

Imitation Effects on Joint Attention Behaviors of Children with Autism

Shauna Ezell¹, Tiffany Field^{1,2}, Jacqueline Nadel³, Rae Newton¹, Greg Murrey¹,
Vijaya Siddalingappa¹, Susan Allender¹, Ava Grace¹

¹Fielding Graduate University, Santa Barbara, USA

²University of Miami Medical School, Miami, USA

³Hôpital la Salpêtrière, Paris, France

Email: tfield@med.miami.edu

Received May 27th, 2012; revised June 28th, 2012; accepted July 26th, 2012

This study examined the effects of adult imitation on three joint attention behaviors of nonverbal preschoolers with autism including referential looking, gaze following and gesturing to the adult. Videotapes taken from a previous study were recoded for the adult's imitation behavior and the children's joint attention behaviors (Field, Field, Sanders, & Nadel, 2001). In the original study, twenty nonverbal, 4 - 6-year-old children with autism were randomly assigned to one of two groups, an imitation or a contingent responsiveness group. Both groups of children engaged in an intervention play phase during which the adult imitated the children or contingently responded to them and a subsequent spontaneous play phase. ANOVAs revealed that the imitation group children versus the contingent responsiveness group children spent a greater percent time looking at the adult during the intervention phase and looking at the adult and following the adult's gaze during the spontaneous play phase. A correlation analysis on the data collapsed across the 2 groups yielded significant correlations between adult imitation during the intervention phase and referential looking and gaze following during the spontaneous play phase. Overall, these results revealed that adults imitating preschoolers with autism elicited joint attention behaviors, highlighting the value of imitation as an intervention.

Keywords: Imitation; Joint Attention; Autism

Introduction

Children with autism show limited joint attention behavior such as referential looking, gaze following and gesturing (Charman et al., 1997). Joint attention delays and deficits, in turn, can affect their language development (Meltzoff & Gopnik, 1993; Williams, Whiten, & Singh, 2004). Some research has noted moderate relationships between imitation and language development (Carpenter, Nagell, Tomasello, Butterworth, & Moore, 1998), while at least one other study reported strong relations between joint-attention and language development (Boucher, 2008).

A growing body of research has demonstrated that training children with autism can enhance their social interaction skills (Hwang & Hughes, 2000). For example, our studies showed that very young children with autism respond to being imitated by increasing both their distal (attention) and proximal (touching) social behaviors during and after imitative interactions (Escalona, Field, Nadel, & Lundy, 2002; Field, Field, Sanders, & Nadel, 2001; Heimann, Laberg, & Nordoen, 2006). In the Field et al. (2001) study, the possibility of imitation merely being a contingently reinforcing response was determined by randomly assigning half the sample to a contingent responsiveness group. The imitation group showed more social behavior than the contingent responsiveness group.

Several studies have focused on joint attention skills in children with autism (Ingersoll & Schreibman, 2006; Kasari, Freeman, & Paparella, 2006; Klinger & Dawson, 1992; McCarthren, 2000; Salt et al., 2002), with one of these studies focusing spe-

cifically on imitation as a significant contributor to the joint attention effects (Ingersoll & Schreibman, 2006). However, different types of interventions were combined in these studies, thus confounding any imitation effects. For example, in one program (Salt et al., 2001, 2002), the treatment group received parent training, imitation, intrusion into solitary play, touch, and verbalization, and in another study, prompts, linguistic mapping and descriptive talk were used in conjunction with imitation and modeling (McCarthren, 2000). Nonetheless, several of these studies suggest that imitation improved children's responsiveness including their joint attention behaviors. It is still unclear, however, whether imitation per se or the contingent responsiveness of imitation facilitated the joint attention behaviors. Thus, in the current study, imitation and contingent responsiveness were compared for their effects on joint attention behaviors including referential looking, gaze-following, and showing and pointing gestures in children with autism.

Videotapes that were previously coded for proximal and distal social behaviors (Field et al., 2001) were re-coded to assess the effects of adult imitation versus contingent responsiveness on joint attention behaviors in preschool children with autism. The children who were imitated versus those in the contingent responsiveness condition were expected to spend a greater percent time showing joint attention behaviors including referential looking, gaze-following, showing and pointing gestures (Carpenter, Pennington, & Rogers, 2002). Further, adult imitation was expected to be related to these joint attention behaviors in the children with autism.

