THE ROLE OF PERSONAL CONTROL MOTIVATION IN THE PROCESSING AND CATEGORIZATION OF RACIALLY AND GENDER AMBIGUOUS FACES

by

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ABSTRACT OF THE DISSERTATION

The Role of Personal Control Motivation in the Processing and Categorization of Racially and Gender Ambiguous Faces

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Abstract

The need for personal control, or perceived control over one's life, stems from the broader human need to perceive the world as nonrandom, orderly and structured. When people lack personal control, they can defend their overarching belief in an orderly and structured world by seeking out external sources of control and structure. Social categories are one such source of structure because they hierarchically order individuals into discrete groups that differ in terms of status and power. The overarching goal of this doctoral dissertation research was to examine if the basic motive for personal control underlies the processing and categorization of racially and gender ambiguous faces. In Studies 1A through 1C, I pretested a set of prototypical male and female faces, create and pretest a set of gender ambiguous faces, and pilot test a measure of ambiguous face processing and categorizations. In Study 2, I created and pretested a set of racially ambiguous faces. In Studies 3A and 3B, I established the association between individual differences in need for personal control and heuristic ambiguous face processing in the domains of race and gender. In Study 4, I pretested a manipulation of personal control to

be used in subsequent studies. In Studies 5A and 5B, I tested the main effect of having versus lacking personal control on the processing and categorization of racially (5B) and gender (5A-B) ambiguous faces. Finally, in Study 6, I found that personal control threat may be more likely to exert an effect on ambiguous person perception among people high in prejudice against ambiguous others or entitativity beliefs, though these results must be interpreted cautiously. Collectively, my dissertation research did not reveal a general effect of personal control motivation on ambiguous person perception, but provides preliminary support that this relation emerges among people high or low on certain attributes.

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The Role of Personal Control Motivation in the Processing and Categorization of Racially and Gender Ambiguous Faces

The need for personal control, or perceived control over one's life, stems from the broader human need to perceive the world as nonrandom, orderly and structured (Kay, Whitson, Gaucher, & Galinsky, 2009; Rothbaum, Weisz, & Snyder, 1982; Skinner, 1996). When people lack personal control, they can defend their underlying belief in an orderly and structured world by bolstering personal agency (e.g., believing that one's actions can achieve desired outcomes and goals), seeking out external sources of agency (e.g., believing in a controlling God or government), and perceiving structure (e.g., seeing meaningful patterns in noise; Kay et al., 2009; Landau, Kay, & Whitson, 2015). People regularly and automatically engage in these various types of compensatory control strategies because despite their underlying aversive nature, low personal control situations are encountered frequently in everyday life. Social categories have the potential to provide an epistemic source of structure because they hierarchically order individuals into discrete groups that differ in terms of status and power, and hence bolster the idea of a clearly structured world (Allport, 1954; Grieve & Hogg, 1999).

Social categorizations are important to study because they drive intergroup attitudes and behaviors (Bodenhausen, Todd, & Becker, 2007; Tajfel, Billig, Bundy, & Flament, 1971). Social psychological research has largely focused on the functional role of social categorizations of *un*ambiguous group members (e.g., a prototypical Black person) in part because, historically, pronounced social disparities have occurred between discrete ethnic-racial (e.g., Black vs. White) and gender (male vs. female) groups. Unambiguous social categorizations occur rapidly and automatically, and are a necessary

precursor to stereotyping, prejudice and discrimination (Bodenhausen et al., 2007). Individuals, however, are increasingly likely to encounter others who cannot be easily categorized into a single race or gender. Importantly, situational factors that activate personal motives influence people's social categorizations, particularly when faced with individuals who are difficult to categorize (Bodenhausen & Peery, 2009; Freeman & Johnson, 2016; Pauker, Rule, & Ambady, 2010; Stolier & Freeman, 2016). One such motive is the need for personal control.

The overarching goal of this doctoral dissertation research was to examine if the basic motive for personal control influences the processing and categorization of racially and gender ambiguous faces. This would suggest that people compensate for loss of personal control by readily imposing clear, structured social categories on ambiguous social targets.

Ambiguous Person Perception

Social psychological research has traditionally focused on the functional role of social categorizations of *un*ambiguous group members (e.g., a prototypical Black male) in part because, historically, pronounced social disparities have occurred between discrete ethnic-racial (e.g., Black vs. White) and gender (male vs. female) groups. Unambiguous social categorizations occur rapidly and automatically, and are a necessary precursor to stereotyping, prejudice and discrimination (Bodenhausen et al., 2007). Individuals, however, are increasingly likely to encounter others who cannot be easily categorized into a single race or gender. Indeed, individuals show much more variation in their categorizations of highly racially or gender ambiguous people, such as Black-White biracial people or androgynous people, than of unambiguous people. Researchers

typically create ambiguous faces by morphing the features of two distinct prototypical faces, such as a typical male and female face or a typical White and Black face, thus creating a measure on which participants must make relatively difficult social categorizations.

Ambiguous person perception provides an interesting lens through which to investigate the role of personal control motivation in social categorizations because although people tend to rely on different heuristics (e.g., mental shortcut to categorize biracial Black-White people as Black and androgynous people as male) when judging ambiguous faces, the extent to which they use them varies with contextually activated basic motives. I next provide a brief overview of the current literature on the categorizations of racially and gender ambiguous faces.

Racially Ambiguous Face Categorizations

Extant research has demonstrated a number of contexts and motivations that influence racially ambiguous face categorizations, particularly with respect to Black-White ambiguous faces. The focus on Black-White biracial populations is largely driven by the historical importance placed on maintaining Black-White racial boundaries in America. This can be understood in relation to hypodescent (i.e., the classification of all Black-White biracial people as Black), a historical practice that was presumably motivated by White Americans' desire to maintain their socially advantaged status by excluding individuals with any amount of minority ancestry from their racial group (Halberstadt, Sherman, & Sherman, 2011; Ho, Sidanius, Levin, & Banaji, 2011). This is also consistent with the ingroup overexclusion effect (Leyens & Yzerbyt, 1992). The tendency to exclude ambiguous group members from dominant social groups can also be

understood through basic cognitive processes. Halberstadt, Sherman, and Sherman (2011) argued and empirically demonstrated that people are more likely to learn about features that distinguish frequently occurring (majority) group members before learning about those that distinguish less frequently occurring (minority) group members. Thus, in service of cognitive efficiency, people attend more readily to features that differentiate novel social targets from previously learned majority group members.

Consistent with these cognitive and motivational explanations, research from the biracial perception literature suggests that, on average, people are more likely to automatically categorize racially ambiguous Black-White faces as Black than White (e.g., Ho, Sidanius, Levin, & Banaji, 2011). Importantly, once labeled Black versus White, racially ambiguous faces tend to be remembered closer to the prototypical representation of that category, suggesting that spontaneous categorizations have lasting effects on social cognition (e.g., Eberhardt, Dasgupta, & Banaszynski, 2003). Moreover, individuals who strongly identify with their ethnic-racial group, express implicit prejudice, and endorse beliefs about biological essentialism, political conservatism, and social dominance orientation are particularly likely to categorize mixed Black-White racial faces as Black (Blascovich, Wyer, Swart, & Kibler, 1997; Dunham, Chen, & Banaji, 2013; Hugenberg & Bodenhausen, 2004; Hutchings & Haddock, 2008; Krosch, Bernsten, Amodio, Jost, & Van Bavel, 2013; Knowles & Peng, 2005; Peery & Bodenhausen, 2008).

Stereotypical racial cues further moderate the categorization of racially ambiguous faces. For example, research shows that White perceivers are more likely to categorize racially ambiguous Black-White faces as Black if they display an angry facial

expression, rather than a neutral or happy facial expression (Hugenberg & Bodenhausen, 2004; Hutchings & Haddock, 2008). This is particularly true amongst people who are high in implicit prejudice against African Americans. Additional contextual cues such as economic scarcity (vs. abundance) primes (Rodeheffer, Hill, & Lord, 2012) and low (vs. high) social status cues (Freeman, Penner, Saperstein, Scheutz, & Ambady, 2011) can lead to more Black categorizations of racially ambiguous Black-White faces. Similarly, stereotypical racial hairstyles bias categorizations of ambiguous Black-Hispanic faces in the stereotype-consistent direction (MacLin & Malpass, 2001). To the extent that contextual cues activate racial stereotypes or motivations to exclude ambiguous group members from one's ingroup, they have consistently been found to bias racially ambiguous face categorizations.

Contextual cues to race are further influenced by chronic and situationally activated psychological motivations. Ho, Sidanius, Cuddy and Banaji (2013) demonstrated that White Americans who are high in social dominance orientation (SDO) rate racially ambiguous Black-White faces as significantly more Black on a controlled categorization measure, but only if a threat to the racial hierarchy is situationally salient. Thus, White Americans' anti-egalitarian motivations (high SDO) may lead them to make racial categorizations that conform to hypodescent when they perceive a threat to their group's status in order to affirm racial boundaries.

Gender Ambiguous Face Categorizations

Extant research on the categorization of *gender* ambiguous faces, while sparser than research on the categorization of racially ambiguous faces, has demonstrated that these categorizations are similarly influenced by contextual and motivational factors.

Several studies have demonstrated that when people initially view an image of a prototypical male or female face (or even gender typical body), they tend to experience an aftereffect in which they are more likely to categorize a subsequently presented gender ambiguous face as the opposite gender (i.e., contrast effect; Amihai, Deouell, & Bentin, 2011; Barrett & O'Toole, 2009; Ghuman, McDaniel, & Martin, 2011; Webster, Kaping, Mizokami, & Duhamel, 2004). Interestingly, this effect appears only to occur when the initial stimulus is perceived consciously, but not when it is presented outside of conscious awareness (Amihai et al., 2011). In a unique study, Kovaks et al. (2004) demonstrated that men who smelled a male-typical hormone (i.e., androgen) required less prototypically masculine features to categorize a face as male than those who smelled a female-typical hormone (i.e., estrogen). Consistent with embodied social cognition theory, Slepian, Weisbuch, Rule and Ambady (2011) found that participants who squeezed a hard ball (Study 1) or pressed hard with a pen (Study 2), as opposed to squeezing a soft ball or pressing gently with a pen, respectively, while completing a gender categorization task categorized significantly more 50% male/50% female faces as male (vs. female). Thus, the physical experience of toughness (vs. tenderness) activated the gender stereotype of men as tough and women as tender, and hence biased ambiguous gender categorizations.

Although not a direct test of gender ambiguous face categorizations, Freeman, Ambady, Rule, and Johnson (2008) demonstrated the importance of stereotypical features for even gender unambiguous face categorizations. That is, feminine (masculine) hairstyles or features on males (females) presumably simultaneously activate people's

mental representations of the male and female categories, leading to less direct gender-consistent categorizations in a mouse-tracking paradigm.

Perhaps most interestingly, race has been found to act as one cue to ambiguous gender categorizations. Johnson, Freeman, and Pauker (2012) recently investigated the threshold for categorizing ambiguous faces that co-vary in gender and racial prototypicality. Specifically, their research asked if race biases gender categorizations via shared facial characteristics and shared stereotypes. Relevant to this dissertation research, Black faces tend to be perceived as more masculine and racially prototypical than same gender White faces (Goff, Thomas, & Jackson, 2008) and Blacks and males are both stereotyped as aggressive, dominant, athletic, and competitive (e.g., Bem, 1974; Ho & Jackson, 2001). Thus, Johnson et al. (2012) hypothesized that activating the social category Black would simultaneously activate the category male. As a person appears more prototypically Black, perceivers would be faster to categorize them as male than female. To test their research questions, Johnson et al. (2012) created a set of gender ambiguous faces and gender unambiguous faces varying in race on a continuum from Asian to Black, with White as the "baseline" or scale midpoint. Across five studies, they demonstrated that people were faster to judge gender ambiguous faces as male (and slower to judge ambiguous faces as female) as the targets became more prototypically Black and that people were faster to categorize gender unambiguous Black faces as male than female. Supporting the role of shared stereotypes in race biased gender categorizations, the authors also demonstrated that only people with high (vs. low) associations between "Black" and "male" (vs. "Asian" and "female") on an implicit association test demonstrated the response latency effect described previously. Moreover,

when the authors controlled for phenotype in their analyses, race no longer biased male judgments. Thus, both shared stereotypes and shared facial characteristics between Blacks and men appear to bias categorization processes because of their associative links.

Thus, like research on racially ambiguous face categorizations, research has demonstrated the primary importance of cues that activate representations of gender prototypes in categorizing gender ambiguous faces. In comparison, less work has spoken to the moderating role of psychological motivations in ambiguous gender categorizations. The current research proposes that the need for personal control, which motivates the search for compensatory sources of structure and meaning in one's environment, is a previously unexplored motivation in the domain of motivated ambiguous person perception that might influence the processing and categorization of ambiguous faces.

Personal Control Motivation

While previous research has predominately explored the role of motivations directly related to stereotyping and prejudice on ambiguous face processing and categorizations, this dissertation research proposes a seemingly unrelated motivation that may influence ambiguous face processing and categorizations in meaningful ways: personal control motivation. According to compensatory control theory (CCT; Kay et al., 2009), chronically motivated and/or situationally activated need for personal control creates a negative psychological state that people are motivated to resolve. As a result, people automatically attempt to reaffirm their underlying need for control and structure by identifying compensatory sources of control in their environment. Internal (i.e., self) and external (e.g., powerful others, structured environment) sources of control substitute for one another as a means of maintaining the belief in an orderly and controllable world.

For example, people are more likely to perceive meaningful and structured relationships where none exist after their sense of personal control is diminished (Whitson & Galinsky, 2008). This is also in line with Rothbaum, Weisz, and Snyder's (1982) two-process model of perceived control, which argues that when people's sense of primary control is undermined (i.e., self as not in control), they tend to seek secondary sources of control (i.e., environment as under control). Thus, perceiving an external source of control or structure compensates for the aversive feeling created by lacking personal control (Antonovsky, 1979). This underlying need to perceive a meaningful world is also captured in Lerner and Janoff-Bullman's respective theories about just world beliefs (Janoff-Bullman, 1992; 1989; Lerner, 1980; Lerner & Miller, 1978). This research makes the novel hypothesis that the categorization of ambiguous social objects, namely racially and gender ambiguous faces, serves as a compensatory source of control by imposing meaningful structure on one's immediate social environment.

In everyday life, people encounter circumstances in which they have little or no control. These experiences can range from the mundane (e.g., being stuck in traffic) to the catastrophic (e.g., natural disasters). In order to explore the psychological consequences of lacking personal control in the laboratory, psychologists have induced lack of personal control by asking people to vividly recall and describe an event over which they lacked control (e.g., Friesen, Kay, Eibach, & Galinsky, 2014; Whitson & Galinsky, 2008), provide reasons why the future is uncontrollable (Rutjens, van Harreveld, van der Pligt, Kreemers, & Noordewier, 2013; Rutjens, van der Pligt, & van Harreveld, 2010), visualize or experience an uncontrollable event (Keinan, 1987; Laurin, Kay, & Moscovitch, 2008), attempt to complete an unsolvable puzzle (Dudley, 1999), or

receive non-contingent performance feedback (Whitson & Galinsky, 2008). This body of work has demonstrated that people compensate for perceived lack of personal control by seeking personal (e.g., illusions of personal control) or external (e.g., controlling God) sources of agency, as well as sources of specific (e.g., studying will lead to better academic performance) and nonspecific (e.g., illusory pattern perception) structure. These different reactions to diminished personal control share a common underlying theme—they afford a general sense of control and structure in one's environment, and therefore reduce the dissonance created between one's mental representation of a controllable and meaningful world and one's current experience of lacking personal control.

Compensatory Control Strategies

The effect of lacking personal (also primary or internal) control has consistently been found to lead people to seek out external (also secondary) sources of control or structure. According to compensatory control theory, perceiving that the self can no longer meaningfully influence one's environment motivates people to confirm that the environment itself is controllable and structured. Indeed, personal control loss increases people's need for order and structure (Whitson & Galinksy, 2008). According to Landau, Kay, and Whitson (2015), compensatory control strategies can be divided into two broad categories: (1) bolstering agency (i.e., personal and external) and (2) affirming epistemic structure (i.e., specific and nonspecific).

Bolstering agency. When people perceive a loss of personal control, they are motivated to restore control by engaging in compensatory control strategies (Landau et al., 2015). In the case of agency, people may bolster their sense of personal (i.e.,

perceiving that one can intentionally act on one's behalf) or external (i.e., perceiving that others are able to act on one's behalf) agency. Landau et al. (2015) defined personal agency as "beliefs that one possesses the resources necessary to perform a behavior or set of behaviors required to produce certain outcomes or achieve certain ends" and serves as the primary source of personal control (p. 695). However, when one's personal agency is chronically or situationally low, believing that external agents can positively act on one's behalf can re-establish a sense of control. The below review will focus on external sources of agency given their relevance to the proposed research.

God and government. Lacking personal control motivates people to align themselves with controlling others and institutions that they believe will act in ways that help them to obtain desired outcomes and achieve their goals. In a classic example, Kay, Gaucher, Napier, Callan and Laurin (2008) demonstrated that participants who were asked to recall and write about a positive event over which they had no control expressed stronger beliefs in God than participants who wrote about a positive event over which they had control (Study 1). Importantly, this effect was moderated by whether God was presented as a controller or creator, such that lacking (vs. having) personal control only shifted belief in a *controlling* God. Moreover, this effect occurred even though all participants recalled a positive event, suggesting that lack of personal control effects occur above and beyond differences in positive or negative affect.

Support for benevolently controlling government institutions also compensates for lost personal control. Kay et al. (2008) conducted a cross-national correlational study with 67 countries in which they found that people with a lower sense of personal control (single item individual difference measure) tended to show increased support for

governmental control. This effect of individual differences in personal control was further moderated by perceived government benevolence; that is, lower personal control predicted preference for governmental responsibility in people living in nations classified as having benevolent governments (i.e., likely to serve the needs of its people), but not in people living in nations classified as having corrupt governments (Study 3). In an experimental test of this relation (Study 4), the authors found that among participants who perceived the national system as high (but not low) in benevolence, those who were experimentally induced to lack personal control were more resistant to sociopolitical change (i.e., change to the current external system of control, or status quo).

Worldview defense. Another means by which people may restore their need to perceive an orderly and controllable world is by defending their worldviews, such as by identifying with their ingroup. One's ingroup can be thought of as an external agent that share's one's beliefs and goals, and will therefore benevolently intervene on one's behalf (also group-based control restoration; Fritsche et al., 2008). In an interesting test of this effect, Fritsche, Jonas, and Fankhänel (2008) found that pure death salience (i.e., imagine dying from an incurable infectious disease), but not dental pain salience (i.e., no mortality salience control condition) or self-determined death salience (i.e., ending own life after incurable disease diagnosis), led to increased worldview defense in the form of social consensus estimates and gender ingroup bias (Study 1), national ingroup bias and perceived homogeneity (Study 2), and national ingroup identification (Study 3). Thus, mortality salience only predicted stronger worldview defense when death was framed as uncontrollable, as opposed to controllable, even though both types of death-related primes similarly increased the accessibility of death-related thoughts as measured by a

lexical decision task (Study 4). To directly test whether mortality salience directly affected sense of control, the authors manipulated mortality salience and measured implicit control motivation using a dual-category paper and pencil implicit association test (IAT). The categories on the IAT included *I* versus *others* (*I, my, mine* vs. *others, his, theirs*) and *control* versus *lack of control* (*control, controlling, powerful* vs. *lack of control, helpless, powerless*). Consistent with predictions, associations between self and having control increased after pure-death salience, but not in the other two conditions. In a complete test of the proposed mediation model, Fritsche et al. (2008) manipulated control salience and mortality salience and looked at their effect on party support. Results revealed that the effect of lacking control (regardless of mortality salience) on increased party support was partially mediated by group-based control restoration motivation.

Belief in progress. Rutjens, van Harreveld, and van der Pligt (2010) demonstrated that belief in progress, which indicates the potential for future control, compensates for a lost sense of personal control. That is, participants who had recalled and wrote about a recent event when they lacked control (vs. had control) rated the author of an article critiquing the potential for human progress more negatively (Experiment 1); however, participants who listed three arguments in favor of the future as uncontrollable (vs. controllable) did not rate the author of a critique of the Dutch Rail more negatively (Experiment 2). In an interesting extension of their hypotheses, the authors conducted a field experiment in which some participants were asked to rate their experienced control, progress beliefs and religious beliefs during an airplane flight (low control context) versus while at a university campus. They found that being on an airplane predicted higher belief in progress compared to being on campus, and this relation was entirely

mediated by experienced control. Although the authors did not find an effect of lacking control on religious beliefs, they attributed this lack of effect to their secular sample. In a final experiment, Rutjens et al. (2010) used a combination of Experiment 1 and 2's control manipulation and found that participants who lacked control (vs. had control) had an increased preference for progressive scientific research and environmental and social policies. This finding underscores the important implications of contexts that decrease control on political decision-making.

Affirming epistemic structure. Recently, Landau et al. (2015) clarified another route that people take to compensate for loss of personal control, namely by affirming specific or nonspecific structure. In the case of affirming specific structure, people may seek out clear and meaningful structure directly related to the control-related threat. That is, within a particular domain (e.g., academics), one needs to believe that actions (e.g., studying) will meaningfully produce outcomes (e.g., good grades). Most relevant to the current paper, nonspecific structure affirmations need not occur in the same domain as the control threat, but must simply uphold the notion of a nonrandom and predictable environment. The latter compensatory control strategy will be the primary focus of the subsequent section.

Attributions to powerful enemies, metaphysical beliefs, and superstitious and conspiratorial beliefs. Just as attributing control to a controlling God or government can compensate for loss of personal control, so too can attributing control to personal or political enemies (Sullivan, Landau, & Rothschild, 2010). In support of this, Sullivan, Landau, and Rothschild (2010) demonstrated that among participants chronically low in perceived personal or internal locus of control, those who saw statistics about deaths

caused by external, random causes (e.g., homicides) attributed more influence to an enemy (but not an annoying other) compared to participants who saw statistics about deaths caused by self-inflicted causes (e.g., risky sexual behavior; Study 1). Metaphysical beliefs can also serve as a source of compensatory control. Wang, Whitson and Menon (2012) demonstrated the relation between personal control loss and people's tendency to see patterns in horoscopes, which are based on the notion that all things can be predicted using astrology. Additionally, they found that lacking control led Westerners to perceive meaningful patterns in their own personality, but led East Asians to perceive meaningful patterns as they pertain to social relations. Finally, superstitious and conspiratorial beliefs are consistently found to compensate for loss of personal control. For example, Dudley (1999) demonstrated that experiencing an uncontrollable event (unsolvable puzzle) increased participants' level of superstitious beliefs (measured after manipulation) from pre-test, and experiencing a controllable event (solvable puzzle) decreased level of superstitious beliefs. Whitson and Galinsky (2008) found that participants who lacked (vs. had) personal control perceived a stronger relation between two unrelated events (e.g., knocking on wood prior to a positive outcome) and perceived a greater likelihood of conspiracy. Related, Whitson et al. (2015) demonstrated that recalling uncertain emotions (fear [negative], hope [positive]), as opposed to certain emotions (disgust [negative], contentment [positive]), led to greater endorsement of both conspiracy beliefs and paranormal beliefs.

Order-conferring theories. Endorsing scientific and non-scientific theories can also serve as a compensatory source of control to the extent that those theories re-establish order. Rutjens, van der Pligt, and van Harreveld (2010) asked participants to

either recall an unpleasant situation over which they lacked versus had control and then provide three reasons in favor of the view that the world is uncontrollable versus controllable, respectively. Then, all participants read two of three possible theories about the origin of life that varied in terms of the existence of a supernatural agent (agent vs. no agent) and whether they promote a structured view of the world (order vs. random): Darwin's Theory of Evolution (random, no agent), Intelligent Design (order, agent), or a modified version of Darwin's theory (order, no agent). Results revealed that while lacking (vs. having) personal control increased preference for a controlling God over a non-orderly theory of evolution, the personal control manipulation did not affect preference for a controlling God over an orderly theory of evolution. This finding highlights that the presence of order and structure, above and beyond an external agent, is sufficient to compensate for lack of personal control.

In the context of the current research, social categorizations can also be thought of as conferring order on one's environment because they both simplify and organize one's immediate environment. This is particularly true to the extent that individuals are difficult to categorize and hence undermine the need for order and predictability.

Preference for hierarchies. Hierarchies impose structure on the environment (Study 1) and promote feelings of certainty and self-efficacy (Study 2; Friesen et al., 2014). Friesen, Kay, Eibach and Galinsky (2014) found that participants who recalled and wrote about a time when they lacked (vs. had) control perceived more hierarchy in an ambiguous (i.e., description included elements of equality and hierarchy) social interaction (Study 3). Study 5 similarly found that participants who recalled and wrote about a positive event where they lacked (vs. had) control and participants who were

chronically high (vs. low) in need for structure preferred workplace hierarchy. Additionally, there was a significant interaction between control threat and need for structure, such that while people chronically high in need for structure demonstrated strong preference for workplace hierarchy regardless of condition, people low in need for structure looked like high need for structure participants if their personal control was threatened (but not if it was unthreatened). This is consistent with research demonstrating that personal control threats temporarily increase the need for structure, thereby leading people to recruit compensatory sources of control (Whitson & Galinsky, 2008). These effects did not occur when a hierarchy was presented as unstructured (Study 6). Finally, people who lacked (vs. had) personal control showed stronger preference for hierarchy-enhancing (vs. hierarchy-attenuating) jobs regardless of whether those jobs were high or low in status and power (Study 7). Collectively, this research shows that it is the structure that hierarchy imposes on one's environment that compensates for lost personal control. Given the hierarchical nature of social categories, it is possible that social categorizations could also provide a sense of hierarchically based structure on the environment.

Illusory pattern perception. Another way that people reaffirm the underlying notion of an orderly and controllable world after personal control loss is by perceiving patterns and meaningful relationships in the environment, even where none exist (i.e., illusory pattern perception). Whitson and Galinsky (2008, Study 2) examined the effect of a personal control threat on the perception of real (present) and illusory (absent) images in "snowy" pictures. Results showed that participants who received random, non-contingent performance feedback during a concept-identification task (lack personal control) subsequently reported seeing more illusory images than participants who

received no feedback during the task (baseline). Additionally, participants who wrote about and recalled an event in which they lacked (vs. had) control in a threatening situation perceived more illusory images, but this effect disappeared among lack control participants who had the opportunity to self-affirm. Rutjens et al. (2013) similarly demonstrated that participants who completed a randomness prime scrambled sentence task (personal control threat) perceived more illusory patterns in snowy images than those who completed a negativity prime scrambled sentence task. This research suggests that people compensate for a lost sense of personal control by seeing meaningful relationships and sources of structure in their immediate environment, even in their absence. Indeed, according to Whitson and Galinsky (2008), the different types of pattern perception that compensate for loss of personal control share an underlying process; that is, "the identification of a coherent and meaningful interrelationship among a set of random or unrelated stimuli" (p. 115). One type of meaningful relationship that people may potentially seek out in their environments under personal control threat is social group membership.

Social Categorizations as a Source of Meaningful Structure

Social categorizations may themselves represent a socially constructed source of structure and meaning. In *The Nature of Prejudice*, Allport (1954) described the process of categorization as necessary for "orderly living" (p. 20). Social categorization allows for the grouping of large numbers of individuals according to a set of shared characteristics (stereotypes), thereby reducing an infinitely complex social world into meaningful, predictable units that are hierarchically organized along dimensions such as status and power (see Sidanius & Pratto, 1999). In the case of race, White people have

higher status and more power in American society relative to all other races, and particularly to Black people. In the case of gender, men have higher status and more power relative to women.

Social dominance theory (Sidanius & Pratto, 1999) argues that people naturally classify others into group-based hierarchies such that certain groups consistently exert dominance over others. From an evolutionary perspective, although hierarchies produce and maintain intergroup biases and disparities, they are thought to reduce societal conflict by maintaining a clear distribution of power and resources. In a related vein, system justification theory (Jost & Banaji, 1994) argues that people seek to preserve the status quo, such as extant group-based hierarchies, because they are motivated to perceive the system as fair and legitimate (even when it disadvantages them).

Thus, social categories serve to reduce uncertainties about social relations and power structures in one's environment, and ultimately guide people's social interactions with ambiguous others through activated schemas. People should generally be motivated to disambiguate ambiguous others, who represent an epistemic threat, by placing them into clearly defined and structured social categories to facilitate a general sense of structure and controllability in their environment, and this may be particularly the case when people experience a loss of personal control.

Personal Control Motivation and Ambiguous Person Perception

Based on the above literature review, the various sources of external agency and structure that people rely on under personal control threat speak to the creative and diverse ways in which people respond to loss of personal control. The compensatory control strategy in which people engage is necessarily a function of the compensatory

sources of control that are currently available and salient. For example, in an experimental context in which personal control is threatened, personal control threat provides the motivation and a measure of belief in God provides the opportunity to compensate for loss of control by strengthening religious conviction.

In the current research, I argue that when people have the opportunity to categorize ambiguous faces, and they are motivated to reaffirm personal control, they may use these categorizations as a compensatory control strategy. In line with Landau et al.'s (2015) conception of compensatory control strategies, when people experience a loss of personal control, one way that they regain control is by seeking out nonspecific (i.e., unrelated to the threat) external sources of structure. Social categorizations are one potential external source of structure following personal control threat because they are an essential means of simplifying and structuring one's environment into discrete groups of people who differ in terms of status and power. Thus, people will be motivated to reduce the aversive feeling elicited by loss of personal control by accurately, clearly, and quickly defining ambiguous others.

