



Sad but not Fearful Facial Expressions Restore Recognition of Other-Race Faces in Infants Following Perceptual Narrowing

Alexa Beichert, Krista Johnson, Stephanie Mayerson, Christina Reid, Rachel Reynolds, Cleo Zografos, & Paul C. Quinn
University of Delaware



ABSTRACT

A recent investigation reported that perceptual narrowing for face race in infants could be disrupted with faces that depict angry or happy facial expressions (Quinn, Lee, Pascalis, & Xiao, in press). Given that angry faces pose threat and happy faces invite affiliation, the findings were interpreted as evidence that the expressions motivated infants to encode face identity. The current study was undertaken to explore this interpretation by examining whether sad or fearful expressions could disrupt perceptual narrowing for face race. The participants were Caucasian 6- and 9-month-olds who have been shown to have difficulty discriminating among neutral Asian faces and between African faces, respectively. The results were that the infants discriminated the other-race faces when depicted with sad but not fearful facial expressions. The findings provide further support that infants are processing the communicative intent of the expressions. Infants may have encoded the identity of the sad faces because those faces display a call for a help. By contrast, fearful facial expressions indicate an external threat, but may not provide motivation for encoding face identity given that the threat is external to the individual posing the expression.

BACKGROUND

Infants can initially discriminate among own-race faces as well as among other-race faces. With increased age accompanied by increased exposure to own-race faces and a lack of exposure to other-race faces, infants maintain the ability to discriminate own-race faces, but have increased difficulty discriminating other-race faces (Kelly et al., 2007). Such narrowing reflects tuning by experience to optimally process frequently encountered face types while tuning out information that differentiates other-race faces.

Given the adaptive advantages of preserving sensitivity to infrequently experienced stimuli (e.g., responding to diverse face types without bias), investigators have become interested in discovering the variables that can disrupt narrowing. Quinn, Lee, Pascalis, and Xiao (in press) reported that adding angry or happy expressions to other-race faces reinstated other-race face recognition following perceptual narrowing. The findings were taken as support for the possibility that the infants processed the communicative intent of the expressions. Because angry faces pose threat and happy faces invite affiliation, expression may create motivation to individuate.

The present study examined the Quinn et al. (in press) hypothesis that infants can be motivated to encode face identity based on facial expression. Specifically, we investigated whether adding sad or fearful emotion to other-race faces would affect perceptual narrowing. Although sadness may have fewer social repercussions relative to emotions such as anger and happiness (Markham & Wang, 1996), it may communicate a call for help (Kret, 2015), and it has been argued that infants are motivated to help others (Paulus, 2014). In addition, fearful facial expressions may engender increased watchfulness or vigilance for threat (Susskind et al., 2008), although one can ask whether they would create motivation to individuate.

METHOD

Apparatus: Infants were tested with a visual preference apparatus (Fagan, 1970).

Participants. Participants were 13 infants, 4 6-month-olds and 9 9-month-olds, all Caucasian.

Stimuli. Stimuli were fearful and sad Asian and African female NimStim faces (Tottenham et al., 2009). Examples are shown in Figure 1.

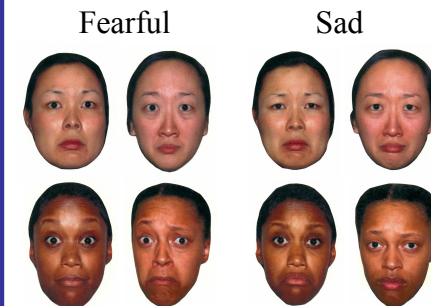


Figure 1. Example other-race face pairs (Asian and African, posing fearful or sad expressions) to be differentiated.

Procedure. Each infant was presented with one other-race face depicting either a sad or fearful facial expression for 2, 15-s familiarization trials, and then tested with the familiar exemplar paired with a novel exemplar with the familiar expression for 2, 10-s test trials. Infants at the two different age groups were presented with the race of faces for which narrowing had already been reported in Quinn et al. (in press): 6-month-olds with Asian faces and 9-month-olds with African faces. The procedure is illustrated schematically in Figure 2. Left-right positioning of the test stimuli was counterbalanced across infants on the first test trial and reversed on the second test trial. The familiarization and test faces were randomly selected for each infant.

