

# INTERSECTIONS WITH ATTACHMENT

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## 7 The Attachment Metaphor and the Conditioning of Infant Separation Protests

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### ABSTRACT

The "attachment" metaphor has labeled a process, of which infant protests to maternal separations have served as an index in the literature. Yet the potential reinforcing role of maternal behaviors (e.g., her departure delay, vacillation or return, reasoning with and/or reassuring the child) when contingent on cued infant protests (cries, fusses, whimpers, and/or whines) has been overlooked in attachment theory and research. The thesis of the investigation reported here is that, by their contingent responding, mothers (and others) may shape and condition their infant's protests in the very departure or separation settings in which those responses are found. Within the frame of the social-conditioning paradigm, how such infant protests come under the control of *cues* and *contingencies* provided by routine maternal behaviors was examined during her departures and, separately, during the ensuing brief separations. Nine 6- to 9-mo. infants were subjected to a repeated-measures design, in successive daily sessions. Two treatments were implemented: 1) DRO—differential reinforcement of behaviors *other than* protests, in which cued infant protests were *never* followed by contingent maternal responses; and 2) CRF—continuous reinforcement, in which cued infant protests were *always* followed by contingent maternal responses. The cued-protest rates of all infant Ss, both in departures and brief separations, increased from the noncontingent-first (DRO<sub>1</sub>) to the contingent-second (CRF<sub>2</sub>) treatment and decreased from the contingent-second (CRF<sub>2</sub>) to the noncontingent-third (DRO<sub>3</sub>) treatment. The reliable result-pattern differences in cued infant responses support the assumption that protests can be conditioned in everyday settings, trained (inadvertently) by the social contingencies provided by caregiver behaviors in the very departure and separation contexts in which the infant protests are found. The relation of cued infant protests to the infant's attachment to mother is considered throughout.

During the early months of life, infant protests during maternal/caregiver depar-

tures and separations are not ordinarily observed. Our conception is that those cued responses emerge in the infant's repertory later in the first year due to learning, as a result of inadvertent training by mothers in the very departure and separation settings in which the protests are found. The research reported in this chapter was mounted to ascertain how infant protests can come under the control of cues and contingencies generated by a mother's responses during her departures and after brief separations from her infant. These cued protests have served as an unlearned index of attachment for some theorists (Schaffer & Emerson, 1964) or of the security of attachment (Stayton & Ainsworth, 1973), and as a conditioned index for others (Gewirtz, 1972b, 1978). A demonstration that cued infant protests can be trained by contingent maternal responding would provide evidence for the learned basis of departure and separation protests, and hence for the conditioned basis of the attachment they have indexed. The research being described can incidentally identify procedures that parents might employ to minimize separation difficulties, by precluding their children's protests in these settings.

Approaches based on Skinner's (1938) operant-learning conceptions, such as the social-conditioning behavioral approach (see, for example, Bijou & Baer, 1965; Gewirtz, 1961, 1969, 1972a, 1972b, 1977), operate in the frame of functional analysis with limited a priori expectations. They focus on issues at the level of what is a stimulus for a response, what is a response to a stimulus, and how stimulus control over particular responses is acquired, maintained, changed, and/or reversed. Abstract terms like "learning" and "discrimination" may be invoked occasionally in such work, typically as labels for research activities or as chapter headings, but are the exception not the rule. Yet loose *metaphoric* abstractions are employed by approaches that have set the contemporary tone for theory and work in substantial research areas. It has been noted that "attachment" is such a term, based on the metaphor of "bond" or "tie," that has been employed heavily in nonbehavioral approaches blending ethological with mentalistic cognitive conceptions (Ainsworth, 1972; Ainsworth, Blehar, Waters & Wall, 1978; Bowlby, 1958, 1960, 1969).

Much of the contemporary flavor of the work on infant attachment derives from Bowlby's ethological approach, as extended by Ainsworth and her associates. Under these approaches, the attachment label has been used to account for the process, the process outcome, the antecedent-consequent relations involved, and/or a "bond" that is said to underlie all three. These theorists have emphasized that the system underlying attachment behavior is a part of the equipment of many species. Thus, Ainsworth (1989) has written attachment "... is manifested by behavior that has the predictable outcome of keeping the individual in proximity to one or a few significant others. . . . attachment behavior is believed to have evolved through a process of natural selection because it yielded a survival advantage. . ." (p.709). We also conceive natural selection and the evolution of the species to be the basis for a portion of human behavior, and a

much larger part of the behavior of other species, but our emphasis has been on both the evolutionary and the proximal role of reinforcement contingencies in the acquisition and development of a class of cued responses (i.e., discriminated operants) that comprise, and can index, the phenomena of attachment.

Hess and Petrovich (this Volume) and Hinde (1974, 1983) have provided analyses of the ethological context in which the attachment term was embedded by Bowlby (1958, 1969). In a comparative analysis of the approaches to attachment of ethology and of behavior analyses with operant learning, Gewirtz (1961) attempted to organize both imprinting in precocial species and attachment in human infants as learned outcomes. At the same time, he made the case that the ethology and learning approaches were not incompatible, indeed complementary, in their concern with unlearned behavior, learned behavior, and the environmental conditions under which those behavior types occur, are fostered, maintained, or inhibited. Gewirtz' (1961) case was made notwithstanding the preference of the ethology of that time for hierarchical explanation favoring central nervous system concepts and experiments in natural settings, and the preference of behavior analysis for laboratory experimentation and nonhierarchical, molar, outside-the-skin explanation. Differences in unit size and content and in label preferences were considered incidental to the overlaps and commonalities of the two systems.

