrete and non-overlapping (e.g., Haslam et al., 2000; Hirschfeld, 1996; Medin & Ortony, 1989; Rothbart & Taylor, 1992; Yzerbyt et al., 2001).

Contrary to my hypothesis, multiracial participants, a group that past research suggested might have weaker essentialist beliefs (Pauker & Ambady, 2009), did not show weaker ARC than monoracial participants (chapter 4, study 1). Unfortunately, because this dataset pooled participants from multiple studies, it did not include measurement of multiracial salience and essentialist beliefs among monoracial and multiracial participants as a manipulation check. Thus, it was difficult to discern whether this null effect could be moderated by either of these two variables. Another possibility for this null finding is that the noise in the data due to sampling multiracial participants across a variety of

procedures and time points occluded the effect of interest. The variability in ARC due to these contextual factors may have been greater than the variability due to racial heritage, making it hard to detect differences in ARC associated with multiracial versus monoracial heritage. Future studies could make a greater effort to recruit a sufficiently large sample of multiracial participants in one study to reduce this variability. Finally, it will also be important for future research with multiracial participants to examine whether there are differences in multiracial participants' ARC strength based on their self-identification. It is possible that those that choose to self-identify as multiracial (and thus embrace and highlight multiracialism), rather than as monoracial, would be more likely to show weaker ARC.

The investigation into these predictors of ARC supported the idea that there are stable and predictable individual differences in ARC strength. These data also support a top-down perspective which suggests that perception of one's world may be shaped by one's beliefs and cognitions. While the present correlational data cannot suggest any causality, it does support the idea that holding these beliefs is related to how people see and use social categories. It is the author's hope that future research continues to identify ARC predictors, and that this body of research ultimately lays the groundwork for understanding how to manipulate ARC strength, especially given its potential relationship with implicit race bias.

Weak ARC linked with less implicit race bias. One especially notable finding from the present body of work was that ARC strength was related to strength of implicit race bias. Specifically, those with strong ARC (i.e., perceiving races as highly discrete) showed greater racial bias than weaker race categorizers. This link was suggested in

previous work, but not explicitly tested (Plaks et al., 2012). This finding is consistent with past theory suggesting that group stereotyping and prejudice increases with greater categorization (Macrae & Bodenhausen, 2000; Tajfel & Turner, 1986).

Still, this finding may suggest a new approach to prejudice reduction. Indeed, conceiving of race categorization as an “on or off” process can be limiting and requires interventions that encourage people not to use racial categories or to re-categorize others into a common in-group category (Gaertner & Dovidio, 2000; Gaertner, Mann, Murrell, & Dovidio, 1989). For example, Gaertner and colleagues (1989) used re-categorization to successfully mitigate intergroup bias. They found that having individuals from two different 3-person workgroups re-categorize themselves into a larger 6-person workgroup led to less intergroup bias than when both workgroups retained their separate group identities. But, these re-categorization effects can be short-lived (Brewer & Gaertner, 2001). And, inhibiting categorization can be difficult because categorization is an instinctive way of making sense of a world filled with “blooming, buzzing confusion” (James, 1890). Furthermore, asking people to re-categorize or inhibit categorization tendencies, may in effect deny group members their racial identities. Because denying racial identities can be offensive, stressful, and psychologically detrimental (Cheryan & Monin, 2005; Purdie-Vaughns, Steele, Davies, Dittmann, & Randall Crosby, 2008; Townsend, Markus, & Bergsieker, 2009; Vorauer, Gagnon & Sasaki, 2009), re-categorization or category inhibition may also cause psychological distress.

ARC research offers a solution to this dilemma by finding a way for researchers to reduce bias without asking participants to disregard their group memberships. To this end, ARC research can identify factors that can weaken individuals’ perceptions of

boundaries and bias (chapter 3, study 2; Plaks et al., 2012). Approaching race categorization as a phenomenon that varies in strength, where individuals perceive the category boundary between races as stronger or weaker, allows race categorization to be treated as an continuous individual difference predictor and may lead to research investigations and insights previously out of reach with a dichotomous variable. For instance, a closer examination into the factors that predict weak ARC could provide direction toward identifying processes that could be manipulated to blur (but not eradicate) category boundaries and weaken implicit biases.

