

Infant Social Cognition and "Second-Order" Effects*

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Thirty-six one-year-olds were observed interacting with their parents in three contexts: mother present, father present, and both parents present. Results showed that the infants directed substantially more affiliative behaviors, and marginally more attachment behaviors, to their parents in the dyadic than in the triadic situation. The parents, too, were considerably more likely to interact with infants in the dyadic context. There are two processes whereby these "second-order" effects can be explained: Either infants distribute their social bids among the available interactants, or they respond to the increased activity of their parents. Since there was no correlation between the activity levels of the infants and their parents, it was suggested that one-year-olds respond primarily to the former cue. Previous studies have found that older infants and adults employ both cues. The results thus suggest that the social cognition of one-year-olds is more restricted than many theorists claim.

After initial concern with the determination of infants' parental preferences (e.g., Cohen & Campos, 1974; Feldman & Ingham, 1975; Kotelchuck, 1976; Lamb, 1976b, 1976c, 1976d, 1977b), recent studies have attempted to determine whether mother-infant and father-infant interactions are affected by the presence or absence of the other parent (Lamb, 1976a, 1976d, 1977c). This interest stems from Bronfenbrenner's (1974) widely publicized appeal that developmental psychologists take care to specify such "second-order" effects in the phenomena they investigate. Lamb (1976a, 1977c) has shown that both 18- and 24-month-olds interact far more with either parent when the other is absent than when both parents are simultaneously present. Similarly, Rosenblatt (1974) has shown that parents interact less with one another when accompanied by a child than when alone. As Lamb (1977c) suggested, these effects can be accounted for in two ways. First, there is the distributional explanation, based on the presumption that when two potential social partners are present, in-

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dividuals will distribute their attention between them, whereas when only one is present, all attention will be focused on him/her. Second, the second-order effect may be observed in children simply because they are responding to the increased stimulation provided by the parents who, Lamb (1976c, 1976d, 1977c) has shown, interact far more with their infants when their spouse is absent.

Given the commonsense nature of these explanations, the most interesting aspect of this second-order effect may be the apparent failure of one-year-olds to monitor their own behavior in this way. Lamb (1976d) found that 12-month-olds were equally active in interaction with either parent regardless of the presence or absence of the other parent. This was particularly surprising since the parents themselves were far more active in interaction with their children when alone with them. This suggested that one-year-olds, unlike 18- and 24-month-olds, failed to notice, or respond appropriately, to two important social cues: the increased activity of (and thus, presumably, increased salience of) the parents, and the absence of alternative figures with whom to interact.

The developmental trend indicated by the results of the three studies (Lamb, 1976a, 1976d, 1977c) are consistent with Hinde's (1974) argument that there is increasing intermeshing of child and adult behavior with age. However, the apparent insensitivity of one-year-olds to two powerful social signals is not consistent with recent claims concerning the social competence of infants and neonates (cf. Lamb, 1977a). If infants from the first trimester of life are indeed capable of monitoring their behavior and that of adults in the course of reciprocal interactions (e.g., Brazelton, Tronick, Adamson, Als, & Wise, 1975; Lamb, 1977a; Stern, 1974a), they should be sensitive to one or both of the cues involved in this second-order effect. Acceptance of Lamb's finding, consequently, would require that we reevaluate our conception of the social competence of infants.

Unfortunately, Lamb (1976d) can be faulted for his failure to control systematically for order effects, and most importantly, for the confounding of the experimental conditions with infant affective state. The results reported indicate that the one-year-olds were significantly more fatigued, fractious, and dependent as the session proceeded, whereas the older infants maintained their composure throughout the relevant episodes (Lamb, 1976a, 1977c). Since the single-parent episode always succeeded the two-parent situation, it is conceivable that the unexpected results reflect merely different states of the younger infants in the two situations.

The present study, consequently, was designed to determine whether the second-order effect could be demonstrated in one-year-olds when a carefully counterbalanced procedure was employed to eliminate any confounding with infant emotional state.

If this effect could be demonstrated among one-year-olds, our second goal was to determine to which of the social cues the infants were sensitive. This was

to be achieved by correlational and covariate analyses.¹ If the infants were responding to the predictable increased activity of their parents, it was hypothesized, there should be high and significant correlations between the levels of activity of the infants and the parents. Lamb (1976a, 1977c) has reported such correlations in the behavior of 15- to 24-month-olds observed both in unstructured home settings as well as in structured laboratory settings in which the parents were under experimental instructions (as in the present study) to be responsive but not initiatory. Indeed, in his explorations of second-order effects among 18- and 24-month-olds, Lamb (1976a, 1977c) found that a major proportion of the variation in infant behavior could be eliminated when variation in the degree of adult activity was controlled by covariation. In one-year-olds, however, Lamb (1976d) reported that there were small and insignificant correlations between the activity levels of adult and infant, and that analyses of infant behavior were completely unchanged by covariation procedures. This indicated that one-year-olds were insensitive to the social cue implicit in the adults' activity levels. A similar finding in the present study, coupled with successful demonstration of the second-order effects, would indicate that the infants were sensitive only to the cue provided by the number of interactants present (the distributional hypothesis). On the other hand, high correlations between levels of adult and infant behavior, but with the second-order effect still apparent after the influence of parental activity had been partialled out by covariate analyses, would suggest that the infants were sensitive to both social cues. Finally, absence of the second-order effect, despite predictable changes in adult behavior, would indicate that the one-year-olds were indeed insensitive to both of these social cues.

