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Father Interaction and Separation Protest[1]

ELIZABETH SPELKE, PHILIP ZELAZO, JEROME KAGAN,[2] AND MILTON KOTELCHUCK
Harvard University

Thirty-six 1-year-old middle-class children with fathers who spent differential time with them at home were observed in two experimental contexts separated by 2 weeks. In the first, each infant was shown six to eight repetitions of three different nonsocial events followed by a change in the repeated standard. In the second, each infant experienced the unannounced entrances and departures of his mother, father, and a female stranger. The infants who were most upset when alone with the stranger came from low-father-interaction families and became bored most rapidly with the nonsocial stimuli. The infants who were least fearful with the stranger came from high-father-interaction families and displayed the greatest interest in and smiling to the inanimate stimuli. It was argued that crying or protest to separation is a complex phenomenon influenced by discrepancy, temperament, and level of cognitive development and is not a sensitive index of the intensity of the child's emotional bond to his parent.

Infant protest following separation from the mother has been used as a partial index of the strength of the mother–infant bond, in which case it is assumed that the strength of that bond covaries with the amount of social interaction (Schaffer & Emerson, 1964). Ainsworth and her colleagues (Ainsworth 1963, 1967; Ainsworth & Bell, 1970; Ainsworth, Bell, & Stayton, 1971) have questioned that practice and suggested that separation fear reflects an insecure attachment between infant and mother. One of the reasons for the ambiguity surrounding the relation of this phenomenon to the child–parent bond is that separation protest is most often measured in a setting in which a mother leaves her child either in an unfamiliar room or in a familiar room with an unfamiliar person (Ainsworth & Bell, 1970; Fleener & Cairns, 1970; Littenberg, Tulkin, & Kagan, 1971). It is not clear, therefore, whether the primary cause of protest is disruption of or threat to the affective tie to the mother or exposure to an unusual event that cannot be assimilated. Several studies affirm Ainsworth's view that separation protest is not necessarily indicative of a strong attachment. Passman and Weisberg (1972) observed that separation protest was attenuated if the infant had his favorite blanket when he was alone in the strange room. Kotelchuck (1972) reported that protest did not occur following every maternal departure; children cried when left with the stranger but not when left with the father. Moreover, despite large differences in maternal and paternal contact at home, protest was as likely to follow separation from father as separation from mother.

The immediate incentive for the present study was the unexpected observation (Kotelchuck, 1972) that 1-year-old infants with fathers who interacted minimally with them showed more separation protest than those who experienced more frequent father interaction. Interpretation of this association is not immediately clear. Hence, we wished to see if it could be replicated with a priori selection of the father-interaction variable. A second purpose was to inquire further into the cognitive foundations of separation distress. Littenberg et al. (1971) found little

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[2] Requests for reprints should be sent to Jerome Kagan, 1510 William James Hall, Harvard University, Cambridge, Massachusetts 02138.

separation protest in a home setting when the mother departed by a door which she used frequently, but considerable apprehension when the mother exited through a door which she used rarely. This result suggests that separation distress occurs when the child detects a discrepant event that he cannot assimilate. If so, children prone to separation distress might also react in a vigilant way to other classes of discrepant experience. Hence, we inquired into the cross-situational stability between behavior to parental separation and behavior to an unexpected, nonsocial event.

Method

Subjects

The subjects were 36 firstborn, Caucasian 1-year-olds, half boys and half girls, from typical middle-class Massachusetts families. At least one parent had received a bachelor of arts or bachelor of science degree; the other parent had completed at least 1 year of post high school training. No mother was employed in a full-time job or involved in activities that kept her from her child more than 20 hours per week. All children visited the laboratory twice, initially at 11½ months and again at 12 months with parental interviews occurring between the two visits.

Father Inteview

Each father was interviewed by the senior author in order to gain sufficient information to place him in one of three groups: high, medium, and low father interaction, with 6 boys and 6 girls in each group. The assignment of fathers—which was made without knowledge of the child's behavior in either laboratory setting and before the assessment of separation protest—was based on five variables: amount of time spent with the child, extent of participation in child care, sensitivity to the child's signals, father's sense of importance as an interacting parent, and general responsiveness.

