Mimicking Others’ Nonverbal Signals Increases Attitude Contagion

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Abstract

Observing nonverbal signals being directed toward unfamiliar individuals is known to influence attitudes and behavior toward those individuals. Specifically, observing biased nonverbal signals in favor of one individual over another can produce nonverbal signal-consistent attitudes among preschool children. Research has shown that people have a tendency to mimic the behavior of others and the phenomenon of mimicking another’s nonverbal emotional response and “catching” their emotions has long been established. However, it has yet to be examined whether this phenomenon can facilitate attitude contagion. We hypothesized that preschool children who mimic the biased nonverbal signals of others are more likely to adopt their social attitudes. Our findings provide initial support for the notion that mimicking others’ nonverbal signals is associated with a greater likelihood of attitude contagion. Results of the current study indicated that the effect of mimicry increased with age among boys and decreased with age among girls. This study provides initial evidence that emotional mimicry may partially mediate the effect of nonverbal signals on attitudes.

Keywords: Social bias, nonverbal signals, children, mimicry, emotional mimicry, attitude contagion
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A child walks out to recess on the first day of school and timidly observes an unfamiliar adult setting up a game on the playground. Several of his classmates happily join the unfamiliar adult for the game and soon the timid child is smiling, watching them having fun together. After watching for a couple of minutes he decides that the unfamiliar adult seems alright and he skips over to join them. This type of observational social learning is thought to be an essential means through which children learn about others in their social world (Bandura & Rosenthal, 1966). Moreover, the nonverbal signals that children observe being directed toward unfamiliar individuals are known to influence their attitudes and behavior toward those individuals (e.g., de Rosnay, Cooper, Tsigeras, & Murray, 2006; Skinner, Meltzoff, & Olson, 2017). The current research was designed to examine a potential moderator of this attitude contagion—the extent to which children mimic affective nonverbal signals. Indeed, others have previously speculated that mimicry of nonverbal behavior may moderate the effect of exposure to biased nonverbal signals on bias development (Dovidio, 2009). Here, we test whether preschool children who mimic the biased nonverbal signals of others are more likely to adopt their social attitudes.

The role of nonverbal signals in shaping social biases

Previous research has shown that exposure to displays of biased nonverbal behavior can lead to increased intergroup biases. Children and adults who are exposed to displays of negative nonverbal behavior towards a Black person (vs. positive nonverbal behavior toward a Black person) subsequently show negative attitudes toward that individual and tend to show more generalized anti-Black bias (Castelli, Carraro, Pavan, Murelli, & Carraro, 2012; Castelli, De Dea, & Nesdale, 2008; Weisbuch, Pauker, & Ambady, 2009; Willard, Isaac, & Carney, 2015). Nonverbal signals can also create novel social attitudes toward unfamiliar individuals. Preschool children who observe nonverbal signals communicating warmth and friendliness toward an
unfamiliar individual tend to develop more positive attitudes toward that individual (relative to someone who received cold unfriendly nonverbal signals; Skinner et al., 2017). Similarly, Brey and Shutts (2018) examined the role of teachers’ nonverbal feedback on 5- to 6-year-old children’s perceptions of others’ intelligence. Children who received more positive nonverbal signals from the teacher while performing a reading task were thought to be smarter, regardless of the actual reading fluency that they demonstrated. Taken together there is mounting evidence that the nonverbal signals that children (and adults) observe being directed toward others can create and shape their social attitudes. Next, we consider the role that mimicry plays in social interactions.

**Social Mimicry**

People have a tendency to mimic the behavior of others, such that merely being exposed to a given behavior or emotional expression increases the likelihood that an individual observer will display that behavior or emotion (Blairy, Herrera, & Hess, 1999; Chartrand & Bargh, 1999; Lakin, Jefferis, Cheng, & Chartrand, 2003; Oberman, Winkielman, & Ramachandran, 2007). Occurring in many forms (e.g., emotional, behavioral, verbal; Duffy & Chartrand, 2015), mimicry develops very early in life. Emotional mimicry (e.g., laughing) has been observed in infants as young as 4- to 5-months-old (Isomura & Nakano, 2016) and behavioral mimicry (e.g., sticking one’s tongue out) has been observed within the first few weeks of life (Meltzoff & More, 1977). Thus, mimicry is thought to be a fairly innate social tool for facilitating interactions—helping to develop rapport with others and increasing social connections (Duffy & Chartrand, 2015).

