Emotional Expressions Preferentially Elicit Implicit Evaluations of Faces also Varying in Race or Age

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Abstract

Both facial cues of group membership (race, age, and sex) and emotional expressions can elicit implicit evaluations to guide subsequent social behavior. There is, however, little research addressing whether group membership cues or emotional expressions are more influential in the formation of implicit evaluations of faces when both cues are simultaneously present. The current study aimed to determine this. Emotional expressions but not race or age cues elicited implicit evaluations in a series of affective priming tasks with emotional Caucasian and African faces (Experiments 1 and 2) and young and old faces (Experiment 3). Spontaneous evaluations of group membership cues of race and age only occurred when those cues were task relevant suggesting the preferential influence of emotional expressions in the formation of implicit evaluations of others when cues of race or age are not salient. Implications for implicit prejudice, face perception, and person construal are discussed.

Key words: Implicit evaluation; face perception; emotional expression; group membership; affective priming.

When we see a face, both variant cues like emotional expressions and invariant cues (e.g. gender, race, age) are quickly extracted and automatically evaluated. These evaluations can influence how we feel (Adelmann & Zajonc, 1989; Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Greenwald, McGhee, & Schwartz, 1998; Neumann & Strack, 2000) and how we behave (Chen & Bargh, 1999). But what information do we rely on most when multiple evaluative cues are available to us? Do we rely on cues that indicate group membership such as race and age, or on cues that indicate what a person is thinking and feeling, such as emotional expression?

Facial cues indicating group membership elicit implicit evaluations as evidenced by studies using a variety of 'implicit' measures including Affective Priming (Fazio et al., 1986), Implicit Association Tests (IAT; Greenwald et al., 1998), and Go/No-go Association Tasks (Nosek & Banaji, 2001). In these tasks, stimuli indicating own and other group membership (e.g. faces) are paired with pleasant and unpleasant words or images. Implicit evaluations can be inferred from the speed and accuracy of response to these words or images. Faster and more accurate responding occurs when a pairing is affectively congruent and slower and less accurate responding occurs when a pairing is affectively incongruent. Across a number of studies more positive evaluation of own versus other group faces has been well established. These 'other groups' include both race (Degner & Wentura, 2010; Greenwald et al., 1998; Ottaway, Hayden, & Oakes, 2001) and age (Dasgupta & Greenwald, 2001; Nosek, Greenwald, & Banaji, 2005; Perdue & Gurtman, 1990).

Similar to group membership cues, facial expressions of emotion elicit implicit evaluations in the laboratory setting. For example, participants were faster to categorize pleasant words and slower to categorize unpleasant words overlaid onto a photograph of a happy face. Conversely, participants were faster to categorize negative words but slower to categorize positive words when overlaid onto an angry face (Stenberg, Wiking, & Dahl, 1998). This facilitation for congruent and inhibition for incongruent affective pairings

demonstrates the quick and effortless elicitation of affect by emotional faces. Similar results have been found by Aguado, Garcia-Gutierrez, Castañeda, and Saugar (2007) and Haas, Omura, Constable, and Canli (2006).

The implicit evaluations of emotion and facial cues of group membership have generally been found in controlled experimental contexts where only the emotional expression or group membership cues were varied. When faces are encountered in natural settings, however, they vary on multiple dimensions, thus it is of interest to reveal whether and how these cues influence each other in the formation of implicit evaluations of a face. Attempts to understand the implicit evaluation of faces with simultaneously varying group membership cues (such as race and age) and emotional expressions are sparse.

Weisbuch and Ambady (2008) conducted a study to look explicitly at the potential interaction between race and emotion on the implicit evaluation of faces. Participants were presented with face primes varying in race (Black and White) and emotional expression (fearful, neutral, and happy) in an affective priming task. Analysis of priming scores revealed an interaction of race and emotional expression. When expressing happiness, white faces were evaluated as more positive than black faces. For fearful expressions, white faces were evaluated as more negative than black faces. In these studies, however, only the question of whether race and emotion can influence implicit evaluations is answered. It could not be determined how these cues interact as it is unclear whether priming results were due to the influence of race on the evaluation of the emotional expression or emotional expression on the evaluation of race. Examination of the broader literature addressing the interaction of race and emotion suggests that either explanation is plausible.

Emotional expressions have been found to influence the processing of group membership cues across a number of tasks. Poorer recognition for other race than own race faces can be mitigated when the faces displayed anger (Ackermann et al., 2006). Similarly, participants high in implicit prejudice were faster to attribute ‘blackness’ to ambiguous race

faces as they morphed between white and black when the faces were angry, but not when they were happy (Hutchings & Haddock, 2009; Hugenberg & Bodenhausen, 2004). Further to this, cues of emotion have been found to influence the search for targets defined by race in a visual search task (Lipp, Craig, Ford, Terry, & Smith, 2014). However, processing of group membership cues is not always influenced by emotional expression. In speeded race categorization, for example, other race faces were categorized faster than own race faces regardless of the emotional expression displayed (Kubota & Ito, 2007).

Group membership cues have also been found to influence the processing of emotional expressions. Participants high in implicit prejudice were faster to detect the onset of anger in faces morphing from happy to angry when the face was black than when it was white (Hugenberg & Bodenhausen, 2003). Similarly, in speeded categorization, race has been found to moderate the categorization of emotional expression. White happy faces were categorized faster than white angry faces. For black faces, the opposite effect emerged: black angry faces were categorized faster than black happy faces (Hugenberg, 2005). Also, anger but not fear or happiness expressions were mimicked to a greater extent when displayed on an own race face than on an other race face (van der Schalk, et al., 2011). However, race does not always moderate the processing of emotional expression (Kubota & Ito, 2007). The interaction between face race and emotional expression in categorization has been shown to vary as a function of, for instance, the type and number of face stimuli used (Craig, Mallan, & Lipp, 2012).

Most previous studies have approached the interaction of facial cues of group membership and emotional expression from one direction only; either investigating the influence of group membership cues on the processing of emotion or the influence of emotion on the processing of group membership cues. To investigate the nature of, for example, the race by emotion interaction, a study must employ the same faces varying in both cues across two tasks where race is task relevant in one, and emotion is task relevant in the other. These

studies allow us to determine whether cues are processed independently (i.e. race and emotion cues do not influence each other) or whether the cues interact asymmetrically (i.e. race influences the processing of emotion in the absence of emotion influencing the processing of race or vice versa) or symmetrically (i.e. race influences emotion processing and emotion influences race processing).

Studies investigating the nature of the interaction using constant stimuli and methods are rare and offer mixed conclusions. One prior study of face categorization, for instance, supports a symmetrical interaction between group membership cues (gender) and emotional expression (Aguado, García-Gutierrez, & Serrano-Pedraza, 2009) whereas other evidence suggests an asymmetrical interaction with race, age, and gender cues influencing emotion categorization, but not vice versa in the Garner paradigm (Atkinson, Tipples, Burt, & Young, 2005; Karnadewi & Lipp, 2011). A further recent study using the visual search method found evidence for an influence of emotion cues on search for targets defined by race in the absence of evidence for an influence of cues of race on the search for targets defined by emotion (Lipp et al., in press). This suggests that the relative importance of group membership and emotion cues may vary across the processes being examined in different paradigms.