Fathers were categorized as low, medium, or high on the first two variables, which were evaluated from straightforward questions about the fathers' and babies' schedules and parental division of caretaking responsibilities. Evaluation of each of the remaining three variables was based on tape-recorded answers to longer, more personal questions which permitted fathers to be categorized low, medium, or high. The variables sensitivity, sense of importance, and responsiveness each contributed one ninth toward the final categorization (or one third as a composite "qualitative" variable). Amount of time spent with the child and caretaking (the less subjective variables) each contributed one third to the final categorization. Fathers whose scores on all variables were in agreement posed no problem for assignment. Fathers with two scores in one category and one in another were assigned to the former category. Level of father interaction was assessed independently by two raters. There was complete agreement between the raters in 75% of the cases and disagreement by one category in the remaining cases. Final scores were based on discussion between the judges.

Separation Protest

Each subject was observed at 12 months in an unfamiliar setting in which presence or absence of mother, father, and female stranger was experimentally manipulated in a procedure that replicated the one used by Kotelchuck (1972). The setting was a room 18 × 21 feet designed to resemble a living room. Toys were placed in the center of a carpeted floor; chairs, a couch, and a stationary video camera were against the walls. A one-way mirror opposite the video camera ran the length of one wall, behind which were a moveable video camera, video recorder, and sound equipment. All infant behavioral variables were coded from videotape recordings of the entire session. Initially each subject was placed in the center of the room facing his parents, who sat in chairs against the mirror. The 39-minute procedure was composed of 13 episodes, which varied the persons who stayed in the room with the child. Every 3 minutes one of the three adults either entered or departed according to the following schedule conditions: condition, 1, mother and father in room with child; 2, father only; 3, father and stranger; 4, stranger only; 5, stranger and mother; 6, mother only; 7, mother and father; 8, mother only; 9, mother and stranger; 10, stranger only; 11, stranger and father; 12, father only; and 13, father and mother.

All subjects received the same schedule, for Kotelchuck (1972) found no effects of order on the child's behavior. The parents were instructed to read magazines and to refrain from initiating interaction with their child, although they were allowed to respond naturally but minimally to the child-initiated interactions. If, however, the child was fretful, the parents were instructed to interact with the child as much as necessary to comfort him. Eight female college students, who acted as strangers, were given instructions similar to those of the parents. If crying continued for 45 seconds when the child was alone with the stranger, the parent scheduled to enter the room next was sent in earlier. This change in procedure was necessary for 12 children. The average lengths of the first and second stranger-alone episodes were 160 and 146 seconds out of a maximum time of 180 seconds.

The following infant behaviors were coded from the videotape recording: *duration* (in seconds) of crying; fretting; playing with toys; looking at mother, father, stranger, and door; proximity to mother, father, stranger, and door; touching mother, father, stranger, and door; as well as

number of vocalizations to mother, father, and stranger; and number of nonsocial vocalizations. These variables were coded for each minute of the 39-minute session. The records of 12 randomly selected infants were scored by two independent coders; the mean intercoder reliability was .92 with a range from .80 to .99.

When a stranger-alone session was terminated early because the child was severely upset, extrapolated values were used in the analyses. All variables were given a score of zero for the time remaining in the 3-minute period, except crying, which was given the maximum value for the remaining time. If proximity and touching were occurring at the time of termination, these variables were also given the maximum value.

Each variable was summed for each of the 13 conditions, and similar conditions were pooled to determine the extent to which the infants behaved differently with mother, father, and stranger. Analyses of variance for two independent variables (level of father interaction and sex) and one repeated measure (successive conditions in which child was with varied adults) were computed.

