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Monitoring and meta-metacognition in the own-race bias

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ABSTRACT

Although there is a great deal of research focused on identification issues related to own-versus other-race faces very few experiments have explored whether metacognitive monitoring contributes to the own-race bias. In the current experiment the typical own-race bias paradigm was modified so that type-2 signal detection measures (e.g. Higham & Arnold, 2007a,b) could be used to directly measure metacognitive monitoring at retrieval. A second goal of the experiment was to explore whether self-reported confidence ratings differed depending on whether they were directed at answer accuracy (e.g., judging a face as "studied") versus at decisions about that answer (e.g., volunteering vs. withholding that answer). Overall the results demonstrated that monitoring does contribute to the own-race bias, in that participants were better at monitoring their memory for own-race faces. Further, there was a significant difference between the two confidence measures, and the pattern of this difference depended on whether responses had been volunteered or withheld.

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1. Introduction

A standard finding reported in the face identification literature is that individuals tend to be more accurate at recognizing faces from their own ethnicity than from a different ethnicity — an effect that has been referred to by various names, such as the other-race effect, the own-race bias, the own-race effect, the other-ethnicity effect, and the cross-race effect (Bukach, Cottle, Ubiwa, & Miller, 2012; Horry, Wright, & Tredoux, 2010; Meissner & Brigham, 2001; Walker & Hewstone, 2006; Young, Hugenberg, Bernstein, & Sacco, 2012).[1] Although there is a great deal of research focused on identification issues related to own-versus other-race faces very little of this work has directly explored whether metacognitive monitoring contributes to the own-race bias (Hourihan, Benjamin, & Liu, 2012). Therefore, one of the main goals of the current experiment was to explore whether monitoring ability at retrieval contributes to the own-race bias; that is, whether our monitoring for our memory of other-race faces is worse than our monitoring for own-race faces. The second main goal of the present study focused on separating out confidence for an answer (e.g., confidence that you have not seen a particular face before) versus confidence for a decision (e.g., confidence that you made the right choice not to volunteer that particular response). This distinction in confidence – that is, what some may refer to as metacognition versus meta-metacognition – may be important for understanding and improving performance.

Research on the own-race bias (ORB) has spanned several decades, and the majority of studies support the finding that our ability to discriminate between previously seen and novel faces is significantly better within-group (own-race) than between-group (other-race; see Meissner & Brigham, 2001, for a meta-analytic review). Explanations for the ORB predominantly have been split between incorporating cognitive versus social mechanisms as the main underlying cause for recognition differences between own- and other-race faces (Hourihan et al., 2012; Meissner & Brigham, 2001; Young et al., 2012). One classic cognitive explanation for the ORB is that we process own- and other-race faces in a qualitatively different manner. For example, some researchers have argued that our expertise with own-race faces leads to configural processing, whereas processing of other-race faces is more "piecemeal" or feature-based; therefore, differences in recognition for own- and other-races faces arise because the configural processing is a more effective encoding strategy than feature-based processing (e.g., Michel, Rossion, Han, Chung, & Caldara, 2006; Rhodes et al., 2009). Conversely, social mechanism theories of the ORB tend to postulate that it is not perceptual processing per se that leads to recognition differences, but rather that such differences arise because we categorize own-race faces as in-group members and other-race faces as out-group members. For instance, classifying own-race faces as in-group leads us to view and process these faces more individually, whereas categorizing other-race

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[1] An important issue that has cropped up in this research area – and likely contributes to the varying effect names – is what is meant by "race" or "ethnicity." The term "own-race bias" will be used to refer to the effect in the present paper, but with the word "race" referring only in the broad sense to in-group (same-race) versus out-group (other-race) membership (Horry et al., 2010; Young et al., 2012).

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faces as out-group members results in homogenizing such faces, and thus to problems with later recognition (e.g., Ge et al., 2009; Hugenberg, Young, Bernstein, & Sacco, 2010). More recently, however, explanations for the ORB have highlighted the importance of both social and cognitive factors, and these "hybrid" accounts are argued to be better equipped at covering the full range of results from the various ORB methodologies (Young et al., 2012).[2]

1.1. Monitoring and the own-race bias

The more recent theories for the ORB may incorporate both cognitive and social mechanisms, but very little consideration has yet to be given to the role of metacognitive monitoring. In general, metacognition (also commonly referred to as metamemory) refers to the knowledge and insight that people possess in relation to their own cognitive processes and memories (Koriat, Ma'ayan, & Nussinson, 2006; Leonesio & Nelson, 1990). One of the driving interests behind the study of metacognition is the strategic regulation of accuracy; that is, how we use our understanding and knowledge of our own cognitive processes and memories to shape and guide our performance (e.g., how many and/or which items to volunteer on a free-recall memory test). Koriat and Goldsmith (1996; Goldsmith & Koriat, 2008) developed a monitoring-control framework to explain the important role of metacognitive monitoring. Specifically, they argued that three key components – retrieval, monitoring, and control – contribute to performance on a given task. For example, after you study a list of words and subsequently are given free-recall instructions you will attempt to retrieve as many of the studied items as possible from your long-term memory. However, rather than simply reporting every item that comes to mind, there is a monitoring mechanism that subjectively evaluates the likelihood that each item is correct (i.e., that the item was a word on the study list), and a control mechanism that decides whether the item should be volunteered. This control mechanism is sensitive to several factors, such as payoffs for a correct/incorrect response and situational demands, and therefore your decision of whether to volunteer a particular answer on the free-recall task may differ depending on the context in which you are making the decision (Higham, 2007; Koriat & Goldsmith, 1996).