The aim of the current study was to clarify the nature of the interaction between two facial cues of group membership, race or age, and emotional expression specifically in the formation of implicit evaluations. As in previous research, the affective priming method was used to investigate this (Weisbuch & Ambady, 2008). Primes varied in both race (Black and White; Experiments 1 and 2) or age (old and young; Experiment 3) and emotion (angry, neutral, and happy; Experiments 1 and 3; fearful, neutral, happy, Experiment 2). To determine the relative importance of the multiple cues, participants completed standard and focused affective priming tasks. In the latter, participants verbally categorized the race/age or the emotional expression of the face primes after evaluating the target word on each trial of the affective priming task. The requirement to verbalize one facial cue was to direct attention

towards it and away from other potential sources of evaluation. This procedure has been found to strengthen prime evaluations when compared to standard affective priming (Andrews, Mallan, Lipp, & König, 2011).

In line with past findings it was predicted that the spontaneous evaluation of faces would be dependent on both the race and the emotional expression of the face (Weisbuch & Ambady, 2008). White happy faces would be evaluated as more positive than black happy faces and black angry faces would be evaluated as more negative than white angry faces, as anger has been found to be more readily associated with other race than own race faces (Hugenberg & Bodenhausen, 2003; Hugenberg, 2005).

In the focused priming tasks it was expected that priming effects would be strengthened for the attended facial cue (Andrews et al., 2011). As the nature of the interaction between race and emotion cues in evaluation type tasks was unknown, the manipulation of attention could have multiple outcomes depending on whether emotion or race cues were evaluated preferentially. If emotion cues were evaluated preferentially, it was expected that focusing attention on emotional expression would strengthen emotion priming effects and attenuate race priming effects, whereas focusing attention on race would strengthen race priming but would not impact on emotion priming. However, if race cues were evaluated preferentially, it was expected that focusing on emotional expression may strengthen emotion priming but that race priming would still be present and that focusing on race cues would strengthen race priming effects but attenuate emotion priming.

Experiment 1

Methods

Participants. Participants were 29 first year psychology students (12 males, M = 18.24, SD = 1.46) who received course credit for participation. All identified as Caucasian.

Stimuli. Across all tasks, 60 images of male faces were used (either of African or Caucasian ethnicity, displaying happy, neutral or angry expressions) sourced from the

Productive Ageing Database (Minear & Park, 2004), the Nimstim Set of Facial Expressions (Tottenham et al., 2009), the Montreal Set of Facial Displays of Emotion (Beaupré & Hess, 2005), the Karolinska Directed Emotional Faces (Lundqvist, Flykt, & Ohman, 1998), and the Eberhardt Face Database (http://www.stanford.edu/~eberhard/faces.html). Images were edited in Photoshop so that only the head was shown: neck, clothing, and background were removed in an attempt to maintain consistency across photos from different databases. Images were resized so that the faces occupied the same area in the image. Images were greyscaled and dropped onto a grey background 520 x 390 pixels in size. These 60 faces were divided into five sets of 12 containing two each of happy white, neutral white, angry white, happy black, neutral black, and angry black faces.

Measures.

Standard affective priming task. On each trial, participants were presented with a blank screen for 1000ms followed by a fixation cross for 500ms. The prime (one of the 12 face stimuli in the set) was presented for 187ms on a black background followed by a blank screen for 93ms. This was replaced with the target word which was presented until a response was made or for 2000ms. Participants responded by pressing one of two buttons labeled 'Pleasant' and 'Unpleasant'. Participants were instructed to pay attention to the faces presented but were not asked to evaluate or categorize them in any way. Evaluation times were measured from the onset of the target word until a response was made.

The target words, drawn from previous research (Fazio, Jackson, Dunton, & Williams, 1995), were presented in bold, uppercase, white font on a black background. The pleasant words were 'APPEALING', 'CHARMING', 'DESIRABLE', 'FAVORABLE', 'NICE', and 'SUPERIOR'. The unpleasant words were 'ANNOYING', 'DISTURBING', 'INFERIOR', 'NASTY', 'REPULSIVE', and 'TERRIFYING'. Each prime was paired with each target word once, resulting in 144 trials randomized in blocks of 12 to ensure that the same prime or target was not presented more than two times in a row.

Affective priming – race and emotion focused tasks. These modified tasks followed the same procedure as the standard affective priming task. As in the standard priming task, participants were presented with a blank screen for 1000ms followed by a fixation cross for 500ms. The prime (one of the 12 face stimuli in the set) was then presented for 187ms on a black background followed by a blank screen for 93ms. This was replaced with the target word which was presented for 1000ms and then replaced by a prompt to verbally classify the race or emotional expression of the prime. Participants were still instructed to respond to the target word as quickly and accurately as possible from its onset. Although the target word was presented for a shorter duration in the focused priming tasks, there was no difference between the standard and focused priming tasks in prime presentation durations or the time between the onset of the prime and the target. Participants were prompted with the statement "The person was BLACK or WHITE," for the race priming task and, "The person was HAPPY, NEUTRAL or ANGRY," for the emotion priming task. This instruction appeared in the center of the screen and remained until a button press had been made or for 2000ms. The role of this prompt was to ensure that the participant's attention was focused on the dimension of interest as they viewed each face prime.

Procedure. Participants were tested individually. Tasks were executed in DMDX (Forster & Forster, 2003) presented on a CRT monitor with a 75 Hz refresh rate and a screen resolution of 1280 x 1024 pixels. Before beginning each task, participants completed 12 practice trials. The standard affective priming task was always completed first. The order of the subsequent race and the emotion focused affective priming tasks was counterbalanced. Participants were exposed to a different set of stimuli in each priming task and the order of the sets was counterbalanced across participants.

Data reduction and analysis. Before analysis, responses faster than 100ms or three standard deviations faster or slower than each participant's mean were removed as within subject outliers. In total 6% of the responses for the standard priming experiment, 11% of

responses for the race focused task, and 16% of responses for the emotion focused task were removed due to incorrect responses or invalid response times. Priming scores (Sinclair, Lowery, Hardin, & Colangelo, 2005; Weisbuch & Ambady, 2008) were calculated by subtracting average evaluation times of positive targets from evnumeraluation times of negative targets for each face category. This resulted in a priming score for happy, angry, and neutral, black and white faces. Positive scores indicate relatively positive evaluations and negative scores indicate relatively negative evaluations.

Priming scores were submitted to a 2 (Race: Black, White) x 3 (Emotion: Angry, Neutral, Happy) repeated measures univariate ANOVA. A separate analysis was conducted for each of the three tasks. The results from one participant were not included in the analysis of the race and emotion focused priming tasks due to equipment failure. Data from one additional participant were not included in analysis for the emotion focused priming task due to an error rate approaching chance (>40%)[1].

Effect sizes reported are generalized eta squared values (Olejnik & Algina, 2003) rather than the more commonly reported partial eta squared values. Generalised Eta squared (η_G^2) reflects the amount of variance explained by each treatment effect as a proportion of the total variance in the model with the other treatment effects subtracted, rather than the variance explained by the treatment effect as a proportion of the sum of the treatment and error variance within that factor alone (η_p^2). Although this typically results in effect size values which are substantially smaller in repeated measures factorial designs, this measure is recommended when comparing effect sizes across studies with non-identical designs (Bakeman, 2005; Fritz, Morris, & Richler, 2012).

[1] Initial analyses including participant gender as a between subjects factor indicated no significant impact of participant gender in any of the results presented across the three experiments so results are reported averaging across this factor.