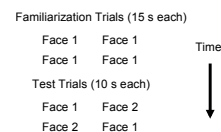


Figure 2. Schematic illustration of the procedure.

RESULTS

Familiarization Trials

Individual looking times were summed over left and right copies of the stimulus presented on each trial. Mean looking times on Trial 1 and on Trial 2 for the two emotional expressions are shown in Table 1. An analysis of variance (ANOVA), Emotion (Fearful vs. Sad) x Trials (1 vs. 2), performed on the individual scores did not reveal a significant Trials effect, $F(1, 13) = 1.74, p > .20$. The effect of emotion and the interaction between emotion and trials were also not significant, $p > .65$, in both cases. The null effect of trials may reflect a small sample size, the small number of familiarization trials, the general interest in face stimuli on the part of infants, or some combination of these factors. Importantly, the lack of evidence for habituation did not preclude encoding of face identity (at least in the group of infants presented with sad faces), given the novelty preference data to be discussed directly below.

Table 1
Mean Fixation Times (s) During the Familiarization Trials 1-2 and Mean Novelty Preference Scores (%) During the Test Trials

Emotion	Familiarization Trial 1		Familiarization Trial 2		Novelty Preference	
	M	(SD)	M	(SD)	M	(SD) r^2
Fearful	6.99	(3.40)	5.01	(2.43)	49.79	(25.43) -0.02
Sad	6.13	(3.03)	5.14	(2.23)	69.91	(10.36) 4.71*

* r^2 vs. chance. * $p < .01$.

Preference Test Trials

Each infant's looking time to the novel stimulus was divided by the total looking time to both test stimuli and converted to a percentage score. Mean novelty preference scores are shown in Table 1. Only the mean novelty preference for infants in the sad face condition was above chance (50% preference). In addition, the mean novelty preferences for the sad and fearful face conditions were reliably different, $t(12) = 1.80, p < .05$, one-tailed. The findings indicate that sad, but not fearful expressions can restore recognition of other-race faces in infants. These same faces were shown in past research not to be discriminable by same-aged infants when presented with neutral expressions (Quinn et al., in press).

ACKNOWLEDGEMENTS

We thank the infants and their parents for their participation, and Laurie Yarzab for her assistance.



DISCUSSION

The present experiment revealed that infants can discriminate among faces chosen from within other-race face classes if those faces depict sad, but not fearful facial expressions. The same faces were shown in past research not to be discriminable by same-aged infants when presented with neutral expressions (Quinn et al., in press).

With regard to mechanism, the findings are inconsistent with the idea that sadness was simply more salient than fear, given that looking time during familiarization did not differ for the two expressions. The findings are consistent with the idea that infants are processing the communicative intent of the expressions. Sad facial expressions pose a call for help and an infant with prosocial tendencies would therefore be motivated to encode the identity of faces posing such expressions. By contrast, a fearful facial expression communicates threat external to the person posing the expression, and hence would not be expected to motivate encoding of face identity.

Additional work with the same stimuli and participant age groups, but with inverted faces, would be an important next step. A null result in an inverted sad facial expression condition would further bolster the case that infants are processing the facial expressions as social signals.

REFERENCES

- Fagan, J. F. (1970). Memory in the infant. *J Exp Child Psychol*, 9, 217-226.
- Kelly, D. J., et al. (2007). The other-race effect develops during infancy: Evidence of perceptual narrowing. *Psychol Sci*, 18, 1084-1089.
- Kret, M. E. (2015). Emotional expressions beyond facial muscle actions. A call for studying autonomic signals and their impact on social perception. *Front Psychol*, 6, Article 711.
- Markham, R., & Wang, L. (1996). Recognition of emotion by Chinese and Australian children. *J Cross-Cult Psychol*, 27, 616-643.
- Paulus, M. (2014). The emergence of prosocial behavior: Why do infants and toddlers help, comfort, and share? *Child Dev Perspect*, 8, 77-81.
- Quinn, P. C., et al. (in press). Emotional expressions reinstate recognition of other-race faces in infants following perceptual narrowing. *Dev Psychol*.
- Susskind, J. M., et al. (2008). Expressing fear enhances sensory acquisition. *Nat Neurosci*, 11, 843-850.
- Tottenham, N., et al. (2009). The NimStim set of facial expressions: Judgments from untrained research participants. *Psychiatry Res*, 168, 242-249.