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The Cross-Race Effect and Eyewitness Identification: How to Improve Recognition and Reduce Decision Errors in Eyewitness Situations

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The Cross-Race Effect (CRE), whereby same-race faces are recognized more accurately than cross-race faces, is a well-replicated psychological phenomenon with clear social consequences. The area in which its influence is most visible is that of eyewitness misidentification. Since the advent of DNA testing, it has been revealed that scores of people have been wrongly imprisoned for crimes that they did not commit, and cross-race eyewitness misidentifications are a determining factor in a large percentage of these convictions. This article reviews existing perspectives on the causes of the CRE, including new work on the social cognitive underpinnings of the bias. Next, we make recommendations aimed at reducing the cross-race effect in eyewitness identification, both at the point of witnessing the crime and during the witness lineup. The goal of this work is to encourage policymakers to implement suggestions based on the current understanding of the causes and moderators of the CRE.

In November 1979, a White 26-year-old woman and her male companion were abducted at gunpoint by two Black men. The perpetrators raped the woman and debated killing her before leaving her alive. The victim later identified a man named Cornelius Dupree as one of her attackers. Largely on the basis of this eyewitness identification, Dupree was convicted and sentenced to spend 75 years in prison. He maintained his innocence throughout the trial and the

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30-year imprisonment that followed. In 2010, he was finally exonerated of the crime due to an examination of DNA evidence, but only after he had been released on parole. The tragic experience of Cornelius Dupree is only one of many recent examples of the fallibility of eyewitnesses' face memory. Since DNA testing was first used in postconviction appeals, over 270 people have been exonerated, and the majority of these involved eyewitness misidentification. Cases such as these, where eyewitnesses fail to accurately recognize the faces of perpetrators, call out for a serious consideration of how the state of the art in science might be leveraged to improve our criminal justice procedures, with the hope of more consistently enacting justice.

Despite having a neural architecture that appears well suited to process faces (cf. Gauthier, Skudlarski, Gore, & Anderson, 2000; Kanwisher, McDermott, & Chun, 1997), we often fail to accurately recognize the faces of others. Notably, these face memory errors are not random. As is exemplified by the case of Cornelius Dupree, perceivers have especially poor recognition for the faces of members of other races (for a review, see Hugenberg, Young, Bernstein, & Sacco, 2010). This Cross-Race Effect (abbreviated as CRE) in face memory has had a profound impact on the criminal justice system. Despite the fact that cross-race crime accounts for a very small percentage of crimes in the United States, roughly 36% of the wrongful convictions that have been later overturned due to the introduction of new DNA evidence were originally prosecuted on the basis of cross-race eyewitness misidentifications (Scheck, Neufeld, & Dwyer, 2003). Put simply, cross-race eyewitness identifications are prone to failure with shocking frequency.

Our system of criminal justice rests on the assertion that innocence should be protected, even at the possible expense of freeing a guilty perpetrator. Yet, the overwhelming power that eyewitnesses can have on juries (e.g., Loftus, 1974), combined with the clear difficulty of cross-race face recognition, can lead to common yet devastating cross-race eyewitness errors. Our society pays a substantial cost for each such error (Doyle, 2001); with each misidentification, lives are risked, individuals are wrongly incarcerated, perpetrators remain at large, and the public trust in our criminal justice system decays. The implications of the CRE are troubling, but we should be encouraged by recent research and its applicability to police procedures and legal policy.

The CRE and Eyewitness Identification

Psychologists have documented the CRE for nearly half a century, and in the past decade psychologists have substantially increased our understanding of its antecedents and potential ways to ameliorate this troubling bias. Despite this, there are few reviews of the state-of-the-art of CRE research designed for communication to those who set public policy. Thus, public policy analyses of eyewitness

identification have yet to consistently benefit from these recent advances in the science of the CRE. This review seeks to address this gap by synthesizing the existing research and theory on the CRE, communicating its known causes and consequences, and addressing how this knowledge can be used by public policy makers, police officers and investigators, and legal counsel.

Importantly, the goal of this review is not to rehash existing debates on police procedures surrounding lineup construction. Although we do briefly review the findings in that important domain, we instead focus primarily on the social and motivational factors that contribute to race-based memory biases at encoding (during the crime itself, rather than at recognition—the focus of debates regarding lineup construction). We will present evidence indicating that our best hope for reducing or eliminating the CRE occurs before encoding—that is, before an eyewitness observes a crime—and that any additional expertise, instructions, or motivation gained after the target face has been encountered is likely to be less effective in increasing recognition accuracy. This may seem to make for a pessimistic view of the problem; however, there are some clear interventions that have proven effective in reducing cross-race misidentifications allowing us to offer perspective on how increased recognition accuracy can be achieved on a broad scale.

What Is the CRE?

To effectively understand the CRE, its causes, and factors that can eliminate it, it is important to understand how we can study it. Though methods and settings for studying the CRE vary, the vast majority of investigations of the CRE incorporate an encoding phase, in which some number of novel faces are presented to participants, and a test phase, in which the participant is exposed to a mixture of previously seen and novel faces. In the test phase, participants are asked to indicate whether or not each individual face was seen in the encoding phase. Although many specifics differ, this generally mirrors a crime witness, who first encodes the face of a perpetrator, and may then later be asked to discriminate between the actual perpetrator and nonperpetrators or "foils" in a lineup.

To analyze recognition ability, researchers most often use procedures derived from signal detection theory. Although a detailed technical discussion of signal detection theory is beyond the scope of this article (see ref. Green & Swets, 1966, for a review), for our purposes it is important to know that in a face recognition experiment, participants can make two types of errors: misses and false alarms. A failure to correctly identify a previously seen face is considered a miss. On the other hand, mistakenly identifying a new face as one that has been seen is a false alarm. Conversely, participants can be correct in two ways: hits and correct rejections. Hits are cases of correctly selecting previously seen faces, whereas correct rejections are correctly indicating that a face had not been previously seen. The cross-race effect is observed as a simultaneous tendency to show fewer hits

for cross-race targets, while also showing more false alarms. Thus, a witness is less likely to correctly select the actual previously seen cross-race perpetrator from a lineups and more likely to misidentify innocent suspects.

In signal detection terms, this means that perceivers have weaker sensitivity for cross-race faces. That is, people are less sensitive to the unique identities of cross-race individuals. In addition, people have a lower criterion for responding "yes" to cross-race faces. This low sensitivity (i.e., difficulty distinguishing) when combined with a lax criterion for saying a face has been seen before (i.e., tendency to say "yes" when uncertain) is what makes the CRE such a pernicious bias. Not only does it make perceivers more likely to be wrong, but it also makes them more likely to err on the side of misidentifications.

When we think of eyewitness misidentification, we tend to think in terms of false alarms. Emotionally affecting anecdotes such as that of Cornelius Dupree exist because of false alarms in face recognition, with terrible consequences. However, policymakers, law enforcement officers, and those in the legal system are also well served to focus on increasing "hits," or correct identifications. Though eyewitness advocates tend to focus on reducing false alarms, almost all would agree that justice is better served to the extent that eyewitnesses are able to correctly identify actual perpetrators. As such, when identifying methods for improving eyewitness identification, we will suggest interventions that tend to act on increasing hits and reducing false alarms (i.e., increasing sensitivity).

Experimental Evidence and Ecological Validity in Eyewitness Research

Before we consider the existing research on the CRE, and its potential public policy implications, it is critical to first consider the extent to which experimental research can be successfully applied to real eyewitness situations. Indeed, much of the evidence on the CRE occurs in a laboratory, which bears only a fleeting similarity to a genuine crime scene. To what extent can such laboratory experiments teach us about what eyewitnesses do or think in the heat of an ongoing crime? To what extent can the memory biases shown by college students (the primary participants in many studies) extend to people across our society?