Since the early 1960s, the tack taken by ethologists such as Bowlby (1969), Eibl-Eibesfeldt (1979), and Sluckin (1972) in cross-species analyses has involved an increasing emphasis, in an evolutionary context, on the ecological dimensions of behavior with proximal survival contingencies. Since then, also, several ethologists carried out microanalyses of molar behavior (Gottlieb, 1968, 1983; Hess & Petrovich, 1973; Hoffman & DePaulo, 1977), not unlike those of behavior analysis; and Skinner (1966, 1981) emphasized the compatibility, of evolutionary selection with response selection in operant learning by natural consequences, as did Petrovich and Gewirtz (1984, 1985). In this frame, the behavior-analytic approach may be even more compatible with ethology today than it was in the 1960s (Petrovich & Gewirtz, 1985).

Under the attachment metaphor, an extensive literature has evolved on the social relations of infants with the important figures in their lives. From a behavioral vantage, as in behavioral research generally it remains advantageous to carry on work at the level of extrinsic stimulus, response, acquisition of stimulus control, and the like as has been done routinely in the frame of the social-conditioning approach. This tack is illustrated in the present analysis with examples from a program of research on infant protests during maternal separations, as well as on the departure protests that have constituted an index of attachment termed "separation protests" (Schaffer & Emerson, 1964; Stayton & Ainsworth, 1973). The research to be described here highlights the maternal-behavior cues and contingencies that very likely underlie the acquisition and maintenance of infant departure and separation protests in life settings.

### The Social-Conditioning Approach

As in the ethological approach, in social conditioning theory the attachment term has served as a convenient label for a process. However, unlike its ethological usage, in the social-conditioning approach attachment involves the acquisition of a close reliance, typically concurrent, of one individual's behavior upon the appearance and behavior stimuli of another, expressed in a variety of cued-response patterns of the former. The attachment metaphor has served to label this influence process that is denoted by the complex of child-response patterns coming to be cued and reinforced/maintained by stimuli provided by the appearance and behavior of an attachment figure/object, in early life primarily the mother, but also others. The child-response pattern might maintain contact proximity, produce attention, comfort, or the like. In this frame, attachment also has labeled concurrent behavioral reflections of the above process, such as differential responding favoring the attachment figure or by exploratory-behavior increases in her presence, as well as behavior disruption due to rejection by, separation from, or the death of, the attached figure, when the behavior can become disorganized and may be accompanied by intense emotional/affective responding (distress).

The cued-response patterns (and their derivatives) denoting attachment are pervasive and may occur in any segment of the life span with diverse, even multiple, interaction partners. These cued responses are *discriminated operants* and are defined by the antecedent stimulus-behavior-reinforcing consequence unit. This three-term contingency is the fundamental unit of analysis in the social-conditioning approach to attachment. Thus, the interaction between an infant and its mother/caregiver must always consider, first, the occasion upon which a response occurs; second, the response itself; and third, the environmental consequences. The interrelations among those three terms are *contingencies of reinforcement* (Skinner, 1969).

The dyadic functional relations between the discriminative (cue) and reinforcing stimuli from an attachment figure/object and the child's responses to that figure (that those stimuli control) that connote attachment, may also involve concurrent influence (i.e., bidirectional) patterns, for instance, child-to-mother and mother-to-child (the same maternal responding that controls infant behavior can come under the close negative-reinforcer control of the infant's stopping its behavior contingent on a maternal behavior). Moreover, initiations could be maintained if only intermittently reciprocated across occasions by an attachment figure. The discriminated operants denoting attachments should not be classified as typologies (such as insecure, avoidant, resistant), nor are they cross-situational traits. By definition, these responses are controlled by particular cue and reinforcing stimuli from the attachment figure, as well as by contextual stimuli (including setting conditions), so their occurrence will vary across situations otherwise defined (cf., Gewirtz, 1961, 1972a, 1972b, 1977, 1978, in press; Gewirtz & Boyd, 1977b; Gewirtz & Peláez-Nogueras, 1989).

### Origins of Separation Protest

The research program here being reported has focused, first, on identifying the conditions that encourage the learning of infant departure/separation protests (particularly as such cued protests have served as a prominent index of attachment to the mother) and, second, on developing a procedure parents might use to minimize or preclude behavior problems (including distress) in their infants either during departures, or after brief separations, from them.

In familiar, everyday settings, there are often found patterns of infant separation protests cued by maternal preparations for distancing, departing, and/or separating herself from her infant, by actual departures from the infant's vicinity, and by the ensuing short- or long-term separations. In younger children, these protests may be comprised of cries, screams, fusses, whines, and whimpers; in older children, protests may involve grabbing the parent's body or clothing and pleading, in addition to exhibiting elements of a younger-child's behavior pattern.

These cued protests at departure/separation have served at one time or another as the/an index of attachment for several nonbehavioral theorists and researchers. Thus, in a highly-influential paper, Bowlby (1960, p.14) proposed that the infant's responses to, and particularly protests at, maternal departures/separations was the inverse of the proximity-seeking core of attachment. Based on Piaget's (1954) conception of object conservation/constancy indexed by the object (person) leaving the child's observational field, and on the Bowlby proposal mentioned, a widely cited report by Schaffer and Emerson (1964) of the age course in the first 18 months of life, of the onset and intensity of infants' focused attachments to their mothers, used measures based on what was essentially a single cued-protest response index of attachment derived from maternal reports. Those measures summarized the reported incidence, intensity, and direction of infant protests after seven types of departure/separations from their mothers and others. Schaffer and Emerson plotted summaries of those measures by monthly age, but did not analyze the role of maternal reactions for infant protests.

To date, little attention has been devoted to the *role of the mother* in separation-behavior problems the child manifests in different settings. Understanding the maternal role in separation problems (including infant protests and distress), and procedures to eliminate them, could provide a basis for understanding early child social development and the parent-child interaction process, and for applying these principles/procedures to school and family settings.

