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Development of face scanning for own- and other-race faces in infancy

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Abstract

The present study investigated whether infants visually scan own- and other-race faces differently as well as how these differences in face scanning develop with age. A multi-method approach was used to analyze the eye-tracking data of 6- and 9-month-old Caucasian infants scanning dynamically displayed own- and other-race faces. We found that 6-month-olds showed differential fixation, fixating significantly more on the left eye and mouth of own-race faces, but more on the nose of other-race faces. Infants at 9 months of age fixated more on the eyes of own-race faces, but more on the mouth of other-race faces. A scan path analysis revealed that infants shifted their attention between the eyes of the own-race faces significantly more frequently than for other-race faces. Overall, younger and older infants responded differentially to own- versus other-race faces not only in the absolute amount of time spent fixating specific features, but also on their fixation shifts between features.

Keywords

eye-tracking; face processing; other-race effect

Recent face processing research has documented abundant evidence demonstrating that adults process own-race faces differently than other-race faces. For example, people are better at recognizing faces from their own race than faces from other races, a phenomenon known as the other-race effect (ORE) (for a review and discussion, see Hugenberg, Young, Bernstein, & Sacco, 2010; Meissner & Brigham, 2001). When looking at own- and other-race faces, people from different ethnic backgrounds tend to look at different features of the faces (Blais, Jack, Scheepers, Fiset, & Caldara, 2008; Fu, Hu, Wang, Quinn, & Lee, 2012). It has been suggested that extensive experience with own-race faces and a relative lack of experience with other-race faces lead to different processing styles for own- and other-race faces (e.g., Tanaka, Kiefer, & Bukach, 2004).

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How children and infants respond to faces of their own race and those of other races has received intensive investigation in recent developmental studies. A better understanding of infants' differential responses to face race information may shed light on the role of visual experience in the development of face processing and the formation of racial prejudice and stereotyping (Bar-Haim, Ziv, Lamy, & Hodes, 2006; Shutts & Kinzler, 2007). Behaviorally, 3-month-old infants exhibit a robust visual preference for own-race faces over other-race faces, whereas newborns lack such preference for own-race faces (Bar-Haim et al., 2006; Kelly et al., 2005, Kelly, Liu, et al., 2007). Kelly and colleagues (Kelly, Quinn, et al., 2007) further investigated whether the difference in the ability to recognize own- versus other-race faces begins in infancy. They found that 3-month-olds are able to discriminate both own- and other-race faces. However, as infants grow older and the difference between own- and other-race experience increases, they become less capable of discriminating between other-race faces. By 9 months of age, infants consistently fail to discriminate and recognize other-race faces, whereas their ability to recognize own-race faces is maintained, if not improved (Anzures, Quinn, Pascalis, Slater, & Lee, 2010). Anzures and colleagues (2010) also examined infants' category formation for own- and other-race faces between 6 and 9 months of age. Findings showed that 9-month-olds are able to categorize both own- and other-race faces according to their race category, whereas 6-month-olds can only do so partially. The findings from these existing studies concerning the development of face preference, recognition, and categorization in infants underscore the importance of early experience with own- versus other-race faces in contributing to the development of the ORE.

Whereas these previous studies provided valuable insights regarding the development of the ORE, it is relatively unknown how infants visually scan own- and other-race faces. Presumably, due to differential exposure to own- and other-race faces, infants should scan own- and other-race faces differently, and the differential scanning patterns should play a role in infants' visual preference, recognition, and categorization of own- and other-race faces. To date, and to our knowledge, only two published studies have investigated this issue with infants. Liu et al. (2011) reported that when viewing dynamic own- and other-race faces, Chinese infants' fixation time on the nose of own-race faces was maintained from 4 to 9 months, whereas their fixation time on the nose of other-race Caucasian faces decreased significantly in this same age range. In addition, Wheeler et al. (2011) reported that with increased age, between 6 and 10 months, Caucasian infants increasingly fixated more on the eyes of own-race faces, and decreasingly attended to the mouths of own-race faces, but the amount of time spent fixating these areas of the other-race faces did not change. Taken together, these results reveal that infants indeed scan own- and other-race faces differently. Also, infants brought up in different cultural environments may have different scanning patterns for own- and other-race faces, echoing recent cross-cultural findings with adults (Blais et al., 2008; Fu et al., 2012).

