THE DEVELOPMENT OF FACE PROCESSING IN INFANCY AND EARLY CHILDHOOD: CURRENT PERSPECTIVES

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Chapter 3

INFANTS PREFER ATTRACTIVE FACES

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In the last thirty years, thousands of studies have shown that adults and even children prefer attractive to unattractive faces (Langlois, Kalakanis, Rubenstein, Larson, Hallam, & Smoot, 2000). Most of this research has assumed that standards of beauty and preferences for attractive faces are learned gradually over time due to increasing exposure to cultural ideals of beauty portrayed by the media. Moreover, much of this research has assumed that children do not display preferences for attractive faces or stereotypes based on facial appearance until at least preschool-age. To test whether cultural socialization is the best explanation for how children develop preferences for facial attractiveness, we have pursued a program of research with infants and toddlers to determine when preferences for attractiveness begin, whether preferences approximate attractiveness preferences and stereotypes in older children and adults, and what mechanisms might explain early preferences for attractive faces.

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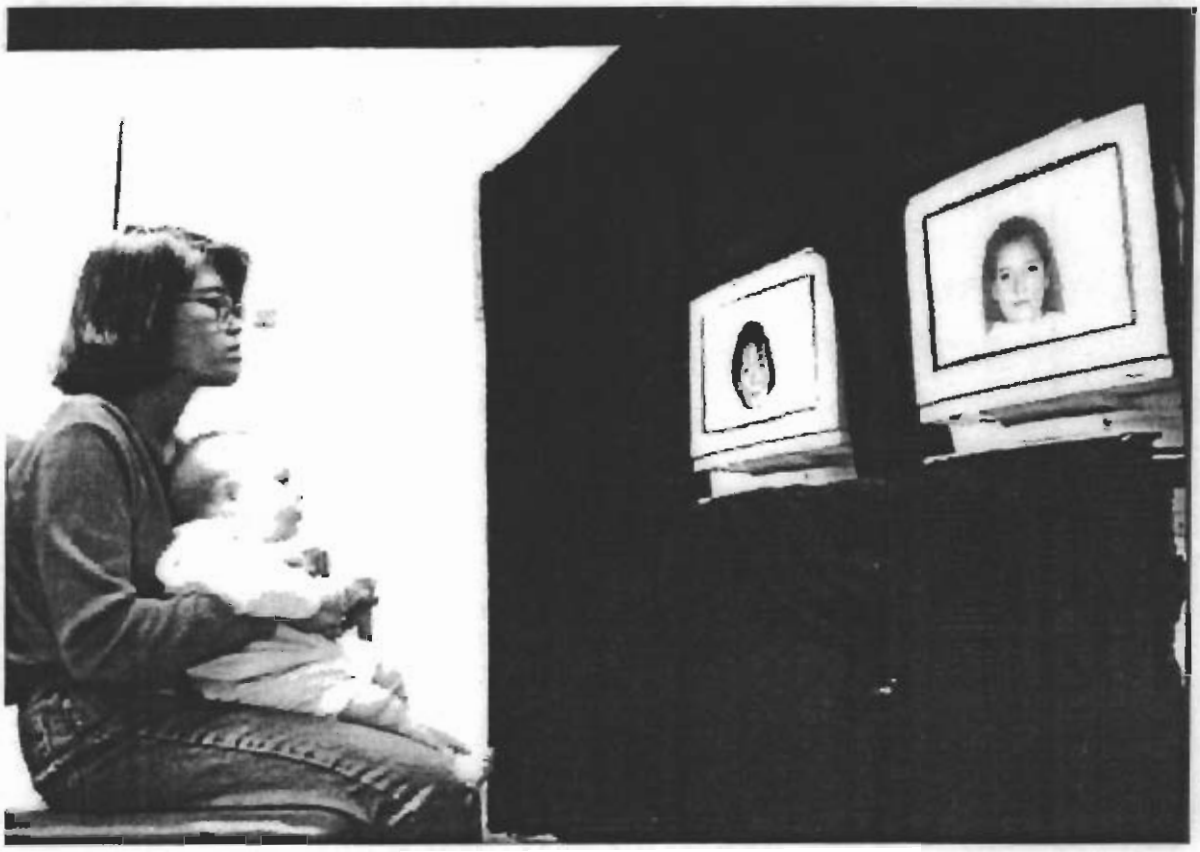
Do Infants Prefer Attractive Faces?