Following the research on ambiguous person perception and personal control motivation reviewed above, my dissertation research tested three overarching hypotheses. *Hypothesis 1: People who lack personal control will be more likely to rely on mental shortcuts or default category judgments to facilitate rapid categorizations of ambiguous others (i.e., heuristic face processing) than people who have personal control.*

We know that social categorizations provide a heuristic (mental shortcut) for simplifying one's environment. For example, it is more cognitively efficient to group large numbers of people into social categories than to individuate them. In ambiguous

person perception, specific heuristics tend to guide people's automatic judgments of highly racially and gender ambiguous people. Whereas Black-White biracial faces (holding gender constant) tend to be categorized Black as opposed to White, androgynous faces (holding race constant) tend to be categorized male as opposed to female. Thus, the Black and male categorization defaults provide people with a useful framework for judging even highly ambiguous others. People may be particularly likely to rely on these heuristics when they are trying to quickly restore order in their environment because they facilitate rapid categorizations of an otherwise difficult to categorize target. Lacking personal control may therefore increase people's tendency to rely on heuristic face processing and categorization strategies than people who have personal control.

Hypothesis 2: People who lack personal control will also seek to categorize others ranging in ambiguity more accurately (i.e., accuracy) than people who have personal control.

Although lacking personal control generally motivates structure seeking, the personal control literature suggests that people specifically seek out meaningful sources of structure that bolster against the idea of a random and chaotic world. With respect to ambiguous face categorizations, although classifying an ambiguous face according to any social category imposes structure on the environment, a "correct" categorization may be more informative. For example, if a person categorizes an androgynous person as male, but that person self-identifies as female, they may rely on the wrong schemas during social interactions. This has important consequences for interpersonal and intergroup relations, as incorrect categorizations can lead to a violation of social norms and expectations during social interactions. Thus, "correct" social categorizations provide a

more useful meaning framework. Therefore, people who lack personal control should be more accurate in categorizing highly ambiguous faces that are slightly more prototypical of one race or gender than those who have personal control. An interesting offshoot of this hypothesis is that to the extent that people are motivated to accurately categorize ambiguous others, they may actually take more time/exert greater caution in making their judgments (i.e., speed-accuracy tradeoff; see Hypothesis 3). This is consistent with research on the effect of personal control threat on increased conspiratorial beliefs, for example, because "the perception of conspiracies is not a simplifying process but a complex integration of data that is cognitively effortful" (p. 116; Whitson & Galinsky, 2008). Thus, certain compensatory sources of control may require deeper cognitive processing as opposed to increased reliance on heuristic processing.

Hypothesis 3: People who lack personal control will categorize ambiguous others at higher levels of ambiguity (i.e., categorization thresholds) and more quickly (i.e., processing speed) than people who have personal control.

Need for personal control leads people to seek out sources of structure in their immediate environment, and as I have argued, social categorizations offer one such source of structure. Although the tendency to automatically categorize others is a well-established human tendency, people tend to take longer to categorize highly ambiguous others than unambiguous others. That is, people tend to deliberate more over ambiguous face judgments than prototypical face judgments, making these categorizations more malleable to chronic and situational motivations. To the extent that people are motivated to reduce the aversive feeling of lacking personal control by imposing structure on their environment, they may show a heightened sensitivity to potential sources of structure like

social categorizations. In contrast to Hypotheses 1 and 2, this may in turn lead people who lack personal control to categorize ambiguous others at higher levels of ambiguity (i.e., lower categorization thresholds) and more quickly (i.e., processing speed) than people who have personal control regardless of categorization type (i.e., default vs. non-default) and accuracy. Although I expected lacking (vs. having) personal control would lead people to demonstrate lower categorization thresholds, I also considered the alternative hypothesis that people who lack (vs. have) personal control might demonstrate higher categorization thresholds and slower categorizations in service of being accurate (see Hypothesis 2).

Overview of the Present Research

This research tests the hypothesized relation between perceived personal control and the processing and categorization of racially and gender ambiguous faces. I conducted a series of studies to test Hypotheses 1 through 3. Studies 1A through 1C were designed to pretest a set of prototypical male and female faces, create and pretest a set of gender ambiguous faces, and pilot test a measure of gender categorization thresholds. Study 2 was designed to create and pretest a set of racially ambiguous faces. Studies 3A and 3B were designed to establish the association between individual differences in need for control and heuristic ambiguous face processing in the domains of race and gender. Study 4 was designed to pretest a manipulation of personal control to use in the experimental design of the subsequent studies. Studies 5A and 5B were designed to establish the main effect of having versus lacking personal control on race (5B) and gender (5A-B) heuristic face processing, accuracy, and categorization thresholds. Finally, Study 6 was designed to explore potential moderators of a personal control effect.

Study 1A: Selecting Prototypical Male and Female Faces

Method

Participants. Forty-two heterosexual participants (26 females, 16 males, M_{age} = 20.83 years, age range: 18-36 years) participated for course credit. Twenty-nine percent were Asian or Pacific Islander, 21% were African-American or Black, non-Hispanic, 19% were Hispanic, 17% were White, non-Hispanic, 9% were another ethnicity not listed, and 5% were Multiracial.

Stimulus selection. I selected pictures of 21 male and 31 female adult faces from Minear and Park (2004) and Tottenham et al. (2009). Since past research has demonstrated that physical characteristics such as race and haircut (see Introduction) influence gender ambiguous face categorizations, all faces were Caucasian and were cropped to include only the head region. Since gender stereotyped emotions could also bias categorizations (e.g., anger stereotyped as masculine emotion vs. sadness stereotyped as feminine emotion), I selected faces that appeared to have a neutral expression (Plant, Hyde, Keltner, & Devine, 2000).

Measured variables.

Gender. Participants rated the gender of each face on a scale ranging from 1 (*Extremely male*) to 4 (*Neither clearly male nor clearly female*) to 7 (*Extremely female*).

Emotion. Participants rated the emotion of each face on a scale ranging from -3 (*Negative*) to 0 (*Neutral*) to 3 (*Positive*).

Attractiveness. Participants rated the attractiveness of each face on a scale ranging from 0 (*Not at all attractive*) to 3 (*Neutral*) to 6 (*Very attractive*).

Procedure. All participants rated each face in a random order for gender prototypicality, emotion, and attractiveness—the latter two measures were counterbalanced.

Results

All descriptive and inferential statistics are displayed in Tables 1 through 3 (and see Appendix A for face stimuli). Based on a series of *t*-tests, I selected six male faces and six female faces that met the following criteria in order of importance: (1) highly prototypical of their respective gender; (2) neutral in emotion; (3) similar in attractiveness. I also conducted a series of one-way ANOVAs to test whether participant gender (male vs. female) moderated ratings of ambiguous faces, particularly with respect to gender prototypicality ratings. The final six male and six female faces were significantly lower or higher, respectively, than the gender scale midpoint of 4 (*Neither clearly male nor female*), were between 1 and -1 on the emotion scale, and were either not significantly different from or significantly greater than 2 on the attractiveness scale. Additionally, gender prototypicality ratings were not moderated by participant gender. However, men rated two of the selected male faces significantly more negative than women. Compared to women, men also rated all the male faces and three of the female faces significantly less attractive.

Study 1B: Confirming the Ambiguity of 50% Male/50% Female Morphed Faces

In Study 1B, I created ambiguous face morphs from the final prototypical male and female faces selected in Study 1A. I then pretested these faces to ensure that they were indeed perceived as ambiguous (i.e., neither clearly male nor female), emotionally

neutral, and similar in attractiveness. Finally, I selected faces that would be used in Study 1C's measure of categorization thresholds.

Method

Participants. Forty-five heterosexual participants (25 females, 20 males, M_{age} = 20.98 years, age range: 18-45 years) participated for course credit. Twenty-five percent were Hispanic, 24% were African-American or Black, non-Hispanic, 20% were Asian or Pacific Islander, 18% were White, non-Hispanic, and 13% were another ethnicity not listed.

Measured variables.

***Speeded categorization task*.** I created gender ambiguous faces using Abrosoft FantaMorph 5 software, which enables facial morphing along various dimensions (e.g., eye distance) based on predefined points of equivalence (e.g., pupil location).

In the present experiment, half of the participants were randomly assigned to attend to the "Male" gender label on the left side of the computer screen (and used the *a* key) and the "Female" gender label on the right side (and used the *k* key). The presentation of labels on the computer screen was reversed for the other half of participants. Participants completed one practice block of four trials to orient participants and one critical block of 168 trials (four categorizations per ambiguous face, two categorizations per prototypical face) to use in the analyses. Participants were tasked with categorizing the faces as quickly as possible.

I computed a categorization score by averaging the sum of female (coded 0) and male (coded 1) categorizations. A score above the midpoint (.5) indicates a higher proportion of male categorizations, a score at the midpoint indicates equal male and

female categorizations, and a score below the midpoint indicates a higher proportion of female categorizations.

Gender. Participants rated the gender of each face on a scale ranging from 0 (*Extremely male*) to 3 (*Neither clearly male nor clearly female*) to 6 (*Extremely female*).

Emotion. See Study 1A.

Attractiveness. See Study 1A.

Procedure. All participants first completed the speeded categorization task, followed by the gender prototypicality scale. Then, participants rated each face on emotion and attractiveness in a counterbalanced order. Thus, all faces were rated on the speeded categorization task and the self-report gender, emotion and attractiveness scales.

Results

All descriptive and inferential statistics are displayed in Tables 4 through 7 (and see Appendix A for stimuli). A series of *t*-tests were conducted to select the final faces. I again conducted a series of one-way ANOVAs to test whether participant gender (male vs. female) moderated ratings of ambiguous faces. I selected eight morphed faces that met the following criteria in order of importance: (1) ambiguous on the speeded categorization task; (2) ambiguous on the gender prototypicality scale; (3) speeded categorizations were not moderated by participant gender; (4) neutral in emotion; and (5) similar in attractiveness. The final eight gender ambiguous faces were not significantly different from the midpoint on the speeded categorization task (.5), were between 3 and 4 on the gender prototypicality scale, were between 1 and -1 on the emotion scale, and were either not significantly different from or significantly greater than 2 on the attractiveness scale. A one-way ANOVA confirmed that neither speeded gender

categorizations nor gender prototypicality ratings were moderated by participant gender. However, compared to women, men rated one ambiguous face significantly more negative and all ambiguous faces significantly less attractive.

Study 1C: Establishing Variance in Gender Heuristic Face Processing, Accuracy, and Categorization Thresholds Measured by a Morph Sequence Categorization Task

Study 1C sought to establish a measure of people's heuristic face processing, accuracy, and categorization thresholds in the domain of gender. As a reminder, heuristic face processing is the extent to which people are faster and more likely to make male (vs. female) categorizations, accuracy is the correctness of categorizations, and categorization threshold is the level of ambiguity at which people recognize the identity of an initially ambiguous face whose identity incrementally becomes clearer. Past research has successfully used a similar paradigm to the one described below to demonstrate the influence of Black racial category activation on the threshold (i.e., level of image degradation) for recognizing crime-relevant objects; that is, White males who were subliminally exposed to Black face primes demonstrated a lower threshold for correctly recognizing degraded crime-relevant objects than those exposed to White primes or no primes (Eberhardt, Goff, Purdie, & Davies, 2004). Thus, participants primed with the Black race were readied to categorize crime-relevant objects due to the mental association between Black and criminal. Extending this paradigm to the current research, people who lack personal control may be more likely to categorize highly ambiguous faces as male than female (i.e., heuristic face processing), be more correct in categorizing highly ambiguous faces (i.e., accuracy), and categorize faces at a higher level of

ambiguity (i.e., categorization threshold) than people who have personal control, presumably because social categories provide a compensatory source of control (tested in Studies 5A-6).

Method

Participants. Forty-three heterosexual participants participated for course credit. One participant was dropped from analysis for making too many errors (0% correct) on the gender categorization task. The final sample consisted of 42 heterosexual participants (26 females, 16 males, M_{age} = 21.83, age range: 18-48 years). Twenty-nine percent were White, non-Hispanic, 21% were Asian or Pacific Islander, 17% were African-American or Black, non-Hispanic, 17% were another ethnicity not listed, 14% were Hispanic, and 2% were Multiracial.

Measured variables.

Morph sequence categorization task. Consistent with past studies that investigate the implicit social cognitive processes underlying differences in perceptual thresholds (Eberhardt et al., 2004), the morph sequence categorization task measured the level of ambiguity at which participants were willing to classify the gender of an ambiguous face. During the task, participants viewed a series of short, movie-like segments of faces that started off ambiguous (i.e., unclear if the face was male or female based on Study 1B pretesting) and became less ambiguous as the movie-like segment progressed. Each segment began with an "X" in the center of the screen which was replaced by an ambiguous (50% male/50% female) face after 1500 ms. The initially extremely ambiguous face then became increasingly male (100% male/0% female) or female (0% male/100% female) in 1% increments (50 picture frames, 500 ms per frame). Two keys

on the keyboard were labeled as “Male” and “Female.” For half the participants, the left Shift key was labeled “Male” and the right Shift key was labeled “Female;” this order was reversed for the remaining half. Participants were instructed to use these keys to determine as quickly as possible when the picture on the monitor was clearly “Male” or “Female.”

All participants completed four practice trials and 16 critical trials. During the first two practice trials, participants simply viewed an ambiguous face transition to a prototypical male and female face in a randomized order without responding. During the second two practice trials, participants again viewed an ambiguous face transition to a male and female face in a randomized order, but were now asked to indicate the gender of the face as it transitioned as quickly as possible. The ambiguous faces used in the practice trials were distinct from those used in the critical trials. During the 16 critical trials, participants viewed the eight ambiguous faces selected from pretesting (see Study 1B) transition to a male face (one time each) and a female face (one time each) in a randomized order. Participants indicated the gender of the face as quickly as possible.

Heuristic face processing was measured as the average number of frames to categorize faces as male (default) versus female (non-default). Accuracy was operationalized in two ways. I computed the overall proportion of correct (0=incorrect, 1=correct) categorizations, and additionally computed the average number of frames to categorize during correct trials (e.g., a face transitioning from ambiguous to male is classified male) versus incorrect trials (e.g., a face transitioning from ambiguous to male is classified female). Finally, categorization thresholds were measured as the average

number of frames individuals took to categorize a face's gender during the 16 critical trials.

Procedure. Participants were informed that they would be completing a study on "social perception." At the start of the study, participants read the following instructions:

> "This task is a way to examine how quickly people can categorize gender. Specifically, you will see a series of short, movie-like segments of faces that will start off ambiguous, meaning that it is unclear if the face is male or female. As the movie-like segment progresses, the ambiguous face will become less ambiguous. Your task is to determine AS QUICKLY AS POSSIBLE when you think the face is clearly MALE or FEMALE."

Next, participants completed the morph sequence categorization task, followed by a demographic survey and debriefing.

Results

Heuristic face processing. A paired samples *t*-test revealed that participants took significantly fewer frames to categorize faces as male than female, $M_{male} = 8.33$ vs. $M_{female} = 10.64$, $t(36) = 2.08$, $p = .04$. This suggests that in general, participants were processing faces in line with the male gender heuristic.

Accuracy. On average, participants categorized approximately 41.82% (SD = 14.19%) of faces correctly. This low level of accuracy is discussed further in Study 5A. Additionally, a paired sample *t*-test demonstrated that participants took marginally significantly more frames to make incorrect categorizations (i.e., categorize face transitioning to male as female) compared to correct categorizations (i.e., categorize face transitioning to male as male), $M_{incorrect} = 7.74$ vs. $M_{correct} = 6.47$, $t(41) = -1.89$, $p = .06$.

This finding suggests that participants deliberated more over their categorizations when they were unable to determine the correct response.

Categorization thresholds. Overall, participants took approximately 7.95 (*SD* = 7.72) frames to categorize faces. This suggests that participants categorized faces at relatively high levels of ambiguity at baseline.

Study 2: Pretesting Racially Ambiguous Black-White Faces

In addition to testing the association of personal control with gender categorizations, I also sought to explore its association with race categorizations. To this end, I developed a set of racially ambiguous Black-White faces to create a race-specific version of the speeded categorization task and morph sequence categorization task described in Studies 1B and 1C, respectively.

Method

Participants. Thirty-eight U.S.-born participants (26 females, 12 males, M_{age} = 21 years, age range: 18-58 years) participated for course credit. Thirty-two percent were White, non-Hispanic, 24% were African-American or Black, non-Hispanic, 18% were Hispanic, 11% were Asian or Pacific Islander, 11% were another ethnicity not listed, and 5% were Multiracial.

Prototypical face selection. I selected pictures of six Black and six White adult male faces from the Eberhardt Face Database (Eberhardt, Goff, Purdie, & Davies, 2004). The database included pretesting data on the age range, attractiveness (1 [*Not at all*] to 4 [*Somewhat*] to 7 [*Extremely*]), and stereotypicality (1 [*Not at all*] to 4 [*Somewhat*] to 7 [*Extremely*]) of each face. On the latter scale, participants indicated either how stereotypically Black or White the person looked depending on the person's race. I also

excluded faces with notable facial hair to limit the role of non-facial features in race judgments. I conducted a series of one-sample *t*-tests to determine which faces met the following criteria in order of importance: (1) stereotypical of their respective race; (2) similar in attractiveness; and (3) similar in age. The six Black and six White male faces I selected were all significantly more stereotypical than the scale midpoint (4), were not significantly different from the attractiveness scale midpoint (4), and were, on average, rated in the 20 to 35 year old age range. All faces were cropped to include only the face region in preparation for morphing.

Measured variables.

***Categorization of racially ambiguous faces*.** I created racially ambiguous faces with Abrosoft FantaMorph 5 software by morphing all possible combinations of the 12 prototypical faces selected above.

In the present experiment, half of the participants were randomly assigned to attend to the "Black" race label on the left side of the computer screen (and used the *a* key) and the "White" race label on the right side (and used the *k* key). The presentation of labels on the computer screen was reversed for the other half of participants. Participants completed one practice block of four trials to orient participants and one critical block of 144 trials (three categorizations per ambiguous face, three categorizations per prototypical face) to use in the analyses.

I computed a categorization score by averaging the sum of White (coded 0) and Black (coded 1) categorizations. A score above the midpoint (.5) indicates a higher proportion of Black categorizations, a score at the midpoint indicates equal Black and

White categorizations, and a score below the midpoint indicates a higher proportion of White categorizations.

Race. Participants rated the race of each face on a scale ranging from 1 (*White*) to 7 (*Black*).

Emotion. Participants rated the emotion of each face on a scale ranging from -3 (*Negative*) to 0 (*Neutral*) to 3 (*Positive*).

Attractiveness. Participants rated the attractiveness of each face on a scale ranging from 1 (*Not at all attractive*) to 4 (*Neutral*) to 7 (*Very attractive*).

Procedure. After completing the race speeded categorization task, all participants rated each face in a random order for race prototypicality, attractiveness, and emotion—measures were always completed in this order.

Results

All descriptive and inferential statistics are displayed in Tables 8 through 11 (and see Appendix B for stimuli). A series of *t*-tests were conducted to select only faces that were not prototypical of either race, and that did not significantly differ in terms of emotion or attractiveness. I also conducted a series of one-way ANOVAs to test whether participant's ethnic-racial identity (White vs. Black vs. non-White, non-Black) moderated ratings of ambiguous faces. I selected the final faces based on the following criteria in order of importance: (1) not significantly rated more Black or White on the speeded task; (2) not significantly rated more Black or White on the self-report race scale; (3) speeded categorizations were not moderated by participant ethnic-racial identity (White vs. Black vs. non-White, non-Black); (4) neutral in emotion; and (5) similar in attractiveness.

The final 10 racially ambiguous faces were not significantly different from the speeded categorization task midpoint of .5 (equally categorized Black and White), all were either only marginally significantly different from or not significantly different from the race scale midpoint of 4, were rated between 1 and -1 on the emotion scale, and were not significantly different from 3 on the attractiveness scale. Additionally, speeded race categorizations, emotion ratings, and attractiveness ratings were not moderated by ethnic-racial identity. Two of the final faces were, however, rated significantly or marginally significantly more Black by White participants compared to both non-White, non-Black and Black participants.

Studies 3A and 3B: Testing the Association between Individual Differences in Need for Control and Heuristic Racially and Gender Ambiguous Face Processing

Given the proposed link between perceived personal control and social categorization of ambiguous persons, two preliminary studies sought to test whether individual differences in need for control were associated with categorizing racially and gender ambiguous faces. As noted above, social categorizations provide a heuristic (mental shortcut) for ordering and structuring one's social environment. Individuals with a chronic fundamental need to perceive an orderly world are likely to process ambiguous faces that do not clearly fit a single category according to heuristics as a means of restoring order. The main prediction was that individuals with greater chronic need for control will make faster Black than White categorizations of ambiguous racial faces and faster male than female categorizations of ambiguous gender faces as a means of restoring order than individuals with lower need for control. This finding would be consistent with Hypothesis 1 (see Introduction) that people who lack personal control will

be more likely to rely on mental shortcuts or default category judgments to facilitate rapid categorizations of ambiguous others (i.e., heuristic face processing) than people who have personal control.

Method

Participants.

Study 3A. Thirty-one U.S.-born White, non-Hispanic students (19 females, 12 males, M_{age} = 19.90 years, age range: 18-23 years) completed the study for extra course credit.

Study 3B. Forty-five heterosexual students participated for extra credit. Eight participants were dropped from analyses for being outliers on the speeded categorization task: three participants (7%) responded faster than 150 ms on over 10% of trials and five participants (11%) responded slower than 3000 ms on over 10% of trials. Of the final 37 participants (22 females, 15 males, M_{age} = 21 years, age range: 18-33 years), 27% were Hispanic, 24% were Asian or Pacific Islander, 22% were White, non-Hispanic, 19% were African-American or Black, non-Hispanic, 5% were another ethnicity not listed, and 3% were Multiracial.

Measures.

Personal control motivation. Individual differences in general motivation to control the outcomes in one's life was measured using the desirability of control scale (e.g., "I enjoy making my own decisions", "I enjoy having control over my own destiny"; Burger & Cooper, 1979; see Appendix D). Participants indicated their agreement with each statement on a scale ranging from 0 (Strongly disagree) to 6 (Strongly agree), with 3 as the neutral midpoint (Neither disagree nor agree). Five items were reverse scored.

Higher average scores across items indicated higher chronic motivation for personal control ($\alpha_{\text{Study 3A}} = .77$; $\alpha_{\text{Study 3B}} = .75$)

Speeded categorization task. Participants were tasked with categorizing a series of prototypical and ambiguous faces by race (Black vs. White) or gender (male vs. female) as quickly as possible. Only reaction times greater than 300 ms and less than 3000 ms were included in the analyses (see Knowles & Peng, 2005 for similar data trimming procedure). Remaining latencies were log transformed to correct for positive skewness (see Chen et al., 2012; Chen et al., 2014).

Study 3A. The race speeded categorization task included the 10 ambiguous faces selected in Study 2 in addition to five prototypical White and five prototypical Black faces from Eberhardt's (2004) database that were not used to create the ambiguous face morphs. After completing four practice trials, participants categorized each ambiguous face four times, and each prototypical face twice, for a total of 60 critical trials. An index of heuristic race processing was created as the difference score in log transformed reaction times to categorize ambiguous faces as Black versus White. Higher positive scores indicated faster Black categorizations than White categorizations of racially ambiguous faces.

Study 3B. The gender speeded categorization task included the eight ambiguous faces selected in Study 1B and the six prototypical male and six prototypical female faces selected in Study 1A. After completing four practice trials, participants categorized each ambiguous face four times, and each prototypical face twice, for a total of 56 critical trials. An index of heuristic gender processing was created as the difference score in log transformed reaction times to categorize ambiguous faces as male versus female. Higher

positive scores indicated faster male categorizations than female categorizations of gender ambiguous faces.

Procedure. All participants completed the speeded categorization task in the lab. However, whereas Study 3A participants completed the desirability of control measure during an online prescreen, Study 3B participants completed the measure after the speeded categorization task.[1] All participants concluded the study with a brief demographic survey, and were fully debriefed.

Results and Discussion

In partial support of Hypothesis 1, higher desirability of control was related to marginally significantly faster heuristic (i.e., Black or male) relative to non-heuristic (i.e., White or female) categorizations in the domains of both race, partial $r(28) = .33$, $p = .079$, and gender, partial $r(34) = .28$, $p = .097$ (see Figure 1). Overall, these preliminary studies provide initial evidence that heuristic ambiguous face processing may serve as a source of compensatory control for individuals chronically high in need for personal control, and sheds light on who may be more likely to ultimately engage in stereotyping and prejudice.

Study 4: Pretesting a Personal Control Manipulation

Although Studies 3A and 3B provided preliminary evidence for the relation between personal control needs and ambiguous face processing, these studies were correlational in nature. Therefore, the goal of this pilot test was to establish a reliable and valid manipulation of personal control that would be used to experimentally test the role of personal control threat on the processing and categorization of racially and gender ambiguous faces.

Method

Participants and design. Seventy-three heterosexual students (36 females, 37 males, M_{age} = 20.18 years, age range: 18-31 years) participated for course credit. Thirty-two percent were Hispanic, 29% were White, non-Hispanic, 18% were African American or Black, non-Hispanic, 14% were Asian or Pacific Islander, 6% were Multiracial, 1% were American Indian or Alaskan Native, and 1% were another ethnicity not listed. The study adopted a one-factor, two-level (Personal control: lack personal control [n = 37] vs. have personal control [n = 36]) between-participants design.

Manipulated variable. I adopted a personal control threat procedure used in past research on compensatory control theory (Rutjens, van der Pligt, & van Harreveld, 2010; (Rutjens, van Harreveld, & van der Pligt, 2010). This manipulation has been previously established to manipulate perceptions of personal control, and multiple studies have since confirmed that this procedure reliably induces a search for sources of structure and meaning (Friesen et al., 2014; Kay, Shepherd, Blatz, Chua, & Galinsky, 2010; Rutjens, van der Pligt, et al., 2010; Wang et al., 2012). Moreover, the manipulation controls for valence of recalled memory, such that all participants are asked to recall and write about a *negative* past even in which they had or lacked personal control. This manipulation rules out the alternative explanation of a disclosure effect (Frattaroli, 2006; Pennebaker, 1997), wherein disclosing one's thoughts and feelings about a traumatic event may induce psychological disclosure benefits rather than a personal control threat. This is unlikely to drive any observed effects because all participants disclose a negative past event and are therefore equally likely to benefit from emotional disclosure of a past psychologically traumatic experience; the only between condition difference, however, is

their perceived personal control in that situation. Additionally, similar effects are obtained when all participants are asked to recall and write about a positive or neutral have or lack personal control event, suggesting that personal control threat is the "key ingredient" driving any between condition effects.

Consistent with Rutjens et al.'s (2010) established procedure, the present participants were told that they would be completing a study investigating "how well people remember specific situations from their past." The manipulation involved two phases: (1) recalling an unpleasant past event and (2) writing about the future. Participants randomly assigned to the lack personal control condition were instructed to "think back on an unpleasant event or situation that you experienced not too long ago, over which you had no control over the unpleasant event or situation," and to briefly describe the event in 50 to 100 words. Next, participants were asked to "name 3 arguments in favor of the fact that the future indeed is uncontrollable and unpredictable." By comparison, participants randomly assigned to the have personal control condition were instructed to "think back on an unpleasant event or situation that you experienced not too long ago, over which you had total control over the unpleasant event or situation," and to briefly describe the event in 50 to 100 words. Next, participants were asked to "name 3 arguments in favor of the fact that you have personal control over your own future."

I chose not to include a baseline condition where participants immediately proceeded to the dependent variables because past research has argued that having personal control *is* people's baseline motivational state, and that these two conditions should not differ in manipulating people's underlying need for order (Cutright, 2012).

Indeed, Cutright (2012) tested the effect of a three-level personal control manipulation (low control vs. high control vs. neutral recall task) on preference for bounded versus unbounded logos, products and environments. In a pretest for between condition differences in self-reported feelings of control, she found that whereas low control participants reported significantly lower feelings of control than high control and neutral participants, there was no significant difference in feelings of control between the high control and neutral participants.

Measured variables.

Participants responded to three questions about the event they previously described, including: (1) how much control they had in that situation using a scale ranging from 1 (*None*) to 7 (*A lot*); (2) how unpleasant they found that situation using a scale ranging from 1 (*Not at all*) to 7 (*Very much*); and (3) whether they are the actor in, or director of, their own life using a scale ranging from 1 (*Actor*) to 7 (*Director*).

Procedure. All participants first completed the personal control manipulation, followed by the three manipulation check items. Finally, participants completed a brief demographics survey.

Results and Discussion

According to a one-way ANOVA, participants who were randomly assigned to recall and write about a situation in which they lacked personal control were significantly more likely to report feeling less control in that past situation than participants randomly assigned to recall a situation in which they had control, $M_{lack\ personal\ control} = 1.78$ *vs.* $M_{have\ personal\ control} = 5.81$, $F(1, 71) = 180.78$, $p < .001$, Cohen's $d = 3.15$. Lack personal control participants also rated their past experience as significantly more unpleasant than have

personal control participants, $M_{lack\ personal\ control} = 6.43$ *vs.* $M_{have\ personal\ control} = 5.61$, $F(1, 71) = 4.66$, $p = .034$, Cohen's $d = .50$. Finally, lack personal control participants were marginally less likely than have personal control participants to rate themselves as the actor versus director of their own lives, $M_{lack\ personal\ control} = 5.22$ *vs.* $M_{have\ personal\ control} = 5.77$, $F(1, 71) = 2.91$, $p = .093$, Cohen's $d = .40$. Across all participants, sense of personal control was negatively associated with unpleasantness of the recalled situation, $r(73) = -.24$, $p = .039$. No other correlations between manipulation check items were statistically significant.