Fortunately, well-performed experiments can not only give us cause-and-effect relationships, but can do so in a way that gives us faith that the results are applicable to the world beyond the laboratory and to populations beyond our participants. To be sure, much of the existing research was carried out in the laboratory with White college students. Despite this limitation, there is reason to believe that much of this work generalizes to a broader population. For one, research does show that the CRE is truly a cross-race effect. That is, it has been empirically demonstrated by perceivers of virtually every racial group in our society (see O'Toole, Deffenbacher, Valentin, & Abdi, 1994; Pezdek, Blandon-Gitlin, & Moore, 2003), and indeed has been demonstrated across multiple cultures and

ethnic groups across the globe (e.g., Sangrigoli, Pallier, Argenti, Ventureyra, & de Schonen, 2005). Though the strength of the effect shows some cross-group variability, the existence of the CRE itself is quite robust across participant populations (Meissner & Brigham, 2001).

Further, we can be quite certain that these findings generalize not just across populations, but to situations outside of our laboratories as well. First, there have been well-conducted experiments on the CRE that have used highly naturalistic situations. Multiple field studies have been conducted which indicate that the magnitude of the CRE in the "real world" is similar to that observed in a lab. For example, Brigham, Maass, Snyder, and Spaulding (1982) used cashiers at local stores as unwitting participants. They had customers of various racial groups enter these places of business and later tested the cashiers' recognition for those customers. As predicted, they found worse recognition for cross-race individuals (see also Platz & Hosch, 1988, for a close replication). Second, by combining the effects of multiple experiments into a single meta-analysis we can observe the CRE as it occurs across dozens of settings and participant populations, giving us a much more reliable measure of the phenomenon. For example, Meissner and Brigham's (2001) meta-analysis includes data from nearly 5,000 participants, giving us a strong estimation of the true strength of the CRE across many different people and situations.

Two Core Causes of the CRE

Although psychologists have known of the existence of the CRE for nearly half a century (Malpass & Kravitz, 1969), there has been some debate as to its cause. Through decades of experimentation, psychologists have found two basic causes for the CRE—first, many people have a lack of experience with cross-race faces, and second, many people tend to think of others in terms of labels (or "categories") rather than as individuals, failing to look past the category to the unique individual. Each of these causes by itself is typically sufficient to substantially reduce cross-race face recognition. Acting together, though, they play absolute havoc with cross-race recognition. These two causes commonly conspire to create the large effects seen in both experiments and the courtroom (Young & Hugenberg, 2012).

Cause 1: A lack of expertise. It has long been argued that the CRE has part of its roots in differential expertise with same-race (SR) and cross-race (CR) faces (Diamond & Carey, 1986; Malpass, Lavigueur, & Weldon, 1973). This expertise hypothesis argues that the CRE begins with de facto racial segregation—even ostensibly multicultural societies such as the United States and the United Kingdom have sustained patterns of informal racial segregation (Goldsmith & Blakely, 2010). According to this expertise model, this de facto racial segregation

leads most people to have substantially more contact with SR faces than with CR faces (MacLin & Malpass, 2001; Meissner & Brigham, 2001). This differential contact is then argued to lead to differential expertise in processing SR and CR faces—people have more practice recognizing same-race relative to cross-race faces—and this differential expertise gives rise to greater recognition accuracy for SR faces.

Exactly how more practice recognizing SR faces translates into better recognition for SR faces is a matter of some scientific debate (see Young, Hugenberg, Bernstein, & Sacco, 2012, for a review). Some theorists argue that expertise elicits a superior process—called configural processing—that allows people to efficiently extract information from SR but not from CR faces (e.g., Rhodes, Brake, Taylor, & Tan, 1989). By extracting information about the relationships among facial characteristics (e.g., the location of the eyes relative to the nose and mouth), rather than attending to a single feature at a time, this is argued to efficiently extract identity information from SR faces. However, insofar as perceivers have less experience with CR faces, they are argued to be less able to engage in this highly efficient configural processing, and therefore have weaker memories for CR faces (Hancock & Rhodes, 2008). One common paradigm for investigating these differences in configural processing is face inversion. To the extent that SR faces are processed more configurally than CR faces, SR face processing should be more impacted by presenting the face upside-down (because inversion disrupts the typical eyes-over-nose-over-mouth configuration of faces). A number of studies using this inversion paradigm have shown that SR faces are processed more configurally than CR faces (Michel et al., 2006; Rhodes et al., 1989; Sangrigoli & de Schonen, 2004). Moreover, Hancock and Rhodes (2008) found that higher levels of self-reported contact with racial out-group members was associated both with a reduction in the CRE and an increase in configural coding of CR faces. Importantly, the cross-race difference in configural coding was a significant predictor of the CRE in recognition memory.

Other theorists, however, argue that the differential same-race versus cross-race recognition is due not to how faces are processed but instead due to how faces are represented in memory. These representational models argue that by having an extensive number of SR faces represented in memory, this biases the memory in such a way that the SR faces are more easily discriminated from one another (Valentine, 1991; Valentine & Endo, 1992). Faces are argued to be represented in a multidimensional face space, with each feature dimension (e.g., the distance between the eyes) being a dimension on which each face is encoded. By encoding faces on a variety of these dimensions, one can represent all possible faces in such a multidimensional space. A very simplified example face space might include just two dimensions: intereye distance and nose width. In this example, faces with average levels of nose width and average intereye distance would be represented at the center of this two-dimensional space, whereas faces with a huge intereye

distance and an extremely narrow nose would be represented at the periphery of this two-dimensional space. Though there are different face space accounts of the CRE, one such account argues that faces are encoded relative to a norm that has been abstracted from past experience with faces. The norm is at the origin of the multidimensional space (i.e., the intersection of the dimensions would produce the most "average" face on all dimensions). Notably, SR faces will naturally cluster more closely to the norm (because the greater experience with SR faces define the norm to be much more like SR than CR faces). Further, because perceivers have more expertise with SR faces, these faces are represented by a more diffuse distribution of points in the face space. CR faces, on the other hand, are clustered closely together, toward the outer periphery of the face space (as they are further from the norm). Importantly, because CR faces are clustered near to each other, any particular CR stimulus will activate multiple nearby exemplars. Resulting from this, perceivers will be more likely to reply that a novel, never-seen CR faces is familiar than is the case for novel SR faces. Though these representational accounts are distinct from processing accounts, both rely on the idea that perceivers have more experience with SR faces than CR faces.

Although the various manifestations of the expertise hypothesis can differ quite dramatically in the proposed psychological mechanism whereby the CRE occurs, all agree on the same central prediction—more experience with CR faces should improve CR memory. Based on the existing literature, there is some evidence in support of this hypothesis. For example, practice at perceptual discrimination (i.e., practicing differentiating one individual face from another) can reduce the magnitude of the CRE, at least temporarily (Malpass, Lavigueur, & Weldon, 1973). Furthermore, lifelong training with CR faces can actually reverse the direction of the CRE (Sangrigoli et al., 2005). Ethnically, Korean perceivers who had been adopted by and grown up with White European families showed a reversal of the CRE as adults. However, other studies have found no relationship between past experience with CR faces and the magnitude of the CRE (e.g., Malpass & Kravitz, 1969; Ng & Lindsay, 1994). In one recent meta-analysis that analyzed the relationship between CR-exposure and the CRE across nearly 5,000 participants, Meissner and Brigham (2001) found that past experience with CR faces only accounts for a small portion of the variance in face memory. Though differential expertise gained via prior contact with SR versus CR faces may be one mechanism of explanation for the CRE, a perspective that relies solely on perceptual expertise is incomplete. In short, simple exposure to CR faces is not a panacea for CR eyewitness misidentifications.

