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## Contingent maternal attention as determinant of infant's protest responses in dark and light contexts

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FLORIDA INTERNATIONAL UNIVERSITY

Miami, Florida

Contingent Maternal Attention as Determinant of  
Infant's Protest Responses in Dark and Light Contexts

A thesis submitted in partial satisfaction of the  
requirements for the degree of

MASTER OF SCIENCE

IN

PSYCHOLOGY

by

Aida Isabel Sanchez

1997

To: Arthur W. Herriott

College of Arts and Sciences

This thesis, written by Aida I. Sanchez, and entitled Contingent Maternal Attention as Determinant of Infant's Protest Responses in Dark and Light Contexts, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this thesis and recommend that it be approved.

Mary Levitt

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Thesis, Co-Chair

Jacob L. Gewirtz, Major Professor

Date of Defense: June 13, 1997

The thesis of Aida Isabel Sanchez is approved.

Dean Arthur Herriott  
College of Arts and Sciences

Dr. Richard L. Campbell  
Dean of Graduate Studies

Florida International University, 1997

This thesis is dedicated to my children Andrea Isabella and Gabriel Alejandro and also to my soul mate.

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ABSTRACT OF THE THESIS  
CONTINGENT MATERNAL ATTENTION AS A DETERMINANT OF INFANT  
PROTEST RESPONSES IN DARK AND LIGHT CONTEXTS

by

Aida Isabel Sanchez

Florida International University, 1997

Miami, Florida

Professor Jacob. L. Gewirtz, Major Professor

When infants confront darkness, a context many consider to be aversive and to elicit fear responses, their protests are often taken to denote fear of the dark. A functional analysis using the operant-learning paradigm was conducted of the role of contingent versus noncontingent maternal attention on protests when confronting darkness, in each of 10 human infants. In the laboratory, each mother served as interactor, her behaviors prompted by the experimenter. Identified were the controlling antecedents and consequences that shape and maintain infants' protests in darkness, and under an illuminated control condition. For every one of the 10 single-within subject designs, both in darkness and in the illuminated control context, the findings were that fear-denoting infant protests increased systematically under contingent maternal attention, and decreased systematically or did not change under attention contingent on alternative-to-protest responses. These findings broaden an understanding of the role maternal attention can play in infant learning and, particularly, in shaping fear-denoting protests in their infants confronting darkness (as well as illuminated settings) and, by implication, behaviors denoting others fears as well.

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# Contingent Maternal Attention as a Determinant of Infant's Protest Responses in Dark and Light contexts

## INTRODUCTION

Fear of the dark is a common fear reported in the literature on children ages 3 to 11 (Giebenhain & O'Dell, 1984; Holmes, 1936; Jersild & Holmes, 1935; Kanfer, Karoly, & Newman, 1975; Kanner, Meyer, Park, & Whitehorn, 1972; Kelley, 1976; Klingman, 1988; Leitenberg & Callahan, 1973; Mikulas, Coffman, Dayton, Frayne & Maier, 1985; Sheslow, Bondy, & Nelson, 1982). Fear of the dark may be the most dominant fear experienced by age 4, and may represent one of the most negative and frustrating problems of childhood (Mikulas & Coffman, 1989; Ollendick, 1979). Some researchers have considered fear of the dark to be age-linked and transitory (Leitenberg & Callahan, 1973); others, however, do not believe that this fear will recede in all children afraid of the dark, as "a number of children do not grow out of this fear, and in some cases the fear actually becomes worse over the years" (Mikulas & Coffman, 1989, p. 185). However, whether or not fear of the dark is universal is unclear.

