Journal of European Psychology Students, 2013,
First Work in Progress Special Edition, 16-24

On the face of it.
Exploring the interaction between racial and arbitrary group recognition

Eva Berlot, *University College London, United Kingdom*
Robert Blakey, *University of Oxford, United Kingdom*
Evelien Demaerschalk, *Norwegian University of Science and Technology, Norway*
Jasna Dishlieska Mitova, *University St. Cyril and Methodious, Macedonia*
Sofia Petisca, *ISCTE – Instituto Superior das Ciências do Trabalho e da Empresa, Portugal*
Carrie Philp, *University of Reading, United Kingdom*
Beatriz Lloret, *ISCTE – Instituto Superior das Ciências do Trabalho e da Empresa, Portugal*
Received: 11.05.2013 | Accepted: 20.07.2013

abstract

The cross-race effect – enhanced recognition of racial ingroup faces – has been justified to exist in other categories, such as arbitrary groups. This study aimed to investigate the effect of crossing racial (black/white) and arbitrary (blue/yellow) categories, in addition to the role of facial expressions in this phenomenon. 120 Caucasian students (from the UK, Macedonia, and Portugal) performed a discrimination task (judging faces as new vs. previously seen). Using a within-subjects design, reaction times and accuracy were measured. We hypothesized that (1) the arbitrary group membership of faces would moderate the cross-race effect and (2) the racial group membership of faces would moderate the usual recognition advantage for happy faces.

Keywords: Arbitrary group, cross-race effect, face recognition, ingroup, minimal group, outgroup, racial group

Over the past decades, researchers have demonstrated and sought to explain biases in face recognition. One of the best-documented and replicated ingroup biases is the Cross Race Effect (CRE, variously labelled as the own-race bias or other-race effect), or the more accurate recognition of Same-Race (SR) faces compared to Other-Race (OR) faces (Meissner & Brigham, 2001).

A meta-analysis on the CRE by Meissner and Brigham (2001) demonstrates the CRE to be widely replicated across studies and cultural settings. Yet, despite these robust findings, arriving at a theoretical account for the CRE has proven difficult (Meissner & Brigham, 2001).

Correspondence

Robert Blakey
robert.blakey@stcatz.ox.ac.uk

Two dominant models have been proposed: perceptual learning models and social cognitive models (see Hugenberg, Young, Bernstein, & Sacco, 2010 for a review). Perceptual learning models claim that people have differing amounts of experience in encoding SR and OR faces (Brigham & Barkowitz, 1978; Wright, Boyd, & Tredoux, 1999). However, evidence demonstrating the effect of interracial contact on the CRE is limited (Ng & Lindsay, 1994).

More recently, social cognitive models of the CRE have gained popularity. These claim that two mechanisms are responsible for ingroup biases: a superior processing style for ingroup faces and greater motivation for processing ingroup faces (Young & Hugenberg, 2010). During face encoding, two different processes occur: categorization (classifying exemplars into a group along shared dimensions) and individuation (discriminating among exemplars of a category) (Hugenberg et al., 2010). SR faces are processed in greater depth (Sporer, 2001), whereas individuating information from OR faces is often disregarded (Levin, 1996). Moreover, the processing style applied to ingroup vs. outgroup faces may be motivationally determined because interactions with other ingroup members are deemed more significant, likely and productive than those with outgroup members (Hugenberg, Miller, & Claypool, 2007; Hugenberg & Sacco, 2008; Young & Hugenberg, 2010).

It is difficult to explain many of the findings on the CRE without accepting the social cognitive perspective: first, participants recognise arbitrary (minimal) ingroup faces more accurately than arbitrary outgroup faces despite having equal perceptual experience of each (Bernstein, Young & Hugenberg, 2007; Van Bavel & Cunningham, 2012). Second, real and arbitrary ingroup recognition advantages are moderated by experimentally induced social exclusion and the self-reported need to belong respectively (Van Bavel, Swencionis, O'Connor & Cunningham, 2012). Third, merely instructing participants to attend to individuating characteristics is sufficient to improve OR face recognition (Hugenberg et al., 2007). Fourth, the arbitrary ingroup recognition advantage is mediated by the time spent attending to ingroup vs. outgroup faces and moderated by reported ingroup identification and the social role (e.g., spy) adopted (Van Bavel & Cunningham, 2012).