As would not be unexpected from use of a theory that was not learning oriented, Schaffer and Emerson (1964, p.51) attended only in passing to, and discounted, the possibility that routine contingent maternal behaviors might foster the operant learning of the cued protest response, on which their attachment index was based, in the very departure and separation settings from which their measures were collected. Yet the pattern of infant protests cued by maternal departures may result simply from operant learning, produced by well-inten-

tioned, contingent maternal reactions to those protests in the departure settings (Gewirtz, 1972b, 1977). In particular, the contingent stimuli provided during a mother's departure by such of her responses as stopping, retracing her steps, hesitating, vacillating, turning immediately to, reasoning with, or returning to hug or pick up her protesting child, could function as reinforcers instrumentally to condition the child's protests to the discriminative cues provided by the mother's preparations to leave, her leaving, and separations from her.

Under this conception, the cued separation protest may well be a prototypic learned behavior during the child's socialization that is, at the same time, representative of the pattern of infant responses cued and reinforced by stimuli provided by the appearance and behavior of the mother (or a significant other). In this frame, in the social-conditioning approach the *separation protest* can serve as one of a number of reasonable indices of infant attachment to the mother as object, insofar as attachment is a metaphoric abstraction for such discriminated operants of the infant under the control of maternal stimuli (Gewirtz, 1972b, 1978).

In the next section, we report results from one of a series of experiments mounted to ascertain if, and how, infant protests can come under the acquired control of stimuli generated by contingent maternal behaviors during departures and after brief separations. A demonstration that infant protests cued by maternal departures and brief separations can be maintained by contingent maternal responding would provide presumptive evidence for the *learned* basis of the departure/separation protests that have served as an attachment index in life settings. This demonstration would also provide some understanding of the case in which the very pattern of maternal responding to her infant's cued protests (that appeals to some conceptions of "loving" mothering) can generate problems of behavior management that prevent the constructive fostering of her infant's developmentally-appropriate behaviors.

### THE CONDITIONING OF SEPARATION PROTESTS: A PARADIGMATIC EXPERIMENT

#### Research Strategy and Tactics

This experiment illustrates in detail how departure and separation conditions separately can acquire stimulus control over the infant's protests by providing discriminable cues that denote (a) a mother's departure including her preparations to leave the infant's vicinity, saying "bye, bye," touching the infant, picking up her purse, walking towards the door, and waving her hand, and (b) a mother's separation including the sight and sound of her opening the door, exiting, and closing the door, and the loss of sight of the mother. The infant protest response manifested in the presence of these discriminative stimuli was shaped differentially by the contingent stimuli. For instance, during departures

the frequent responding of a mother immediately contingent on her infant's cued protests or their precursors should shape and condition (i.e., affect more frequent and/or intense) her infant's cued protests; and during separations infant protests should be conditioned by her contingent return to her infant from outside the room. In later research, the independence between departure and separation contexts (cues) for infant protests was empirically demonstrated (see Gewirtz & Peláez-Nogueras, 1989).

*Shaping and Differential Reinforcement.* The *shaping* procedure involves systematic provision of the maternal responses contingent upon *successive approximations* of the infant responses to the target response, in this case protesting. For instance, in cases where an infant did not emit a protest when cued, across sessions its vocalizations may be shaped into a protest by the mother responding only to successive increases in their duration, amplitude or some other response feature. In this way, what originally may have started as an incidental vocalization during pre-separation events might be shaped gradually into an intense protest. The protest response involved is then routinely followed by contingent maternal responding and is sometimes termed CRF (for *continuous reinforcement*). On the other hand, if a mother were to cue her child that she is departing (e.g., "Bye bye; I'll be right back") and to leave his/her vicinity without vacillation or apparent concern (whether or not the infant were to protest in reaction to the maternal departure cues), the infant's response would not be shaped into a protest and conditioned to the maternal departure cues.

Another procedure (sometimes termed DRO) involves *differential reinforcement of behaviors other than the target*, in which the target protest is ignored and other responses are followed by contingent maternal responding. The differential-reinforcement-of-behaviors-other-than-the-target procedure can be combined with shaping. In this way, for each instance of the protest response, increasingly lengthy pauses are required for the mother to respond, until the nonoccurrence of a protest cues the mother's response to her infant. Then, the mother responds only to alternative infant behaviors (e.g., vocalizations, smiles and/or play). Using this procedure for several training sessions in laboratory settings, a conditioned high protest rate can be reduced, even discontinued, with the child then exhibiting behaviors incompatible with protests.

The research design and experimental procedures employed were focused on maximizing between-treatment differences (effects) while minimizing intrasubject and intersubject differences (i.e., variability). Between-treatment differences were heightened by establishing the two treatments as logical opposites at extremes of the dimension ranging from contingent to noncontingent stimulation. Intrasubject differences were minimized by using a repeated-measures design. Intersubject differences were minimized by using a powerful procedure, including shaping and running each subject under CRF and DRO until a behavioral criterion was attained, so that every infant subject would have received a maximal dose of each treatment, to contribute to overriding unique reinforcement

histories, thresholds, capacities, and experiences. In sum, the strategy was to maximize treatment effects and examine the behavior outcomes in a laboratory setting in which relatively-much control was exercised over the proximate conditions thought to be causal, and care taken to limit the operation of potentially confounding and artifactual variables and minimize interindividual and intra-individual differences.

*Subjects and Settings.* The research procedure involved bringing 9 middle-class infant-mother pairs into the laboratory for successive, typically daily, sessions (ranging from 9 to 11), each lasting about 35 min. The normal middle-class babies included 7 males and 2 females who ranged in age from six to nine months at the start of their participation in the study. Subjects were selected on the basis of their mothers reporting them, or the infants showing themselves, capable of remaining in a playpen in the mother's presence for at least 20 min. without protesting or crying. A daily session was postponed when a mother reported that her child was "out of sorts" or off schedule, or that she had rushed to get him/her to the laboratory on time, or that the infant or infant's sibling was ill.

