

## *Affective Learning About Racial In-Group and Out-Group Members*

David L. Neumann, Griffith University, Australia  
Sarah Webb, Griffith University, Australia  
Stefania Paolini, Newcastle University, Australia  
Andrea S. Griffin, Newcastle University, Australia  
Alexander W. O'Donnell, Griffith University, Australia

The European Conference on Psychology & the Behavioral Sciences 2016  
Official Conference Proceedings

### **Abstract**

Learning experiences occur within a social context and these can influence whether an individual is likely to approach or avoid certain people and situations in the future. The present study used an associative learning paradigm to investigate the acquisition and attenuation of affective responses towards in-group and out-group members defined on the basis of ethnicity. White Australian participants initially viewed images of two White faces (in-group) and two Middle Eastern ethnicity faces (out-group) in a habituation phase. Next, one face of each ethnic group type was paired with an aversive electrotactile stimulus whereas the other face was presented alone in an acquisition phase. Finally, all faces were presented alone in an extinction phase. Self-report ratings showed no interactions between face ethnicity and whether it was paired with the aversive stimulus or not. Ratings of fear and arousal were higher and ratings of pleasantness and liking were lower for out-group faces than in-group faces after all phases. In addition, these ratings were higher for the faces paired with the aversive stimulus than for faces presented alone following the acquisition and extinction phases. Skin conductance responses did show an interaction between face ethnicity and whether it was paired with the aversive stimulus or not, although this was limited to the acquisition phase. In this phase, responses were larger to out-group faces paired with the aversive stimulus than to out-group faces presented alone whereas there were no differences between in-group faces paired with the aversive stimulus or presented alone. The results suggest that negative emotional responses are overall elevated and are more likely to be associated with negative experiences for ethnic out-group members than for in-group members. The results have implications for racial prejudice and for the personal and situational factors that may motivate an individual to approach or avoid intergroup contact.

Keywords: intergroup anxiety, intergroup contact, conditioning, learning, psychophysiology

**iafor**

The International Academic Forum  
[www.iafor.org](http://www.iafor.org)

## Introduction

It has been argued that prejudice towards ethnic out-group members can be reduced through intergroup contact (Allport, 1954; Pettigrew & Tropp, 2006). While multiple factors might be implicated in the proposed reduction in prejudice, intergroup anxiety has emerged as a particularly important mediator (Pettigrew & Tropp, 2006). As a result, a better understanding of how intergroup anxiety develops and is modified over time has the potential to lead to the development of approaches that reduce prejudice in society (Paolini, Harris, & Griffin, 2016).

Pavlovian conditioning provides a framework by which we can understand the formation and reduction in anxiety towards out-group members. A basic Pavlovian conditioning procedure involves two phases: acquisition and extinction (Gottlieb & Begej, 2014). Acquisition refers to a repeated pairing of a conditioned stimulus (CS) and an unconditioned stimulus (US) until an association between the two is learnt. The US can be an aversive stimulus that elicits a response known as an unconditioned response (UR) regardless of an individual's prior learning history. For fear learning to have occurred and the acquisition phase considered successful, presentation of the CS alone must elicit a conditioned fear response (CR). The extinction phase refers to a procedure designed to reduce the conditioned fear. The procedure involves repeated presentations of the CS alone. The removal of the US results in new learning that the CS is no longer associated with the US and a reduction in the conditioned fear response is typically observed.

A seminal study by Olsson, Ebert, Banaji, and Phelps (2005) used a fear conditioning procedure to show differences in fear extinction to in-group and out-group members defined by ethnicity. In typical fear conditioning studies, the CS is a neutral stimulus like a geometric shape or tone. However, Olsson et al. (2005) used images depicting the face of an individual of the same or different ethnicity as the CS. During acquisition, both White and Black participants demonstrated conditioned fear responses to both in-group and out-group CSs. Following an extinction phase, fear responses extinguished to the in-group CS. However, conditioned fear responses were reduced but not completely extinguished for the out-group CS. The amount of extinction in conditioned fear was unrelated to participants' negative attitudes against the out-group but it was greater for those individuals who reported having more prior interracial romantic partners.

Subsequent research has found that extinction is even more retarded for out-group exemplars with an angry expression in comparison to a happy expression (Bramwell, Mallan, & Lipp, 2014). Importantly, resistance to extinction to outgroup exemplars may not be a universal phenomenon. For example, no resistance to extinction to out-group ethnic members was found when participants were given explicit instructions that the US was not going to be presented in the extinction phase (Mallan, Sax, & Lipp, 2009). In addition, no resistance to extinction was found when the CS was a female ethnic out-group member (Navarrete et al., 2009) or when in-group and out-group membership was minimally defined (Navarrete, et al., 2012). However, the latter study by Navarrete did find that minimal group membership (as defined by t-shirt colour) did influence the acquisition of fear learning, with faster learning for out-group member CSs. This suggests that out-group biases may also be observed during the acquisition of conditioned fear.

From research conducted to date, it may be concluded that Pavlovian conditioning can provide a mechanism that leads to learnt out-group anxiety. Moreover, this contingency bound learning of anxiety is more difficult to attenuate following experience with out-group members than in-group members (Paolini et al., 2015). It is important to determine whether these effects are general or whether they have boundary conditions (Navarette et al., 2009). Resistance to extinction in White participants has been observed with out-group faces of Black/African American (Bramwell et al., 2014; Olsson et al., 2005; Navarette et al., 2009) and Chinese (Mallan et al., 2009) ethnicity. In the present experiment, we examined whether learning differences extend to faces of Middle Eastern ethnicity in a White Australian sample. Middle Eastern ethnicity is particularly salient given local and global events surrounding this cultural group. Moreover, racist attitudes by White Australian individuals towards Middle Eastern individuals exists (Jonason, 2016) and overt discrimination has been documented (Forrest, Elias, & Paradies, 2016).