The importance of the caregiver's contributions to children's fearful conduct in general has been noted by pioneer researchers in the exploratory and descriptive work on children fears (Jersild & Holmes, 1935, 1935a; Jersild & Markey, 1933; Jones, 1924). Although maternal attention has been recognized as a factor in maintaining fearful responses in the dark (Kanner et al, 1972), no study has shown systematically the effect of contingent maternal attention in the generation, maintenance, and reversal of protest behaviors that is often taken to denote fear of the dark in children. Specifically, fear of the dark has been investigated primarily using avoidance and approach responses in 3- to 11-year-old children exposed to darkness. Past studies measuring fear of the dark have involved two

types, experimental and home-based. In general, experimental studies are conducted to assess objectively the fear of the dark in a child. That is, a measure (a 5-point scale fear thermometer) set by the child is taken to indicate if he/she is afraid (Kelly, 1976; Sheslow et al., 1982). Graduated exposure with reinforcement, duration of time spent in darkness, or how dark the child can tolerate the experimental room without protesting are the typical avoidance or dark tolerance tests employed in these studies. In addition, school or home-based studies have been carried out in the classroom or at home using bibliotherapy, which includes modeling as a behavioral component (i.e., telling stories to the children which present darkness in a positive way), or by teaching parents specific techniques which include also the use of story books, games and behavior-change techniques (i.e., shaping behavior to tolerate darkness; or the application of differential reinforcement of alternative behaviors). The measurement commonly used in homes involves a dark-tolerance test, a behavior-approach test, and/or a fear-behavior checklist completed by the parents; other home studies use the level of nighttime illumination voluntarily set by the child on a rheostat positioned in the bedroom to indicate the child's "subjective" rating of his/her fear level during the night (Mikulas & Coffman, 1989).

The present study, however, differs from other approaches in the following ways: (1) Because this study was experimental, the measures employed prevented the confounding of other factors typically found in home-based studies (bed problems/ siblings); (2) The fear behavior of the child was assessed objectively by direct observation of actual behavior (fearful facial expressions, protests, social referencing), rather than by subjective measures as in the aforementioned studies on fear of the dark; (3) The presence of the protest behavior of the child often used to denote fear was compared in two different contexts (dark and light) and with two types of maternal attention (contingent CRF vs. noncontingent DRO); (4) An extended functional analysis of the role of maternal attention

in shaping, maintaining and reducing infant protests behavior denoting fear in a potentially aversive situation (darkness) was examined; and (5) The use of a younger sample than is studied ordinarily; each of ten infants aged 6- to 9-months with his/her mother was observed both under light and dark conditions in a laboratory setting, to demonstrate that problem behavior can be shaped both in darkness and in light by maternal attention.

From birth to two years of age, infants have been reported in various settings to exhibit a multitude of elicited behaviors denoting diverse fears, including fear of the dark (Izard, 1990; Jones, 1924; Scarr & Salapatek, 1970; Valentine, 1930; Watson & Morgan, 1917). Since these reports have only been descriptive, without a focus on process, the behaviors of infants confronting darkness require further investigation, including a focus on the effects of contingent maternal attention on infants' protests, one behavior taken to denote this fear. The present study is a functional analysis conducted to (a) identify objectively in infants behavior indices of fear in darkness, (b) understand the effects of introducing and removing contingent maternal attention in the shaping, maintenance, and elimination of fear-denoting behaviors in infants in dark and in light contexts, and (c) minimize or prevent the development of fear-denoting behaviors in darkness at an early age, and to promote other more constructive behaviors (i.e., decreasing reliance on external contingencies) in a context believed by many to be aversive or threatening naturally for diurnal species.

Clinical studies most often have utilized child or parent reports for identifying the presence of common problematic fearful behavior (e.g., some operant) exhibited by their children at nighttime as a sufficient index of fear of the dark. Among the operant behaviors cited in the literature as indicating fear of the dark are: resistance to entering a dark room by protesting, fussing, crying, whining when lights are turned off, requesting company to avoid sleeping alone, repetitively asking for water as an apparent excuse to

get parental attention, going to the parent's bed, and/or insisting that lights, televisions or radios be left or turned on. In contrast, this study proposes the use of other more effective and valid methods such as the application of a functional analysis to study the emission of fearful behaviors in infants when confronting darkness.