Each baby was placed in a 1-meter-square playpen, containing several simple toys (e.g., blocks, plastic animals), located in the far corner from the entrance/exit door of a pleasant, yellow, windowless, 15-meter-long by 5-meter-wide room with children's paintings decorating the wall. At the start of a trial, the mother was seated on a small sofa positioned adjacent to the playpen. Two television cameras located in the room concurrently monitored the expressions and behavior of the infant in the playpen and of the mother as she sat initially near the play pen and then walked from her seat to and through the door while cueing and responding either contingently or noncontingently to her infant's protest's, depending on the treatment in force. In an adjacent observation room, the synchronized behavior of infant and mother in interaction was displayed on a video monitor in split-screen format, and recorded on videotape in that mode. From the observation-room video monitor, two experimenters could view the mother-infant interaction in the laboratory, at the same time as one of them was directing the mother's actions via earphone, instructing her on when and how to give the departure cues and when and how to respond to the infant initiations. (For each of the 9 mothers, a natural departure style was noted in a preliminary assessment trial, to be used as the basis of her departure responses in all subsequent sessions.)

*Response Definition and Dependent Variable.* The outcome measure used in both treatments was the proportion of trials-per-daily session on which the infant made a cued protest. Infant protests during the departure, separation and reunion, and control periods were scored, with the exact time of occurrence noted (for latency computations). A *protest* was defined as a whine, whimper, fuss, or cry sound emitted by the infant in response to the cues provided by a mother's departure or separation. The dependent variable, *proportion of protest trials per*

*session*, was calculated separately for departure and separation settings. (To produce percentage measures, proportions were multiplied by 100.) Proportion of protests was determined by dividing the total number of trials that included a protest by the total number of trials in that session. Pairs of independent observers scored the time and events as they occurred. Five observers were involved in all. One of the observers helped the experimenter in the timing of instructions to the mother, particularly on when the mother should leave/return to the room, and in determining whether or not the subject's response pattern attained the predetermined criterion. Observer-reliability determinations in the scoring of protests, protest latencies, and several other behaviors, were made subsequently from the videotape records. Percentage of agreement on protests was obtained by dividing the total number of agreements between two independent observers by the total number of observations (agreements plus disagreements). Two observers scored independently 573 trials comprising 103 sessions for 13 infants on whether or not at least one protest occurred during a trial under a treatment after the mother cued her departure and, separately, her separation. Overall percentage observer agreement on cued protests was determined to be 94% for maternal departures and 95% for brief separations.

### Procedure

An A-B-A (i.e., DRO-CRF-DRO) repeated-measures design was employed. The *departure* condition began when a mother first cued her infant that she was leaving and ended when she closed the room's door after exiting. The *separation* condition began at that point and lasted until the mother opened the door and reentered the room. Before the start of the first session (during a preliminary trial), mothers were instructed to leave the room as naturally as possible, as they would during routine departures in a familiar setting. The pattern of maternal behaviors was noted on this preliminary trial, and subsequently emphasized in experimenter's instructions via earphones to mothers during departure and separation settings across all treatment trial sessions.

There was a 5-min habituation period at the beginning of each daily session. Afterward, the experimenter signaled the mother to leave the room, initiating the first trial. Each trial consisted of a departure period (mean = 28 sec), a period of maternal absence (5 min maximum), a standard reunion period (15 sec) and an intertrial interval (1 min) also termed a control period between trials. Infant protests during maternal departures, when the mother was responding to the infant and in full view, were considered operationally different from the protests occurring during separations when the mother was out of sight and earshot, and were assumed to be independent (uncorrelated). (The independence between the departure and separation contexts as evidenced by maximal differential infant responding under a conditional-discrimination paradigm was demonstrated by Gewirtz & Peláez-Nogueras, 1983.) Each subsequent trial began after 1 min of a control period between trials had elapsed, provided that no observation of an

infant protest or potential distress was made. This procedure was useful in precluding carry-over or confounding effects from one trial to the next.

The content and number of maternal cue and contingent stimuli (auditory, visual, tactile) presented to the infant subjects during the departure, separation, and reunion, and the control period between trials, was under the close instructional earphone control of the experimenter. Using her natural departure style (as described earlier), on every trial the mother signaled her departures from the room three times: first, by kissing her child, then by picking up her purse, standing up and waving (e.g., she said "Bye bye, I'll be right back") while turning toward the exit door; second, by starting to walk slowly to the door while giving the child a second verbal cue; and, third, once she had opened the door, by turning to look at her child and once more verbally signaling her departure in her usual style, closing the door and exiting the room. All the maternal behaviors were under the moment-to-moment control of a sequence of instructions from the experimenter given via earphone.

Under the *contingent-stimulation* treatment (CRF), infant protests or precursors of protests to the departure cues were *always* followed immediately (within 2 sec) by maternal auditory and visual stimuli provided by her contingent responses (e.g., turning towards the infant and saying "It's all right, Mommy will be right back" or "What's the matter?"), until the infant's response across sessions was shaped to a protest and/or the criterion met. The criteria for terminating the contingent treatment and initiating the reversal treatment was for a protest to occur in at least 80% of the trials of a session both for departures and separations and, in addition, the protest latency (i.e., the elapsed time between the onset of a maternal cue ( $S^D$ ) and the onset of a protest) during departures had to be less than 5 sec on each of the last 3 trials of the last session to trigger switching to the noncontingent treatment. When the mother was outside of the room with the door closed during separation under the contingent treatment, the baby's protest brought on contingent maternal responding, the mother's immediate return to the room and approach to her infant while emitting verbal responses (e.g., "Mommy's here!").

Under the "*noncontingent-stimulation*" treatment more properly termed a Variable DRO schedule of reinforcement, wherein *behaviors other than the target response* are followed by maternal contingencies. (In most instances, these other-than-protest behaviors were playing and vocalizing.) Specifically, the maternal response occurred either when the infant was *not* protesting or after at least 10 sec had elapsed from the offset of the most recent protest while the mother was departing.