Consistent with this social connection process, 18-month-old infants who mimicked an unfamiliar adult were more likely to invite the adult to play with them (Fawcett & Liszkowski, 2012). Moreover, as children get older, they begin to mimic in a way that increases ingroup
affiliation. For example, 3-year-olds mimicked members of their experimental ingroup as frequently as members of their experimental outgroup, but 4- to 6-year-olds selectively mimicked ingroup members (van Schaik & Hunnius, 2016). Additionally, adults and children seem to recognize (if not explicitly) the social benefits of mimicry. Adults show increased behavioral mimicry when attempting to establish or reinforce social connections (Lakin, Chartrand & Arkin, 2008) and are less likely to mimic strangers or people that they do not like (Hess & Fischer, 2014). This is also true of young children who will, for example, mimic ritualized but unnecessary actions in the presence of the adult who demonstrated those actions but not an adult who demonstrated those same actions but was no longer present (Nielsen & Blank, 2011). Thus, mimicry is known to serve as social affiliative function throughout the lifespan. In the next section, we turn to the evidence linking emotional mimicry to the spread of emotions and attitudes.

**Linking Mimicry with Emotion and Attitude Contagion**

Mimicry plays a critical role in social learning; children learn a great deal about socially appropriate ways of behaving and emotionally responding through mimicry (Meltzoff & Moore, 1994; Kavanagh & Winkielman, 2016). From this perspective, mimicry provides implicit information about how to navigate one’s social world. Though discussion of this topic has previously focused on the learning of appropriate social responses in general, an extension on this notion would be that mimicry may foster an understanding of how to feel about and interact with specific others in our social environment—shaping social attitudes.

Emotional mimicry has been described as providing feedback about the underlying emotions that another is experiencing, better equipping observers to accurately interpret them. In fact, some have argued that one of the key purposes served by emotional mimicry is understanding others’ thoughts and emotions (Hess & Fischer, 2014). Although the literature is
somewhat mixed, there is evidence that emotional mimicry facilitates emotional understanding—particularly when making complex social evaluations (Ipser & Cook, 2015; Maringer, Krumhuber, Fischer, & Niedenthal, 2011; Rychlowska et al., 2014). For instance, when participants were assigned a mimicry-inconsistent task (producing vowel sounds) they were less accurate in differentiating genuine smiles and false smiles than when they were assigned to a control condition (Ipser & Cook, 2015). Given that emotional mimicry increases the ability to understand others, it is particularly relevant to attitude contagion. Specifically, mimicking may provide information about the expresser’s attitudes toward the social target (Hess & Fischer, 2017). Thus, emotionally mimicking someone demonstrating biased nonverbal signals may facilitate understanding of that individual’s feelings toward the target of nonverbal signals.

Beyond just facilitating understanding, the work on emotional contagion suggests that mimicking emotional facial expressions actually produces a weak version of that emotion within the mimicker (Hatfield, Cacioppo, & Rapson, 1994; Laird, 1984; for a review of this see Hatfield, Bensman, Thornton, & Rapson, 2014). The tendency to “automatically mimic and synchronize movements, expressions, postures, and vocalizations with those of another person and, consequently, to converge emotionally,” is known as primitive emotional contagion (Hatfield, Cacioppo, & Rapson, 1992; pp. 153-154). In fact, there is some evidence that merely contracting one’s facial muscles into a specific emotional expression produces emotion-like physiological responses (Ekman, Levenson, & Friesen, 1983). Moreover, impeding this type of emotional mimicry can inhibit emotion contagion (Davis, Senghas, & Ochsner, 2009). Although there has been some debate about the effect of facial expressions on emotional experience (often referred to as the “facial feedback hypothesis”), recent meta-analytic evidence provides support for a small but significant effect of facial expression on experienced affect from
a total of 136 studies (Coles, Larsen, & Lench, 2017). There is also evidence of cross-channel mimicry and contagion, such that hearing vocalizations of anger and disgust can elicit emotion-consistent facial expressions and affective experiences (Hawk, Fischer, & van Kleef, 2012). This finding is relevant to the matter of the nonverbal spread of attitudes, given that nonverbal facial expressions and body language are often paired with variations in vocalics, which may heighten emotional mimicry and contagion. In sum, the extant literature provides theoretical evidence that there may be a relation between mimicking the biased nonverbal signals of others and the adoption of their social attitudes toward others.