Traditional studies of intergroup relations typically study one social dimension at a time (Crisp, Hewstone, & Rubin, 2001) and the same is true for research on the CRE (Wallis, Lipp, & Vanman, 2012). Yet, in real-life, individuals are simultaneously members of several categories. More recent findings on face recognition and evaluation refer to the moderating effects of crossing a racial category with an extra ingroup dimension. For example, making the university memberships of mixed-race faces salient eliminates the CRE (Hehman, Mania, & Gaertner, 2010), as does assigning participants to an arbitrary group (Van Bavel & Cunningham, 2012). Second, participants evaluate arbitrary ingroup (but not outgroup) faces independently of their race (Van Bavel & Cunningham, 2009). Third, participants show more sensitivity in memory to arbitrary visual than racial cues to social allegiance when only the former are contextually valid (Kurzban, Tooby & Cosmides, 2001). Together, these studies concur with the evolutionary view that humans have evolved to detect social alliances rather than race per se; therefore, the perceived importance of race is malleable (Kurzban, Tooby & Cosmides, 2001). Of particular interest to the current study was the extent to which crossed categorisation (of racial and arbitrary groups) would affect face recognition in a similar manner to group member evaluations (Urban & Miller, 1998).

Despite lacking research, it seems plausible to assume that emotional expressions moderate the CRE; indeed, presenting angry faces can eliminate (Young & Hugenberg, 2012) or even reverse (Ackerman et al., 2006) the CRE. Research has focused on emotion recognition in SR and OR faces, showing that participants are more accurate at recognising emotional expressions of cultural ingroup members than of outgroup members (Elfenbein & Ambady, 2002; Young & Hugenberg, 2010). One facial expression that is considered a desirable ingroup characteristic – and may act as an important indicator of the ingroup – is smiling (Tajfel, 1978). Smiling faces are attributed more often to the ingroup and neutral expressions are attributed more often to the outgroup, even in situations without social function (Beaupré & Hess, 2003). This 'happy face advantage' (Kirita & Endo, 1995) is moderated by the target race. For example, Hugenberg (2005) found that white participants recognise negative emotions in black faces more quickly than positive emotions. However, the origin of this bias is unclear: it may result from the motivation to positively differentiate the ingroup relative to the outgroup (Tajfel, 1978 as cited in Beaupré & Hess, 2003) or from the increased frequency with which smiles are perceived on ingroup (rather than outgroup) faces in everyday life (Beaupré & Hess, 2003).

Facial expressions also affect the mood of people who perceive faces, whose emotions converge towards the expressions displayed on same-race faces but diverge away from the expressions displayed on other-race faces (Weisbuch & Ambady, 2008). In turn, such emotional responses may affect social identities and face recognition. For example, inducing positive emotions has been reported to facilitate common ingroup identities (Dovidio, Isen, Guerra, Gaertner, & Rust, 1998) and to eliminate the CRE (Johnson & Fredrickson, 2005). Positive emotions can broaden a person's perspective and activate holistic processing, facilitating face recognition (Johnson & Fredrickson, 2005; Michel, Caldara, Rossion, 2006). This highlights the additional possibility that presenting ingroup smiling faces induces positive emotions – and so increases the salience of common ingroup identities – in the viewer, thereby increasing the use of more effective, holistic processing. In contrast, this would not be predicted with the affective divergence induced by outgroup faces (Weisbuch & Ambady, 2008).

The current study aims to expand existing knowledge on the CRE, by assessing both main and interaction effects of racial and arbitrary group membership, as well as facial expressions. In our experiment, we used a 2 (Race: Black vs White) x 2 (Background: Blue vs Yellow) x 2 (Emotion: Smiling vs Neutral) repeated measures experimental design. We hypothesised that participants would show a recognition advantage for:

1. Racial ingroup relative to outgroup faces:
   This CRE would be reduced when faces were also arbitrary ingroup relative to outgroup members
2. Arbitrary ingroup relative to outgroup members
   This cross-category effect would be reduced when faces were also racial ingroup relative to outgroup members.
3. Smiling (racial or arbitrary) ingroup faces relative to neutral (racial or arbitrary) ingroup faces
   In contrast, neutral (racial or arbitrary) outgroup faces would be recognised more accurately than smiling (racial or arbitrary) outgroup faces