After the criterion was attained under the contingent treatment in both the departure and separation contexts, the treatment was reversed. The cued infant protest rate was decreased by providing *noncontingent* maternal responding relative to protests for several sessions until a reversal criterion ( $< 17\%$  of the protest trials) was met. In instances where a protest began during a maternal departure and continued into the ensuing separation, that response was scored as a separa-

ture protest. The next protest was scored as occurring during separation only after there had been at least a 10-sec pause after the departure protest and the mother was already outside the room). Under the noncontingent treatment in the separation setting, mothers were instructed initially to return to the infant only after there had been a 10-sec pause without protest and, when feasible, were sent back to their infants on successive trials with systematically increasing nonprotest pauses (30, 60, 90, 120, 150 sec, etc.). Thus, the pause or nonprotest period required for maternal responding (i.e., her return to the infant) was increased gradually from 10 sec up to 5-min. This time lapse without an infant protest served as one criterion for ending the noncontingent-separation treatment sessions. In the rare cases where elicited crying persisted for longer than 45 sec, the session was terminated.

In the event a protest did not occur under the contingent stimulation treatment when the separated mother was outside the experimental room, the maximum time of her absence was 5 min. In such cases of maximum elapsed time without protests, the mother was instructed to return to the room without looking at, or talking to, the infant. A new discrete trial began as usual after a 1-min between-trials *control period* had elapsed without an infant protest. This control period allowed the experimenter to insure that the baby, who was in the playpen, was in good form (not protesting) and not responding emotionally on apparently unconditioned grounds due to hunger, pain, or sleepiness and, as indicated above, precluding potential carryover effects from one trial to the next, thus making the effects of the departure cues ( $S^D$ s) more salient.

The *density* of maternal stimuli refers to the number and content of maternal responses (providing the cues and contingent or noncontingent stimuli either for protests or for alternative behaviors). For all subjects, the density of maternal stimulation provided was comparable in both the contingent and the noncontingent treatments, under the departure condition as well as under the separation condition. To equate the pattern and density of discriminative *cues* in these two treatments under experimental instructions, a mother emitted the same three short *cues* during a *departure* trial (e.g., "Bye, bye, mommy will be right back," while looking towards her infant) and the same number of similar responses, either *contingent* or *noncontingent*, depending on the treatment (e.g., "It's all right; Mommy will be back soon;" "What's the matter?" "Don't worry!"). For the *separation* trials, the mother's exiting, closing of the door, and absence were the only cues, and there was only one contingent or noncontingent response possible on each trial (i.e., the mother's return to the child's room while emitting verbal responses). This procedure allowed for controlling the possibility that the different effects of the treatments on the child-behavior pattern could be due to differential elicitation/stimulation/arousal resulting from maternal stimulation preceding the infant responses and not due to the contingent responding (reinforcement) effects.

*Additional criteria for terminating treatments* were used in the final noncontingent-treatment session for all nine Ss to allow for the reversal decrease or

elimination of the rate of cued protests before the infants left the project. Under the noncontingent (reversal) treatment, an infant's protest rate had to be reduced to occur on one-sixth or fewer of the total trials of a session, before the treatment was terminated. Even so, it was necessary occasionally to shift treatments before these criteria were met in cases where the number of daily sessions under one of the treatments reached six. (This restriction made it possible to fail to reach criterion and, hence, to show conditioning under departures, separations, or both. Even so, all nine Ss attained the criterion for each treatment in both settings within those six sessions.

**Results**

Results are based on 9 individual infant subjects, whose conditioning records are displayed in Fig. 7.1. Analyses were performed within groups on patterns of effects for individual subjects using nonparametric, one-tail, Wilcoxon paired-ranks tests, to evaluate changes from the final session of one treatment phase to the final session of another. The outcome measure used was the percentage of trials-per-daily-session on which the infant made a cued protest. This index seemed sensible in a context where response criterion was used to reverse or terminate a treatment. The logic of using a criterion to terminate/switch a treatment emphasizes the final-session score level (that represents the acquisition-curve asymptote) and deemphasizes such factors as the rate/speed (i.e., the number of trials or sessions per subject) in attaining the criterion level.

Under the ABA design, both for departures and for separations, the 9 individual-response-curve pairs in the aggregate (i.e., their median scores) increase from the "noncontingent" DRO<sub>1</sub> to the contingent CRF<sub>2</sub> condition ( $p = .002$ ,  $p = .002$ , each test 1 tail) and decreased from the contingent CRF<sub>2</sub> to the "noncontingent" DRO<sub>3</sub> (see Fig. 7.2) ( $p = .002$ ,  $p = .002$ , each test 1 tail). Moreover, mothers remained outside the room during separations for longer periods under the DRO than under the CRF treatment and, in most of the cases, without the infants protesting. Thus, the mothers of every one of the 9 infants showed a marked decline in the Median time they remained outside the room during separations from the final "noncontingent" DRO<sub>1</sub> (Mdn. 105 sec) to the final contingent CRF<sub>2</sub> (Mdn. 5 sec) session ( $p = .002$ , 1 tail) and a marked increase in the time they remained outside the room from the final contingent CRF<sub>2</sub> (Mdn. 5 sec) to the final "noncontingent" DRO<sub>3</sub> (Mdn. 124 sec) session ( $p = .002$ , 1 tail).