**Current Study**

The phenomenon of mimicking another’s nonverbal emotional response and “catching” their emotions has long been established, however it has yet to be examined whether this phenomenon can produce attitude contagion. The goal of the current research is to test whether children who mimic the biased nonverbal signals of others are more likely to adopt their social attitudes. To do this, the current study utilized archival data from a series of four previously conducted studies assessing the impact of the observed nonverbal signals on preschool children’s social attitudes (Skinner et al., 2017; Skinner, Olson, & Meltzoff, 2018). A subset of these data collection sessions were video recorded and these recordings were then coded for behavioral and emotional mimicry while children observed the nonverbal bias manipulation. We hypothesized that mimicking the actor who displayed nonverbal signals toward the targets in the stimulus videos would be associated with a greater likelihood of nonverbal signal-consistent preferences.

The ability to distinguish other people’s emotions based on their facial expressions increases throughout childhood (Lawrence, Campbell, & Skuse, 2015; for a review see Widen, 2013). Children’s ability to mimic others’ emotional facial expressions also increases with age (Grossard et al., 2018). Given that emotion labeling and mimicry becomes increasingly accurate
with age, we reasoned that it could moderate the relation between mimicry and attitude contagion. There is also evidence that in childhood emotion recognition varies as a function of gender (Lawrence et al., 2015) and among adults there is evidence of gender differences in emotional mimicry (Dimberg & Lundquist, 1990). In addition, given that children and adults are more likely to mimic ingroup members than outgroup members (Buttelmann, Zmyj, Daum, & Carpenter, 2013; Yabar, Johnston, Miles, & Peace, 2006)—and the actors displaying nonverbal biases in the stimulus videos for the current study were both women—child gender was also included as a potential moderator.

**Method**

**Participants**

All data collection session recordings that we were able to obtain from the previous studies (Skinner et al., 2018; Skinner et al., 2018) were used for analysis. The final sample included 283 children (53% boys, $M_{age} = 58.19$ months, $SD = 6.73$ months). Participants were identified by their parents as: White (75%), Multiracial (17%), Asian (5%), or another racial or ethnic group (3%).

**Materials and Procedure**

All four of the studies included in this archival analysis began similarly. First, children engaged in a warm-up task where they practiced pointing to things on the computer screen. Children were told that they would be watching a video of two people (which were visually presented to children) and that they should pay close attention to see what happens. Then children observed a brief video (~30 seconds) in which negative (cold, unfriendly) nonverbal signals were demonstrated toward one of the people and positive (warm, friendly) nonverbal signals were directed toward the other. For a complete description of the procedure see Skinner
and colleagues (2017); stimulus videos are available on Open Science Framework at https://osf.io/6bbup/. After watching the video twice, children were asked which one of the individuals they liked the best, and to which of the individuals the experimenter should give a stuffed toy (prosocial giving). Although we were primarily interested in children’s explicit preference (who they liked best), as this is the most direct measures of attitude, we also report exploratory analyses of the prosocial giving outcome in Supplemental Materials. The procedure after that point varied considerably across the four studies, thus the focus of the current analyses is this initial portion that was nearly identical across studies.

To assess the extent to which children mimicked the actors displaying nonverbal biases in the videos, we coded for whether children demonstrated emotional mimicry while watching the stimulus videos. We focused on emotional mimicry, given that emotional mimicry (e.g., smiling) was anticipated to be more associated with attitude development than behavioral mimicry (e.g., repeating words from the video). Children who showed no emotional mimicry scored a 0 and children who showed emotional mimicry scored a 1.