Within a functional analysis, preceding diagnosis and treatment, it is necessary to identify the antecedents and consequences that are potential proximal causal variables which can intensify behaviors of children exposed to darkness. Children diagnosed as manifesting fear of the dark often show distinct fearful behaviors occasioned by two significant antecedent events in their natural setting at nighttime: (1) when lights are extinguished and darkness is confronted and associated with the termination of customary stimulation (i.e., withdrawal of potential reinforcers of the visual type such as books, television and toys), and (2) when separation from caregivers is common, and parents request that their young children go to bed (Mikulas & Coffman, 1989). In this analysis, the identification of consequences (such as intermittent maternal attention to children's protests through the night) that shape and maintain fearful-dependent behaviors at nighttime, is also critical for the reduction and/or prevention of the same behaviors in darkness.

Under the operant-learning paradigm proposed here, darkness which reduces or terminates the customary stimulation infants and children are exposed to throughout the day, can represent a discriminative stimulus occasioning behaviors leading to parental attention or proximity, extending the bedtime period, and/or acquiring other potential reinforcers at nighttime. Thus, the application of a functional analysis to this phenomenon which is commonly said to "emerge" when children attain the modal age range of three to seven, could clarify many incorrect assumptions about children diagnosed as being afraid of the dark. In the present study, a behavior analysis intervention to decrease fear-

denoting behaviors in infants exposed to darkness is examined, and alternative techniques are recommended for teaching behaviors incompatible with fears in children protesting when the lights are turned off in their rooms.

In addition, the present research contributes to the developmental psychology literature by discussing treatment issues missing from the children's` fear-of-the-dark literature. First, operant-behavior problems denoting children's fear of the dark can result from parent-supplied positive or negative reinforcement contingencies when darkness is confronted. Many fears can be acquired on the basis of an operant-learning process involving inadvertent parent-supplied positive reinforcers (Graziano, DeGiovanni, & Garcia, 1979). Infant protests denoting fear in darkness can be trained and maintained by contingent maternal responding. In contrast, other practical types of maternal-responding schedules, such as (differential) attention contingent on behaviors other than those denoting fear (DRO), can prevent, reduce or extinguish these negative fear-denoting behaviors in the same context.

A second issue not discussed adequately as a critical feature in the children's fear of the dark literature concerns sleep disturbances. Sleep deprivation is detrimental to a young child's development and health. Studies on the effects of sleep deprivation in children have indicated that sleep-loss or interrupted-sleep patterns are detrimental to health and frequently precipitates conduct disturbances in younger children (Renshaw, Miller, & Marquis, 1970). For this reason, parents and others should not accept behavior denoting fear of the dark in children as normal. The present investigation examines empirically the application of differential maternal attention in darkness as a practical technique that parents can apply to minimize and prevent fear-denoting behaviors. Furthermore, this technique is designed to promote the development of other more

constructive behaviors in children while strengthening their sleeping behavior patterns in darkness.

Another area lacking sufficient attention in the developmental literature involves the imprecision and unclarity of behaviors denoting fear. A distinction between operant and respondent behaviors when children exhibit behaviors denoting fear of the dark is necessary for an accurate analysis of the antecedents and consequences controlling those behaviors. Operant and respondent behaviors have different inherent characteristics that can often be identified, and that are preceded by different stimulus classes. The literature presents an array of experimental studies documenting the exhibition of respondent and operant behaviors in infants and children when confronting fear situations (Jones, 1924; Holmes, 1936; Valentine, 1930; Watson & Morgan, 1918). Nevertheless, when assessing children's fear of the dark, many professionals have relied only on the subjective reports of parents and children, overlooking the role of respondents, and mainly depending on the operant responses denoting fear of the dark (Jersild & Holmes, 1935). Very often, observers overestimate the operant responses denoting fear as sufficient criteria for fear of the dark in children. Thus, it is proposed here that in the absence of respondent-type responses in darkness, interpreting operant behaviors as genuine fear indicators may lead erroneous analysis.