Additionally, finding that ARC predicts implicit race bias is important given that implicit race bias has been shown to predict greater cognitive depletion (Gehring, Karpinski, & Hilton, 2003) and discrimination in interracial interactions (Sekaquaptewa, Espinoza, Thompson, Vargas, & von Hippel, 2003), and likelihood of racially biased patient treatment (Green et al., 2007), to name a few. As such, understanding how to weaken ARC may be important in mitigating disparities and negative psychological and health-related outcomes.

Still, it is worth remembering that the present research is correlational. One cannot determine whether intergroup bias is based upon strong categorization tendencies or vice versa. And, as mentioned previously, researchers have recently begun to question and empirically examine the assumption that bias stems from categorization strength (Deffenbacher et al., 2009; Freeman & Ambady, 2009; Livingston & Brewer, 2002; Park & Judd, 2005). And, it is important to recognize that while the present research supported the theory that increased categorization strength is associated with increased race bias, this may not always be the case. For instance, Deffenbacher and colleagues (2009) found

that intergroup biases were not stronger when group categorization strength increased. There are important distinctions between their work and the present research. For example, Deffenbacher and colleagues (2009) used explicit measures of intergroup bias (e.g., group warmth thermometers) while the present research used implicit bias measures. Additionally, Deffenbacher and colleagues (2009) used minimal groups (i.e., dot estimators) or weakly identity-relevant groups (i.e., non-sorority members) while the present research focused on race, an arguably more salient and important category in the US. Future research could identify the necessary factors that link categorization strength and bias.

Future Directions

Manipulating ARC strength. An important next step for this research is to manipulate ARC strength. One could imagine that some contexts may elicit particularly strong ARC. For example, ARC may intensify during times when outgroup races are seen as especially threatening (e.g., after the September 11, 2001 attacks, Americans were particularly attuned to race; Gerstenfeld, 2002). Conversely, there may be contexts that weaken ARC. For instance, greater exposure to high profile multiracial figures (e.g., President Obama) could weaken ARC over time. The present research on ARC predictors suggests several avenues for exploring ARC manipulation. This avenue of research could help pinpoint causal directionality of some of the relationships examined in the present research.

For example, the current research suggests a link between using multiracial language and weak ARC. But could researchers manipulate multiracial language and alter ARC strength? There is evidence to suggest this might be possible. Existing evidence

suggests that racial labels (e.g., Black vs. White) alter perceptions of race of ambiguous-race faces toward the racial label (Eberhardt et al., 2003). Research in color perception suggests that perceived categorical distinctions between colors can be created by introducing new color terminology to differentiate the otherwise continuously varying colorspace (Özgen, 2004; Özgen, Davies, & Widdowson, 2004). In a similar manner, it is possible that use of mixed-race labels may lead to a shift in ARC where the lines between races are blurred, away from ‘Black’ and ‘White’ categories and toward a more continuous conception of race.

Second, ARC may also be shaped through educational policies about genetics. Classrooms could reinforce the idea of continuous variation among world populations – a concept well-known to geneticists (e.g., Brace, 1964; Wilson & Brown, 1953; see also, chapter 3 of this dissertation). Students could be taught about the lack of biological basis for race categories. Emphasizing the genetic similarity of different ethnic groups may help crystallize the notion that race is continuous and a socially constructed concept. Students could learn about diversity not only between cultures, races, and ethnicities, but also within these groups may influence ARC. It is likely that instilling knowledge about the high genetic overlap among members of different races would be a particularly compelling method of weakening ARC. People find DNA to be especially convincing evidence of group (e.g., race) traits (Dar-Nimrod & Heine, 2006; Monterosso et al., 2005; Schnittker, 2008).

If teaching students that races share the majority of their genetics leads to weaker ARC, it may also reduce interracial bias. Such findings would be in line with previous research which found that people primed with articles dispelling the myth that race is

genetically based were more likely to be concerned about racial disparities than those who read an article claiming that race is genetically determined (Williams & Eberhardt, 2008). Indeed, evidence of high genetic overlap between races may act as a particularly persuasive form of superordinate categorization (i.e., a common ingroup: humanity) which has been shown to reduce prejudice (Gaertner et al., 1989; Dovidio, Gaertner, Validzic, & Matoka, 1997). And, because genetics are seen as immutable (Monterosso et al., 2005; Schnittker, 2008), it is possible that such a manipulation would have longer lasting effects than those found in previous common ingroup identity studies (Brewer & Gaertner, 2001). Incidentally, educating students about high genetic overlap among the races may create an overarching commonality among groups without denying peoples' racial identities. Beliefs about the etiology of racial group distinction can be broken down into two independent beliefs: the belief that groups become distinct through socialization and the belief that there is a biological basis for groups (Bettancourt & López, 1993; Rangel & Keller, 2011). It is possible that teaching about high genetic overlap can negate the biological beliefs about group differences, but retain socialization beliefs about groups. And, maintaining these cultural beliefs about race may offer a way to respect individuals' racial identifications and connections.

