

Mother-Infant Engagements in Dyads with Handicapped and Nonhandicapped Infants: A Pilot Study

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The purpose of this study was (a) to investigate the effect of a handicapping condition on mother-infant interactions and (b) to investigate the conditions under which coordinated attention to an object and a person is demonstrated. This study provides a unique opportunity to make across-mother and within-mother comparisons of mother-infant interactions in two sets of fraternal twins. In each set, one infant was handicapped whereas the other was nonhandicapped. Microanalyses of several aspects of mother-infant free-play sessions showed that handicapped infants emitted fewer object-directed behaviors, had fewer instances in which their leads were followed, and spent relatively little time in joint attention with mother. The data also suggest that repetitive sequences with an object may be an important context in which coordinated attention is demonstrated.

Prelinguistic communication is viewed as the onset of a continuum of communicative behaviors that eventually may develop into language (Harding, 1983; Clark, 1978; Bruner, 1982). Within these prelinguistic engagements, both mothers and infants influence each other's behavior (Bell, 1974). A handicapped infant may produce behaviors, or fail to produce important behaviors, which greatly change the form of mother-infant engagements. For example, mothers may find it difficult to maintain an interaction in the face of frequent infant regulatory behaviors, for example, gaze aversions, crying, or active reflex patterns (Als, 1982). This study is focused on how mothers

and infants regulate and influence each other's behavior with respect to initiating, terminating, and maintaining their interactive episodes. These episodes are sequences of behavior in which mother and infant attend to the same objects for a sustained period. Within an episode, objects often provide a focus around which mothers and infants can interact (Schaffer, 1977). Although episodes of interaction frequently occur without objects (e.g., peek-a-boo), in this study we are most interested in episodes that do involve objects.

There is evidence to suggest that during the early part of the first year of life the infant does not attend to objects and people simultaneously (Clark, 1978; Gray, 1978; Nelson, 1979; Trevarthen and Hubley, 1978). Coordinated attention is important for later communicative development. Sustained interactive episodes involving joint attention to an object may be an important context in which infants learn and demonstrate coordinated attention. The presence of a handicapping condition may greatly affect the form and length of these episodes. The purpose of this study was twofold: (a) to investigate the mutual influence of the mother's and infant's behavior in establishing and maintaining these episodes and (b) to explore a possible context in which infant coordinated attention to an object and to mother is demonstrated and developed.

This study provides a unique opportunity to study how the presence of a handicapping condition affects the mother's behavior and the form of the resulting interaction. Most studies that compare mother-infant engagement in dyads with handicapped and nonhandicapped infants have used some type of infant-matching procedure to attempt to control for confounding variables (e.g., Jones, 1977). Unfortunately, such matching procedures do not control for differences between mothers. The subjects for this study are two sets of fraternal twins and their mothers. The male in each set is severely handicapped, whereas the female in each set is developing normally. These subjects allowed us to observe the same mother interacting with a handicapped child and a nonhandicapped child. The second set of twins allows a replication to determine the effects of the handicapping condition on the interaction that may be common to both sets of twins.

METHOD

Subjects

Two sets of twins were recruited from an early intervention program in effect across the state of North Carolina, as a part of a larger longitudinal study of the development of exceptional children. Each handicapped twin was being served by a home-based early intervention program. In both twins, the handicapping condition was brought about by a severe trauma. One twin suf-

ferred anoxia of a prolonged nature during birth, resulting in brain damage and recurrent seizures. The other suffered meningitis at 6 months of age. The extent of damage is undetermined, but he too suffers seizures, and visual and auditory capacities are uncertain. In both cases the nonhandicapped twin is female and developing normally.

Procedure

When the infants were 12 months old, each mother and her twins came to the Frank Porter Graham Research Center in Chapel Hill, NC. While at the center, demographic information was collected from the mothers. The children were given the Bayley Scales of Infant Development and the Movement Assessment of Infants (MAI) (Chandler, Andrews, & Swanson, 1980). The latter instrument assesses the quality of movement, not developmental motor milestones. An overall risk score is obtained by summing across four subscales; the higher the score, the greater the risk in motor development.