Method

Participants

One hundred and twenty Caucasian students (79 female) participated in this study. Mean age was 20 (*range: 17-42*). Participants volunteered to take part at the following universities: ISCTE-IUL in Lisbon, Portugal (*N* = 38), University St. Cyril and Methodious in Skopje, Macedonia (*N* = 15), University of Reading in UK (*N* = 38) and University of Oxford in UK (*N* = 30). In all countries, participants were tested in cubicles, the same procedure (described in 'Design and Procedure') was undertaken, and to ensure consistency amongst experimenters an instruction script was generated, to which experimenters adhered. All participants were naïve as to the purpose of the study.

Design and Procedure

The experimental design used was a 2 (race: black/white) x 2 (background: blue/yellow) x 2 (emotion: smiling/neutral) repeated measures design. The dependent variables were accuracy and reaction times in the recognition task.

First, participants were required to answer a series of questions relating to variables of interest: demographic information regarding gender, age, ethnicity, education, year and subject of their studies, ethnicity and nationality. Participants were also asked to complete a Ten-Item Personality Inventory (TIPI) (Gosling, 2003), for which they had to indicate the extent to which they thought pairs of traits applied to them (e.g. reserved, quiet) on a 7-point scale (e.g., I see myself as extraverted, enthusiastic). Given its influence, the starting mood of participants was also measured in the present study, with a mood questionnaire to complete, for which they had to indicate their mood on 7, 9-point scales (e.g., sad to happy, positive to negative, tense to relaxed) (Garcia-Marques, 2004).

Second, participants were all allocated to one group by choosing between two envelopes, each containing a different picture on the front but the same message inside. The message read 'Based on the painting you chose, you have been allocated to the BLUE group. All members of the blue group have chosen the same painting. Some members of your group will appear in the computer task. Their faces will be presented on a blue background'. Figure 2 shows the two paintings shown on the front of each envelope, which were picked on the basis of their contrasting style and content.

Figure 2. The two paintings shown to the participants on the front of each envelope. On the left: "Starry night" by Vincent Van Gogh, and on the right: "The Seine at Asnières" by Pierre-Auguste Renoire.

Next, participants started the computerized experimental task in which they were shown 48 face stimuli. Each face displayed a happy or neutral expression and was signalled to belong to a specific racial and arbitrary group (see 'Face stimuli' for details). Each of the 48 trials began with the presentation of a blank page for 2 seconds, followed by each stimulus for 3 seconds. The total duration of this encoding phase was 4 minutes, after which participants performed the filler task for 2 minutes.

The filler task involved 22 mathematical sums, which were generated by the experimenters. These involved basic mathematical operations (i.e., addition, subtraction, multiplication and division). The level of difficulty of the equations increased gradually.

Then the test phase of the face memory task began. For every stimulus, participants were required to press 'Y' on the keyboard if they had seen the face before and 'N' if they had not seen the face before. If they did not respond for 8 seconds, the following trial automatically began.

Finally, participants were asked to rate the extent to which they identified with their ingroups (i.e. White people and people on the blue background separately) on a four-item, 5-point questionnaire, from Crisp, Turner, and Hewstone (2010) (e.g., ratings of agreement with "I identify strongly with other white people", "Being a member of the blue group is an important part of who I am").

Participants were then debriefed and given the opportunity to ask questions. The experiment took 20-25 minutes in total.

Face stimuli

The face recognition task was created using the computer programme DMDX (Forster & Forster, 2003). In the encoding task, 48 standardized faces (Females = 24) were presented with six faces in each category (see Figure 1 for examples). For the recognition test, 96 faces (consisting of the 48 faces previously seen and 48 new matched faces) were presented. Altogether, half of the faces were of each race, half of the faces were presented on each coloured background and half of the faces displayed each facial expression; this was true for both the learning and recognition phases. Pictures were adapted from the database of Minear and Park (2004). The photos were standardised so that all the faces presented were equally large, eyes were located at the same co-ordinates, all the people in the images wore grey or black tops and no obvious accessories were shown. In line with Bernstein et al. (2007) and similar to Kurzban et al. (2001), the background colour (blue vs. yellow) of each face indicated its arbitrary group membership.