Understanding ARC developmental trajectory. One way to determine how to manipulate ARC is to examine how and when ARC develops in children. Ultimately, understanding what factors develop in concert with strong ARC may shed light on mechanisms underlying ARC. Such knowledge could provide insight into how to mitigate the development of ARC in childhood and how to reduce ARC (and implicit

racial bias; see chapter 3 and Plaks et al., 2012) in adult populations. Examining the developmental trajectory of ARC might be an exciting next step in this research.

When would ARC develop? Some research suggests that children as young as 3 or 4 years of age have the ability to use categories (Gelman & Markman, 1987). When children 3 to 6 years in age are given ingroup and outgroup categories, they use these categories and display intergroup bias (Dunham, Baron, & Banaji, 2008; Patterson & Bigler, 2006). In line with these findings, some evidence suggests that 3 and 4 year olds treat race as essentialized (i.e., as categories whose membership is determined by some set of necessary or essential features) and informative (Gelman, 2004; Gelman & Markman, 1987; Hirschfeld, 1996).

Recent research in children found that race salience and classification skills were weaker in 3- to 5-year-olds relative to 5- to 6-year-olds (Pauker, Ambady, Apfelbaum, 2010). These researchers also found that race constancy, the idea that one's race is unchangeable, and essentialist reasoning about race did not emerge until ages 5-6 and increased with children's age. This new evidence suggests that the concept of race categories may not stabilize until 5 to 6 years of age. Thus, it is possible that the development of these essentialized racial beliefs is highly related to ARC development.

Implications from this Dissertation Research

Social Policy Implications. According to the 2000 US Census, 6.8 million people identify with more than one racial category. In the 2010 Census, this figure is likely to be higher. In fact, researchers suggest that the actual population of multiracial individuals in the United States may be significantly larger than the census estimate due to differing

definitions of multiraciality (Goldstein & Morning, 2000; Harris & Sim, 2002) and imperfect knowledge of one's mixed-race ancestry (Morning, 2002).

Additionally, 5.5% of American marriages, about six and a quarter million couples, are interracial (Rosenfeld, 2007), and the children of these couples will further increase the multiracial population in the US. As the multiracial population increases, greater numbers of multiracial individuals will enter the nation's consciousness.

Understanding how this population is perceived and reacted to will become an increasingly important issue in the ongoing evaluation of race-related policies such as affirmative action and law enforcement 'profiling.'

Changing how we survey race. One way to expand the "vocabulary" of race categories is through race options on demographic forms. Throughout their lifetime, people encounter demographic forms (e.g., on standardized tests, driver's license exams, the Census, surveys, etc.) where they are asked to classify their race into specific check-boxed categories. Policies regarding how race is surveyed should be informed by empirical findings on race labels' effects on ARC. For example, adding "multiracial" as an option, or allowing people to check multiple boxes as practiced in the 2010 census, may encourage people to view race in a less categorical fashion.

It should be noted that the way race is measured on forms such as the census is a contentious issue (Anderson & Feinberg, 2000; Hirschman, Alba, & Farley, 2000; Lee & Bean, 2004). Historically, definitions of race are tied to resource and political implications as well as personal and cultural significance. Some research suggests that people with multiracial heritage are perceived as less deserving of minority scholarships than their monoracial counterparts (Sanchez & Bonam, 2009). And embracing racial and

ethnic heritage has positive psychological benefits and while denying one's racial identity can be offensive, stressful, and psychologically detrimental (Cheryan & Monin, 2005; Townsend et al., 2009; Purdie-Vaughns et al., 2008; Vorauer et al., 2009).