The design of the present experiment was based on Olsson et al. (2005) and Bramwell et al. (2015). Similar to Olsson et al. (2015), a fully within-subjects design was used in which participants were presented with faces of both the same and different ethnicity. The measures of fear learning followed that used by Bramwell et al. (2014) by using subjective ratings and phasic skin conductance responses. We extended the dimensions of subjective ratings beyond pleasantness by also including ratings of fear, arousal, and interest (see Lipp, Neumann, & Mason, 2001; Neumann, Boyle, & Chan, 2013). In addition, unlike Bramwell et al. (2014) who measured pleasantness after extinction, we obtained subjective ratings after both acquisition and extinction phases. A habituation phase was also included to examine pre-existing differences between the faces of different ethnicity. It was hypothesized that out-group CSs would initially be evaluated more negatively and elicit larger skin conductance responses than in-group CSs during habituation. Moreover, it was hypothesized that faster acquisition and slower extinction of conditioned responses would be observed for out-group CSs in comparison to in-group CSs.

## **Method**

### ***Participants***

Participants were recruited from the first year psychology student pool at a large East Coast metropolitan Australian university. Participants self-identified themselves and both their parents as White (Caucasian). Ten participants were excluded due to problems with the psychophysiological measures or disruptions in the procedure. The final sample contained 44 participants (34 female and 10 male) with a mean age of 23.52 years (range = 16 – 49,  $SD = 7.71$ ). All participants gave informed written consent to a protocol approved by the institutional review board.

### ***Apparatus***

The participant sat in a 3 × 3 m sound attenuated room and was monitored by an experimenter via a closed circuit video camera. Images of the CSs were presented via a Panasonic Model PT-L557E LCS data projector onto a 1.8 m wide × 1.2 m high white screen that was approximately 1.5 m from the participant (see Neumann &

Longbottom, 2008). The DMDX program controlled the experiment and displayed the stimuli via the projector.

The CSs were custom produced using the facial generation program FaceGen Modeller. All faces were standardised with neutral expressions, front on view, male and aged approximately 20-30 years. A range of faces were produced and the final set was selected based on results from two pilot studies. In the first pilot study, participants ( $N = 6$ ) rated a sample of four generated White faces and four generated Middle Eastern faces on a scale from 1 = *most like Caucasian[or Middle Eastern]* to 4 = *least like Caucasian[or Middle Eastern]*. The two faces that were ‘most like’ each ethnicity (Caucasian faces:  $M = 2.33$ ,  $SD: 0.94$ ;  $M = 1.33$ ,  $SD = 0.47$  and Middle Eastern faces:  $M = 2.66$ ,  $SD: 1.10$ ;  $M = 1.83$ ,  $SD = 1.06$ ) were selected for inclusion in the second pilot study.

The second pilot study involved generating an additional six faces. These faces represented Maori, Asian, and Black African ethnicities and were collated with the previously selected White and Middle Eastern faces. Participants ( $N = 13$ ) were asked to match each face to one of the five ethnicities. All participants correctly categorised the White and Middle Eastern faces. The two faces representing White ethnicity and two faces representing Middle Eastern ethnicity were thus used for the in-group and out-group ethnicity CSs, respectively.

The electrotactile US was administered by an IWORX SI100 stimulus isolator via two disposable ADInstruments MLA1010B Ag/AgCl electrodes placed on the participants preferred forearm (Neumann & Waters, 2006). The isolator was held at a set current level and produced 0 to 100 volts for 200 ms.

Participants gave self-report ratings on paper (see Neumann, Waters, Westbury, & Henry, 2008). The first self-reported rating was ‘fear’, rated on a scale from 0 = *low fear* to 8 = *high fear*. The second self-reported rating was ‘arousal’, rated from 0 = *calm* to 8 = *arousing*. The third self-reported rating of ‘pleasantness’ was rated from 0 = *unpleasant* to 8 = *pleasant*. The fourth self-reported rating of ‘likability’ was rated on a scale from 0 = *dislike* to 8 = *like*.

Physiological measurements were obtained using an ADInstruments PowerLab 8/30 physiological data acquisition system (for details see Boschen, Neumann, & Parker, 2007; Neumann & Longbottom, 2008). Skin conductance activity was recorded via an ADInstruments ML116 GSR Amp by attaching electrodes to the distal phalanges of the first and second fingers of the non-preferred hand. Respiration was also recorded via an ADInstruments ML1132 Piezo Respiratory Belt applied to the lower chest to control for respiratory influences (e.g. coughs, sneezes) on skin conductance.

### ***Procedure***

During the advertisement of the experiment and the informed consent process, participants were informed that they would be asked to complete a “learning task” that involved faces of individuals from a “Caucasian and Middle Eastern background” and an “electrotactile stimulus” and they would be asked to report various “reactions” to the stimuli. Each participant was tested individually and granted partial credit towards their study requirements in exchange for participation. Participants washed

their hands and the respiration transducer and skin conductance electrodes were applied. Following this, participants selected the level of the electrotactile US. The experimenter increased the level in increments of 5 volts until the participant reported the shock to be 'unpleasant, but not painful'. The mean shock intensity was 49.78 V.