Also during a visit to the center, the mother and each of her twins were videotaped for 20 minutes playing together. The setting for the observation sessions was a carpeted area of a lab. In the area were large pillows, a mat, several developmentally appropriate toys, and a few magazines. The parents were told that we were interested in how babies played with toys and their mothers and to interact with their babies as they would if they were at home.

The last 5 minutes of each session were independently coded by two observers. The last segment of the session was chosen to allow the infant and mother time to have become well engaged in interaction before coding was begun. Any disagreement between the observers was resolved through repeated viewings until the observers could arrive at 100% consensus. The duration and sequence of the following behaviors were coded from videotapes.

Mother-directed behaviors were coded when the infant looked at, touched, extended his arm toward, or threw an object toward the mother.

Joint attention to an object was coded when both partners acted on, touched, or gazed toward the same object or when the infant or mother attended to the other partner, who was in turn attending to the object.

Coordinated attention to an object and a listener was coded when the infant exhibited one of the following behaviors: (a) alternation of gaze between an object and the mother's eyes, (b) handing an object to the mother, or (c) some action that involved an object being directed toward the mother, for example, throwing an object to the mother. Of the three behavior classes, only alternating gaze between mother and an object was expected to be seen in the handicapped infants.

Episodes occurred when joint attention was sustained over 10 seconds, and these episodes must also have had at least two alternating turns from each partner that showed joint attention to an object. An example of an episode

is when mother shows a rattle to the baby. The baby looks at the rattle. Mother gives it to the baby. And the baby shakes the rattle.

Repetitive game-like sequences were a type of episode involving at least two cycles of repeated action with an object that were contingent on the baby's behavior. For example, mother covers up a toy bug with a scarf, baby uncovers the bug, then mother covers up the bug again and the cycle repeats.

Following the child's lead referred to shifting attention to the same object to which the baby had shifted his attention. For example, mother and baby have been looking at a ball; the baby shifts his gaze to the rattle; mother begins playing with the rattle.

Interrupting the episode was coded when either mother or infant (a) took away a toy the other was attending to, (b) introduced a new toy or activity to the actor, or (c) ceased to attend to the object of joint attention for more than 10 seconds.

Because the nature of the infant's terminating behavior may influence mother's behavior, we further discriminated the infant's terminations into four categories.

1. An *unfocused gaze* was coded when the infant's gaze did not rest on any visible object for more than 10 seconds.
2. A *cry* was coded when the infant became sufficiently engrossed in crying so that she/he no longer looked at or touched the object or so that the mother began to comfort him instead of attending to the previous object of joint attention.
3. A *reflex pattern* was coded when the infant arched his back, pushed his head back, straightened his legs, and indicated general discomfort.
4. An *object-directed behavior* was coded when the infant looked at or attempted to get a new object of interest.

RESULTS AND DISCUSSION

Each set of twins was 12 months old. Within each twin pair the infants were on quite different developmental levels. Both handicapped infants scored 28 (estimated) on the Bayley Scales of Mental Development and both amassed a total of at least 55 risk points on the MAI. The nonhandicapped children scored no risk points on the MAI, twin A scored 117 on the Bayley, twin B scored 107. The mothers, however, were from different socioeconomic levels. Mother of twin pair A was white, had attended college; the family had an income of \$20–25,000 per year. Mother of twin pair B was black, and graduated from high school; her family had an income of \$10–15,000 per year.

Table 1 details data that indicate that the handicapping condition affected the interaction in both sets of twins in similar ways.