Implications of ARC strength on criminal justice. Research on ARC may provide additional insight into other psychological phenomena. For example, individual differences in ARC strength may have implications for criminal justice. It is widely accepted among expert witnesses for legal trials that the cross-race effect (Malpass & Kravitz, 1969) is scientifically supported (Kassin, Tubb, Hosch, & Memon, 2001). In other words, White witnesses may be more likely to confuse one Black man for another Black man than they are likely to confuse two White men. Thus, the present findings have implications for assessing the validity of eye-witness testimony, as well as suggesting that the accuracy of such testimonies may be improved if people's automatic race perception becomes more continuous. This research offers a new perspective on this phenomenon by examining how differences in ARC could moderate this robust effect. Could a person's ARC predict the likelihood of confusing targets of not only of the outgroup race but also those of the ingroup race, during an eyewitness testimony scenario in the lab?

There may be legal ramifications because differences in ARC are associated with a decrease in racial bias (i.e., fewer stereotypic race associations). This relation may be especially important in the legal setting, where seeing a defendant categorically as Black, rather than multiracial, may elicit greater stereotyping. Research has shown that perceiving defendants as more stereotypically Black leads to harsher sentencing (Eberhardt, Davies, Purdie-Vaughns, & Johnson, 2006).

In Conclusion

The research presented in this dissertation offers social psychology a new approach to race categorization. The studies in this dissertation demonstrated not only that one can theoretically conceive of race categorization as a phenomenon that can vary from weak (i.e., continuous perception of race) to strong (i.e., discrete perception of race). But this research also highlights how a new tool for investigating automatic social categorization (Sedlins et al., 2012) can be used to measure these individual differences in ARC.

In addition, the results of this research are expected to have important implications for how race is publicly portrayed (e.g. in the media, government, and education). Demonstrating that people perceive race categorically even in response to continuously varying racial features provides a novel demonstration of how race is socially constructed. This, in turn, could lead to ways to reduce racial disparities in power, economic and social resources, and interpersonal biases.

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Appendix A: Questionnaires and task stimuli

Need for Cognition (Cacioppo, Petty, & Kao, 1984)

Instructions: Read each of the following statements and decide how much you agree with each according to your beliefs and experiences. Please respond according to the following scale.

-4	-3	-2	-1	0	1	2	3	4
Very strong disagreement	Strong disagreement	Moderate disagreement	Slight disagreement	Neither agreement nor disagreement	Slight agreement	Moderate agreement	Strong agreement	Very strong agreement

1. I would prefer complex to simple problems.
2. I like to have the responsibility of handling a situation that requires a lot of thinking.
3. Thinking is not my idea of fun. (r)
4. I would rather do something that requires little thought than something that is sure to challenge my thinking abilities. (r)
5. I try to anticipate and avoid situations where there is likely a chance I will have to think in depth about something. (r)
6. I find satisfaction in deliberating hard and for long hours.
7. I only think as hard as I have to. (r)
8. I prefer to think about small, daily projects to long-term ones. (r)
9. I like tasks that require little thought once I've learned them. (r)
10. The idea of relying on thought to make my way to the top appeals to me.
11. I really enjoy a task that involves coming up with new solutions to problems.
12. Learning new ways to think doesn't excite me very much. (r)
13. I prefer my life to be filled with puzzles that I must solve.

14. The notion of thinking abstractly is appealing to me.
15. I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.
16. I feel relief rather than satisfaction after completing a task that required a lot of mental effort. (r)
17. It's enough for me that something gets the job done; I don't care how or why it works.
(r)
18. I usually end up deliberating about issues even when they do not affect me personally.

Need for Closure (Webster & Kruglanski, 1984)

Instructions: Read each of the following statements and decide how much you agree with each according to your beliefs and experiences. Please respond according to the following scale.

1	2	3	4	5	6
Strongly disagree	Moderately disagree	Slightly disagree	Slightly agree	Moderately agree	Strongly Agree

Bold = reverse-score

1. I think that having clear rules and order at work is essential for success.
2. **Even after I've made up my mind about something, I am always eager to consider a different opinion.**
3. I don't like situations that are uncertain.
4. I dislike questions which could be answered in many different ways.
5. **I like to have friends who are unpredictable.**
6. I find that a well ordered life with regular hours suits my temperament.
7. I enjoy the uncertainty of going into a new situation without knowing what might happen.
8. When dining out, I like to go to places where I have been before so that I know what to expect.
9. I feel uncomfortable when I don't understand the reason why an event occurred in my life.
10. I feel irritated when one person disagrees with what everyone else in