Though the evidence suggests that exposure and the associated expertise alone cannot solve the problems related to CR eyewitness identification, we assert that the best strategy does involve expertise. However, it will be an "expertise-plus-motivation" strategy that is most effective in reducing CR identification errors (Young & Hugenberg, 2012). Our research shows that in most cases, perceivers

do have the expertise necessary to recognize faces of different races. Whether they deploy these resources effectively is the relevant question. It turns out that social categorical thinking underlies the failure to deploy such resources in many cases. This perspective will be critical to our suggestions for improving eyewitness recognition: people do possess, and can deploy, the resources necessary to recognize CR faces.

Cause 2: Categorical thinking. More recent research has begun to expand our knowledge beyond what we know from the perceptual expertise approach. This more recent approach begins with what we know from decades of social cognitive research: people strongly rely on categories when thinking about other people. This tendency to think categorically about others is automatic, pervasive, and occurs spontaneously in most contexts (Macrae & Bodenhausen, 2000). Upon seeing someone, we quickly and efficiently categorize them according to salient characteristic such as age, sex, and race (e.g., Ito & Urland, 2003). Further, category information is nearly inevitably activated when perceiving faces. Though there are exceptions (e.g., Macrae, Bodenhausen, Milne, & Calvini, 1999; Macrae, Bodenhausen, Milne, Thorn, & Castelli, 1997; Quinn, Mason, & Macrae, 2009, 2010), category activation occurs in nearly all contexts in which face memory is relevant.

This tendency has clear benefits in terms of simplifying the world. Without categorization, navigating even simple social situations would be burdensome and difficult. Categories allow us to make predictions about what kind of behavior to expect from others. Just as categorizing an animal as a dog allows one to confidently predict that it will wag its tail but not purr, categorizing a person as a baby leads one to expect crying behavior and a lack of verbal skills. This process of placing other people into these "boxes" occurs so naturally that we may not note it unfolding. It is only when we are motivated to think carefully about others that we tend to move past categories to look for individuating information—that is, it takes some effort to attend to what discriminates an individual from others like them (Brewer, 1988; Fiske & Neuberg, 1990). One effect of such categorization is that it can essentially make faces that belong to the same category seem to blend together. Rather than being seen as individuals, people are seen as category members. Stronger category activation can translate into weaker recognition (Susa, Meissner, & DeHeer, 2010; Young, Hugenberg, Bernstein, & Sacco, 2009). This suggests that, in situations where race is salient, targets (e.g., suspects) may be merely encoded according to race, and thus, recognized rather poorly.

Evidence suggests that categorical influences on face memory can take root in basic perceptual processing. In one series of studies, Corneille, Huart, Becquart, and Bredart (2004) investigated memory distortions toward racial prototypes. Using faces morphed along continua from White to North African and White to Asian, they found that memory for previously seen faces was distorted toward the ethnic prototype. Participants who saw a face that was 70% North African/30%

White were more likely at recognition to identify an 80% or 90% North African face as the target face. These distortions did not occur for highly ambiguous (50/50) faces. Rather, if a face could be defined as belonging to one race or another, people remembered that face as more like the typical member of that race.

Other research has investigated these memory distortions in a more typical face recognition paradigm. MacLin and Malpass (2001) conducted research in which they presented Hispanic participants with images of ethnically ambiguous faces (Hispanic/Black). To induce participants to categorize the faces, they added hairstyles to each face that were either typical of Hispanic or Black people. In a subsequent recognition task, participants showed more accurate recognition of previously seen "Hispanic" faces than "Black" faces. Despite the fact that the ethnicity of the actual faces had not been altered, top-down category effects induced by hairstyle drove biases in face memory. In fact, such a manipulation has effects beyond face memory; in a follow-up investigation, MacLin and Malpass (2003) found that faces categorized as Black due to hairstyle were even judged to have darker skin tone than faces with Hispanic hairstyles. Once again, these studies provide clear examples of how categorizing a face as belonging to a particular race will lead to race-based, categorical thinking, rather than individuated processing.

In a related set of experiments, Pauker et al. (2009) found that memory for White–Black biracial faces was moderated by the racial label attached to the face. Participants recognized SR faces more accurately than CR and biracial faces, but when the biracial faces were labeled as either Black or White, they elicited recognition consistent with their labels. Furthermore, simply encouraging participants to include biracial individuals in their definition of the in-group led to better memory for biracial faces. In important ways, perceived membership in a social category drives perceptions of and processing of faces. In many cases, this differential processing results in worse recognition for racial and ethnic out-group members. Importantly, what matters here is how the perceiver categorizes the face. Faces categorized as same-race are recognized well, and faces categorized as other-race are recognized poorly.

This leads to the second effect of categorization: categories themselves can signal to us that members of out-groups seem unnecessary to process. The individual identities of members of some groups just seem less personally relevant than others. For example, for the childless, the identities of toddlers likely seem irrelevant, and thus get little attention. That is, until one is expecting a newborn, and suddenly one attends much more to young children. More specific to the CRE, the identities of racial out-group members (i.e., CR faces) likely seem less relevant than the identities of racial in-group members (i.e., SR faces). Unless someone has a reason to move beyond a category label for CR faces, attending to the individual characteristics of CR faces becomes much less likely. In short, because outgroups seem subjectively less relevant, if we want to reduce the CRE we need to motivate people to individuate CR faces.

Hugenberg, Miller, and Claypool (2007) provided some preliminary evidence in support of this motivational perspective. In a very straightforward procedure, they found that the commonly observed CRE could be eliminated simply by warning participants about the CRE, and instructing them to attend to what differentiates among the faces of racial outgroup members (see the Appendix for exact instructions). Participants who received these individuation instructions before encoding (i.e., before attempting to remember faces) showed no CRE, whereas participants who were simply asked to attend to the faces showed the well-replicated deficit for CR recognition.

The findings reported by Hugenberg, Miller, and Claypool (2007) are among a growing wave of social cognitive-oriented investigations of the CRE. Broadly speaking, the growing body of evidence suggests that perceiver and target factors that are likely to elicit individuation will attenuate or eliminate the CRE. For example, as previously noted simply being a member of an out-group—any out-group, not just one defined by race—seems sufficient to reduce recognition. For example, Bernstein, Young, and Hugenberg (2007) conducted research in which group membership was defined either by university affiliation (same- or different-university) or arbitrarily assigned membership to a group supposedly defined by personality characteristics. In both of these examples, White perceivers showed differential recognition for White faces according to these group distinctions. Perceivers showed better recognition for students at their own university than for students at another university, and even believing that a person has a different personality type than oneself can be detrimental to face recognition. Though this research did not involve race, it provided the necessary theoretical undergirding for further research on the influence of group categorization on face memory.