Results

Standard priming task. In the standard affective priming paradigm, only the emotional expression displayed on the face significantly influenced implicit evaluations (Figure 1a). This was supported by a significant main effect of emotion, $F(2, 56) = 5.96$, $p = .006$, $\eta_G^2 = .04$. Follow up comparisons revealed that angry primes were evaluated as more negative than both neutral, $t'(56) = 3.02$, $p = .004$, and happy primes, $t'(56) = 2.67$, $p = 013$. Happy and neutral primes did not differ significantly in evaluation scores, $t'(56) = 0.35$, $p = .728$. No significant main effect of race, $F(1, 28) = 0.361$, $p = .361$, $\eta_G^2 = .01$ or interaction of race and emotion was found, $F(2, 56) = 0.22$, $p = .789$, $\eta_G^2 < .01$.

Race focused priming task. As shown in Figure 1b, when participants were instructed to focus on race, both the race and the emotional expression displayed on the face influenced implicit evaluations. White primes were evaluated as more pleasant than black primes regardless of emotional expression as indicated by a significant main effect of prime race, $F(1, 27) = 16.46$, $p < .001$, $\eta_G^2 = .17$. Emotional expression also influenced implicit evaluations, $F(2, 54) = 5.90$, $p = .005$, $\eta_G^2 = .06$. Adjusting for multiple comparisons ($\alpha = .016$ adjusted for three comparisons), angry faces were evaluated as more negative than happy faces, $t'(54) = 3.23$, $p = .002$, and neutral faces as marginally more negative than happy faces, $t'(54) = 2.43$, $p = .019$. There was no significant difference between angry and neutral faces, $t'(54) = 0.82$, $p = .416$. There was no significant interaction of race and emotion, $F(2, 54) = 0.60$, $p = .542$, $\eta_G^2 = .01$.

Emotion focused priming task. Emotional expression but not the race of the face influenced evaluations (Figure 1c). This was supported by a significant main effect of emotion, $F(2, 52) = 27.57$, $p < .001$, $\eta_G^2 = .21$. Overall, angry primes were evaluated as more negative than neutral primes, $t'(52) = 4.82$, $p < .001$, and happy primes, $t'(52) = 7.12$, $p < .001$. Neutral primes were also evaluated as marginally more negative than happy primes, $t'(52) = 2.30$, $p = .026$ ($\alpha = .016$ adjusted for three comparisons). The main effect of race, $F(1,$

26) = 2.55, p = .112, η_G^2 = .02 and the race x emotion interaction, $F(2, 52)$ = .842, p = .431, η_G^2 = .01, did not reach significance.

Discussion

The results from Experiment 1 suggest that race and emotion interacted asymmetrically in these affective priming tasks and emotional expression information was more heavily weighted in the formation of implicit evaluations. Emotion priming emerged in the absence of race priming in the standard priming task as well as in the emotion focused task. Race priming only emerged when the race of the face was explicitly task relevant, however even under these conditions, emotion priming was still evident. The prediction that priming would be strengthened for the attended dimension in the race and emotion focused tasks was supported. The prediction based on past research by Weisbuch and Ambady (2008) that implicit evaluations formed in the standard priming task would be dependent on both the race and emotion of the face was not supported. Taken together, the findings of Experiment 1 suggest that emotional expressions are preferentially evaluated in affective priming tasks. In drawing this conclusion there are a number of factors that need to be considered.

One consideration, although not a key focus of this paper, is the finding of higher error rates as well as slower overall response times in the focused priming tasks. This is consistent with the cognitive load literature where introducing a second task, like the verbal categorization task, is found to increase task difficulty reflected behaviorally in increased response times and error rates (e.g. see Pashler, 1994). Given the focus of the current study is on more automatic processes, it is important to consider whether the longer response times observed in the focused priming tasks could allow more time for controlled processes to be engaged and to influence the outcome of the focused priming tasks. There are two key reasons why this is unlikely.

Previous research has revealed that introducing a second task leaves fewer resources available to inhibit the influence of the prime on the responses to a target and can exacerbate

automatic priming effects (Lavie, Hirst, de Fockert, & Viding, 2004). The introduction of a second task should, if anything, increase rather than decrease the automatic influence of the prime on target responding. Additionally, we observe race priming in the focused but not the standard priming task. In our lab when we measure explicit evaluations of own and other race faces using procedures that permit the engagement of controlled processes such as rating tasks, we fail to find more negative evaluation of other race faces (e.g. Bramwell, Mallan, & Lipp, 2014). This suggests that when controlled processes are activated, participants inhibit the influence of any automatic race associations. Given we observe more negative implicit evaluations of other race faces in the race focused task, it seems unlikely that this reflects the effects of more controlled processes.

A second key consideration is why we fail to replicate Weisbuch and Ambady (2008). There are a number of differences between the studies that may account for this. Firstly, the current task used slightly different methods than that of Weisbuch and Ambady (2008) such as using word rather than pictorial targets which may have influenced the results. Additionally, the experiments were conducted in different cultural contexts. Participants in the Weisbuch and Ambady (2008) study were predominantly White American and to them Black faces may be more salient as they represent a culturally relevant racial outgroup. Participants in the current study were predominantly from Australia where the same stereotypes and associations are known but may be less salient. In our lab we tend to find more positive associations with White faces and more negative associations with Black faces on implicit evaluation measures when using neutral faces. Having said that, Africans are a less culturally relevant group to Australians as less than 1% of the population identifies their ancestry as African (Australian Department of Immigration and Citizenship, 2008). The results of the race focused priming task indicate that participants in Experiment 1 still demonstrated relatively negative evaluations of other race faces when this dimension was made salient

suggesting a lack of negative bias towards African faces in our participants cannot account for the differences in results.

Another difference between the current experiment and the method used by Weisbuch and Ambady (2008) is that angry rather than fearful faces were used. This may have changed the experimental context and may have led happy other race faces to be evaluated in a comparatively different light. For example, presenting own and other race happy and fearful rather than angry faces together may have elicited a competitive intergroup context. Happiness on the other race face may have been related to the fear present on the own race face and thus seen as malicious and negative when present on other race faces.

In Experiment 1 we chose to use angry expressions to be consistent with previous studies investigating the nature of the interaction between race and emotion. i.e. whether race and emotion interact symmetrically or asymmetrically, or are processed independently (Karnadewi & Lipp, 2011 Kubota & Ito, 2007; Lipp et al., in press), and the majority of studies investigating the interaction of race and emotion (Craig et al., 2012; Hugenberg, 2005; Hugenberg & Bodenhausen, 2003, 2004; Hutchings & Haddock, 2009; van der Schalk, 2011). Weisbuch and Ambady (2008), however, chose to investigate evaluations of fear as it was a negative emotion not associated with stereotypes about African Americans.

Previous research investigating the influence of race on emotion categorisation suggests that the particular negative emotions used may not matter when the target emotional expressions selected are both positive and negative in valence as under these conditions, the influence of race on the categorization of emotion is primarily driven by evaluations rather than stereotypes (Bijlstra, Holland, & Wigboldus, 2010). For example, the finding of faster categorization of happy than angry white faces but faster categorization of angry than happy black faces was replicated when sad rather than angry faces were used, even though expressions of sadness are not generally associated with African Americans (Hugenberg, 2005).

