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Towards a synthetic model of own group biases in face memory

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In the current work, we extend the Categorization-Individuation Model (Hugenberg, Young, Bernstein, & Sacco, 2010)—an existing model of the own race bias—to organize and explain the proliferation of own group biases in face memory. In this model, we propose that own group biases result from the coacting processes of social categorization, motivation to individuate, and individuation experience. This extended Categorization-Individuation Model affords a number of benefits. First, this model allows us to begin to consider various own group biases as manifestations a single class of phenomena, offering sensible predictions across and among biases. Further, this extended Categorization-Individuation Model makes novel predictions for how own group biases can be exacerbated and eliminated by both perceptual and motivational processes, allowing for potentially novel interventions for own group biases. Finally, we discuss a variety of open questions with regard to an extended Categorization-Individuation Model, with an eye towards framing future research questions.

Keywords: Own group bias; Face perception; Motivation.

The own race bias,[1] or the tendency to have better recognition for faces of one's racial ingroup than for racial outgroup faces, is one of the most robust biases in face perception and has been known to psychologists for more than a half century (e.g., Allport, 1954; Malpass & Kravitz, 1969). In fact, the

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[1]The own race bias has been known by various terms in the literature (and in our own work), including the own race effect, the other race effect, the cross race effect, and the cross race recognition deficit. All such monikers refer to the tendency to have superior face memory for members of racial ingroups than racial outgroups.

effect is so robust that many readers may have experienced the feeling that members of racial outgroups seem to "look the same" as one another. Given the robust effect size of this own race bias in both experimental and naturalistic contexts (see Meissner & Brigham, 2001, for meta-analytic evidence), it is not a surprise that cross-race recognition errors are commonplace.

Whereas the own race bias has long captured the attention of researchers, it is not the only ingroup bias in face memory. Instead, over the past half-century, the tendency to show superior ingroup face recognition has been demonstrated across a variety of ingroup/outgroup distinctions. In some early work, Cross, Cross, and Daly (1971) observed an own sex bias (better recognition of own-sex vs. cross-sex faces; Wright & Sladden, 2003; see Herlitz & Lovén, in press). Similarly, own age biases have also been documented, with face recognition favouring faces of one's own age group over faces substantially younger or older than the perceiver (e.g., Anastasi & Rhodes, 2006; He, Ebner, & Johnson, 2011; Rodin, 1987; Wright & Stroud, 2002; see Wiese, Komes, & Schweinberger, in press, for a review). Even an own species bias, indicating superior processing of and representation of faces belonging to one's own species, has been observed (e.g., Scott & Monesson, 2009; Sigala, Logothetis, & Rainer, 2011; see Scott & Fava, in press, for a review). Although these age-based, sex-based, and even species-based biases have been corroborated and replicated in the literature, they have received relatively little attention compared to the own race bias.

More recently, a remarkable series of own group biases (OGBs)—face memory advantages for one's ingroup versus outgroups—have also been demonstrated for groups even without unambiguous physiognomic facial markers. Perceivers more efficiently encode and better recognize faces that share their sexual orientation (Rule, Ambady, Adams, & Macrae, 2007) and religious beliefs (Rule, Garrett, & Ambady, 2010), that ostensibly attend the same university (Bernstein, Young, & Hugenberg, 2007; Hehman, Mania, & Gaertner, 2010), and that profess the same political affiliation (Ray, Way, & Hamilton, 2010), compared to faces of targets belonging to social outgroups on these dimensions. Perhaps most noteworthy, even *experimentally induced* ingroup/outgroup distinctions can elicit similar face memory biases. Bernstein et al. (2007; Young, Bernstein, & Hugenberg, 2010) found that participants who were informed that they had a particular "personality type" (via bogus feedback) showed better recognition of faces that ostensibly shared their personality type, relative to faces having a different personality type. Arbitrary team memberships show equivalent effects—Van Bavel and Cunningham (2012) found better face recognition for fellow ingroup members even when people were randomly assigned to experimentally created groups in an experimental session (e.g., "Lions" or "Tigers"; "Moons" or "Suns").

Despite the proliferation of ingroup/outgroup biases in the research literature, little existing theory has sought to organize these biases under a single rubric. Until recently, many of these biases in face memory have been investigated as separate phenomena and explained via different mechanisms. However, this variety of analogous face recognition biases calls for a meaningful theoretical synthesis that allows the field to move forwards to investigate their similarities and differences and uncover the shared and distinct mechanisms underlying these biases. The current Special Issue is one step towards treating own group biases as a single class of phenomena, rather than as wholly separate entities. Indeed, we think it worthwhile to consider each of these face memory biases, from race, sex, age, and sexual orientation to religious and university affiliation, to personality type, as a manifestation of a broader own group bias (OGB) in face memory. Therefore, the goal of the current work is to move towards a synthetic perspective on these own group biases.

We have recently proposed a synthetic model of the own race bias—the Categorization-Individuation Model (CIM)—a model that we believe may be extended to help organize and explain various face memory biases (see Hugenberg, Young, Bernstein, & Sacco, 2010; Young, Hugenberg, Bernstein, & Sacco, 2012). To this end, in the current work we first briefly review the CIM and its core predictions, and then describe how the CIM may serve to organize the burgeoning but generally unconnected literatures on own group biases. Finally, we outline a number of exciting yet unanswered questions, which we hope will help to organize our own and others' future research on these issues.

A BRIEF REVIEW OF THE CATEGORIZATION-INDIVIDUATION MODEL

As originally written, the Categorization-Individuation Model (CIM; Hugenberg, et al., 2010; Young et al., 2012) was a theoretical account of the own race bias, but one that we believe may be of use in organizing and understanding own group biases more generally. At its core, the CIM posits that most own group biases are *multiply determined*. That is, most own group biases observed in the literature are the joint product of multiple, coacting causes. As we outline later, we have argued that social categorization, perceiver motivation, and perceiver experience with discriminating between ingroup and outgroup faces can conspire to generate the robust effect sizes commonly observed in the literature on the own race bias. Notably, because these three causes are also most likely at work to differing extents in a vast variety of own group biases, we believe the CIM may be fruitfully extended to OGBs more generally. Although a full recapitulation of the CIM is

beyond the scope of the current work, in the following we briefly outline the key components of the CIM, with a particular focus both on the unique predictions of the CIM that set it apart from other models of own group biases, and on recent findings that are of interest vis-à-vis this perspective.