These findings confirm that the memory recall procedure effectively influenced perceived personal control. Given the between condition difference in unpleasantness of the recalled event, I chose to include a mood measure in subsequent studies to ensure that I could control for any effects of positive and negative mood on categorization thresholds.

Study 5A: Demonstrating the Main Effect of Personal Control Threat on the Processing and Categorization of Gender Ambiguous Faces

Study 5A was designed to demonstrate the influence of personal control threat on the processing and categorization of gender ambiguous faces. I manipulated personal control using Study 4's validated procedure, measured gender ambiguous face processing and categorizations using the task developed in Study 1C, and measured positive and negative affect to control for possible mood effects. The morph sequence categorization measure allowed me to investigate three different components of social categorizations in the domain of gender: heuristic face processing, accuracy, and categorization thresholds. I predicted that compared to have personal control participants, lack personal control

participants would demonstrate more heuristic face processing, greater accuracy, and lower categorization thresholds. Thus, the remaining studies were designed to simultaneously test my three main hypotheses (also see Introduction):

Hypothesis 1: People who lack personal control will be more likely to rely on mental shortcuts or default category judgments to facilitate rapid categorizations of ambiguous others (i.e., heuristic face processing) than people who have personal control.

Hypothesis 2: People who lack personal control will also seek to categorize others ranging in ambiguity more accurately (i.e., accuracy) than people who have personal control.

Hypothesis 3: People who lack personal control will categorize ambiguous others at higher levels of ambiguity (i.e., categorization thresholds) and more quickly (i.e., processing speed) than people who have personal control.

Here, I therefore predicted that, compared to have personal control participants, lack personal control participants would demonstrate more heuristic face processing (Hypothesis 1), greater accuracy (Hypothesis 2), and lower categorization thresholds (Hypothesis 3).

Method

Participants and design. One hundred and twenty-three heterosexual students (53 females, 70 males, M_{age} = 19.78 years, age range: 18-42 years) participated for course credit. Twenty-nine percent were Hispanic, 24% were White, non-Hispanic, 16% were Asian or Pacific Islander, 13% were African American or Black, non-Hispanic, 11% were Multiracial, and 8% were another ethnicity not listed. The experiment employed a

one-factor, two-level (Personal control: lack personal control [*n* = 61] vs. have personal control [*n* = 62]) between-participants design with random assignment.

Manipulated variable. I adopted the recall procedure from Study 4. As a reminder, participants were asked to recall and then briefly write about a time when they lacked control or had control over a situation. Lack personal control and have personal control condition participants were also asked to recall three arguments in favor of the fact that the future is uncontrollable or controllable, respectively.

Measured variables.

Morph sequence categorization task. Participants completed the morph sequence categorization task from Study 1C (see above for complete description). In this task, participants would indicate when they would categorize an initially ambiguous face transitioning from ambiguous to prototypical as male or female.

***Speeded categorization task*.** Participants completed the same speeded forced choice gender task used in Study 1B and Study 3B. In this task, participants categorized a series of randomly presented ambiguous (50% male/50% female) and prototypical (100% male or female) faces as male or female as quickly as possible.

Positive and negative affect schedule. Positive and negative mood were measured with the positive and negative affect schedule (PANAS; Watson, Clark, & Tellegen, 1988; see Appendix E). The scale consists of 20 words that describe positive (i.e., *interested, excited, strong, enthusiastic, proud, alert, inspired, determined, attentive, active*) and negative (i.e., *distressed, upset, guilty, scared, hostile, irritable, ashamed, nervous, jittery, afraid*) emotions. Participants were asked to rate the extent to which each word described how they feel "right now, that is, in the present moment" on a scale

ranging from 1 (*Very slightly or not at all*) to *5* (*Extremely*). A positive affect (PA; α = .87) score and negative affect (NA; α = .82) score were computed for each participant by averaging across responses to the positive and negative items, respectively.

Procedure. In the lab, a research assistant presented the experiment as two unrelated studies. "Study 1" was presented as a "memory study," but in reality allowed me to administer the personal control manipulation. During "Study 2," which was presented as a "social perception study," all participants completed the gender categorization threshold task and the forced choice categorization task. Next, all participants completed the PANAS scale and a brief demographic survey. After filling out the demographic survey but before debriefing, all participants completed a values affirmation in which they were instructed to "write about a value or characteristic that is important to you and how it makes you feel about yourself." This self-affirmation was intended to buffer against the negative psychological effects of personal control threat. For example, a large body of research has demonstrated a link between personal control and stress (e.g., Laurin et al., 2008; Law, Logan, & Baron, 1994; Park, 2005; Shanahan & Neufeld, 2010; Taylor & Brown, 1988; Thompson, Sobolew-Shubin, Galbraith, Schwankovsky, & Cruzen, 1993). Finally, participants were thoroughly debriefed.

Results and Discussion

A one-way ANOVA did not find a significant effect of personal control condition on positive affect, $F(1, 121) = .65$, $p = .38$, or negative affect, $F(1, 121) = .27$, $p = .42$; therefore, I did not control for mood effects in any of the subsequent analyses.

Heuristic face processing (Hypothesis 1).

***Morph sequence categorization task*.** I created an index of the male default heuristic by subtracting participants' average frame to make any male categorization from their average frame to make any female categorization regardless of correctness (difference score: female minus male). Thus, higher, positive scores indicated increased general use of the male gender heuristic. Lack personal control participants did not demonstrate a significantly greater use of heuristic gender categorizations than have personal control participants ($M_{lack\ personal\ control}$ = 1.71 vs. $M_{have\ personal\ control}$ = 2.55), $F(1, 109) = 1.35$, $p = .24$. Moreover, participant gender (male vs. female) did not moderate the effect of personal control condition on average frames to categorize faces male versus female, $F(1, 107) = .43$, $p = .51$.

Speeded categorization task. With respect to categorization frequencies (0=female, 1=male), lack personal control participants did not demonstrate a significantly higher proportion of male categorizations than have personal control participants ($M_{lack\ personal\ control}$ = .50 vs. $M_{have\ personal\ control}$ = .48), $F(1, 121) = .45$, $p = .50$, and participant gender did not moderate this effect, $F(1, 119) = 1.87$, $p = .17$. With respect to log transformed latency scores on the speeded gender task, lack personal control participants did not demonstrate different latencies for categorizing ambiguous faces as male versus female (difference score: female minus male) than have personal control participants ($M_{lack\ personal\ control}$ = -.05 vs. $M_{have\ personal\ control}$ = -.05), $F(1, 118) = 0$, $p = .99$, and this was not moderated by participant gender, $F(1, 116) = .86$, $p = .35$.

Accuracy (Hypothesis 2).

Morph sequence categorization task. Lack personal control participants also did not demonstrate a significantly different proportion of correct categorizations than have

personal control participants ($M_{lack\ personal\ control}$ = .42 vs. $M_{have\ personal\ control}$ = .43), $F(1, 121)$ = .20, p = .65, and this effect was not moderated by participant gender, $F(1, 119)$ = .31, p = .57. Lack personal control participants also did not take significantly more frames to categorize faces incorrectly than correctly (difference score: incorrect minus correct) compared to have personal control participants ($M_{lack\ personal\ control}$ = 1.85 vs. $M_{have\ personal\ control}$ = 1.62, $F(1, 119)$ = .13, p = .72, and this effect was also not moderated by participant gender, $F(1, 117)$ = .61, p = .43.

Categorization thresholds (Hypothesis 3).

Morph sequence categorization task. Results of a one-way ANOVA found that lack personal control participants did not demonstrate a significantly lower categorization thresholds than have personal control participants ($M_{lack\ personal\ control}$ = 7.46 vs. $M_{have\ personal\ control}$ = 6.48), $F(1, 121)$ = .98, p = .32. Participant gender did not moderate the effect, $F(1, 119)$ = .62, p = .43.

Additional exploratory analyses. There are two possible reasons I believe that I did not obtain the predicted effects that I explore below.

Psychosocial resources. First, it is possible that another variable not included in the above analyses moderated the effect of personal control on the dependent variables. For example, a personal control manipulation may not emerge amongst participants with high psychosocial resources (e.g., self-esteem, social support) to inoculate them from situation-based threats (e.g., Greenberg, Solomon, Pyszczynski, Rosenblatt, Burling, et al., 1992). I therefore tested whether psychosocial resources, namely self-esteem, served as a potential moderator on the effect of personal control threat on gender categorizations using data collected during an online prescreening. I used two indices of self-esteem: the

Rosenberg Self-Esteem Scale (RSES; 1965) and the Self-Liking/Self-Competence Scale (SLSC; Tafarodi & Swann, 1995). The RSES (α = .90) is a 10-item measure of global self-esteem (e.g., "I focus on my strengths", "I am a capable person"), while the SLSC (α = .95) is a 20-item measure that captures two types of global self-esteem, self-liking and self-competence. The SLSC can therefore be treated as a global indicator of self-esteem, or can be decomposed into two subscales: the self-liking subscale (α=.93), which is a 10-item scale that captures social esteem (e.g., "I feel comfortable about myself", "I feel good about who I am"), and the self-competence subscale (α = .91), which is a 10-item scale that captures personal efficacy (e.g., "I perform very well at a number of things", "I am talented"). All measures were scored such that higher scores reflected higher self-esteem. In each regression, I entered the dummy coded variable for personal control condition (0=have personal control, 1=lack personal control) and the centered self-esteem variable in the first step of the regression, and their interaction term in the second step.

Heuristic face processing. The Personal Control X RSES interaction did not significantly predict differences in the average number of frames to categorize faces as male versus female on the morph sequence categorization task, $\Delta F(1, 103) = .17$, $p = .68$, $R^2 = .02$, $\beta = .06$, difference in latencies for categorizing ambiguous faces as male versus female on the speeded categorization task, $\Delta F(1, 112) = 2.08$, $p = .15$, $R^2 = .025$, $\beta = -.19$, or categorization frequencies on the speeded categorization task, $\Delta F(1, 115) = 2.15$, $p = .14$, $R^2 = .022$, $\beta = .20$. Similarly, the Personal Control X SLSC interaction did not significantly predict differences in gender heuristic processing as measured by the morph sequence categorization task, $\Delta F(1, 100) = .26$, $p = .61$, $R^2 = .015$, $\beta = .07$, or on the latency difference scores, $\Delta F(1, 107) = 2.52$, $p = .11$, $R^2 = .033$, $\beta = -.21$, or

categorization frequencies, $\Delta F(1, 109) = 2.17$, $p = .14$, $R^2 = .024$, $\beta = .20$, from the speeded categorization task. When using the self-liking (SL) and self-competence (SC) subscales as predictors in the regression model, similar results were obtained. The Personal Control X SL interaction did not significantly predict differences in gender heuristic processing as measured by the morph sequence categorization task, $\Delta F(1, 100) = .15$, $p = .69$, $R^2 = .02$, $\beta = .05$, or on the latency difference scores, $\Delta F(1, 107) = 2.46$, $p = .12$, $R^2 = .025$, $\beta = -.21$, or categorization frequencies, $\Delta F(1, 109) = 1.23$, $p = .27$, $R^2 = .026$, $\beta = .15$, from the speeded categorization task. Finally, the Personal Control X SC interaction did not significantly predict differences in gender heuristic processing as measured by the morph sequence categorization task, $\Delta F(1, 100) = .15$, $p = .69$, $R^2 = .01$, $\beta = .06$, or on the latency difference scores, $\Delta F(1, 107) = 2.19$, $p = .14$, $R^2 = .037$, $\beta = -.20$, or categorization frequencies, $\Delta F(1, 109) = 2.97$, $p = .087$, $R^2 = .027$, $\beta = .23$, from the speeded categorization task

Accuracy. The Personal Control X RSES interaction did not significantly predict differences in proportion of correct categorizations, $\Delta F(1, 115) = .21$, $p = .65$, $R^2 = .003$, $\beta = .06$, or difference in the average number of frames to make incorrect versus correct categorizations, $\Delta F(1, 113) = .35$, $p = .55$, $R^2 = .008$, $\beta = -.08$, on the morph sequence categorization task. The Personal Control X SLSC interaction also did not significantly predict proportion of correct categorizations, $\Delta F(1, 109) = 1.01$, $p = .31$, $R^2 = .015$, $\beta = .14$, or incorrect versus correct categorizations, $\Delta F(1, 107) = .50$, $p = .48$, $R^2 = .007$, $\beta = -.10$. The Personal Control X SL interaction also did not significantly predict proportion of correct categorizations, $\Delta F(1, 109) = 2.23$, $p = .13$, $R^2 = .023$, $\beta = .20$, or incorrect versus correct categorizations, $\Delta F(1, 107) = .64$, $p = .42$, $R^2 = .008$, $\beta = -.11$. Finally, the

Personal Control X SL interaction also did not significantly predict proportion of correct categorizations, $\Delta F(1, 109) = .29$, $p = .59$, $R^2 = .011$, $\beta = .07$, or incorrect versus correct categorizations, $\Delta F(1, 107) = .32$, $p = .57$, $R^2 = .005$, $\beta = -.08$.

Categorization thresholds. When predicting average number of frames to categorize faces on the morph sequence categorization task, results revealed a non-significant Personal Control X RSES interaction, $\Delta F(1, 115) = .35$, $p = .55$, $R^2 = .01$, $\beta = -.08$, Personal Control X SLSC interaction, $\Delta F(1, 109) = 2.40$, $p = .12$, $R^2 = .03$, $\beta = -.21$, Personal Control X SL interaction, $\Delta F(1, 109) = 3.54$, $p = .063$, $R^2 = .039$, $\beta = -.24$, and Personal Control X SC interaction, $\Delta F(1, 109) = 1.35$, $p = .24$, $R^2 = .023$, $\beta = -.16$. This suggests that, at least in the present experiment, self-esteem did not moderate the effects of personal control threat on heuristic face processing, accuracy, or categorization thresholds.

Methodological issues. A second possible reason that I did not obtain the predicted effect is due to methodological issues with the dependent variable. This is particularly likely given that the Study 4 pretesting demonstrated the effectiveness of the personal control manipulation on perceived control. Indeed, the below chance rates of correct responses across participants on the morph sequence categorization task seemed to indicate that the task may have been too difficult for participants and hence masked any effects of the experimental manipulation. Study 5B sought to remedy this potential flaw in the categorization task by increasing the morphing increments from 1% intervals between frames to 2% intervals between frames. I also included a race categorization task to test whether the effect of personal control threat would also affect race categorization thresholds.

Study 5B: Demonstrating the Main Effect of Personal Control Threat on the Processing and Categorization of Racially and Gender Ambiguous Faces with a Modified Dependent Variable

Study 5B was designed to test Study 5A's predictions using a more simplistic dependent variable (gender categorization task with 2% morph increments rather than 1%). I additionally included a race morph sequence categorization task and a speeded categorization gender or race task. Given that the null results in Study 5A may be due to methodological issues, I retained my predictions for the constructs measured by the morph sequence categorization task. As a reminder, I predicted that, compared to have personal control participants, lack personal control participants would demonstrate more heuristic face processing, greater accuracy, and a lower categorization threshold in both the domains of race and gender. The new speeded categorization task, which included a continuum of morphed faces rather than just completely ambiguous and prototypical faces as in Studies 3A, 3B and 5A, provided additional indices of ambiguous person perception. Moreover, it provided me with a measure of processing speed, or how quickly participants categorize faces across changing morph values (as opposed to at a particular morph value). Here, I predicted that lack personal control participants would categorize highly ambiguous faces more quickly than have personal control participants (Hypothesis 3).

Method

Participants and design. One-hundred and seventy-one heterosexual U.S.-born students participated for course credit. Consistent with Study 3A and 3B's outlier analyses, one participant (1%) was dropped from analyses for responding faster than 150

ms on over 10% of trials during the gender version of the speeded categorization task. Of the final 170 participants (111 females, 59 males, M_{age} = 21.05 years, age range: 18-55 years), 26% were Asian or Asian American, 24% were Latino or Hispanic or Chicano or Puerto Rican, 15% were Black or African American, 14% were White or European American, 12% were Middle Eastern or North African, 5% were Multiracial, 3% were Another identity, 1% were American Indian or Alaskan Native, and 1% were Native Hawaiian or Pacific Islander. The experiment employed a 2 (Personal control: lack personal control [n = 87] vs. have personal control [n = 83]) X 2 (Categorization: race [n = 87] vs. gender [n = 83]) between-participants design with random assignment.

Manipulated variable. I adopted the same recall procedure to manipulate lacking versus having personal control from Studies 4 and 5A.

Measured variables.

Morph sequence categorization task.

Gender. A random half of participants completed the gender categorization task from Studies 1C and 5A with three modifications to the procedure. First, rather than presenting the gender category labels on the computer keys themselves, half of the participants were randomly assigned to attend to the "Male" gender label on the left side of the computer screen (and used the *a* key) and the "Female" gender label on the right side (and used the *k* key). The presentation of labels on the computer screen was reversed for the other half of participants. Second, rather than being instructed to categorize the face's gender as quickly as possible, participants were now instructed to try to categorize the face's gender as accurately as possible. I made this change to ensure that participants were not sacrificing accuracy for speed, another potential confound in

the original 1% gender categorization task. Third, following the fixation point, the initially extremely ambiguous face became increasingly male (100% Male/0% Female) or female (0% Male/100% Female) in 2% increments (25 picture frames, 500 ms per frame).

Race. A random half of participants completed a race categorization task that was identical to the procedure for the modified 2% gender categorization task described above. I used the 10 ambiguous faces selected in Study 2 to create a total of 20 critical categorization trials. Now, participants were tasked with categorizing each face's race (Black vs. White) accurately.

Speeded categorization task. The modified race and gender speeded categorization tasks were designed to include the entire spectrum of faces ranging from prototypically White or female to prototypically Black or male, as opposed to completely ambiguous faces and completely prototypical faces only. In general, with respect to probability of default (Black or male) categorizations, people should be more likely to categorize faces as Black or male as they become more prototypically Black or male (and, simultaneously, less prototypically White or female). To the extent that people generally rely on race and gender heuristics in categorizing ambiguous faces, people should also be more likely to categorize faces as Black or male as they become increasingly ambiguous. With respect to categorization latencies, people should generally be faster to categorize faces as they become more prototypically male (gender) or Black (race), and should be slower to categorize faces as they become increasingly ambiguous. The former prediction is consistent with an attentional bias to threat detection because both the Black race and male gender are stereotypically perceived as cues to threat that

automatically capture attention (e.g., Trawalter, Todd, Barid, & Richeson). That is, it allowed me to investigate if the relation (or two-way interaction) between morph value (primary analyses) or target ambiguity (secondary analyses) and default categorization probabilities or categorization latencies significantly differed as a function of condition, rather than simply demonstrating the difference between categorizations and latencies at a single morph value (see Data Analytic Plan).

Gender. This task was a modified version of the speeded forced choice task used in Studies 1B and 5A meant to converge with the gender categorization task and hence provide a second index of gender categorization thresholds. All participants attended to the "Male" gender label on the left side of the computer screen (and used the *a* key) and the "Female" gender label on the right side (and used the *k* key) during one set of critical trials, and attended to the reverse presentation of labels on a separate set of critical trials (counterbalanced between-participants to control for order effects). Participants categorized four sets of 13 faces (52 unique faces) that ranged from -6 (prototypically female) to 0 (ambiguous) to 6 (prototypically male) one time each during two critical blocks (104 total trials) as quickly as possible (faces borrowed with permission from Freeman, Rule, Adams Jr., & Ambady, 2010; see Appendix C). Prior to each set of critical trials, participants completed a practice block of four trials to orient them to the task.

Race. Half of the participants completed a race categorization task designed in the same manner as the speeded forced choice gender task described above. On each set of trials, participants categorized ten sets of 11 faces (110 unique faces) from 10 possible face continua that ranged from -5 (prototypically White) to 0 (ambiguous) to 5

(prototypically Black) one time each during two critical blocks (220 total trials) as quickly as possible (stimuli from Study 2; see Appendix B). The only difference in procedure is that participants were now tasked with categorizing faces by race as "Black" versus "White."

Positive and negative affect schedule. Positive and negative mood were again measured with the PANAS. A positive affect (PA; $\alpha = .90$) and negative affect (NA; $\alpha = .78$) score were computed for each participant by averaging across responses to the positive and negative items, respectively.

Procedure. In the lab, a research assistant presented the experiment as two unrelated studies. "Study 1" was presented as a "memory study," but in reality allowed me to administer the personal control manipulation. During "Study 2," which was presented as a "social perception study," participants completed either the two gender categorization tasks or the two race categorization tasks. Instructions for the morph sequence categorization task were modified from Study 5A to emphasize accuracy rather than speed. Specifically, participants read:

> "This task is a way to examine how accurately people can categorize race (gender). Specifically, you will see a series of short, movie-like segments of faces that will start off ambiguous, meaning that it is unclear if the face is BLACK (MALE) or WHITE (FEMALE). As the movie-like segment progresses, the ambiguous face will become less ambiguous. Your task is to determine when you think the face is clearly BLACK (MALE) or WHITE (FEMALE). Remember to try to categorize the face's race (gender) ACCURATELY."

Contrary to the morph sequence categorization task, instructions for the speeded categorization task instructed participants to "respond rapidly" and "as quickly as possible." The morph sequence categorization task was always completed prior to the speeded categorization task given our initial interest in the former outcome. After completing both categorization tasks, all participants completed the PANAS scale and a brief demographic survey. Finally, all participants completed a values affirmation (see Study 5A) and were thoroughly debriefed.

Data Analytic Plan

Morph sequence categorization task. The morph sequence categorization task was scored and analyzed as previously outlined.

Speeded categorization task. I used a multilevel generalized estimating equation (GEE) regression (logistic or multiple) approach in SAS Studio (SAS Institute Inc., 2016) to analyze categorization probabilities (logistic regression) and latencies (multiple regression) on the updated speeded categorization tasks. GEE models are ideal because they can handle both binary (categorizations) and continuous (latencies) outcomes, and more importantly, they allow for the analysis of nested data while accounting for within-participant error in a repeated measures design (Zeger & Liang, 1986; Zeger, Liang, & Albert, 1988). In the speeded categorization task, participants' data were nested across multiple levels, including face identity (each unique face morph), face morph value (faces of same morphing proportion from different continuum), and face continuum (faces from same morphing continuum). A multilevel GEE regression approach is also superior to other multilevel models for my data because it is far more robust in its ability to handle model misspecifications; that is, it uses a working covariance matrix and a robust

"sandwich estimator" (i.e., working correlation matrix is "sandwiched" with the observed data) to provide reliable estimates of fixed effects and their standard errors (Hanley, Negassa, Edwardes, & Forrester, 2003; Hubbard et al., 2010; Kauermann & Carroll, 2001). Moreover, other research from the ambiguous face categorization literature using a similar speeded categorization task has employed a GEE approach, further supporting the appropriateness of this data analytic approach for the current data (e.g., Freeman et al., 2016; Freeman et al., 2011; Johnson et al., 2012).

Consistent with Studies 3A and 3B, only reaction times greater than 300 ms and less than 3000 ms (and their corresponding categorizations) were included in the analyses (see Knowles & Peng, 2005 for similar data trimming).

Generalized estimating equations. In my primary analyses, I was interested in the two-way interaction between personal control condition and target morph value on racially and gender ambiguous face processing and categorizations. In all models, I specified a more conservative exchangeable (i.e., compound symmetry) working correlation structure to account for within-participant error. In the Black or male categorization probability outcome models, I specified a binary distribution and logit link function, which are standard for dealing with binary observations. A binary distribution was appropriate given that race and gender categorizations were dummy coded 0 (White or female) and 1 (Black or male). I also dummy coded the condition variable such that have control participants were recoded -.5 and lack control participants were recoded .5 for the overall model. Additionally, for all significant effects, logits (unstandardized B-values) were converted to percentages for ease of interpretation. In the log transformed categorization latency outcome models, we specified a normal distribution. In the White

or female categorization latency outcome models, I first tested the three-way interaction between personal control condition (.5=lack personal control, -.5=have personal control), target morph value (-6 or -5 through 6 or 5), categorization type (0=White or female, 1=Black or male) and their interaction on categorization responses (binary outcome) or categorization latencies (continuous outcome). Depending on whether the three-way interaction was significant, I subsequently tested for the two-way interaction between personal control condition and target morph value on collapsed categorization latencies or disaggregated categorization latencies (Black or male vs. White or female).

I also conducted secondary analyses to test whether my primary analyses were masking the interactive effect of personal control motivation and target ambiguity on categorization probabilities and latencies. Thus, in my secondary analyses, I was interested in the interaction between personal control condition and target ambiguity on racially and gender ambiguous face processing and categorizations. To prepare the speeded categorization task data for my secondary analyses, I ran the identical GEE models to those described above; however, I recoded the gender (-6 to 6) and race (-5 to 5) morph values such that the highest value indicated the most ambiguous faces (6 or 5), whereas the lowest value 0 reflected the most prototypical faces. For race, the scale ranged from 0 (prototypically Black or White) to 5 (ambiguous), whereas for gender, the scale ranged from 0 (prototypically male or female) to 6 (ambiguous). Thus, when categorization probabilities served as the criterion, I tested for the main and interactive effects of personal control condition and target morph value or target ambiguity. When categorization latencies served as the criterion, I first tested for the three-way interaction between personal control condition, target morph value or ambiguity and categorization

type (0=White or female, 1=Black or male). As with my primary analyses, depending on whether the three-way interaction was significant, I subsequently tested for the two-way interaction between personal control condition and target ambiguity on collapsed categorization latencies or disaggregated categorization latencies (Black or male vs. White or female).

Across Study 5B analyses, I did not collapse the race and gender outcomes for both theoretical (because gender and race are psychologically distinct social categories) and practical (they were on different scales) reasons. In the latter case, because there were 10 parent faces in the race version of the speeded categorization task but only four parent faces in the gender version of the task, SAS software would automatically treat gender responses and latencies as missing for faces five through 10 (even though this data is missing by design). Similarly, because there were 11 faces within each morph continuum in the race version but 13 faces within each continuum in the gender version, SAS software would automatically treat race responses and latencies as missing for faces at morph values -6 and 6. This would essentially make any GEE analyses conducted on the collapsed data uninterpretable.

Results

As in Study 5A, I first sought to rule out the possibility of mood effects driving significant results. Again, a one-way ANOVA did not reveal a significant effect of personal control condition on positive affect, $F(1, 168) = 0$, $p = .99$, or negative affect, $F(1, 168) = .26$, $p = .61$; therefore, I did not control for mood effects in any of the subsequent analyses.

Heuristic face processing (Hypothesis 1). Studies 3A and 3B demonstrated that people with a higher need for personal control tend to process racially and gender ambiguous faces more heuristically; that is, they are faster to categorize ambiguous faces into the default category (Black or male) than they are to categorize them into the non-default category (White or female). This would suggest that when people chronically lack personal control, they are not only faster to impose order on their current environments through the mere act of categorizing, but they are also more likely to rely on heuristics in those judgments (see Hypothesis 1). Therefore, I next investigated the effect of personal control threat on people's reliance on heuristics when judging ambiguous others.

Morph sequence categorization task. I computed an index of race and gender heuristic face processing by subtracting the average frames to categorize faces as male or Black (default) from the average frames to categorize faces as female or White (non-default). In the race model, a one-way ANOVA revealed that lack control participants did not categorize faces as Black at an earlier frame than White compared to have personal control participants ($M_{lack\ personal\ control}$ = 1.15 vs. $M_{have\ personal\ control}$ = 1.54), $F(1, 85) = .37$, $p = .54$. Similarly, personal control condition did not significantly predict heuristic face processing in the gender model, ($M_{lack\ personal\ control}$ = .87 vs. $M_{have\ personal\ control}$ = 1.12), $F(1, 78) = .13$, $p = .71$. Participant race (White vs. Black or part-Black vs. non-White, non-Black) and participant gender did not moderate the effect of personal control condition on average frames to categorize faces Black versus White (difference score: White minus Black), $F(1, 81) = .92$, $p = .40$, or male versus female, $F(1, 76) = .19$, $p = .66$. Consistent with Study 5A's null gender findings, a personal control manipulation

did not affect race or gender heuristic face processing as measured by the morph sequence categorization task.

Speeded categorization task. As a reminder, speeded categorization task data were analyzed using a GEE approach. In these analyses, I was primarily interested in the two-way interaction between personal control condition and target morph value or target ambiguity. For binary response outcomes, the model specified a binary distribution and a logit link function. For significant effects, logits (unstandardized B-values) were converted to percentages for ease of interpretation. In all models, I regressed categorizations (0=White or female, 1=Black or male) onto personal control condition (-5 [have personal control] vs. .5 [lack personal control]), target morph value (-5 or -6 [100% White or female] to 0 [50% White or female/50% Black or male] to 5 or 6 [100% Black or male]) or target ambiguity (0 [100% White, Black, female or male] to 5 or 6 [50% White or female/50% Black or male]), and their interaction.