More recently, other researchers have used similar manipulations to eliminate the CRE. For example, Van Bavel, Packer, and Cunningham (2011) assigned participants to membership on one of two teams, the Leopards or the Tigers. Believing that it was necessary to learn the faces of their teammates, participants showed an in-group recognition advantage. Critically, each group contained both Black and White faces, and recognition was not moderated by target race. These researchers also found elevated activation of the fusiform face area (a brain region central to face processing) for in-group members. This advantage once again was not qualified by target race. Results such as these suggest that even CR targets may be individuated if they are part of a superordinate in-group (see also Hehman, Mania, & Gaertner, 2010 for a similar conclusion). In short, seeing an individual as a fellow in-group member (even when that individual is of a different race) can substantially improve recognition, whereas seeing that individual as an out-group member can substantially reduce recognition. This knowledge has important implications for how we think about eyewitness memory. Not only does it suggest that we will show poor recognition for CR faces, but it also demonstrates that faces will be recognized poorly if perceivers see them as not belonging to valued

in-groups, a point we address at some length below. A perceiver may, for instance, categorize all homeless people as homeless, without individuating further. Imagine a witness who sees a homeless person set a house fire, only to be later unable to distinguish the culprit from another homeless person who rushed into the burning house to save the family inside. These confusions will tend to happen for all manner of people who perceivers see as belonging to out-groups.

Motives to individuate can also be instantiated by the behaviors of targets themselves. For instance, Ackerman et al. (2006) found that White perceivers were better at recognizing angry Black targets than nonangry Black targets. Out-group members will also be better individuated when they are perceived as powerful. Shriver and Hugenberg (2010) found that Black targets portrayed as having high-power occupations (e.g., CEO, doctor) or carrying out high-power behaviors (e.g., demanding a pay raise, being in a gang fight) were recognized just as well as high-power Whites.

Taken together, this body of research indicates that social categories themselves, even beyond prior experience with faces, can both create and attenuate the CRE. Moreover, categories other than race, including even arbitrary group memberships, can create CR like effects. Importantly, however, this research indicates that motives outside of category information, elicited by the behavior of the targets or even instructions to perceivers, can reduce or even eliminate the CRE. Knowledge of factors that reduce the CRE may be leveraged to reduce eyewitness errors in the future.

Integrating the Two Causes of the CRE

Taken together, the two causes of the CRE outlined above have proven effective across dozens of experiments. And as previously noted, each cause alone is sufficient to create cross-race deficits in eyewitness memory, but together they can truly debilitate memory.

A focused reader might note, however, that these two causes of the CRE share one critical commonality—both lead the perceiver to focus away from others' individuality when we are learning their face or identity. That is, either via a lack of ability (due to weak experience) or due to a lack of attention (due to the category), the perceiver is not focusing on what makes the perpetrator's face unique, and different from everyone else. This makes a focus on individuation a key place for effective interventions to eliminate the CRE.

Second, the reader may also note that both causes—a lack of expertise and categorical thinking—focus on the encoding phase of recognition. That is, they focus on what happens when learning about a face, rather than what happens when attempting to later recognize others faces (say, during a police lineup). The (unfortunate) fact of the matter is that the CRE does appear to occur at encoding (see Young, Bernstein, & Hugenberg, 2010). That means that there is very little

one can do after witnessing a crime to improve one's memory for perpetrators' faces. This is a troubling and seemingly immutable fact of face memory. Even the act of trying to describe the characteristics of perpetrators' faces can ironically reduce subsequent recognition (see Schooler, Ryan, & Reeder, 1996). This leads to the potentially pessimistic inference that once a crime is witnessed, there is nothing one can do to improve CR recognition. However, this masks two key points of intervention—first, there are multiple effective interventions that can be employed before witnessing a crime (or when trying to encode any face) that can substantially reduce the CRE. Second, that there is much that can be done to prevent eyewitness decision errors from occurring, even if we cannot improve the memory itself after the fact.

Extending this logic, in the following section we focus both on general strategies for improving eyewitness identification and on CRE-specific strategies designed to tackle race-based deficits in face memory. Many of these general influences on face recognition are not specific to the CRE, and have been covered extensively elsewhere, and we therefore give this matter only a brief discussion. We then move to the specific strategies that have proven effective at reducing the CRE at encoding. For both the general influences on recognition and the race-specific strategies, we focus on the two time points at which interventions can be undertaken—at encoding (i.e., during or before a crime) or at recognition (i.e., during lineup or courtroom identification).

Influences on Face Recognition and Strategies for Improving Recognition

General Influences on Eyewitness Accuracy

Encoding-level influences: Prceptual quality and psychological state. Although this is not an exhaustive discussion of the factors shown to influence face recognition (see Wells & Olson, 2003 for a review), it is worth noting that face recognition is subject to multiple influences outside of race. Indeed, there are a number of perceptual factors that are likely to hinder accurate eyewitness face recognition. Perhaps first among these is the quality of the viewing conditions in which the face is initially encoded (Shapiro & Penrod, 1986). Viewing a face only briefly (Light, Kayra-Stuart, & Hollander, 1979; Maclin, Maclin, & Malpass, 2001) or at a distance (Malpass & Devine, 1981) have been reliably shown to elicit poor subsequent recognition. All of these influences serve to make an environment perceptually "noisy"—that is, they provide objectively poor viewing conditions, which then translate into poor memories.

There are also psychological influences that can affect face encoding, leading to poor memories in spite of even high-quality (i.e., low "noise") viewing conditions. For example, both distraction and stress have been shown to reliably debilitate face recognition. One classic example of a situation that elicits both

distraction and stress is the presence of a firearm or a weapon—known as the weapon focus effect. Indeed, Loftus (Loftus, 1979; Loftus, Loftus, & Messo, 1987) and others (Cutler, Penrod, & Martens, 1987) have found that the presence of a firearm when witnessing a crime reduces eyewitnesses' subsequent recognition accuracy. Early research suggested that perceivers focus on weapons for longer than other items in a scene (Loftus, Loftus, & Messo, 1987). Other research more directly investigated the effects of weapon focus on identity recognition. For example, Cutler, Penrod, and Martens (1987) found that perceivers who viewed a video of a robbery in which a gun was visible were substantially less accurate in a subsequent lineup than those who viewed a robbery in which the gun was hidden. Although the presence of a weapon was clearly detrimental to accurate recognition, it should be noted that even in the no-weapon condition, only 46% of perceivers made correct identification judgments. Other researchers have corroborated such effects; Steblay (1992) conducted a meta-analysis finding that weapon focus effects are relatively small ($d = 0.13$) but consistent.

Notably, there is some debate as to whether this effect is due to surprise (most people do not expect to witness a crime involving a violent crime) or to stress (weapons can be quite threatening). Indeed, Hope and Wright (2007) found that when perpetrators held up a bank cashier with either a firearm or a feather duster, recognition for the perpetrator's face was reduced relative to a control condition, suggesting surprise may play a large role in the weapon effect.

Postencoding influences: Lineup presentation. Although not the focus of our review, previously proposed postencoding strategies for reducing eyewitness errors certainly merit some discussion. One strategy that has been widely suggested, and subsequently adopted in many police departments (Jonsson, 2007), is the use of sequential eyewitness lineups. Rather than presenting witnesses with suspects simultaneously as one group, researchers and investigators present witnesses with suspects one at a time. Initial evidence of the superiority of the sequential lineup was presented by Lindsay and Wells (1985) in a study in which participants witnessed a mock crime and subsequently were asked to pick the perpetrator out of a lineup. For some participants, the perpetrator was present in the lineup, and for others, the perpetrator was absent. Those who viewed the suspects in a sequential manner showed a substantially lower tendency to select innocent suspects in perpetrator-absent lineups than those who saw the classic lineup, with only a slightly elevated tendency to fail to pick the perpetrator when he was present.