Indices of Fear of the Dark. Respondent-type behaviors (e.g., fearful facial expression, hand trembling, screaming, red face, paleness, bodily disturbance) generated by the presentation of an unconditioned or conditioned aversive stimulus (e.g., a loud noise) occurring in the dark may have features distinct from operant responses (e.g., chronic verbal protests or avoiding going to sleep because the room is dark). However, it is important to note that, on occasion, the structural form of respondents and operants may be similar, and only their function will distinguish the two behavior classes. Such

similarities indicate greater reason to learn to distinguish the behavioral indices of elicited fears from those of operant protests emitted by the child in the same context.

Social referencing has been used to evaluate infant responding (looking, touching, turning to) and “using information in the facial (vocal and/or gestural) emotional expressions of others (most often the mother) to cue/guide their responding in contexts of uncertainty” (Gewirtz & Pelaez-Nogueras, 1992, p. 151). Consequently, in the present investigation it was considered important to analyze the presence or absence of social referencing in infants when confronting darkness. The point here is that operant protests in familiar contexts (the child’s dark room) are not necessarily true indicators of fear. Instead, operant responses occurring at nighttime may be indicators of a different problem, such as separation protest “disorder” (Ollendick, Hagopian, & Huntzinger, 1991; Gewirtz & Pelaez-Nogueras, 1991; Pelaez-Nogueras, 1989). Consequently, interpreting operant behaviors, in the absence of respondent-type responses, as genuine fear indicators, may lead to erroneous analysis. Such an analysis ignores important proximal variables that cause the occurrence and maintenance of operant responses that do not denote fear specifically, but denote other typical problems of childhood development. Thus, under controlled conditions in darkness, a common, potentially fear-evoking event in diurnal species, this study attempts to assess the presence both of respondent reflex-type behaviors (fearful face) and of operant protests (whining, fussing, protesting, crying) denoting fear of the dark in infants.

Given the empirical support of the use of fearful facial expressions to denote fear in infants, this study examines such facial expressions as well as social referencing when confronting darkness to identify indicators of the fear of darkness (i.e., mostly elicited respondents/ reflex-type behaviors cited by Watson and Morgan, 1917; Valentine, 1930).



A differentiation of respondents (fearful faces) and operants (protests) in infants when confronting darkness was also proposed.

Identification of indices of fearful “emotions” in infants has been recognized in the literature. In this context, the work of Izard and colleagues on developing coding systems of objective facial emotional expression has been recognized (Camras, Holland, & Patterson, 1993). Izard (1990) has reported the ability of infants to express different discrete facial expressions in situations eliciting common emotions including fear. In one study, the social validity of infants expressing the fundamental emotions of interest, joy, surprise, sadness, anger, disgust, contempt, and fear was confirmed (Izard, Huebner, Risser, McGinnes, & Dougherty, 1980). Other investigators have identified infant behavior manifestations (mostly respondents), reactivity (locomotion), or behavioral expressions of affect including gaze direction, motor activity including orienting and defensive responses, and heart-rate activity in situations recognized as eliciting fear, such as a visual-cliff depth gradients, maternal separation, strangers approaching, the appearance of a sudden event involving unexpectedness, and/or looming, loud noises, or novelty (e.g., Campos, Emde, Gaensbauer, & Henderson, 1975; Parry, 1973; Schwartz, Campos & Baisel 1973; Stifter, Fox & Porges 1989). Among the behaviors observed in the aforementioned studies were: showing hesitancy in approaching stimuli, crying, visual attention, limb- movement inhibition indicative of attentiveness, freezing, locomotion, distress vocalization (whimpering, fussing or continuous loud wailing sounds), while the presence of “positive” vocalizations (cooing, babbling or laughing sounds) was used to index the absence of fear.

With the evidence cited supporting the possibility of infants making fearful expressions and emitting negative vocalizations in situations that are said to elicit fear, it was decided in this study to observe fearful facial expressions and other infant behaviors (social

referencing, negative vocalizations including fussing, whining, protest or operant cries) as indices of fear when confronting darkness.