Method

Sample

The sample videotaped for the original study comprised twenty preschool non-verbal children with autism (10 boys and 10 girls) who ranged from 4 to 6 years of age ($M = 5.4$). The families of the children were middle socioeconomic status (Hollingshead Index (1975), $M = 2.9$), and ethnicity was distributed 52% Caucasian, 40% Hispanic, and 8% African-American. All children had received a DSM-IV diagnosis of autism. The children's PEP-R scores averaged 18.8 (imitation = 17.9, perception = 22.6, cognitive performance = 18.2, cognitive verbal = 16.7). The two groups of children did not differ on these variables.

Procedure

In the original study the interaction sessions were held in a playroom equipped with two chairs, a table, and two identical sets of toys to enable imitation of same object actions. Placed in full view on the table, the two sets of toys included cups, plates, slinkies, dolls, balls, hats, sunglasses, umbrellas, stuffed animals, and balloons. The children were randomly assigned to one group in which an unfamiliar adult was asked to immediately imitate all of the children's behaviors with the same object or to a second group in which the adult was asked to immediately contingently respond with a nonverbal behavior to the children's behaviors (respond immediately but with a non-imitative behavior) (Field et al., 2001). This was the first 3-minute interaction called the intervention phase. Imitation for the current study was defined as the adult reproducing the same behavior observed in the child (vocal, gestural, object-action with the same object) during the same time sample unit. Field et al. (2001) noted that even though the unfamiliar adult was instructed not to imitate the child's behaviors during the contingent responsivity (non-imitative) condition, some imitation may have occurred during this intervention. Likewise, the imitation-only intervention phase featured occasional non-imitative, yet contingently responsive behaviors. After the intervention phase, both groups participated in a 3-minute spontaneous play phase during which the adult was asked to play spontaneously with the children rather than imitating or contingently responding to their behaviors. Although three sessions were videotaped for the original Field et al. (2001) study, because of limited power only the first and last sessions were coded for the present study (yielding 6 minutes of intervention play and 6 minutes of spontaneous play).

Measures

The joint attention behaviors included the following: 1) referential looking or looking at the interactive adult and what the adult was holding and doing (dyadic) and looking from object to adult and back to object (triadic); 2) gaze-following or following the attentional focus of the adult by shifting gaze; and 3) pointing and showing gestures with the adult. Three graduate students were trained to code the videotapes that were randomly assigned to them. The coders were blind to the purpose of the study and the group assignment. The videotapes of the adult and child were coded at 10-second time intervals for the two 3-minute phases, checking these three child behaviors and adult imitation behavior on a time sample unit coding sheet

whenever they occurred. The total number of time sample units checked for each behavior was divided by the total number of time sample units to calculate the percent time each behavior occurred for each interaction phase (intervention and spontaneous play). Percent time was calculated because of the slight variability in the length of the interaction phases. Inter-coder reliability was established by Cohen's Kappa on one-third of the videotapes as follows: Adult imitation (.89), child referential looking (.81), child gaze-following (.83), and child gesturing (.83).

Results

The two sessions were combined for data analyses because of limited power and the apparent absence of differences across the two sessions. ANOVAs were performed to compare the 2 groups on the adult's imitation behavior and the children's 3 joint attention behaviors during the intervention play phase and during the spontaneous play phase. A Pearson correlation analysis was then conducted on data collapsed across the 2 groups to determine the relations between adult imitation and the child joint attention behaviors.

As can be seen in **Table 1**, and as expected, more adult imitation occurred in the imitation group versus the contingent responsivity group during the intervention phase ($F[1, 18] = 14.50, p = .001$, partial $\eta^2 = .45$). Also as expected, the groups did not differ on the percent time the adult imitated the children during the spontaneous play phase ($F[1, 18] = .63, p = .44$, partial $\eta^2 = .03$).

ANOVAs conducted on the three joint attention behaviors revealed that the children in the imitation group spent a greater percent time engaged in referential looking during the intervention phase ($F[1, 18] = 12.37, p = .003$, partial $\eta^2 = .41$) as compared to the children in the contingently responsive group. The size of this observed effect was noteworthy according to Cohen's guidelines (1988) indicating that 41% of the variance in referential looking during the intervention phase could be explained by the imitation intervention. No group differences were observed for the child gesturing behavior ($F[1, 18] = .86, p = .37$, partial $\eta^2 = .05$).