Despite some evidence for the effectiveness of sequential lineups, more recent investigations have called the superiority of sequential lineups into serious question. For example, Meissner, Tredoux, Parker, and MacLin (2005) argued that sequential lineups have the effect of making perceivers more selective in choosing targets. Thus, they are more likely to successfully avoid picking a target in target-absent lineups, but they are more likely to miss when the target is

present—creating a shift in criterion but not in sensitivity in signal detection terms. In other words, perceivers' response bias shifts toward a tendency to indicate that the target is not present. Other work has found that the sequential lineup advantage only occurs under limited circumstances. Carlson, Gronlund, and Clark (2008) found that sequential lineups are superior when the lineup has been constructed in a biased way, such that the target is highly distinctive relative to the foils. In addition, identifications in sequential lineups are more diagnostic as the suspect is placed later in the lineup. One additional criticism that has been leveled toward sequential lineups is that the procedure advocated by Lindsay and Wells (1985) involves multiple confounds. Though they argue that sequential lineups per se are more effective than simultaneous lineups, their procedure involves other changes as well. In other words, it is possible that the advantages reported by Lindsay and Wells are due to a "package" of changes, rather than merely manipulating the sequential versus simultaneous nature of the presentations (Malpass, Tredoux, & McQuiston-Surrett, 2009). For example, they suggest a number of other procedures in the sequential administration of lineups: witnesses are to make a yes/no decision after each face; witnesses are uninformed as to how many faces will appear in the lineup; the suspect is never presented first; and witnesses may only see each face once. Recently, Malpass, Tredoux, and McQuiston-Surrett (2009) assessed the literature and concluded that the body of work does not justify a mandated move to sequential lineups. Though sequential lineups offer some promise toward better eyewitness identification procedure, the question of how to best conduct lineups remains open.

Because of the mixed evidence regarding sequential versus traditional lineups, it would be imprudent for us to make strong recommendations in favor of either method. However, there do seem to be real tradeoffs involved with this decision. As is mentioned above, most research finds that sequential lineups lead perceivers to shift their criterion for identifying targets (e.g., Meissner, Tredoux, Parker, & MacLin, 2005). This criterion shift toward increased selectivity is certainly good for suspects, but it necessarily entails a lower probability of successfully identifying actual perpetrators. As such, the question of which type of lineup to use may best be thought of as a value judgment. If it is more important to avoid convicting the innocent (i.e., innocent until proven guilty), then sequential lineups may be superior, as false alarms will tend to be reduced. However, if the prevailing goal is to convict as many criminals as possible (at the potential cost of more innocent citizens being imprisoned), traditional lineups should yield higher hit rates. Despite the lack of a clear correct answer, policymakers should certainly be aware of the tradeoffs involved with choosing one over the other.

Postencoding influences: Witness instructions during recognition. One key factor in eyewitness accuracy is the instructions that police give to witnesses. In short, eyewitnesses are quite suggestible (e.g., Loftus, Miller, & Burns, 1978; see

Zaragoza & Lane, 1998 for related demonstrations), and may frequently wish to please the police investigators. Because of this, it has become common policy for police to give eyewitnesses "unbiased instructions" during lineups—that is, to tell the witness explicitly that the lineup may or may not contain the suspected perpetrator (Wogalter, Malpass, & McQuiston, 2004). These unbiased instructions can be compared to "biased instructions," which do not provide for the possibility that the perpetrator is not present. The consequences of such instructions have been examined meta-analytically by several researchers (Clark, 2005; Rosenthal, 1991; Steblay, 1997). The earlier findings seem to clearly favor unbiased instructions, as they reduced false alarms (i.e., false recognitions) without appreciable impact on hits (i.e., correct identifications). However, Clark's (2005) more recent analysis concludes that the difference is not so clear. He found that, contrary to what was reported by Steblay (1997), biased instructions resulted in more correct identifications.

However, rather than concluding that biased instructions are a superior or even acceptable strategy, he points out ways in which this work can be understood in light of other factors such as viewing conditions. Police, he argues, may be especially likely to "nudge" a witness if viewing conditions were favorable. However, these are the very conditions under which witnesses may have been most likely to make an identification in the first place. Thus, nonidentifications under good conditions should be trusted as rather diagnostic, and biased instructions should serve to only increase false alarms in these situations (e.g., Malpass & Devine, 1981). With regard to policy, we once again observe that biased instructions will serve to increase the rate of both correct and incorrect identifications, whether or not the perpetrator is actually present. Because of this, decisions about what kind of instructions to use will largely be determined by the competing values of protecting more innocents from wrongful imprisonment and incarcerating more perpetrators.

Postencoding Influences: Blind Administration of Lineups. A final important component to lineup administration is the administrators' knowledge of the identity of the suspect and whether the suspect is present in the lineup. Wells and Luus (1990), in comparing eyewitness lineups to a well-conducted research experiment, argued for double-blind lineup administration. That is, both the eyewitness and the administrator should remain blind to the identity of the suspect. It was pointed out, for example, that the potential benefits of using a sequential lineup would be neutralized if the experimenter were aware of the suspect's identity. This idea was tested empirically by Phillips, McAuliff, Kovera, and Cutler (1999). In an experimental paradigm, they found that knowledge of suspect identity did bias lineup administration in sequential lineup. That is, participants were more likely to commit a false identification in sequential lineups when the administrator knew the suspect's identity. Strikingly, this occurred even in the presence of an observer

who supervised the lineup administration. Results such as these suggest strongly that investigators using sequential lineups should select administrators who are blind to the identity of the suspect.

Eyewitness Confidence versus Accuracy

Beyond recognition deficits created by poor encoding or biases in the lineup presentation process, one surprising lesson that psychologists have learned about memory is that the confidence of an eyewitness is only weakly related to their recognition accuracy (see Sporer, Penrod, Read, & Cutler, 1995, for a review). This is remarkable given that most lay people believe that confidence strongly predicts accuracy—a confident eyewitness appears to be an accurate one (Brigham & Bothwell, 1983; Deffenbacher & Loftus, 1982)—and the confidence of eyewitnesses receive a great deal of weight in juridic decisions (e.g., Cutler, Penrod, & Dexter, 1990; Lindsay, 1994).

One can look to the existing field research as instructive with regard to this issue. Rather than merely informing jurors that research has found that eyewitness testimony is fallible, it might be useful to give them examples of field research in which even SR identifications are highly suspect. Actual proven cases of mistaken identification in the legal system are rare, at least in part because innocence is difficult to prove. However, one can look to an example such as the field study carried out by Brigham et al. (1982) for illustration. In this study, store clerks were asked to identify "customers" who had been in their store two hours earlier. Surprisingly, clerks were correct less than 50% of the time. When including clerks who did not attempt to guess, accuracy was only 34% (chance responding was 16.7% in this case). Further, a preliminary study showed that accuracy was at chance levels after only a 1-day delay. Though not truly analogous to a crime attempt, the data from this study show just how bad people can be at recalling facial identities in real-life settings. Especially alarming is the fact that 85% of clerks reported being confident enough that they would testify in court.

This is unfortunately consistent with the perceptions of prosecutors who responded to a survey by Brigham (1981). In this survey, the majority of prosecutors reported that "90–95%" of the eyewitness identifications they encountered in their work were likely to be correct. This inflated confidence should be worrisome to anyone who is interested in a just legal system. The possibility that race can magnify such a discrepancy cannot be ignored.

Specific Influences on and Strategies for Cross-Race Recognition

Encoding-level influence: Individuation motivation as an encoding intervention. Perhaps one of the greatest advances in recent theory on the CRE is that categorical thinking undercuts our tendency to seek out the uniqueness in others.

Instead, we can use categories (e.g., Black or White; cashier or criminal) which draw our attention to what makes people similar, and distract us from what makes faces different from one another (see Levin, 1996; 2000), or distract us from faces altogether (see Rodin, 1987). Remarkably, this occurs across a vast variety of categories, not just race (see Hugenberg et al., 2010 for a review), which indicates that a variety of category-based deficits in face recognition can occur—empirically this point has been borne out time and again.