As was noted earlier, the absence of children's respondent behaviors, and the presence of operant fear-denoting behaviors when in darkness, most often involves the child protesting at a time when separation from parents normally occurs. Thus, it is proposed here that protests indexing fear of the dark at bedtime when the lights are turned off may indicate other problems; separation from mother, being unable to remain alone without an array of potential reinforcers, or complaining about the absence of customary stimulation (Ollendick, Hagopian, & Huntzinger, 1991; Pelaez-Nogueras & Gewirtz, 1992; Watson & Morgan, 1917).

The third issue identified in the fear of the dark literature is the overlap or duplication of different clinical terms connoting similar behavior problems in the same context and at the same time, (e.g., the confounding of fear of the dark with fear of being alone (Kanner, Meyer, Park, & Whitehorn, 1972), or the confounding of fear of the dark with bedtime and sleep problems, as well as attention seeking (Mikulas, & Coffman, 1989). Sleep disturbances, awakening problems, nighttime behavior problems, and fear of the dark are some of the different terms given to similar behavior problems exhibited by infants and children in the same setting, and at nighttime when lights are extinguished. The problematic behaviors indexing the above categories show similar features, and occur in the same context, at the same time. Parental attention contingent on the behaviors that index these different phenomena may be a common factor.

This study uses the contextual design used by Gewirtz and Pelaez-Nogueras (1991; 1992; Pelaez-Nogueras, 1989). In two studies, these researchers demonstrated that cues and contingencies provided by the mother in the context of departure or separation prompted and shaped the child's protests. The purpose of the present experiment was to

analyze the learning of the fear of the dark phenomenon in normal 6- to 9 month old infants, insofar as protests cued by darkness (or light) denoted that fear. Kanner, Meyer, Park, and Whitehorn (1972) recognized the lack of an objective basis in childhood formations of fear of the dark, traced its origin to environmental determinants, and acknowledged that this so-called fear may be confounded with the fear of being alone. Kanner et al. (1972) assumed that the scope of this fear rests largely on observation and imitation. These authors explained that when parents justify this fear by “soothing” the child, they behave in protective ways in the familiar dark room (a nontreatening context). For example, when parents let the child share their bed or approve of leaving the light on in the child’s bedroom until he/she falls asleep, they are confirming that indeed there is something to fear. The authors affirm that children who are “afraid of the dark” begin also protesting for company during other events which do not include darkness, such as in the morning, which can include school time. Thus, fear of the dark may also generalize (transfer) to other events (objects, times, places) when the child is alone.

The usefulness of DRO (differential reinforcement of other behaviors) as an efficient technique for reinforcing desirable behaviors while ignoring (“extinguishing”) inappropriate behaviors at nighttime has already been recommended as an effective procedure for dealing with children who are afraid of the dark (Giebenhain & O’Dell, 1984; Mikulas & Coffman, 1989). Thus, one of the purposes of the present study was to examine experimentally the systematic effect of administering differential maternal attention on infant alternative-to-protest-behaviors in two different contexts (dark or light).

The observations included in this study of initial reactions in infants confronting darkness will clarify some of the aforementioned confounding and inherent problems in the fear-of-the-dark literature. Contingent maternal attention has been found to be a

reinforcer for infant protests in separation and departure settings. A careful and thorough examination of two distinct schedules and modes of maternal attention (CRF and DRO) for infant protests while both mother and infant confront darkness was conducted. This contributed to the understanding of the role of contingent maternal attention on the shaping of infant protests denoting fear in darkness. Thus, the assumption in this study is that contingent maternal attention (on a CRF schedule) will increase fear-denoting infant protests, in both dark and illuminated settings. In contrast, the administration of contingent maternal attention on behaviors other than protests (on a DRO schedule) will decrease or extinguish the incidence of protest, in these dark or illuminated settings. The implication in this study is that infant protests denoting fear in darkness can be conditioned by contingent maternal attention as putative positive reinforcement.