CATEGORIZATION AND INDIVIDUATION IN PERSON PERCEPTION

The Categorization-Individuation Model begins with the well-validated finding that person perception can occur with two different attentional foci—categorization or individuation (Brewer, 1988; Macrae & Quadflieg, 2010). Whereas categorization involves a focus on shared characteristics among a class of exemplars (i.e., category-diagnostic information), individuation involves an attentional focus on target characteristics unique to a particular exemplar (i.e., identity-diagnostic information). Thus, in the context of own group biases, categorizing a target requires attending to facial characteristics diagnostic of the category (i.e., shared categorical features), whereas individuating a target requires attending to facial characteristics diagnostic of that target's unique identity. Naturally, a focus on shared categorical cues during face encoding will debilitate subsequent recognition—if a perceiver strongly encodes a target's race or sex, for example, to the detriment of unique facial characteristics, this will make subsequent recognition of this specific face (as compared to similar distractors) more difficult.

Category activation commonly occurs quickly, effortlessly, and spontaneously for novel faces (Brewer, 1988). Indeed, the low-level perceptual characteristics diagnostic of categories such as sex, race, and age are extracted quickly by the perceptual system (Ito & Urland, 2003; Mouchetant-Rostaing & Girard, 2003), and this category-diagnostic information is generally readily extracted even under poor viewing conditions (e.g., visual noise, inversion; Cloutier, Mason, & Macrae, 2005; Macrae, Quinn, Mason, & Quadflieg, 2005).

Finally, outgroup categories also tend to be more salient for outgroups than for ingroups (Levin, 1996, 2000; Sherman et al., 2009; Stroessner, 1996). This is because the ingroup category serves as a default or expected category, and violations of this elicit attention and processing. This tendency to be more attuned to outgroup than ingroup categories leads to a default bias to attend to the category-diagnostic features of outgroup faces, but to the individuating characteristics of ingroup faces. However, according to the CIM, this differential tendency to individuate ingroup members (i.e., attend to their unique identities) and to categorize outgroup members (i.e., attend to category information) is dependent on a variety of characteristics,

including both perceivers' differential *individuation motivation* and differential *individuation experience* with ingroup and outgroup members.

Individuation motivation in own group biases

Although the Categorization-Individuation Model predicts that differential categorization of own-race and cross-race faces can elicit differential attention to category- versus identity-diagnostic information, what sets the CIM apart from other models that predict similar phenomena (see Levin, 1996, 2000; Sporer, 2001) is that we argue that a variety of cues (categorization among them) can also elicit differential *motivation to individuate* faces of different categories. Thus, the CIM also predicts that perceivers will only individuate faces deemed sufficiently worthy of their limited attention. In other words, we adopt the long-standing and well-validated assumption that enhanced motivation can trigger selective attention (and deeper processing), which can facilitate encoding (Chun & Turk-Browne, 2007). In short, the unique identities of members of some categories (e.g., own-race faces) frequently seem more important to us than the identities of members of other categories (e.g., cross-race faces). Because many people in our environment are not personally relevant to us, and hence encoding their unique facial identities is not subjectively useful, they are simply treated categorically. For example, one can successfully ride the bus without knowing or remembering the driver or other passengers; instead, category information is often sufficient. However, if one happens to be a brand new college student in a bus full of new college students, the potential for friendship may motivate superior face memory in this context. Similarly, the face of the elderly cashier at the grocery store may be difficult to remember, but the face of one's new dean may remain etched in one's mind—even if these two faces are nearly identical.

Perceiver motivation triggering attention and depth of processing is a rare component of models of the own race bias, and at least in part makes the CIM distinct from related theoretical positions on own group biases. Notably, that perceiver motives influence face memory biases is not only well-validated by a variety of recent findings (Baldwin, Keefer, Gravelin, & Biernat, 2013; Bernstein et al., 2007; Hugenberg, Miller, & Claypool, 2007; Pauker et al., 2009; Ratcliff, Hugenberg, Shriver, & Bernstein, 2011; Shriver & Hugenberg, 2010; Van Bavel & Cunningham, 2012), but it also allows the CIM to explain a variety of phenomena in the literature, as we discuss later.

Individuation experience in own group biases

Finally, the CIM predicts that perceivers' level of individuation experience with own-race and cross-race faces can play a potent role in creating an own

race bias as well. Perceivers commonly have more high-quality experience discriminating among own-race than cross-race faces, and this differential individuation experience with faces can translate into differential patters of attention and face habituation to own- versus cross-race faces as early as 6 to 9 months of age (e.g., Kelly et al., 2007, 2009). Importantly, this differential experience with own- and cross-race faces can affect how those faces are encoded. Individuation experience involves learning to attend to category dimensions that are diagnostic for intracategory discrimination (e.g., Haider & Frensch, 1996). Therefore, this differential individuation experience with own- and cross-race faces can translate into differential ease with which identity-diagnostic information can be extracted from own- and cross-race faces. Further, because faces of different racial groups commonly differ on the dimensions useful for discriminating identity (e.g., Hills & Lewis, 2006; Shepard & Deregowski, 1981), the relatively high levels of experience with own-race faces translate only imperfectly to other racial groups with different phenotypic characteristics.