Reaction to Discrepancy

Two weeks before the separation session each subject came to a different laboratory room and was exposed to three different procedures designed to measure reactions to unexpected visual discrepancy (Kagan, 1971). A relatively novel event was repeated for a fixed number of trials followed by a transformation of that standard. Each child sat on his mother's lap in front of a stage which resembled a puppet theater. A black curtain extended from the right side of the stage and concealed two coders; a third experimenter presented stimuli through slits in the curtain. The three procedures were called *cube, light,* and *car-doll.*

Cube. In the first sequence, the examiner lifted a 2-inch orange cube from a box, moved it across the stage in a zigzag motion, and returned it to the box. After six standard trials, a 1½-inch orange cube—the transformation—was presented in the same manner for three trials, followed by a return of the original larger cube for three additional trials.

Light. In the second sequence, the examiner moved an orange rod in a circular arc from left to right until it touched one of three colored lights. On contact, all three lights lit. After eight such repetitions, the examiner rested his hand on the rod without moving it, and 3 seconds later the lights lit. This transformation occurred five times, followed by three repetitions of the original standard.

Car-doll. In the third sequence, the examiner set a car in motion down a ramp toward a styrofoam object which fell on contact. Following eight repetitions, five transformation trials occurred in which the doll did not fall when hit by the car, followed by three presentations of the original standard event.

The major dependent variables coded were fixation of the stimulus event, positive vocalization, smiling, and fretting (in seconds). Intercoder reliabilities for these four variables were all above .90. These four behaviors, as well as selected stimulus events in each procedure, were simultaneously recorded on an eight-channel Grass polygraph. The data were analyzed for four blocks of three trials each. In all three sequences, Block 1 consisted of the first three standard trials, Block 2 of the last three standard trials, and Block 4 of the three return trials. Block 3 consisted of the three transformation trials for the cube sequence and of the first, second, and fourth transformation trials in the light and car-doll sequences.

Results

Behavior to Separation

As Kotelchuck (1972) reported originally, departure of one parent did not provoke much crying or disruption of play as long as the other parent remained in the room. Crying occurred primarily when the child was left alone with the stranger. Analyses of variance were computed in which the independent variables were alone with stranger, alone with father, alone with mother, and the dependent variables were duration of crying, fretting, and playing. Children cried and fretted more but played less when alone with the stranger than with either parent ($F = 17.86$ for crying, $F = 19.39$ for fretting, $F = 41.36$ for playing, $df = 2/60$ and $p < .001$ for each case, see Figure 1).

Children who cried to the departure of one parent were also likely to cry following separation from the other, if the separation left them alone with the stranger ($r = .86$, $p < .001$). However, there was a minimal relation between degree of upset to each of the maternal departures (Conditions 2 and 10) in which the child was left with the father on the first and with the stranger on the second ($r = .32$, $p < .10$).

The lack of differential protest to mother and father departures could be interpreted as indicating an equally strong attachment to both parents. However, the father interaction effects render that interpretation unlikely. If separation protest were indicative of strength of attachment, children with high-interacting fathers should have gravitated more toward their fathers and protested more following his separation than children with low-interacting fathers. The

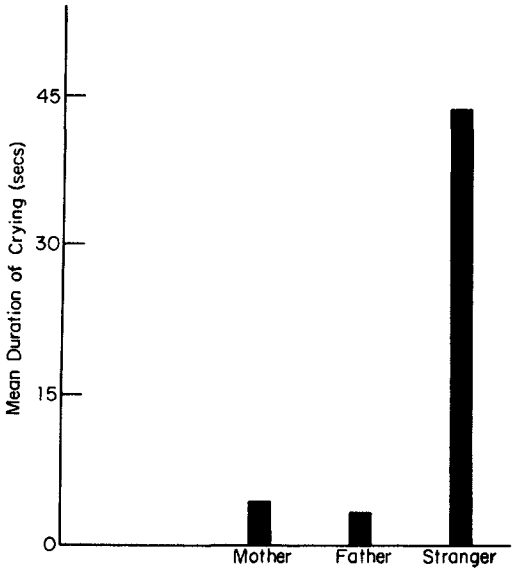

FIG. 1. Mean duration of crying when the child is left alone with each of three adults.

data revealed the opposite effect. High-father-interaction children, when alone with the stranger, showed little crying, fretting, or disruption of play; low-father-interaction children showed the most crying and maximal disruption of play ($F = 3.32$ for crying, $p < .05$; $F = 2.49$ for fretting, $p = .05$; $F = 2.68$ for play, $p < .05$; $df = 4/60$ for all cases; see Figure 2). More specifically, children who experienced low father interaction cried more to his departure (40.5 seconds) than infants who experienced either medium (16.4 seconds, $t = 1.86$, $df = 22$, $p < .05$) or high father interaction (8.8 seconds, $t = 2.28$, $df = 22$, $p < .025$). There were no effects of level of father interaction on proximity, touching, or vocalization.