In summary, the goal of the present investigation which constituted a functional analysis of two distinct types of maternal attention (CRF and DRO) on two distinct types of infant behavior (protests and alternatives-to-protests) was to: (1) observe under experimental conditions, behaviors (fearful faces, social referencing, protests) of infants confronting darkness; (2) analyze the effects of contingent maternal attention (CRF) in generating and maintaining infant protests both in dark and illuminated settings; and (3) determining alternative techniques such as differential maternal attention (DRO) in reducing, reversing or extinguishing the incidence of protests denoting fear in the dark and illuminated settings. With careful attention given to previous studies of the process of children learning fears, this investigation is designed to provide specific conclusions and a better understanding of whether or not darkness constitutes an unlearned aversive event that can elicit fear responses in children 6- to 9-months of age; and, alternatively, whether or not darkness simply may be a discriminative event signaling that protests could be followed by maternal attention. Thus, in this research an analysis is made of the "fear of

the dark" phenomenon in normal infants, insofar as protests cued by darkness indexes that fear. The investigation was conducted in a controlled environment in which maternal attention in response to infant protests was manipulated. Lastly, objective specifications will be derived pertaining to the environmental events controlling the behaviors denoting "fear of the dark" in children.

## CHAPTER II

### METHOD

#### Participants

Ten healthy infants, six to nine months of age (seven females and three males), and their mothers participated in this study. The infants were recruited by contacting their mothers by phone after obtaining information from county birth records. The participation of six additional subjects was discontinued by their mothers. Two mothers could not be contacted and two mothers declined to participate for the required number of sessions. The last two infant-mother dyads withdrew from the study as the infants could not tolerate being out of sight of their mothers (even in the light context). After initial phone contact, the mothers received a letter of invitation explaining the nature of the study, the confidentiality and protection of their rights, and assurance of their infant's safety (Appendix B). On the first day of the experiment, each mother, who agreed to participate, was asked to read carefully and sign a consent form which explained the nature of the investigation (Appendix C). Each mother was also given a letter of instruction in English or Spanish (Appendix D1, D2) explaining the procedures for maximum comfort of the infant when brought to each session, and parking information. Each mother-infant dyad participated in the laboratory for successive weekday sessions. The number of experimental sessions for the 10 dyads ranged from 8 to 22.

#### Apparatus and Setting

The experiment was conducted in a rectangular shaped laboratory room measuring 50 by 17 ft equipped with tripod mounted infrared devices. One such device consisted of a video observation system with audio (manufactured by Components Specialties, Inc., Model CVC-300/OS) purchased at Spy Shops International Inc., Miami, Fl. The camera attached to a tripod had a wide-angle 4 mm lens with infra-red LED's which allowed

subjects to be identified under both normal and low light conditions (i.e., 1/2 lumen--virtual darkness). The second device attached to the same tripod was an infrared light source to facilitate the detection by the camera of the infants' behaviors and facial expressions in the dark. At the rear of the room was a lamp with a 40 W light bulb directed toward the ceiling used for the illumination (i.e., light) conditions.

The light and dark conditions presented in the experimental room were manipulated by an assistant observing from an adjacent control room. Two posters were placed one m in front of the infant. An array of age-appropriate toys (glow-in-the-dark safe phosphorescent stimuli visible to the infant, rattles, and mouthing toys) were positioned on a table, next to the mother, to be used by her as part of the presumptive reinforcing-stimulus complex. In the adjacent control room, a monitor and a video tape recorder displayed and recorded the infants' behaviors. The viewing of the monitor allowed the experimenter to provide instructions via earphones to mothers on how to interact with their infants during the experiment.

### Setting Conditions

The two different setting conditions were light and darkness. Each trial consisted of a 12 s presentation of either the light or dark condition. The dark and light trials were mixed randomly during the session with the constraint that no more than two consecutive trials of the same light or dark condition be presented. An experimental session consisted of administering two 20-trial blocks. Each trial block consisted of 10 interspersed trials under the dark condition and 10 trials under the light condition.