METHOD

Subjects

Eighteen male and 18 female one-year-olds (± 2 weeks) and their parents served as subjects in this study. Participants were recruited from published birth records by means of an introductory letter, followed by a telephone call. Fifty-one percent of those contacted agreed to participate: An acceptance rate similar to that reported by most individuals using these records for recruitment. The sample was overwhelmingly upper middle class, reflecting the demographic characteristics of the university town in which the research was conducted. On the 7-point Hollingshead (1957) Occupational Scale, 67% of the families were

¹Previous research (Lamb, 1976a, 1976d, 1977c; Sherrod, 1976) and our own pilot observations suggest that adequate control by experimental instruction is difficult to achieve. In both the present study and Lamb's earlier studies, parents were instructed not to initiate interaction, yet when their spouses left the room parents almost invariably increased their interaction with the child — evidence of the potency of the second order effect among adults.

classified in Class I, 8% in each of Classes II, III, and VI, 3% in IV, and 5% in Class V. Eighteen (50%) of the infants were first-borns, fourteen (39%) were second-borns, and four (11%) were later-borns.

Procedure

Each infant was observed in three contexts: Mother present, Father present, and Mother and Father present. Each episode was of eight minutes duration. The order of the episodes was varied systematically; three boys and three girls were observed in each of the six possible orders. The episodes followed immediately after one another: interepisode intervals permitted only the entrance or exit of the person concerned.

The families were observed in a large playroom (6.0 m X 7.5 m) in which were positioned two chairs for the parents 2.5 m apart along one wall, a couch, a table and chair, some large wooden toys along the walls, and 26 smaller toys, laid out in a standard manner around the room. Taped lines indicated a radius of .9 m around each parent's chair, and the spot (2.4 m from the parents' chairs) where the child was placed at the beginning of the procedures. There were no toys positioned within 1 m of the parents' chairs at the start of the session. Eighteen of the fathers were assigned randomly to the chair on the left, and 18 were assigned to the chair on the right. The parents were instructed to refrain from initiating interaction with the children, though they were asked to respond when the children initiated interaction with them. When leaving the room, they were asked to do so as they would normally. On returning to the room, they paused briefly at the door so that the infants noted their return before the other parent left the room.

From behind the one-way windows that extended along the length of one wall, an observer recorded the infant's behavior using the SSR Keyboard, a modified event recorder that permits computerized transcription of the behavioral accounts (Stephenson, Smith, & Roberts, 1975). The same observer was responsible for all observations. In addition, however, a videotaped record of each session was recorded, and several of these were recoded independently to permit the computation of observer reliability coefficients (see below). The parents' chairs were positioned in front of this window, thus assuring the observer and camera a clear frontal view of the baby's face when it was oriented toward either parent. Overhead microphones were used to record verbal interactions.

Ten infant behaviors were recorded: Five of these are referred to as affiliative behaviors and five are called attachment behaviors. This distinction between attachment and affiliative behaviors rests on theoretical claims (Bowlby, 1969; Bretherton & Ainsworth, 1974) and empirical demonstrations (Lamb, 1977b; Tracy, Lamb, & Ainsworth, 1976) that attachment behaviors are directed most often to attachment figures, whereas affiliative behaviors, which are essential for almost all social interaction, are directed not only to attachment figures, but also

to individuals to whom infants are not attached. The affiliative behaviors were: Smiling at, vocalizing to, looking at, laughing at or in interaction with, and proffering (offering or showing) a toy to, a parent.² The attachment behaviors were proximity (being within .9 m of the parent), touching, approaching, asking to be held by, and fussing to, a parent. The detailed definitions of these behaviors are identical to those provided by Lamb (1976b, 1976d), except that the data-recording system used in the present study permitted more accurate estimates of the duration of time spent touching, or in proximity of, the parent. All other measures were frequency counts, scored once each time they occurred.

The frequency of adult vocalization to the child was also recorded (see definition in Lamb, 1976d). This measure was used because it can be scored reliably by an observer without demanding that s/he cease watching or recording the baby's ongoing behavior. In addition, it is reported to provide an accurate estimate of the activity or involvement of the parent(s) in the immediate situation, particularly when the instructions to the parents inhibit all other forms of interaction (Lamb, 1976d, 1976e, 1977c).