Girls spent more time near and vocalized more to their mothers than to their fathers; boys remained closer to and vocalized more to their fathers than to their mothers across all 13 conditions (Sex × Parent interaction for proximity, $F = 4.63$, $df = 2/60$, $p < .05$; and for vocalization, $F = 3.47$, $df = 2/60$, $p < .05$; see Figure 3).

Protest, Father Interaction, and Reaction to Discrepancy

Since the relation between the degree of upset to separation and reactivity to the nonsocial discrepancies was of interest, the children were divided into three groups on the basis of duration of crying when alone with the stranger; no crying (7 boys, 7 girls), crying for up to 1 minute (6 boys, 6 girls), and greater than 1 minute of crying (5 boys, 5 girls). Since level of father interaction was negatively related to separation protest, two analyses of variance were computed. The first had sex and level of father interaction as the independent variables; the second had sex and amount of crying when alone with the stranger as the independent variables. The product-moment correlation between father interaction and the protest variable was $-.39$ ($p < .05$).

Infants who cried the most when alone with the stranger were less attentive to the transformation and return trials of the light episode than children who cried minimally (for the Crying × Trial Block interaction, $F = 2.27$, $df = 6/90$, $p < .05$; see Figure 4.) There was no relation between attentiveness and level of father interaction.

The shorter fixation times of the maximally protesting subjects suggest less interest in the light episode. That hypothesis is affirmed by the fact that these children also vocalized most during the light sequence when they were not looking at the stimulus, a response that generally indicates boredom ($F = 2.90$ for the Cry × Trial Block interaction, $p < .02$). In this case, low-father-interaction children also vocalized more while not looking at the light ($F = 4.86$, $df = 6/90$, $p < .001$). There were no comparable differences in attentiveness to the cube or car-doll episode.

Analysis of affective behavior revealed an inverse relation between separation protest and frequency of smiling to the three episodes ($\chi^2 = 5.03$, $df = 1$, $p = .08$) and a positive relation between separation protest and irritable fretting to the three episodes ($\chi^2 = 7.66$, $df = 1$, $p < .05$). Although there was no relation between level of father interaction and smiling, irritable fretting was more frequent for the low-father-interaction children ($\chi^2 = 7.66$, $df = 1$, $p < .05$).

Discussion

Since the topology of the behavior to separation displayed by these 1-year-olds was similar to that described by others, this dis-

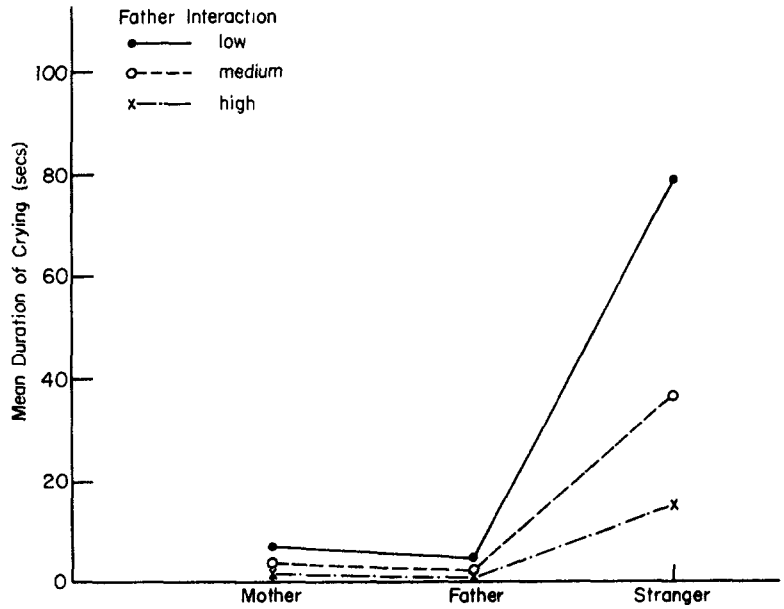

FIG. 2. Mean duration of crying when alone with each adult as a function of level of interaction with father.