- a group believes.
11. I hate to change my plans at the last minute.
- 12. I would describe myself as indecisive.**
13. When I go shopping, I have difficulty deciding exactly what it is I want.
14. When faced with a problem I usually see the one best solution very quickly.
- 15. When I am confused about an important issue, I feel very upset.**
16. I tend to put off making important decisions until the last possible moment.
- 17. I usually make important decisions quickly and confidently.**
- 18. I have never been late for an appointment or work.**
- 19. I think it is fun to change my plans at the last moment.**
- 20. My personal space is usually messy and disorganized.**
21. In most social conflicts, I can easily see which side is right and which is wrong.
- 22. I have never known someone I did not like.**
23. I tend to struggle with most decisions.
- 24. I believe orderliness and organization are among the most important characteristics of a good student.**
25. When considering most conflict situations, I can usually see how both sides could be right.
26. I don't like to be with people who are capable of unexpected actions.
- 27. I prefer to socialize with familiar friends because I know what to expect from them.**
- 28. I think that I would learn best in a class that lacks clearly stated objectives and requirements.**

29. When thinking about a problem, I consider as many different opinions on the issue as possible.
30. I don't like to go into a situation without knowing what I can expect from it.
31. I like to know what people are thinking all the time.
32. I dislike it when a person's statement could mean many different things.
33. It's annoying to listen to someone who cannot seem to make up his or her mind.
- 34. I find that establishing a consistent routine enables me to enjoy life more.**
35. I enjoy having a clear and structured mode of life.
36. I prefer interacting with people whose opinions are very different from my own.
- 37. I like to have a plan for everything and a place for everything.**
- 38. I feel uncomfortable when someone's meaning or intention is unclear to me.**
39. I believe that one should never engage in leisure activities.
40. When trying to solve a problem I often see so many possible options that it's confusing.
41. I always see many possible solutions to problems I face.
- 42. I'd rather know bad news than stay in a state of uncertainty.**
43. I feel that there is no such thing as an honest mistake.
44. I do not usually consult many different options before forming my own view.
45. I dislike unpredictable situations.
46. I have never hurt another person's feelings.
47. I dislike the routine aspects of my work (studies).

Scoring the Need for Closure Scale

1. Reverse-score items 2, 5, 7, 12, 13, 16, 19, 20, 23, 25, 28, 29, 36, 40, 41, and 47.
2. Sum items 18, 22, 39, 43, and 46 to form a lie score.
3. Remove the subject if the lie score is greater than 15.
4. Sum all items except for the above listed lie items to calculate the need for closure score.
5. Use the top and bottom quartiles to determine high and low need for closure subjects.
6. If factors are required, use the following scoring system:

Order: 1, 6, 11, 20, 24, 28, 34, 35, 37, 47

Predictability: 5, 7, 8, 19, 26, 27, 30, 45

Decisiveness: 12, 13, 14, 16, 17, 23, 40

Ambiguity: 3, 9, 15, 21, 31, 32, 33, 38, 42

Closed Mindedness: 2, 4, 10, 25, 29, 36, 41, 44

Political Ideology Measurement

. Please circle the number that best describes you:

- 1 Very liberal
- 2 Moderate liberal
- 3 Slight Liberal leaning
- 4 Slight Conservative leaning
- 5 Moderate conservative
- 6 Very conservative

Pro-Minority & Anti-Minority (adapted from Katz & Hass, 1988)

Pro-Black	Anti-Black
<ol style="list-style-type: none">1. Black people do not have the same employment opportunities that Whites do.2. It's surprising that Black people do as well as they do, considering all the obstacles they face.3. Too many Blacks still lose out on jobs and promotions because of their skin color.4. Most big corporations in America are really interested in treating their Black and White employees equally.^a5. Most Blacks are no longer discriminated against.^a6. Blacks have more to offer than they have been allowed to show.7. The typical urban ghetto public school is not as good as it should be to provide equal opportunities for Blacks.8. This country would be better off if it were more willing to assimilate the good things in Black culture.9. Sometimes Black job seekers should be given special consideration in hiring.10. Many Whites show a real lack of understanding of the problems that Blacks face.	<ol style="list-style-type: none">1. The root cause of most of the social and economic ills of Blacks is the weakness and instability of the Black family.2. Although there are exceptions, Black urban neighborhoods don't seem to have strong community organization or leadership.3. On the whole, Black people don't stress education and training.4. Many Black teenagers don't respect themselves or anyone else.5. Blacks don't seem to use opportunities to own and operate little shops and businesses.6. Very few Black people are just looking for a free ride.^a7. Black children would do better in school if their parents had better attitudes about learning.8. Blacks should take the jobs that are available and then work their way up to better jobs.9. One of the biggest problems for a lot of Blacks is their lack of self-respect.10. Most Blacks have the drive and determination to get ahead.^a

^a items scored in reverse

note: the present research used an adapted version of Katz and Hass (1988) that replaced

'Black(s)' with 'minority(ies).'