Nevertheless, we failed to find an influence of both emotion and race in the standard priming task when angry faces were used. It may be the case as proposed above, that the use of fear rather than anger is a key factor in the failure to replicate the findings of Weisbuch and Ambady (2008). The aim of Experiment 2 was to address this possibility. We replicated Experiment 1 but used fearful instead of angry faces to determine whether the use of anger rather than fear expressions explains the difference between the current results and the findings of Weisbuch and Ambady (2008). If the use of fearful rather than angry faces is the key factor that leads to the different outcomes, we predict that Experiment 2 should replicate the findings of Weisbuch and Ambady (2008) in that both emotional expressions and race cues should influence priming scores in the standard task. For the focused priming tasks, in line with the results of Experiment 1, we predict that priming will be strengthened for the focused dimension, but that emotion will be preferentially evaluated. As such we expect to observe both race and emotion priming in the race focused task, but only emotion priming in the emotion focused task

Experiment 2

Method

Participants. Participants were 32 first year psychology students and volunteers from the University of Queensland (10 Male, M = 19.63 years, SD = 2.12) who received either partial course credit or AU $10 for participation. All participants identified as Caucasian. Data from one additional participant were not included they did not identify as Caucasian.

Stimuli. Stimuli used throughout Experiment 2 were the same neutral and happy black and white faces used in Experiment 1. The 10 white and 10 black angry faces were replaced by 10 white and 10 black fearful faces drawn from the same databases used in Experiment 1. As in Experiment 1, these 60 faces were divided into five sets of 12 containing two of each type of face (i.e. two happy white, neutral white, fearful white, happy black, neutral black, and fearful black faces).

Measures.

Standard affective priming task. The same measures as in Experiment 1 were utilized for Experiment 2. The angry black and white stimuli were replaced with fearful black and white stimuli.

Affective priming – race and emotion focused tasks. The measures for the focused priming tasks used in Experiment 1 were also used in Experiment 2. As in Experiment 1, Participants were prompted to verbally indicate the race of the face stating "The person was BLACK or WHITE" for the race focused priming task and "The person was HAPPY, NEUTRAL or FEARFUL" for the emotion focused priming task.

Procedure. Experiment 2 was conducted in a small group computer lab in groups of no more than three. The experimental tasks were presented on monitors with an 85 Hz refresh rate and a screen resolution of 1024 x 768 pixels. As in Experiment 1, the standard priming task was always completed first followed by the race and emotion focused tasks counterbalanced. Within any one testing session the same task sequence was used so that all participants were completing the race/emotion focused tasks at the same time. Apart from the changes specified above, the experiment was run in exactly the same manner as Experiment 1.

Data reduction and analysis. The data reduction procedure used in Experiments 1 was used in Experiment 2, resulting in 6% of responses for the standard priming tasks, 10% for the race focused priming task, and 14% of responses for the emotion focused priming task being excluded due to incorrect or invalid responses. Calculation of priming scores and analyses were carried out as described in Experiment 1. Again, priming scores were submitted to separate 2 (Race: Black, White) x 3 (Emotion: Fearful, Neutral, Happy) repeated measures ANOVAs for each task.

Results

Standard priming task. As can be seen in Figure 2a positive expressions were evaluated more positively than negative expressions regardless of the race of the face. This

was confirmed by a significant main effect of Emotion, $F(2, 62) = 5.60$, $p = .006$, $\eta_G^2 = .04$. Follow up comparisons revealed that happy faces were evaluated as more pleasant than fearful faces, $t'(62) = 3.30$, $p = .002$. The difference between fearful and neutral, $t'(62) = 1.86$, $p = .068$, and between neutral and happy faces, $t(‘62) = 1.44$, $p = .159$, was not significant when adjusting for multiple comparisons. There was no significant race priming observed, $F(1, 31) = .03$, $p = .876$, $\eta_G^2 < .01$, and there was no significant race x emotion interaction, $F(2, 62) = 1.62$, $p = .207$, $\eta_G^2 = .02$.

Race focused priming task. Figure 2b indicates that priming scores varied as a function of both race and emotion when participants focused on the race of the face. A significant main effect of race, $F(1, 31) = 28.99$, $p < .001$, $\eta_G^2 = .23$, indicated that White faces were evaluated as more positive than Black faces. There was also a significant main effect of emotion, $F(2, 62) = 4.87$, $p = .011$, $\eta_G^2 = .04$. Fearful expressions were evaluated as less positive than happy expressions, $t'(62) = 3.10$, $p = .003$, but there was no significant difference in evaluations between fearful and neutral or neutral and happy faces, t's < 1.83, ps $> .072$. This effect of emotion was moderated by race, $F(2, 62) = 3.86$, $p = .039$, $\eta_G^2 = .03$. Participants evaluated White faces as more pleasant than Black faces regardless of emotional expression t's > 4.51, ps $< .001$, but this difference was significantly larger for neutral faces than for happy, $t'(62) = 4.38$, $p < .001$, or fearful expressions, $t'(62) = 3.96$, $p < .001$.

Emotion focused priming. When focusing on the emotional expression on the face, only emotion priming was evident (Figure 2c). This was confirmed by a significant main effect of emotion, $F(2, 62) = 29.168$, $p < .001$, $\eta_G^2 = .22$. Follow up comparisons indicate that happy expressions were evaluated as more positive that neutral, $t'(62) = 5.41$, $p < .001$, and fearful faces, $t'(62) = 7.18$, $p < .001$, but there was no difference in the evaluation of neutral and fearful faces, $t'(62) = 1.77$, $p = .082$. There was no significant main effect of race, $F(1, 31) = 0.48$, $p = .493$, $\eta_G^2 < .01$, and the race x emotion interaction did not reach significance, $F(2, 62) = 0.08$, $p = .906$, $\eta_G^2 < .01$.

Discussion

The aim of Experiment 2 was to determine whether the difference in results of Weisbuch and Ambady (2008) and the findings of Experiment 1 were due to the use of fearful expressions in the former, and angry expressions in the latter. The pattern of results for Experiment 2 was similar to the results reported in Weisbuch and Ambady (2008). Priming scores were numerically more positive for happy white than happy black faces and numerically more positive for fearful black faces than fearful white faces, but these differences did not reach significance in the current sample. In the standard priming task, only significant emotion priming was evident. However, as predicted in the focused priming tasks, both race and emotion priming were evident in the race focused task, but only emotion priming was found in the emotion focused task. This set of results is consistent with the findings of Experiment 1 and again suggests an asymmetrical interaction of race and emotion with preferential evaluation of emotional expressions in affective priming tasks.

Although the pattern of results in the standard priming task was similar to that reported by Weisbuch and Ambady (2008), consideration must be given to why the effects did not reach significance in the current comparably sized sample. It is possible that the results reported by Weisbuch and Ambady reflect a chance finding, however differing affective responses to emotional expressions as a function of group membership have been found under a variety of circumstances. Support for affective divergence has been found in a number of labs using difference methods (e.g. van der Schalk et al. 2011). We also find some evidence of affective divergence in the race focused priming tasks in both Experiments 1 and 2 where implicit evaluations were based on both race and emotion. It is also possible that differences in methodology such as the use of pictorial rather than word targets, fewer trials or a smaller set of primes in the Weisbuch and Ambday (2008) task accounts for the difference in results. However, the finding of affective divergence in the race focused priming tasks in both Experiments 1 and 2, suggests that baseline differences in the importance or salience of race

cues to Australian and the American participants may best explain the difference between the findings of Weisbuch and Ambady (2008) and the results of the standard priming tasks.