cussion is devoted to alternative interpretations of this phenomenon. The belief that crying to separation reflects intensity of attachment to a parent (as a result of frequent interaction) is not supported. Although the children spent more time at home with their mothers than their fathers, they cried as much when their father left them alone with a stranger as when their mother did. Moreover, the children of high-interacting fathers, who should have been most strongly attached to them, cried the least when their father departed, while children who interacted minimally with their fathers at home, and should have been weakly attached, cried the most when he left. Further, the attachment interpretation has no way to handle the relation between irritability, boredom, and lack of smiling to the nonsocial visual procedures and high separation protest.

Let us, therefore, turn to a second interpretation which has been suggested earlier (Kagan, 1972; Kotelchuck, 1972), namely, that a child's protest to separation is the result of being exposed to a discrepant event that he cannot assimilate or act upon. Infants of all ages may react to unusual or unexpected events with fear, stranger anxiety being one of the most common examples. If the child can make an instrumental action that either removes him from the fear-inducing situation or alters it, then behavioral signs of fear will be attenuated. Hence, cry to maternal separation is reduced if the child is able to locomote to the mother in a labo-

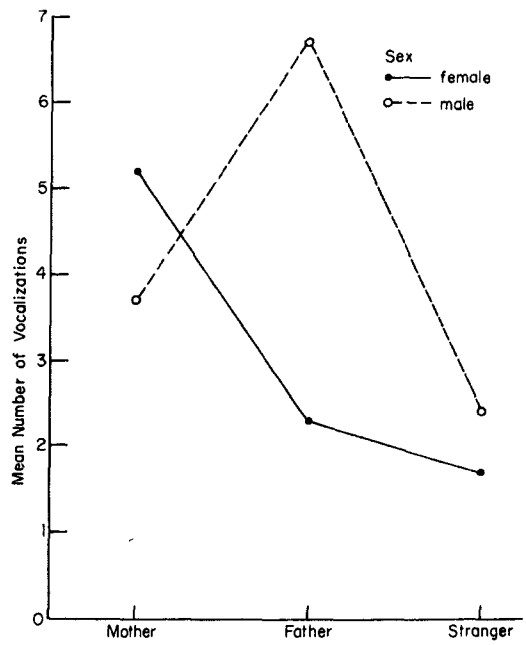

FIG. 3. Sex differences in vocalization to each of the three adults across all conditions.

ratory (Rheingold & Eckerman, 1970) or in the more natural home setting (Stayton, Ainsworth, & Main, 1972).

But whether the child perceives an event as discrepant depends on his experience and maturity. If separation fear is, in part, the product of an unresolved puzzle, it is necessary to explain why this reaction is most likely to occur between 8 and 18 months, rather than earlier or later.

The results of several experiments have led to the hypothesis that toward the end of the first year most infants begin to activate hypotheses to aid interpretation of unusual events (Kagan, 1971, 1972). It is possible that separation protest occurs when the child is mature enough to generate hypotheses about the location of his caretaker but not mature enough to resolve that question.[3] A recent replication of Kotelchuck's original experiment in a poor, lower-class area of Antigua, Guatemala, revealed that despite the markedly different experiences of the children in the two cultural settings, separation protest peaked at the same age in Guatemala as it did in Cambridge, Massachusetts (namely, 12 to 18 months). Moreover, Stevens (1971) found no difference in age of onset of separation protest between infants raised in an institution in which each child had an average of 15 caretakers a week and infants raised in nuclear families. Stevens' data and interpretations are in accord with our suggestion that occurrence of separation fear is dependent, in part, on the maturation of specific cognitive functions.