Three coders were trained extensively on how to pick up on subtle, emotional responses and match them up with the nonverbal displays of emotion demonstrated in the stimulus videos—differentiating mimicry from more general emotional engagement with the stimulus video. Two coders watched and independently coded each video, and all discrepancies were resolved by a third coder, who served as the tiebreaker. Thus, each child received a mimicry score for the first time they watched the stimulus video and the second time they watched the

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1 An additional thirteen children completed the dependent measures in a different order. Because these children responded to a different set of items after watching the stimulus videos the first two times we were unable to include them for these analyses.
stimulus video. Children were then divided into two groups, those who showed emotional mimicry during at least one of the videos and those who never showed any emotional mimicry. All coders were blind to counterbalance condition and children’s responses to the dependent measures (i.e., whether or not they showed nonverbal signal-consistent attitudes).

Results

Predictors of Emotional Mimicry

To examine whether emotional mimicry varied as function of child age and gender we conducted a binary logistic regression analysis in which mean-centered age (in months) and gender were included as interacting predictors of emotional mimicry. We also controlled for the specific study the child participated in. Age was a marginally significant predictor, but unlike previous studies, mimicry actually decreased with age, $\chi^2(1, N = 283) = 3.23, p = .072$. None of the other main effects or the interaction between age and gender were significant.

Emotional Mimicry and Attitude Contagion

First, we examined the frequency of nonverbal-signal consistent social preferences among children who showed emotional mimicry (66%) and those who did not show emotional mimicry (60%). Given that the frequencies were in the hypothesized direction (i.e., more of the children who mimicked showed nonverbal signal-consistent preferences), we moved forward with inferential analysis. To examine whether mimicry predicts nonverbal signal-consistent preferences, we conducted a binary logistic regression analysis in which emotional mimicry, mean-centered age (in months), and gender were included as interacting predictors. We also controlled for the specific study the child participated in and whether they got the manipulation
Whether children passed the manipulation check was a significant predictor in the model, $\chi^2(1, N = 283) = 16.34, p < .001$. Children who passed the manipulation check ($\text{Probability} = .71$) were significantly more likely to show nonverbal-signal consistent attitudes than children who failed the manipulation check ($\text{Probability} = .35$). Our other control variable—the study in which the child participated—was also a significant predictor of nonverbal signal consistent attitudes, $\chi^2(3, N = 283) = 7.88, p = .049$. With regard to the predictors of interest, there was a significant main effect of child gender, $\chi^2(1, N = 283) = 7.79, p = .005$. Examination of the effect of gender in a main effects only model indicated that boys ($\text{Probability} = .63$) were more likely to show attitude contagion than girls ($\text{Probability} = .46$). The effect of gender was qualified by a three-way interaction between gender, child age, and emotional mimicry, $\chi^2(1, N = 283) = 5.88, p = .015$ (see Figure 1).

To break down the three-way interaction, we examined the probability of choosing the nonverbally-preferred person among children who showed emotional mimicry (relative to those who did not) among children of the same gender and age. Among younger (1 SD below the mean age) girls, those who showed emotional mimicry were significantly more likely ($\text{Probability} = .53$) to show nonverbal-signal consistent attitudes than those who did not show emotional mimicry ($\text{Probability} = .26$), $z = −2.09, p = .035$, 95% CI $[−2.19, −0.07]$, $OR = 0.32$. Among younger (1 SD below the mean age) boys, nonverbal-signal consistent attitudes did not vary as a function of emotional mimicry, $z = 1.13, p = .257$, 95% CI $[−0.45, 1.67]$, $OR = 1.84$.

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2 This was used as exclusion criteria in the original studies, but to preserve statistical power and retain as many participants as possible, we chose to control for this in the model rather than using it as exclusion criteria. See Supplemental Materials for analyses excluding children who failed the manipulation check.
Among older (1 SD above the mean age) girls, those who showed emotional mimicry were no more likely to show nonverbal-signal consistent attitudes than those who did not show emotional mimicry, $z = 0.01, p = .989$, 95% CI [−1.11, 1.13], $OR = 1.01$. Among older (1 SD above the mean age) boys, those who showed emotional mimicry ($Probability = .76$) were marginally more likely to show nonverbal-signal consistent attitudes than those who did not show emotional mimicry ($Probability = .53$), $z = -1.80, p = .072$, 95% CI [−2.15, 0.09], $OR = 0.36$.