In both twin pairs, the atypical infant usually interrupted joint attention

TABLE 1.
Comparisons of Handicapped and Nonhandicapped Twins
in Dyadic Interactions with Their Mothers Demonstrating Similarity Between the Pairs

	Mother Interruption %	Percentage of Behaviors That Interrupt Joint Attention				Obj. Dir.	Number of times Mother Followed Child's Lead	Total Time in Episodes
		Infant Interruptions						
		Unfocused Gaze %	Cry %	Reflex %				
<i>Twin Pair A</i>								
Atypical	0	36	18	45	0	1*	14 seconds	
Normal	0	41	6	0	53% (9)	7	135 seconds	
<i>Twin Pair B</i>								
Atypical	10	10	0	65	15% (3)	2	84 seconds	
Normal	29	5	0	0	67% (14)	6	202 seconds	

*Based on mother's interpretation of baby attending to an object. Observer saw no object directed behavior on which to base maternal interpretation.

with a behavior that did not focus on a new stimulus. Table 1 shows that the atypical infants most frequently interrupted joint attention to an object with the activation of a reflex pattern. The second most frequently observed behavior that interrupted joint attention was unfocused gaze, the least frequent infant interruptions were those that focused on a new object. Thus, both atypical infants engaged in behaviors (involuntarily) that made sustained attention to an object with their mothers very difficult.

Finally, the atypical children spent less total time in episodes than did the nonhandicapped children. As can be seen in Table 1, nonhandicapped infants A and B spent 135 and 202 seconds of the total 300-second segment in sustained joint attention episodes. The atypical infants A and B spent only 14 and 84 seconds, respectively, in episodes. The atypical babies' frequent non-directed behaviors provided fewer opportunities for the mother to establish joint attention by following the child's lead. This factor may have resulted in fewer opportunities for establishing an episode.

In contrast, Table 1 shows the nonhandicapped infants in both twin pairs usually used object-directed behaviors when they interrupted joint attention. That is, the nonhandicapped infants interrupted joint attention to an object most often to attend or play with a new object of interest. This kind of redirection of interest is obviously easier for mothers to follow and understand. In both sets of twins, the mother followed the nonhandicapped child's lead more than she followed the atypical child's lead.

To summarize, the interactions of both twin sets showed at least three com-

TABLE 2.
Comparisons of Handicapped and Nonhandicapped Twins in Dyadic Interactions
with Their Mothers Showing Differences Between the Pairs

	Number of Behaviors Directed to Mother	Number of Instances of Coordinated Attention	Number of Episodes	
			Repetitive	Non Repetitive
<i>Twin Pair A</i>				
Atypical	0	0	0	1
Normal	0	0	1	2
<i>Twin Pair B</i>				
Atypical	15	3	2	1
Normal	26	25	7	2

mon effects of the handicapping condition on mother-infant interaction: (a) the handicapped infants interrupted joint attention with nondirected behaviors; (b) the mother followed the handicapped infant's leads fewer times; and (c) the handicapped infants spent less time in sustained joint attention episodes.

Table 2 details the data that demonstrate the ways the interactions of twin pair A differed from those of twin pair B. These differences help identify a context in which coordinated attention may be facilitated and demonstrated and they indicate individual variability in mothers' interactive patterns with their infants, typical as well as atypical in development.

Neither child in twin pair A directed an act to mother, whereas the children in twin pair B did so frequently. Consequently, neither child in twin pair A showed coordinated attention to mother and an object. Again both of the children in pair B did show instances of coordinated attention.

These results were unexpected. We predicted that coordinated attention would be demonstrated with increasing developmental capability. However, as seen in Table 2, this was not the case. Why would neither the atypical or typical child in twin set A demonstrate coordinated attention?

One explanation is differences in the atypical infants. Twin B began life handicapped because of severe birth trauma. In contrast, twin A began life as normal and later suffered severe trauma with spinal meningitis. The resulting brain damage may prevent coordinated attention from ever being developed in the meningitis child. Perhaps the child impaired by meningitis lacked the cognitive and behavioral requirements to develop coordinated attention; whereas atypical twin B may have had more cognitive and motoric skills. Perhaps the cognitive and motor assessment instruments were not sufficiently accurate or sensitive to discriminate differences between these two severely handicapped infants.

However, the nonhandicapped twin A did not show coordinated attention either. This points to the possibility of differences in styles of maternal interaction. It seems unlikely that nonhandicapped twin A is incapable of coordinating attention to objects and mother. These data suggest that coordinated attention may be demonstrated more frequently in the context of episodes that can be characterized as repetitive game-like sequences. Of the 28 instances of coordinated attention seen in all four dyads, all but two occurred in sustained episodes. And all but one of the episodes that contained an instance of coordinated attention were repetitive game-like sequences.