The result pattern supports the assumption that the infant protests cued by maternal departures and during brief separations (that have served as an attachment index) can be learned in the very life departure/separation settings in which they appear, trained by contingent maternal behaviors. Further, the infant Ss learned to tolerate longer separation-from-mother under the DRO maternal non-

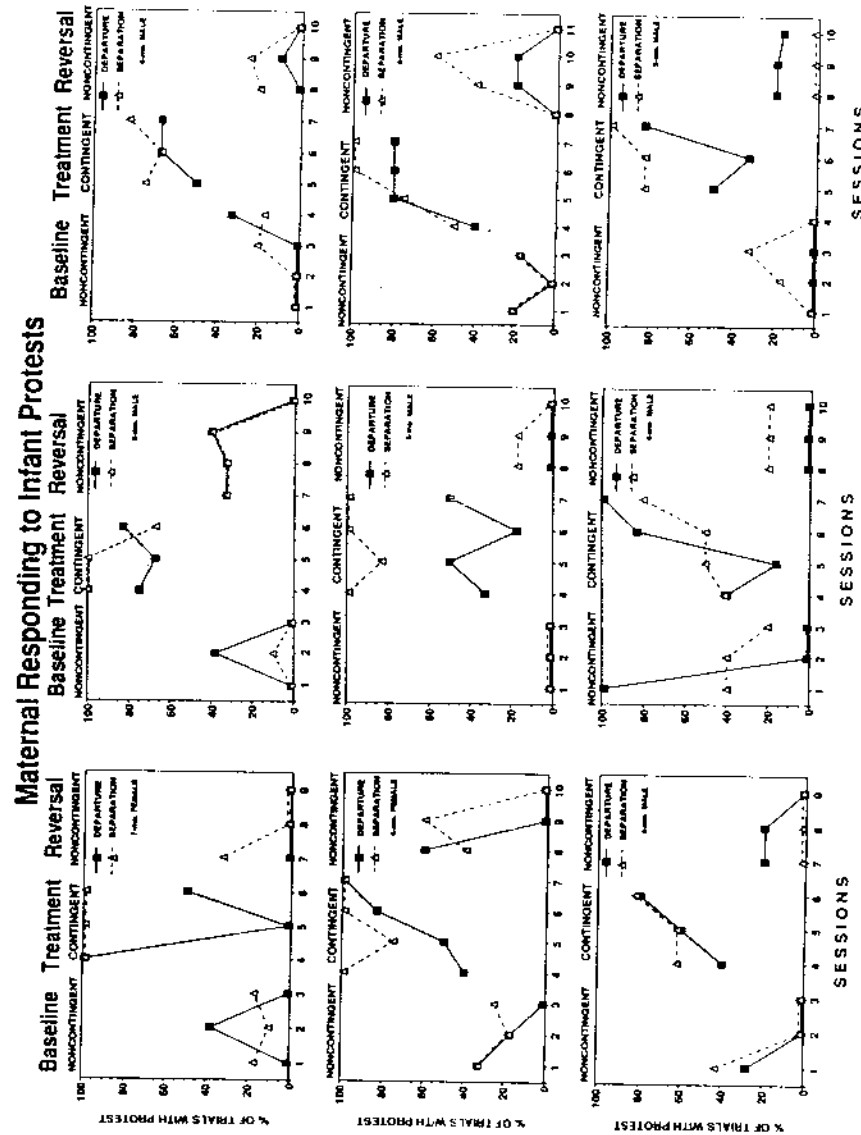


FIG. 7.1. Conditioning records of 9 individual subjects ranging from 6 to 9 mos. of age, showing Percentage Protest Trials Per Session under successive noncontingent DRO, contingent CRF, and noncontingent DRO stimulation conditions.

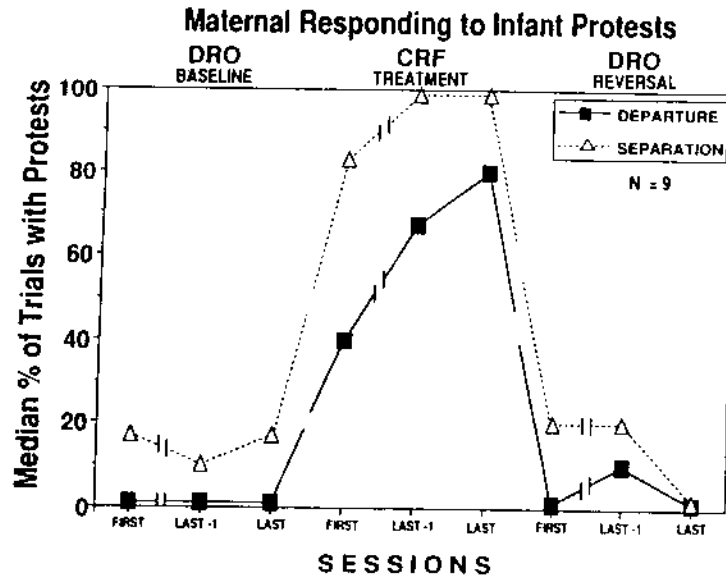


FIG. 7.2. A composite conditioning curve for the 9 infant Ss, representing Median Percent Protest Trials Per Session, across the First, Last -1 (i.e., next-to-last), and Last session score under each of the three successive treatment conditions.

contingent-responding treatment than under the CRF maternal contingent-responding treatment.

## DISCUSSION OF THE EXPERIMENT

### Learned Protests and Attachment

These early results from our laboratory-research program indicate that 6- to 9-month-old infants can be trained differentially to protest and not to protest to maternal departure or separation cues by reinforcing contingencies produced by maternal responding. This learning/training could be occurring on similar bases in home settings, though due there inadvertently to well-intentioned maternal responding contingent on those infant protests in the departure or separation contexts. These contingencies might involve such maternal behaviors as speaking to, explaining or reasoning with her infant, as well as the mother vacillating, backtracking, or hesitating during her departure, showing concern, and/or returning to pick up or hug her infant after he/she emits a protest.

A corollary of our finding that protests can be conditioned on an operant basis is that, by using separation protests to index attachment, Schaffer and Emerson

(1964) and Stayton and Ainsworth (1973) made their conception of attachment hostage to the idiosyncratic factors underlying whether or not, and how, mothers respond to their infants' departure or separation protests. Schaffer and Emerson did not propose that such idiosyncratic maternal factors as maternal responding contingent on the infant protests during separations were at all relevant to their attachment conception.