Although little attention has been given to the potential contribution of metacognitive monitoring to the ORB, Hourihan et al. (2012) recently focused on monitoring by exploring the relationship between predictions of future recognition and own- versus other-race faces. Specifically, the researchers had Asian and White participants study both Asian and White faces, and at the end of each study trial the participants were required to predict the likelihood that they would recognize each face on a later recognition tests (similar to a judgment-of-learning task). Overall, the results demonstrated that monitoring was more accurate for own-race faces: Participants were significantly worse at predicting their recognition performance (i.e., both how likely or unlikely it was they would recognize a face) for other-race faces compared to own-race faces.

Hourihan et al.'s (2012) work highlighted that there are monitoring differences between own- and other-race faces at encoding, but to the best of this author's knowledge there has been no research directly examining whether metacognitive monitoring differences are found for the ORB effect at retrieval. It is important to explore monitoring at retrieval because if there are differences in monitoring then these differences may have a significant impact on recognition performance; that is, by impacting recognition scores in a positive or negative manner. One way to assess whether there are monitoring differences for own- versus other-race faces is to examine strategic regulation of accuracy. That is, if monitoring is poorer for other-race faces then, in situations where people are allowed to choose whether to volunteer or withhold an answer, they should be worse at deciding which (and/or how many) of their other-race recognition responses to volunteer.

There are two approaches that have been used to study the strategic regulation of accuracy; the monitoring-control framework mentioned above (Koriat & Goldsmith, 1996), and the type-2 signal detection theory (SDT) framework (Higham, 2007; Higham & Arnold, 2007a,b). The type-2 SDT framework has been applied both to test-taking contexts (Arnold, Higham, & Martín-Luengo, under review; Higham, 2007) and recognition memory (Higham, Perfect, & Bruno, 2009), and is the framework that was adopted in this paper. Although the type-2 SDT framework is a more recent approach than the monitoring-control framework, most researchers are familiar with type-1 SDT because it is a common method used to study recognition memory (Green & Swets, 1966; Rotello, Macmillan, & Reeder, 2004; Wixted & Stretch, 2004). The standard type-1 SDT paradigm requires participants to discriminate between experimenter-defined signal (e.g., studied items on a recognition test) and noise (e.g., new items on a recognition test), and many researchers use this methodology because it provides several informative measures of recognition performance. For example, it is possible to calculate indices of accuracy, such as discrimination (how well you distinguish between the signal and noise trials; e.g., d'), and response bias (how willing you are to label a trial as "signal present"; e.g., C).

The key distinction between type-1 and type-2 SDT is the nature of the underlying distributions. In contrast to the experimenter-defined distributions in type-1, the signal and noise distributions in type-2 SDT are individual-determined. Specifically, the task in type-2 SDT is to discriminate between your own correct responses (signal) and incorrect responses (noise); for example, volunteering your correct answers and withholding your incorrect answers. The type-2 SDT methodology also produces measures of discrimination and response bias, but because the underlying distributions are an individual's own correct and incorrect responses these measures take on a different meaning. That is, in type-2 SDT discrimination (d') is a measure of metacognitive monitoring (i.e., how well individuals differentiate between their own correct and incorrect answers) and response bias (C) is a measure of an individual's willingness to volunteer a response (for a more detailed discussion of type-1 vs. type-2 SDT see Arnold et al., under review; Higham & Arnold, 2007a,b).

The monitoring-control approach and the type-2 SDT framework are quite similar in their constructs of monitoring and control. However, one of the main advantages of the type-2 SDT framework for the current purpose is that its methodology allows for a straightforward and direct measure of metacognitive monitoring, and consequently it is possible to compare monitoring ability across different groups and/or situations (see Higham, 2011; Goldsmith, 2011, for a comparison of the two approaches). To calculate metacognitive monitoring in the type-2 framework, though, it is necessary to know the accuracy of both the volunteered and withheld responses. One technique that provides information for both types of responses is to implement a one-pass report/withhold recognition test (Higham, 2007).

In the one-pass procedure participants are required to provide a recognition response on every test trial (e.g., studied/new), but they are allowed to choose whether they want to report (volunteer) or withhold each response. Importantly, the instructions make it clear to participants that only the reported responses count toward their overall score on the test, with points awarded to correct reported responses and penalties applied to incorrect reported responses. Higham (2007) first used this type of one-pass procedure to examine metacognitive monitoring for multiple-choice general-knowledge tests. Specifically, participants were required to provide an answer to every test question, but they were allowed to assign each answer to either a "go for points" category (report: points and penalties for correct and incorrect responses, respectively) or a "guess" category (withhold: 0 points/penalties for both correct and incorrect responses). Higham demonstrated that this one-pass procedure produced similar results to a two-pass method, but the advantage of the one-pass procedure is that it equates processing between reported

[2] A full examination of the numerous and complex theoretical explanations for the ORB is beyond the scope of the present paper. For a recent review of the various social, cognitive, and hybrid models of the ORB refer to Young et al. (2012).

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