Data in Table 2 support the relationship of game-like sequences and coordinated attention. Nonhandicapped infant A may not have demonstrated coordinated attention because she and her mother established only three episodes, only one of which involved a repetitive game-like sequence. In contrast, the nonhandicapped infant who did show coordinated attention engaged in nine episodes, seven of which were repetitive.

If the repetitive pairing of mother's action and an attractive object is an important context in which infants learn to attend to mother and objects, then the lack of such repetitive game-like sequences may, in part, account for the absence of coordinated attention in the first handicapped infant. As seen in Table 2, mother A was not able to establish any repetitive sequences with her handicapped infant. In contrast, the handicapped infant who did demonstrate coordinated attention was engaged in two such sequences.

The authors do not present these data as evidence supporting a causal relationship between repetitive sequences and the development of coordinated attention. However, we are proposing that this kind of sequence should be studied as an important context in which to investigate the demonstration and development of coordinated attention.

CONCLUSION

The atypical infants in each twin set affected their mothers' interactions in similar ways. Both mothers followed their atypical child's lead less frequently; in each case the atypical twin provided few cues that mothers could follow and build into an interactive sequence. The resulting interaction was one in which the atypical infants spent relatively little time in joint attention with mother. Although the atypical twins were similar in their interactive patterns and the resulting play behaviors with their mothers closely resembled each other, there were differences between the twin pairs as well. One major difference between the way the mothers interacted with their children was that neither child in pair A showed coordinated attention even though one of the infants was not handicapped. Corresponding with this finding was the fact that mother A did not engage in game-like sequences. Future researchers may do well to investigate the relationship of these repetitive game-like sequences to the development and use of coordinated attention in infants.

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REFERENCES

- Als, H. (1982). The unfolding of behavioral organization in the face of a biological violation. In E. Z. Tronick (Ed.), *Social interchange in infancy: Affect, cognition, and communication*. Baltimore, MD: University Park Press.
- Bell, R. Q. (1974). Contributions of human infants to caregiving and social interaction. In M. Lewis & L. Rosenblum (Eds.), *The effect of the infant on its caregiver*. New York: John Wiley & Sons.
- Bruner, J. S. (1982). The organization of action and the nature of the adult–infant transaction. In E. Z. Tronick (Ed.), *Social interchange in infancy: Affect, cognition, and communication*. Baltimore, MD: University Park Press.
- Chandler, L., Andrews, M., & Swanson, M. (1980). *Movement assessment of infants*. Seattle, WA: University of Washington.
- Clark, R. (1978). The transition from action to gesture. In J. Lock (Ed.), *Action, gesture and symbol: The emergence of language*. London: Academic Press.
- Gray, H. (1978). Learning to take an object from the mother. In J. Lock (Ed.), *Action, gesture and symbol: The emergence of language*. London: Academic Press.
- Harding, C. (1983). Setting the stage for language acquisition: Communication development in the first year. In R. M. Golinkoff (Ed.), *The transition from prelinguistic to linguistic communication*. Hillsdale, NJ: Lawrence Erlbaum.
- Jones, O. H. (1977). Mother–child communication with prelinguistic Down’s syndrome and normal infants. In H. R. Schaffer (Ed.), *Studies in mother–infant interaction*. London: Academic Press.
- Nelson, K. (1979). The role of language in infant development. In M. H. Bornstein & W. Kessen (Eds.), *Psychological development from infancy: Image to intention*. New York: John Wiley & Sons.
- Schaffer, H. R. (1977). Early interactive development. In H. R. Schaffer (Ed.), *Studies in mother–infant interaction*. London: Academic Press.
- Trevarthen, C., & Hubley, P. (1978). Secondary intersubjectivity: Confidence, confiding and acts of meaning in the first year. In A. Lock (Ed.), *Action, gesture and symbol: The emergence of language*. London: Academic Press.