The goal of our first study with infants was to determine if even young infants might have preferences for attractive faces– if they do, then it is highly unlikely that these preferences are learned through gradual socialization. Because infants cannot tell us what they like and don't like, researchers rely on a method called the visual preference or preferential looking technique. In this procedure, researchers show infants two pictures paired side-by-side. If infants look longer at one picture than another, we assume that they "like" or prefer it. This procedure has a long history of use in the infant literature (see Banks & Salapatek, 1983; Fantz, 1958). Thus, using a visual preference technique, we (Langlois et al. 1987) showed 6-month-olds images of female college students who had been rated as either more or less attractive by their peers. In each trial, infants saw a pair of faces, one face more attractive and the other less attractive (the faces were attractive but not drop-dead gorgeous like movie stars, or unattractive but not deformed or grotesque). We also showed the infants pairs of female faces that included either two attractive or two unattractive faces.



To our own amazement, we found that 6-month-olds looked longer at the attractive faces than the unattractive faces. Even more amazing to us, we added a second group of even younger infants (2-3-month-olds) and found similar results. These very young babies also preferred to look longer at attractive faces than unattractive faces. But, what if, you say, there was something different between the more and less attractive faces besides attractiveness? What if the peer-rated attractive women were all blonds, whereas the unattractive women had mousy colored hair? Or, what if the peer-rated attractive women were all smiling but the unattractive women were scowling? Such confounds between rated attractiveness and hair color or facial expression would surely be a problem. However, we took care to make sure that the pairs of faces were matched in hair color, facial expression, length of hair, and all other possible extraneous variables. Indeed, the only difference between the faces within our pairs was rated facial attractiveness.

To be sure of our findings that infants preferred more attractive over less attractive faces, we conducted three more visual preference studies with 6-month-olds (Langlois, Ritter, Roggman, & Vaughn, 1991). This time, we showed the infants pictures of adult Caucasian male faces (rated for attractiveness by other college students), adult African-American female faces (rated for attractiveness by other African-Americans), and other infants' faces (rated for attractiveness by college students). Similar to their preferences for attractive Caucasian female faces, infants preferred to look at attractive Caucasian male faces, attractive African-American female faces, and attractive infant faces in comparison to their less attractive counterparts.

These results taken together suggest that infants already prefer attractive over unattractive faces, regardless of the gender, race, or age of those faces, at an age too young to be

significantly influenced by socialization (we assume that not many young babies read fashion magazines or watch a lot of beauty contests on television!). Moreover, infants prefer diverse types of attractive faces with little exposure to these various types of faces. Thus, knowing that infants have preferences for attractive faces by even 2 months of age, our research question became twofold: First, do these preferences approximate the same preferences that older children and adults express for attractive faces, and, second, why do these preferences exist?

ARE VISUAL PREFERENCES REALLY SOCIAL PREFERENCES?

Even though it is commonly assumed in infant research that selective longer looking by infants reflects a preference for a particular stimulus, we wanted to show conclusively that infant visual preferences for attractive faces are functionally equivalent to older children's and adults' preferences for attractive faces. Much research has shown that adults believe that "beauty is good" or that attractive people possess pleasant attributes such as being friendly or socially outgoing (e.g., Berscheid & Walster, 1974; Langlois et al., 2000). And, children as young as preschool-age prefer attractive children as friends and want to play with them more than with unattractive children (e.g., Dion, 1973). Therefore, to determine whether infants also show social preferences for attractive faces similar to the preferences of adults and older children, we conducted two different kinds of observational studies (Langlois, Roggman, & Rieser-Danner, 1990).