The present study aimed to better understand how and why differential scanning patterns for own- and other-race faces develop in infants, using more advanced methods of analyses. We used two new data analytic approaches to reanalyze the data collected by Wheeler et al. (2011), who used the traditional Area of Interest (AOI) approach. Although the AOI approach has the advantage of being easy to use and provides a default mode of analysis for most eye-trackers, it tends to group fixations on a large area of the face together as if they are the same (e.g., fixations on the pupil, sclera, and eyelid being indiscriminately lumped together as fixations on the eyes). This approach thus fails to reveal potentially important differences in fixations on different parts within an AOI. Also, the fact that researchers define AOIs differently makes results between studies not directly comparable. Furthermore, important fixation effects may sometimes occur at the borders of multiple AOIs, resulting in obscuring the effects. Here, we took a pixel level data-driven approach that overcomes these methodological shortcomings of the AOI approach. More specifically, we used the *i*Map Matlab toolbox developed by Caldara and Miellet (2011) to provide pixel level statistical maps about the fixation distribution differences between own- and other-race face scanning in each age group. This data-driven approach allows for direct comparisons of the differential scanning patterns between own- and other-race faces across age, and enables us to go beyond the AOI approach used in Wheeler et al. (2011). By doing so, we aimed to reveal more subtle differences in the scanning patterns of own- and other-race faces outside of what has been shown by the traditional AOI approach.

We also used another novel approach, the scan path analysis, that has yet to be widely used to analyze infants' scanning of faces, and was not a method employed by Wheeler et al. (2011). The scan path analysis capitalizes on the rich saccade data that are concurrently collected with the fixation data in an eye tracking experiment, but often left unanalyzed. This analysis assesses specific fixation shifts between major internal face features, such as visual shifting between the eyes, between the eyes and the mouth, or between the eyes and the nose. Specifically, we examined and compared how younger and older Caucasian infants shift their attention within own- versus other-race faces. Maurer and Salapatek (1976) examined the number of times that 1- and 2-month-olds shifted from one feature to another. It appears that 2-month-olds were more likely to change their region of fixation inside the face than 1-month-olds. Presumably, the more infants shift between major face features, the more likely they are to attend to spatial relations among the internal features, which may play a role in developing their face recognition ability. Based on previous findings on own-race processing bias (Kelly et al., 2005; Kelly, Quinn, et al., 2007), we hypothesized that Caucasian infants would shift fixations more between internal features for own-race faces relative to other-race faces.

Method

Participants

The final sample was comprised of 17 6-month-olds (*M* = 169 days; range: 131–210 days) and 22 9-month-olds (*M* = 279 days; range: 238–324 days). All were healthy, full-term infants of Caucasian descent. They were recruited through mailers sent to parents in the community. All parents indicated that the infants had no regular exposure to African faces. An additional 17 infants were excluded due to failure to complete the calibration procedure (*n* = 8) or because parents were non-Caucasian or of mixed race (*n* = 9).

Materials

The stimuli consisted of six videos of female adult faces (three Caucasian and three African). Female faces were chosen because previous studies have shown that infants tend to be more receptive to female than to male faces due to the fact that most primary caregivers are female (Quinn, Yahr, Kuhn, Slater, & Pascalis, 2002). Each video featured an adult female looking directly into the camera with a neutral expression while counting upwards for 30 seconds, although the video recordings were presented as silent. Dynamic videos, as opposed to photo images, were shown because infants are more attentive to dynamic video images. The resolution of the video was 640×480 pixels.

Procedure

Parents were first informed of the purpose of the study and gave written consent for their child to participate. Infants were secured in a car seat that was placed in a three-quarter, semi-reclining position beneath a 21-inch monitor with an integrated Tobii 2150 eye tracker. The eye-tracking screen was positioned at an angle parallel to the incline of the infant with a viewing distance of 60 cm. An experimenter sat behind the infant to adjust the position of the car seat during the calibration procedure. If the infant was inattentive for more than 3 seconds during the experimental session, the experimenter would redirect the infant's gaze onto the screen.

Infants were first shown a cartoon character to attract their attention onto the screen display before calibration began. Infants then saw another cartoon character sequentially pop up at five locations across the screen: the four corners and the center. If insufficient data were collected during the initial calibration, then the same calibration procedure was repeated until successful, or for up to four failed attempts. After calibration, each infant saw one own-race face and one other-race face. The particular face exemplar from each race was chosen randomly and the order of the two videos was counterbalanced across infants. Each video clip lasted for 30 seconds.