Regardless of this, the findings from the focused priming tasks suggest that emotional expressions are preferentially evaluated. This finding holds with the use of a large set of stimulus faces across two experiments using different negative emotional expressions. However, it remains to be determined whether this finding holds for other cues present on the face or whether the preferential evaluation of emotion cues over group membership cues only occurs when race is the group membership cue of interest. As such, Experiment 3 aimed to investigate the interactive effects of emotional expression and another invariant facial cue, age, to establish whether the results from Experiment 1 could be generalized to another social category evident from facial cues.

There are a number of reasons why facial cues of age are an interesting avenue for investigating the generalizability of the Experiment 1 and 2 findings. The age of a face is another cue which is encoded early during face processing (Johnston, Kanazawa, Kato, & Ota, 1997). The processing of age cues has been found to parallel the processing of race cues in a number of ways. Firstly, cognitive effects like the Other Race Effect, the observation that own race faces are recognized more accurately than other race faces (Meissner & Brigham, 2001; MacLin & Malpass, 2003) have also been observed with younger and older other age faces (Anastasi & Rhodes, 2005; Kuefner, Macchi Cassia, Picozzi, & Bricolo, 2008; Wiese, Schweinberger, & Hansen, 2008). Similarly, the finding that other race faces are categorized faster than own race faces (Levin, 1996, 2000) has also been observed with own and other age faces (Johnston et al., 1997). Further to this, just as other race faces tend to be negatively evaluated, young adults tend to evaluate the faces of older adults as negative in comparison to young adult faces (Dasgupta & Greenwald, 2001; Nosek et al., 2005). Age cues have also been found to influence the perception of emotional expressions (Sacco & Hugenberg, 2009). Due to the apparent similarities observed between the processing of race cues and age cues,

using a stimulus set where faces vary in age will allow us to investigate whether emotion cues are evaluated preferentially in affective priming tasks beyond the dimension of race.

In Experiment 3 we again use angry, neutral, and happy expressions. Although there may be stereotypes about angry older adults, previous research demonstrates that fear is also associated with facial cues of age (Sacco & Hugenber, 2009). Further, the results of Experiment 2 demonstrate that the results of Experiment 1 were not due to the use of emotional expressions stereotypically associated with the categories of interest but generalized to other non-stereotypic negative emotions. We therefore return to using angry expressions as was done in Experiment 1 to be consistent with the majority of the literature investigating the nature of the interaction between emotion and group membership cues (Aguado et al., 2009; Karnadewi & Lipp, 2011; Kubota & Ito, 2007; Lipp et al. 2013). The aim of Experiment 3 was to assess whether and how cues of age and emotional expression interact in the evaluative context. The same methods implemented in Experiment 1 were utilized for Experiment 3, however, photographs of black and white faces were replaced with images depicting younger and older adults expressing either angry, neutral or happy expressions. If the findings of Experiments 1 and 2 can be generalized to other cues of group membership, it is predicted that emotional expression but not age cues should influence priming scores in the standard priming task. In the focused priming tasks, priming should be strengthened in the task relevant domain and emotion cues should still influence priming scores in the age focused task but not vice versa.

Experiment 3

Method

Participants. Participants were 37 first year psychology students from the University of Queensland (11 Male, M = 19.04 years, SD = 1.64). Data from one additional participant were not included as they were aged over 30, outside of the age of the ‘young’ category

defined by the age range portrayed in the stimulus set. All participants received course credit for their participation.

Stimuli. Stimuli used in Experiment 3 were 60 images of male faces (either young – younger than 30 or old – over 70, displaying happy, neutral or angry expressions) sourced from the productive aging database (Minear & Park, 2004) and the FACES database (Ebner, Riediger, & Lindenberger, 2010). Images were prepared to the same specifications as in Experiment 1. These 60 faces were divided into five sets of 12 containing two of each type of face (i.e. two happy young, neutral young, angry young, happy old, neutral old, and angry old faces).

Measures

Standard affective priming task. The same measures as in Experiment 1 were utilized for Experiment 3. The race related stimuli were replaced with age related stimuli.

Affective priming – age and emotion focused tasks. The measures for the focused priming tasks used in Experiment 1 were also used in Experiment 3. Participants were prompted to verbally indicate the age of the face stating "The person was YOUNG or OLD" for the age focused priming task and "The person was HAPPY, NEUTRAL or ANGRY" for the emotion focused priming task.

Procedure. Apart from the changes specified above, the experiment was run in exactly the same manner as Experiment 1.

Data reduction and analysis. The same method of data reduction used in Experiments 1 and 2 was used in Experiment 3, resulting in 8% of responses for the standard priming tasks, 14% for the age focused priming task and 15% of responses from the emotion focused priming task being excluded due to incorrect or invalid responses. Calculation of priming scores and analyses were carried out as described in Experiment 1. Priming scores were submitted to separate 2 (Age: Young, Old) x 3 (Emotional Expression: Angry, Neutral, Happy) repeated measures ANOVAs for each task.

Results

Standard priming task. As can be seen in Figure 3a, only significant emotion priming was observed. This was supported by a significant main effect of emotion, $F(2, 72) = 3.63$, $p = .032$, $\eta_G^2 = .03$. Happy faces were evaluated as more positive than angry faces, $t(72) = 2.65$, $p = .010$. There was no difference between evaluations of happy and neutral or angry and neutral faces, ts$(72) < 1.67$, ps $> .099$. The age of the face had no overall significant influence on target word evaluations, $F(1, 36) = .94$, $p = .339$, $\eta_G^2 < .01$, and did not moderate the evaluation of emotion, $F(2, 72) = .40$, $p = .668$, $\eta_G^2 < .01$.

Age focused priming task. Inspection of Figure 3b suggests that young faces were evaluated as more positive than old faces as indicated by a significant main effect of age, $F(1, 36) = 31.62$, $p < .001$, $\eta_G^2 = .22$. There was no overall influence of emotional expression on evaluation scores, $F(2, 72) = .28$, $p = .741$, $\eta_G^2 < .01$, and no significant age x emotion interaction, $F(2, 72) = .33$, $p = .691$, $\eta_G^2 < .01$.

Emotion focused priming. As in the standard priming task, emotional expression but not age influenced the evaluation of target faces, $F(2, 72) = 20.98$, $p < .001$, $\eta_G^2 = .20$, (Figure 3c). Angry faces were evaluated as more negative than neutral faces, $t'(72) = 3.55$, $p < .001$, and neutral faces were evaluated as more negative than happy faces, $t'(72) = 2.52$, $p = .014$. There were no differences in priming scores as a function of the age of the faces, $F(1, 36) = 1.50$, $p = .229$, $\eta_G^2 < .01$, and age did not moderate the evaluations elicited based on emotional expression, $F(2, 72) = .98$, $p = .372$, $\eta_G^2 = .01$.

Discussion

The aim of Experiment 3 was to determine whether the results of Experiments 1 and 2 investigating the evaluation of faces varying in both race and emotion could be generalized to faces varying in age and emotion. For the standard priming task, it was predicted that happy faces would be evaluated as more pleasant than angry faces regardless of the age of the face and that there would be no difference in evaluations between old and young faces. Results

from Experiment 3 supported this. Happy faces were indeed evaluated as more positive than angry faces regardless of the age of the face.

In line with the findings of Experiments 1 and 2, it was also predicted that emotion cues would be evaluated preferentially to age cues. As such, for the emotion priming task it was predicted that emotion priming, but not age priming would be evident. For the age focused priming task it was predicted that age priming would be evident but that cues of emotion may still influence the resulting implicit evaluations. As predicted, in the emotion focused priming task, emotional expression information, but not the age, influenced implicit evaluations. As predicted, in the age focused priming task, age cues influenced implicit evaluations but unexpectedly emotion cues did not.