However, the CIM also predicts that even high levels of individuation experience do not inevitably translate into strong face memory. Instead, the CIM proposes that in many situations perceivers are not motivated to deploy their previously learned individuation abilities to encode faces. Rather, it is only when a target's identity appears sufficiently self-relevant or otherwise important that perceivers fully attend to identity-diagnostic characteristics of those faces. Thus, consistent with most perceptual learning models of the own race bias, the CIM predicts that differential experience individuating own- and cross-race faces contributes to the own race bias. However, the CIM also predicts that this attentional attunement to individuating characteristics afforded by experience will be at their strongest in situations where targets' facial identities are motivationally relevant. In short, the CIM predicts that differential experience can facilitate, but will not mandate strong own-race face memory, relative to cross-race face memory.

EXTENDING THE CATEGORIZATION-INDIVIDUATION MODEL

Although the CIM was designed originally as a model of the own race bias, we believe its joint focus on *perceiver experience* and *perceiver motivation* allows for the CIM to serve as a synthetic model of own group biases more generally. Models that focus only on perceiver expertise would seem ill-suited to predict or explain the proliferation of "mere" own group biases (i.e., OGBs based on ingroup/outgroup memberships without face-based category distinctions; Bernstein et al., 2007; Ray et al., 2010; Van Bavel & Cunningham, 2012), whereas a model that focuses only on differential motivation for encoding ingroups and outgroups cannot explain, for example, the convin-

cing evidence that some own group biases (e.g., own-species bias, Scott & Monesson, 2009; own-race bias, Kelly et al., 2007, 2009) are caused in part by developmentally based perceptual attunement. Our reading of the evidence indicates that both perceiver experience and perceiver motivation must be part of any serious attempt to synthesize the literature on own group biases, to a great extent because the evidence is clear that both of these are sufficient to cause and eliminate OGBs.

Building on this logic, we argue that the Categorization-Individuation Model is well positioned to organize and explain the burgeoning literature on own group biases. Later, we outline a series of clarifications and extensions of the CIM designed to address OGBs as a single, large class of phenomena.

CATEGORIZATION CAN TRIGGER CATEGORY-BASED ASSIMILATION AND MOTIVATION

As originally written, the Categorization-Individuation Model hypothesized that categorizing a target by race would draw attention to race-diagnostic facial characteristics and away from identity-diagnostic facial characteristics. This differential attention at encoding could, in part, influence subsequent recognition. Additionally, the racial category distinction itself (i.e., the distinction between racial ingroup and outgroup) commonly signals the differential importance or subjective relevance of a target face. As noted earlier, racial ingroups are commonly more important or self-relevant than are outgroups (Correll & Park, 2005).

Extending the CIM to account for multiple own group biases requires careful consideration of when attentional focus on category versus identity may drive recognition biases. Obviously, a focus on shared category features (i.e., category-diagnostic information) in a face can only occur when the category itself is endogenous to the face. Thus, categories such as species, race, sex, and age, and to a lesser extent sexual orientation or religion (see Rule et al., 2007, 2010) could be driven in part by this differential attentional focus. For categories where the category membership is exogenous to the face (i.e., facial cues are uncorrelated or weakly correlated with category membership), such differential attentional focus cannot serve as a mechanism for the own group bias. For example, in the own university bias demonstrated by Bernstein and colleagues (2007; Young et al., 2010), or the mere ingroup categorization demonstrated by Van Bavel and Cunningham (2012), there are no facial cues to university or group membership (in fact, the target faces were randomly assigned to ingroup or outgroup membership). In such cases, differential attention to visually marked categorical cues

cannot account for the observed effects, given that such cues do not exist in the face.

In these cases, an extended CIM predicts that such own group biases are driven purely by differential motivation to individuate the ingroup and outgroup faces. Indeed, the CIM predicts that, even for classes of faces with which perceivers have extensive experience (e.g., same-race faces), strong experience does not always translate into strong recognition. Instead, the CIM argues that face processing and encoding resources are limited (Palermo & Rhodes, 2002) and are deployed more extensively for faces that are motivationally relevant. In support of this hypothesis, a variety of demonstrations provide evidence that even when expertise is held constant (i.e., when all faces are the same race as perceivers), target faces are encoded and recognized more effectively when they are motivationally relevant. For example, Ratcliff and colleagues (2011) found that own-race faces believed to be high in power (e.g., CEOs, doctors) were attended to, encoded, and recognized more effectively than were own-race faces believed to be lower in power (e.g., janitors, fry cooks). In other work demonstrating the impact of motivation on face memory, both chronic and temporarily activated belongingness needs influence own group biases. Van Bavel, Swencionis, O'Connor, and Cunningham (2012) found that increased belongingness needs (i.e., feeling left out) not only increased the importance of the ingroup, but also led to a stronger own group bias in face memory. Similarly, identification with the ingroup has also been shown to be a predictor of the OGB (Van Bavel & Cunningham, 2012). In this work, participants who identified the most with their lab-created ingroups showed the largest OGB. Further, reducing the motivational relevance of an ingroup face through target manipulations can reduce the OGB through a reduction in own-group recognition. For instance, Adams, Pauker, and Weisbuch (2010) showed an elimination of the own race bias for targets with averted eye gaze—own-race averted-gaze targets were remembered just as poorly as cross-race targets displaying both direct and averted-gaze.

DIFFERENT OGBS HAVE DIFFERENT CAUSES: PERCEIVER EXPERTISE AND MOTIVATION

The central premise of the Categorization-Individuation Model—that own group biases are multiply determined—affords perhaps its greatest strength in explaining OGBs as a single class of phenomena. From this perspective, all OGBs can be organized along the dimensions of perceiver experience and perceiver motivation (see Figure 1).