The data from the nonsocial light sequences are also supportive of this cognitive interpretation of separation protest. The infants who cried least to separation remained most interested in the light sequence during the transformation trials when there was a 3-second period during which no dynamic movement occurred. This was the only procedure that contained a period during the trial in which no movement occurred. Extensive normative data on these episodes for infants 3½ to 11½ months of age indicate that children under 9 months are more likely to turn away from the stimulus and/or fret during the transformation trials to the light than to the transformation trials of the cube and car-doll episodes. This finding is reasonable if one assumes that only a child mature

[3] M. D. S. Ainsworth (personal communication, 1972) has suggested that the fear-inducing discrepancy is "relevant to the child's expectation about or confidence in his mother's accessibility." This expectation could be viewed as similar to our notion of a hypothesis about the location of the caretaker.

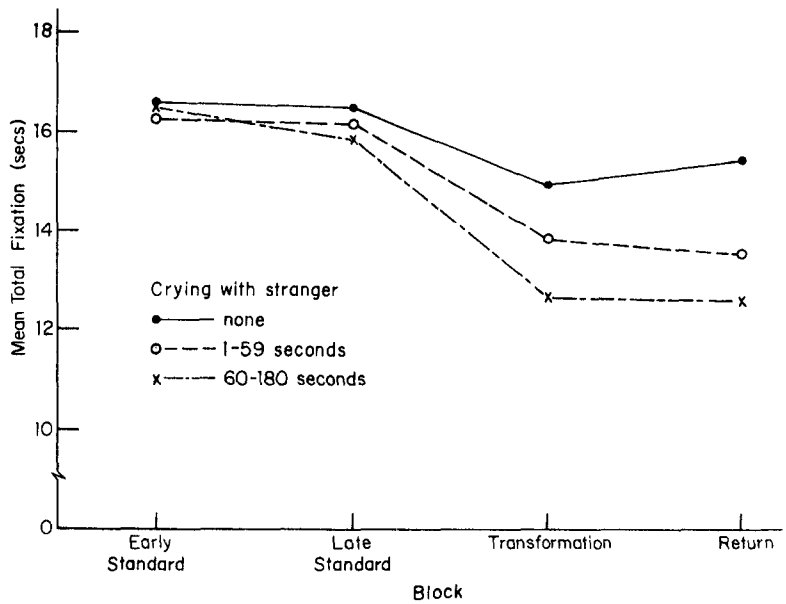

FIG. 4. Mean total fixation to the light episode by trial block as a function of amount of crying when alone with the stranger.

enough to activate some representation of the original event and relate it to the transformed event would remain interested, since the actual event contains 3 seconds of "no action." Hence, it is possible that the 1-year-old infants who remained attentive to the light transformation were intellectually precocious to those who became irritable. If these same children also activated hypotheses in the separation procedure that explained the experience of being left alone with the strange woman, they might not have become irritable. The positive relation between high father interaction at home and low separation protest can be viewed as supportive of this argument if one assumes that a child who has frequent interactions with both parents has access to a greater variety of experience and, as a result, might be cognitively advanced. The essential theme in this explanation is that the children who did not protest were able to assimilate the discrepant experience and their cognitive precocity was due, in part, to the frequent interaction at home with two, rather than one, parents.

An alternative and more parsimonious interpretation is that in those families in which the father remained home a great deal of the time, the mothers were able to leave the house more often than mothers from families with low-interacting fathers. Hence, children in the high-father-interaction homes would have had a greater opportunity to become accustomed to the presence of a caretaker other than the mother and to extinguish anxiety to the experience of the mother's departure.