On the other hand, it was noted for the social-conditioning approach that infant attachment is a metaphor for infant discriminated operants being under maternal-stimulus control. In this context, cued departure or separation protests like those trained in this experiment may be prototypic learned behaviors during socialization that can represent the pattern of infant responses cued and reinforced by stimuli provided by the mother's appearance and behavior. On this learned basis, in the first 18 months of life cued protests can serve well as a representative index of infant attachment to mother (Gewirtz, 1972b, 1978).

### The Age Course of Protests

The results of the training reported put into question the assumed-unlearned, diagnostic, "separation-protest" attachment index used by Schaffer and Emerson (1964) to chart the age course of attachment in the first 18 months of life. In the 26 years since its publication, the interview-derived Schaffer and Emerson chart has been emphasized, nearly without exception, to represent the developmental course of attachment in introductory child-developmental psychology textbooks published. For some examples, see Hall, Lamb, and Perlmuter (1986, p. 377), Hetherington and Parke (1986, p. 248), Helms and Turner (1986, p. 199), Liebert and Wicks-Nelson (1981, p. 279), Santrock (1988, p. 219), Santrock and Bartlett (1986, p. 296), Santrock and Yussen (1987, p. 373), and Schaffer (1979, p. 153; 1985, p. 435; 1988, p. 118).

There is also a similar question about the 9-month or so age-of-onset and the temporal course of separation fear/anxiety/distress, as denoted by observed separation protests, summarized for several cultural groups by Kagan, Kearsley, and Zelazo (1978). In the laboratory research we have reported here, high rates of departure protests and of separation protests were conditioned in infants as young as 6 months of age, an age at which infants ordinarily would not protest at separations according to Kagan et al. and to Schaffer and Emerson. Under the contingent-maternal responding treatment, at 6 mos all five of our infant Ss protested their mother's departures/separations, as did our single 7-month-old S, our two 8-month-old Ss, and our single 9-month-old S. In the more natural nontraining circumstances summarized by Kagan et al for four culture groups (their p. 107) and in the home-care and day-care groups (their p. 240) at ages 5 to 10 mos, as well as for the Schaffer and Emerson data, far lower percentages of infants manifested departure/separation protests at our Ss' age points.

With respect to the Schaffer and Emerson (1964) and the Kagan et al. (1978) reports of the age course of protests at separation, our view is that there should be



continuity in an infant's protest pattern across age as long as there is continuity across age in the contingent maternal behaviors maintaining that protest pattern. Declines in protests, for instance like that observed by Kagan et al. after 18 mos, may reflect simply a change in the style of maternal responding to infant departure/separation protests, perhaps due to developmental advances in the infant's behavior repertory.

This research has reported that (a) protests during departures were conditioned on an operant basis in every one of the 9 infants and (b) protests during brief separations from the mother were conditioned on the same basis in all 9 infants. The infant subjects of the experiment we report here ranged in age from 6 to 9 months. As with other demographic-type variables (e.g., culture group, social status, sibling position, geographic location), the *age-in-months* (against which the separation-protest scores were plotted by Schaffer and Emerson and by Kagan et al.) is not, in itself, a psychological variable; it must be reduced to the causal variables required by the extant psychological theories to function as proper input variables (Baer, 1970; Gewirtz, 1969). Hence, in a process analysis the infants' age could not be considered to be the causal process variable responsible for the developmental changes observed.

Schaffer and Emerson had reported the onset and rise in separation protests within the 6- to 9-mo. age range, that they took to denote focused attachment. Under our methodology, *no* age differences were found in the conditioning and reversibility of infant protests either to maternal departure or to separation cues. Protests were conditioned in every boy and girl S in the 6- to 9-month range, the age span in which Schaffer and Emerson and Kagan et al detected the onset and rise of such protest patterns. The findings we have reported, showing that separation protests and departure protests can be operant conditioned throughout the 6- to 9-month age range both for girls and boys, is compatible with the logic cited earlier that age, *not* a proximal causal variable, cannot explain the process involved in the learning of such infant outcome patterns. (In the present study, the main proximal variable was contingent vs. noncontingent maternal responding.) This finding suggests that infants can learn to protest, or not to protest, maternal departures or separations, due to differential contingent maternal responding (as reinforcers).

#### Infant Control of Maternal Responding

The emphasis in the research reported has been on the one-way or unidirectional influence that the mother's behavior-provided cues and contingencies exert over infant protest behaviors. In the laboratory setting employed, the mothers, agents of the experimenters, exhibited invariant behavior under instructional control, while the infant's behavior was free to vary. A one-way influence process was involved. In earlier analyses of free-operant infant *crying* in natural-life settings, it was detailed how a two-way bidirectional influence process is ordinarily involved in mother-infant interaction (Gewirtz, 1977; Gewirtz & Boyd, 1977a). In

this bidirectional process, the concurrent conditioning of the behavior of both infant and caregiver takes place, effected by the impact of stimuli provided by the (behavior of) the one on the response of the other. Elicited, and often operant, infant crying is ordinarily aversive to caregivers, due to its shrill, noxious qualities (Bowby, 1958; Gewirtz, 1961) or because it could reflect a mystery about the cause of the crying, a parent ordinarily being impelled to do what would be required to terminate the crying.

At the same time the infant operant crying is conditioned by the positive-reinforcement contingencies provided by the mother picking up her infant and/or soothing it, those very same maternal responses could come under the negative-reinforcer control of the infant's crying behavior, when infant crying ceases contingent on such parent behavior as picking up and/or soothing the infant. In natural departure and separation settings, it is assumed that a similar two-way influence process operates: At the same time that infant protests cued by departure preparations and brief separations would come under the control of contingent maternal responses, such as reasoning with the child, backtracking, vacillating, picking it up, or returning to the room, those same maternal responses could come under the *negative*-reinforcer control of the contingent termination of infant protests (comprised of fusses, whines, whimpers, and/or cries).