In the first study, we observed 12-month-olds who are capable of engaging in many more social behaviors than 6-month-olds. The 12-month-olds interacted with a female adult stranger. For half the infants, the stranger wore a thin, lifelike latex mask that was designed by a professional theatrical mask-maker to be very attractive. The other half of the infants interacted with the same female stranger but, for these infants, the stranger wore a realistic mask that was unattractive. We gave her a script that she used to interact with the babies; the script ensured that she behaved the same way with the babies regardless of which type of mask she wore (and later, observers rated her behavior from video tapes and confirmed that she behaved identically in the two different attractiveness conditions). In short, we created a laboratory situation in which the only thing different about the "stranger" to the two groups of infants was her facial attractiveness. We recorded how the babies behaved with her, and the results demonstrated clear social preferences: The 12-month-olds liked the facially attractive "stranger" more than the facially unattractive "stranger" as evidenced by more positive affect and more play involvement when the stranger was attractive versus unattractive. Conversely, infants were more resistant and withdrawn when the stranger was unattractive versus attractive.

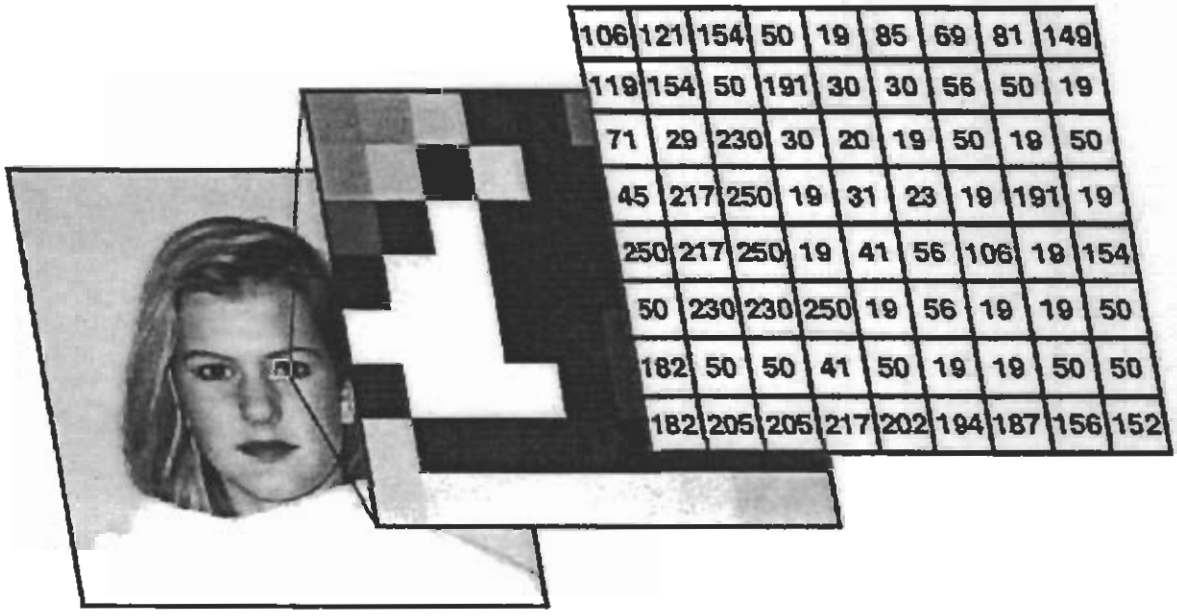
To be sure of our conclusions, we conducted a second study in which we observed 12-month-old infants playing with two dolls that were identical except for their faces. We made faces for the dolls based on faces of real infants who had been rated as either attractive or an unattractive. Once again, we found that infants seem to like attractive faces more than unattractive faces because they played more with the attractive than the unattractive doll. Together, these studies show convincingly that infants' early visual preferences for attractive faces are indeed functionally equivalent to the ubiquitous social preferences for attractive people shown by older children and adults.

What is an Attractive Face and Why Do Infants Prefer Attractive Faces?

What makes a face beautiful? For centuries, scientists and philosophers have debated about what makes a face beautiful. Some have believed that faces whose shapes approximate "phi" or a "golden ratio" are most attractive. Others have posited that attractive faces are those that appear youthful, symmetrical, or even extreme in facial features (e.g., large eyes or full lips in female faces; Cunningham, 1986). The seeds for another explanation of what constitutes facial attractiveness, however, can be found in work by Francis Galton in the late 1800s.