![Mimicry and Bias Contagion](image)

**Figure 1.** Probability (with standard errors) of selecting the nonverbal preferred target (showing bias contagion) as a function of child age, gender, and emotional mimicry. Estimates for younger children (~ 4 years and 2 months) were 1 standard deviation below the mean age of 4 years and 10 months, estimates for older children (~ 5 years and 4 months) were 1 standard deviation above the mean age.

**Discussion**
Results of the current study provide initial support for our overall hypothesis that, among preschool children, mimicking nonverbal signals would be associated with increased attitude contagion. However, results of the current study indicated that this effect was moderated by the age and gender of the child. Specifically, young girls (approximately 4 years and 2 months) were the only ones who showed statistically significant evidence of an association between emotional mimicry and increased attitude contagion. Older girls (approximately 5 years and 4 months) showed no evidence of a relation between emotional mimicry and attitude contagion. In contrast, younger boys showed no evidence of a relation between emotional mimicry and attitude contagion, whereas older boys who mimicked the nonverbal signals that they were exposed to were marginally more likely to show attitude contagion. Taken together, our results suggest that the effects of mimicry on attitude contagion increase with age among preschool boys but decrease with age among preschool girls. Nonetheless, given that the age and gender findings were not predicted a priori, we are hesitant to draw any firm conclusions about the effects of gender and age on the relation between emotional mimicry and attitude contagion.

Prior work has shown that children’s capacity for deliberate mimicry increases with age (Grossard et al., 2018), yet we found evidence of decreasing mimicry with age. In light of the current findings, we propose that children may become more adept at reproducing facial expressions with age, but show decreasing spontaneous high-fidelity mimicry as they become more socially aware and better at self-monitoring. This is because high-fidelity mimicry, which too closely or obviously mirrors another’s emotions or behavior, is thought to be off-putting to others (e.g., Ashton-James, van Baaren, Chartrand, Decety, & Karremans, 2007; Kavanagh & Winkielman, 2016; Lakin & Chartrand, 2003). For instance, when mimicry is detected, adults tend to perceive the mimicker as less friendly and trustworthy (Bailenson, Yee, Patel, & Beall, 2008). Thus, although this obvious form of mimicry—which we were able to readily detect
through visual coding—is common in very early childhood, it likely decreases as children get older (Fawcett & Liszkowski, 2012).

Some previous work suggests gender differences in mimicry among adults (Dimberg & Lundquist, 1990), yet meta-analytic evidence indicates that results are mixed (Lehane, 2015). The current findings provide little evidence of gender differences in mimicry among preschool children. To our knowledge, gender differences in mimicry have not previously been examined among children, thus it is possible that preschoolers do not show the gender differences in mimicry that adults do. Alternatively, these differences in mimicry may exist among children but not be detectable with the level of precision afforded by our approach. Most of the prior work that has identified gender differences in mimicry compared facial muscle activity rather than observable facial mimicry (Lehane, 2015).

Previous research has shown that when adults are motivated to infer the emotions of others they show increased emotional mimicry (Murata, Saito, Schug, Ogawa, & Kameda, 2016). Thus, mimicry in the current study may have been heightened by the fact that children were instructed to watch the video closely and see what happens to the targets. Although in everyday life children are not often instructed to infer the emotions of those around them, they may nonetheless be highly motivated to do so. Particularly when it comes to unfamiliar people and social contexts, children should be highly motivated to infer the emotions of trusted adults to determine how to respond and behave.

It is important to note that contextual factors (e.g., liking of the expresser) moderate emotional mimicry (Hess & Fisher, 2013), thus merely observing someone demonstrating biased nonverbal signals will not necessarily lead to mimicry or attitude change. Evidence suggests that people are less likely to emotionally mimic those who they dislike (Hess & Fischer, 2014), which is compatible with balance theories of attitudes (Heider, 1958). That is, the fact that
people are more likely to mimic those that they like may help explain why they are more likely to adopt attitudes that are consistent with those who they like. In the studies that our archival data were drawn from, expressers were fairly likeable (yet unfamiliar) adults. If the expressions of nonverbal bias had been familiar to children (e.g., parents or teachers) or individuals whom children already really liked, we conceive that mimicry (and attitude contagion) may have been considerably stronger.