Race: Primary analysis. As expected, the main effect of target morph value on Black categorization probability was significant, $B = .5633$, $SE = .0606$, $z = 9.29$, $p < .0001$; that is, Black categorization probability increased as target morph value (i.e., Black prototypicality) increased. However, neither the main effect of personal control condition, $B = -.0116$, $SE = .1491$, $z = -.08$, $p = .9380$, nor the interaction effect, $B = .1424$, $SE = .1213$, $z = 1.17$, $p = .2401$, were significant.

Race: Secondary analysis. The main effect of target ambiguity on Black categorization probability was significant, $B = .1341$, $SE = .0169$, $z = 7.93$, $p < .0001$; that is, Black categorization probability also increased as targets became increasingly ambiguous. However, neither the main effect of personal control condition, $B = .0114$, *SE*

= .0338, z = .34, p = .7359, nor the interaction effect, B = -.0185, SE = .0338, z = -.55, p = .5837, were significant. Thus, neither my primary nor secondary analyses supported my prediction that there would be a stronger reliance on the Black categorization heuristic among lack personal control participants than have personal control participants.

Gender: Primary analysis. Consistent with race findings, the main effect of target morph value on male categorization probability was significant, B = .5343, SE = .0596, z = 8.96, p < .0001, such that male categorization probability increased as target morph value (i.e., male prototypicality) increased. However, neither the main effect of personal control condition, B = .0373, SE = .0830, z = .45, p = .6528, nor the interaction effect, B = .1582, SE = .1193, z = 1.33, p = .1847, were significant.

Gender: Secondary analysis. Again, only the main effect of target ambiguity on male categorization probability was significant, B = .0620, SE = .0119, z = 5.19, p < .0001; that is, male categorization probability also increased as targets became increasingly ambiguous. The main effect of personal control condition, B = -.0293, SE = .0401, z = -.73, p = .4645, and the two-way interaction between personal control condition and target ambiguity, B = .0089, SE = .0239, z = .37, p = .7102, were not significant. As with race, I failed to find support for my prediction that people situationally lacking control would demonstrate a stronger relation between male prototypicality or target ambiguity and male categorization probability than those who had personal control.

Accuracy (Hypothesis 2). Next, I investigated the effect of personal control threat on participants' accuracy in social categorizations. To the extent that lacking personal control motivates a search for structure that provides a meaning-framework for

one's environment, loss of personal control may lead people to make more accurate categorizations that will allow them to successfully navigate the social context. Incorrect social categorizations, on the other hand, may undermine people's ability to predict and control their environment (see Hypothesis 2).

Morph sequence categorization task. I first looked at the overall proportion of correct responses during the morph sequence categorization task. That is, on what proportion of trials were participants successful in categorizing a face transitioning towards Black or male (White or female) as Black or male (White or female)? Next, I computed an index of threshold as a function of accuracy for race and gender by subtracting the average frames to correctly categorize faces from the average frames to incorrectly categorize faces. One-way ANOVAs revealed that lack personal control participants did not demonstrate a significantly different proportion of correct categorizations than have personal control participants in the domain of race ($M_{lack\ personal\ control}$ = .89 vs. $M_{have\ personal\ control}$ = .92), $F(1, 85) = 1.10$, $p = .29$, or gender ($M_{lack\ personal\ control}$ = .74 vs. $M_{have\ personal\ control}$ = .70), $F(1, 81) = 1.35$, $p = .24$. While participant race did not moderate the relation between personal control condition and race categorization accuracy, participant gender marginally significantly moderated the relation between personal control condition and gender categorization accuracy, $F(1, 79) = 3.25$, $p = .075$, Cohen's $d = .41$. Among males, those who lacked personal control made significantly more accurate gender categorizations than those who had personal control ($M_{lack\ personal\ control}$ = .75 vs. $M_{have\ personal\ control}$ = .61), $F(1, 25) = 4.38$, $p = .047$, Cohen's $d = .84$; however, the between condition effect did not reach significance among females ($M_{lack\ personal\ control}$ = .74 vs. $M_{have\ personal\ control}$ = .74), $F(1, 54) = 0$, $p = .99$.

Additionally, lack control participants did not take significantly longer to make incorrect categorizations than have personal control participants in the domain of race ($M_{lack\ personal\ control}$ = -2.31 vs. $M_{have\ personal\ control}$ = -1.53), $F(1, 34) = 1.09$, $p = .30$, or gender ($M_{lack\ personal\ control}$ = -2.20 vs. $M_{have\ personal\ control}$ = -1.37), $F(1, 76) = .82$, $p = .37$, and these respective effects were not moderated by participant race, $F(1, 30) = 1.37$, $p = .26$, or gender, $F(1, 74) = 2.14$, $p = .14$. These findings replicate Study 5A's null gender results and extend them to the domain of race.

Categorization thresholds (Hypothesis 3). I also investigated the role of personal control threat on people's categorization thresholds, or the level of ambiguity at which people categorize faces by gender or race. People who are 'readied' to perceive others categorically through loss of personal control should be more likely to impose category labels on highly ambiguous faces (i.e., lower level categorization threshold) than those who have personal control (see Hypothesis 3).

Morph sequence categorization task. In this task, categorization threshold was operationalized as the average number of frames to make any race or gender categorization. Lower (higher) values, or earlier (later) categorizations, indicate lower (higher) categorization thresholds. A one-way ANOVA did not reveal a significant between condition difference in race categorization thresholds ($M_{lack\ personal\ control}$ = 8.04 vs. $M_{have\ personal\ control}$ = 8.39), $F(1, 85) = .20$, $p = .65$, which was not moderated by participant race, $F(1, 81) = 1.37$, $p = .25$. By contrast, analyses did reveal a significant effect of condition on gender categorization thresholds ($M_{lack\ personal\ control}$ = 11.14 vs. $M_{have\ personal\ control}$ = 8.59), $F(1, 81) = 5.34$, $p = .023$, Cohen's $d = .51$. Additionally, participant gender marginally significantly moderated the significant interaction between personal

control condition and average frames to make any gender categorization, $F(1, 79) = 3.14$, $p = .08$, Cohen's $d = .40$. Among men, lack control participants took significantly longer (higher categorization threshold) to categorize faces by gender than have control participants ($M_{lack\ personal\ control} = 12.68$ vs. $M_{have\ personal\ control} = 7.35$), $F(1, 25) = 5.85$, $p = .023$, Cohen's $d = .97$; however, the between condition effect was not significant among women ($M_{lack\ personal\ control} = 10.33$ vs. $M_{have\ personal\ control} = 9.14$), $F(1, 54) = .94$, $p = .33$. Thus, in the case of gender but not race, lacking personal control led to higher categorization thresholds than having personal control. These findings contrast with Study 5A's null findings for personal control condition on gender categorization thresholds. Moreover, while these findings fail to support Hypothesis 3 (i.e., emphasis on speed, more heuristic ambiguous face processing), they lend partial support for Hypothesis 2 in the context of gender (i.e., emphasis on accuracy, less heuristic ambiguous face processing).

Processing speed (Hypothesis 3). Finally, I investigated the role of personal control threat on people's processing of ambiguous and prototypical faces. Although I originally predicted that lacking (vs. having) control would lead to faster categorizations of ambiguous faces, this study's unanticipated finding that personal control threat led to higher gender categorization thresholds as measured by the morph sequence categorization task suggests that lack personal control participants were deliberating more than have personal control participants over ambiguous judgments. Thus, I remained open to the alternative hypothesis that people who lacked (vs. had) personal control would take more time to categorize highly ambiguous faces, presumably to be more

accurate (though there is no "correct" categorization for a 50% male or Black/50% female or White face).

***Speeded categorization task*.** As a reminder, I conducted GEE analyses with a normal distribution on log transformed latency data because the latency data was significantly positively skewed; therefore, the raw latency data was not interpretable because it reflects skewness. Again, I was interested in the two-way interaction between personal control condition and target morph value (primary analyses) or target ambiguity (secondary analyses). For all analyses, I first tested for the three-way interaction between personal control condition (-5 [have personal control] vs. .5 [lack personal control]), target morph value (-5 or -6 [100% White or female] to 0 [50% White or female/50% Black or male] to 5 or 6 [100% Black or male]) or target ambiguity (0 [100% White, Black, female or male] to 5 or 6 [50% White or female/50% Black or male]), and categorization type (0=White or female, 1=Black or male) to determine whether categorization type moderated the two-way interaction between personal control condition and target morph value or ambiguity. If categorization type significantly moderated the two-way interaction, I disaggregated my data and tested the two-way interaction between personal control condition and target morph value or ambiguity separately for Black or male categorization latencies and White or female categorization latencies. When categorization type did not significantly moderate the two-way interaction, I tested the two-way interaction between personal control condition and target morph value or ambiguity on all latencies regardless of categorization type.

Race: Primary analysis. The three-way interaction between personal control condition, target morph value, and categorization type was not significant, B = -.0075, *SE*

= .0158, z = -.48, p = .6347. In the two-way interaction model, the main effect of target morph value was significant, B = -.0139, SE = .0014, z = -9.84, p < .0001, such that all participants were significantly faster to categorize faces as target morph value (i.e., Black prototypicality) increased. However, neither the main effect of personal control condition, B = .0256, SE = .0384, z = .67, p = .5040, nor the interaction effect, B = .0041, SE = .0028, z = 1.44, p = .1494, were significant.

Race: Secondary analysis. When looking at target ambiguity, the three-way interaction was significant, B = -.0186, SE = .0089, z = -2.09, p = .0362. In the disaggregated two-way interaction models, the main effect of target ambiguity on categorization latency was significant for Black categorization latencies, B = .0692, SE = .0042, z = 16.40, p < .0001, and White categorization latencies, B = .0619, SE = .0046, z = 13.34, p < .0001; that is, participants made significantly slower White and Black categorizations as target ambiguity increased. The main effect of condition was not significant for Black, B = .0300, SE = .0319, z = .94, p = .3465, or White, B = .0007, SE = .0346, z = .02, p = .9836, categorization latency models. The two-way interaction between personal control condition and target ambiguity was not significant in the Black categorization latency model, B = -.0038, SE = .0084, z = -.45, p = .6558, or the White categorization latency model, B = .0145, SE = .0093, z = 1.57, p = .1170, nor was the interaction effect moderated by participant race. These findings suggest that the significant three-way interaction between personal control condition, target ambiguity and categorization type was not driven by between condition effects. The collective race findings fail to support my prediction that lack personal control participants would be

faster to categorize prototypically Black and ambiguous faces as Black compared to have personal control participants.

Gender: Primary analysis. The three-way interaction between personal control condition, target morph value, and categorization type was not significant, B = -.0228, SE = .0142, z = -1.60, p = .1095. Consistent with race findings, in the two-way interaction model, the main effect of target morph value on categorization latencies was significant, B = -.0061, SE = .0011, z = -5.36, $p < .0001$; that is, participants were significantly faster to categorize face gender as target morph value (i.e., male prototypicality) increased. However, neither the main effect of personal control condition, B = .0480, SE = .0444, z = 1.08, p = .2795, nor the interaction effect, B = 0, SE = .0023, z = -.01, p = .9913, were significant.

Gender: Secondary analysis. In contrast to the race findings for target ambiguity, the three-way interaction was not significant, B = .0035, SE = .0083, z = .42, p = .6752. In the two-way interaction model, the main effect of target ambiguity was significant, B = .0493, SE = .0031, z = 15.93, $p < .0001$; that is, participants were significantly slower to categorize faces by gender as target ambiguity increased. However, neither the main effect of personal control condition, B = .0393, SE = .0349, z = 1.12, p = .2608, nor the interaction effect, B = .0032, SE = .0062, z = .51, p = .6106, was significant. Consistent with race findings, gender findings failed to support the predicted effect of personal control condition on categorization speeds as a function of target morph value or ambiguity.

Discussion

Results from Study 5B provided minimal support for my main hypotheses. On the morph sequence categorization task, in contrast to Study 5A's null results, lack personal control participants demonstrated significantly higher gender categorization thresholds than have personal control participants regardless of categorization type (male vs. female). On the speeded categorization task, personal control condition failed to demonstrate a main or interactive (with target morph value or ambiguity) effect on any of the dependent variables.

Study 5B failed to provide any support for Hypothesis 1 (lacking personal control leading to greater use of heuristic face processing and categorization). On the other hand, Study 5B's gender morph sequence categorization task results did lend some support for Hypothesis 2 (lacking personal control leading to greater accuracy) as opposed to Hypothesis 3 (lacking personal control leading to faster processing speed). That is, people who lack personal control may demonstrate higher gender categorization thresholds because they are motivated to categorize ambiguous faces accurately. As the morph sequence progressed, participants received more cues (i.e., increasingly prototypical features) to guide their categorizations. Thus, waiting to categorize faces until they became more prototypical was an effective strategy for promoting accuracy in social judgments (i.e., speed-accuracy tradeoff). This finding, while in contrast to the effects observed in Studies 3A and 3B, may partly reflect methodological differences. First, whereas Studies 3A and 3B treated personal control as an individual differences variable, Study 5B manipulated need for personal control. Second, Studies 3A, 3B and 5B's speeded categorization tasks instructed participants to categorize completely ambiguous

and prototypical faces according to race or gender *as quickly as possible* (speed emphasis), whereas Study 5B's morph sequence categorization tasks instructed participants to categorize faces transitioning from complete ambiguity to complete prototypicality by race or gender *as accurately as possible* (accuracy emphasis).

Following personal control threat, participants may engage in a spontaneous structure-seeking process that is restricted by the nature of the subsequently presented task. Ambiguous face perception theoretically should provide a means of resolving personal control threat because ambiguous faces themselves represent an epistemic threat that people are generally motivated to resolve, and the salience of this threat is moderated by various bottom-up (e.g., race prototypicality) and top-down (e.g., motivation) processes. This is distinct from the physical threat associated with faces that are perceived as prototypically Black and male. While participants were primed to approach ambiguous face categorizations with a speed emphasis in Studies 3A, 3B and 5B's speeded categorization task, participants in Study 5B were primed to approach ambiguous face categorizations with an accuracy emphasis during the morph sequence categorization task. Importantly, different processes will facilitate each of these approaches to ambiguous face categorizations (e.g., heuristic face processing facilitates speed but not accuracy). Thus, these two seemingly disparate sets of findings represent two different means for restoring order and structure in one's environment through ambiguous face processing and categorizations.

Surprisingly, analyses of the speeded categorization task (which also encouraged fast responding) failed to produce conceptually similar findings to those demonstrated in Studies 3A and 3B, which revealed that higher chronic need for personal control

predicted greater heuristic face processing. Interestingly, the consistent main effect of target morph value and ambiguity on the probability of Black and male categorizations indicated that participants were generally relying on heuristics to categorize faces regardless of personal control condition. This led me to consider that my models may be failing to account for an important moderating variable in the speeded categorization task. That is, under what conditions (viz. individual differences) will peoples' reliance on heuristic face processing differ as a function of personal control condition (Hypothesis 1)? I aimed to test this prediction in Study 6. Thus, Study 6 aimed to first replicate the null effect of personal control threat on racially and gender ambiguous face processing and categorization, and to explore whether between condition effects emerge based on peoples' prejudice toward racially or gender ambiguous people, intergroup contact quantity and quality, political beliefs, perceived government instability, and entitativity beliefs.

Study 6: Testing Moderators of the Main Effect of Personal Control Threat on the Processing and Categorization of Racially and Gender Ambiguous Faces

Given the inconclusive results of Studies 5A and 5B, Study 6 sought to establish the chronic and situationally activated motivations that moderate the effect of personal control threat on ambiguous person perception. To this end, I tested five theoretically related moderators: prejudice (gender: androgynous people; race: Biracial Black-White people), intergroup contact (quantity, quality), political beliefs, perceived government instability, and entitativity beliefs. In the case of intergroup attitudes, the "prejudiced personality" hypothesis argues that people who are most likely to express relatively unfavorable attitudes (i.e., prejudice) toward outgroups tend to have a constellation of

personality factors, including but not limited to: a social dominance orientation, authoritarianism, high need for closure and structure, politically conservative beliefs, and endorse religious fundamentalism (Stangor, 2009). Although, in general, the literature suggests that personal control threat should lead people to express more stereotyping and prejudice (cognitive heuristics), people who are high on the aforementioned individual difference measures should be more likely than those who are low on those same measures to rely on heuristic racially and gender ambiguous face judgments under personal control threat. I therefore predicted that people who are high (but not low) on a direct measure of prejudice against ambiguous people will be more likely to engage in heuristic face processing in the domains of race and gender (more Black or male than White or female categorizations and faster categorizations of increasingly ambiguous faces) when they situationally lack personal control versus have personal control. I made identical predictions for political conservatism; that is, people high (but not low) in politically conservative beliefs should be more likely to use heuristic processing and categorizations, particularly under personal control threat (see also Krosch et al., 2013).

Importantly, intergroup contact is one mechanism for reducing outgroup prejudice through both affective (e.g., reducing intergroup anxiety through exposure) and cognitive routes (e.g., updating stereotypic representations; Aberson & Haag, 2007; Tropp & Pettigrew, 2005), and some research on ambiguous face processing and categorizations does suggest that the relative homogeneity or diversity of one's local environment moderates the relation between face ambiguity and biased processing and categorizations (Freeman et al., 2016; Halberstadt et al., 2011; Webster et al., 2004). Moreover, the intergroup contact literature has produced a strong body of evidence for the differential

roles of contact *quantity* versus *quality.* Here, among people with low outgroup contact quantity and quality, following a personal control threat, the use of stereotyping and prejudice (and related heuristics) serves as a means of restoring one's threatened self-image; however, among people with high outgroup contact quantity and quality, the use of cognitive heuristics that reflect intergroup bias would not be a viable self-image maintenance mechanism. Thus, I predicted that participants high (but not low) in contact quantity and quality would be less likely to rely on heuristics during ambiguous social judgments, and this difference should be particularly pronounced in a personal control threatening context.

Contrary to my prediction for intergroup contact, I also tested whether high perceived government instability exacerbates the use of heuristic ambiguous face processing and categorizations under personal control threat. Government instability serves as a threat to external systems of control (Kay et al., 2010). Moreover, the compensatory control theory (CCT) literature suggests that sources of internal and external control fluidly compensate for one another (Kay et al., 2009). That is, if one source of people's sense of external control is threatened, they might protect their underlying belief in an orderly and non-random world by seeking out alternative external sources of structure. The most classic example of the hydraulic relation between different sources of control shows that when people's faith in the government declines, their faith in God increases in a compensatory fashion that maintains the perception of external order (Kay et al., 2010). To the extent that, as I argue in this dissertation, heuristic face processing and categorizations serve as an external source of control, it should serve a similar function to that of religion when perceived government instability is high. This

should be particularly true for people who experience a situational personal control threat, because they will be the most highly motivated to affirm a sense of meaning and structure. Thus, I predicted that people high (but not low) in perceived government instability would be more likely to rely on heuristic processing and categorizations in the domains of race and gender, and this should be particularly true among those who lack versus have personal control.

Finally, I explored whether individual differences in entitativity beliefs would moderate the effect of personal control threat and target morph value or ambiguity on heuristic face processing. Entitativity beliefs reflect people's general beliefs about the utility of social group categorizations; that is, do they serve as a useful heuristic? For example, stereotypes only serve as a useful heuristic to the extent that a person believes that members of groups are generally similar and unable to change. While much of past research has looked at entitativity beliefs toward specific groups (viz. African Americans), I chose to look at entitativity beliefs about social groups in general because it reflects a general cognitive orientation toward social categorizations. I therefore predicted that people high (but not low) on entitativity beliefs will be more likely to demonstrate heuristic face processing in the domains of race and gender, and again, the effect should be stronger among people who situationally lack personal control than those who have personal control.

Method

Participants and design. Two-hundred and sixty-seven heterosexual U.S.-born adults from Amazon Mechanical Turk participated for $.50-.75. Consistent with Study 3A, 3B, 5A and 5B's outlier analyses, 14 participants (5%) were dropped from analyses:

five for responding faster than 150 ms on over 10% of trials during the race speeded categorization task, eight for responding faster than 150 ms on over 10% of trials during the gender speeded categorization task, and one for responding slower than 3000 ms on over 10% of trials on the gender speeded categorization task. Of the final 253 (149 females, 104 males, M_{age} = 39.63 years, age range: 19-74 years), 78% were White or European American, 8% were Black or African American, 8% were Multiracial,4% were Asian or Asian American, 2% were Latino or Hispanic or Chicano or Puerto Rican, .4% were American Indian or Alaska Native, and .4% were Another identity. The experiment adopted a 2 (Personal control: lack personal control [n = 109] vs. [n = 144] have personal control) X 2 (Categorization: race [n = 117] vs. gender [n = 136]) X Continuous variable (Moderators: prejudice, intergroup contact, political beliefs, perceived government instability, entitativity beliefs) between-participants design with random assignment.

Manipulated variable. This study employed the same personal control manipulation as Studies 4, 5A and 5B.

Measured variables.

Speeded categorization tasks. The race speeded categorization task was identical to that used in Study 5B, whereas the gender speeded categorization task was modified from Study 5B in two ways. First, I only included gender faces that fell along the same morphing continuum as the race faces (i.e., -5 to 5), thereby reducing the total number of gender stimuli from 52 to 44. Second, I increased the number of gender categorization trials from 104 (two critical blocks of 52 trials) to 220 (two critical blocks of 110 trials). Thus, in each critical block of 110 trials, I programmed the experiment file to randomly present each face morph 10 times. While most gender faces were seen twice in each

block of critical trials, some were randomly presented three times to ensure that both race and gender participants were being exposed to the different morphing proportions at the same rate. Although participants in the gender condition viewed the same face morph proportions multiple times within each critical block as opposed to one time per critical block as in the race categorization task, I argue that all faces of the same morphing proportion (e.g., 40% female/60% male) activate the same categorization processes even if those face morphs come from different parent faces. Overall, these modifications aimed to standardize the gender and race speeded categorization measures and increase the reliability of our gender speeded categorization task by increasing the number of trials.

Prejudice. Participants randomly assigned to complete the gender task version reported their feelings toward *androgynous people*, whereas those randomly assigned to complete the race task version reported their feelings toward *Biracial Black-White people*. Participants indicated their overall feelings toward each group on a 100-point scale anchored at 0 (*cold*), 50 (*neutral*), and 99 (*warm*) (Greenwald, McGhee, & Schwartz, 1998). Responses were reverse scored such that higher scores indicated relatively stronger prejudice toward the ambiguous target group.

Intergroup contact. Participants completed either a race or gender contact questionnaire slightly modified from Tropp and Pettigrew (Study 2, 2005). Two items captured contact quantity ("How many *members of the opposite sex/Black people* would you consider to be your *close* friends?", "How many *members of the opposite sex/Black people* would you consider to be your *casual* friends?"). For each contact quantity item, participants indicated their response by typing in a numeric value. Two items captured contact quality ("How close do you feel to *members of the opposite sex/Black people* that

you know?", "How close do you feel to the one *member of the opposite sex/Black person* with whom you have had the closest relationship?"). For each contact quality item, participants indicated their response on a 7-point scale anchored at 0 (*Not at all close*) to 6 (*Very close*). Given the strong positive correlation between the two contact quantity items, $r(247) = .75$, $p < .001$, and between the two contact quality items, $r(247) = .73$, $p < .001$, we averaged the two quantity and quality items to create a composite score of contact quantity ($\alpha = .85$) and contact quality ($\alpha = .84$), respectively. People who reported more overall contact quantity were also significantly more likely to report more overall contact quality, $r(253) = .29$, $p < .001$.

Political beliefs. All participants were asked to report "How do you describe yourself politically?" on a one-item scale embedded in the demographic survey (Jost, 2006). Participants indicated their political beliefs on a 7-point scale: 1 (*Extremely liberal*), 2 (*Liberal*), 3 (*Slightly Liberal*), 4 (*Moderate/middle of the road*), 5 (*Slightly Conservative*), 6 (*Conservative*), 7 (*Extremely Conservative*). Thus, higher scores indicated relatively more conservative political beliefs.

Government instability. All participants completed a 4-item measure of perceived government instability. Each item began with the statement "Right now, the American government seems" followed by one of four adjectives: *unbalanced*, *united* (reverse scored), *dependable* (reverse scored), and *unreliable* (Kay et al., 2010). Items were rated on a scale ranging from 0 (*Not at all*) to 6 (*Extremely*). Higher scores indicated stronger beliefs that the American government is currently unstable ($\alpha = .89$).

Entitativity. All participants completed a 7-item measure of entitativity beliefs or the extent to which they believe that social groups are homogenous and immutable (see

Appendix F; Plaks, Stroessner, Dweck, & Sherman, 2001). Thus, entitativity beliefs serve as a proxy for the extent to which people feel that their social categorizations are meaningful and informative (e.g., "Every group is a certain type of collection of people, and there is not much that can be done to change that", "Groups can do things differently, but the important parts of who the group members are can't really be changed"). Participants indicated their agreement with each statement on a 7-point scale from 0 (*Strongly disagree*) to 6 (*Strongly agree*). Four items were reverse scored. Higher scores indicated higher entitativity beliefs ($\alpha = .91$).

Procedure. The procedure was identical to Study 5B; however, the study was administered on Amazon Mechanical Turk and the proposed moderators (counterbalanced) were administered in "Study 2" after the speeded categorization tasks.

Results

Replicating Study 5B results.

***Heuristic face processing*.** As a reminder, speeded categorization task data were analyzed using a multilevel GEE regression approach in SAS Studio (SAS Industry Inc., 2016). In these analyses, I was primarily interested in the two-way interaction between personal control condition and target morph value (primary analyses) or target ambiguity (secondary analyses). For binary response outcomes, the model specified a binary distribution and logit link function. For significant effects, logits (unstandardized B-values) were converted to percentages for ease of interpretation. As in Study 5B, I regressed categorizations (0=White or female, 1=Black or male) onto personal control condition (-5 [have personal control] vs. .5 [lack personal control]), target morph value (-5 [100% White or female] to 0 [50% White or female/50% Black or male] to 5 [100%

Black or male]) or target ambiguity (0 [100% White, Black, female or male] to 5 [50% White or female/50% Black or male]), and their interaction.

Race: Primary analysis. The main effect of target morph value on Black categorization probability was significant, $B = .9125$, $SE = .0604$, $z = 15.10$, $p < .0001$; that is, Black categorization probability increased as target morph value (i.e. Black prototypicality) increased. However, neither the main effect of personal control condition, $B = .1309$, $SE = .2497$, $z = .52$, $p = .6000$, nor the interaction effect, $B = -.0374$, $SE = .1208$, $z = -.31$, $p = .7569$, were significant, and the interaction was not moderated by participant race, $B = .1124$, $SE = .1106$, $z = 1.02$, $p = .3096$.

Race: Secondary analysis. The main effect of target ambiguity on Black categorization probability was also significant, $B = .2213$, $SE = .0148$, $z = 14.92$, $p < .0001$, such that Black categorization probability increased as ambiguity increased. However, the main effect of personal control condition, $B = -.0165$, $SE = .0412$, $z = -.40$, $p = .6896$, and the two-way interaction between personal control condition and target ambiguity, $B = .0070$, $SE = .0297$, $z = .23$, $p = .8148$, were not significant. Moreover, the interaction was not moderated by participant race, $B = .0426$, $SE = .0372$, $z = 1.14$, $p = .2526$. Together, results for Black categorization probability (i.e., heuristic race categorizations) replicated Study 5B's non-significant findings.

Gender: Primary analysis. The main effect of target morph value on male categorization probability was significant, $B = .8905$, $SE = .0651$, $z = 13.69$, $p < .0001$; that is, male categorization probability increased as target morph value (i.e., male prototypicality) increased. However, neither the main effect of personal control condition, $B = -.1198$, $SE = .1011$, $z = -1.19$, $p = .2357$, nor the two-way interaction

between personal control condition and target morph value, B = .0635, SE = .1301, z = .49, p = .6256, were significant. The interaction was also not moderated by participant gender, B = -.0638, SE = .2554, z = -.25, p = .8027.

Gender: Secondary analysis. The main effect of target ambiguity on male categorization probability was also significant, B = .0760, SE = .0112, z = 6.77, p < .0001; that is, male categorization probability increased as target ambiguity increased. However, the main effect of personal control condition, B = .0264, SE = .0236, z = 1.12, p = .2637, the two-way interaction between personal control condition and target ambiguity, B = -.0276, SE = .0224, z = -1.23, p = .2179, were not significant, and the interaction was not moderated by participant gender, B = -.0694, SE = .0458, z = -1.52, p = .1296. These non-significant gender heuristic face categorization effects replicate those obtained in Study 5B.

Processing speed. I also investigated the role of personal control threat on people's processing of ambiguous faces. As a reminder, in these analyses I was most interested in the two-way interaction between personal control condition and target morph value or target ambiguity. I again conducted GEE analyses with a normal distribution using log transformed latency data because the latency data was significantly positively skewed (see Study 5B). Consistent with Study 5B, I first tested for the three-way interaction between personal control condition (-5 [have personal control] vs. .5 [lack personal control]), target morph value (-5 [100% White or female] to 0 [50% White or female/50% Black or male] to 5 [100% Black or male]) or target ambiguity (0 [100% White, Black, female or male] to 5 [50% White or female/50% Black or male]), and categorization type (0=White or female, 1=Black or male) to determine whether

categorization type moderated the two-way interaction between personal control condition and target morph value or ambiguity. If categorization type significantly moderated the two-way interaction (as Hypothesis 1 would suggest), I disaggregated my data and tested the two-way interaction between personal control condition and target morph value or ambiguity separately for Black or male categorization latencies and White or female categorization latencies (consistent with Hypothesis 3). When categorization type did not significantly moderate the two-way interaction, I tested the two-way interaction between personal control condition and target morph value or ambiguity on all latencies regardless of categorization type.