Data analysis

The eye-tracking data were collected by Tobii ClearView. We used two analytic approaches to examine the fixation data. The first analysis was a data-driven approach using *i*Map Matlab toolbox (Caldara & Miellet, 2011), which generated a pixel level statistical fixation map for each age group when viewing own- and other-race faces. Unlike the AOI approach, that clusters all fixation points that fall into a predetermined area of interest, *i*Map allows for statistical testing and comparison of fixations on any part of a stimulus without the restriction of the AOIs. The statistical maps of fixations were computed by summing the fixation location coordinates (x, y) across time and smoothing the resulting fixation distribution with a Gaussian kernel. Then, the fixation maps for all the participants belonging to the same age group were pooled together and separated by face-race. Next, the group fixation maps were$Z$-scored. Finally, a statistical Random Field Theory (RFT) approach was applied to assess significant fixation spots.

The second analytic procedure was a scan path analysis which examined how frequently infants shifted their fixation between particular facial features. Fixations were defined as looking at a spot with a minimum radius of 30 pixels for at least 100 milliseconds as in Wheeler et al. (2011). To categorize infants' fixation shifts, five AOIs were created, comprising the left eye, the right eye, the nose, the mouth, and the remaining area of the face (that is, the area within the face contour without the hair). The number of times participants shifted from one AOI area to another was recorded. These paths included any shifts between the eyes, the eyes and the nose, the eyes and the mouth, and the nose and the mouth. Patterns of fixation shifts between own- and other-race faces were compared to examine any potential similarities or differences during infants' scanning of the faces.

Results

Preliminary analyses revealed no significant effect of infants' gender or order of conditions on fixation patterns. Therefore, data for these two factors were combined for all subsequent analyses.

Raw fixation distribution map

Table 1 shows the descriptive results of number of fixations and the total looking time on own- and other-race faces. Infants' fixation data on Caucasian and African faces were analyzed using the *i*Map toolbox (Caldara & Miellet, 2011). The raw fixation-distribution maps generated for own- and other-race faces in younger and older groups are shown in Figure 1. Areas with significantly greater fixation time, based on a Pixel test (Chauvin, Worsely, Schyns, Arguin, & Gosselin, 2005), are denoted by warmer colors ($p < .05$, corrected). Specifically, the *i*Map analysis also tested the differential scanning patterns between own- and other-race faces in the two age groups. In the third column of Figure 1, warmer colors (i.e., red) denoted significantly more fixations on own- than other- race faces, while cooler colors (i.e., blue) denoted significantly more fixations on other- than own-race faces. Values around 0 (or background color) indicate that fixations between own- and other-race faces were of similar magnitude.

The fixation map of 6-month-olds scanning own-race faces showed that they focused on the left eye and mouth area, while 9-month-olds fixated more on both eyes of own-race faces. When 6-month-olds scanned other-race faces, they tended to look more at the inner corner of the left eye, the area below the right eye, nose bridge, and mouth, while 9-month-olds focused more on the left eye, nasion (area between the eyes), and mouth of other-race faces.

When infant fixation maps were contrasted between own- and other-race faces (the third column in Figure 1), 6-month-olds fixated on the area below the left eye and mouth of own-race faces significantly more than those of other-race faces. In contrast, 6- month-olds fixated more on the inner corner of the left eye, nose tip, and the area below the right eye of other-race faces than those of own-race faces. The difference map for 9-month-olds showed that older infants fixated significantly more on the eyes of own-race faces than those of other-race faces. Significantly greater fixation on the mouth was found when viewing other-race faces than own-race faces.

Analysis of scan paths between AOIs

We analyzed four fixation paths: between eyes, eyes–nose, eyes–mouth, and nose–mouth. Mean frequencies for each path type are shown in Table 2. Given the structure of the observed data, we used a generalized linear model approach to test our research questions. Because the frequency distribution for each type of scan path was not normalized, a Poisson regression model was used. To examine the effects of face race (own vs. other) and age (6 months vs. 9 months) on all types of scan paths, four generalized linear models were tested with face race and age as predictors and the count for each defined fixation path as the dependent variable. All analyses were performed using SPSS Statistics 20.