The total frequencies or duration of each behavior in each episode composed the data base for the study.

Reliability

Eleven (31%) of the videotaped records were selected at random and independently recoded, using the SSR keyboard system, by a trained observer who was naive with respect to experimental hypotheses. Percentage of agreement was calculated by dividing the smaller of the two observers' measures by the larger and multiplying by 100; this procedure is the same as that used in previous observational studies (e.g., Eckerman, Whatley, & Kutz, 1975; Lamb, 1976a, 1976b, 1976d) because it results in a more conservative estimate of the reliability than do correlation coefficients. Coefficients ranged from 65% (vocalize to parent) to 95% (seek to be held). The mean was 83%, and the median, 85%. All coefficients except one were above 70%. The coefficients are presented in Table 1. Since coefficients of agreement were similar, regardless of the experimental condition or identity of the parent, it appears that reliability was satisfactorily high to permit confidence in the accuracy of observation.

RESULTS

Table 2 displays the frequencies of attachment and affiliative behaviors and adult vocalizations in the two conditions. The individual measures were not

²The focus was clearly upon directed social behavior. Vocalizations that were not directed to a particular parent were recorded as indeterminate vocalizations. The second-order effects were not evident in the occurrence of such indeterminately directed behaviors.

TABLE 1

Summary of Observer Reliability Coefficients

Behavior	Percentage agreement
Smile	72
Vocalize	65
Look	75
Laugh	87
Proffer	79
Proximity	88
Approach	94
Touch	85
Seek to be held	95
Fuss	94
Indeterminate vocalization	85
Parental vocalization	75

significantly correlated with one another, within or across treatments. The data were subjected to a 2 (Sex: Boy or Girl) by 2 (Parent: Mother or Father) by 2 (Cohort: Spouse present or Spouse absent) multivariate analysis of variance (MANOVA) using the *Multivariate* program written by Finn (1974). The frequencies of smiling, vocalizing, looking, laughing, proffering, approaching, asking to be held, and fussing to a parent were not normally distributed, so analyses were conducted using $\log_{10}(x+1)$ transformations of these variables. Since there is uncertainty regarding the usefulness of such normalizing transformations in multivariate analysis (Harris, 1975), the analyses were recomputed without the transformation. The results were unchanged.

The first MANOVA revealed an insignificant Parent main effect ($p < .5$) but a highly significant Cohort effect ($p < .0001$). Subsequent separate MANOVAs of the attachment and affiliative behaviors showed significant effects in both of these groups of behaviors ($p < .01$, $p < .0001$, respectively). As Table 2 indicates, the infants interacted far more with either parent in the absence of the other than when both were simultaneously present. The results of both uni- and multivariate analyses are displayed in Table 2.

Since the parents, too, were strongly affected by the Cohort condition, with both talking to the infant considerably more in the absence of their spouse ($p < .001$), the analyses were recomputed using the frequency of adult vocalization as a covariate. This MANOCOVA yielded an insignificant Parent main effect, but a highly significant Cohort effect ($p < .0001$). The results, which are displayed in Table 2, indicated that even with the degree of parental activity controlled by covariation, the infants engaged in significantly more interaction with both parents when only one was present than when both were simultaneously present. The effect was most marked in the occurrence of affiliative behaviors, though it was also evident in the occurrence of two (proximity, $p < .02$; approaching, $p < .02$) of the attachment behavior measures. These results indicate

TABLE 2
Mean Frequencies of Attachment and Affiliative Behavior

Behavior	Spouse present		Spouse absent		Significance of second-order effect	
	Mother	Father	Mother	Father	Covariate	No covariate
<u>Affiliative</u>					$p < .0001$	$p < .0001$
Smiles	3.1	4.3	2.6	5.1	NS	NS
Vocalizes	4.8	5.1	6.9	7.9	$p < .05$	$p < .01$
Looks	14.9	15.2	19.6	20.2	$p < .0005$	$p < .0005$
Laughs	0.4	0.3	0.1	0.1	$p < .05$	NS
Proffers	2.0	1.9	3.7	3.4	$p < .05$	$p < .01$
<u>Attachment</u>					$p < .05$	$p < .01$
Proximity	206.2	96.2	228.3	325.4	$p < .05$	$p < .01$
Touches	76.3	14.7	57.1	98.8	NS	NS
Approaches	3.9	2.7	5.1	4.8	$p < .05$	$p < .05$
Seek to be held	1.1	0.1	0.3	1.0	NS	NS
Fusses	1.1	0.3	0.3	0.9	NS	NS
All behaviors					$p < .0001$	$p < .0001$
Adult vocalization	18.7	10.1	37.8	38.4		

that use of the covariate had little effect on the results of the analyses. Correlational analyses confirmed that all indices of infant behavior were minimally and insignificantly correlated with the index of adult activity.