Race: Primary analysis. The three-way interaction between personal control condition, target morph value and categorization type was not significant, $B = .0073$, $SE = .0134$, $z = .54$, $p = .5884$. In the two-way interaction model, the main effect of target morph value on race categorization speed was significant, $B = -.0171$, $SE = .0013$, $z = -13.22$, $p < .0001$; that is, participants were significantly faster to categorize faces as morph value (i.e., Black prototypicality) increased. However, neither the main effect of personal control condition, $B = .0189$, $SE = .0294$, $z = .64$, $p = .5201$, nor the interaction effect, $B = .0010$, $SE = .0026$, $z = .37$, $p = .7119$, were significant. Interestingly, and in contrast to Study 5B, participant race significantly moderated this two-way interaction, $B = -.0085$, $SE = .0034$, $z = -2.48$, $p = .0133$. I therefore decomposed the two-way interaction by ethnic-racial group. The two-way interaction between personal control condition and target morph value was significant among White participants ($n = 86$), $B = .0059$, $SE = .0026$, $z = -11.94$, $p = .0232$, and Black or part-Black participants ($n = 14$), $B = -.0180$, $SE = .0079$, $z = -2.27$, $p = .0233$, but not among non-White, non-Black

participants (n = 17), B = -.0070, SE = .0064, z = -1.09, p = .2745. Further analyses revealed that among White participants, the relation between increasing target morph value (i.e., Black prototypicality) and faster race categorization speed was significantly *weaker* among lack control participants, B = -.0126, SE = .0016, z = -8.07, p < .0001, than have control participants, B = -.0186, SE = .0021, z = -8.87, p < .0001. Among Black or part-Black participants, however, the relation between increasing target morph value (i.e., Black prototypicality) and faster race categorization speed was significantly *stronger* among lack control participants, B = -.0305, SE = .0064, z = -4.80, p < .0001, than have control participants, B = -.0125, SE = .0047, z = -2.64, p < .0001. While these between participant race effects are certainly interesting, I will not speculate on their implication given the relatively small number of Black or part-Black (n = 23) and non-White, non-Black (n = 34) participants included in the analysis.

Race: Secondary analysis. In contrast to Study 5B, the three-way interaction between personal control condition, target ambiguity and categorization type was not significant, B = -.0049, SE = .0064, z = -.77, p = .4411. In the two-way interaction model, the main effect of target morph value on race categorization speed was significant, B = .0418, SE = .0027, z = 15.22, p < .0001; that is, participants were significantly slower to categorize faces as ambiguity increased. However, neither the main effect of personal control condition, B = .0259, SE = .0246, z = 1.05, p = .2933, nor the two-way interaction between personal control condition and target ambiguity, B = -.0032, SE = .0055, z = -.58, p = .5639, were significant, and the interaction was not moderated by participant race, B = .0004, SE = .0087, z = .05, p = .9595. Thus, race categorization speed analyses yielded similarly non-significant effects as those observed in Study 5B.

Gender: Primary analysis. For gender, the three-way interaction between personal control condition, target morph value and categorization type was not significant, $B = .0082$, $SE = .0129$, $z = .63$, $p = .5270$. In the two-way interaction model, the main effect of target morph value was significant, $B = -.0075$, $SE = .0011$, $z = -6.59$, $p < .0001$, such that participants were significantly faster to categorize faces by gender as target morph value (i.e., male prototypicality) increased. However, results yielded a non-significant main effect of personal control condition, $B = -.0197$, $SE = .0299$, $z = -.66$, $p = .5095$, and interaction effect of personal control condition and target ambiguity, $B = .0020$, $SE = .0023$, $z = .90$, $p = .3663$. The interaction was not moderated by participant gender, $B = .0021$, $SE = .0047$, $z = .46$, $p = .6478$.

Gender: Secondary analysis. The three-way interaction between personal control condition, target ambiguity and categorization type was also not significant, $B = -.0039$, $SE = .0058$, $z = -.68$, $p = .4941$. In the two-way interaction model, the main effect of target ambiguity was significant, $B = .0561$, $SE = .0026$, $z = 21.87$, $p < .0001$; that is, participants were significantly slower to categorize faces as target ambiguity increased. However, neither the main effect of personal control condition, $B = -.0037$, $SE = .0250$, $z = -.15$, $p = .8828$, nor the two-way interaction between personal control condition and target ambiguity, $B = -.0071$, $SE = .0051$, $z = -1.38$, $p = .1683$, were significant. Additionally, participant gender did not moderate the interaction, $B = .0088$, $SE = .0108$, $z = .81$, $p = .4174$. Together, the findings for the main and interactive effects (with target morph value or ambiguity) of personal control condition on gender categorization speed are identical to those obtained in Study 5B. That is, while people are generally

categorizing faces ranging in gender prototypicality in line with heuristics, these effects do not differ as a function of personal control condition.

Testing for moderation.

Heuristic face processing (Hypothesis 1). To test my predictions regarding the proposed moderators, I regressed race (0=White, 1=Black) or gender (0=female, 1=male) categorizations onto personal control condition (-.5 [have personal control] vs. .5 [lack personal control]),target morph value (-5 [100% White or female] to 0 [50% White or female/50% Black or male] to 5 [100% Black or male]) or target ambiguity (0 [100% White, Black, male or female] to 5 [50% White or female/50% Black or male]), the mean-centered moderator, followed by all two- and three-way interaction terms. Significant and marginally significant three-way interactions were further analyzed by examining the two-way personal control condition by target morph value or ambiguity centered at low and high levels of the moderator (1 SD above and below the mean; Aiken & West, 1991). This allowed me to determine whether the between condition effect was driving the three-way interaction. Significant and marginally significant two-way interactions at different levels of the moderator were interpreted by examining the simple effect of target morph value or ambiguity centered on each condition (consistent with Study 5B original analyses). Given the increased chance of Type 1 error present in multiple comparisons, I applied a Bonferroni correction to my error rate (.05) by dividing it by the total number of tests per model (6), resulting in a conservative alpha of .008. Thus, significant and marginally significant effects must be interpreted with caution for the remainder of my analyses.

Prejudice.

Race: The three-way interaction between personal control condition, target morph value and prejudice against biracial Black-White people was significant, B = -.0093, SE = .0034, z = -2.71, p = .0067; however, the two-way interaction between personal control condition and target morph value did not reach significance centered on either low prejudice, B = .2135, SE = .1364, z = 1.57, p = .1175, or high prejudice, B = -.2303, SE = .1598, z = -1.44, p = .1495. This suggests that the between condition difference in the relation between target morph value and Black categorization probability at different levels of the moderator did not drive the significant three-way interaction.

As when target morph value was used as a predictor, the three-way interaction between condition, target ambiguity and prejudice against biracial Black-White people was significant, B = -.0027, SE = .0012, z = -2.24, p = .0249. Also consistent with my primary analyses, however, the two-way interaction between personal control condition and target ambiguity did not reach significance centered on either low prejudice, B = .0662, SE = .0409, z = 1.62, p = .1052, or high prejudice, B = -.0611, SE = .0401, z = -1.52, p = .1278. Therefore, both my primary and secondary analyses failed to support my prediction that among high (but not low) prejudiced people, lacking personal control would lead to greater use of categorization heuristics as target morph value (i.e., Black prototypicality) or target ambiguity increased than having personal control.

Gender: The three-way interaction between condition, target morph value and prejudice against androgynous people was marginally significant, B = -.0061, SE = .0035, z = -1.75, p = .0795. However, mirroring the race findings, the two-way interaction between personal control condition and target morph value was not significant centered

on either low prejudice, $B = .1979$, $SE = .1343$, $z = 1.47$, $p = .1405$, or high prejudice, $B = -.1184$, $SE = .1656$, $z = -.72$, $p = .4745$.

The three-way interaction was marginally significant when target ambiguity was used as a predictor, $B = -.0012$, $SE = .0007$, $z = -1.78$, $p = .0749$. Interestingly, while the two-way interaction was not significant centered on low prejudice, $B = .0043$, $SE = .0277$, $z = .16$, $p = .8768$, it was significant centered on high prejudice, $B = -.0595$, $SE = .0291$, $z = -2.04$, $p = .0410$ (see Figures 2A-B). Contrary to my prediction that people high in prejudice would be more likely to rely on heuristic face categorizations as face ambiguity increased when they lacked versus had personal control, I found people high in prejudice demonstrated a weaker relation between higher ambiguity and higher male categorization probability when they lacked control, $B = .0442$, $SE = .0211$, $z = 2.09$, $p = .0366$, compared to when they had control, $B = .1037$, $SE = .0201$, $z = 5.17$, $p < .0001$.

Intergroup contact.

Race: Neither the three-way interaction between condition, target morph value and contact was significant for contact quantity, $B = .0016$, $SE = .0033$, $z = .49$, $p = .6210$, or contact quality, $B = .0679$, $SE = .0430$, $z = 1.58$, $p = .1142$. When target ambiguity served as a predictor, the three-way interaction also failed to reach significance for contact quantity, $B = .0005$, $SE = .0020$, $z = .24$, $p = .8123$, and contact quality, $B = .0228$, $SE = .0154$, $z = 1.48$, $p = .1395$. Therefore, these findings do not support any of my predictions.

Gender: The three-way interaction between condition, target morph value and contact was not significant for contact quantity, $B = -.0060$, $SE = .0131$, $z = -.46$, $p = .6465$, or contact quality, $B = -.0258$, $SE = .0681$, $z = -.38$, $p = .7043$. Similarly, the

three-way interaction between condition, target ambiguity and contact was not significant for contact quantity, $B = .0002$, $SE = .0028$, $z = .09$, $p = .9322$, or contact quality, $B = .0174$, $SE = .0206$, $z = .84$, $p = .3981$. Thus, both race and gender analyses failed to support the moderating role of contact quantity or quality on the relation between personal control condition and the processing and categorization of faces ranging in ambiguity.

Political beliefs.

Race: The three-way interaction between condition, target morph value and political beliefs was not significant, $B = .0586$, $SE = .0559$, $z = 1.05$, $p = .2941$. The three-way interaction also did not significantly predict Black categorization probabilities when target ambiguity was a predictor, $B = -.0123$, $SE = .0178$, $z = -.69$, $p = .4894$.

Gender: As with race, the three-way interaction between personal control condition, target morph value or ambiguity and political beliefs did not significantly predict male categorization probability when either target morph value, $B = -.0333$, $SE = .0595$, $z = -.56$, $p = .5752$, or target ambiguity, $B = -.0021$, $SE = .0107$, $z = -.19$, $p = .8473$, was the predictor. These findings suggest that political conservatism does not moderate the relation between target morph value or ambiguity and default categorization probability in the domains of race and gender.

Perceived government instability.

Race: The three-way interaction between personal control condition, target morph value and perceived government instability was not significant, $B = -.0962$, $SE = .0804$, $z = -1.20$, $p = .2311$. The three-way interaction between condition, target ambiguity and

perceived government instability was also not significant, B = -.0249, SE = .0215, z = -1.16, p = .2479.

Gender: Consistent with race, the three-way interaction between personal control condition, target morph value or ambiguity and perceived government instability did not significantly predict male categorization probability when either target morph value, B = .1235, SE = .0980, z = 1.26, p = .2076, or target ambiguity, B = .0063, SE = .0168, z = .37, p = .7090, was the predictor. These findings suggest that like the related construct of political conservatism, perceived government instability does not moderate the relation between target morph value or ambiguity and Black or male categorization probability.

Entitativity Beliefs.

Race: Primary analysis. The three-way interaction between condition, target morph value and entitativity beliefs was significant, B = -.2463, SE = .0994, z = -2.48, p = .0132. While the two-way interaction between personal control condition and target morph value was not significant centered on low entitativity beliefs, B = .2343, SE = .1464, z = 1.60, p = .1096, the interaction was significant centered on high entitativity beliefs, B = -.4163, SE = .2028, z = -2.05, p = .0401 (see Figures 3A-B). In contrast to my prediction that people high in entitativity beliefs would be more likely to categorize faces heuristically as target morph value (i.e., Black prototypicality) increased when they lacked versus had personal control, I found that among those with high entitativity beliefs, the relation between increasing Black prototypicality and higher Black categorization probability was weaker when lacking personal control, B = .7196, SE = .1787, z = 4.03, p < .0001, than having personal control, B = 1.1359, SE = .0958, z = 11.86, p < .0001. This finding suggests that for people who are high in the belief that

social categories can predict stable group-based differences, those who lack control are less likely to demonstrate a steep category boundary between White and Black judgments (i.e., less steep "S" curve) than those who have personal control.

By comparison, the three-way interaction between personal control condition, target ambiguity and entitativity beliefs was not significant, B = -.0334, SE = .0253, z = -1.32, p = .1870.

Gender: The three-way interaction between condition, target morph value or ambiguity and entitativity beliefs was not significant when target morph value, B = .0614, SE = .0891, z = .69, p = .4907, or target ambiguity, B = .0079, SE = .0169, z = .47, p = .6406, was the predictor.

Processing speed. Prior to testing my processing speed predictions regarding the proposed moderators, I regressed log transformed race or gender categorization latencies onto personal control condition (-.5 [have personal control] vs. .5 [lack personal control]), target morph value (-5 [100% White or female] to 0 [50% White or female/50% Black or male] to 5 [100% Black or male]) or target ambiguity (0 [100% White, Black, male or female] to 5 [50% White or female/50% Black or male]), the mean-centered moderator, categorization type (0=White or female, 1=Black or male), followed by all two-, three- and four-way interaction terms. If the four-way interaction between personal control condition, target morph value or ambiguity, the moderator and categorization type was significant, I disaggregated the three-way interaction between personal control condition, target morph value or ambiguity, and the moderator for default (Black or male) and non-default (White or female) categorization latencies. If the four-way interaction was not significant, I ran the three-way interaction between personal control condition, target

morph value or ambiguity, and the moderator using collapsed categorization latencies as the criterion. Significant and marginally significant three-way interactions were further analyzed by examining the two-way personal control condition by target morph value or ambiguity centered at low and high levels of the moderator (1 SD above and below the mean; Aiken & West, 1991). This allowed me to determine whether the between condition effect was driving the three-way interaction. Significant and marginally significant two-way interactions at different levels of the moderator were interpreted by examining the simple effect of target morph value or ambiguity centered on each condition (consistent with Study 5B original analyses). As noted above, given the inflated chance of Type 1 error associated with multiple comparisons, significant and marginally significant results must be interpreted with caution.

Prejudice.

Race: The four-way interaction between personal control condition, target morph value, prejudice against Biracial Black-White people and categorization type was marginally significant, $B = .0013$, $SE = .0006$, $z = 1.95$, $p = .0510$. The three-way interaction between personal control condition, target morph value, and prejudice against Biracial Black-White people was significant when predicting Black categorization latencies, $B = .0007$, $SE = .0003$, $z = 2.77$, $p = .0057$, but not White categorization latencies, $B = -.0006$, $SE = .0005$, $z = -1.14$, $p = .2526$. Further analyses of Black categorization latencies revealed that the two-way interaction between personal control condition and target morph value was significant when centered on high prejudice, $B = .0247$, $SE = .0086$, $z = 2.86$, $p = .0042$, but not low prejudice, $B = -.0097$, $SE = .0089$, $z = -1.10$, $p = .2728$ (see Figures 4A-B). Contrary to my prediction that high prejudice people

(but not low prejudice people) would make faster and more heuristic face categorizations when lacking control compared to having control, I found that the relation between faster Black categorizations and increasing target morph value (i.e., Black prototypicality) was weaker among lack personal control high prejudice people, B = -.0194, SE = .0066, z = -2.93, p = .0034, than have personal control high prejudice people, B = -.0441, SE = .0055, z = -8.00, p < .0001.

When target ambiguity served as a predictor, the four-way interaction between condition, target ambiguity, prejudice against Biracial Black-White people and categorization type was not significant, B = -.0001, SE = .0003, z = -.25, p = .7991. The three-way interaction between condition, target ambiguity, and prejudice against Biracial Black-White people was significant, B = -.0005, SE = .0002, z = -2.16, p = .0305. Further analyses on collapsed categorization latencies revealed that the two-way interaction between personal control condition and target ambiguity was significant when centered on high prejudice, B = -.0159, SE = .0074, z = -2.15, p = .0313, but not low prejudice, B = .0075, SE = .0076, z = .99, p = .3238 (see Figures 5A-B). Consistent with my prediction that high prejudice people (but not low prejudice people) would make faster and more heuristic face categorizations when lacking control compared to having control, I found that the relation between slower race categorizations and increasing target ambiguity was weaker among lack personal control high prejudice people, B = .0304, SE = .0049, z = 6.19, p < .0001, than have personal control high prejudice people, B = .0462, SE = .0055, z = 8.39, p < .0001. These findings are more consistent with Hypothesis 3 (faster processing speed) because high prejudice people who situationally lack control are

speeding up their responses relative to those who have control, consistent with a compensatory control effect.

Gender: The four-way interaction between condition, target morph value, prejudice against androgynous people and categorization type was not significant, $B = 0$, $SE = .0005$, $z = .07$, $p = .9440$, nor was the three-way interaction between condition, target morph value, and prejudice against androgynous people, $B = .0001$, $SE = .0001$, $z = 1.30$, $p = .1926$. Neither the four-way interaction, $B = -.0003$, $SE = .0002$, $z = -1.43$, $p = .1513$ (hence no moderation by categorization type), nor the three-way interaction, $B = .0001$, $SE = .0002$, $z = .69$, $p = .4933$, was significant when target ambiguity served as the predictor. These non-significant gender categorization latency effects do not support any of my predictions.

Intergroup contact.

Race: The four-way interaction between personal control condition, target morph value, contact quantity and categorization type was significant, $B = -.0010$, $SE = .0005$, $z = -2.22$, $p = .0265$. Disaggregated by categorization type, the three-way interaction between condition, target morph value, and contact quantity did not significantly predict Black categorization latencies, $B = -.0003$, $SE = .0002$, $z = -1.46$, $p = .1435$, but did significantly predict White categorization latencies, $B = .0008$, $SE = .0004$, $z = 2.03$, $p = .0423$. However, the two-way interaction between personal control condition and target morph value (i.e., Black prototypicality) did not significantly predict White categorization speed when centered on low contact quantity, $B = -.0119$, $SE = .0094$, $z = -1.27$, $p = .2042$, or high contact quantity, $B = .0092$, $SE = .0125$, $z = .73$, $p = .4629$. When contact quality was entered as the moderator, neither the four-way, $B = -.0066$, $SE =$

.0075, z = -.89, p = .3729, nor three-way interactions, B = -.0020, SE = .0019, z = -1.10, p = .2720, were significant.

The four-way interaction between personal control condition, target ambiguity, contact quantity and categorization type was marginally significant, B = -.0004, SE = .0002, z = -1.66, p = .0973. Disaggregated by categorization type, the three-way interaction between condition, target morph value, and contact quantity did not significantly predict Black categorization latencies, B = .0001, SE = .0002, z = .37, p = .7079, but did significantly predict White categorization latencies, B = .0005, SE = .0002, z = 2.32, p = .0204. However, as with target morph value, the two-way interaction between personal control condition and target ambiguity did not significantly predict White categorization speed when centered on low contact quantity, B = -.0061, SE = .0075, z = -.81, p = .4195, or high contact quantity, B = .0067, SE = .0064, z = 1.05, p = .2954. Also consistent with target morph value findings, when contact quality was entered as the moderator, neither the four-way, B = .0018, SE = .0040, z = .45, p = .6500, nor three-way interactions, B = .0012, SE = .0029, z = .40, p = .6894, were significant. Thus, as was evident from my categorization analyses, neither contact quantity or quality appears to moderate the strength of the relation between increasing target morph value or ambiguity and the processing or categorization of faces ranging in ambiguity as a function of personal control condition.

Gender: The four-way interaction between personal control condition, target morph value, contact and categorization type was not significant for contact quantity, B = .0008, SE = .0015, z = .51, p = .6083, or contact quality, B = .0127, SE = .0119, z = 1.07, p = .2830. Similarly, the three-way interaction between personal control condition, target

morph value, and contact did not significantly predict gender categorization latencies for contact quantity, B = .0003, SE = .0002, z = 1.16, p = .2446, or contact quality, B = -.0003, SE = .0022, z = -.15, p = .8811.

When target ambiguity served as a predictor, the four-way interaction was not significant for contact quantity, B = .0005, SE = .0006, z = .74, p = .4565, or contact quality, B = -.0018, SE = .0048, z = -.38, p = .7058. The three-way interaction also failed to significantly predict gender categorization latencies for contact quantity, B = 0, SE = .0007, z = .03, p = .9734, and contact quality, B = -.0074, SE = .0049, z = -1.50, p = .1347. Taken together, contact quantity and quality do not appear to moderate the relation between increasing target morph value or ambiguity and the processing or categorization of faces ranging in ambiguity as a function of personal control condition in the domains of race or gender.

Political beliefs.

Race: The four-way interaction between personal control condition, target morph value, political beliefs and categorization type was not significant, B = .0069, SE = .0069, z = .99, p = .3228. Although the three-way interaction between condition, target ambiguity, and political beliefs was marginally significant, B = .0027, SE = .0016, z = 1.73, p = .0840, further analyses on collapsed categorization latencies revealed that the two-way interaction between personal control condition and target ambiguity was not significant when centered on low (liberal) political beliefs, B = -.0036, SE = .0039, z = -.92, p = .3592, or high (conservative) political beliefs, B = .0057, SE = .0037, z = 1.54, p = .1231. This suggests that between condition effects were not driving the significant three-way interaction.

The four-way interaction between personal control condition, target ambiguity, political beliefs and categorization type was not significant, B = -.0032, SE = .0034, z = -.93, p = .3547. The three-way interaction between personal control condition, target ambiguity, and political beliefs did not significantly predict race categorization speed, B = -.0003, SE = .0035, z = -.10, p = .9239. While inconsistent with my original prediction, these non-significant findings parallel the null effects obtained when looking at the moderating role of political beliefs on Black categorization probability.

Gender: The four-way interaction between personal control condition, target morph value or ambiguity, political beliefs and categorization type was not significant when target morph value, B = .0002, SE = .0066, z = .02, p = .9814, or target ambiguity, B = .0026, SE = .0032, z = .83, p = .4066, was the predictor. Similarly, the three-way interaction between personal control condition, target morph value or ambiguity and political beliefs did not significantly predict gender categorization speed when target morph value, B = .0004, SE = .0011, z = .32, p = .7501, or target ambiguity, B = 0, SE = .0025, z = 0, p = .9985, was the predictor. Thus, both race and gender categorization speed analyses fail to support the moderating role of political beliefs in the processing and categorization of faces varying in ambiguity as a function of personal control condition.

Perceived government instability.

Race: The four-way interaction between personal control condition, target morph value or ambiguity, perceived government instability and categorization type was not significant when target morph value, B = -.0078, SE = .0114, z = -.69, p = .4924, or target ambiguity, B = -.0052, SE = .0047, z = -1.11, p = .2684, was the predictor. Similarly, the

three-way interaction between personal control condition, target morph value or ambiguity and perceived government instability did not significantly predict race categorization speed when target morph value, B = .0007, SE = .0023, z = .30, p = .7632, or target ambiguity, B = .0009, SE = .0038, z = .23, p = .8215, was the predictor. These findings are consistent with the non-significant moderating effect of perceived government instability on Black categorization probability.

Gender: Gender categorization speed results were identical to those obtained for race categorization speed. Specifically, the four-way interaction was not significant when the predictor was target morph value, B = -.0002, SE = .0085, z = -.02, p = .9847, or target ambiguity, B = .0019, SE = .0049, z = .39, p = .6977. The three-way interaction was also non-significant when the predictor was target morph value, B = .0002, SE = .0017, z = .12, p = .9044, and target ambiguity, B = .0014, SE = .0036, z = .38, p = .7014. Thus, race and gender categorization speed findings do not support the moderating role of perceived government instability, which is conceptually similar to the motivation captured by political beliefs, in either the processing or categorization of faces ranging in ambiguity as a function of personal control condition.

Entitativity beliefs.

Race: The four-way interaction between personal control condition, target morph value, entitativity beliefs and categorization type was significant, B = .0228, SE = .0101, z = 2.25, p = .0244. Disaggregated by categorization type, the three-way interaction between condition, target morph value, and entitativity beliefs significantly predicted Black categorization latencies, B = .0116, SE = .0049, z = 2.36, p = .0183, and White categorization latencies, B = -.0171, SE = .0061, z = -2.82, p = .0048. The two-way

interaction between personal control condition and target morph value (i.e., Black prototypicality) did not significantly predict Black categorization speed when centered on low entitativity beliefs, B = -.0067, SE = .0076, z = -.89, p = .3741, but did significantly predict Black categorization speed when centered on high entitativity beliefs, B = .0240, SE = .0107, z = 2.23, p = .0254 (see Figures 6A-B). In contrast to my prediction that people with high (but not low) entitativity beliefs would make faster and more heuristic face categorizations when lacking control compared to having control, I found that the relation between faster Black categorizations and increasing Black prototypicality was weaker among lack personal control high entitativity belief people, B = -.0223, SE = .0085, z = -2.61, p = .0089, than have personal control high entitativity belief people, B = -.0463, SE = .0065, z = -7.07, p < .0001. Interestingly, the two-way interaction between personal control condition and target morph value (i.e., Black prototypicality) marginally significantly predicted White categorization speed when centered on both low entitativity beliefs, B = .0185, SE = .0102, z = 1.82, p = .0694, and high entitativity beliefs, B = -.0267, SE = .0142, z = -1.88, p = .0604 (see Figures 7A-B). Centered on low entitativity beliefs, I found that the relation between slower White categorizations and increasing target morph value (i.e., Black prototypicality) was stronger among those who lacked personal control, B = .0320, SE = .0084, z = 3.80, p = .0001, than among those who had personal control, B = .0135, SE = .0057, z = 2.37, p = .0180. Centered on high entitativity beliefs, I found the opposite pattern of results; that is, the relation between slower White categorizations and increasing target morph value (i.e., Black prototypicality) was weaker (and non-significant) among those who lacked personal control, B = -.0014, SE = .0130, z = -.11, p = .9132, compared to those who had personal control, B = .0253, SE = .0057, z =

4.47, $p < .0001$. These findings are more consistent with Hypothesis 2 (accuracy) because people with high entitativity beliefs who situationally lack control are showing less bias in their Black and White categorization speeds than those who have control.

The four-way interaction between personal control condition, target ambiguity, entitativity beliefs and categorization type was not significant, $B = -.0047$, $SE = .0047$, $z = -1.00$, $p = .3165$. Collapsed across categorization type, the three-way interaction between condition, target ambiguity, and entitativity beliefs significantly predicted race categorization latencies, $B = -.0084$, $SE = .0042$, $z = -1.97$, $p = .0491$. The two-way interaction between personal control condition and target morph value (i.e., Black prototypicality) did not significantly predict race categorization speed when centered on low entitativity beliefs, $B = .0058$, $SE = .0076$, $z = .76$, $p = .4444$, but did significantly predict race categorization speed when centered on high entitativity beliefs, $B = -.0162$, $SE = .0079$, $z = -2.06$, $p = .0398$ (see Figures 8A-B). Consistent with my prediction that people with high (but not low) entitativity beliefs would make faster categorizations when lacking control compared to having control, I found that the relation between slower race categorizations and increasing target ambiguity was weaker among lack personal control participants with high entitativity beliefs, $B = .0296$, $SE = .0065$, $z = 4.53$, $p < .0001$, than have personal control participants with high entitativity beliefs, $B = .0459$, $SE = .0044$, $z = 10.40$, $p < .0001$. Thus, consistent with Hypothesis 3 (faster processing speed), among those with high entitativity beliefs, lacking personal control led to faster race categorizations (Black or White) of increasingly ambiguous faces than having personal control.

Gender: In contrast to my race latency results, the four-way interaction did not significantly predict gender categorization speed when the predictor was target morph value, B = .0006, SE = .0087, z = .07, p = .9474, or target ambiguity, B = .0005, SE = .0038, z = .14, p = .8878. The three-way interaction was also non-significant when the predictor was target morph value, B = -.0015, SE = .0014, z = -1.09, p = .2752, and target ambiguity, B = -.0012, SE = .0036, z = -.33, p = .7400. Thus, unlike race categorization speed findings, gender categorization speed findings do not support the moderating role of entitativity beliefs.

Discussion

Study 6 generally replicated Study 5B's non-significant effect of personal control condition on the relation between target morph value (Black or male prototypicality) or ambiguity and racially and gender ambiguous face processing and categorizations. Thus, although people were generally more likely to categorize both increasingly prototypical Black or male faces and increasingly ambiguous faces as Black or male, contrary to Hypothesis 1, this heuristic face processing and categorization effect was not moderated by lacking versus having personal control. In the same vein, although people were generally faster to categorize faces as they became increasingly male or Black, and were slower to categorize faces as they became increasingly ambiguous, contrary to Hypothesis 3, this effect did not differ as a function of personal control condition. Despite these null and underwhelming main effects, a series of moderator analyses tentatively suggested that personal control manipulation may only affect the ambiguous person perception of people with certain attitudes, experiences and beliefs. Taken together, these findings largely failed to support my competing predictions, but suggested an important

avenue for future research on moderators of the relation between personal control and ambiguous person perception.