Consider first perceiver experience. There are some category distinctions with which perceivers have strongly differing levels of expertise with ingroup

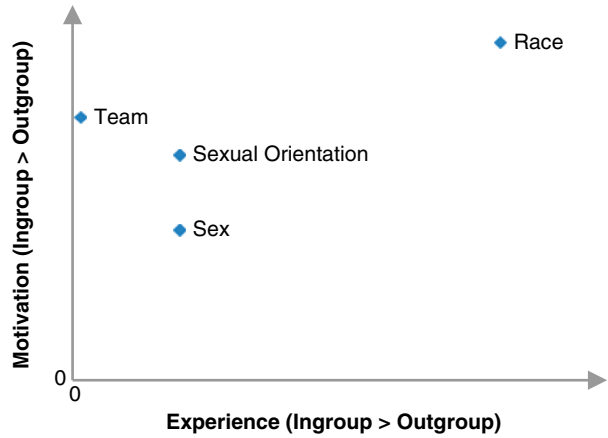

Figure 1. A representation of how various own group biases (OGBs) differ simultaneously on their bases in differential individuation motivation and differential individuation experience. Whereas some OGBs have their bases primarily (or exclusively) in differential motivation (e.g., own team bias), others have their bases primarily (or exclusively) in differential experience (e.g., own species bias). Many commonly experienced OGBs (e.g., own race bias), however, differ both in perceivers' individuation motivation and in perceivers' individuation experience.

and outgroup faces. Race, for example, is commonly discussed as one such category distinction (e.g., Kelly et al., 2007; Rhodes, Tan, Brake, & Taylor, 1989; Rossion & Michel, 2011). However, there are other category distinctions with which perceivers most likely have equivalent experience with the ingroup and outgroup. Sex, for example, is a category distinction with which people tend to have equivalent experience for the ingroup and outgroup, at least among the populations commonly studied in psychological research (i.e., most of us do not live in strongly sex-segregated environments). Experimentally induced categories, such as mere ingroup/outgroup distinctions (e.g., Bernstein et al., 2007; Van Bavel et al., 2012, Young, Bernstein, & Hugenberg, 2010), are other examples of categories with which perceives have (a priori) equivalent experience with ingroup and outgroup faces.

Between these two extremes, there exists a variety of category distinctions for which there is only a weak experience difference between the ingroup and outgroup. For example, sexual orientation is most likely one such case. Although there are facial structural cues that are diagnostic of sexual orientation, they are only weakly so, leading to better than chance but still inaccurate judgements of sexual orientation from faces at zero acquaintance (e.g., Rule & Ambady, 2008). Further, many multicultural societies segregate along the lines of sexual orientation in some contexts (e.g., mating contexts), but do not in others (e.g., working contexts). Combining the inconsistency of the segregation with relatively weak diagnosticity of facial cues for sexual

orientation most likely leaves an extant but weak experience difference for sexual orientation ingroup and outgroup faces. By the same logic, other similar categories with weakly diagnostic facial cues and inconsistent intergroup segregation (e.g., religious affiliation) may also be category distinctions that create weak but extant differences in perceiver experience with ingroup and outgroup faces. Thus, ingroup/outgroup distinctions differ on the extent to which perceivers have differential experience with the ingroup and outgroup. From the perspective of extending the CIM, this variability in differential experience with ingroups and outgroups should predict differential magnitude of own group biases.

Second, categories also vary on the extent to which perceivers are motivated to individuate ingroup more than outgroup faces. There are some categories with which perceivers have strongly differing motivation to individuate ingroup and outgroup members. For example, race may be one category distinction that can trigger strong differences in motivation to individuate (Hugenberg et al., 2007). In the case of the US, despite claims for a postracial society, race serves as a powerful organizing group distinction for daily life. Many Americans continue to desire proximity to racial ingroup members, continue to live in racially segregated subcultures, and continue to experience discomfort around racial outgroup members (Pearson, Dovidio, & Gaertner, 2009). Because of this, racial ingroups tend to serve as a stronger and more consistent social resource than do racial outgroups (see Correll & Park, 2005; Sacco, Wirth, Hugenberg, Chen, & Williams, 2011). Conversely, there are other category distinctions for which perceivers commonly have equivalent motivation to individuate ingroup and outgroup members. Eye colour or astrological signs are two examples of categories that are rarely used to organize our daily lives (unless one finds oneself in Jane Elliott's classroom or in an astrologer's parlour).

Finally, it is important to note that different cultures and subcultures will also most likely differ on the extent to which intergroup experience and individuation motivation occur. For example, in the US, whereas some subcultures have historically segregated along the lines of sex (e.g., Quaker religious communities), or sexual orientation (e.g., the US military; viz. "Don't ask don't tell"), others have not. Because of this, even within a macro-level or national culture, there most likely exist strong subcultural differences in intergroup face experience. Similarly, not only is intergroup segregation a cause for differential individuation experience, it is also a cause for and consequence of differential individuation *motivation* as well. Knowing that one can treat outgroup members as functionally interchangeable means that one need not be motivated to individuate members of that category (Malpass, 1990), because the easily extracted categorical information will most likely suffice to navigate most interactions.

The benefits from such a conceptual organization of OGBs are twofold. First, and most straightforward, is that such a conceptual organization brings OGBs together under a single rubric. Second, and perhaps more important, is that it affords predictions about which OGBs are most likely to be susceptible to change via different processes. Understanding that an own group bias, such as the own race bias, is the joint product of differential experience and differential motivation means that it can be exacerbated or eliminated via both such mechanisms (see Young et al., 2012, for a review). Conversely, knowing that a recognition bias is due only (e.g., OGBs in minimal group contexts) or primarily to differential motivation to individuate (e.g., own sexual orientation bias), or due only (e.g., differences in Greeble recognition; Gauthier & Tarr, 1997) or primarily to differential individuation experience (e.g., own species bias) can help inform both theory and predictions for intervention.

THE MAGNITUDE AND STABILITY OF OGBS WILL DEPEND ON THEIR CAUSES

One immediate implication of considering own group biases as jointly caused by individuation motivation and individuation experience is that the magnitude and stability of OGBs will depend on their causes. If an own group bias has a strong basis both in experience and in motivation (e.g., the own race bias), it will most likely be of a larger effect size than will other potential biases that have a basis in, for example, only perceiver motivation (e.g., own university bias). We make this prediction for a variety of reasons. First, a category distinction with which perceivers have strong differential experience commonly means that ingroup faces can be processed more efficiently (Michel, Rossion, Han, Chung, & Caldara, 2006; Rhodes et al., 1989; Tanaka, Kiefer, & Bukach, 2004), or represented in memory more effectively (e.g., Valentine, 1991), than outgroup faces. This differential processing efficiency or representation allows, at baseline, a stronger OGB to occur.