The existence of such two-way influence patterns received some confirmation in this study. Infant high-rate protesting is ordinarily correlated with a high-rate of maternal responsiveness. It is interesting that, under the first or second DRO "noncontingent"-stimulation-on-the-target response treatment, most of the mothers commented spontaneously that they were astounded by the rapid and dramatic decline in the incidence of their babies' protests, that permitted them to remain outside the room for increasing and substantial periods. Before their participation in this experiment, these mothers reported on a questionnaire that, at home, they hesitated to leave their infants' vicinities for fear that the infants would emit intensive, lengthy protests. In other words, the contingent maternal behaviors that were functioning as positive reinforcers for the infant protests were under the negative-reinforcer control of those very protests. Furthermore, before the experiment, at home, nearly all of those same mothers could not readily separate themselves from their infants by closing a door between them, because of a concern that the infant would protest. Hence, those mothers were astonished further by the fact that, under the "noncontingent"-stimulation (DRO) treatment, ultimately their infants could, without protesting, tolerate increasing functional separation, the mothers remaining outside the experimental room, with the door closed, for increasing periods across sessions.

#### Implications of Misplaced Contingencies

It has long been assumed in the child-care literature that proper caregiving requires that the mother or caregiver respond to alleviate the physical distress underlying various elicited (unconditioned, reflexive, expressive) behaviors,

such as intense crying (resulting from identified antecedent causes e.g., hunger, pain). The core aspect of maternal sensitivity as defined by Ainsworth's attachment theory is responsiveness to the infant's signals in communication (Ainsworth & Bell, 1977). Even so, a sensitive caregiver should be able to discriminate between her child's instrumental (manipulative) protests and her child's pained, elicited crying. The problem emphasized in this paper is that, in caregiving situations in life, mothers often provide abundant *misplaced contingencies* to their infants' behaviors, which can encourage developmentally-inappropriate behaviors. A remedy can be provided by maternal *differential responding* to infant behaviors. A sensitive mother responds differentially to her infant's protest, distress cries, or other initiation based on her knowledge of antecedents of the response and the infant's idiosyncrasies (Gustafson & Harris, 1990).

In addition to detailing an important instance of social learning in early life, this study provides some understanding of the case where the very pattern of maternal responding to the infant's cued protests, that appeals to some conceptions of "loving mothering," can generate problems of infant-behavior management that preclude the constructive fostering of developmentally-appropriate infant social and cognitive behaviors. Thus, a paradox is involved in the phenomena being explored in this research analysis. There appears to be a popular belief among educated parents that a child attached to them would necessarily exhibit departure/separation protests, and that an unattached child would not emit protests during separations. Hence, many parents appear to operate under a belief that leads them to encourage (perhaps ambivalently) their children's departure/separation protesting. This paradoxical dilemma is one of the themes underlying this chapter.

Appreciating the maternal role in separation problems and in procedures to eliminate them provides a basis for understanding early child social development and the parent-child interaction process, and for applying these principles/procedures to family, day care, and school settings. It is conceivable that, in such other settings as the home and day-care center, other of the child's instrumental responses emitted during maternal departures and separations could also be trained inadvertently by caregiver reactions like those provided contingent upon infant protests. Understanding the mechanisms involved in the infants' and adults' contingent responses can illuminate the "pathological" as well as the "normal" development of the child.

#### Naturalistic Observations and Laboratory Experiments

Some comments on the use of laboratory versus natural-life research designs may be useful here. We have reported a research in which observations of infant departure and separation protests in home settings led us directly to mount a laboratory study for efficient validation of the mechanisms abstracted from, and

thought to be operating in, the life settings. In this instance, the proximal determinants of cued infant protests were studied employing mothers as experimental agents. Alternatively, a passive-observation study or field experiment (which has many of the same constraints as has the laboratory study) in natural home settings might have been mounted. Nevertheless, a naturalistic description (although useful in the preliminary phases of an investigation) is a deficient research method, insofar as it does not permit the inference of causality (McCall, 1977). This naturalistic tactic was not used as our first alternative because it is routinely found in nature that the magnitude of effect(s) reflecting the phenomena of interest is small relative to the uncontrolled (error) variation there. Hence, passive observation in natural settings with contextual variables uncontrolled ordinarily would give little return relative to investment. And such observation with a preliminary attempt to control, or stratify for, context also was thought less efficient for our purpose than the laboratory study reported here.

In this frame, the researcher must often consider moving between laboratory settings, in which there is relatively much control of the proximate causal dimensions thought to be operating, little independent-variable variation, and few confounding conditions (i.e., high internal validity), and life settings in which there may be very limited control and many varying and confounding conditions. This is particularly the case where the researcher intends to make claims about life settings from the laboratory research, as ideally we would like to do here. Ultimately, at least some triangulation will be required between laboratory-generated mechanisms such as those presented here and results obtained from passive observation under the massive inefficiencies prevailing in life settings. This would validate applying the laboratory-generated mechanisms to the life setting. For the moment, our abstraction of the mechanism from extensive observation in home settings, of contingent-maternal responding as the main proximal determinant of infant protests at maternal departures and separations, together with the inherent plausibility of the logic used, will have to stand for the triangulation ultimately required until such time as that proximal mechanism could be validated in the life setting.

#### EPILOGUE

An experimental analysis of contingent maternal behavior that can train and maintain infant protests cued by maternal departures and separations provides a basis for understanding features of social conditioning in early human life, in particular social discriminated operants that comprise, and can index, the attachment process. The research has illustrated an instance of early infant social learning and some of the maternally-mediated proximal environmental conditions apparently responsible for their acquisition and maintenance. At the same time, the results provide a basis for minimizing or eliminating unconstructive

infant behaviors, such as cued departure or separation protests, in this instance by responding differentially, by not providing maternal responding contingent upon such protests. This investigation also illustrated the role a laboratory study can play in providing efficient leverage over questions and solutions for behavioral problems that arise in the real world.

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# IV

## STRESS, TEMPERAMENT, AND ATTACHMENT