Words in Evaluative Priming Task

Positive	Negative
appealing, delightful, attractive, likeable, wonderful, pleasant, enjoyable, decent, intelligent, loyal, reliable, tidy, smart, kind, nice, honest	annoying, disgusting, offensive, repulsive, horrible, aggressive, troublesome, stupid, deceitful, lazy, impolite, careless, disturbed, gloomy

Appendix B: Additional Figures

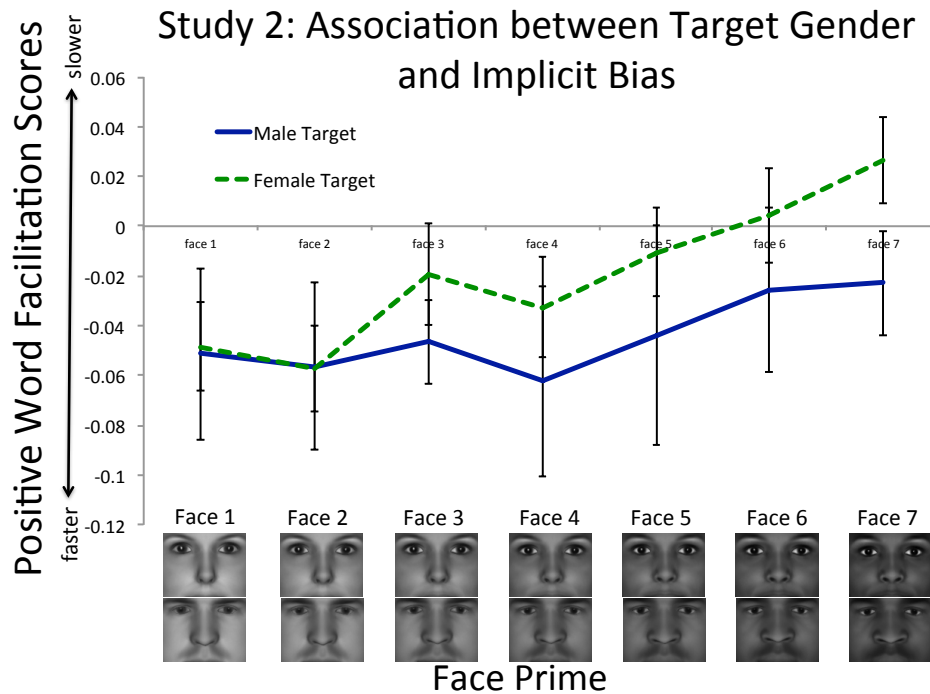


Figure A.1. (From chapter 3, study 2) Implicit race bias occurred with female rather than male targets on the evaluative priming task.

Positive facilitation scores were examined in a 7 (face prime) x 2 (target gender) analysis of variance with genetics beliefs entered as a centered continuous predictor variable.

There was a non-significant trend toward an interaction between face prime and target gender, linear contrast: $F(1, 103) = 2.46, p = .12$. Surprisingly, a closer examination of target gender showed that there was no effect of face prime for male faces, linear contrast: $F(1, 35) = 1.98, p = .17$. On the other hand, female faces showed the typical effect such that it was harder to categorize positive words following Blacker female faces than following Whiter female faces, linear contrast: $F(1, 67) = 11.53, p = .001$ (see Figure A.1).