Limitations and Future Directions

The measure of mimicry used in the current study was rather coarse. Because this study capitalized on archival videos—which were rather low resolution—subtle emotional mimicry could not be detected using the current approach. Future studies, designed to measure nonverbal signals in this context, should utilize higher resolution video or physiological recordings of facial muscle movement (Hess & Fischer, 2013). It is also important to note that the analyses reported here were somewhat exploratory. We did not have a priori predictions about how age and gender would interact with mimicry, thus additional confirmatory research is needed to determine whether the observed gender and age effects represent replicable effects. Nonetheless, others have found that mimicry and emotional facial expression varied as a function of child age, child gender, and the particular emotion being expressed (Chaplin & Aldao, 2013; Grossard et al., 2018).

Another interesting future direction would be to consider whether the valence of mimicked nonverbal signals influences attitude contagion. In other words, might mimicry of negative nonverbal signals more strongly related to attitude contagion than mimicry of positive nonverbal signals? Anecdotally, we noticed that some children mostly mimicked positively valenced nonverbal signals, some mostly mimicked negatively valenced nonverbal signals, whereas others mimicked both positive and negative nonverbal signals. Previous work has
shown that both positive and negative nonverbal signals can shape social attitudes (Brey & Shutts, 2018), but it is possible that the role of emotional mimicry varies as a function of the valence of nonverbal signals that are mimicked. Although the archival videos used in the current study cannot provide the level of precision necessary to test this question, future studies that utilize more fine grained measures of mimicry (e.g., facial EMG) and stimuli designed to elicit positive and negative nonverbal mimicry will help us to better understand these processes in the future.

Although we have conceptualized mimicry as possibly facilitating bias contagion, it is unclear whether emotional mimicry had any causal influence on children’s attitudes. Given the design of the study, it is possible that children who were more engaged with and attentive to the videos were both more likely to mimic the individual expressing nonverbal biases and show evidence of bias contagion. By utilizing designs employed in previous mimicry work (e.g., having participants engage in another task that is incompatible with emotional mimicry) future research can begin to examine whether mimicry actually increases bias contagion.

Another worthwhile consideration for future investigation is the role that individual differences in empathy might play. Individuals who are high in trait empathy are more likely to mimic others than those that are low in trait empathy (Sonnby-Borgstrom, Jonsson, & Svensson, 2003). Thus, those that are high in empathy might be particularly susceptible to attitude contagion. However, mimicking an outgroup member decreases implicit bias against members of that group (Inzlicht, Gutsell, & Legault, 2012). Thus, to the extent that empathy promotes mimicry of outgroup members it may reduce biases. Taken together, existing findings suggest that the effects of empathy may vary as a function of whether it facilitates ingroup mimicry, outgroup mimicry, or both. Mimicry based on group membership emerges in early childhood (van Schaik & Hunnius, 2016) and continues on into adulthood (Yabar et al., 2006)—such that
people are more likely to mimic ingroup members than outgroup members. Even so, it is unclear whether trait empathy heightens or buffers against this tendency, thus additional research is needed.

Conclusions

The current research—which is the first to examine the relation between emotional mimicry and attitude contagion—indicated that preschoolers who emotionally mimic nonverbal biases show increased attitude contagion. Although the findings observed here are somewhat preliminary, they are notable as the first to show evidence of a link between emotional mimicry and increased attitude contagion. The fact that any relation between mimicry and attitude contagion could be detected in this archival dataset (e.g., with rather low resolution video footage) suggests that the association between emotional mimicry and attitude contagion may be much more robust if more sensitive measures of mimicry are utilized. Moreover, the current experiment provides evidence of somewhat naturalistic emotional mimicry given that, unlike most studies of mimicry, the stimuli were not deliberately designed to elicit mimicry. This study provides initial evidence that, as Dovidio (2009) suggested, emotional mimicry may partially mediate the effect of nonverbal signals on attitudes.

References