In his research to determine whether certain groups of people (e.g., criminals) had defining facial characteristics, Galton (1878) overlaid images of individual faces to create a single composite image and found that the composite or "averaged" face was more attractive than the faces that comprised it. Darwin's (1859) theory of natural selection provides an explanation for why facial averageness would be attractive: Average values of population features are most likely free from genetic mutation and therefore should be preferred over extreme values. Because we were intrigued by the possibility that attractive faces are preferred because they are average in facial configuration, we decided to empirically test the relationship between facial attractiveness and averageness (Langlois & Roggman, 1990).

We first computer scanned and digitized the images of different individual faces. We then averaged the facial images together by arithmetically averaging matrices of gray values that represented each image. We created 2-, 4-, 8-, 16-, and 32-face composite images of both male and female faces and then had adults rate the facial images for attractiveness on a scale of 1 (very unattractive) to 5 (very attractive). We found that the 16- and 32-face composites were rated as attractive and, indeed, as more attractive than most of the individual faces that comprised them. These results suggest that averageness is attractive.



It is important to be clear about what we mean by average. Averaged faces are not average in attractiveness but average in terms of the mean or central tendency of the facial configuration of the population from which they came. Averaged faces are *above* average in attractiveness; they are above average in terms of how much infants, children, and adults like them; they are above average in terms of how much people evaluate them as being good examples of a face.

Why Do Infants Prefer Attractive Faces?

What mechanisms account for infants' preferences for attractive faces? Given that socialization seems to be an unlikely exclusive cause of preferences for attractiveness, we wanted to study other alternative explanations for these preferences. In line with our evidence that attractive faces are mathematically average in facial configuration, we pursued research on two possibilities for the origin of infant preferences for attractive faces: 1) An experience-based explanation in which infants' preferences for attractive faces are a consequence of the ability to average across facial stimuli to extract a prototype or averaged face; and 2) an innate explanation in which infants' preferences for attractive faces are present at birth.

An Experience-Based Explanation for Infants' Preferences for Attractive Faces

Prototypes are defined as a central or "average" representation of a category and are often preferred to individual exemplars of stimuli categories (e.g., Martindale & Moore, 1988; Whitfield & Slatter, 1979). Adults and even infants are able to extract prototypes from a set of stimuli and respond to them as familiar even though the prototypes have not been seen before (e.g., Quinn, 1987; Strauss, 1979). If infants cognitively average across faces to form a prototype of the faces, then this ability could explain why they like attractive faces even without much exposure to the media. Hence, although media experience may not be necessary for infants to form preferences for attractive faces, experience with faces may be necessary before infants demonstrate preferences for averaged or attractive faces.

To test an experience-based explanation for infants' attractiveness preferences, we conducted a series of studies (Rubenstein, Kalakanis, & Langlois, 1999). To assess whether infants can and do average across faces to form a mental composite face, we familiarized 6-month-old infants to eight attractive individual female faces, each shown twice. After familiarization, the infants viewed three types of test pairs: 1) a familiar attractive face paired with a novel attractive face; 2) a novel attractive face paired with an averaged face created from the eight familiarization faces; and 3) a familiar attractive face paired with the averaged face. Note that all the faces in these comparisons were equally attractive, so we were not testing infants' preferences for more or less attractive faces but rather their ability to recognize whether some of the attractive faces looked familiar to them. The logic behind this type of familiarization design is that infants generally look longer at novel stimuli, all other things being equal. Given that the faces were equal in attractiveness, these comparisons tested which faces seemed familiar and which seemed novel to the infants. If infants can mentally

average faces together, the averaged face should seem familiar to them even though they have never seen it before.

The results for the first test pair showed that the infants did, in fact, prefer the novel attractive face to a familiar attractive face, just as the familiarization design would predict. More importantly, however, the results for the second test pair showed that the infants preferred the novel attractive face to the novel averaged face suggesting that they had indeed averaged across the familiarization faces: Even though the infants had not previously seen the averaged face, they reacted to it as a familiar face. The results for the final test pair showed again that infants must be averaging across faces when they see them because they preferred the familiar attractive face to the novel averaged face: The averaged face was perceived as even more familiar than a previously viewed face. Because a follow-up study confirmed that infants' preferences in the three test trials could not be attributed to pre-existing preferences, we could conclude that infants can cognitively average across faces and that averaged or prototype faces seem familiar to them. Thus, infants' preferences for averaged faces may be the result of their cognitive abilities to extract a prototype face from a population of faces following experience with these faces.