Taking a closer look at the results of the standard affective priming tasks may provide some insight as to why emotion priming was not evident in the age focused task. Priming scores provide information about relative positive and negative evaluations of stimuli. Comparing the percentage variance in priming scores explained by emotional expression in each the standard priming tasks across the three experiments (using η_G^2) reveals a numerically greater amount of variance explained by the emotional expressions on the face in Experiments 1 and 2 (percent variance = 3.60% and 3.82% respectively) than in Experiment 3 (percent variance = 2.57%). This suggests that the proportion of total variability accounted for by emotion was around one and a half times larger in Experiment 2 than in Experiment 3, although a small but significant emotion priming effect was evident in the absence of significant race/age priming in all tasks. Emotion priming being somewhat weaker in Experiment 3 may provide an explanation as to why emotional expression did not significantly influence priming scores when cues of age were task relevant.

Race and age priming only emerged when participants were asked to also categorize the race/age of the face whilst completing the affective priming task. Significant emotion priming was evident in eight of the nine tasks. Overall, results from all experiments speak to

the preferential evaluation of emotional expression cues over race and age cues in the implicit evaluation of faces but suggest that there may be some differences in how race and age interact with emotion cues in the formation of implicit evaluations.

General Discussion

The purpose of this study was to examine the nature of the interaction between facial cues of race and age, and emotional expression in the formation of implicit evaluations. The results of the three experiments were generally consistent. Emotion cues were evaluated preferentially in an affective priming task utilizing faces varying in both emotional expression and cues of race or age. This interpretation is supported by significant emotion priming in the absence of race/age priming in all standard priming tasks. Implicit evaluations of race and age cues were only evident when these cues were made task relevant via a concurrent race/age categorization task. The current results suggest that cues of race or age need to be salient to observe significant race/age priming when emotional expressions are used in evaluations tasks. These findings can extend our understanding in both the areas of implicit prejudice and face processing.

The current results demonstrate that the commonly reported implicit race/age bias is not necessarily observed when emotional expressions are concurrently varied within the task, unless participants explicitly attend to race/age cues. This is not the first demonstration that implicit bias elicited in response to group membership cues is malleable. Implicit race biases have been reduced or eliminated in the laboratory by priming participants with positive exemplars of outgroup members such as sports people (Mitchell, Nosek, & Banaji, 2003) and even by the subtle presence of posters that prime outgroup heterogeneity (Brauer, Er-rafiy, Kawakami, & Phills, 2012). The current findings demonstrate that implicit group membership biases may be attenuated in ways that do not rely on manipulating states of the observer, but rather manipulating a feature of the face. This is important as it suggests that members of groups who are typically negatively evaluated may effectively use emotional expressions to

reduce the observer's negative evaluations. This is not to suggest that the presence of emotional expression will always completely attenuate implicit evaluation based on race or age. As we see in the focused priming tasks, when cues of race or age are made salient, we observe differences in the evaluation of white and black faces and old and young faces. It may be the case that when race or age is made salient by the broader context, such as the culture one lives in, that implicit evaluations may also be influenced by cues of race/age without the task drawing focus to them as observed by Weisbuch and Ambady (2008). These findings suggest that affective divergence, that is emotional responding that depends on the group membership of the actor or poser, may be limited to situations where the group membership cue is contextually salient.

The current results also provide an important extension to the developing literature addressing the nature of the interaction between multiple facial cues. Past research demonstrated the interaction of race and emotion in the affective context but did not address the question of how these cues interact. It was unclear whether evaluations were primarily influenced by race but modulated by emotional expression or vice versa. We were able to address this by complementing a standard affective priming task with two focused priming tasks. Across three experiments, only significant emotion priming was observed unless participants were required to explicitly attend to the race/age of the face. Further to this, in the two race focused tasks, emotion priming was also observed even though the task required participants to focus on the race of the face. We interpret this as a demonstration of the preferential evaluation of emotional expressions over cues of race and age in implicit evaluation tasks.

Although emotion has been found to influence the processing of race cues (e.g. Ackerman et al., 2006; Hugenberg & Bodenhausen, 2004), the few studies attempting to establish which cues are preferentially processed within the demands of a particular task have presented mixed results. In one study, a symmetrical interaction was observed such that

emotion influenced performance on a task focused on categorizing sex cues just as sex cues influenced performance on an emotion categorization task (Aguado et al., 2009). In others, evidence was provided for an asymmetrical interaction where race and age cues interfered with the categorization of emotional expression in the absence of a similar influence of emotion on the categorization of race and age cues (Karnadewi & Lipp, 2011). Further to this, a recent study by Lipp and colleagues (in press) provides evidence of an asymmetrical interaction in the opposite direction where emotion cues influence search for targets defined by race in the absence of a similar influence of race on emotion search. The current study provides a further demonstration of the preferential influence of emotional expression cues over cues of race and age. Considering the current study along with past research suggests that the way in which cues like race, age, and emotion interact depends on the nature of the task. It is thus important to consider how the context elicited by the task might influence results when drawing conclusions about the processing of multiple facial cues.

Theoretical Implications. Although the current study was not designed to explicitly test a particular theoretical model, the findings can be reconciled under the 'dynamic interactive theory of person construal' (Freeman & Ambady, 2011). This model was favored over older models of face perception (e.g. Bruce & Young, 1986 or Haxby, Hoffman, & Gobbini, 2000) as it attempts to address how multiple facial cues interact, rather than just describing that distinct facial cues can be extracted from the structure and movement of a face. This connectionist model proposes that the representations we form of others are the product of an interactive system shaped by both bottom-up and top-down influences. Visual input activates cue level nodes sensitive to features like skin tone and face structure which are related to social categories such as race, age, gender, and emotion. Over time, cue level nodes excite relevant nodes at the category level resulting in stable person construals. This process occurs under the influence of top-down higher level cognitive states such as motivation, processing goals, and task demands. Although this model is focused on the person construal

rather than evaluations, making sense of the visual information in a face is a necessary precursor to any evaluation that is elicited in response to that face. As such, implicit evaluations should be the result of an interaction of bottom-up and top-down influences.

A number of findings in the current study can be reconciled within this model. Firstly, the finding of preferential evaluation of emotional expressions over race and age cues within affective priming may be due to the affective priming task eliciting a state that compels the excitation of emotion relevant category and cue nodes as the focal task requires evaluation judgments. Although other relevant race, age, and gender nodes are activated in the system, emotion cues and categories are prioritized. The race/age and emotion focused tasks exert additional top down processing goals on the system prioritizing the excitation of the task relevant (race/age or emotion) category and cue nodes. The additional processing goal weights the system in favor of evaluating the task relevant cues explaining why race and age priming is evident in the race/age focused tasks. Despite this, the broader evaluative context weights the influence of emotion cues, potentially explaining why emotion priming was observed even in the race focused priming tasks.

This model can also provide an explanation for the disparity between the current findings and those of Weisbuch and Ambady (2008). Although our predominantly Australian sample tends to implicitly evaluate White faces as more positive than Black faces when only neutral expressions are present within the task, it may be the case that attitudes relating to race are not chronically activated or contextually relevant to the same extent as they are in an American sample. Cues of race may not be particularly salient to a predominantly White Australian sample when emotional expression information is also available, but may still be informative to a predominantly White American sample. This is another example of how the top-down influence of higher order cognitive states may modulate the evaluation of faces varying in cues of race and emotional expression.