The results revealed a significant effect of face race for scan paths between the eyes, $\chi^2(1) = 4.92$, $p = .027$. Regardless of age, infants made significantly more frequent scans between the eyes of own-race faces than other-race faces. For the scan paths between eyes and nose, we found a significant interaction between face race and age, $\chi^2(1) = 7.30$, $p < .01$. With increased age, infants scanned more frequently between eyes and nose for own-race faces, but less frequently for other-race faces. For the scan path between eyes and mouth, the main effect of face race was significant, $\chi^2(1) = 7.06$, $p < .01$. In contrast with the scan paths between the eyes, the scan paths between eyes and mouth were more frequent when scanning other-race than own-race faces. For the scan path between nose and mouth, we found a significant main effect of age, $\chi^2(1) = 27.31$, $p < .001$ and a reliable interaction between face race and age, $\chi^2(1) = 9.74$, $p < .01$. With increased age, infants decreased their fixation shifts between nose and mouth more for own-race faces than for other-race faces. As shown in Figure 2, infants overall had an advantage in upper-region scanning of own-race faces, whereas scan paths projected more toward the lower-region of other-race faces.

Discussion

The present study reanalyzed the eye-tracking data of Wheeler et al. (2011) and investigated more specific scanning behaviors with two different approaches, *i*Map and scan path analyses. Specifically, the present study addressed how and when the differential fixation patterns between own- versus other-race faces develop. The current study also sought to address how infants' visual fixations shift between facial features and how these shift patterns vary by face race and age.

Our *i*Map results confirmed Wheeler et al.'s (2011) finding that with increased age, Caucasian infants increased their fixation on the eyes of own-race faces, but tended to fixate less on the mouth of own-race faces. Also consistent with Wheeler et al. (2011), infants' visual attention towards the nose of other-race faces remained unchanged with age. However, the *i*Map analyses revealed additional and more subtle findings. Regarding the fixation distribution for own-race faces, 6-month-olds spent more time looking at the left eye and mouth. Comparatively, 9-month-olds fixated significantly more on both eyes of own-race faces and their attention to the mouth shrank to a smaller spot. Infants' attention to the mouth is partly consistent with the finding by Lewkowicz and Hansen-Tift (2012) that infants at 6 month of age showed increasing looking at the mouth. Differently, 9-month-olds in our study decreased their looking at the mouth of own-race faces. This is likely because our videos were presented silently. Without audio input, 9-month-olds might find dynamic movement of the mouth no longer an important source of information and consequently distribute less attention to that.

When contrasting the scanning of own- versus other-race faces, we found that Caucasian 6- and 9-month-olds showed different fixation distributions for own-race Caucasian faces and other-race African faces. When scanning Caucasian faces, 6-month-olds fixated more on the mouth and left eye area, whereas they spent more time viewing the right eye and nose of the African faces. The differential looking patterns were even more pronounced in 9-month-olds. These infants fixated more on the eyes of own-race faces, but spent more time looking at the mouth of other-race faces. This greater fixation on the eyes of own- versus other-race faces may stem from infants' experience in their dynamic interactions with own-race caregivers. It has been well established that in Western cultures, Caucasian infants as young as 3 months of age actively seek eye contact to socially engage with another own-race individual (Hains & Muir, 1996). Infants might generalize such tendencies from dynamic interactions to the current experimental setting where the salient talking adult appeared to be interacting with them.

The analysis of scan paths provided insight into the differences in face processing based on race categories. Our results showed that 6-month-olds shifted attention more frequently between the eyes and between the nose and mouth of own-race faces, but more between the eyes and nose, and the eyes and mouth of other-race faces. In contrast, 9-month-olds shifted their fixations more frequently between the eyes and the eyes and nose when scanning own-race faces. However, the scan paths between eyes and mouth, and nose and mouth were more frequent for other-race faces than own-race faces. These findings suggest that infants might focus on different second-order relations when processing own- versus other-race faces (Maurer, LeGrand, & Mondloch, 2002). The greater sensitivity to relations between the eyes may result in better extraction of the information necessary to recognize and identify individual faces (see Lee, Anzures, Quinn, Pascalis, & Slater, 2011). Reduced fixation shifts between the eyes when viewing other-race faces might thus lead to poorer individuation and hence the behavioral ORE, a possibility that needs to be verified with specifically-designed studies in the future.