Also as can be seen in **Table 1**, regarding the spontaneous play phase, the imitation group versus the contingent responsivity group spent more time showing: 1) referential looking ($F[1, 18] = 7.45, p = .01$, partial $\eta^2 = .29$); and 2) gaze-following ($F[1, 18] = 23.19, p < .001$, partial $\eta^2 = .56$). The effect sizes were large for all three behaviors. The largest effect was noted for gaze-following behavior, with 56% of the variance explained by the imitation intervention. Again, no significant group differences were noted for the child gesturing behavior ($F[1, 18] = .12, p = .74$, partial $\eta^2 = .01$).

As can be seen on line 7 of **Table 2**, the Pearson correlation analysis yielded significant correlations between the percent time the adult imitated the child during the intervention phase and the percent time the child engaged in referential looking during both the intervention ($r = .62, p = .004$) and the spontaneous play phases ($r = .47, p = .03$). According to Cohen's guidelines (1988) the power of each was calculated to be approximately .83 and .40 respectively. Adult imitation during the intervention phase also correlated with gaze following ($r = .69, p = .001$) during the spontaneous play phase. An examination of Cohen's guidelines revealed a better than chance probability falling above .83 and just below .96. No significant association

Table 1.

Mean percent time (and standard deviations) behaviors occurred in the imitation and contingent responsivity groups during the intervention and spontaneous play phases.

	Groups				F	p
	Imitation		Contingent Responsivity			
	M	SD	M	SD		
<u>Intervention Phase</u>						
Adult Imitates Child	73.70	11.80	33.15	31.54	14.50	.001
Referential Looking	33.20	18.30	10.70	8.72	12.32	.003
Gaze Following	59.70	23.50	38.83	23.63	3.91	.06
Child Gestures to Adult	18.85	18.16	12.90	9.12	.86	.37
<u>Spontaneous Play Phase</u>						
Adult Imitates Child	8.50	7.34	5.00	11.86	.63	.44
Referential Looking	27.30	17.66	10.65	7.77	7.46	.01
Gaze Following	74.80	15.57	40.40	16.37	23.19	.000
Child Gestures to Adult	28.45	18.36	25.90	14.81	.12	.74

Table 2.

Correlation matrix: adult imitation and joint attention behaviors during intervention (IP) and spontaneous play (SP) phases.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Referential Looking (IP)	1.0							
(2) Referential Looking (SP)	.73*	1.0						
(3) Following Gaze (IP)	.05	.14	1.0					
(4) Following Gaze (SP)	.51*	.50*	.18	1.0				
(5) Gesturing (IP)	.66**	.19	-.29	.22	1.0			
(6) Gesturing (SP)	.11	.03	-.17	.18	.39	1.0		
(7) Adult Imitation (IP)	.62**	.47*	.03	.69**	.26	-.08	1.0	
(8) Adult Imitation (SP)	.24	.23	.36	.11	-.07	-.08	.47*	1.0

Note: * $p < .05$; ** $p < .01$ (2-tailed).

was found between adult imitation during the intervention phase and gesturing in either phase. Also, not surprisingly, adult imitation during the spontaneous play phase was not related to child joint attention behaviors during the previous intervention phase.

Discussion

The present study investigated the effects of adult imitation on joint attention behaviors of preschoolers with autism. ANOVAs yielded differences between the imitation and contingent responsivity groups on the adult imitation and child joint attention behaviors during both the intervention and spontaneous play phases. During the intervention play phase, the children in the imitation group showed more referential looking. During the spontaneous play phase, the imitation group showed not only more referential looking, but also more gaze-following. The correlation analysis revealed robust relations between adult imitation and these two joint attention behaviors of the children. Significant correlation coefficients were noted for the percent time the adult imitated the children's behaviors during the intervention phase and the percent time the children engaged in referential looking during the intervention phase as well as referential looking, and gaze-following by the children during

the spontaneous play phase.

Overall, these results demonstrate the effectiveness of imitating preschoolers with autism specifically in terms of their referential looking and gaze following behaviors. Imitation as compared to contingent responsivity by an unfamiliar adult elicited at least these two joint attention behaviors of the four to six-year-old preschoolers. These results, in conjunction with the findings of Field et al. (2001) using the same sample, highlight the effectiveness of adult imitation for eliciting more proximal and distal social behaviors and more joint attention behaviors in young children with autism. The joint attention behaviors observed during this study are similar to those demonstrated by younger, typically-developing children during imitative games (Meltzoff, 1990; Trevarthen, 1977). The significant correlations between imitating the children's behaviors during the intervention phase and the time the children spent looking at the adult and following the imitating adult's gaze, during the subsequent spontaneous play phase were noteworthy. Imitation may have captured the children's attention reflected by their greater referential looking during the intervention play phase (more referential looking) leading to the children's increased referential looking and gaze following in the subsequent spontaneous play phase.