A 3-minute acclimatisation period followed in which participants were instructed to rest. Next, the participant was read a standardised set of instructions. They were instructed that they will be shown faces of both Middle Eastern and Caucasian males and that these faces may or may not be followed by an electrotactile stimulus. They were also given instructions on making the subjective ratings. The participant was left alone in the room for the remainder of the procedure whilst being observed through the closed circuit camera.

Participants were initially habituated to the stimuli in a pre-exposure phase with two trials of each of the four CSs presented alone to reduce any initial skin conductance reactivity to the CSs. During habituation and all subsequent trials, each CS was presented for 8 s and the intervals between CSs were randomly varied from 8, 9, or 10 s from CS offset to next CS onset. Additionally, the first CS presented in each phase was counterbalanced and subsequent trial presentations were randomised. Following the habituation phase, self-report ratings were administered to assess any pre-existing biases to the stimuli, while also allowing the participant to become familiar with the rating procedure. The order of the CSs for the ratings was counterbalanced in a Latin squares design that was allocated across participants randomly. The order was kept constant for a participant for subsequent rating periods.

The acquisition phase involved presenting eight trials of each CS type. The US immediately followed the CS<sup>+</sup><sub>in-group</sub> and CS<sup>+</sup><sub>out-group</sub> presentations. The CS<sup>-</sup><sub>in-group</sub> and CS<sup>-</sup><sub>out-group</sub> presentations were shown without the US. The assignment of faces as CS<sup>+</sup> and CS<sup>-</sup> were counterbalanced. Half the participants received one face from both the in-group and out-group faces as the CS<sup>+</sup> and the other half received the alternate face as each respective CS<sup>-</sup>. Following the acquisition phase, self-report ratings were administered.

After acquisition, the extinction phase involved presenting participants with 12 trials of each CS. All CSs were shown in this phase with no US. Following the extinction phase, self-report ratings were administered. Participants were debriefed at the conclusion of the experiment.

### ***Data Scoring and Statistical Analysis***

The first four dependent variables were ratings of fear, arousal, pleasantness, and likability. For these self-report ratings, two within-subjects independent variables were used. The first was CS with two levels (CS<sup>+</sup> and CS<sup>-</sup>) and the second was Ethnicity (In-group and Out-group). The fifth dependent variable was the SCR and it had CS and Ethnicity as independent variables. An additional within-subjects variable of Block was examined. Each block was the average of 2 trials such that there were 4 blocks in acquisition and 6 blocks in extinction. The SCR magnitude was quantified as the difference between trough and apex of the response curve for the largest response that began in a 1 to 5 s response latency window following CS onset. Responses containing respiratory artefacts were scored as missing and subsequently

replaced with estimates based on the mean by using the response of those trials before and after the missing trial for the same CS and participant (< 0.1% of responses were replaced).

Repeated measures ANOVAs were conducted on the self-report and SCR dependent measures. The family-wise error rate set at .05. For brevity, only significant main effects and interactions are reported.

## Results

### *Self-Report Ratings*

Figures 1 to 4 show the mean subjective ratings after each experimental phase. The results in each phase were similar for fear ratings (Figure 1), arousal ratings (Figure 2), pleasantness ratings (Figure 3), and likeability ratings (Figure 4). Separate  $2 \times 2$  (CS  $\times$  Ethnicity) ANOVAs were conducted for each measure and phase.

Ratings obtained following the habituation phase showed a pre-conditioning subjective bias. As reflected in a main effect of Ethnicity, fear ratings were higher,  $F(1,43) = 20.40, p < .001, \eta_p^2 = .32$ , arousal ratings were higher,  $F(1,43) = 16.15, p < .001, \eta_p^2 = .27$ , pleasantness ratings were lower,  $F(1, 43) = 22.43, p < .001, \eta_p^2 = .34$ , and likeability ratings were lower,  $F(1, 43) = 18.77, p < .001, \eta_p^2 = .30$ , for out-group CS faces than for in-group CS faces.

Evidence of learning was found following the acquisition phase. As supported by a main effect of CS, significant differences between the CS+ and CS- were observed for fear ratings,  $F(1, 43) = 16.03, p < .001, \eta_p^2 = .27$ , arousal ratings,  $F(1,43) = 6.69, p = .013, \eta_p^2 = .14$ , pleasantness ratings,  $F(1, 43) = 14.25, p = .001, \eta_p^2 = .25$ , and likeability ratings,  $F(1, 43) = 13.30, p = .001, \eta_p^2 = .24$ . In addition, the overall differential ratings to out-group and in-group CSs observed during habituation persisted for fear ratings,  $F(1,43) = 28.48, p < .001, \eta_p^2 = .40$ , arousal ratings,  $F(1, 43) = 7.14, p = .011, \eta_p^2 = .14$ , pleasantness ratings,  $F(1, 43) = 45.25, p < .001, \eta_p^2 = .51$ , and likeability ratings,  $F(1,43) = 35.83, p < .001, \eta_p^2 = .46$ . No interaction was observed between CS type and ethnicity.

Following the extinction phase, the differential ratings between the CS+ and CS- persisted. As reflected in a main effect of CS, fear ratings were higher,  $F(1, 43) = 6.74, p = .013, \eta_p^2 = .14$ , arousal ratings were higher,  $F(1, 43) = 7.45, p = .009, \eta_p^2 = .15$ , pleasantness ratings were lower,  $F(1, 43) = 7.97, p = .007, \eta_p^2 = .16$ , and likeability ratings were lower,  $F(1, 43) = 6.62, p = .016, \eta_p^2 = .12$ , for the CS+ than the CS-. The difference between CSs thus demonstrated a resistance to extinction for all ratings. Similar to habituation and acquisition, a main effect for Ethnicity indicated differential ratings of fear,  $F(1,43) = 16.76, p < .001, \eta_p^2 = .28$ , arousal,  $F(1, 43) = 7.34, p = .010, \eta_p^2 = .15$ , pleasantness,  $F(1, 43) = 22.40, p < .001, \eta_p^2 = .34$ , and likeability,  $F(1, 43) = 16.83, p < .001, \eta_p^2 = .28$ , for in-group and out-group CS. No interaction between CS type and ethnicity was observed.