Curriculum Vitae

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Education

Ph.D., Psychology, University of Washington, Spring 2012

M.S., Psychology, University of Washington, June 2009

B.A., Psychology (Honors), Stanford University, June 2004

Research Interests

social perception, race categorization, social identity, stereotyping, discrimination

Fellowships & Awards

Diversity Travel Award, Society for Personality & Social Psychology, San Diego, CA 2012

Student Travel Award, Society for Personality & Social Psychology, San Diego, CA 2012

National Science Foundation (NSF) *Graduate Research Fellowship* 2008-2011

University of Washington Psychology *Graduate Student Service Award* June 2010

Summer Institute in Social Psychology, Chicago, IL 2009

NSF Small Grant for Exploratory Research (SGER) 2008-2009; written in collaboration with advisors Dr. Yuichi Shoda and Dr. Jason Plaks

Publications

Kaiser, C. R., Hagiwara, N., Malahy, L. W., & Wilkins, C. L., (2009). Group identification moderates attitudes toward ingroup members who confront discrimination. *Journal of Experimental Social Psychology*, 19, 770-777. Note: the last 3 authors contributed equally and are listed in alphabetical order.

Malahy, L. W., Rubinlicht, M., & Kaiser, C. R. (2009). Justifying inequality: A cross temporal investigation of the relationship between income disparities and just world beliefs from 1973-2006. *Social Justice Research*, 22, 369-383.

Malahy, L.W., Sedlins, M., Plaks, J. & Shoda, Y. (2010). Black and White, or shades of gray? How we racially label Obama predicts implicit race perception. *Analyses of Social Issues and Public Policy special issue on "The Social Psychology of the 2008 U.S. Presidential Election,"*10, 207-222.

Kaiser, C.R., Drury, B. Malahy, L.W., & King, K. (2011). Nonverbal Asymmetry in Interracial Interactions: Strongly Identified Blacks Display Friendliness, but Whites Respond Negatively. *Social Psychological and Personality Science*, 2, 554-559. Note: the second and third authors contributed equally and are listed in alphabetical order.

Plaks, J., Malahy, L.W., Sedlins, M., & Shoda, Y. (2012). Folk Beliefs about Human

Genetic Variation Predict Implicit Race Bias. *Social Psychological and Personality Science*, 3, 31-39. doi:10.1177/1948550611408118

Manuscripts in Preparation

Malahy, L.W., Sedlins, M., Plaks, J., & Shoda, Y. (2012). *A new perspective on race categorization*. Manuscript in preparation.

Malahy, L.W., Sedlins, M., & Shoda, Y. (2012). *No longer just Black and White: When thinking about race as a continuous construct reduces implicit race bias*. Manuscript in preparation.

Sedlins, M., Malahy, L.W., & Shoda, Y. (2012). *The Memory Confusion Task: A New Measure of Automatic Social Categorization*. Manuscript in preparation.

Conference Presentations

Malahy, L.W., Sedlins, M., Plaks, J. & Shoda, Y. (2012, May). *Strong versus Weak Automatic Race Categorization and its Relationship to Bias*. Symposia chair and speaker at the 24th Annual Convention for the Association for Psychological Science, Chicago, IL.

Sedlins, M., Malahy, L.W., Plaks, J. & Shoda, Y. (2012, May). The Memory Confusion Task: A New Measure of Automatic Social Categorization. Symposia talk given at the 24th Annual Convention for the Association for Psychological Science, Chicago, IL.

Malahy, L.W., Sedlins, M., & Shoda, Y. (2011, August). *Black and White or Shades of Gray How Levels of Automatic Race Categorization Relate to Implicit Race Bias*. Symposia talk given at the Annual Pacific Conference on Prejudice and Culture, Bellingham, WA.

Sedlins, M., Malahy, L.W., & Shoda, Y. (2011, August). *The Memory Confusion Task: A New Measure of Automatic Social Categorization*. Symposia talk given at the Annual Pacific Conference on Prejudice and Culture, Bellingham, WA.

Malahy, L.W., Plaks, J., Sedlins, M., & Shoda, Y. (2010, July). *Black and White, or Shades of Gray? Ideology and Genetic Folk Beliefs Predict Categorical vs. Continuous Implicit Race Perception*. Symposia talk given at the Annual conference for the International Society of Political Psychology, San Francisco, CA.

Sedlins, M., Malahy, L.W., Plaks, J., & Shoda, Y. (2010, May). *Blurred Boundaries: Validating a New Measure of Implicit Categorization*. Talk given at annual North West Cognition and Memory conference, Bellingham, WA.

Kaiser, C.R., Pratt-Hyatt, J. S., Wilkins, C. W., Rieck, H. M., Malahy, L. W., & Drury, B. J. (2009, February). *Perception and reality: Why do highly identified minorities report experiencing more prejudice than weakly identified minorities?* Talk presented at the 10th Annual Meeting of the Society for Personality and Social Psychology, Tampa, FL.