In a more hopeful vein, this indicates that we may be able to draw perceivers' attention away from categories at encoding and toward others' unique facial characteristics—that is, toward what makes a particular face memorable. Recent research indicates that this intervention is quite effective in the laboratory. The previously reported experiment carried out by Hugenberg, Miller, and Claypool (2007) is one example of how such an intervention can reduce the CRE. Simply by warning a group of White perceivers before encoding both White and Black faces about the CRE and further exhorting them to attend closely to what makes cross-race faces unique and different from one another significantly improved cross-race recognition. These instructions were brief yet powerful. The effectiveness of these same instructions has been replicated across multiple experiments and laboratories (e.g., Rhodes et al., 2010; Young et al., 2010; Young, Hugenberg, Bernstein, & Sacco, 2012). More promising is that (yet unpublished) data from our own laboratory indicates that perceivers can even enjoy the benefit of these instructions when otherwise distracted. This provides promise that such motivation can improve CR recognition even in otherwise distracting situations that may occur in real-world crime scenes.

Importantly, in some cases individuation motivation can be induced without explicit instructions. As previously described, Bernstein et al. (2007) found that mere in-group/out-group distinctions (such as university affiliation or even arbitrarily assigned personality types) were sufficient to create superior recognition for in-group relative to out-group faces. Similarly, Van Bavel et al. (2011) found that assigning participants to teams—Leopards and Tigers—created superior recognition for one's own team. Remarkably, this improved in-group recognition was true regardless of whether the in-group faces were of participants own race or of another race. In short, these experimentally created teams "trumped" race in recognition. Hehman, Mania, and Gaertner (2010) found a nearly identical pattern of data, whereby a shared university affiliation "trumped" race, eliminating the CRE for cross-race targets that attended one's own university. Taken together, this research indicates that a shared group membership at encoding can substantially improve recognition, and even attenuate or eliminate the CRE.

Encoding-level influence: High-quality cross-race individuation training over time. Because one core cause of the CRE is a lack of experience differentiating among CR faces, one obvious solution to this deficit might be a crash program

of exposure to CR faces. By this logic, having people simply view dozens or hundreds of CR faces might be enough to fix the CRE for good. Unfortunately, the cumulative evidence suggests that this strategy does not work—or at least it does not work by itself.

As previously reported, Meissner and Brigham's (2001) meta-analysis finds that self-reported exposure to CR faces accounts for only about 2% of the variance in the CRE—in other words, this is a weak effect. Indeed, there are plenty of examples using real-world groups that indicate that a lot of real-world CR contact can translate into little to no improvement in CR recognition. For example, Ng and Lindsay (1994) find that Whites living in Singapore showed just as big of a CRE for East Asian faces as Whites living in North America; despite the obviously substantial difference in CR contact.

More recent research appears to have found the culprit—a lack of high-quality contact. Simply because a White person is living in Singapore does not guarantee that she interacts with Asians at an individuated level. Instead if the White person lives among and works primarily among other Whites, this provides little motivation to or experience with discriminating among Asian faces. In support of this, Tanaka and Pierce (2009) recently found that training participants to classify CR targets according to individual identity led to better subsequent recognition accuracy than training participants to classify faces by ethnicity. White participants saw a series of Hispanic and Black faces, for which they underwent recognition training. For half of participants, individual Black faces were each assigned a unique key on the keyboard, while all Hispanic faces were assigned the same letter label. For the other half of participants, Black faces were assigned one key and Hispanic faces were assigned individual keys. Participants showed improved recognition for targets that were assigned to unique keys, relative to targets that shared a key with other targets of the same race. This work is grounded in the idea that perceivers' default strategy with CR faces is to categorize them according to race. However, when the learning task requires that the faces be encoded according to individual identity, perceivers will do so even for CR faces. In short, simply viewing CR faces without the emphasis on individual identity did not lead to better recognition. Tanaka and Pierce's (2009) training also led to different patterns of neural activity in addition to the behavioral improvement; when viewing the faces, participants who were induced to classify CR faces by individual identity showed neural activity associated with expertise. In other words, we can make people act like CR face recognition experts with a proper focus on individuation.

Postencoding influence: Biased lineup construction. As has been discussed extensively throughout this article, the CRE appears to occur primarily at encoding (see Young, Bernstein, & Hugenberg, 2010). However, race-based biases on the part of those who construct the police lineups can lead to postencoding influences, even for perceivers who have encoded CR faces quite well.

To clarify, the effectiveness of a police lineup depends to a great extent on the "foils" included in the lineup. The more the foils look like the suspect, the more diagnostic an accurate identification of a suspect is. Take the extreme case of having a lineup consisting of five identical siblings. When the eyewitness accurately selects the suspect because of the suspect's unique scar on his right arm, we are very likely to trust the eyewitness because of how difficult it is to detect the actual suspect.

Unfortunately, however, there appear to be race-based biases in how lineups are constructed. Brigham and Ready (1985) had White and Black participants construct lineups using both Black and White suspects. Notably, White lineup constructors were less selective of who was included in a lineup of Black faces, whereas Black lineup constructors were less selective of who was included in a lineup of White faces; participants making the lineup tended to select CR foils who were easy to reject. This created a race-based bias in the lineups—lineups made across racial lines (e.g., a White person constructing a lineup of Black faces, or vice versa) were less fair than were SR lineups. This bias was strong enough to lead multiple theorists (e.g., Sporer, 2001; Wells & Olson, 2001) to avoid CR lineup construction and to instead recommend that investigative personnel who make lineups be of the same race as the suspect in the investigation.

Implementing Public Policy to Reduce the CRE

Public Policy and Police Interventions

The fact that the CRE occurs at encoding makes it quite a challenging bias to combat in real eyewitness identifications. There is little that one can do to improve face memory after encoding (although we can potentially manage errors—see *Unbiased Construction of Police Lineups* and *Legal Interventions* below). Although we cannot easily induce individuation motivation after the eyewitness event (Young et al., 2010), we can offer two primary recommendations for policy makers and police that can be implemented systematically to reduce CR eyewitness errors: (1) individuation training for police, and (2) unbiased construction of police lineups.

Cross-race individuation training for police. It is often the case that police officers serve as eyewitnesses. Though some legal opinions have taken the position that police are particularly good eyewitnesses, others have concluded that police may have no real advantage in identifications (Lipton, 1996). Initial laboratory research indicated that police are no better than civilians at face recognition (Billig & Milner, 1976). However, follow-up work in more naturalistic settings indicated that police do show better recall than civilians, though only under conditions of relatively long exposure, such as when a target asks for directions (Clifford &

Richards, 1977). Notably though, this work is limited to a handful of studies, none of which involve race as a variable of interest.

However, because police do commonly serve as eyewitnesses to crimes and their aftermath, and do so at a rate substantially higher than that of most civilians, the highly proceduralized nature of police training and operations provides a promising opportunity to implement recommendations based on solid research. Indeed, our first recommendation is to engage police officers in Cross-Race Individuation Training.

Specifically, based on the research of Tanaka and Pierce (2009), we recommend that police get sustained training discriminating among CR faces. As previously discussed, Tanaka and Pierce had participants learn to provide unique responses to each of a series of CR faces. Their task was somewhat analogous to learning the individual names for a whole group of CR individuals. This type of training improves CR recognition. Notably though, past research has indicated that the effectiveness of CR training of this sort decays over time (Goldstein & Chance, 1985). This suggests that the training should be repeated over time; even less than 15 minutes of such discrimination training can yield benefits in subsequent CR recognition (Elliott, Wills, & Goldstein, 1973). Practically speaking, it should be possible to implement a program of multiple brief sessions of Individuation Training over time.