There are other unexpected but intriguing findings that may complicate both interpretations and imply that an intraindividual temperamental factor may be contributing variance to the phenomenon of separation fear. The noncrying infants smiled more to all three nonsocial visual events, although smiling was unrelated to level of father interaction at home. Although smiling can reflect assimilation of a discrepancy—which is in accord with the earlier explanation—independent longitudinal data suggest that smiling during the first year is a temperamental attribute with some degree of heritability (Kagan, 1971). High-smiling infants displayed a slower tempo of play with toys and a longer period of attentiveness to visual events than low-smiling infants. The longitudinal study just referred to contained a separation episode in which a mother left her 8-month-old child alone in a strange room. About one half of the infants showed separation protest, and these children, like the infants in this study, were bored more quickly and were more irritable to the nonsocial visual episodes. Moreover, Bronson (1971) analyzed separation protest behavior for two independent samples and found, for males, that early onset of fear was significantly related to intense fearfulness of a strange person at 1 year of age. Bronson suggested that "genetically based constitutional differences may be interacting with experiential factors to produce the observed variations in the development of fear reactions [p. 63]."

Psychologists and parents have suggested on many occasions that some infants are prone to fretful irritability, some of which is in the service of fear, from the early months of life and retain this disposition for 1 or 2 years. It is possible that this individual difference dimension, which may be only partially related to quality of social experience, is contributing variance to the separation display. It may be more than coincidence that despite the various samples studied in this and other cultures, the proportion of children 8 to 18 months old who protest to separation usually ranges between 20% and 60%. The fact that the proportion rarely approaches 100% argues for the influence of a temperamental attribute.

In sum, protest to parental departure seems to be less clearly related to intensity of emotional attachment to a parent than to the child's level of cognitive development, experience with parental departures in the home setting, and, perhaps, a temperamental attribute. This simple reaction appears to be more complicated than many have surmised.

REFERENCES

AINSWORTH, M. D. S. The development of infant-mother interaction among the Ganda. In B. M. Foss (Ed.), *Determinants of infant behavior.* II. New York: Wiley, 1963.

AINSWORTH, M. D. S. *Infancy in Uganda: Infant*

care and the growth of love. Baltimore: Johns Hopkins University Press, 1967.

AINSWORTH, M. D. S., & BELL, S. Attachment, exploration, and separation: Illustrated by the behavior of one-year-olds in a strange situation. *Child Development,* 1970, **41,** 49–67.

AINSWORTH, M. D. S., BELL, S. M. V., & STAYTON, D. J. Individual differences in strange-situation behavior of one-year-olds. In H. R. Schaffer (Ed.), *The origins of human social relations.* London: Academic Press, 1971.

BRONSON, G. W. Fear of the unfamiliar in human infants. In H. R. Schaffer (Ed.), *The origins of human social relations.* London: Academic Press, 1971.

FLEENER, D., & CAIRNS, R. Attachment behaviors in human infants: Discriminative vocalization on maternal separation. *Developmental Psychology,* 1970, **2,** 215–223.

KAGAN, J. *Change and continuity in infancy.* New York: Wiley, 1971.

KAGAN, J. Do infants think? *Scientific American,* 1972, **226,** 74–81.

KOTELCHUCK, M. The nature of a child's tie to his father. Unpublished doctoral dissertation, Harvard University, 1972.

LITTENBERG, R., TULKIN, S., & KAGAN, J. Cognitive components of separation anxiety. *Developmental Psychology,* 1971, **4,** 387–388.

PASSMAN, R., & WEISBERG, P. Mother and "security" blankets as familiarization objects for children's play behavior (The Linus phenomenon is real). Paper presented at the meeting of the Eastern Psychological Association, Boston, April 1972.

RHEINGOLD, H. L., & ECKERMAN, C. O. The infant separates himself from his mother. *Science,* 1970, **168,** 78–90.

SCHAFFER, H. R., & EMERSON, P. E. The development of social attachments in infancy. *Monographs of the Society for Research in Child Development,* 1964, **29**(3, Serial No. 94).

STAYTON, D. J., AINSWORTH, M. D. S., & MAIN, M. B. The development of separation behavior in the first year of life: Protest, following and greeting. Baltimore, Md.: Author, 1972. (Mimeo)

STEVENS, A. G. Attachment behavior, separation anxiety and stranger anxiety. In H. R. Schaffer (Ed.), *The origins of human social relations.* London: Academic Press, 1971.

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