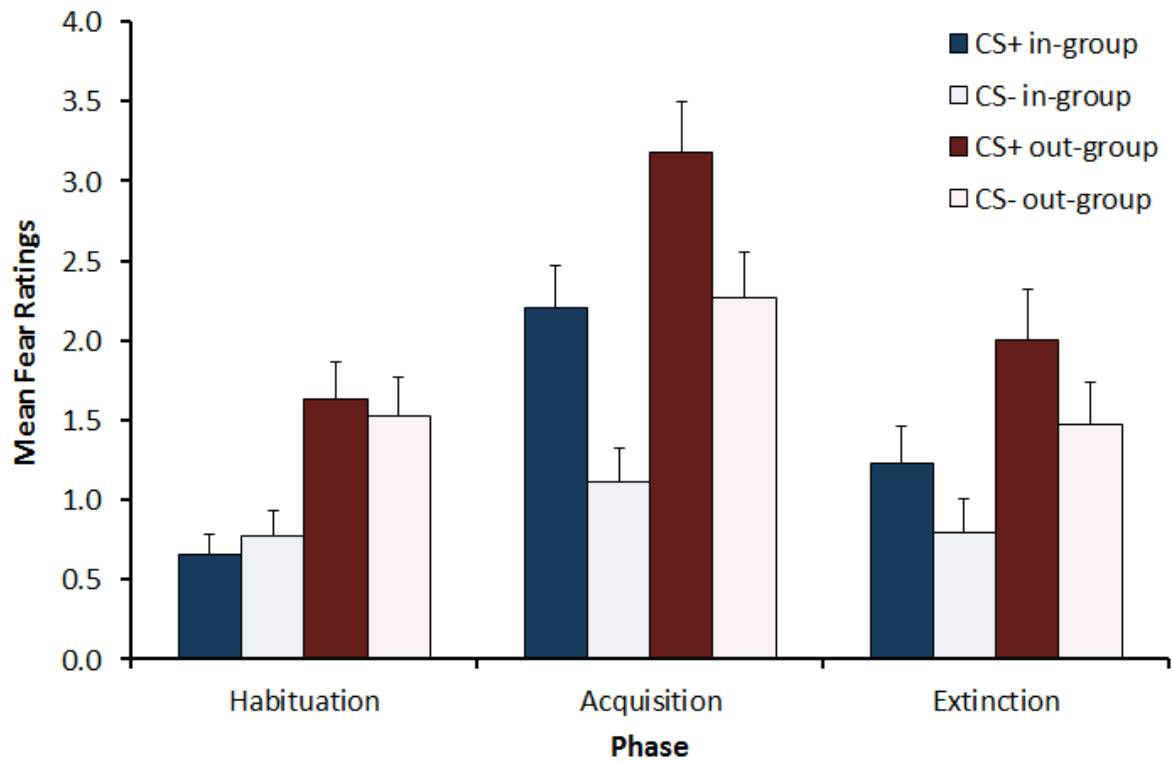


Figure 1: Mean self-report fear ratings for in-group and out-group CSs following each experimental phase. Error bars depict the standard error of the mean.