The results of the *i*Map analysis showing that older infants fixate more on the eyes of own-race faces, and the findings from the scan path analysis showing that infants are more likely to scan between the eyes of own-race faces, are consistent with the upper region bias that has previously been reported to be a critical factor in infants' preference for faces (Simion, Valenza, Cassia, Turati, & Umilta, 2002). In addition, the emphasis on the eyes of own-race faces is in accord with previous observations that infants are more sensitive to featural changes around the eyes than around the mouth for Caucasian infants looking at Caucasian faces (Quinn & Tanaka, 2009).

In sum, the findings from the *i*Map and scan path analyses provide evidence that infants younger than 1 year of age scanned own- and other-race faces in different ways. The differences exist in terms of not only the absolute amount of time spent on the specific regions of the faces, but also on their fixation shifts between features in the faces. Caucasian 9-month-olds focused more on the eyes of own-race faces, but more on the mouth of other-race faces. Furthermore, infants shifted fixations between the eyes more frequently when viewing own-race faces than when viewing other-race faces. Future research should continue to cultivate a more comprehensive understanding of the impact of these differential strategies on infants' recognition and memory for faces. Additional empirical work is also

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needed to address the question of how experience shapes an individual's visual attention patterns towards particular faces.

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References

Anzures G, Quinn PC, Pascalis O, Slater AM, Lee K. Categorization, categorical perception, and asymmetry in infants' representation of face race. Developmental Science. 2010; 13:553–564. [PubMed: 20590720]

Bar-Haim Y, Ziv T, Lamy D, Hodes RM. Nature and nurture in own-race processing. Psychological Science. 2006; 17:159–163. [PubMed: 16466424]

Blais C, Jack RE, Scheepers C, Fiset D, Caldara R. Culture shapes how we look at faces. PLoS ONE. 2008; 3:e3022. doi: 10.1371/journal.pone.0003022. [PubMed: 18714387]

Caldara R, Miellet S. *i*Map: A novel method for statistical fixation mapping of eye movement data. Behavior Research Methods. 2011; 43:864–878. [PubMed: 21512875]

Chauvin A, Worsely KJ, Schyns PG, Arguin M, Gosselin F. Accurate statistical tests for smooth classification images. Journal of Vision. 2005; 5:659–667. [PubMed: 16356076]

Fu G, Hu CS, Wang Q, Quinn PC, Lee K. Adults scan own- and other-race faces differently. PLoS ONE. 2012; 7:e37688. doi: 10.1371/journal.pone.0037688. [PubMed: 22675486]

Hains SMJ, Muir DW. Infant sensitivity to adult eye direction. Child Development. 1996; 67:1940–1951. [PubMed: 9022223]

Hugenberg K, Young S, Bernstein M, Sacco DF. The categorization-individuation model: An integrative account of the cross race recognition deficit. Psychological Review. 2010; 117:1168–1187. [PubMed: 20822290]

Kelly DJ, Liu S, Ge L, Quinn PC, Slater AM, Lee K, Pascalis O. Cross-race preferences for same-race faces extend beyond the African versus Caucasian contrast in 3-month-old infants. Infancy. 2007; 11:87–95. [PubMed: 18974853]

Kelly DJ, Quinn PC, Slater AM, Lee K, Ge L, Pascalis O. The other-race effect develops during infancy: Evidence of perceptual narrowing. Psychological Science. 2007; 18:1084–1089. [PubMed: 18031416]

Kelly DJ, Quinn PC, Slater AM, Lee K, Gibson A, Smith M, Pascalis O. Three-month-olds, but not newborns, prefer own-race faces. Developmental Science. 2005; 8:F31–F36. [PubMed: 16246233]

Lee, K.; Anzures, G.; Quinn, PC.; Pascalis, O.; Slater, A. Development of face processing expertise. In: Calder, AJ.; Rhodes, G.; Johnson, MH.; Haxby, JV., editors. The Oxford handbook of face perception. Oxford University Press; Oxford, UK: 2011. p. 753-778.

Lewkowicz DJ, Hansen-Tift A. Infants deploy selective attention to the mouth of a talking face when learning speech. Proceedings of the National Academy of Sciences. 2012 doi: 10.1073/pnas. 1114783109.