Malahy, L.W. (2007, May). *Stereotype associations in a multiracial world: How do racial associations generalize to multiracial targets?* Talk presented at 36th Annual

Psychology Research Festival at University of Washington in Seattle, WA.

Conference Posters

Malahy, L.W., Sedlins., M., & Shoda, Y. (2012, January). *Black, White, or Shades of Gray? Automatic Race Categorization and Its Relationship with Implicit Race Bias*. Poster will be presented at the annual conference for the Society of Personality and Social Psychology, San Diego, CA.

Malahy, L.W. & Kaiser, C.R. (2010, January). *Enacting counterstereotypic behavior shapes implicit self-concept*. Poster presentation at the annual conference for the Society of Personality and Social Psychology, Las Vegas, NV.

Baillie, S., Malahy, L.W., & Kaiser, C.R. (2010, May). *Implicit Sexual Orientation Self-Concept: A New Tool for Investigations into Sexual Orientation*. Undergraduate Research Symposium, University of Washington, Seattle, WA

Malahy, L.W., Sedlins, M., Plaks, J. & Shoda, Y. (2009, May). *Black and White, or shades of gray? Individual differences in implicit race perception*. Poster presentation at the 21st annual conference for the American Psychological Association, San Francisco, CA.

Sedlins, M., Malahy, L.W., & Shoda, Y. (2009, May). *A New Method for Assessing Implicit Categorization*. Poster presentation at the 21st annual conference for the American Psychological Association, San Francisco, CA.

Malahy, L.W. & Kaiser, C.R. (2009, February). *Behaving like the out-group: Stereotype disconfirmation affects implicit gender identity*. Poster presentation at the annual conference for the Society of Personality and Social Psychology, Tampa, FL.

Malahy, L.W., Rubinlicht, M.A., & Kaiser, C.R. (2009, February). *Justifying inequality: A cross-temporal investigation of the relationship between income disparities and just world beliefs from 1973-2006*. Poster presentation at the annual Justice pre-conference for the Society of Personality and Social Psychology, Tampa, FL.

Malahy, L.W. & Plaks, J. (2008, February). *Stereotype associations in a multiracial world: How do racial associations generalize to multiracial targets?* Poster presentation at the annual conference for the Society of Personality and Social Psychology, Albuquerque, NM.

Teaching Experience

Teaching Assistant, Fundamentals of Psychological Research (PSYCH 209),
Fall 2011, Spring 2012

Honors Student Mentor for Sarah Baillie, 2008-2010

Guest Lecturer. Social Psychology Lab (PSYCH 361), Spring 2010

Guest Lecturer. Social Psychology (PSYCH 345), Winter 2010

Teaching Assistant, Social Psychology (PSYCH 345), Winter 2010

Teaching Assistant, Summer Transition Program, Summer 2009

Teaching Assistant, Statistical Inference in Psych Research (PSYCH 318),
Spring 2008

Teaching Assistant, Intro to Probability & Statistics for Psych (PSYCH 317),
Winter 2008

Teaching Assistant, Introductory Psychology (PSYCH 101), Winter 2007

Service

Graduate Student Chair, UW Psych Diversity Steering Committee, 2009 – 2010

Graduate Student Representative, UW Graduate Psychology Action Committee 2007-
2010

Graduate Student Representative, Diversity Steering Committee, 2007-current

Psychology Representative, McNair Graduate School Fair 2010

Presenter, Essence of Success High School UW Lab Tours 2008

Organizer, UW Prospective Graduate Student Weekend. 2006-2008

Organizer, EndNote workshop for UW Psychology 2006

Journal Reviews

Ad hoc reviewer, *Analyses of Social Policy*, 2011

Ad hoc reviewer, *Social Justice Research*, 2009

Ad hoc reviewer, *Personality and Social Psychology Bulletin*, 2008
Jointly reviewed with Dr. Cheryl Kaiser

Ad hoc reviewer, *Journal of Experimental Social Psychology*, 2008
Jointly reviewed with Dr. Cheryl Kaiser

Ad hoc reviewer, *British Journal of Social Psychology*, 2007
Jointly reviewed with Dr. Cheryl Kaiser

Professional Affiliations

Society for Personality and Social Psychology (SPSP)

American Psychological Society (APS)