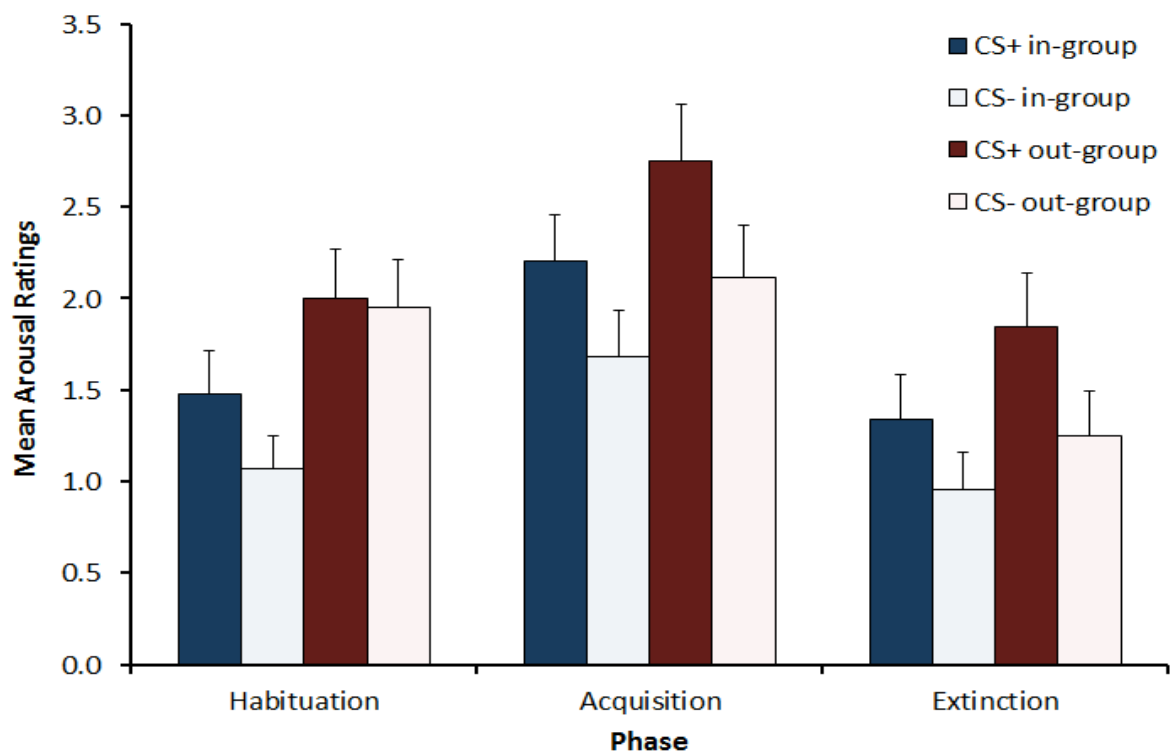


Figure 2: Mean self-report arousal ratings for in-group and out-group CSs following each experimental phase. Error bars depict the standard error of the mean.

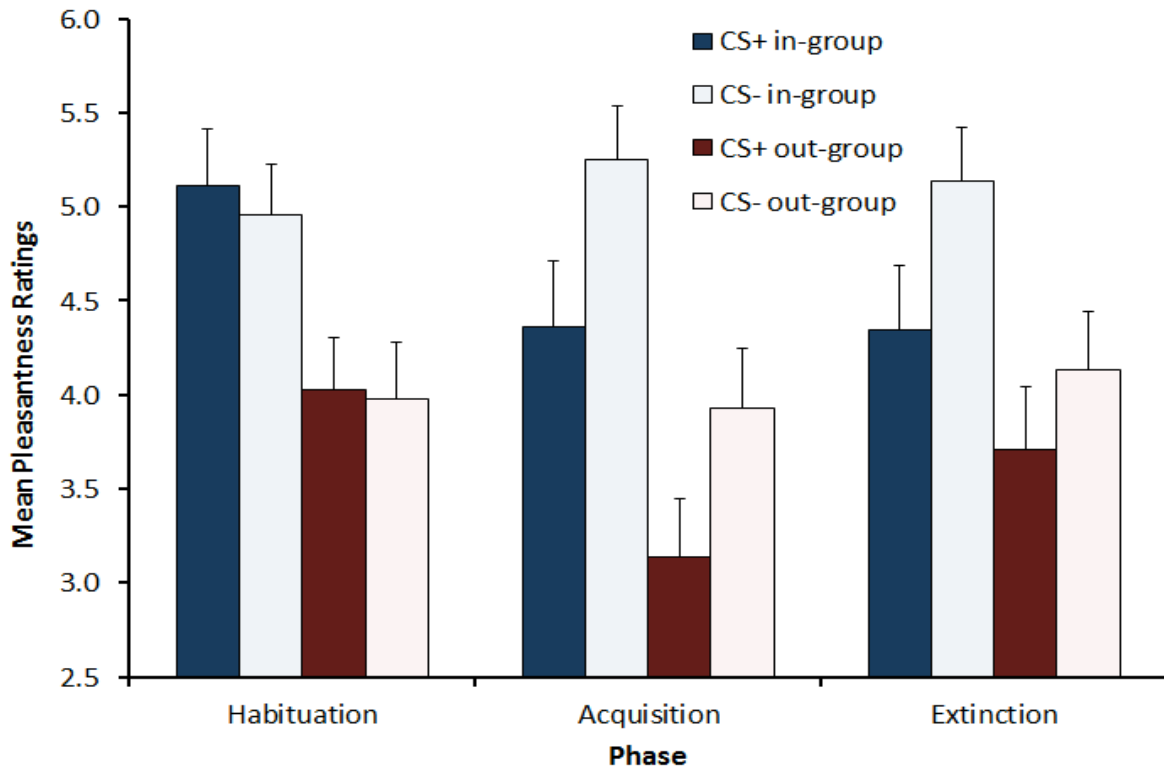


Figure 3: Mean self-report pleasantness ratings for in-group and out-group CSs following each experimental phase. Error bars depict the standard error of the mean.