Surprisingly, contact (quantity or quality), political beliefs and perceived government instability did not moderate the interactive effect of target morph value or ambiguity and personal control threat on default categorization probability, default relative to non-default categorization latencies, or overall categorization latencies. In the former case, I expect that contact quantity or quality failed to moderate the personal control condition by target morph value or target ambiguity interaction because contact was assessed in relation to Black people and members of the opposite sex, and therefore did not capture contact with racially and gender *ambiguous* people. In the latter case, I speculate the current American political climate obfuscated the moderating role of political beliefs and perceived government instability; that is, the transition to the Trump presidency has created a context of low external control that masks pre-existing individual differences in constructs related to general need for control (political beliefs) or perceived external control (perceived government instability).

Several interesting effects emerged during moderation analyses, but as noted in the Testing for Moderation section, it is important to remain cautious in their interpretation because of the issue of multiple comparisons. Two effects emerged when looking at default categorization probability outcomes. In the domain of gender, among people with high (but not low) prejudice against androgynous people, lacking personal control led to a dampened relation between increasing ambiguity and male categorization probability than having personal control, suggesting that for certain people, lacking control can lead to a reduction in heuristic gender categorizations (in contrast to

Hypothesis 1). In the domain of race, among people with high (but not low) entitativity beliefs, lacking personal control led to less categorical race perception than having personal control; that is, those who lacked personal control were generally less likely than those who had personal control to show a sharp boundary between Black and White categorizations. This may suggest that high entitativity belief people who lack personal control are less likely to see the world in Black and White than those who have personal control.

Additional effects emerged when looking at categorization speed, either as a function of categorization type or across categorizations, in the domain of race but not gender. First, among people with high (but not low) prejudice against biracial Black-White people, lacking personal control led to a weaker relation between increasing Black prototypicality and faster Black (but not White) categorizations than having personal control. Again, this finding seems in opposition to Hypotheses 1 and 3, and instead suggests that certain people's default categorization speed is less likely to covary with Black prototypicality under lack personal control contexts than have personal control contexts. Second, also among people high in prejudice against biracial Black-White people, lacking personal control led to a weaker relation between target ambiguity and slower race categorization speed (regardless of type) than having personal control. This finding tentatively suggests that lacking personal control leads certain people to show more stable categorization speeds across ambiguity levels than having personal control.

Third, among people with high entitativity beliefs, lacking personal control led to a weaker relation between increasing Black prototypicality and faster Black categorizations than having personal control; however, among people with low

entitativity beliefs, the relation between faster Black categorizations and increasing Black prototypicality was weaker among lack personal control people compared to have personal control people. I also found that among people with low entitativity beliefs, the relation between slower White categorizations and increasing target morph value (i.e., Black prototypicality) was stronger among those who lacked personal control than had personal control. By comparison, among people with high entitativity beliefs, the relation between slower White categorizations and increasing target morph value (i.e., Black prototypicality) was weaker (and non-significant) among those who lacked personal control than had personal control. Finally, among those with high entitativity beliefs, I found that the relation between slower race categorizations (regardless of type) and increasing target ambiguity was weaker among lack personal control participants than have personal control participants.

Together, these findings fail to support my initial prediction that personal control threat drives ambiguous face processing and categorizations in general. However, these results also suggest that the relation between personal control threat and ambiguous face judgments may emerge only for certain types of people, though future research would require a larger sample size to demonstrate this small to medium effect.

General Discussion

My dissertation studies sought to test the role of personal control motivation in racially and gender ambiguous person perception. This research contributes to the literature on compensatory control strategies by suggesting that when social categorizations are ambiguous, imposing clear and distinct social categories on one's environment serves as a source of nonspecific epistemic structure. Thus, social

categorizations may represent one compensatory control mechanism that bolsters against the aversive effects of personal control loss. The predicted personal control condition effect on people's processing and categorization of racially and gender ambiguous faces, however, may manifest in different ways. In Hypothesis 1, I argued that people who lack personal control may be more likely to heuristically categorize and process ambiguous faces than those who have personal control. However, in Hypothesis 2, I acknowledged the equally plausible prediction that people who lack personal control may be motivated to categorize ambiguous faces more accurately in service of imposing not just any structure on the external world, but a meaningful one. Indeed, incorrect social categorizations would fail to compensate for threatened personal control because they could ultimately lead people to violate social norms, another important source of external structure. Such an accuracy drive might also be reflected in slower, or more deliberative, categorization speeds across increasing (Black or male) prototypicality and increasing ambiguity. Finally, in Hypothesis 3, I considered the alternative to Hypotheses 1 and 2; that is, people who lack personal control may be faster to categorize faces by any category label than have personal control participants. This is inconsistent with Hypothesis 1 because it does not assume a differential effect of categorization speed as a function of categorization type. This is also inconsistent with Hypothesis 2 because it assumes that social categorizations should compensate for personal control loss regardless of their truth value.

I conducted six studies to test these competing hypotheses. In Studies 1A, 1B and 1C, I pretested a set of prototypical male and female faces, created and pretested a set of gender ambiguous faces, and pilot tested a measure of the processing and categorization

of ambiguous faces. In Study 2, I created and pretested a set of racially ambiguous faces. In Studies 3A and 3B, I established the association between individual differences in need for control and heuristic ambiguous face processing in the domains of race and gender. In Study 4, I pretested a manipulation of personal control to explore whether a temporary loss of personal control leads people to categorize faces more heuristically and in line with people who chronically desire personal control. In Studies 5A and 5B, I therefore aimed to establish the effect of having versus lacking personal control on the processing and categorization of racially (5B) and gender (5A-B) ambiguous faces. In Studies 5B and 6, I included a new speeded categorization task that allowed me to also investigate the interactive effect of target morph value (Black or male prototypicality) or ambiguity and personal control condition on ambiguous face judgments. Finally, in Study 6, I tested moderators of the effect of personal control threat on ambiguous person perception.

Overall, my dissertation research tentatively suggests that in contrast with my original prediction that personal control threat should generally impact the processing and categorization of racially and gender ambiguous faces, this relation may only shape the perceptions of certain types of people; that is, personal control threat may be more likely to affect the ambiguous face processing and categorizations of people who are high in prejudice against ambiguous people and who hold strong entitativity beliefs.

Review of the Findings

Hypothesis 1. According to Hypothesis 1, people who lack personal control should be more likely to demonstrate heuristic face processing than those who have personal control. Correlational studies 3A and 3B provided partial support for this

hypothesis, such that higher chronic motivation to control one's outcomes was related to marginally significantly faster heuristic (i.e., Black or male) relative to non-heuristic (i.e., White or female) categorizations in the domains of both race and gender. This correlational evidence suggests that heuristic ambiguous face processing may serve as a source of compensatory control for individuals chronically high in need for personal control. To determine the causal role of personal control motivation in ambiguous face judgments, however, I first pre-tested the established experimental manipulation of personal control condition using an undergraduate student sample from an urban university to ensure the manipulation was valid in this context.

Study 5A did not provide support for Hypothesis 1. Although Study 1C demonstrated that in absence of a personal control manipulation, participants took significantly fewer frames to categorize faces as male than female, suggesting that they were generally processing faces in line with the male gender heuristic, Study 5A did not suggest that heuristic face processing differed as a function of personal control condition. Specifically, compared to have personal control participants, lack personal control participants were not significantly faster to make male categorizations than female categorizations on the gender morph sequence task. Similarly, compared to have personal control participants, lack personal control participants did not demonstrate a significantly higher male categorization probability or faster male relative to female categorization speed on the speeded gender categorization task. Study 5B also failed to demonstrate a significant relation between personal control condition and time to make default (Black or male) relative to non-default (White or female) categorizations of

highly ambiguous faces in the domains of race and gender on the simplified race and gender morph sequence categorization tasks, respectively.

Study 5B employed a new speeded categorization task for race and gender that included a continuum of faces ranging in ambiguity rather than just prototypical and ambiguous faces (as in Studies 3A, 3B and 5A). Results revealed that compared to people who had personal control, those who lacked personal control did not demonstrate a stronger relation between increasing Black or male prototypicality (primary analyses) or target ambiguity (secondary analyses) and higher Black or male categorization probability, suggesting again that racially and gender ambiguous heuristic face processing and categorizations did not differ as a function of personal control.

Study 6's main analyses replicated Study 5B's non-significant effects on a speeded categorization task; however, moderator analyses did reveal several noteworthy findings suggesting that people who are high in certain attributes are actually significantly *less* likely to utilize heuristic face processing when lacking, as opposed to having, personal control. Contrary to my prediction that people high in prejudice against ambiguous people would be more likely to rely on heuristic face categorizations as face ambiguity increased when they lacked versus had personal control, in the domain of gender only, I found that people high (but not low) in prejudice against androgynous people demonstrated a weaker relation between higher ambiguity and higher male categorization probability when they lacked control compared to when they had control. Similarly, in the domain of race, I found that among those with high entitativity beliefs, lacking personal control led to a weaker relation between increasing Black prototypicality and higher Black categorization probability than having personal control. This finding

suggests that for people who are high in the belief that social categories can predict stable group-based differences, those who lack personal control are less likely to perceive race categorically (demonstrated by less steep category boundary between White and Black judgments, or "S" curve) than those who have personal control. Thus, among people with high prejudice or high entitativity beliefs, lacking personal control dampened heuristic face processing relative to having personal control in the domains of gender and race, respectively. This may suggest that individuals who are highly prejudice and who express strong entitativity beliefs are more meticulous in their processing and categorizations of racially ambiguous faces presumably because these categorizations are more meaningful to them.

Hypothesis 2. With respect to my hypothesis that lacking personal control would lead to more accurate categorizations than having personal control, neither Studies 5A or 5B revealed a significant between condition difference in probability of correct categorizations or time to make correct versus incorrect categorizations on the gender morph sequence categorization task.

Hypothesis 3. Study 5A also failed to support my hypothesis that people who lacked personal control versus had personal control would be significantly faster to make any categorization of ambiguous faces (both heuristic and non-heuristic). Study 5B's morph sequence categorization results contradicted Hypothesis 3 in the domain of gender but not race. Thus, lacking personal control led to higher gender categorization thresholds than having personal control. This finding is more in line with Hypothesis 2, because it suggests that people who lacked personal control waited to make categorizations until

faces were more prototypically male or female than people who had personal control because they were motivated to categorize ambiguous faces accurately.

Turning to Study 5B's speeded categorization task, I found that compared to people who had personal control, those who lacked personal control did not demonstrate a stronger relation between increasing Black or male prototypicality (primary analyses) and faster Black or male categorization speed, suggesting that gender and race processing speed did not differ as a function of personal control and target prototypicality. Similarly, those who lacked personal control did not demonstrate a weaker relation between increasing target ambiguity (secondary analyses) and slower race or gender categorization speed, suggesting that experimental participants were not speeding up their categorizations to quickly impose social order at increasing levels of ambiguity. Moreover, these non-significant interactions were not further moderated by categorization type (default vs. non-default), in contrast to Hypothesis 1. As with Hypothesis 1, Study 6's main analyses replicated the non-significant effect of personal control condition on the relation between target morph value or target ambiguity and general categorization speeds.

Study 6's individual difference moderation analyses provided mixed support for Hypothesis 3, but only among people high on certain attributes. Additionally, more consistent with Hypothesis 1, some of these effects were moderated by the type of categorization (default vs. non-default). Indeed, in the domain of race, categorization type (Black vs. White) significantly moderated the three-way interaction between personal control condition, target morph value, and prejudice against biracial Black-White people. That is, the two-way interaction between personal control condition and target morph

value only significantly predicted Black (but not White) categorization speed. Contrary to Hypothesis 3, only among people high in prejudice against biracial Black-White people, the relation between faster Black categorizations and increasing target morph value (i.e., Black prototypicality) was weaker in the lack personal control condition than have personal control condition. Categorization type did not, however, moderate the three-way interaction between personal control condition, target ambiguity and prejudice against biracial Black-White people. Consistent with Hypothesis 3, I found that the relation between slower race categorizations (regardless of type) and increasing target ambiguity was weaker among those with high prejudice who lack as opposed to have personal control.

Categorization type (Black vs. White) also moderated the three-way interaction when entitativity beliefs served as the moderator, and the two-way interaction between personal control condition and target morph value significantly predicted Black and White categorization latencies. For Black categorization latencies, in contrast to Hypothesis 3, among people with high (but not low) entitativity beliefs, the relation between faster Black categorizations and increasing target morph value (i.e., Black prototypicality) was weaker in the lack personal control condition than have personal control condition. For White categorization latencies, among those with low entitativity beliefs, I found that the relation between slower White categorizations and increasing target morph value (i.e., Black prototypicality) was stronger when lacking versus having personal control. Among those with high entitativity beliefs, I found the opposite pattern of results; that is, the relation between slower White categorizations and increasing target morph value (i.e., Black prototypicality) was weaker (and non-significant) among those

who lacked versus had personal control. Finally, categorization type did not moderate the three-way interaction between personal control condition, target ambiguity and entitativity beliefs. Consistent with Hypothesis 3, I found that the relation between slower race categorizations (regardless of type) and increasing target ambiguity was weaker among those with high entitativity beliefs who lack as opposed to have personal control.

Limitations

While this research collectively demonstrates a relation between personal control motivation and racially and gender ambiguous face processing and categorizations, several limitations require further discussion. First, I had a limited ability to test for moderation by participant race or gender based on sample size issues (Studies 5A, 5B and 6). However, based on my analyses, I could determine that participant's own relevant social identity did not systematically moderate ambiguous face processing and categorizations in either domain. Future research can replicate these largely non-significant effects with greater statistical power.

Second, moderation effects must be read with caution given the issue of interpreting p-values when running multiple comparisons. Indeed, because the error rate increases with each additional test, the familywise error rate for Study 6 may actually exceed .05 (D. J. Lick, personal communication, April 13, 2017). Additionally, it is difficult to perform a post hoc power analysis in multilevel models as there is no widely accepted method for calculating power in GEEs. Thus, this dissertation cannot address whether significant and marginally significant effects were driven by true population differences or inadequate statistical power to detect a significant effect (D. J. Lick, personal communication, April 13, 2017). This combined with the fact that significant

moderation effects were of a relatively weak effect size indicate that the current results must be replicated before drawing conclusions.

Third, I elected to use a single manipulation of personal control across studies. This decision was driven by the fact that in service of establishing a personal control effect on ambiguous face judgments, I made notable changes to my dependent variables across Studies 5A through 6. Thus, I wanted to keep my personal control manipulation consistent to ensure that discrepant findings were driven by changes in the sensitivity of my dependent variables alone, rather than changes to the impact of the manipulation itself.

Fourth, although my research focuses on social sources of compensatory control I cannot empirically rule out the possibility that non-social sources of control may in some circumstances lead to similar compensatory control effects as those obtained in my dissertation research. The key difference, however, is that social categorizations (as opposed to non-social categorizations) are imbued with meaning in a cultural context. For example, if I were to examine the effect of personal control threat on people's color categorizations (black vs. white) of shapes varying in shade on a continuum from white to grey (ambiguous) to black, I would not expect to replicate any effects obtained in this research. However, if I were to experimentally attach value to those non-social categorizations (as in a minimal group paradigm) this might shift people's perceptual threshold for seeing black over white (or vice versa) when viewing ambiguously grey squares. Even if I were to obtain similar effects of personal control threat on social and non-social categorizations, critically, my focus on social categorizations is driven by their

greater potential negative consequences than non-social categorizations (viz. stereotyping, prejudice and discrimination).

Finally, there was a discrepancy between my correlational (Studies 3A and 3B) and experimental (Studies 5A, 5B and 6) findings. This discrepancy likely reflected methodological differences. First, whereas Studies 3A and 3B measured individual differences in chronic motivation for control, Studies 5A, 5B and 6 experimentally manipulated need for personal control. Thus, the failure to demonstrate significant between condition differences on heuristic face processing and categorizations in my experimental studies may suggest that in general, people's situational need for control may be less likely to predict their ambiguous person perception than their chronic (and perpetually salient) need for control. Instead, Study 6 suggested that situationally threatened personal control may be more likely to affect the ambiguous face processing of people high in prejudice against ambiguous people and high in entitativity beliefs. Thus, the failure to demonstrate significant between condition differences in heuristic face processing and categorizations in my experimental studies may suggest that in general, people's situational need for control may be less likely to predict their ambiguous person perception than their chronic (and perpetually salient) need for control. That is, personal control motivation in general may not affect categorizations of ambiguous others despite my initial theory-based predictions, but may instead arise among certain type of people. Indeed, Study 6 suggested that situationally threatened personal control may be more likely to affect the ambiguous face processing of certain types of people. Specifically, results tentatively suggest that people high in prejudice and entitativity beliefs who lack (vs. have) personal control may be more meticulous in their

racially and gender ambiguous face judgments, but this is not the case for people low in these individual difference factors. This would suggest that the top-down effect of personal control motivation on ambiguous face processing and categorizations does not function the same for everyone. This is consistent with an interactionist perspective, which argues that outcomes are influenced by both personal motivations and the context (Bowers, 1973; Endler, 1975; McCall, 2006; McCall & Simmons, 1966). Again, however, moderation effects must be interpreted with caution. Second, whereas participants were instructed to categorize faces according to race or gender *as quickly as possible* (speed emphasis) in Study 5A's morph sequence categorization task and Studies 3A, 3B, and 5B's speeded categorization tasks, they were instructed to categorize faces *as accurately as possible* (accuracy emphasis) in Study 5B's morph sequence categorization task. This may explain the main effect of personal control condition on gender categorization thresholds in Study 5B (but not Study 5A), such that lacking personal control led to higher categorization thresholds than having personal control (perhaps in service of accuracy).

Social Categorizations as a Compensatory Control Mechanism

Despite the wealth of research on the positive impact of compensatory control strategies for an individual's psychological well-being and performance, this research considers a potentially negative outcome of compensatory control strategies: biased social judgments. It is important to understand the extent to which commonly encountered situations ready actors, particularly those in positions of power (e.g., legal, political, social), to categorize highly racially and gender ambiguous people in distinct ways because the specific categorizations that people make have downstream

consequences for intergroup relations. Indeed, as stated by Stolier and Freeman (p. 352), "our inferences, judgments, and actions toward a person are of course driven by how we perceive that person."

I first consider the consequences of personal control threat on increased default (Black and male) categorizations, as the general tendency to categorize racially and gender ambiguous people as Black and/or male (versus White and/or female) may make them the target of harmful cultural stereotypes. Research on the weapon bias (see Payne, 2006 for a review) and the shooter bias (see Correll, Hudson, Guillermo, & Ma 2014 for a review) suggests that the pervasive cultural stereotype of Black males as violent makes them particularly vulnerable to becoming the victims of lethal police force. Indeed, police officers are often faced with split-second decisions in which they may unintentionally rely on well-known stereotypes associating Black males with crime and violence to assess threat, which may in turn lead to a biased threat-based response. Using a weapon identification task, Payne (2001) demonstrated that people are faster to identify guns after being primed with Black (vs. White) faces. Furthermore, when a short response window is imposed, participants are more likely to incorrectly report seeing a gun following Black face primes as opposed to White face primes. Related research by Eberhardt, Goff, Purdie, & Davies (2004) found that White males who were subliminally exposed to Black face primes demonstrated a lower threshold for recognizing degraded crime-relevant objects than those exposed to White primes or no primes. Both lines of research suggest that the stereotypic association between Black and violent readies people to perceive threat, even in its absence.

Correll, Park, Judd, and Wittenbrink (2002) investigated whether racially biased threat perception extends to peoples' decisions to shoot. As in typical experimental investigations of shooter bias, participants completed a computer game designed to simulate a police officer's experience. Specifically, participants were tasked with deciding to "shoot" or "not shoot" a White or Black target who is either holding a gun or a non-threatening object (e.g., Correll, Park, Judd, & Wittenbrink, 2002; Correll, Park, Judd, Wittenbrink, Sadler, & Keesee, 2007). This research tends to show that participants are faster to shoot armed Black than White targets, and are faster to not shoot unarmed White than Black targets. Additionally, participants mistakenly shoot significantly more unarmed Black targets than unarmed White targets. Using signal detection analyses, researchers have demonstrated that these differences in error rates reflect participants' tendency to set a lower criterion for shooting Black targets as opposed to White targets. Moreover, work by Plant et al. (2011) demonstrates that this effect is specific to Black *males*. Interestingly but not surprisingly, Ma and Correll (2011) found that the strength of shooter bias is moderated by target racial prototypicality. This work collectively suggests that even highly ambiguous people who are categorized as Black and male are at heightened risk of falling victim to lethal police force. To the extent that people's situationally activated motivations automatically ready them to judge highly ambiguous people as belonging or not belonging to a particular racial and gender group, namely Black and male, they may non-consciously treat the same ambiguous Black male in distinct (and differently biased) ways.

Although the majority of research on the consequences of ambiguous face perception focus on the potential costs of being assigned a marginalized, default social

identity (e.g., Black male), my research suggests that certain people (high prejudice, high entitativity beliefs) may be relatively less likely to bias their categorizations toward a disadvantaged (e.g., Black) versus advantaged (e.g., White) identity. The variation in likelihood of being viewed as an advantaged group member is also important and potentially pernicious because to the extent that ambiguous people are perceived as "less minority" (i.e., White, or equally Black and White), they may be denied important resources designated for members of socially disadvantaged groups (e.g., affirmative action; Sanchez, Good, & Chavez, 2011; Young, Sanchez, & Wilton, 2017). One underlying mechanism for this effect is people's beliefs about the level of discrimination faced by ambiguous people. That is, to the extent that people view ambiguous others as less prototypical of a stigmatized identity, they will perceive them as having experienced less identity-based discrimination, and therefore as less worthy of diversity related financial aid (Young et al., 2017). More research must be accumulated to show the potential costs of non-default categorizations for ambiguous people.

As suggested by the above research, ambiguous people occupy a precarious social position in which being labeled one identity versus another will confer distinct sets of advantages and disadvantages, with neither identity being "better" in an absolute sense (e.g., White categorization as "better" for the individual than Black categorization in context of stop-and-frisk, but "worse" in context of diversity scholarships). Categorizations may also impact ambiguous people's feelings of social inclusion with a particular ingroup as a function of how they are categorized and judged by relatively prototypical group members (e.g., Young et al., 2017). Given that the way people are categorized will disparately influence their intergroup interactions, it is essential to

investigate the motivations that increase the salience of social categories and their associated stereotypes and prejudices. This dissertation research suggests that chronic or temporary need for personal control is one such motivation, and in the latter case, such effects may only emerge among people who are chronically high on other theoretically related attributes (prejudice, entitativity beliefs). People at all levels of society (e.g., police officers, civilians) regularly encounter situations that make them feel as if their actions cannot meaningfully affect their outcomes (e.g., stuck in traffic, feeling that one's vote did not influence a presidential election). Thus, it is important to understand how personal control motivation influences peoples' attention to social categorizations, particularly when those people are in positions of power.

Conclusion

This dissertation research attempted to demonstrate how a very basic cognitive motivation seemingly unrelated to prejudice and stereotyping can influence racially and gender ambiguous face categorizations in meaningful ways. While my original hypotheses regarding the general relation between personal control threat and ambiguous person perception were not supported, this relation did appear to occur for people high in prejudice and entitativity beliefs. It is important to elucidate situationally activated motivations that may lead people to engage in biased categorizations of ambiguous people that ultimately exacerbate intergroup disparities. My research tentatively suggests that personal control motivation may be one such motive among people high in certain values, beliefs and experiences.

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Footnotes

[1]For interested readers, whereas in Study 3A (race) the speeded categorization task was completed as part of a larger study on the effect of group-based intelligence feedback on race categorizations, in Study 3B (gender), the speeded categorization task was completed as part of a pretest on a set of gender ambiguous and prototypical faces (and hence did not involve an experimental manipulation). I conducted a multiple linear regression to test whether experimental condition moderated the relation between individual differences in desirability of control and heuristic face processing. In the first step, I entered difference in latency to categorize prototypical faces to control for general differences in making Black versus White categorizations. I next entered condition (0=control, 1=experimental) and desirability for control (mean-centered), followed by their two-way interaction. Results revealed a non-significant interaction effect, $\Delta F(1, 26) = .11$, $p = .743$, $R^2 = .21$, $\beta = -.12$, suggesting that the experimental manipulation did not impact the relation between desirability of control and heuristic face processing.

Table 1

Study 1A: Gender Ratings for Gender Prototypical Faces

Face Type	*M*	*SD*	*t* (Test Value=4)	*F*
Male Faces				
M1	1.60	.91	-17.08**	.26
M2	1.45	.67	-24.64**	.12
M3	2.00	1.06	-12.24**	.35
M4	1.79	.87	-16.48**	.26
M5	1.24	.48	-36.95**	.01
M6	1.60	1.13	-13.82**	.17
Female Faces				
F1	6.76	.43	41.52**	.35
F2	6.26	.88	16.56**	.005
F3	6.07	1.02	13.14**	.32
F4	6.14	1.02	13.54**	.008
F5	6.12	1.04	13.20**	.40
F6	6.81	.50	36.02**	1.68

** $p<.001$

Table 2

Study 1A: Emotion Ratings for Gender Prototypical Faces

Face Type	*M*	*SD*	*t* (Test Value=1)	*t* (Test Value=-1)	*F*
Male Faces					
M1	.19	1.23	-4.25**	6.25**	0
M2	.60	1.06	-2.47*	9.75**	4.11*a
M3	.05	1.32	-4.66**	5.13**	.17
M4	.10	1.06	-5.56**	6.73**	.02
M5	-.48	1.27	-7.51**	2.67*	4.77*a
M6	-.48	1.13	-8.46**	3.00*	.89
Female Faces					
F1	.43	1.45	-2.55*	6.38**	.03
F2	.26	1.13	-4.24**	7.25**	.05
F3	-.69	1.18	-9.29**	1.70†	.07
F4	.05	1.29	-4.80**	5.28**	.18
F5	-.14	1.22	-6.07**	4.55**	.19
F6	.12	1.26	-5.03**	5.27**	.83

†p<.10, *p<.05, **p<.001

[a]Males rated face as more negative than females

Table 3

Study 1A: Attractiveness Ratings for Gender Prototypical Faces

Face Type	*M*	*SD*	*t (*Test Value=2)	*F*
Male Faces				
M1	2.48	1.69	1.83†	4.33^{*a}
M2	2.57	1.66	2.24*	16.81^{**a}
M3	1.90	1.50	-.41	10.00^{*a}
M4	1.81	1.31	-.94	2.97$^{\dagger a}$
M5	2.31	1.79	1.12	8.32^{*a}
M6	1.79	1.51	-.92	6.79^{**a}
Female Faces				
F1	4.00	1.31	9.92**	2.19
F2	2.83	1.56	3.46*	3.86$^{\dagger a}$
F3	2.52	1.31	2.59*	.66
F4	2.50	1.40	2.31*	2.61
F5	2.38	1.41	1.75†	5.74^{*a}
F6	3.90	1.36	9.09*	12.80^{*a}

$^{\dagger}p<.10$, $^{*}p<.05$, $^{**}p<.001$

[a]Males rated face as less attractive than females

Table 4

Study 1B: Speeded Categorizations for Gender Ambiguous Faces

Face Morph	*M*	*SD*	*t (*Test Value=.5)	*F*
M1F2	.49	.36	-.21	.05
M1F3	.47	.32	-.58	.27
M2F2	.52	.31	.47	.43
M2F5	.47	.36	-.63	1.81
M5F4	.57	.35	1.38	0
M5F5	.57	.26	1.70^{+}	.44
M6F2	.51	.37	.10	.80
M6F4	.48	.34	-.43	1.87

Table 5

Study 1B: Gender Ratings for Gender Ambiguous Faces

Face Morph	*M*	*SD*	*t* (Test Value=3)	*t* (Test Value=4)	*F*
M1F2	3.07	1.79	.25	-3.50*	.20
M1F3	3.16	1.87	.56	-3.03*	.96
M2F2	3.69	1.52	3.04*	-1.37	0
M2F5	3.33	1.67	1.34	-2.69*	2.52
M5F4	3.18	1.67	.72	-3.31*	.01
M5F5	3.71	1.75	2.72*	-1.11	1.36
M6F2	3.69	1.61	2.88*	-1.30	.11
M6F4	3.53	1.56	2.29*	-2.01*	.69

*$p<.05$

Table 6

Study 1B: Emotion Ratings for Gender Ambiguous Faces

Face Morph	*M*	*SD*	*t* (Test Value=1)	*t* (Test Value=-1)	*F*
M1F2	.38	1.30	-3.21*	7.10**	.34
M1F3	-.09	1.44	-5.06**	4.24**	.03
M2F2	.42	1.10	-3.53*	8.70**	1.49
M2F5	.04	1.26	-5.09**	5.56**	.96
M5F4	-.11	1.34	-5.58**	4.47**	.16
M5F5	-.42	1.39	-6.87**	2.79*	4.60*[a]
M6F2	.44	1.31	-2.85*	7.42**	0
M6F4	-.31	1.35	-6.54**	3.44*	.71