Additionally, in Experiments 1 and 2, emotion priming was also observed in the race focused tasks, but this was not observed in the age focused task in Experiment 3. This inconsistency can also be reconciled within the model. As discussed previously, a tendency towards stronger emotion priming was observed in the standard priming task in Experiments 1 and 2 (race) than Experiment 3 (age). As the tasks were equivalent, this suggests that the faces in Experiment 3 may have less powerfully activated emotion relevant cue and category nodes. When the concurrent age categorization task was added, the stronger excitation of age cue nodes elicited by the task may have outweighed the influence of emotion nodes on the resulting evaluation.

Slight differences in the findings of Experiments 1 and 2 investigating race by emotion interactions, and Experiment 3 investigating age by emotion interactions highlight the need for future research in this area. Other cues like gender and person identity may interact with emotional expression in the formation of implicit evaluations as they do in other contexts like categorization (e.g. Hess, Adams, Grammer, & Kleck, 2009; Schweinberger & Soukup, 1998) and the nature of these interactions may also differ from the interactions described here as is the case in past research (Karnadewi & Lipp, 2011). Further to this, evaluations of faces varying in race/age and emotion might also be modulated by varying other cues like gender within the task. These findings highlight the importance of beginning to investigate more thoroughly how multiple cues like race, age, sex, identity, and facial expression interact when more than two cues are present to better understand how these cues are evaluated in more naturalistic setting where any or all of these cues may vary.

Conclusion. These studies contribute to the theoretical understanding of how faces varying in emotional expression and race/age cues are evaluated and to the area of face processing as a whole. Of particular novelty is determining the relative importance of different facial cues in implicit evaluation tasks. Emotional expressions are more influential than group membership cues of race or age in the formation of implicit evaluations of faces

varying on both of these dimensions however the way in which emotion interacts with race and age may differ slightly. Overall, this series of studies has implications for interpersonal interactions with members of other groups. Results from the current study indicate that when emotion information is available from a face, other facial cues of group membership such as age and race may not play a significant role in the formation of spontaneous evaluations unless the race or age cue is made salient in some way. Displaying positive emotional expressions when interacting with members of other groups may serve to overshadow negative evaluations formed on the basis of group membership cues alone and facilitate the effectiveness of these interpersonal interactions with members of other groups.

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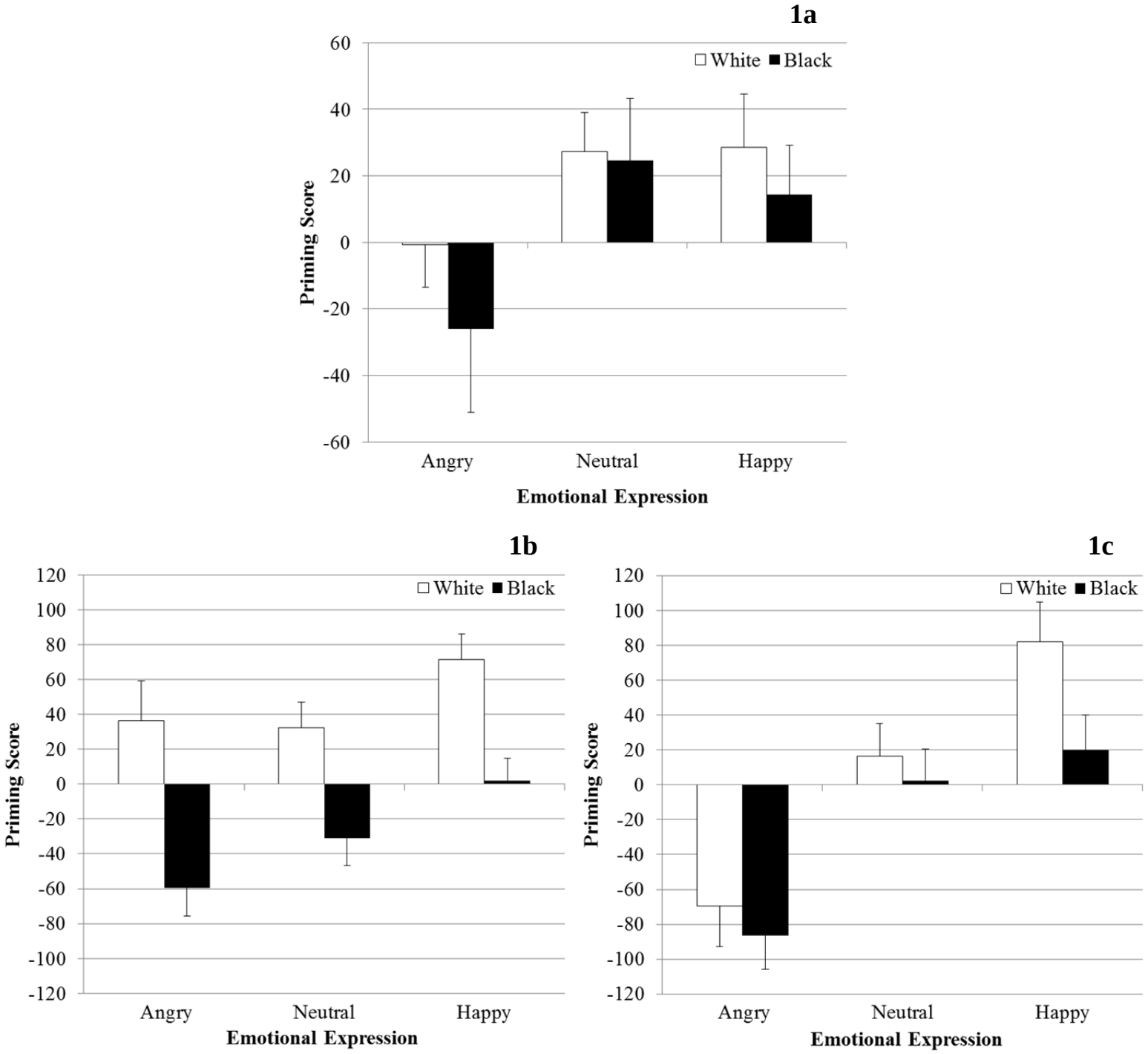

Figure 1. Priming scores for angry, neutral, and happy faces as a function of the race of the face from the Standard Priming Task (Figure 1a), the Race Focused Priming Task (Figure 1b), and the Emotion Focused Priming Task (Figure 1c) of Experiment 1. Error bars represent one SEM.