Although none of the MANOVAs or MANOCOVAs revealed significant interactions among the effects, inspection of Table 2 suggests a marked Parent X Cohort interaction. Four of the five univariate analyses indeed reflected statistically significant interactions (proximity, $p < .02$; touching, $p < .04$; seeking to be held, $p < .02$; and fussing to an adult, $p < .04$). These results suggested that when both parents were present, the infants directed more attachment behaviors to their mothers than to their fathers, while in the single-parent episodes, far more attachment behavior was evident in the father-infant episodes than in the mother-infant episodes. However, although Table 2 suggests that the mothers spoke to the infants far more than the fathers when both were present while being equally active in the single-parent episodes, this interaction was not statistically significant ($p = .5$).

Sex Differences

The initial MANOVA and the subsequent MANOCOVA revealed a significant Sex of Child effect ($ps < .05$), though only two of the univariate measures even approached significance (proffering, $ps < .0002$, vocalizing, $ps < .10$). Girls vocalized to both parents more than boys, while also proffering toys to them

more often. The affiliative behavior MANOVA, consequently, showed a significant Sex effect ($p < .01$), though there was no similar effect on the attachment behavior measures ($p < .7$). There were no significant interactions involving the Sex factor.

DISCUSSION

These results clearly indicate that one-year-olds are capable of appraising their social context and altering their behavior appropriately. The infants interacted far more with either parent when alone with him/her than when both parents were simultaneously present. As in previous studies, the effect was most clearly evident on the affiliative behavior measures, with smiling being least sensitive. Although two of the attachment behavior measures (proximity, approaching), showed similar effects, these were less dramatic, and in the case of proximity, interpretation is hampered by an interaction with the parent effect. Comparison of effects on individual measures with those reported for older infants (Lamb, 1976a, 1977c) suggests that there are no developmental changes during late infancy in the sensitivity of individual behavioral measures to these second-order effects. Lamb's (1976d) previous failure to demonstrate these second-order effects among one-year-olds, therefore, would appear to be an artifact of his procedure, and his failure to control for order effects.

Lamb's results had cast into question recent speculations concerning the social-cognitive competence of young infants (see Lamb, 1977a, for a review). The results of the present study do not completely allay these doubts. The absence of correlations between the indices of adult and infant activity indicate that the level of interactive activity of one-year-olds, unlike that of 18- and 24-month-olds, is not influenced by the level of activity of the social partner. This strongly implies that infants of this age have not yet succeeded in intermeshing their own with parental behavior. This in turn suggests that at this age, the second-order effects are evident because infants distribute their attention differentially dependent upon the number of potential interactants present, and not because they respond to the increased activity (and thus salience) of the parents. Interestingly, Lamb (1976d) also reported that degree of adult activity was uncorrelated with the level of interactive activity among one-year-olds. The importance of this is underscored by reports that during the second year of life, both at home and in the laboratory, level of adult activity exerts a considerable influence on infant behavior — primarily affiliative interaction (Lamb, 1976a, 1977c). Viewed together, these studies indicate that considerable intermeshing of adult and infant behavior takes place in the second year of life, and hence, by corollary, that infants do not appear able in the first year of life to monitor the intensity of adult behavior and adjust their level of social activity accordingly. This conclusion is consistent with Lamb's (1977a) argument that much of the evidence believed to indicate the capacity of young infants to monitor their behavior and that of others should instead be viewed simply as confirmation that

adults adjust *their* behavior to intermesh with the child's behavior, rather than the reverse. This reinterpretation is consistent with much of the available evidence (e.g., Brazelton et al., 1975; Jaffe, Stern, & Peery, 1973; Lewis & Freedle, 1973).

On the other hand, Stern (1971, 1974a, 1974b) has found that 3-month-old infants modulate interaction by averting their gaze when the stimulation provided by the mother is too intense. Meanwhile Brazelton (Brazelton et al., 1975; Tronick, Adamson, Wise, Als, & Brazelton, 1975) and Carpenter (1974; Carpenter, Tecce, Stechler, & Friedman, 1970) have shown that when adults are unresponsive, infants apparently perceive a violation of expectations and intensify their efforts to engage the adults in interaction before withdrawing or crying. Thus it appears that while infants and neonates respond to the gross social cues implicit in overstimulation or total unresponsiveness, they are incapable of monitoring and responding appropriately to the more subtle cues implicit in variations in the level of adult activity. While demonstrating the ability of one-year-olds to respond appropriately to one social cue (number of potential interactants), therefore, this study also indicates that the social cognition of young infants is more restricted than many theorists are wont to claim (cf. Lamb, 1977a, for a review).

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