If an OGB has a strong experience component (i.e., there are strong differences in perceiver experience for ingroup and outgroup targets), it is most likely to be more robust across contexts than OGBs that do not differ in experience. This is due, in part, because experience is more difficult to modify than motivation. Consider, for example, the own race bias. We predict that this bias is most likely so robust (Meissner & Brigham, 2001) because it is rooted in part in differential experience. Perceivers' greater experience individuating own-race but categorizing cross-race faces will tend to persist across a variety of situations (e.g., Shriver, Young, Hugenberg, Bernstein, & Lanter, 2008). Admittedly, past research has reliably demonstrated that even

the own race bias can be eliminated by increasing individuation motivation for cross-race faces (Baldwin et al., 2013; Young et al., 2010; Hugenberg et al., 2007; Rhodes, Locke, Ewing, & Evangelista, 2009; Shriver & Hugenberg, 2010), decreasing the individuation motivation for own race faces (e.g., Adams et al., 2010; Shriver et al., 2008; Wilson & Hugenberg, 2010), or recategorizing targets' group memberships (e.g., Hehman et al., 2010; MacLin & Malpass, 2001; Pauker et al., 2009; Van Bavel & Cunningham, 2012). In the absence of such manipulations of individuation motivation, however, the own race bias appears quite robust. Moreover, the effectiveness of such motivational manipulations appears bounded by perceivers' individuating experience with cross-race faces (e.g., Bukach, Cottle, Ubiwa, & Miller, 2012; Young & Hugenberg, 2012), providing clear evidence that experience-driven recognition deficits can be more challenging (though clearly not impossible) to overcome with motivation than OGBs without some basis in experience.

Other own group biases, such as the own sex bias, or alternately "mere" group biases (e.g., own university bias, own personality bias, own political party bias), have their foundations primarily or even exclusively in differential motivation to individuate ingroup and outgroup members. These biases may appear quite fickle across situations, depending on contextual factors, such as category salience and situationally inducted motives to individuate. For example, in the case of an own university bias, there is a vast variety of situations where one's university affiliation is irrelevant or even inaccessible (Hugenberg & Bodenhausen, 2004). In such situations, no such bias should emerge. However, in situations where that group distinction is both highly salient and highly relevant, it can affect face encoding and recognition (Bernstein et al., 2007; Young et al., 2010; Hehman et al., 2010; Ratner & Amodio, 2013; see also Stevenson, Soto, & Adams, 2012). Indeed, even the structure of the ingroup/outgroup context should determine whether an OGB occurs or not. Consider the recent findings of Van Bavel and Cunningham (2012). In this research, they randomly assigned White American participants to experimentally created mixed-race groups—groups labelled as Lions or Tigers, which were ostensibly constituted by both Black and White people. Participants then encoded the faces of fellow ingroup members (e.g., "Lions") and outgroup members (e.g., "Tigers"). Notably, participants showed a memory advantage for the experimentally created ingroup members, regardless of their racial group membership; participants no longer showed a race bias when team membership was sufficiently salient (see also Hehman et al., 2010). More interesting, though, is their follow-up experiment where Van Bavel and Cunningham manipulated participants' roles within the groups (Exp. 3). Here, participants were randomly assigned to mixed-race groups (in this study the "Moons" and the "Suns"), but were told either that they were "soldiers" who would "remain loyal to the Moons

[Suns]" and that their goal would be "to serve the needs of" the ingroup; or were told that they were "spies" who would "remain loyal to the Moons [Suns]", but that their goal would be to "infiltrate" the outgroup. Whereas "soldiers" showed an own group bias in favour of their ingroup, "spies" showed strong recognition for both ingroup and outgroup faces. In other words, in a situation structured to make outgroup members functionally interchangeable (soldiers), an OGB was observed, but where one's role demanded individuation of both the ingroup and the outgroup (spies), the OGB was eliminated. Taken together, this work demonstrates how contextual factors that influence the motivation to individuate faces can drastically change the nature of the OGB, beyond the influence of individuation experience.

As another example of a malleable bias, consider the own sex bias. Most perceivers have virtually equivalent experience individuating men and women. However, the motives surrounding sex are both complex and situationally determined. The extant data on the own sex bias indicate that it is highly context-sensitive (see Herlitz & Lovén, in press, for a meta-analysis), with some studies demonstrating an OGB (e.g., Wright & Sladden, 2003), others showing only an OGB for female but not male participants (e.g., Lovén, Herlitz, & Rehnman, 2011), and others still showing that both men and women preferentially attend to and better remember female faces relative to male faces (e.g., Maner, Gailliot, Rouby, & Miller, 2007; Sacco, Hugenberg, & Sefcek, 2009). From the perspective of the CIM, this seeming fickleness of the own sex bias is partially attributable to the complex and shifting motives surrounding sex as a social category. Whereas some situations seem to pit men against women (which should be more likely to elicit a true OGB), most situations do not. Instead, men and women collaborate closely to pursue shared goals across a variety of contexts (e.g., parenting goals, workplace goals). One situation in which sex *is* a key social distinction is in the domain of mating behaviour. However, given the differential mating roles and goals of men and women in heterosexual mating contexts, the attentional and memory biases in mating contexts tend not to lead to own sex biases. Indeed, because women tend to serve the role of sexual gatekeeper (Baumeister & Vohs, 2004), both men and women in mating contexts (either experimentally induced, or chronically activated) attend more closely to women's faces (Maner et al., 2007; Sacco et al., 2009). Thus, from the perspective of the CIM, the fickleness that appears to occur in the own sex bias is a result of a weak difference in experience, and a highly variable and contextually dependent set of motives to attend to and encode the faces of men and women.