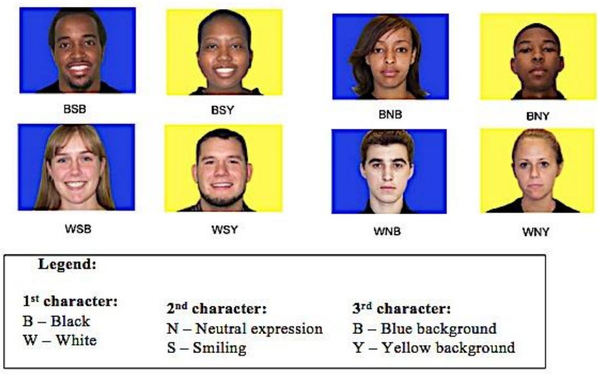

Figure 1. Example stimuli for each of the categories used in the experiment.

Practical

There were some special concerns we had to take into account when running the experiments in this project. One of the first ones we encountered was choosing suitable experimental software. Since not all universities have the same facilities for psychology research, even the best-known software is absent from some universities. That forced us to find free software that could also be used in different types of computers so as to allow access across all researchers.

In the phase of collecting data we stumbled upon another problem, most universities do not allow Bachelor and Master students (which was our case) to use their pool of participants. This created large differences between samples. Large samples were difficult to obtain when there was no money or any other kind of reward for participants, and they were recruited based only on their curiosity and willingness to help. On the contrary, in the cases where university pools were available, and participants were rewarded with credits, a lot of students were attracted to come and participate.

Another difficulty encountered was sourcing the expenses to present at congresses. Registration fees and the costs of printing posters have been self-funded and so prevented the group from attending more congresses to discuss the study with experts in order to gain new ideas; hence the lack of funding has caused strong limitations.

Current Status of Project

All data have been collected and a preliminary analysis has been conducted. We calculated the signal detection parameter sensitivity (*d'*) for indexing recognition. Sensitivity (*d'*) is commonly used in CRE studies and measures perceiver's ability to discriminate between 'new' and 'old' faces. It simultaneously accounts for accurate responses and false alarms by subtracting the z-scores for the false alarm rate from the z-scores of the hit rate. The accuracy data was used to calculate *d'* scores for each condition. These *d'* scores were used in a 2 (target race: Black vs. White) x 2 (background: Blue vs. Yellow) x 2 (emotion: Smiling vs. Neutral) repeated measures ANOVA. Significant interaction effects were further investigated with post-hoc t-tests. Table 1 gives a summary of preliminary results.

Table 1

Preliminary Results

> = significantly higher *d'* scores			Expected?
Arbitrary ingroup, racial outgroup, neutral	>	**Arbitrary outgroup**, racial outgroup, neutral	Yes
Neutral, arbitrary & racial ingroup	>	**Smiling**, arbitrary & racial ingroup	No
Racial outgroup, arbitrary ingroup, smiling	>	**Racial ingroup**, arbitrary ingroup, smiling	No
Arbitrary outgroup, racial ingroup, smiling	>	**Arbitrary ingroup**, racial ingroup, smiling	No

Results were recently presented in two research meetings: The British Psychology Society Annual Conference 2013 held in Harrogate, UK, and *8º Encontro da Associação Portuguesa de Psicologia Experimental* (8^{th} Meeting of the Portuguese Association of Experimental Psychology), in Aveiro, Portugal.

Prospective Discussion

Further analysis of the results is required before we draw conclusions regarding how they relate to the initial hypotheses and previous research. Nevertheless, we now face the challenge of explaining why the preliminary results were inconsistent with our predictions; the discrepancy may be due to interactions between the three variables. Of particular interest is the reversal of the arbitrary ingroup bias and racial ingroup bias with smiling faces belonging to at least one ingroup (see Table 1). Following this, we may need to run additional data analysis controlling for the variables that we consider to be related to face processing (such as mood and personality), compare results on recognition accuracy with those at the level of reaction times, and search literature for a suitable explanation of the effects. In addition, we will continue to communicate this research in further scientific meetings and papers.

This manuscript is part of the Work in Progress special edition of JEPS and was developed under a research project of EFPSA's Junior Researcher Programme cohort of 2012-2013.