Second, as part of this Individuation Training, we also recommend training officers to habitually use an individuation mind-set when engaging with suspects. As previously discussed, Hugenberg, Miller, and Claypool (2007) found that merely informing participants that the CRE exists, and then instructing them to attend to what discriminates among CR faces, led to a substantial increase in the recognition of CR faces (see also Rhodes, Locke, Ewing, & Evangelista, 2009; Young et al., 2010; Young & Hugenberg, 2012, for replications of this effect). Thus, when interacting with criminal suspects, it is important to attend closely to what differentiates a particular individual from other individuals of that racial group. People seem to do this spontaneously for SR faces but apparently need to be reminded to do so for CR faces (Hugenberg et al., 2010). Insofar as we can make this a habit of police officers during police training, we can reduce eyewitness errors at least among police officers. As a practical matter, once officers have undergone sessions that repeatedly encourage them to enact such a mind-set, it should become somewhat habitual and thus automatized.

The above recommendations for Cross-Race Individuation Training are based on a solid and increasing body of evidence. Although researchers are constantly refining our understanding of what exactly underlies the CRE, we believe that the existing evidence for how to reduce it is strong enough that policies should be implemented in an attempt to do so. That said, it is important to point out that what we are suggesting is not sensitivity training aimed at racial attitudes. Though it would be plausible to expect that racial prejudice would be a predictor

of the CRE, a large body of research has thus far refuted this possibility (see Meissner & Brigham, 2001). Though we would agree that sensitivity training can be beneficial to police for various reasons, we find no basis upon which to believe that improving racial attitudes would have any independent influence on CR face recognition ability. Rather than being a strategy relying on attitudes and evaluations, ours is a cognitive and motivational strategy designed to improve perceivers' experience with individuation and motivation to individuate during encoding. Further, it will be important to engage police as willing participants in programs of individuation training. Merely exposing unmotivated participants to CR faces will not be sufficient (see below for more on high-quality contact).

Finally, it is also important to note that we make these recommendations for police officers primarily because they commonly serve as eyewitnesses to crimes and because police training is extensive, rigorous, and mandatory. Given these factors, this seems to be the most sensible place to begin a targeted intervention to increase CR recognition. Though these recommendations can be applied perhaps most readily to police, they could certainly be effective for community members at large. Admittedly, focusing primarily on police officers limits the scope of our policy suggestions in important ways. However, we feel that applying our research to police training programs is an important first step toward a broader understanding of how to improve overall eyewitness accuracy. The solutions we suggest are based in carefully conducted and replicable findings, and we are confident that they can be adapted to improve eyewitness identification.

Unbiased construction of police lineups. Although not a novel recommendation, we also reiterate the recommendations of Sporer (2001) and Wells and Olson (2001), to have police and investigators only create lineups for suspects of the same race as the officer. Although the issue of unintentional race-based bias in suspect lineups has long been recognized (Brigham & Ready, 1985), this policy has yet to be applied consistently in lineup construction.

As previously discussed, Brigham and Ready (1985) found that people tend to select foils when constructing lineups that resemble the suspect less closely when constructing CR (relative to SR) lineups. Thus, one simple policy that could reduce eyewitness errors is to have individuals only create SR lineups. This simple and very low-cost policy change can reduce errors, and thus save us from unnecessary cases of mistaken identity.

Legal Interventions: A Cautious Use of Eyewitness Identifications

For the above reasons, one of the best-supported recommendations that we can make echoes what many have recently argued: eyewitness testimony should be treated with real caution. This is especially true given that even eyewitnesses who may seem quite sure of their memories are incorrect roughly as frequently

as those who seem unsure (Deffenbacher, 1980; Loftus, Miller, & Burns, 1978; Wells, Lindsay, & Ferguson, 1979; Yarmey, 1979). Although researchers, public policy analysts, and police departments have begun to identify methods that may lead to fewer eyewitness misidentifications, there are various characteristics of situations that can undermine face recognition.

Further, given the substantial evidence for poor CR face recognition, it can be stated unequivocally that CR eyewitness testimony should be treated with even more caution than SR testimony. To this end, Wells and Olson's (2001) meta-analysis offers one disturbing statistic: a Black innocent suspect is more than 55% more likely to be falsely identified by a White eyewitness than a Black eyewitness. We strongly encourage counsels and courts to consider specifically addressing the issue of CR identification inaccuracies. Some courts recognize the importance of allowing testimony regarding the unreliability of eyewitness testimony in general (Fradella, 2006). We argue that states should go further, however. For instance, New Jersey's Supreme Court has mandated that juries be instructed specifically of the elevated likelihood of inaccuracies in CR identifications when those identifications constitute a critical piece of evidence in the case and are not corroborated by additional evidence (New Jersey v. Cromedy, 1999).

It has been argued that such instructions are unnecessary and even harmful. One line of argument is that jury instructions regarding CR identifications are overly general and can do nothing to inform the particular identification in question (e.g., Bartolomey, 2001). In addition to claiming that the evidence for the CRE is "hardly overwhelming," Bartolomey argues that jurors are capable of understanding that perceivers make mistakes. Identification testimony is presented in the context of a body of evidence that all must be assessed to prove that the suspect is guilty beyond a reasonable doubt. Thus, eyewitness testimony must be questioned just as any other evidence presented, but we should not attempt to call into question CR identifications because of the existence of a general phenomenon. It is also argued that such a jury instruction would be unfairly partial, as it will always favor the defendant. Rational verdicts, she argues, will best be rendered by a systematic and impartial consideration of all evidence.

We believe that this argument falls short, however. The evidence for the CRE is reliable, robust, and overwhelming (Meissner & Brigham, 2001). In actual eyewitness situations, this translates into a real and systematic bias that unduly harms suspects who are not of the witness' ethnicity. Despite what Bartolomey seems to argue should be essentially a matter of common sense, problems remain. Instructions are one way to attempt to mitigate the problems.

Finally, though we do recommend that courts allow expert testimony on the CRE, we realize that this is a largely unsatisfying solution. Quite obviously, expert testimony does nothing to actually eliminate or reduce the occurrence of the CRE at the point of encoding. However, such instructions should be one important component of an overall strategy for reducing the harmful effects of the CRE in

eyewitness identifications. As is argued by Wells and Olson (2001), the traditional legal safeguards that are meant to prevent wrongful convictions, such as pretrial suppression motions, cross-examination, and closing arguments that could focus on race, wrongful convictions based on mistaken identifications still occur. Though we can of course not make conclusions about the causal role of race in individual cases of proven wrongful convictions, the statistics pointing to the role of race are difficult to deny (Meissner & Brigham, 2001; Wells & Olson, 2001).

Social Interventions to Promote Individuation

Though we hope the difficulties with inducing perceivers to individuate CR perpetrators in crime scenarios have been made clear in this review, we do think that social interventions that have previously been initiated for the purpose of changing racial attitudes could have positive effects on real-world face recognition as well. For example, some evidence exists that we may be able to induce individuation of out-group members via recategorization. In other words, some research indicates that perceivers can look past race when encoding the faces of others, to focus on other similarities they have with others. This focus on a shared similarity (such as a shared university affiliation with a CR individual) can motivate increased individuation and improved face recognition.