Consistent with this, recent research finds that the own sex bias is eliminated when other category distinctions are made salient. For example, when age and sex are varied, such that participants view both female and male, young and old faces, only an own age bias is found, suggesting that

other relevant social categories can trump sex in a face memory paradigm (e.g., Wallis, Lipp, & Vanman, 2012). That said, because OGBs that are primarily derived from motivation are highly context sensitive, active mating motives may come to dominate other category distinctions. This could perhaps explain recent studies linking mating goals and target sex effects in attention to and memory for faces (e.g., Maner et al., 2007). Thus, when perceivers have high experience levels with members of each group of a given category, the emergence of OGBs will be dependent on whether the category has been made motivationally relevant (e.g., whether a mating goal has been primed).

OPEN QUESTIONS IN AN EXTENDED CATEGORIZATION-INDIVIDUATION MODEL

We believe that an extended Categorization-Individuation Model contributes to a more satisfying and parsimonious understanding of own group biases as a single class of phenomena. This can be achieved primarily by understanding how both perceiver experience and perceiver motivation can coact in the creation of face memory biases. Despite this, we see a number of yet unanswered questions in the literature, to which we turn next.

How does motivation (or mere ingroup membership) influence face encoding?

Although there have been a variety of demonstrations indicating that perceiver motives can improve encoding, the specific mechanisms by which such motivated effects occur is not currently well understood. A variety of possibilities exist. First, the tendency to categorically process outgroup faces most likely leads to perceptual homogenization (e.g., Corneille, Huart, Becquart, & Bredart, 2004; Tajfel & Wilkes, 1963). To the extent that outgroup exemplars are viewed as sharing many facial characteristics in common, they are most likely stored closely together in face space, resulting in confusions and false alarms at recognition. Thus, the perception of outgroup similarity that stems from rapid categorization and the allocation of attention to category-specifying features probably contributes to the clustering of cross-race and cross-group faces in face-space. One way of conceiving of face space is having exemplar similarity defined by a finite set of diagnostic features contained in faces themselves; here, no amount of perceiver motivation would change the similarity relations among these faces.[2] Alternately, face space could be conceived as a psychological

[2] The authors wish to thank both the editor and the anonymous reviewers for this point.

construct, where exemplar similarity is sensitive to perceiver motives. For example, selective attention to certain category dimensions can allow for the perceptual stretching of the attended dimension, enhancing perceived differences along that dimension, while suppressing differences across nonattended dimensions (e.g., Goldstone, 1998; Nosofsky, 1986). Thus, from this perspective, it may be possible to represent perceiver motives as stretching perceptual dimensions, thereby warping face space (see Corneille, Hugenberg & Potter, 2007), allowing for a more variegated and less densely clustered encoding.

Alternately, it is possible that categorization alone leads to faces being encoded differentially in face space. In support of this hypothesis, Papesh and Goldinger (2010) demonstrate that, even holding face structure constant, outgroup faces are represented more densely in face space. In this work, the authors used FaceGen software to create a racially ambiguous prototype face, which they then used to create a series of novel faces bearing close resemblance to one another. Critically, they then manipulated the skin tone of the targets to make both a Black (dark skin) and a White (light skin) version of each face. Notably, this created Black and White stimuli that were structurally equivalent, but differing in skin tone. They then had participants complete a series of same/different judgements among all possible pairs of White faces (i.e., are these two faces just similar, or are they identical?) and among all possible pairs of Black faces. Naturally, all faces were distributed around the prototype in face space, but despite the fact that the Black and White faces were structurally equivalent, cross-race faces were represented more densely in face space. These data support the case that categorizing a target as a cross-race face (relative to an own-race face) leads to worse encoding of cross-race faces. It is worth noting, however, that although the manipulation of skin tone was orthogonal to face structure, this manipulation may have both manipulated perceiver motives *and* induced a change in appearance of the face structure. In the former case, if skin tone manipulates motives, then any apparent representation differences are themselves a function of motivation, complicating the interpretation. However, if manipulating skin tone manipulates the appearance of the face, this (weakly) confounds categorization with appearance. This too is an intriguing possibility, because it means that manipulations of skin tone that exist in the research literature (e.g., Balas & Nelson, 2010) become ambiguous as to whether they are simultaneously or orthogonally manipulating the category and the apparent structure of a face (as well as perceiver motives). Replicating the Papesh and Goldinger (2010) results with social categories that are manipulated exogenous to the face stimuli themselves (e.g., "mere" group categories) could help clarify this matter.

Alternately, from a processing efficiency perspective, it is possible that increased motivation at encoding elicits more configural or holistic face

processing. Indeed, the extent to which holistic face processing predicts face memory has been an issue of great interest, with Richler, Cheung, and Gauthier (2011a, 2011b) recently providing convincing evidence that previous findings indicating that holistic processing was sensitive to perceiver beliefs and motivations occurred due to procedural confounds. Notably, debate surrounding this issue is ongoing (see Palermo et al., 2011; Rossion, in press, for counterarguments), as is research in our lab and others. That said, we do have preliminary findings indicating that configural processing is sensitive to ingroup/outgroup distinctions (e.g., Young & Hugenberg, 2010). It is also possible that perceiver motivation simply triggers a greater amount of processing in one's default mode (that is, more piecemeal processing of cross-race faces, more configural processing of own-race faces). Thus, it is possible that increased motivation, even using a less efficient (piecemeal) process, may be sufficient to yield high levels of recognition accuracy.