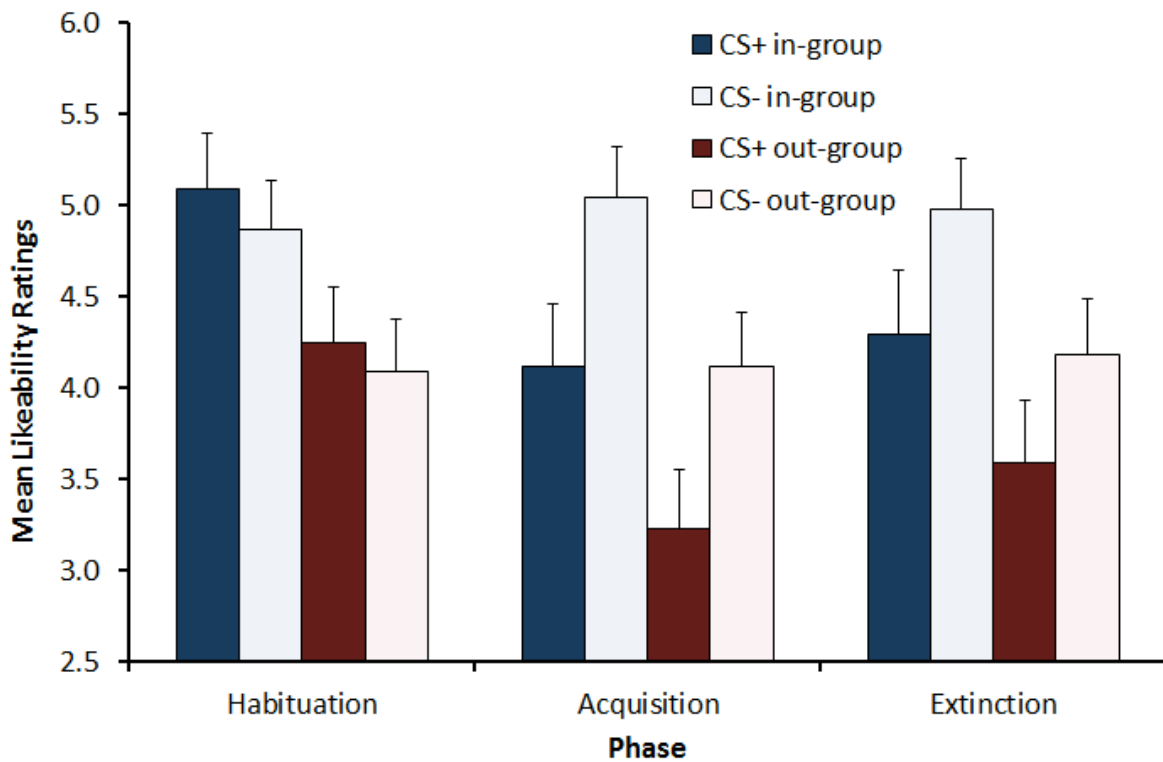


Figure 4: Mean self-report likability ratings for in-group and out-group CSs following each experimental phase. Error bars depict the standard error of the mean.



### *Skin Conductance Response Amplitude*

A square root transformation was applied to normalise the distributions of skin conductance response amplitude prior to further analysis. Preliminary analyses were conducted by including the trial blocks factor. A  $2 \times 2 \times 4$  (CS  $\times$  Ethnicity  $\times$  Block) ANOVA for acquisition and a  $2 \times 2 \times 4$  (CS  $\times$  Ethnicity  $\times$  Block) ANOVA for extinction indicated that trial block did not interact with either the CS or Ethnicity factors. As a result, responses were averaged across block prior to statistical analyses with separate  $2 \times 2 \times 4$  (CS  $\times$  Ethnicity) ANOVAs for each phase.

The mean SCR during habituation, acquisition and extinction phases are shown in Figure 5. As can be seen, there appeared to be a larger response to out-group CSs than in-group CSs during habituation. However, the ANOVA did not support this interpretation with all main effects and interactions failing to reach significance, all  $F_s < 1.19$ ,  $p > .05$ . However, analyses for the acquisition phase resulted in a CS  $\times$  Ethnicity interaction,  $F(1, 43) = 4.29$ ,  $p = .044$ ,  $\eta_p^2 = .09$ . As shown in Figures 5, the interaction reflected that the larger SCRs during the CS+ than the CS- that is indicative of fear conditioning was found for the out-group CSs but not for the in-group CSs. Finally, analyses for the extinction phase resulted in no significant main effects or interactions, all  $F_s < 2.91$ ,  $p > .01$ .

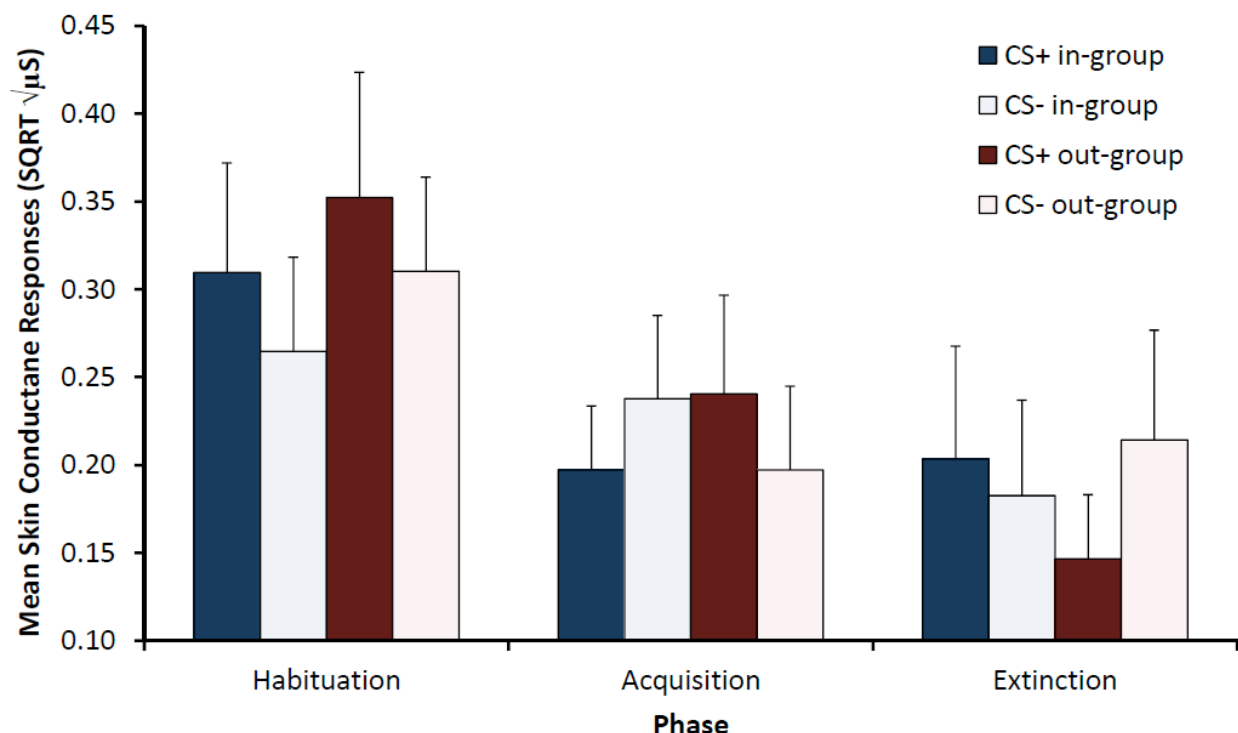


Figure 5: Mean skin conductance response amplitude for in-group and out-group CSs following each experimental phase. Error bars depict the standard error of the mean.