References

Ackerman, J. M., Shapiro, J. R., Neuberg, S. L., Kenrick, D. T., Becker, D. V., Griskevicius, V., ... Schaller, M. (2006). They All Look the Same to Me (Unless They're Angry) From Out-Group Homogeneity to Out-Group Heterogeneity. *Psychological Science, 17*(10), 836-840. doi:10.1111/j.1467-9280.2006.01790.x

Bernstein, M. J., Young, S. G., & Hugenberg, K. (2007). The cross-category effect: Mere social categorization is sufficient to elicit an own-group bias in face recognition. *Psychological Science, 18*, 706-712. doi:10.1111/j.1467-9280.2007.01964.x

Beaupré, M. G., & Hess, U. (2003). In my mind, we all smile: A case of in-group favoritism. *Journal of Experimental Social Psychology, 39*, 371-377. doi:10.1016/S0022-1031(03)00012-X

Brigham, J., & Barkowitz, P. (1978). Do "The all look alike?" The effect of race, sex, experience, and attitudes on the ability to recognize faces. *Journal of Applied Social Psychology, 8*, 306-318. doi:10.1111/j.1559-1816.1978.tb00786.x

Crisp, R. J., Turner, R. N., & Hewton, M. (2010). Common ingroups and complex identities: Routes to reducing bias in multiple category contexts. *Group Dynamics: Theory, Research, and Practice, 14*, 32-46. doi:10.1037/a0017303

Crisp, R. J., Hewstone, M., & Rubin, M. (2001). Does multiple categorisation reduce intergroup bias? *Personality and Social Psychology Bulletin, 27*, 76-89. doi:10.1177/0146167201271007

Dovidio, J., Isen, A., Guerra, P., Gaertner, S., & Rust, M. (1998). Positive affect, cognition and the reduction of intergroup bias. In C. Sedikides (Ed.), *Intergroup Cognition and Intergroup behaviour* (pp. 337-366). Mahwah, NJ: Erlbaum.

Elfenbein, H. A., & Ambady, N. (2002). On the universality of cultural specificity and emotion recognition: A meta-analysis. *Psychological Bulletin*, *128*, 203-235. doi:10.1037/0033-2909.128.2.203

Forster, K. I., & Forster, J. C. (2003). DMDX: A windows display program with millisecond accuracy. *Behavior Research Methods, Instruments, & Computers, 35*, 116-124. doi:10.3758/BF03195503

Gosling, S. D., Rentfrow, P. J., & Swann, W. B., (2003). A very brief measure of the big five personality domains. *Journal of Research in Personality*, *37*, 504-528. doi:10.1016/S0092-6566(03)00046-1

Garcia-Marques, T. (2004). Measuring the variable "mood state" in the Portuguese population. *Psychology Lab*, *2*, 77-94.

Hehman, E., Mania, E., & Gaertner, S. (2010). Where the division lies: Common ingroup identity moderates the cross-racial facial-recognition effect. *Journal of Experimental Social Psychology*, *46*, 445-448. doi:10.1016/j.jesp.2009.11.008

Hugenberg, K. (2005). Social categorization and the perception of facial affect: Target race moderates the response latency advantage for happy faces. *Emotion*, *5*, 267-276. doi:10.1037/1528-3542.5.3.267

Hugenberg, K., Miller, J., & Claypool, H. M. (2007). Categorization and individuation in the cross-race recognition deficit: Toward a solution to an insidious problem. *Journal of Experimental Social Psychology*, *43*, 334-340. doi:10.1016/j.jesp.2006.02.010

Hugenberg, K., & Sacco, D. (2008). Social categorization and stereotyping: How social categorization biases person perception and face memory. *Social and Personality Psychology Compass*, *2*, 1052-1072. doi:10.1111/j.1751-9004.2008.00090.x

Hugenberg, K., Young, S. G., & Bernstein, M. J., & Sacco, D. F. (2010). The categorization-individuation model: An integrative account of the other-race recognition deficit. *Psychology review*, *11*, 1168-1187. doi:10.1037/a0020463