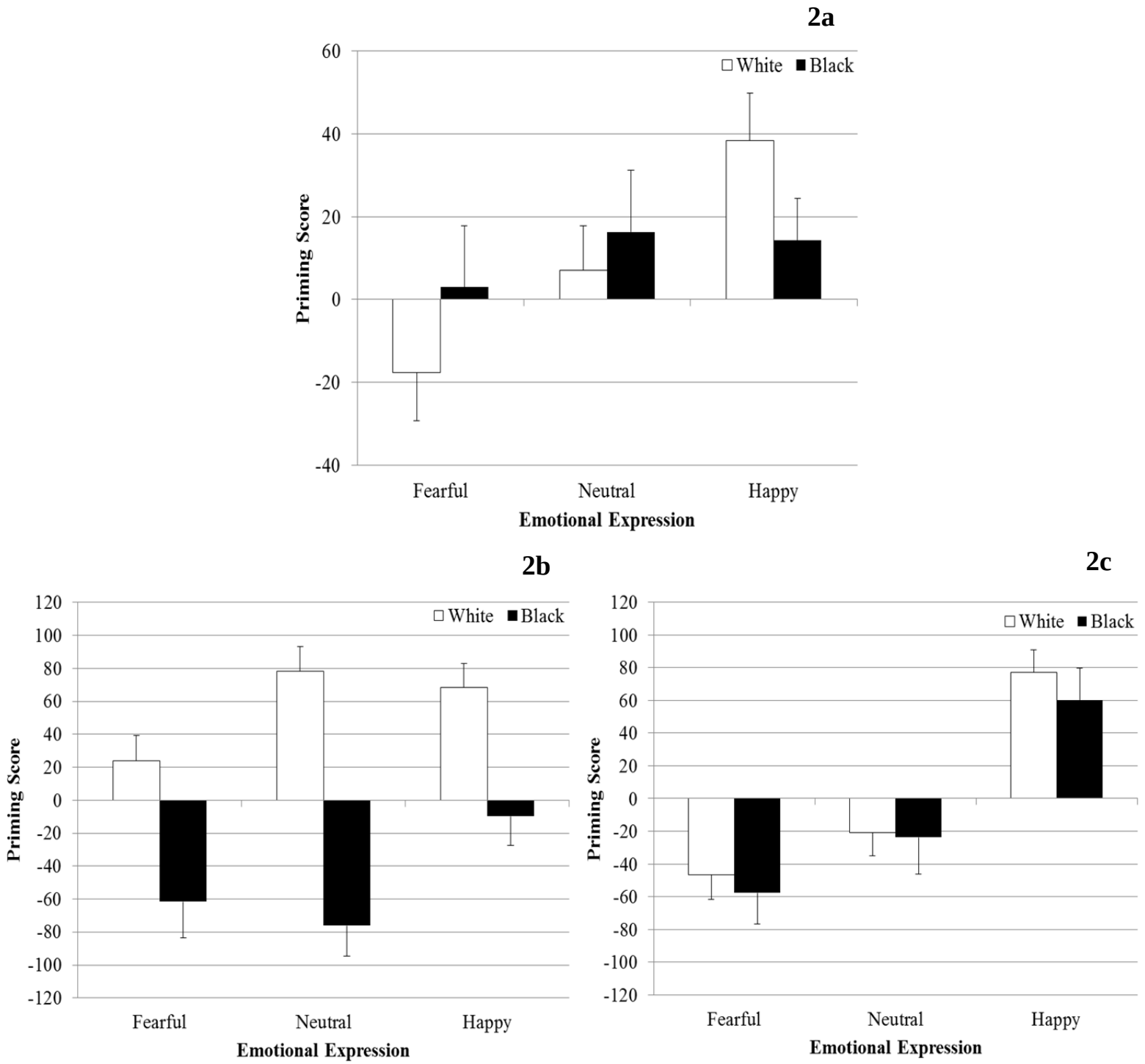

Figure 2. Priming scores for fearful, neutral, and happy faces as a function of the race of the face from the Standard Priming Task (Figure 2a), the Race Focused Priming Task (Figure 2b), and the Emotion Focused Priming Task (Figure 2c) of Experiment 2. Error bars represent one SEM.

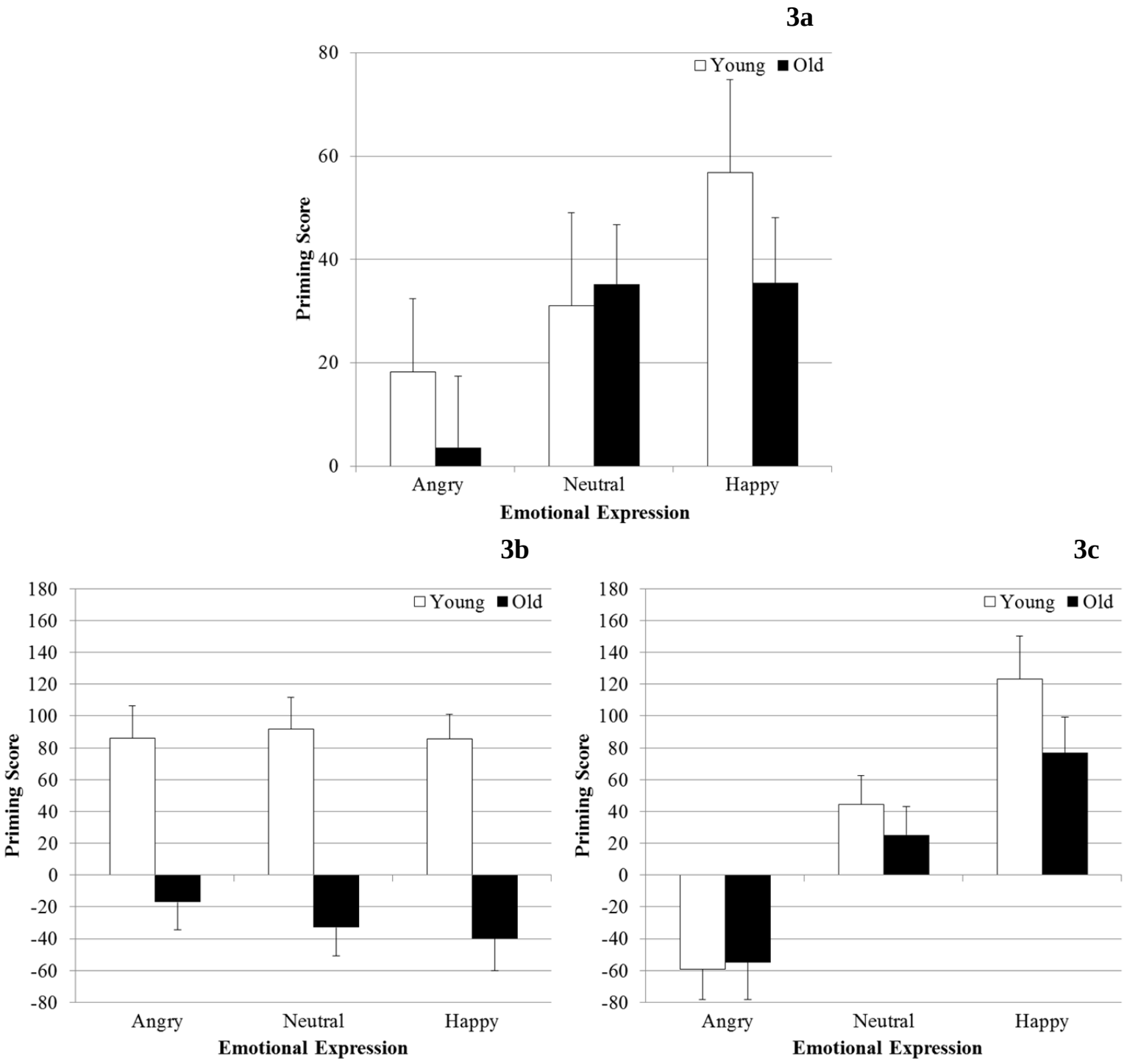

Figure 3. Priming scores for angry, neutral, and happy faces as a function of the age of the face from the Standard Priming Task (Figure 3a), the Age Focused Priming Task (Figure 3b), and the Emotion Focused Priming Task (Figure 3c) of Experiment 3. Error bars represent one SEM.