Liu S, Quinn PC, Wheeler A, Xiao N, Ge L, Lee K. Similarity and difference in the processing of same- and other-race faces as revealed by eye-tracking in 4- to 9-month-old infants. Journal of Experimental Child Psychology. 2011; 108:180–189. [PubMed: 20708745]

Meissner CA, Brigham JC. Thirty years of investigating the own-race bias in memory for faces: A meta-analytic review. Psychology, Public Policy, and Law. 2001; 7:3–35.

Maurer D, LeGrand R, Mondloch CJ. The many faces of configural processing. Trends in Cognitive Sciences. 2002; 6:255–260. [PubMed: 12039607]

Maurer D, Salapatek P. Developmental changes in the scanning of faces by young infants. Child Development. 1976; 47:523–527. [PubMed: 1269319]

Quinn PC, Tanaka JW. Infants' processing of featural and configural information in the upper and lower halves of the face. Infancy. 2009; 14:474–487.

Quinn PC, Yahr J, Kuhn A, Slater AM, Pascalis O. Representation of the gender of human faces by infants: A preference for females. Perception. 2002; 31:1109–1121. [PubMed: 12375875]

Shutts K, Kinzler K. An ambiguous-race illusion in children's face memory. Psychological Science. 2007; 18:763–767. [PubMed: 17760769]

Simion F, Valenza E, Cassia VM, Turati C, Umilta C. Newborns' preference for up-down asymmetrical configurations. Developmental Science. 2002; 5:427–434.

Tanaka JW, Kiefer M, Bukach CM. A holistic account of the own-race effect in face recognition: Evidence from a cross-cultural study. Cognition. 2004; 93:1–9. [PubMed: 15110724]

Wheeler A, Anzures G, Quinn PC, Pascalis O, Omrin DS, Lee K. Caucasian infants scan own- and other-race faces differently. PLoS ONE. 2011; 6:e18621. doi:10.1371/journal.pone.0018621. [PubMed: 21533235]

