

Brief Report

Brief Report: Imitation Effects on Children with Autism

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Twenty children with autism (mean age, 5 years) were recruited for the study from a school for children with autism. The children were randomly assigned to an imitation ($n = 10$) or contingently responsive ($n = 10$) interaction group based on a stratification table for gender and developmental and chronological age. The sessions consisted of four phases, with each phase lasting 3 minutes. In the first phase, the child walked into a room that was furnished with a sofa, a table, chairs, and two sets of identical toys. An adult was in the room sitting very still like a statue (first still-face condition). In the second phase, the adult either imitated the child or was contingently responsive to the child. In the third phase, the adult sat still again (second still-face condition), and in the fourth phase, the adult engaged in a spontaneous interaction. During the third phase (the second still-face condition), the children in the imitation group spent less time in gross motor activity and more time touching the adult, as if attempting to initiate an interaction. The contingency condition appeared to be a more effective way to facilitate a distal social behavior (attention), whereas the imitative condition was a more effective way to facilitate a proximal social behavior (touching).

KEY WORDS: Autism; imitation; distal social behavior; proximal social behavior.

INTRODUCTION

Children with autism rarely initiate social interactions (Hobson, 1993). Because of this lack of initiative, it is unclear whether children with autism have expectancies concerning human behavior. A study conducted in Paris by Nadel and her colleagues (Nadel, Croue, Kervella, Mattinger, Canet, Hudelot, Lecuyer, & Martini, 2000) investigated this question by adapting a version of the Still Face Paradigm. In the original paradigm, mothers were asked to interact naturally with

their infants for 3 minutes, then to sit in a still-faced fashion and not move for an additional 3 minutes, and finally to interact normally for 3 minutes (Tronick, Als, Adamson, Wise, & Brazelton, 1978). The purpose of this paradigm was to determine whether the infant would react negatively during the still-face portion, which would in turn indicate that the baby had an expectation about the mother's behavior that was being violated.

In the Nadel *et al.* (2000) study adaptation of the still-face paradigm, children with autism interacted with an unfamiliar adult for four phases, each lasting 3 minutes. In the first phase, the child walked into a room that was furnished with a sofa, a table, chairs, and two sets of identical toys. A stranger sat on the sofa with a still face and a body like a statue and did not move for 3 minutes. In the second phase, the stranger imitated everything the child did using toys that were identical to those the child used. The third phase consisted of a second still face similar to the first one, and the fourth phase was a spontaneous interaction. The

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results of the Nadel *et al.* (2000) study showed that of the six social behaviors coded (looking at person, positive facial expressions, negative facial expressions, positive social gestures, close proximity, and touch), five (looking at person, negative facial expressions, positive social gestures, close proximity, and touch) were significantly higher for the second still-face session compared with the first still-face session. Thus, the children displayed significantly more expectant behaviors such as looking at or touching the stranger after the imitation session. The increase in proximity-seeking and touching behaviors were particularly viewed as positive changes because they seemed to indicate attempts on the part of the children to initiate interactions, a rare event for children with autism.

It is not clear why the imitative behavior on the part of the adult was so effective, although normal children at this early preschool developmental age have also been noted to be particularly responsive to imitations of their own behaviors (Lubin & Field, 1981). A shortcoming of the Nadel *et al.* (2000) study, however, is that it cannot be determined whether the imitation per se or simply the interaction being contingently responsive led to their results. Thus, the purpose of the present study was to attempt to replicate the Nadel *et al.* (2000) study but to compare the effects of the adult being imitative versus simply being contingently responsive in their interaction behavior. This comparison would help determine whether the Nadel *et al.* (2000) results were due to contingent responsivity of the examiner or due to imitation specifically. Based on previous studies (Dawson & Adams, 1984; Dawson & Galpert, 1990; Nadel & Peze, 1993; Tiegerman & Primavera, 1981, 1984), the children with autism were expected to benefit more from being imitated than from simply having a contingently responsive adult interaction partner.