Earlier work, carried out from the social cognitive perspective on the CRE, had suggested that such recategorization may be difficult to achieve. For instance, Shriver, Young, Bernstein, Hugenberg, and Lanter (2008) found that White targets depicted in low socioeconomic status (SES) contexts were recognized as poorly as Black targets, whereas Black targets depicted in high-SES contexts did not enjoy improved recognition. However, other work does suggest that explicit recategorization of targets as in-group members may be effective. For example, according to the Common Ingroup Identity Model (Gaertner & Dovidio, 2000), changing social contexts have an influence on how people conceptualize themselves. As we all hold memberships in multiple social categories, it should be possible to shift the social identity that is salient at any given time. The Common Ingroup Identity Model argues that when a target is recategorized according to a shared social identity (e.g., a shared group membership), that target will be afforded the benefits of in-group membership, including superior face recognition. The logic underlying this model has been most straightforwardly applied to intergroup attitudes (Gaertner et al., 2000), but recent evidence suggests that it can usefully inform face recognition research as well.

For example, Hehman, Mania, and Gaertner (2010) had White participants complete a recognition task in which they saw Black and White faces. Each face was also labeled onscreen as belonging to a student at the same university or a student at a different university. Faces were presented onscreen 8 at a time, and they were grouped either by race or by university affiliation. When faces were

grouped by race, participants showed the CRE (though Black own-university targets were remembered marginally better than Black other-university targets). However, when faces were grouped by university, participants showed no CRE. Rather, they only showed an own-group advantage. Black same-university targets were remembered just as well as Black other-university targets.

Thus, though more subtle manipulations such as social context may not be effective, perceivers who can explicitly recategorize CR faces as in-group members will show improved CR recognition. Just as the Common Ingroup Identity Model (Gaertner, Dovidio, & Bachman, 1996) and intergroup contact interventions (Carithers, 1970) have been used in schools to improve intergroup attitudes, we encourage policymakers and educators to consider such initiatives aimed at emphasizing shared superordinate identities that cut across race. To the extent that White students, for example, make it a habit of seeing their fellow Black students as in-group members who should be individuated, it is possible that the CRE can be reduced over time. Of course, we still need to investigate the long-term impact of individuation instructions and motivations that have been found effective in experimental settings.

High-Quality Contact

In terms of social prescriptions for a reduction in the CRE, the research strongly suggests that it is high-quality interracial contact that can help to reduce recognition errors. To this point, we must be clear that we do not prescribe mere contact as a panacea for the CRE. To readers who are familiar with the literature on group-based prejudice, this may come as a surprise. We know from meta-analyses that mere contact with members of other racial groups does reliably reduce prejudice (see Pettigrew & Tropp, 2006). Unreinforced exposure to CR others does reduce prejudice over time. However, the same cannot be said with any confidence for face memory. Cross-race contact only accounts for a very small percentage of the variance in the CRE (Meissner & Brigham, 2001). Indeed, the CRE occurs not due to prejudice, but rather to both a lack of experience with CR faces and a lack of motivation to individuate them. Therefore, intergroup contact alone will have little effect because mere contact does not necessarily encourage individuation. Rather, contact that occurs at an individuated level and that motivates attention to individuating characteristics can serve both to improve individuation experience with CR faces, and to enhance motivation to individuate CR faces.

Indeed, some types of contact could likely exacerbate rather than reduce problems with face memory. For example, contact that emphasizes group boundaries, or worse, creates intergroup anxiety or threat, will not lead to individuation of CR faces. In fact, such contact can even reduce recognition for same-race targets (Wilson & Hugenberg, 2010). When perceivers are led to think that an out-group

is encroaching on valued in-group roles, characteristics, or traits that make the in-group distinct and unique, it can lead to group-based homogenization of both groups. Further, group level contact where out-group members become functionally interchangeable (e.g., enemy soldiers on a battlefield) will also not encourage individuation. In line with classic theories of the Contact Hypothesis in social psychology (Allport, 1954), we encourage intergroup contact to be equal in status, to forge common goals, to afford the potential for group members to forge intergroup friendships, and to have the clear support of authorities. Such conditions provide much more than mere intergroup contact; rather, they provide the context and the motivation for true individuation.

Limits to Individuation in Face Recognition: A Problem in Context

Although researchers have shown that individuation motives can improve CR recognition and reduce the CRE, there are important limitations, especially with regard to potential policy applications. First, according to recent research, the CRE may be best conceptualized as a specific manifestation of a broader phenomenon by which in-group members are recognized better than out-group members. As previously noted, race is not the only dimension upon which these group differences influence recognition—it occurs across a variety of in-group/out-group distinctions. For example, the work by Bernstein et al. (2007) on mere group distinctions (see also Van Bavel et al., 2011) illustrates that any situation in which group memberships are salient can result in relative recognition deficits for out-group members.

This work also points to the importance of maintaining an individuating mindset in the context of cross-racial identifications. We have already reviewed the research establishing ways in which CR recognition can be improved. Again, though, it is worth emphasizing that practice alone is not enough. In the same way that people may show poor recognition even for SR targets who are obviously out-group members, people who have expertise individuating CR targets may still fail to individuate if they lack the proper mind-set. The research on own-group biases on face recognition can serve as a warning that high levels of expertise with faces of a certain race are not enough to ensure good recognition.

Taken together, work such as this strongly suggests that we should think quite broadly about how to improve recognition in eyewitness situations. Race, of course, is the most obvious dimension that should be of focus in any approach to improve individuation. However, people, such as police, who are especially likely to witness crimes, should be aware that they are susceptible to these more general group-based biases as well. Though the existing literature does not allow us to make any conclusions about how these group-based biases may actually play out in eyewitness identification, we suspect that they do. As such, precautionary measures should be taken.

Conclusion

Cross-race eyewitness identifications have long posed problems for our police and court systems. A large and still-growing body of work has been dedicated to describing the nature, uncovering the cause, and finding remedies for the CRE in face memory. We know more than we have ever known about the CRE, and we are increasingly confident that the existing body of work must be used to inform eyewitness identification policy. Courts have gradually begun to show willingness to acknowledge the fallibility of eyewitness memory in general; however, there is still much room for progress, especially with regard to the specific case of CR identifications. We have proposed a few important ways to reduce CR eyewitness mistakes. Some strategies, namely individuation training, are aimed at actually improving eyewitness memory. Others, such as jury instructions, are more focused on managing the impact of likely errors. Both kinds of strategies are critical for effecting a reduction in wrongful convictions based on flawed eyewitness testimony.

Psychological research has a long history of informing legal policies. Among the various domains in which psychology can inform the law, eyewitness memory is especially relevant. Regardless of whether one places more value on bringing perpetrators to justice or protecting innocent suspects, research on the fallibility of CR face memory should inform how eyewitness testimony is treated by courts. When people like Cornelius Dupree are wrongly convicted, not only does an innocent person unjustly spend long years in prison, but actual perpetrators remain unconvicted. In Dupree's case, justice was merely delayed. Undoubtedly, though, justice for others is never achieved. We believe that research on cross-race face memory offers practical, implementable suggestions for minimizing the likelihood of such injustices.

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Appendix

Hugenberg, Miller, and Claypool's Individuation Instructions:

"Previous research has shown that people reliably show what is known as the Cross-Race Effect (CRE) when learning faces. Basically, people tend to confuse faces that belong to other races. For example, a White learner will tend to mistake on Black face for another. Now that you know this, we would like you to try especially hard when learning faces in this task that happen to be of a different face. Do your best to try to pay close attention to what differentiates one particular face from another face of the same race, especially when that face is not of the same-race as you. . .

Remember, pay very close attention to the faces, especially when they are of a different race than you in order to try to avoid this Cross-Race Effect."