*$p<.05$, **$p<.001$

[a]Males rated face as more negative than females

Table 7

Study 1B: Attractiveness Ratings for Gender Ambiguous Faces

Face Morph	*M*	*SD*	*t* (Test Value=3)	*t* (Test Value=2)	*F*
M1F2	2.31	1.38	-3.35*	1.51	8.24*[a]
M1F3	2.40	1.50	-2.69*	1.79†	7.82*[a]
M2F2	2.09	1.59	-3.84**	.37	4.44*[a]
M2F5	2.33	1.35	-3.32*	1.66	5.05*[a]
M5F4	2.51	1.38	-2.38*	2.49*	10.02*[a]
M5F5	2.20	1.42	-3.77**	.94	5.98*[a]
M6F2	2.51	1.55	-2.12*	2.22*	10.63*[a]
M6F4	2.31	1.44	-3.20*	1.45	7.39*[a]

†$p<.10$, *$p<.05$, **$p<.001$

[a]Males rated face as less attractive than females

Table 8

Study 2: Speeded Categorizations for Racially Ambiguous Faces

Morphed Face	*M*	*SD*	*t (*Test Value=.5)	*F*
B1W1	.57	.38	1.09	.10
B1W6	.50	.41	.07	.17
B2W4	.44	.39	-.92	.26
B2W6	.57	.39	1.05	.04
B3W6	.56	.44	.81	.06
B4W1	.60	.38	1.64	.23
B4W6	.55	.39	.76	.21
B5W1	.59	.40	1.43	.20
B5W6	.59	.38	1.37	.23
B6W4	.41	.36	-1.59	.36

Table 9

Study 2: Race Ratings for Racially Ambiguous Faces

Morphed Face	*M*	*SD*	*t (*Test Value=4)	*F*
B1W1	4.08	1.40	.35	3.82[*a]
B1W6	4.03	1.69	.10	1.09
B2W4	4.08	1.59	.31	1.49
B2W6	4.22	1.57	.84	1.33
B3W6	4.19	1.43	.80	2.53[†a]
B4W1	4.30	1.20	1.51	2.08
B4W6	4.19	1.41	.82	.78
B5W1	3.92	1.38	-.36	2.00
B5W6	4.24	1.28	1.16	1.46
B6W4	3.46	1.63	-2.02[†]	.87

[†]$p<.10$, [*]$p<.05$

[a]White participants rated faces closer to Black (7), followed by non-White, non-Black participants, followed by Black participants

Table 10

Study 2: Emotion Ratings for Racially Ambiguous Faces

Face Morph	*M*	*SD*	*t* (Test Value=-1)	*t* (Test Value=1)	*F*
B1W1	.51	.96	9.72**	-3.24*	.10
B1W6	.22	.98	7.75**	-5.05**	1.07
B2W4	.49	.84	10.95**	-3.91**	.05
B2W6	.92	.89	13.43**	-.55	2.04
B3W6	-.46	.77	4.48**	-11.73**	.45
B4W1	-.24	.76	5.98**	-10.25**	.25
B4W6	-.24	.72	6.59**	-10.68**	.33
B5W1	.11	.81	8.54**	-6.91**	1.01
B5W6	.22	.82	9.21**	-6.00**	.26
B6W4	-.11	.77	7.22**	-8.92**	.06

*p<.05, **p<.001

Table 11

Study 2: Attractiveness Ratings for Racially Ambiguous Faces

Morphed Face	*M*	*SD*	*t (*Test Value=3)	*F*
B1W1	3.08	1.61	.41	.02
B1W6	3.05	1.78	.28	.71
B2W4	3.08	1.64	.40	.14
B2W6	3.32	1.77	1.21	.68
B3W6	2.68	1.63	-1.10	.85
B4W1	3.05	1.63	.30	1.21
B4W6	3.43	1.80	1.55	.24
B5W1	2.97	1.64	0	0
B5W6	2.70	1.63	-1.00	.10
B6W4	2.78	1.64	-.70	.25

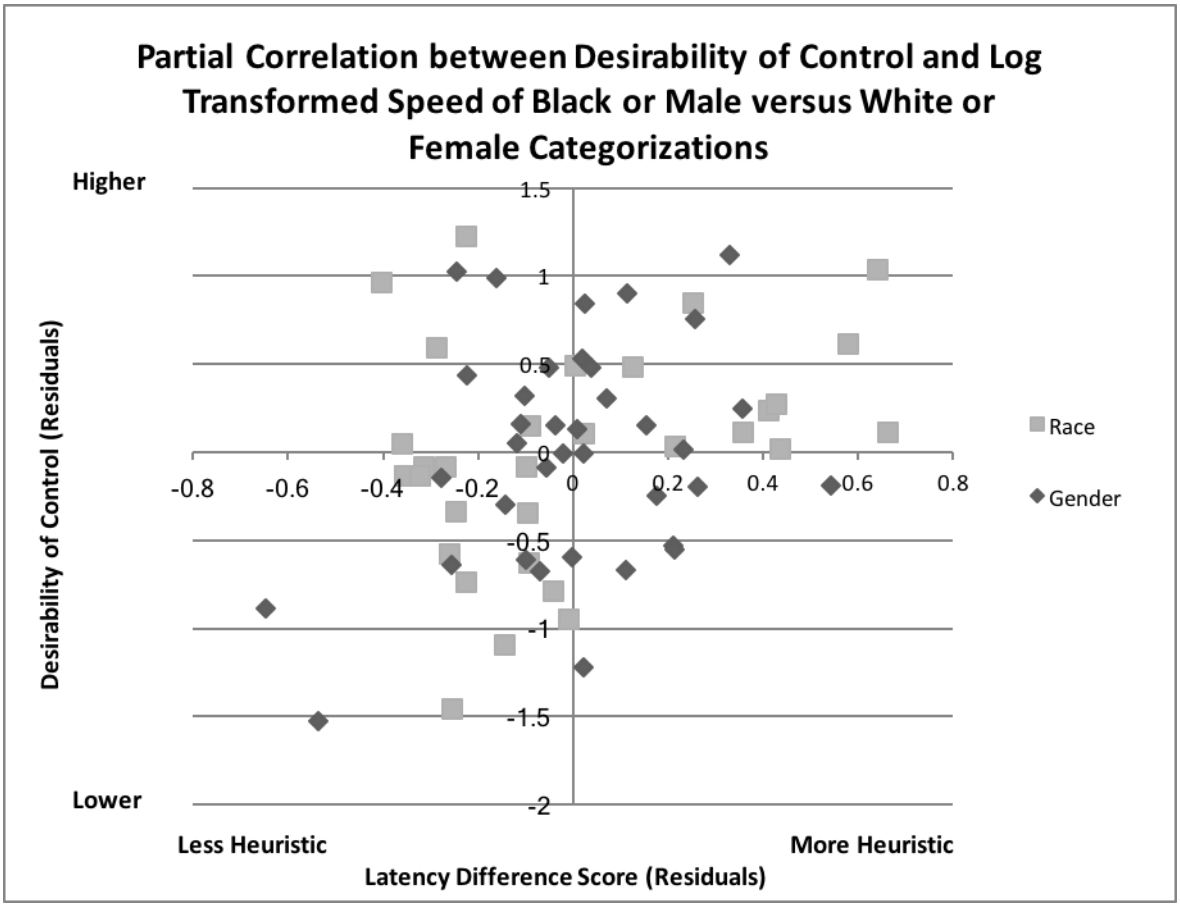


Figure 1. Studies 3A-B: Plotted residuals for the partial correlation between log transformed latency making Black or male ambiguous face categorizations relative to White or female categorizations (difference score) and desirability for control, controlling for difference in speed to categorize prototypical Black or male relative to White or female categorizations.

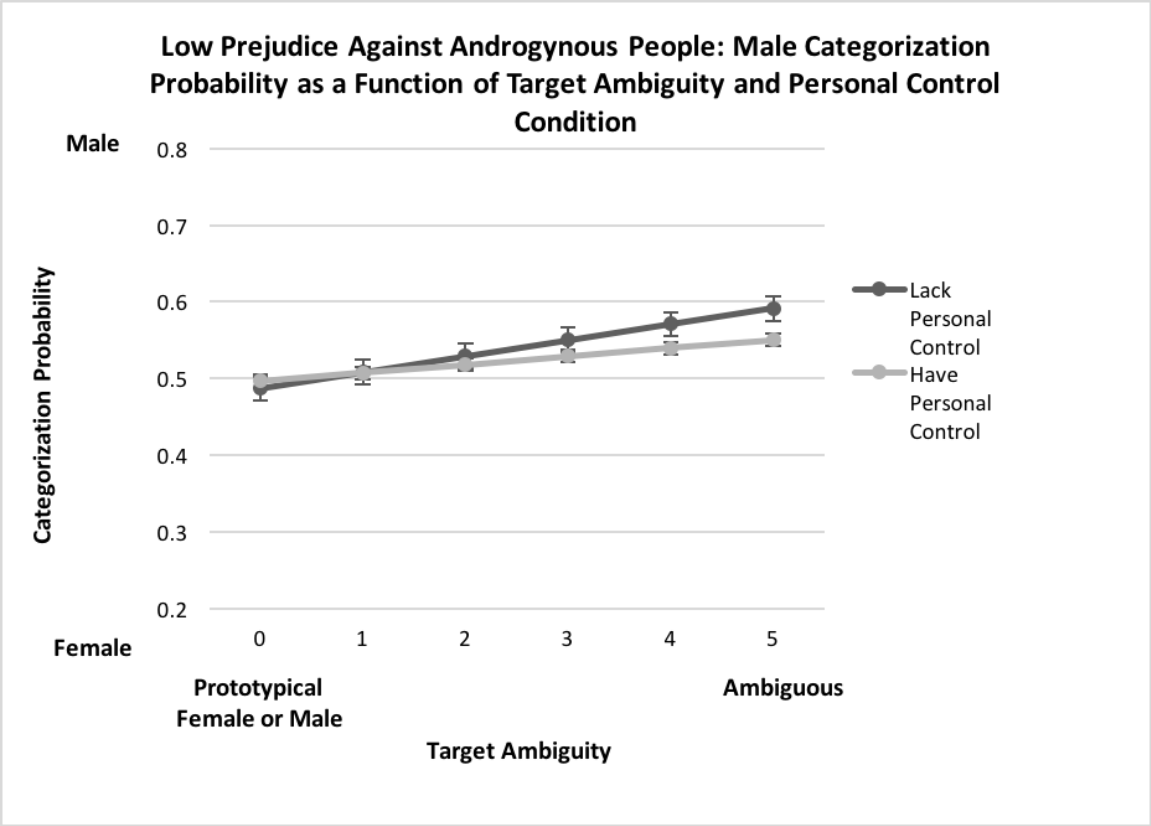


Figure 2A. Study 6: Male categorization probability as a function of increasing target ambiguity among those with low prejudice against androgynous people.

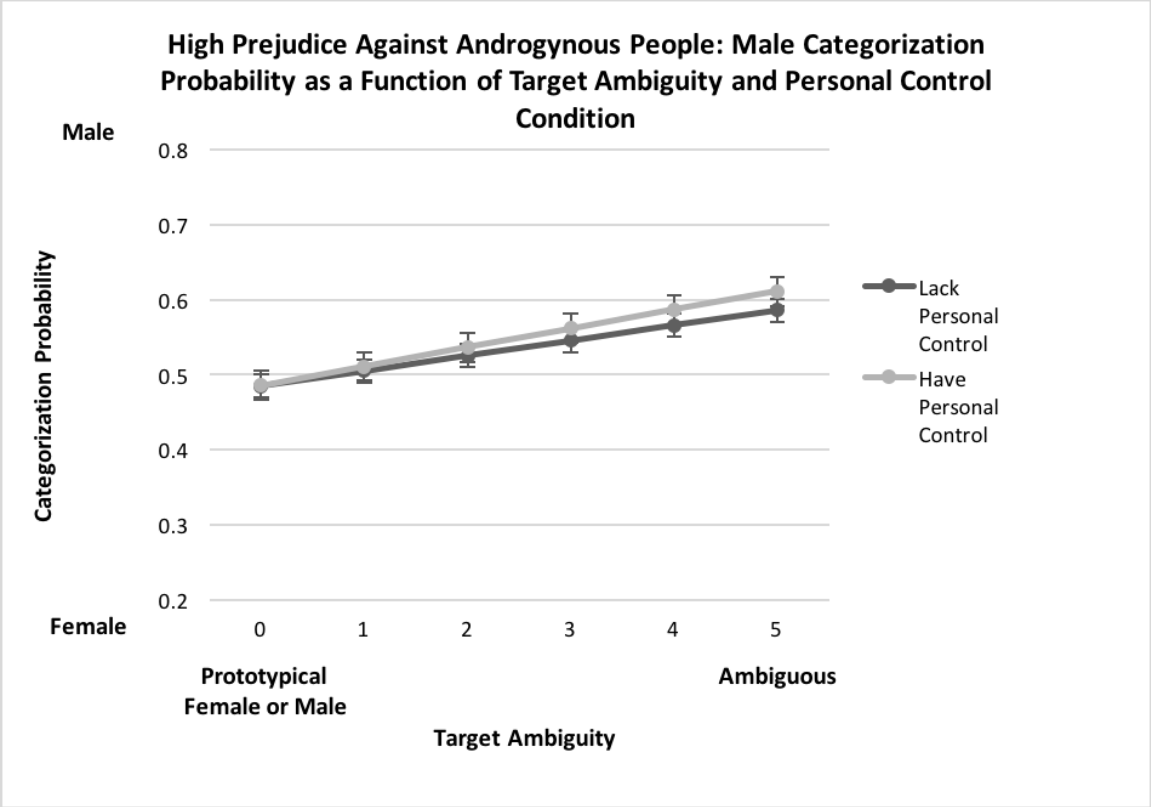


Figure 2B. Study 6: Male categorization probability as a function of increasing target ambiguity among those with high prejudice against androgynous people.

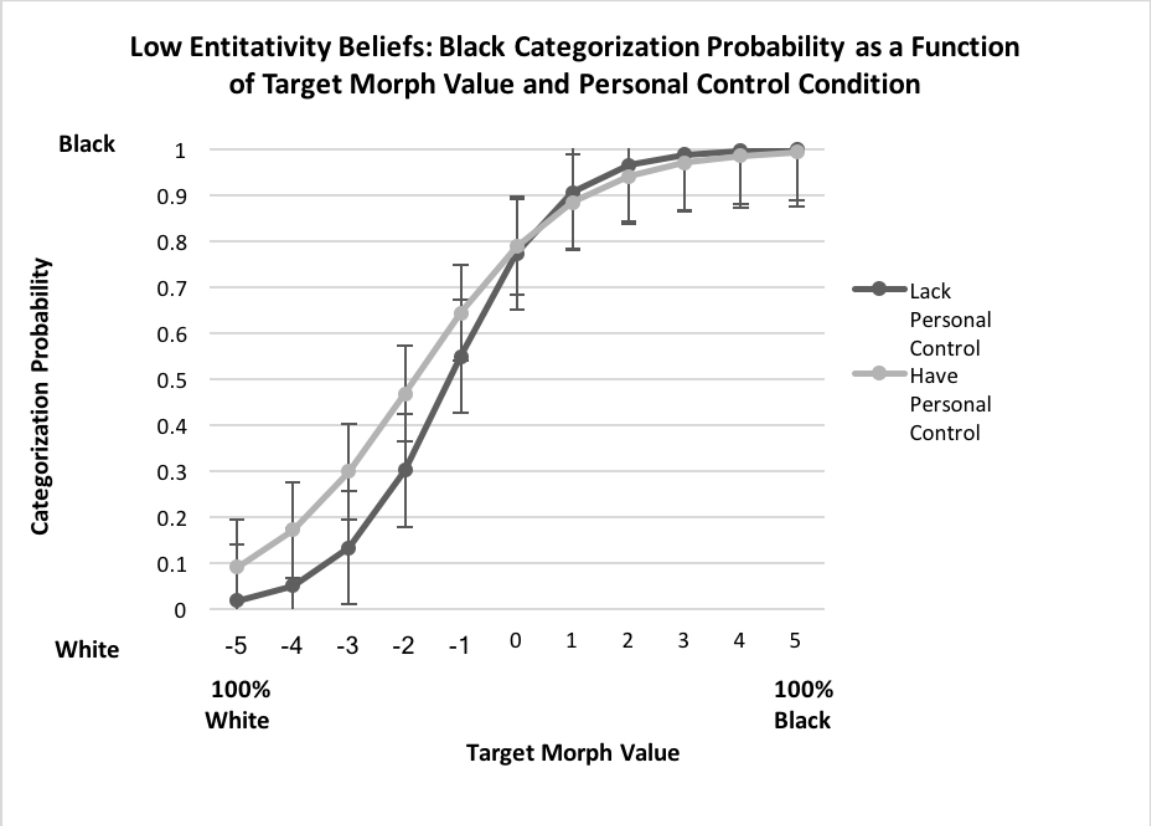


Figure 3A. Study 6: Black categorization probability as a function of increasing Black prototypicality among those with low prejudice against androgynous people.

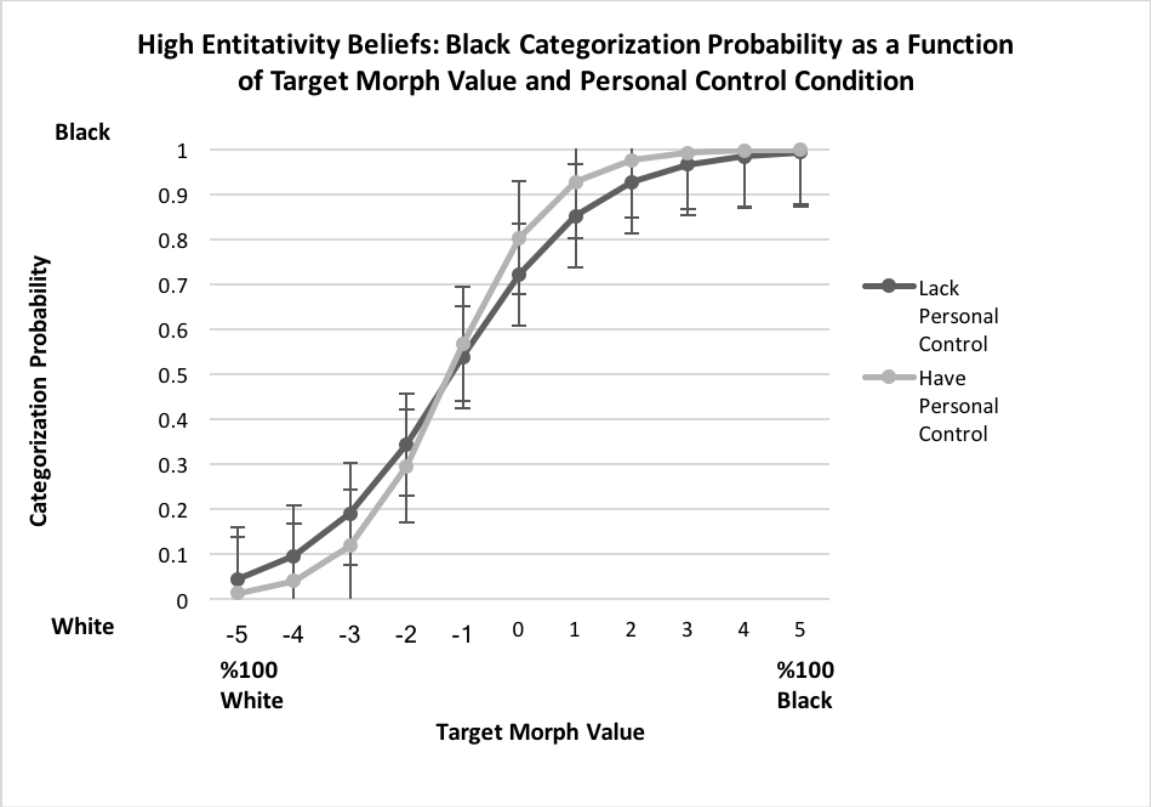


Figure 3B. Study 6: Black categorization probability as a function of increasing Black prototypicality among those with high prejudice against androgynous people.

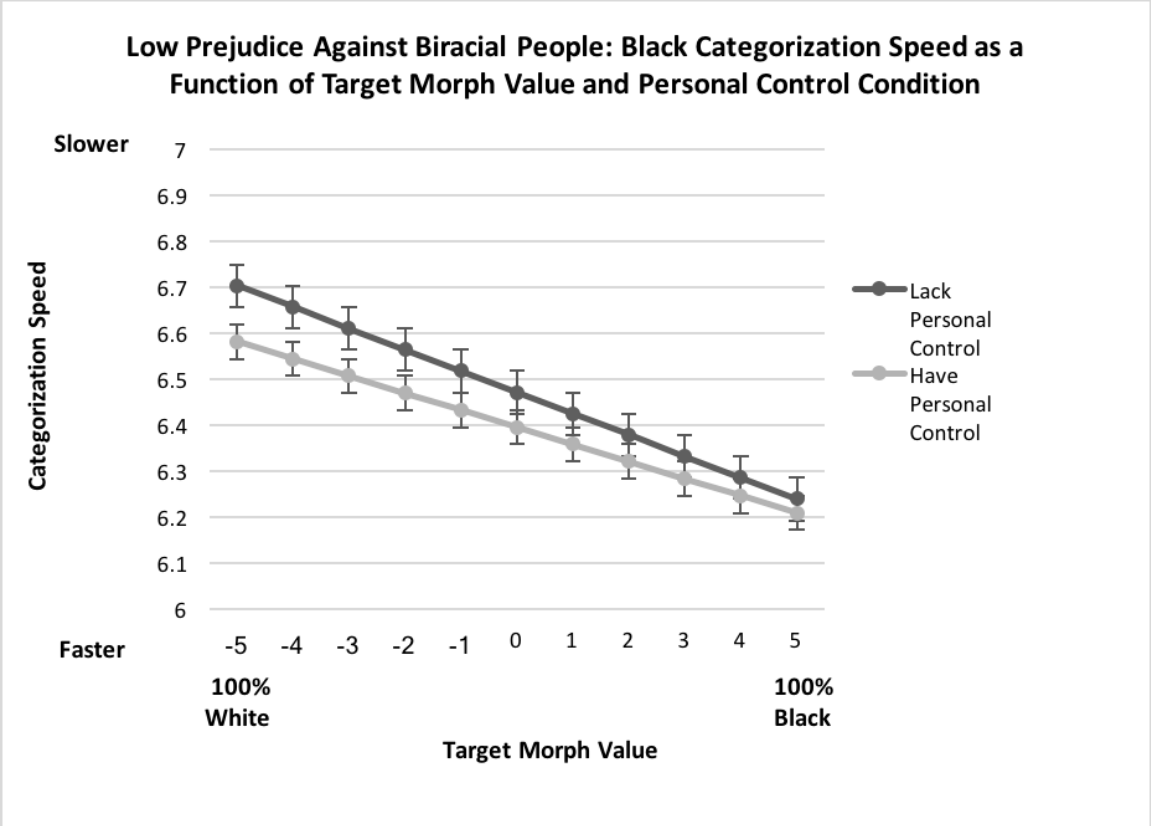


Figure 4A. Study 6: Log transformed Black categorization speed as a function of increasing Black prototypicality among those with low prejudice against biracial Black-White people.

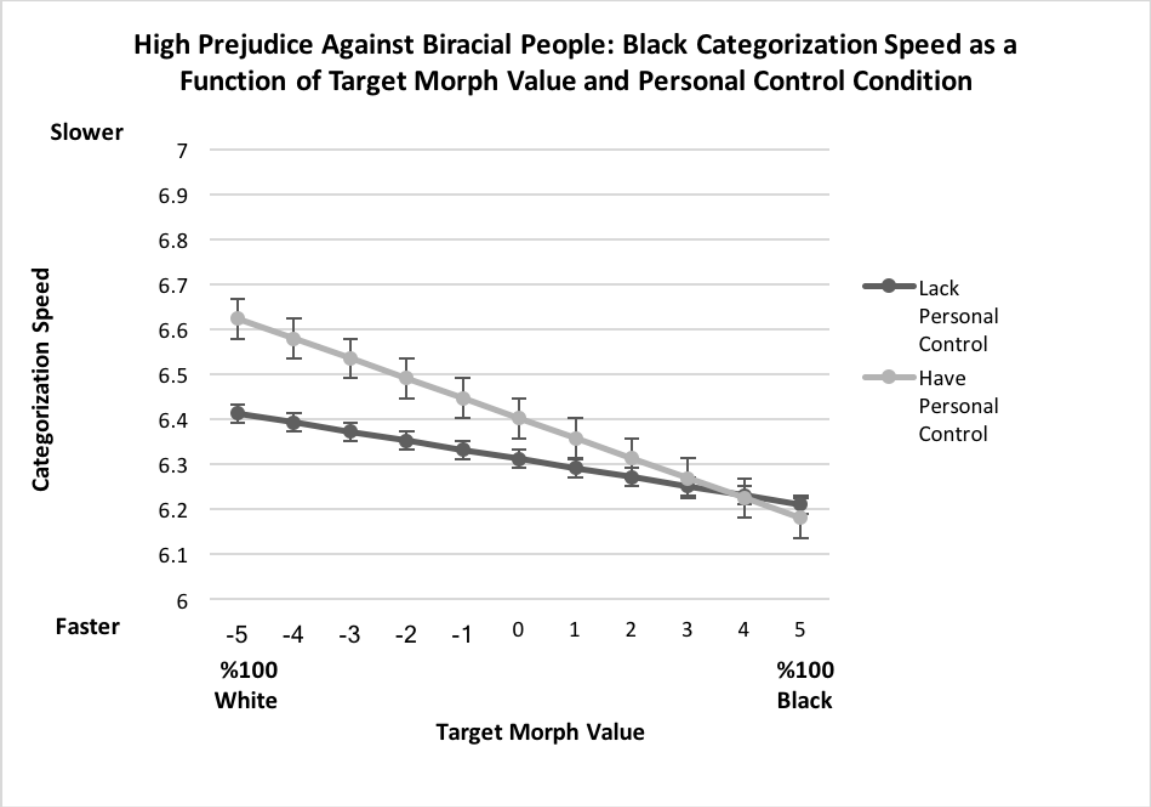


Figure 4B. Study 6: Log transformed Black categorization speed as a function of increasing Black prototypicality among those with high prejudice against biracial Black-White people.

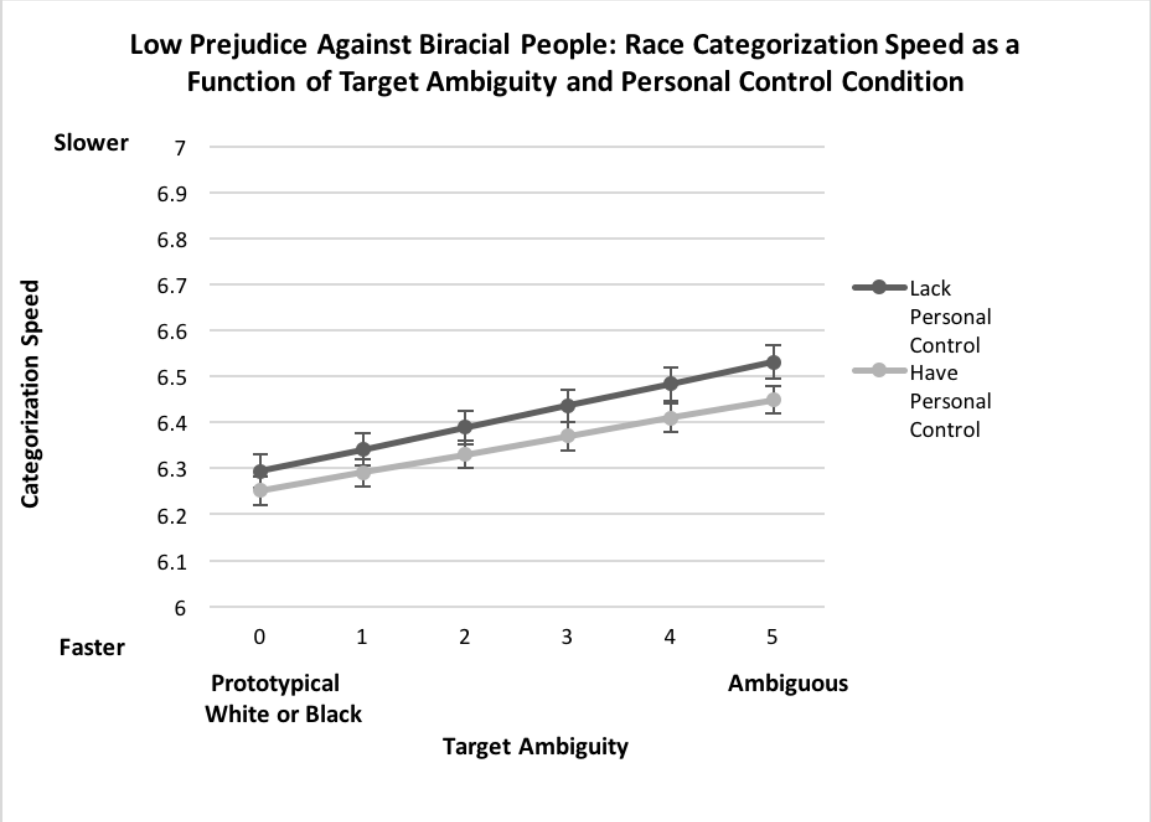


Figure 5A. Study 6: Log transformed race categorization speed as a function of increasing target ambiguity among those with low prejudice against biracial Black-White people.