Twenty children (eight girls) with autism ranging in age from 3 to 7 years (mean age: girls, 4.8 years; boys, 5.5 years) were selected for their nonverbal behavior from a school of children with autism. The children had been diagnosed with autism by the age of 3 by the school's experienced (10 years) clinical psychologist using DSM-IV criteria. The children were of middle socioeconomic status (mean, 2.7 on the Hollingshead Index) and varied in ethnicity (41% white, 27% Hispanic, 23% black, and 9% other ethnic group). On consent, the children were randomly assigned to an imitation ($n = 10$) or contingently responsive ($n = 10$) interaction group. The groups did not differ in ethnicity, gender, chronological age, years in the school (mean, 2 years), level of symptomatology (CARS scores, 38 and 37 for the imitation and contingent re-

sponsivity groups, respectively), and developmental level (PEP-R scores for the imitation and contingent responsivity groups, respectively, including imitation, 19 and 15; perception, 25 and 31; cognitive performance, 19 and 17; and cognitive verbal, 17 and 14).

The study was conducted in a testing room that contained a sofa, 2 chairs, and a table. None of the children were familiar with the room or this procedure. On the table were two sets of identical toys, including two of each of the following: balls, dolls, Slinkies, hats, sunglasses, stuffed animals, cups, plates, balloons, and umbrellas.

The procedure consisted of four phases, with each phase being 3 minutes long. In the first phase, the child entered the room alone. In the room, an unfamiliar adult sat still on the sofa like a statue, and her face was still with no expression. The sessions were videotaped behind a two-way mirror. An auditory signal indicated the end of each 3-minute phase. During the second phase, the unfamiliar adult was either imitative or contingently responsive to the behaviors of the child. Although both of these conditions could be considered contingently responsive, in the imitative condition, the unfamiliar adult imitated everything the child did, including all stereotypes, sounds, and motor movements. In the contingently responsive interaction, the adult simply responded immediately to the child with a similar behavior but not with an imitative behavior. During the third phase, the adult returned to the sofa and sat still once again. The fourth phase consisted of spontaneous interaction so that any child who was upset by the second still-face phase could be calmed by the final play segment.

The videotapes were converted into video files that could be read by a computer using a software program specifically designed for that purpose by Kervella and Nadel (1999). This software allowed for a second-by-second coding of each behavior by stopping the video file every 30 frames (30 frames = 1 second). The six behavior categories included motor activity (any gross motor behavior except stereotypes), stereotypes (any facial or motor stereotypes), looking at adult's face or body, silence (no discernible sound or vocal stereotype), distance from adult (more than 5 feet away), and touching adult in a socially positive way (smooth, light touch vs. abrupt, rough touch). If by chance two behaviors occurred within the same second, the behavior of the longer duration was coded.

Coders were trained to .90 intercoder reliability, and intercoder reliability was established using *Kappa* coefficients to correct for chance disagreement. The *Kappas* averaged .72 for one third of the observations (Cohen, 1968).

A repeated-measures multivariate analysis of variance with imitative versus contingently responsive groups as the grouping variable and still-face phase (still-face 1, still-face 2) as the repeated measure yielded a significant group by trial interaction effect [$F(6,12) = 2.87$, $p < .05$]. Post hoc analyses of variance and Bonferroni t tests for significant interaction effects yielded the following changes between still-face 1 and still-face 2 for the imitation versus the contingent responsivity group, respectively: (1) a decrease in time spent in motor activity (running/walking/jumping) ($t = 3.55$, $p < .01$) for the imitation group versus the contingent responsivity group (from 6.2% to 2.1% vs. 4.4% to 4.3%); (2) an increase in time spent showing motor stereotypies for the contingent responsivity group ($t = 2.10$, $p < .05$) (from 0.9% to 0.9% vs. 0.6% to 1.1%), which simply resulted in the contingent responsivity group matching the initial level of the imitation group; (3) a decrease in silence (or increase in sounds) by the contingent responsivity group ($t = 1.96$, $p < .05$), (from 85.3% to 81.2% vs. 84.7% to 77.9%); (4) an increase in the proportion of time spent looking at the adult ($t = 1.79$, $p < .05$) (from 7.9% to 6.0% vs. 2.6% to 5.1%), which again simply increased the contingent responsivity group to the initial level observed in the imitation group, (5) both groups showed a decrease in distance from the adult ($t = 3.18$, $p < .01$) (from 91.8% to 69.6% vs. 94.6% to 68.6%), suggesting they were more proximal to the adult; and (6) despite both groups increasing touching of the adult, the imitation group showed a significantly greater increase ($t = 1.98$, $p < .05$) (from 0.1% to 0.9% vs. 0% to 0.2%).