## Discussion

The results showed differences between the self-report ratings and skin conductance responses. The self-report ratings of fear, pleasantness, arousal, and likeability differed between in-group CS faces and out-group CS faces during habituation, acquisition, and extinction phases. In each case, out-group faces were rated more negatively. No overall difference between in-group and out-group CS faces was observed for skin conductance responses. Fear learning was observed for subjective ratings in that ratings were more negative for CS+ faces than CS- faces regardless of ethnicity. This effect emerged following acquisition and persisted following extinction. In contrast, larger skin conductance responses for the CS+ than CS- were found only for out-group faces and only during acquisition. The results demonstrate a bias in the initial evaluation and subsequent fear learning for out-group members in comparison to in-group members.

Similar to past studies (Bramwell et al., 2014; Navarrete et al., 2009; 2012; Olsson et al., 2005), the present experiment included an initial habituation phase. The overall more negative evaluation of out-group faces than in-group faces following habituation differs from the ratings obtained prior to habituation by Bramwell et al. (2014). In their study, White Australian participants rated out-group Black happy faces as more pleasant than in-group White happy faces. The opposite results may reflect that participants in Bramwell et al. (2014) over-corrected their subjective bias when making the ratings (see Hewstone, Rubin, & Willis, 2002). Other reasons may reflect differences in the nature of the faces used (e.g., Middle Eastern ethnicity, neutral expression, and computer-generated faces in the present experiment).

A covariation bias has been observed with fear-relevant stimuli, such as pictures of snakes and spiders. The covariation bias is observed as a tendency for participants to be more likely to associate fear-relevant stimuli with an aversive outcome than fear-irrelevant stimuli (Mineka & Ohman, 2002). This bias is present even before acquisition. Although we did not measure electrocutaneous stimulus expectancy directly, out-group CSs were rated as more fearful than in-group faces. The fear ratings are consistent with the notion of a pre-existing fear bias for out-group members. Future research should measure shock expectancy more directly, such as by using a dial-and-pointer (Neumann & Longbottom, 2008) or speeded key press (Bandarian-Balooch, Neumann, & Boschen, 2012) to examine the covariation bias.

Despite the pre-existing bias being present in subjective ratings, there was no differential in-group/out-group fear learning effects in these measures. Similar to Bramwell et al. (2014), we found that the CS+ was rated as less pleasant than the CS- following extinction for both ethnic groups. Our findings extend this by showing that the difference between the CS+ and CS- was also present following acquisition. In addition, this resistance to extinction extended to ratings of self-reported fear, arousal, and likability. The lack of extinction to out-group CSs is consistent with the resistance to extinction observed in past research with skin conductance responses (Olsson et al., 2005; Navarrete et al., 2009; Olsson et al., 2005; Mallan et al., 2009) and startle blink responses (Mallan et al., 2009). However, the fact that the resistance to extinction was also observed for in-group CSs is not consistent with this past research.

The resistance to extinction of subjective ratings is, however, consistent with the notion of evaluative conditioning. Evaluative conditioning is defined as a change in the perceived valence of a stimulus following a procedure in which the stimulus has been paired with a second stimulus that is itself either positive or negative in valence (Hofmann, De Houwer, Perugini, Baeyens, & Crombez, 2010). The resistance of extinction has traditionally been regarded as a defining characteristic of evaluative conditioning, although more recent meta-analyses show that it can be sensitive to extinction trials of the CS on its own (Hoffman et al., 2010). Extinction of evaluative responses may be more readily observed with a particularly large number of extinction trials. The use of 12 extinction trials in the present experiment may have been inadequate to observe an extinction effect. Further research is required to determine whether extending the extinction phase will result in the complete extinction of subjective ratings as only then could the hypothesis about the slower extinction for out-group CSs be tested.

In the context of evaluative conditioning, skin conductance responses are regarded as a measure of predictive learning (Hofmann et al., 2010). It was only in skin conductance responses where differential learning effects were observed as a function of CS ethnicity. The strength of the conditioning effect for the out-group faces was modest. The difference between the CS+ and CS- for the out-group faces was  $d = 0.23$ , which represents a small effect. Other studies from our laboratory have observed effect sizes of  $d = 0.79$  for neutral CSs (Neumann, Waters, & Westbury, 2008) and  $d = 0.67$  for fear-relevant and fear-irrelevant CSs (Neumann & Longbottom, 2008).

The reason for the relatively weak conditioning effects is not clear. The use of four different CSs might have increased the complexity of the learning task. However, Olsson et al. (2005) also used four CSs and observed conditioning effects. The use of computer generated faces might have made it more difficult to discriminate between the CSs. However, differences between the CS+ and CS- were observed in the self-report ratings. The number of acquisition trials (8 trials for each CS) also appears to be sufficient to observe fear conditioning in skin conductance (e.g., Neumann & Longbottom, 2008). Nevertheless, the results showed that participants were better able to learn the predictive association between an aversive stimulus and out-group member than for an in-group member.