Johnson, K. J., & Fredrickson, B. L. (2005). "We all look the same to me" Positive emotions eliminate the own-race bias in face recognition. *Psychological Science*, *16*, 875-881. doi:10.1111/j.1467-9280.2005.01631.x

Kirita, T., & Endo, M. (1995). Happy face advantage in recognizing facial expressions. *Acta Psychologica*, *89*, 149-163. doi:10.1016/0001-6918(94)00021-8

Kurzban, R., Tooby, J., & Cosmides, L. (2001). Can race be erased? Coalitional computation and social categorization. *Proceedings of the National Academy of Sciences*, *98*(26), 15387-15392. doi:10.1073/pnas.251541498

Levin, D. T. (1996). Classifying faces by race: The structure of face categories. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *22*, 1364-1382. doi:10.1037/0278-7393.22.6.1364

Meissner, C. A., & Bringham, J. C. (2001). Thirty years of investigating the own-race bias in memory for faces. A meta-analytic review. *Psychology, Public Policy, and Law, 7*, 3-35. doi:10.1037//1076-8971.7.1.3

Michel, C., Caldara, R., & Rossion, B. (2006): Same-race faces are perceived more holistically than other-race faces. *Visual Cognition*, *14*, 55-73. doi:10.1080/13506280500158761

Minear, M., & Park, D. C. (2004). A lifespan database of adult facial stimuli. *Behavior Research Methods, Instruments, & Computers*, *36*, 630-633. doi:10.3758/BF03206543

Ng, W-J. & Lindsay, R. C. L. (1994). Cross-Race facial recognition: Failure of the contact hypothesis. *Journal of Cross Cultural Psychology*, *25*, 217-232. doi:10.1177/0022022194252004

Sporer, S. L. (2001). Recognizing faces of other ethnic groups: An integration of theories. *Psychology, Public Policy and Law*, *7*, 36-97. doi:10.1037/1076-8971.7.1.36

Tajfel, H. (1978). Social categorization, social identity and social comparison. In H. Tajfel (Ed.), *Differentiation between social groups: Studies in the social psychology of intergroup relations* (pp. 61-76). London: Academic Press.

Urban, L. M., & Miller, N. (1998). A theoretical analysis of crossed categorization effects: A meta-analysis. *Journal of Personality and Social Psychology*, *74*(4), 894-908. doi:10.1037/0022-3514.74.4.894

Van Bavel, J. J., & Cunningham, W. A. (2009). Self-categorization with a novel mixed-race group moderates automatic social and racial biases. *Personality and Social Psychology Bulletin*, *35*(3), 321-335. doi:10.1177/0146167208327743.

Van Bavel, J. J., & Cunningham, W. A. (2012). A Social Identity Approach to Person Memory Group Membership, Collective Identification, and Social Role Shape Attention and Memory. *Personality and Social Psychology Bulletin*, *38*(12), 1566-1578. doi:10.1177/0146167212455829

Van Bavel, J. J., Swencionis, J. K., O'Connor, R. C., & Cunningham, W. A. (2012). Motivated social memory: Belonging needs moderate the own-group bias in face recognition. *Journal of Experimental Social Psychology, 48*(3), 707-713. doi:10.1016/j.jesp.2012.01.006

Wallis, J., Lipp, O., & Vanman, E. (2012). Face age and sex modulate the other-race effect in face recognition. *Attention, Perception and Psychophysics, 74*, 1712-21. doi:10.3758/s13414-012-0359-z.

Weisbuch, M., & Ambady, N. (2008). Affective divergence: automatic responses to others' emotions depend on group membership. *Journal of Personality and Social Psychology, 95*(5), 1063-1079. doi:10.1037/a0011993

Wright, D. B., Boyd, C. E., & Tredoux, C. G. (2001). A field study of own-race bias in South Africa and England. *Psychology, Public Policy, and Law, 7*, 119-133. doi:10.1037//1076-8971.7.1.119.

Young, S. G., & Hugenberg, K. (2010). Mere social categorization modulates identification of facial expressions of emotion. *Journal of Personality and Social Psychology, 99*, 964-977. doi:10.1037/a0020400.

Young, S. G., & Hugenberg, K. (2012). Individuation motivation and face experience can operate jointly to produce the own-race bias. *Social Psychological and Personality Science, 3*(1), 80-87. doi:10.1177/1948550611409759