Finally, we conducted a study to determine whether infants prefer to look longer at a novel averaged face than at novel unattractive faces much as they prefer to look longer at attractive faces than unattractive faces. Although we knew from Langlois and Roggman (1990) that adults rate averaged faces as highly attractive, we wanted to be sure that infants also prefer averaged faces. In this study, we showed averaged faces paired with unattractive faces to 6-month-old infants. As predicted, infants looked significantly longer at the averaged faces than at the other faces. Note that in this study the faces were all equally novel (there was no familiarization phase) and, thus, infants should have chosen the face they prefer based on attractiveness, not novelty. Thus, this study shows that babies respond to averaged faces much like they respond to attractive faces.

Similar to their preferences for attractive faces, infants prefer averaged faces over less attractive faces, and they respond to averaged faces as if they are familiar. Taken together, these findings suggest that facial attractiveness may be preferred by both infants and adults because attractive faces are prototypical, and, as such, are perceived as better examples of faces than other face stimuli.

Are Infants' Preferences for Attractive Faces Innate?

Although cognitive averaging can explain the preferences of both infants and adults for attractive faces, experience with faces is required for the averaging process to take place. An alternative perspective exists: Perhaps no experience is necessary and that, instead, infants have innate preferences for attractive faces. Although Rubenstein et al. (1999) concluded that 6-month-olds can average across faces, this finding does not rule out the possibility that infants prefer attractive faces at birth and that no prior experience with faces is necessary to demonstrate these preferences. Therefore, our next step was to assess whether or not newborns prefer attractive faces.

An intriguing study by Slater et al. (1998) found that newborns looked longer at attractive than unattractive faces. However, the newborns in this study were, on average, 72 hours old and could have seen many faces prior to testing (think of how many relatives and friends

come to visit a newborn at the hospital). Because other studies have shown that infants can form prototypes and average across stimuli very quickly (Walton & Bower, 1993), it is possible and indeed likely that Slater's infants had enough experience with faces to engage their ability to average across faces and form prototypes. Thus, to test the view that babies might have an innate (i.e., present at birth and requiring no experience) preference for attractive faces, we conducted our own study of newborns to determine whether they had preferences for attractive faces when they were, on average, 15 minutes old (Kalakanis & Langlois, 2000). In this study, we employed a visual tracking procedure used by Morton and Johnson (1991) to show newborns two attractive and two unattractive female faces, equated for contrast and spatial frequency (i.e., how visible the faces appeared to the newborns). A camera recorded how long the infants tracked each face, and raters, who were blind to the faces the infants saw, coded the position of the infants' eyes at the start and end of the tracks from the video record. No matter how we analyzed the data, we found no overall preferences for attractive over unattractive faces. Given these null results, we cannot yet conclude that preferences for attractive faces are innate as suggested by Slater. Even if not innate, however, the results of the study by Slater et al. still suggest that babies acquire preferences for attractive faces very early in development.

The results of our study of newborns combined with our study of infants' abilities to average across faces to form prototypes suggest that, at least at the present time, a cognitive averaging explanation of preferences for attractive faces is probably the best explanation for why both infants and adults prefer attractive faces. Consequently, some experience with faces appears to be necessary before infants develop preferences for attractive faces, even though the experience required is much less extensive than previously thought.

THE DEVELOPMENT OF ATTRACTIVENESS STEREOTYPES

Once we understood the mechanisms of infants' attractiveness preferences, we began a series of studies to determine when attractiveness stereotypes develop in order to expand on our findings that infants have positive reactions to attractive faces and negative reactions to unattractive faces (Langlois et al., 1990). Stereotypes, as defined by Allport (1954), are exaggerated beliefs associated with a category such as the category of attractive faces. When do simple preferences for attractive faces become transformed into something like beliefs and stereotypes about attractive and unattractive people? Moreover, are infants capable of forming simple associations between levels of facial attractiveness and positive and negative attributes? These associations, if present, could be the rudiments of the full-blown stereotypes about attractive and unattractive people that are clearly evident in older children and adults.