## **Conclusion**

The present experiment demonstrated differences between self-report ratings and skin conductance responses during a fear learning and extinction task with CSs of different ethnicity. The subjective ratings reflected the evaluative valence of the CSs and were resistant to extinction. Moreover, the effect of CS ethnicity was additive, not interactive with the associative learning effects with this measure. Only the predictive learning-based measure of skin conductance showed an interaction between CS ethnicity and learning. The present findings are preliminary and in need of replication. Moreover, future research should manipulate the ethnicity of the participants to achieve a fully crossed design between participant ethnicity and CS ethnicity. It is through future research that we may be better able to understand how fear learning processes might underlie racial prejudices and how exposure might be used to reduce these prejudices through a reduction in anxiety.

## References

- Allport, G. W. (1954). *The nature of prejudice*. Reading, MA: Addison-Wesley.
- Bandarian Balooch, S., Neumann, D. L., & Boschen, M. J. (2012). Extinction treatment in multiple contexts attenuates ABC renewal in humans. *Behaviour Research & Therapy, 50*, 604-609.
- Boschen, M. J., Parker, I., & Neumann, D. L. (2007). Changes in implicit associations do not occur simultaneously to Pavlovian conditioning of physiological anxiety responses. *Journal of Anxiety Disorders, 21*, 788-803.
- Bramwell, S., Mallan, K., & Lipp, O. (2014). Are two threats worse than one? The effects of face race and emotional expression on fear conditioning. *Psychophysiology, 51*, 152-158. doi: 10.1111/psyp.12155
- Forrest, J., Elias, A., & Paradies, Y. (2016). Perspectives on the geography of intolerance: Racist attitudes and experience of racism in Melbourne, Australia. *Geoforum, 70*, 51-59. doi:10.1016/j.geoforum.2016.02.005
- Gottlieb, D., & Begej, E. (2014). Principles of Pavlovian Conditioning. In F. McSweeney & E. Murphy (Eds.), *The wiley-blackwell handbook of operant and classical conditioning* (pp. 3-26). Chichester, Sussex, UK: Wiley-Blackwell.
- Hewstone, M., Rubin, M., & Willis, H. (2002). Intergroup bias. *Annual Review of Psychology, 53*, 575-604.
- Hofmann, W., De Houwer, J., Perugini, M., Baeyens, F., & Crombez, G. (2010). Evaluative conditioning in humans: A meta-analysis. *Psychological Bulletin, 136*, 390-421.
- Jonason, P. K. (2015). How “dark” personality traits and perceptions come together to predict racism in Australia. *Personality and Individual Differences, 72*, 47-51. doi:10.1016/j.paid.2014.08.030
- Lipp, O.V., Neumann, D.L., & Mason, V. (2001). Stimulus competition in affective and relational learning. *Learning and Motivation, 32*, 306-331.
- Mallan, K., Sax, J., & Lipp, O. (2009). Verbal instruction abolishes fear conditioned to racial out-group faces. *Journal of Experimental Social Psychology, 45*, 1303-1307. doi: 10.1016/j.jesp.2009.08.001
- Navarrete, C., McDonald, M., Asher, B., Kerr, N., Yokota, K., Olsson, A., Sidanius, J. (2012). Fear is readily associated with an out-group face in a minimal group context. *Evolution and Human Behavior, 33*, 590-593. doi: 10.1016/j.evolhumbehav.2012.02.007
- Navarrete, C., Olsson, A., Ho, A., Mendes, W. B., Thomsen, L., & Sidanius, J. (2009). Fear extinction to an out-group face. *Psychological Science, 20*, 155-158. doi: 10.1111/j.1467-9280.2009.02273.x

Neumann, D. L., & Longbottom, P. L. (2008). The renewal of extinguished conditioned fear with fear-relevant and fear-irrelevant stimuli by a context change after extinction. *Behaviour Research and Therapy*, *46*, 188-206.

Neumann, D. L., Boyle, G. J., Chan, R. C. K. (2013). Empathy towards individuals of the same and different ethnicity when depicted in negative and positive contexts. *Personality and Individual Differences*, *55*, 8-13.

Neumann, D. L., Waters, A. M., & Westbury, H. R. (2008). The use of an unpleasant sound as the unconditional stimulus in aversive Pavlovian conditioning experiments that involve children and adolescent participants. *Behavior Research Methods*, *40*, 622-625.

Neumann, D. L., Waters, A. M., Westbury, H. R., & Henry, J. (2008). The use of an unpleasant sound unconditional stimulus in an aversive conditioning procedure with 8 to 11 year old children. *Biological Psychology*, *79*, 337-342.

Olson, A., Ebert, J., Banaji, M., & Phelps, E. (2005). The role of social groups in the persistence of learned fear. *Science*, *309*, 785-787.

Paolini, S., Harris, N. C., Griffin, A. S. (2015). Learning anxiety in interactions with the outgroup: Towards a learning model of anxiety and stress in intergroup contact. *Group Processes & Intergroup Relations*, *19*, 275– 313. doi: 10.1177/1368430215572265

Pettigrew, T. F., & Tropp, L. R. (2006). A meta-analytic test of intergroup contact theory. *Journal of Personality and Social Psychology*, *90*, 751-783.

**Contact email:** d.neumann@griffith.edu.au. This research was supported under Australian Research Council's Discovery Projects funding scheme (project number DP150102210).