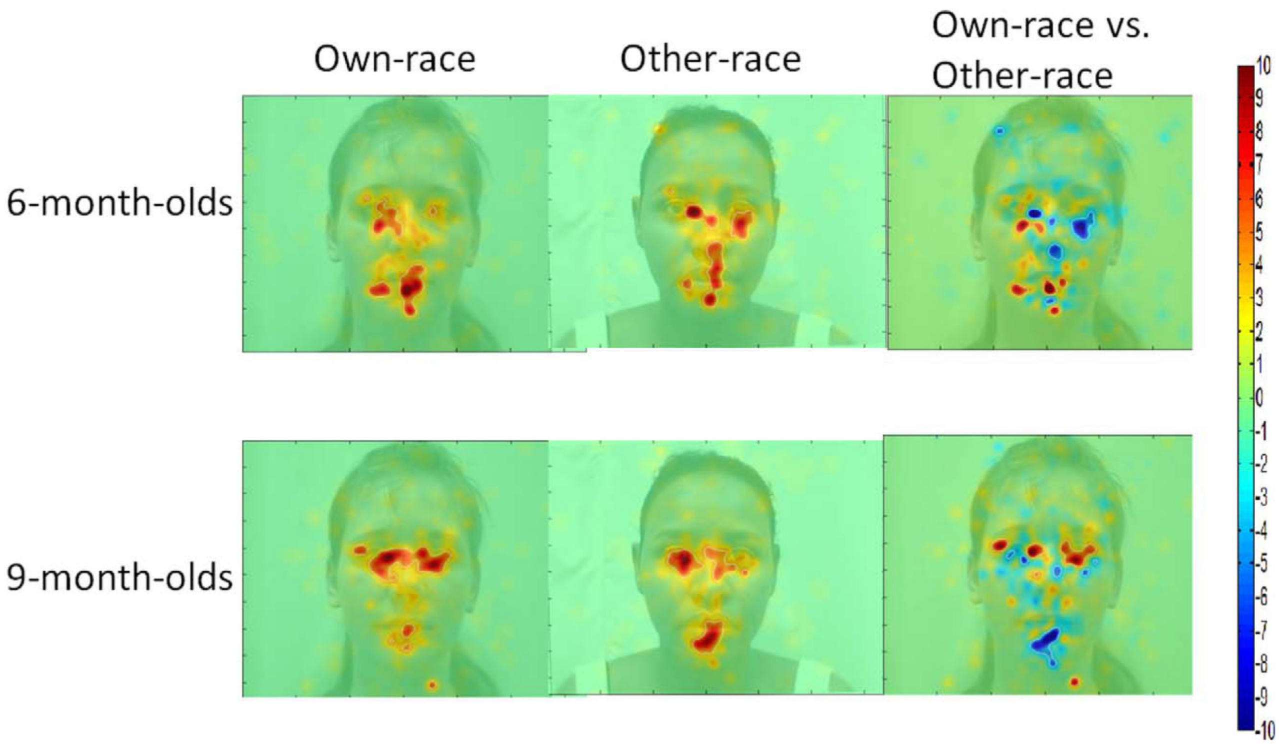

Figure 1.

Raw fixation maps for viewing own-race faces (first column), other-race faces (second column), and the difference between viewing own- versus other-race faces (third column) in 6-month-olds and 9-month-olds. The colors represent Z-scores of the fixation duration, with warmer colors denoting longer fixation duration. In the difference map, warmer colors indicate greater fixation time for own- than other-race faces, while cooler colors indicate greater fixation time for other- than own-race faces ($p < .05$, two-tailed, corrected).

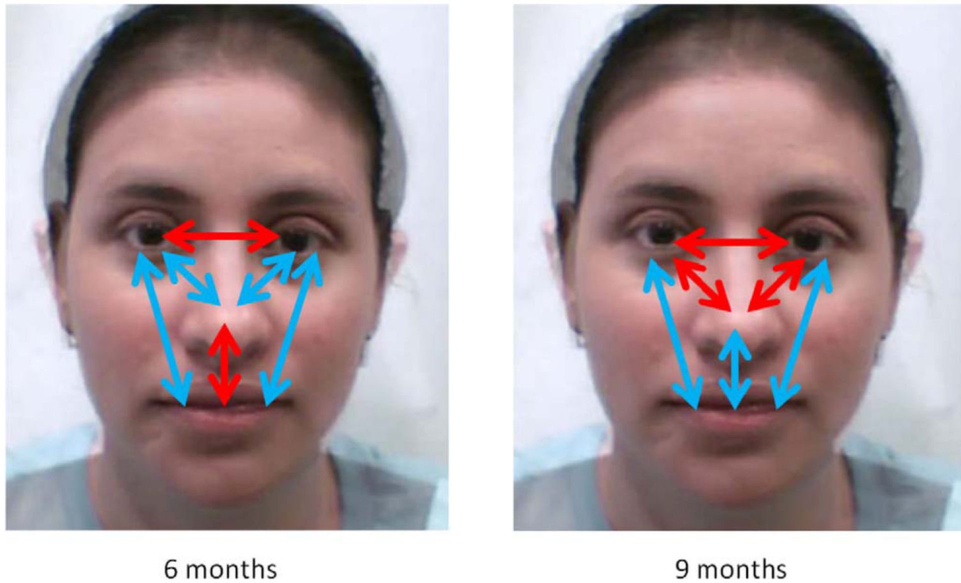

Figure 2.

Mean scan path maps for the difference between own- and other-race faces in 6- and 9-month-olds. The face shown is a morph of one Caucasian and one African face used in the experiment. The red line indicates more scan path counts in own- versus other-race faces. The blue line indicates more scan path counts in other- versus own-race faces.

Table 1

Mean and standard deviation of number of fixations and total duration of fixations (seconds) in the own- and other-race conditions

	Number of fixations		Total duration of fixations	
	Own-race faces	**Other-race faces**	**Own-race faces**	**Other-race faces**
Mean	50.21	45.26	13.49	12.82
SD	36.16	25.52	10.32	8.44

Table 2

Mean frequencies (*SD*) of scan paths between AOIs of own- and other-race faces in 6-month-olds and 9-month-olds

	6 months		9 months	
Category	**Own-race**	**Other-race**	**Own-race**	**Other-race**
Between eyes	1.44 (2.39)	0.73 (2.05)	1.76 (2.83)	1.29 (1.65)
Eyes–nose	1.25 (1.48)	2.47 (2.20)	1.95 (2.01)	1.43 (1.60)
Eyes–mouth	1.38 (2.03)	2.20 (3.21)	1.90 (1.79)	2.95 (3.43)
Nose–mouth	3.06 (3.82)	2.40 (5.84)	0.57 (1.03)	1.57 (1.69)