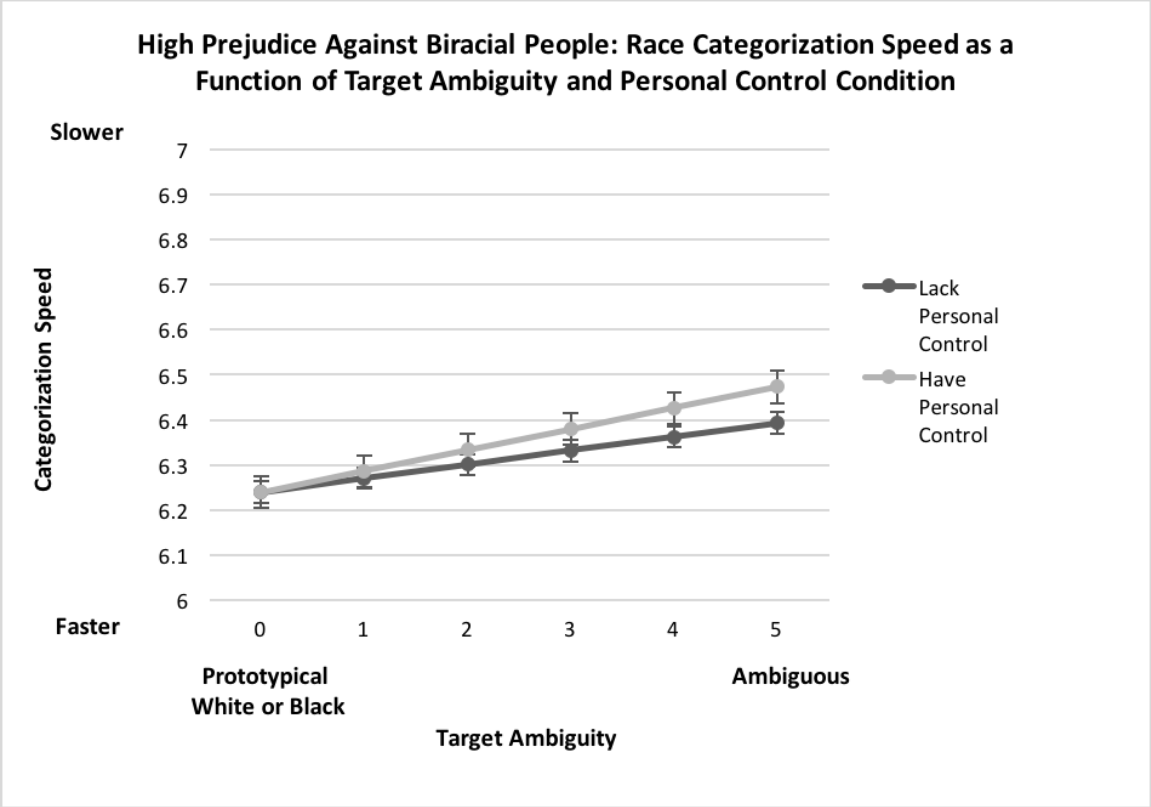


Figure 5B. Study 6: Log transformed race categorization speed as a function of increasing target ambiguity among those with high prejudice against biracial Black-White people.

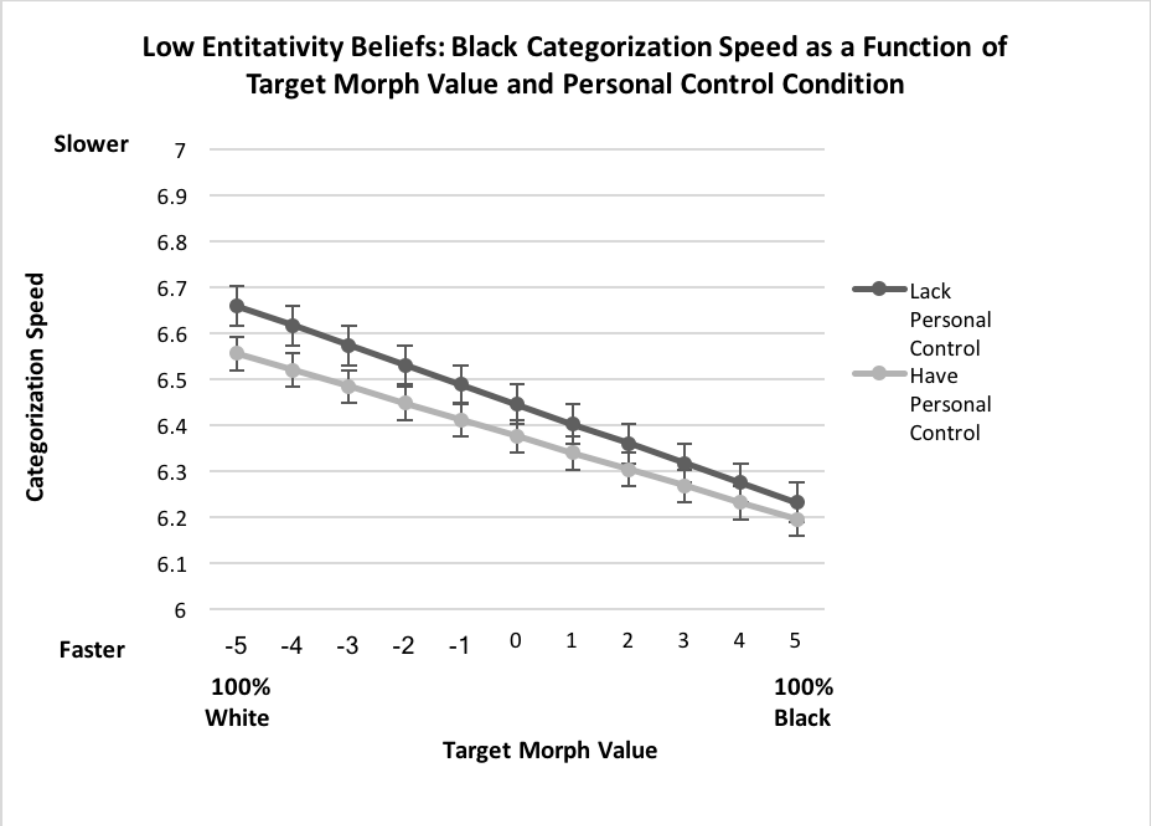


Figure 6A. Study 6: Log transformed Black categorization speed as a function of increasing Black prototypicality among those with low entitativity beliefs.

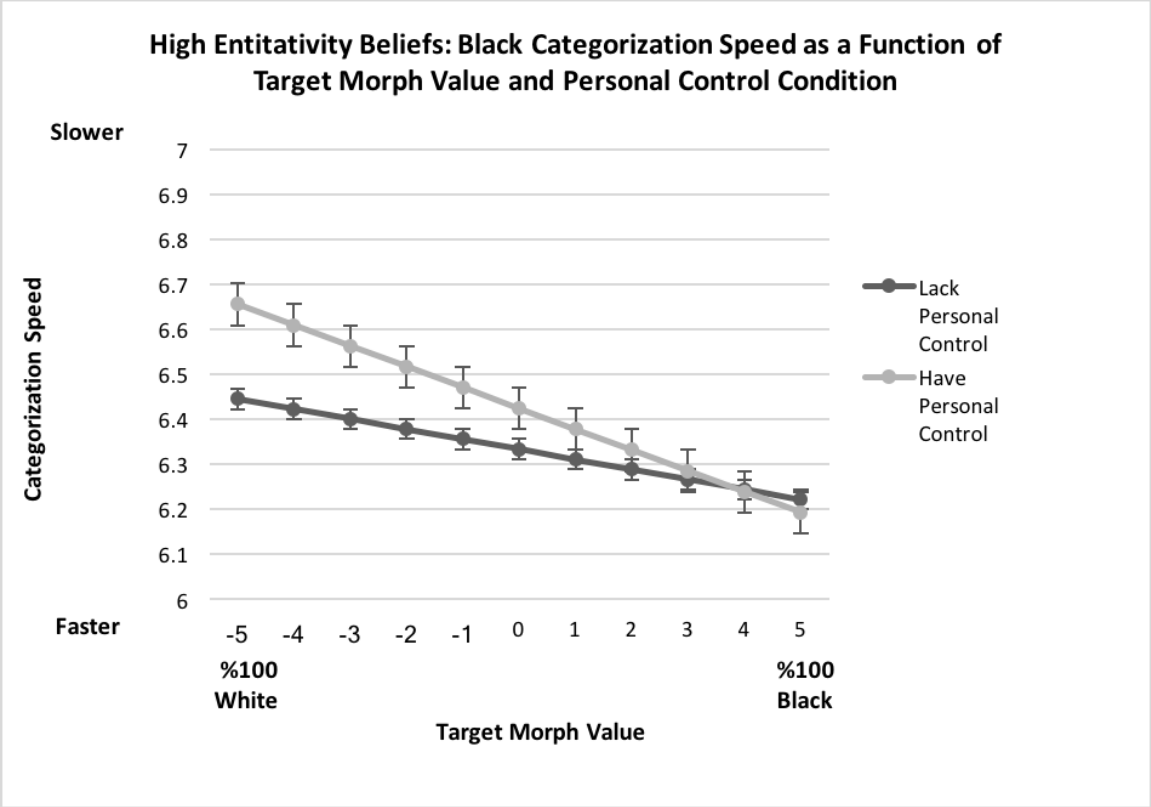


Figure 6B. Study 6: Log transformed Black categorization speed as a function of increasing Black prototypicality among those with high entitativity beliefs.

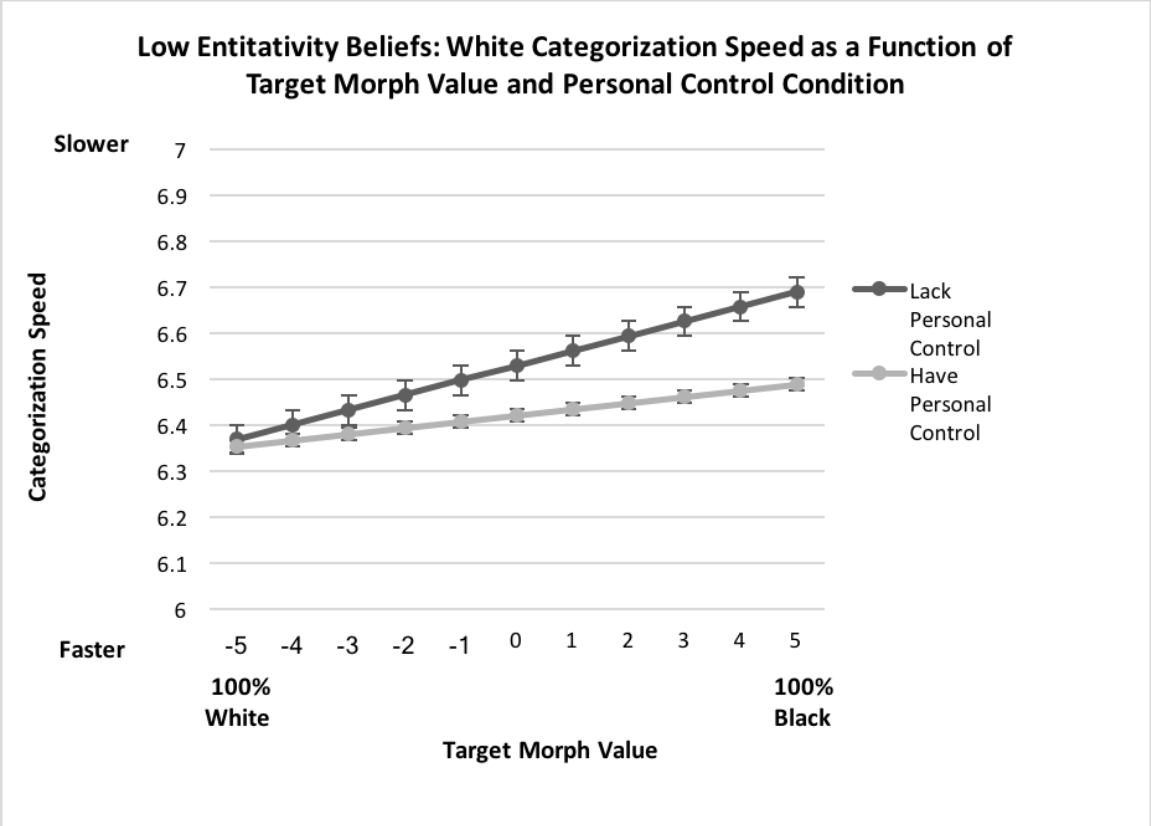


Figure 7A. Study 6: Log transformed White categorization speed as a function of increasing Black prototypicality among those with low entitativity beliefs.

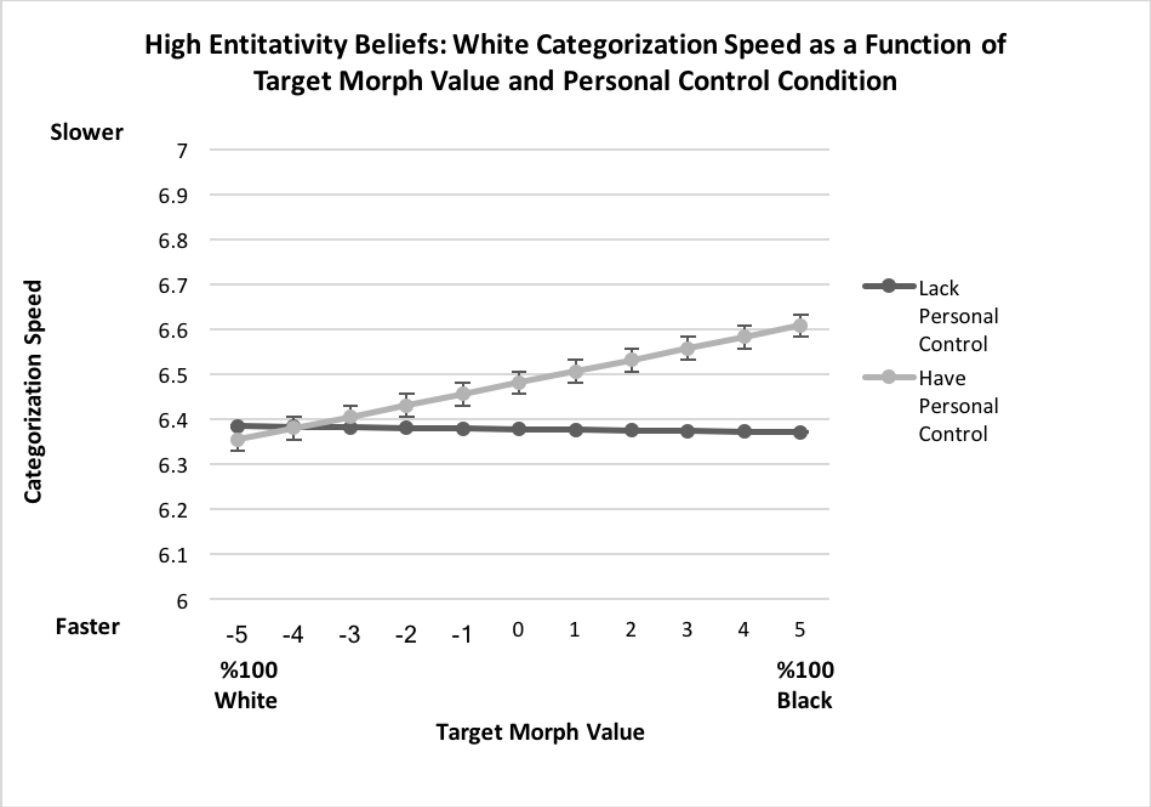


Figure 7B. Study 6: Log transformed White categorization speed as a function of increasing Black prototypicality among those with high entitativity beliefs.

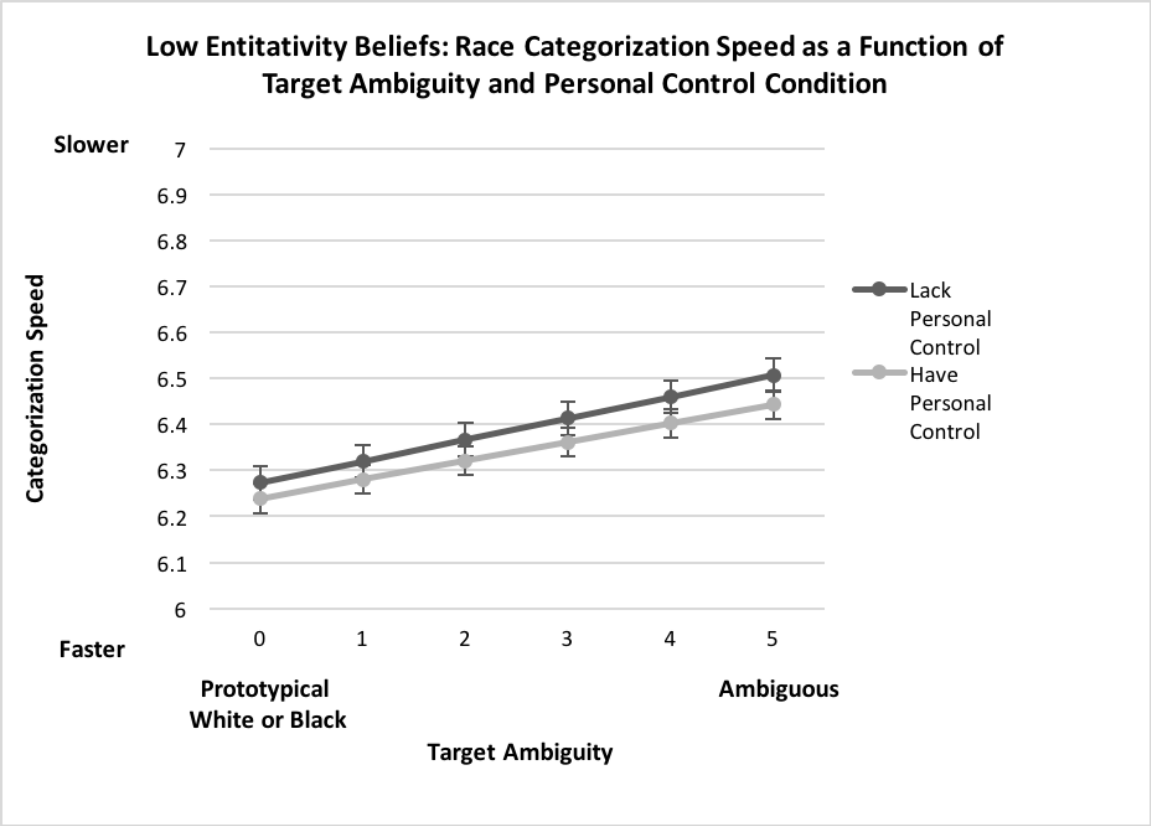


Figure 8A. Study 6: Log transformed race categorization speed as a function of increasing target ambiguity among those with low entitativity beliefs.

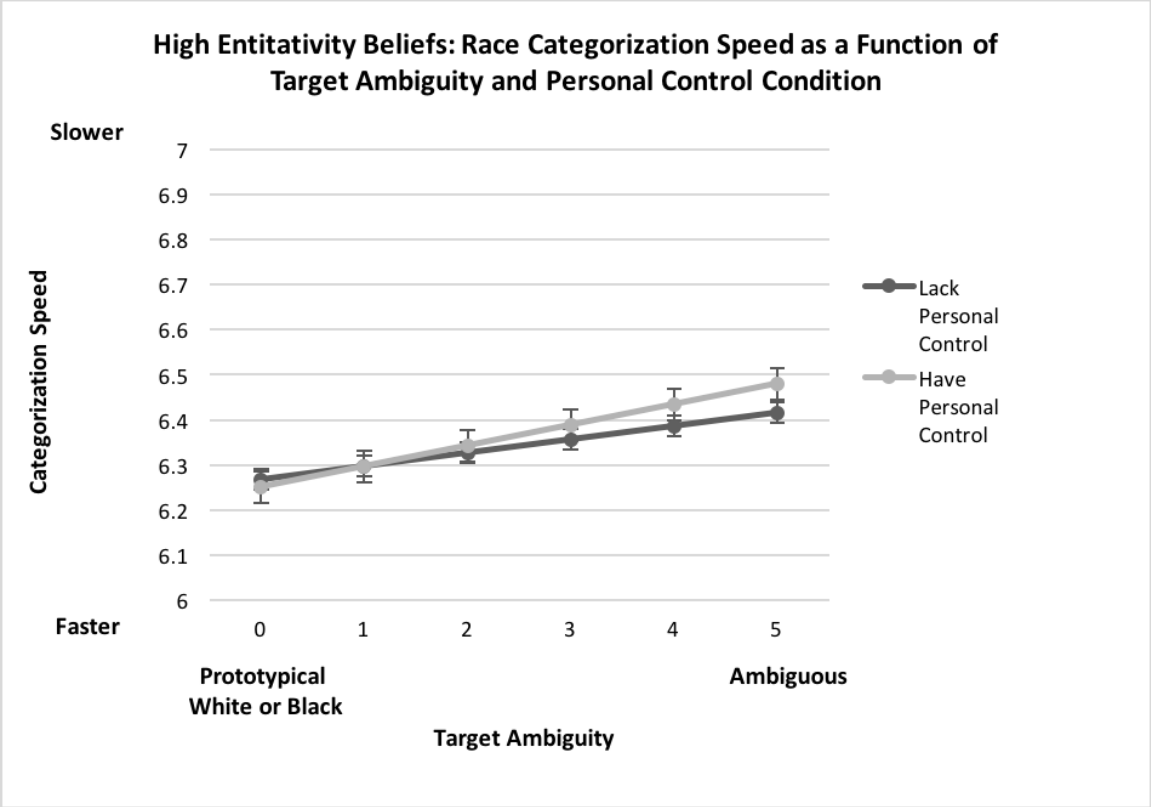
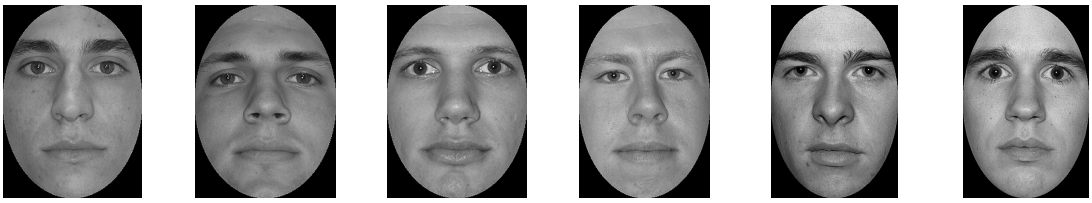


Figure 8B. Study 6: Log transformed race categorization speed as a function of increasing target ambiguity among those with high entitativity beliefs.

Appendix A

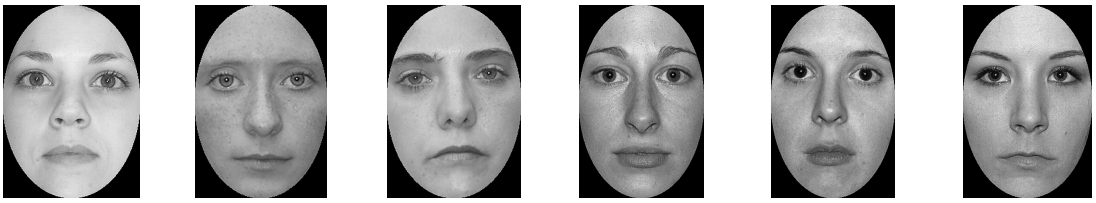
Prototypical and Ambiguous Faces: Gender

Prototypical male faces



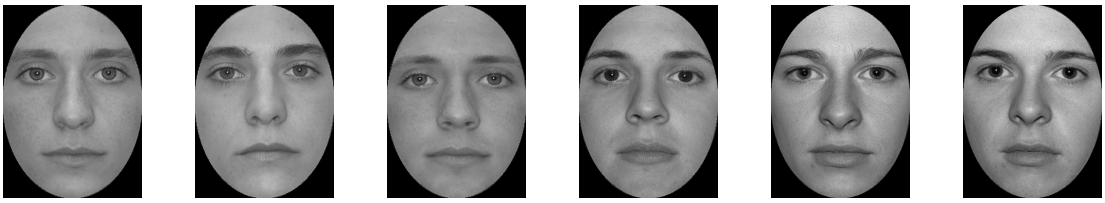
M1 M2 M3 M4 M5 M6

Prototypical female faces



F1 F2 F3 F4 F5 F6

Ambiguous faces (50% male/50% female)



M1F2 M1F3 M2F2 M2F5 M5F4 M5F5

M6F2 M6F4

Appendix B

Prototypical and Ambiguous Faces: Race

Prototypical Black faces


B1


B2


B3


B4


B5


B6

Prototypical White faces


W1


W2


W3


W4


W5


W6

Ambiguous faces (50% Black/50% White)


B1W1


B1W6


B2W4


B2W6


B3W6


B4W1


B4W6


B5W1


B5W6


B6W4

Appendix C

Prototypical and Ambiguous Faces from Freeman et al. (2011): Gender

Face continuum 1:

Face continuum 2:

Face continuum 3:

Face continuum 4:

Appendix D

Desirability of Control Scale

INSTRUCTIONS: Below you will find a series of statements. Please read each statement carefully and respond to it by expressing the extent to which you believe the statement applies to you. Use the scale below when responding.

0	1	2	3	4	5	6
Strongly Agree	Moderately Agree	Slightly Agree	Neither Agree Nor Disagree	Slightly Disagree	Moderately Disagree	Strongly Disagree

1. I prefer a job where I have a lot of control over what I do and when I do it.
2. I enjoy political participation because I want to have as much of a say in running government as possible.
3. I try to avoid situations where someone else tells me what to do.
4. I would prefer to be a leader than a follower.
5. I enjoy being able to influence the actions of others.
6. I am careful to check everything on an automobile before I leave for a long trip.
7. Others usually know what is best for me.*
8. I enjoy making my own decisions.
9. I enjoy having control over my own destiny.
10. I would rather someone else take over the leadership role when I'm involved in a group project.*
11. I consider myself to be generally more capable of handling situations than others are.
12. I'd rather run my own business and make my own mistakes than listen to someone else's orders.
13. I like to get a good idea of what a job is all about before I begin.
14. When I see a problem, I prefer to do something about it rather than sit by and let it continue.
15. When it comes to orders, I would rather give them than receive them.
16. I wish I could push many of life's daily decisions off on someone else.*
17. When driving, I try to avoid putting myself in a situation where I could be hurt by another person's mistake.
18. I prefer to avoid situations where someone else has to tell me what it is I should be doing.
19. There are many situations in which I would prefer only one choice rather than having to make a decision.*
20. I like to wait and see if someone else is going to solve a problem so that I don't have to be bothered with it.*

*Item is reverse scored.

Appendix E

Positive and Negative Affect Schedule

INSTRUCTIONS: The following scale consists of a number of words that describe different feelings and emotions. Please read each item and select the number that best represents your evaluation of the item. There are no right or wrong answers. We are only interested in your honest opinion.

0	1	2	3	4
Very slightly or Not at All	A Little	Moderately	Quite a Bit	Extremely

1. To what extent do you feel INTERESTED right now, that is, at the present moment?
2. To what extent do you feel DISTRESSED right now, that is, at the present moment?
3. To what extent do you feel EXCITED right now, that is, at the present moment?
4. To what extent do you feel UPSET right now, that is, at the present moment?
5. To what extent do you feel STRONG right now, that is, at the present moment?
6. To what extent do you feel GUILTY right now, that is, at the present moment?
7. To what extent do you feel SCARED right now, that is, at the present moment?
8. To what extent do you feel HOSTILE right now, that is, at the present moment?
9. To what extent do you feel ENTHUSIASTIC right now, that is, at the present moment?
10. To what extent do you feel PROUD right now, that is, at the present moment?
11. To what extent do you feel IRRITABLE right now, that is, at the present moment?
12. To what extent do you feel ALERT right now, that is, at the present moment?
13. To what extent do you feel ASHAMED right now, that is, at the present moment?
14. To what extent do you feel INSPIRED right now, that is, at the present moment?
15. To what extent do you feel NERVOUS right now, that is, at the present moment?
16. To what extent do you feel DETERMINED right now, that is, at the present moment?
17. To what extent do you feel ATTENTIVE right now, that is, at the present moment?
18. To what extent do you feel JITTERY right now, that is, at the present moment?
19. To what extent do you feel ACTIVE right now, that is, at the present moment?
20. To what extent do you feel AFRAID right now, that is, at the present moment?

Appendix F

Entitativity Beliefs

INSTRUCTIONS: Read each of the following statements and decide how much you agree with each according to your attitudes, beliefs, and experiences. It is important for you to realize that there are no right or wrong answers to these questions. People are different, and we are interested in how you feel. Please respond by selecting a number from the scale provided.

0	1	2	3	4	5	6
Strongly Agree	Moderately Agree	Slightly Agree	Neither Agree Nor Disagree	Slightly Disagree	Moderately Disagree	Strongly Disagree

1. Every group is a certain type of collection of people, and there is not much that can be done to really change that.
2. Groups can change even their most basic qualities.*
3. No matter what kind of group you look at, the group members can always change very much.*
4. As much as I hate to admit it, you can't teach an old dog new tricks. Groups can't really change their deepest attitudes.
5. Every group, no matter who they are, can significantly change their basic characteristics.*
6. Groups can substantially change the kind of group they are.*
7. Groups can do things differently, but the important parts of who the group members are can't really be changed.

*Items reverse scored