Gesturing appeared to increase from both intervention conditions (imitation and contingent responsivity) to the spontaneous play phases. The considerable intragroup heterogeneity (high standard deviations) may have masked potential group differences, especially given the combining of the referential looking and gaze-following behaviors. A larger sample would enable further examination of the specific gesturing behaviors and whether any differences exist between communicative and instrumental gestures (Loveland & Landry, 1986). Some have referred to these as initiating joint attention behaviors and initiating regulating/requesting behaviors. Also, with a larger sample, comparisons could be made between those children who used gestures and those who did not. Alternatively, this result may be consistent with the finding that children with autism are less impaired in gesturing than other joint attention behaviors (Mundy & Sigman, 2006).

Research supports the perspective that imitation serves two functions (Nadel, Revel, Andry, & Gaussier, 2004; Uzgiris, 1981). Nadel et al. (2004) refer to these as communication and learning. The present study supports this position by expanding on previous studies that showed increased distal (attention) and proximal (touching) social behaviors during and after imitative interactions (Escalona et al. 2002; Field et al., 2001). The present study demonstrates that imitating preschoolers with autism elicits more joint attention behaviors.

Although there is ample evidence that children with autism have joint attention deficits, these deficits are not universal and are more evident in the imitation of joint attention than in response to the joint attention of others. (Charman et al., 1997). Some have argued that an imitation deficit disrupts the development of joint attention behavior (Rogers & Pennington, 1991). However, Nadel (2006) suggests that the lack of imitation may be the result of how this capacity has been researched in children with autism.

Caution must be taken regarding the interpretation and generalization of these results beyond this age group or to apply them to children with other developmental disabilities or language impairments. Also, joint attention was assessed by only three behaviors thereby limiting the generalization of these findings to this definition of joint attention. Future studies might include additional joint attention behaviors. Further research is also needed to determine the effects that imitating nonverbal children with autism may have on language development. Other suggestions for future research include further examination of joint attention behaviors and other behaviors related to the development of language including the child's recognition of being imitated and the child's initiation of novel behaviors. Another possible investigation might be the examination of the relations between imitation, practice effects, and the child's development of joint attention behaviors. Nonetheless, the results of this study suggest an association between social-affective and communicative behavior. They also indicate that imitating preschoolers with autism may be an effective intervention for at least increasing two of the joint attention behaviors observed in this study including gaze following and gesturing to the adult.

Acknowledgements

We would like to thank the researchers who conducted the original play sessions with the children (Tory Field and Brenda Lundy) and the children who participated in the play sessions.

Additional gratitude is also extended to Lissette Medina who assisted with the manuscript. This paper was completed in partial fulfillment of the Ph.D. in clinical psychology by the first author.