Regardless of the specific theoretical position on face encoding that one adopts, it does appear that not only do many own group biases occur at encoding (Young et al., 2010), but also that even mere ingroup/outgroup distinctions trigger differential electrocortical responses during structural face encoding. Specifically, Ratner and Amodio (2013) have demonstrated that N170 responses, an ERP component reflecting face structural face encoding (e.g., Rossion & Caharel, 2011), are differentially sensitive to even mere ingroup/outgroup distinctions. In this research, Ratner and Amodio manipulated the ingroup/outgroup membership of faces by first having participants complete a dot estimation task. Participants were subsequently informed that they were either dot "overestimators" or dot "underestimators", creating an arbitrary ingroup and outgroup for use in the experiment. Participants then encoded a series of faces on blue and green backgrounds, which ostensibly represented dot overestimators and underestimators (with target group and target colour counterbalanced across participants), while EEGs were recorded. Not only were peak N170 amplitudes larger for ingroup than outgroup faces, but this was not coupled with a latency delay, indicating the N170 effect was not due to increased perceptual engagement due to encoding difficulty (Rossion et al., 2000). In conceptually related work employing fMRI techniques, Van Bavel, Packer, and Cunningham (2011) demonstrated that even arbitrary ingroups (as compared to arbitrary outgroup or unaffiliated control faces) selectively activates the Fusiform Face Area, a face-selective area of the brain that appears central to processing facial identity using structurally invariant facial characteristics (see Natu & O'Toole, in press, for a review). Taken together, this work indicates that even mere ingroup faces appear to trigger superior structural encoding, holding perceiver expertise constant. In short, regardless of one's theoretical position on face perception, motivation facilitates encoding, and this superior encoding appears to translate into more accurate recognition.

How do perceiver motives and experience coact in creating and eliminating ogbs?

A second open question is the relationship between perceiver motivation and perceiver experience in creating own group biases. Computationally speaking, one possibility is that they operate as simple main effects in an OGB. That is, it could be that the magnitude of an OGB is simply the summation of the recognition advantage afforded by the perceivers' differential experience with the target groups added to the perceivers' differential motivation to individuate in- versus outgroup members. In terms of process, this would mean the two processes were unrelated.

Based on the existing evidence, however, we believe this unlikely to be the case in most contexts. Instead, it appears that perceiver motivation and experience interact to create OGBs. Initial behavioural evidence is consistent with this prediction. First, and in line with the predictions of the CIM, it is clear that perceptual experience with outgroup faces alone is insufficient consistently to trigger strong individuation; instead, the perceptual experience with outgroup faces must be paired with a *motive to individuate*. Supporting this hypothesis, McGugin, Tanaka, Lebrecht, Tarr, and Gauthier (2011) trained White participants to individuate the faces of one racial outgroup (Black or Hispanic) but to make eye-luminance judgements of faces of the other racial outgroup. Here, individuation training with outgroup faces, but not simple exposure to racial outgroup faces (as created in the eye-luminance judgement condition), facilitated subsequent improvement in other race face discrimination. In a similar procedure, Tanaka and Pierce (2009) trained White participants to individuate racial outgroup faces of one category (Black or Hispanic), but to categorize the other racial outgroup along racial lines. Here again, individuation training, but not categorization training, facilitated recognition of outgroup faces, indicating that exposure to outgroups may afford little benefit in face memory if not coupled with the motivation to individuate.

Second, it is also clear that prior individuation experience for outgroup faces can interact with current individuation motivation in determining own group biases. For example, we (Young & Hugenberg, 2012) recently conducted a study in which White participants encoded both own-race and cross-race faces. However, we manipulated on a between-subjects basis whether participants were motivated (via experimental instructions) to individuate cross-race faces. In past work, a variety of similar manipulations have been shown to reduce the own race bias by increasing cross-race recognition (e.g., Hugenberg et al., 2007; Kawakami et al., 2013; Pauker et al., 2009; Rhodes et al., 2009; Young et al., 2010). However, we predicted that increased cross-race individuation motivation would translate most effectively into cross-race face memory for individuals who had strong *prior*

experience individuating cross-race faces. In other words, effort would translate most effectively into memory for perceivers who could most efficiently extract individuating information from cross-race faces.

This is just what we found. Perceivers who had more extensive cross-race contact were also more effective at individuating cross-race faces in the individuation instructions condition. Here, participants who were explicitly informed about the own race bias, and were instructed to individuate racial outgroup members, were better able to do so when they had more prior interracial contact. Notably, however, even very high levels of experience with cross-race faces did not translate into strong cross-race face memory for participants in the (low motivation) control condition, in which participants received no instructions to individuate racial outgroup faces. In other words, being able to efficiently encode cross-race faces appeared irrelevant, except when perceivers were motivated to employ their previously accrued perceptual experience. It is also worth noting that, in a follow-up experiment, we found that the interactive effects of processing efficiency and motivation broke down at higher levels of motivation. Here, we manipulated the individuation motivation with a biologically prepotent signal—angry faces. Past work has shown that angry racial outgroup faces do not elicit an own race bias, with the recognition of angry outgroup faces rising to the typically strong levels observed for ingroup faces (e.g., Ackerman et al., 2006). Using this stronger manipulation of individuation motivation, these higher levels of perceiver motivation overcame differential encoding efficiency for ingroup and outgroup faces. When a more extreme induction of encoding motivation for cross-race faces was employed, the Efficiency × Effort interaction did not emerge. Instead, we saw only effects of perceiver motivation—regardless of prior experience with cross-race faces, encoding of cross-race faces was strong for perceivers with very high cross-race individuation motivation. Thus, although experience and motivation appear to interact in many contexts, given sufficient motivation, the effects of experience appear to be attenuated.

However, it is also likely that analogous effects occur for very strong manipulations of processing efficiency. For example, past research in our own lab and others has shown that simple inductions of perceiver motivation to individuate cross-race faces can increase cross-race recognition (e.g., Hugenberg et al., 2007; Rhodes et al., 2009; Young et al., 2010). However, it is quite plausible that the effects of such manipulations may be limited or eliminated in circumstances where the encoding efficiency of cross-race faces is experimentally limited. For example, making stimuli harder to recognize (e.g., cropping stimuli; using different stimuli at encoding and recognition, Bornstein, Laub, Meissner, & Susa, 2013), using stimuli that are perceptually similar (naturally occurring or via morphing), or otherwise eliminating individuating characteristics that are easier for inexpert perceivers to extract from targets (e.g., using Greebles; Gauthier & Tarr, 1997) could potentially

attenuate or eliminate motivational effects. Similarly, truncated exposure times may prevent the deployment of motivated resources (e.g., Young & Hugenberg, 2010) or efficient modes of face processing (e.g., Palermo & Rhodes, 2002), further limiting the ability of motivation to influence encoding.