These results suggest that the child's proximal behaviors may be increased by the adult's imitation and contingent responsivity. Decreased distance from the adult occurred for both groups during the second still-face session after the imitation and contingently responsive interactions, suggesting that the children were initiating moves toward the adult. Imitation, however, yielded additional improvements, including less motor activity, suggesting that imitation may have made the child more aware of the adult and thus diverted his or her attention from motor activity when the adult stopped imitating the child during the second still-face session. Although both groups reduced their distance from the adult, the increase in the children's socially touching of the adult was significantly greater for the imitation group and is consistent with data reported in the prototype for this study by Nadel *et al.* (2000). These effects are likely to have derived from the differences in the imitation/contingent responsivity paradigms inasmuch as this homogeneous sample of young nonverbal children with autism enabled random assignment of

similar groups. Although at least two behaviors differentiate the groups at baseline, the groups appear to be relatively balanced, as one behavior at baseline favored the imitation group (more looking at the adult) and one favored a contingent responsivity group (less stereotypies). The fact that contingent responsivity group looked at the adult at baseline significantly less than the imitation group but doubled their looking time at the adult, while the imitation group did not change, points to the problem of baseline differences and the potential effects of the law of initial values. The significant increase in looking at the adult could have been an effect unique to the contingent responsibility condition. The variable behavior of children with autism also highlights the need for larger samples.

Studies by Dawson and Adams (1984) had earlier suggested that children with autism and a low level of imitative ability were more socially responsive, showed more eye contact, and played with toys in a less perseverative manner when the experimenter imitated their behavior. The authors suggested that imitation was beneficial to children with lower developmental ages because imitation is a recognized exchange, or connection, between two persons and thereby creates a feeling of shared understanding between them (Dawson & Adams, 1984; Nadel & Peze, 1993). In addition, adult interaction partners have been noted to become more sensitive to their child's cues when they are being imitative (Field, 1977). In a future study, coding the adult's sensitivity to cues would further inform this possibility. In addition, a future study could repeat the imitation and contingent responsivity segments (rather than the spontaneous play segment at the end of the session) to determine whether the differential effects of the two conditions increased. The two conditions could also be reversed in a within-subject design to determine whether the effects specific to the conditions could be demonstrated within the same subjects, highlighting the specificity of the two conditions.

According to Nadel *et al.* (2000), children with autism develop social expectancies during the imitation condition. They showed these expectancies in both the Nadel *et al.* (2000) study and the current study by reducing their distance from the adult but also by touching the adult more frequently. They also showed a greater advantage for social interaction relative to the contingent responsivity group by reducing motor activity and vocal stereotypies, as indicated by no decrease in silence. Although the silence category also included no discernible sound, which could also include preverbal vocalizations, this makes this finding diffi-

cult to interpret inasmuch as increases in stereotypic speech may be less desirable while increases in other vocalizations may be more desirable, especially if they occur at the same time the children are increasing their attention to an adult. Fewer behavior changes were noted in the current study versus the Nadel *et al.* (2000) study, possibly because the children were younger but more likely because the imitation effects were being assessed in contrast to another intervention documented to be effective, namely contingent responsivity. Although contingent responsivity also led to decreased distance, it did not result in as great an increase in touch behavior as the imitation situation.

A future study might determine the specific ways in which the adult differs during the contingent responsivity and imitation conditions. A larger sample would also enable a comparison between those children who initiate contact by touching the adult after imitation and the other approximately half of the children who do not. The anecdotally reported frequency of social touch aversion in children with autism (Baranek, 1999) highlights the importance of finding interventions such as imitation to enhance the proximity and touch initiations noted in the children with autism in this study. The fact that imitation was more effective in reducing gross motor behavior and increasing the children's social contact behavior (touching) than the contingently responsive interaction highlights the special nature of imitation. It is not only being immediately responsive, as in being contingently responsive, that is important, but it is also responding with the same form of behavior that is effective. The data from this study as well as those from other studies (Dawson & Adams, 1984; Nadel & Peze, 1993) suggest that imitation by adults may be an effective intervention with young non-verbal children with autism.

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