REFERENCES

- Boucher, S. M. (2008). *Joint attention, imitation, and repetitive behaviors as predictors of autism and expressive language ability in early childhood*. Doctoral Dissertation, Chapel Hill, NC: University of North Carolina at Chapel Hill.
- Carpenter, M., Nagell, K., Tomasello, M., Butterworth, G., & Moore, C. (1998). Social cognition, joint attention, and communicative competence from 9 to 15 months of age. *Monographs of the Society for Research in Child Development*, 63, i-174. doi:10.2307/1166214
- Carpenter, M., Pennington, B. F., & Rogers, S. J. (2002). Interrelations among social-cognitive skills in young children with autism. *Journal of Autism and Developmental Disorders*, 32, 91-106. doi:10.1023/A:1014836521114
- Charman, T., Swettenham, J., Baron-Cohen, S., Cox, A., Baird, G., & Drew, A. (1997). Infants with autism: An investigation of empathy, pretend play, joint attention, and imitation. *Developmental Psychology*, 33, 781-789. doi:10.1037/0012-1649.33.5.781
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Escalona, A., Field, T., Nadel, J., & Lundy, B. (2002). Brief report: Imitation effects on children with autism. *Journal of Autism and Developmental Disorders*, 32, 141. doi:10.1023/A:1014896707002
- Field, T., Field, T., Sanders, C., & Nadel, J. (2001). Children with autism display more social behaviors after repeated imitation sessions. *Child Development*, 5, 317-323.
- Heimann, M., Laberg, K. E., & Nordøen, B. (2006). Imitative interaction increases social interest and elicited imitation in non-verbal children with autism. *Infant and Child Development*, 15, 297-309. doi:10.1002/icd.463
- Hollingshead, A. (1975). *Four-factor index of social status*. New Haven, CT: Yale University.
- Hwang, B., & Hughes, C. (2000). The effects of social interactive training on early social communicative skills of children with autism. *Journal of Autism and Developmental Disorders*, 30, 331-343. doi:10.1023/A:1005579317085
- Ingersoll, B., & Schreibman, L. (2006). Teaching reciprocal imitation skills to young children with autism using naturalistic behavioral approach: Effects on language, pretend play, and joint attention. *Journal of Autism and Developmental Disorders*, 36, 487-505. doi:10.1007/s10803-006-0089-y
- Kasari, C., Freeman, S., & Paparella, T. (2006). Joint attention and symbolic play in young children with autism: A randomized controlled intervention study. *Journal of Child Psychology and Psychiatry*, 47, 611-620. doi:10.1111/j.1469-7610.2005.01567.x
- Klinger, L., & Dawson, G. (1992). Facilitating early social and communicative development in children with autism. In S. F. Warren, & J. Reichle (Eds.), *Causes and effects in communication and language intervention*, Vol. 5. Baltimore, MD: Brookes.
- Loveland & Landry (1986). Joint attention and language in autism and developmental language delay. *Journal of Autism and Developmental Disorders*, 16, 335-349. doi:10.1007/BF01531663
- McCarthren, R. B. (2000). Teacher-implemented prelinguistic communication intervention. *Focus on Autism and Other Developmental Disabilities*, 15, 21-29. doi:10.1177/108835760001500103
- Meltzoff, A. N. (1990). Foundation for developing a concept of self: The role of imitation in relating self to other and the value of social mirroring, social modeling, and self practice in infancy. In C. Cicchetti, & M. Beeghly (Eds.), *The self in transition: Infancy to childhood* (pp. 139-164). Chicago, IL: University of Chicago press.
- Meltzoff, A., & Gopnik, A. (1993). The role of imitation in understanding persons and developing a theory of mind. In S. Baron-Cohen, H. Tager-Flusberg, & D. J. Cohen (Eds.), *Understanding other minds* (pp. 335-366). New York: Oxford University Press.
- Mundy, P., & Sigman, M. (2006). Joint attention, social competence

- and developmental psychopathology. In D. Cicchetti, & D. J. Cohen (Eds.), *Developmental psychopathology* (2nd ed., Vol. 1, pp. 293-332). Hoboken, NJ: John Wiley & Sons, Inc.
- Nadel, J. (2006). Does imitation matter to children with autism? In S. J. Rogers, & J. H. G. Williams (Eds.), *Imitation and the Social Mind: Autism and typical development* (pp. 118-137). New York: Guilford Press.
- Nadel, J., Revel, A., Andry, P., & Gaussier, P. (2004). Toward communication: First imitations in infants, low-functioning children with autism and robots. *Interaction Studies*, 5, 45-74. [doi:10.1075/is.5.1.04nad](https://doi.org/10.1075/is.5.1.04nad)
- Rogers, S. J., & Pennington, B. F. (1991). A theoretical approach to the deficits in infantile autism. *Development and Psychopathology*, 3, 137-162. [doi:10.1017/S0954579400000043](https://doi.org/10.1017/S0954579400000043)
- Salt, J., Shemilt, J., Sellars, V., Boyd, S., Coulson, T., & McCool, S. (2001). The scottish centre for autism preschool treatment programme: I. A developmental approach to early intervention. *Autism: The International Journal of Research and Practice*, 5, 362-373. [doi:10.1177/1362361301005004003](https://doi.org/10.1177/1362361301005004003)
- Salt, J., Shemilt, J., Sellars, V., Boyd, S., Coulson, T., & McCool, S. (2002). The scottish centre for autism preschool treatment programme: II. The results of a controlled treatment outcome study. *Autism: The International Journal of Research and Practice*, 6, 33-46. [doi:10.1177/1362361302006001004](https://doi.org/10.1177/1362361302006001004)
- Trevarthen, C. (1977). Descriptive analyses of infant communicative behavior. In H. R. Schaffer (Ed.), *Studies in mother-infant interaction* (pp. 227-270). London: Academic Press.
- Uzgiris, I. C. (1981). Two functions of imitation during infancy. *International Journal of Behavioral Development*, 4, 1-12.
- Williams, J. H. G., Whiten, A., & Singh, T. (2004). A systematic review of action imitation in autistic spectrum disorder. *Journal of Autism and Developmental Disorders*, 34, 285-299.