Are identity-diagnostic and category-diagnostic information distinct?

A third intriguing question with regard to the current extension of the Categorization-Individuation Model is whether identity-diagnostic and category-diagnostic information are perceptually distinct. Indeed, a schematic version of the motivational predictions of the CIM would have extraction of category information occur quickly, and this categorization would trigger motives to individuate (or not). Naturally, for the category to serve a "gating" function for individuation, this assumes that identity-diagnostic and category-diagnostic information are perceptually distinct. However, it is certainly the case that identity- and category-diagnostic information can vary as to whether they are perceptually distinct, both across types of categories and within-categories, but across situations.

In the simplest case, consider "mere" OGBs, based purely on perceptually indistinguishable categories. For example, OGBs created by randomly assigning targets to ingroups and outgroups, and assigning participants to those same bogus categories experimentally creates a situation where identity-diagnostic information is perfectly dissociated from category-diagnostic information, because the category itself is exogenous to the face. Here, categorization *must* proceed separately from individuation. However, category-diagnostic information is not perceptually distinct from identity-diagnostic information in situations when the category itself is endogenous to the face (e.g., race, sex, age). As an example, your face manipulated to be of a different race simply isn't you anymore. Identity is inherently confounded with category in situations where categories are endogenous to the face.

That said, there is strong evidence that such visually marked categories are extracted more efficiently than is identity information (see Macrae & Quadflieg, 2010). For example, visual noise more strongly degrades identity recognition than category recognition, even for well-known exemplars (Cloutier et al., 2005). However, it is also the case even for strongly visually marked categories that identity-diagnostic information is not fully independent of category-diagnostic information. For very well-known faces, the activation of an individuated face representation can occur even before categorization has been completed (e.g., Balas, Cox, & Conwell, 2007; Rossion, 2002). Further, there may be highly informative parts of the face, such as eye regions, that can be simultaneously diagnostic for both categories and identities. Here, in situations where identity-diagnostic information is

extracted before (e.g., Balas et al., 2007; Rossion, 2002), or in conjunction with category-diagnostic information, it is most likely the case that motivational effects triggered by categorization would be eliminated (e.g., for highly familiar stimuli) or substantially attenuated. In cases such as these, where categorization cannot effectively trigger motivation, either because of a strong prior mental representation, or because the individuating information is extracted simultaneously with category-diagnostic information, the motivational effects predicted in the CIM would be weak or nonexistent.

Finally, it is worth noting that category-diagnostic and identity-diagnostic information can also be confounded by ecological concerns as well. Put simply, there are many situations where categories are quite useful cues to identity. In situations with strong (but imperfect) segregation along category lines, this may be particularly acute. For example, if an organization has only one White male employee, seeing a White man enter the staff meeting is a very strong cue to his identity. Or if there is only one Asian family in one's neighbourhood, relying on racial categories may resolve person memory just as well as could an individuated face representation. As noted earlier, this is part of the core argument of the CIM: Categories commonly suffice when processing outgroups.

APPLICATIONS OF AN EXTENDED CATEGORIZATION-INDIVIDUATION MODEL

One exciting component of an extended Categorization-Individuation Model is that it provides us a different lens through which to consider when and where own group biases are likely to occur (see Wilson, Hugenberg, & Bernstein, 2013). First, the CIM predicts that OGBs are common across a variety of salient and subjectively important ingroup/outgroup distinctions. In the forensic literature surrounding face recognition, race tends to dominate the discussion. However, in an eyewitness context, there may be a variety of group differences between perpetrator and witness, many of which could potentially debilitate recognition. For example, we know that perceivers are less likely to individuate own-race targets in low-SES contexts (Shriver et al., 2008). This suggests that police investigating criminal activity in, for example, public housing projects, could fail to individuate targets who they may categorize as "poor". The converse could occur in wealthy neighbourhoods if police fail to individuate upper-income targets because they too are seen as outgroup members. Similarly, own age biases may be particularly likely when police encounter juvenile offenders. Law enforcement officials may benefit from an increased awareness of the tendency to categorize targets belonging to outgroups, and to focus on individuation when interacting with anyone who may need to be subsequently identified.

Second, we see an extended CIM as potentially providing a novel way of predicting not only when OGBs may occur, but also designing interventions to prevent OGBs before they occur. Whereas past research has indicated (and for good reason) that individuation training can improve cross-race eyewitness identifications, research in our lab and others indicates that adopting an individuation mindset can lead to similar behavioural results (i.e., strong cross-race recognition; see Wilson et al., 2013). Further, given the interactive effects of perceiver motivation and experience in attenuating OGBs (Young & Hugenberg, 2012), it is apparent that motivation can help to address OGBs. Thus, both the perceptual experience created by high-quality intergroup contact and the motivational advantage provided by an individuation mindset can orient attention towards targets' unique, identity-diagnostic facial information, and can substantially improve recognition for otherwise poorly recognized outgroup faces (e.g., Hugenberg et al., 2007; Rhodes et al., 2009).

CONCLUSION

In recent years, demonstrations of various own group biases have proliferated at a dramatic rate. Given new knowledge that superior ingroup (vs. outgroup) face recognition does not only emerge for racial groups, but also for a variety of visually marked (e.g., sexual orientation, religion) and even arbitrary group distinctions (e.g., university and political affiliations), a synthetic model that can account for a wide range of own group biases is necessary. In the current work, we have proposed that the key premises of the Categorization-Individuation Model—the interplay of perceiver motivation and experience—can be extended to help organize and understand these own group biases. Finally, although we understand that a variety of important issues remain to be explored, we believe that conceptualizing own group biases as a single class of phenomena, which can be explained by the joint action of categorization, individuation motivation, and individuation experience, is a meaningful advance in our understanding of these biases.

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