Because categorization is a cognitive prerequisite of stereotyping (e.g., Tajfel et al., 1971; Zebrowitz-McArthur, 1982), we first tested whether infants can categorize attractive and unattractive female faces into two different groups (Ramsey, Langlois, Hoss, & Rubenstein, 2000) before testing stereotypic associations in infants. We first familiarized 6-month-olds to either attractive or unattractive female faces. We then showed infants novel faces from the same attractiveness category to which they were familiarized, paired with novel faces from the other attractiveness category. If infants look at the two different kinds of faces for similar amounts of time, we can conclude that they evaluate the faces as belonging to only one category (e.g., a "face" category). In contrast, if the infants look significantly longer at one

kind of face than the other, we can conclude that they evaluate the faces as "different" and as belonging to two different categories (e.g., attractive face group and unattractive face group). Results demonstrated that the infants looked longer at the novel faces from the new attractiveness category indicating that they can form categories of attractive and unattractive faces.

Knowing from our research that infants can categorize faces based on attractiveness and from other research that infants "match" visual information such as happy or sad faces to corresponding auditory information such as voices speaking in a happy or sad tone (Walker-Andrews, 1986), we developed a study to test infants' early stereotypic associations (Rubenstein & Langlois, 2000). We employed a procedure in which we showed 9- and 12-month-old infants pairs of female faces (with an attractive and unattractive face in each pair) while simultaneously presenting auditory stimuli (voices laughing, crying, or speaking in a pleasant or unpleasant tone). In each trial, we measured how long the infants looked at the attractive and unattractive faces without sound and how long the infants looked at the faces with sound. We found that12-month-olds, but not 9-month-olds, increased their looking time to faces that "matched" the valence of the sound (i.e., infants increased their looking time to an attractive face when a positive tone of voice was being played, and they increased their looking time to an unattractive face when a negative tone of voice was being played). These results suggest that infants form associations between attractive faces and other pleasant stimuli and between unattractive faces and other negative stimuli by the end of the first year of life.

Thus, by the time infants enter their second year of life, they already associate "good" or "pleasant" with attractive faces and "bad" or "unpleasant" with unattractive faces. Although much research has shown that children express well developed stereotypes that "beauty is good" or that attractive individuals have positive characteristics sometime after 3 years of age (e.g., Dion, 1973), no studies had examined the gap between infancy and early preschool age. To bridge the gap in research from infants' attractiveness preferences and simple associations to preschoolers' attractiveness stereotypes, we conducted a study of toddlers.

We wanted to test whether toddlers (children 30- and 36-months-old) performed like preschoolers in an age-appropriate stereotyping task (Hoss & Langlois, 2000). Research with notoriously stubborn toddlers is difficult and time-consuming and is probably the reason why we have little or no research on children of this age. Nevertheless, we showed toddlers six pairs of children's faces in which each pair contained one attractive and one unattractive face, and we asked them a question about each pair of faces (e.g., "who do you think is nice?"). Our results suggested that, like children older than 36-months-old, children exactly 36-months-old both like and want to play with attractive children more than unattractive children. They also think that attractive peers are nice and likely to own a good-looking toy. Unlike older preschoolers, however, 3-year-olds do not yet believe that unattractive children are mean. In contrast to the 36-month-old children, the 30-month-old children in our study did not express any consistent attractiveness stereotypes. Thus, our research indicated that stereotypes about attractive others do not appear to be expressed until about 3-years-old.

CONCLUSION

Our program of research on infants' perceptions of and responses to facial attractiveness has examined a number of important questions regarding the origins of appearance-based stereotypes. We have found that, like older children and adults, infants: 1) prefer attractive over unattractive faces of both genders and several ages and races; 2) respond positively to attractive faces and negatively to unattractive faces; and even 3) exhibit associations between levels of facial attractiveness and similarly-valenced stimuli. However, children do not actually express the full-blown version of the stereotype that beauty is good until 36 months of age.

We have also shown that an attractive face is best defined as a face that is mathematically average or prototypic. Finally, we have preliminary evidence suggesting that preferences for attractive faces are not innate but rather appear after experience with faces, albeit very early in life. In sum, our research provides extensive evidence that cultural socialization is *not* the best explanation for early preferences for attractive faces. Rather, infants' preferences stem from their early perceptual experience with faces and their abilities to cognitively average across faces.

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