### Procedure

On the first session of the study, random assignment of the subjects to two different orders of condition groups was effected. A undergraduate student blind to the treatments picked from a sack little folded papers indicating if the subject was to be assigned either to

Group 1 or Group 2. This procedure counterbalanced the order of the treatment effects. At the start of each laboratory visit, each mother was asked if her infant was on schedule, with no deviation from routine. If the answer was affirmative, the infant was fed and diapered by the mother before initiating the experiment. Then the infant engaged in free play for a period of approximately 5 min. with the mother in the experimental room with the lights dimmed. This interaction served as a habituation period to preclude protest behavior due to the subject's unfamiliarity of the context, and to provide transition time for eye pupil adaptation between bright daylight illumination and darkness. When the experimenter recognized that the infant appeared content (i.e., not protesting, or crying due to pain or hunger, etc.), and ready to be separated from her mother, the infant was placed in a high chair secured with a restraining safety belt. The mother was asked to sit on a chair located directly behind the infant's high chair and approximately 20 in. away. The mother was also asked to wear earphones.

From a control room, the experimenter instructed each mother on when to provide contingent attention to her infant. At the beginning of each session two posters were randomly selected from a group of six posters that contained glow-in-the-dark figures toys and placed 1 m in front of the infant throughout the entire session. The composite positive reinforcer of "attention" that was to be provided contingent upon the infant's protest (or alternative response) consisted of talking to the infant, administering tactile stimuli (briefly touching the infant), and presenting preselected toys for playing. Specifically, maternal attention consisted of touching the infant's head, shoulders, and arms for approximately 3 s while repeating familiar phrases such as: "Hi baby!," "It's O.K.," "Mom is here," and the occasional presentation of a toy. Each session lasted approximately 25 min. If, at any time during a particular session (regardless of which treatment was in effect) an infant showed continuous (seemingly elicited) crying for any



duration longer than 15 s, or appeared distressed (showing a fearful facial expression with a continuous cry), the experimenter promptly terminated the session. The infant would then be comforted and soothed by his/her mother until the crying ceased. Each session was videotaped and two independent observers coded the infants' responses in three categories for each light and dark 12-s trial. These behavior categories were: protest, social referencing, or fearful facial expressions.

Upon completion of their participation in the study, mothers received instructions (Appendix G) on how to minimize the infants' protest behaviors should protests be emitted at home or in any other setting. After approximately three weeks of participation, all mothers were contacted by phone by the experimenter to insure that they were following the instructions provided on the letter of explanation given to each mother at the end of the study on how to attend selectively to independent-type behaviors of their infants (e.g., remaining in darkness quietly and calmly in their familiar room at night).

#### Experimental Design

A within-subjects alternating, concurrent and sequential, treatments single-subject design with reversals was implemented. The within-subject reversal treatments consisted of contingent attention (CRF) vs. differential attention (DRO) for protests under both conditions (dark vs. light). A between-subjects factor consisted of two orders of treatment presentation for the two groups. Group 1 received CRF in DARK first (Phase B) vs. Group 2 which received CRF in DARK second (Phase C). Treatments and conditions were compared across four experimental phases.

For both groups, the first Phase consisted of a baseline which continued until protest responses stabilized in both light and dark conditions. After completion of the baseline phase (Phase A), subjects were randomly assigned to one order of treatment presentation and treatments were administered distinctly for the two groups: CRF in Dark vs. DRO in

Light for Group 1, and CRF in Light vs. DRO in Dark for Group 2. (i.e., either CRF in DARK first (Phase B) or CRF in LIGHT first (Phase C). After completion of the first intervention phase (B or C) when the response criterion was attained, treatments were reversed for each group for the third phase. That is, CRF in Light vs. DRO in Dark for Group 1 and CRF in Dark vs. DRO in Light for Group 2. Again, this third Phase, served to counterbalance or reverse the order of treatment given in the previous phase. The five subjects of Group 1 were exposed to phases ABCD; in contrast, the five subjects of Group 2 were exposed to phases ACBD. The last Phase, consisted of administering the DRO treatment to the two conditions, that is DRO in Dark and DRO in Light for the two Groups to reduce or extinguish protests learned in the laboratory.

### Treatments

The mother of each infant served as proximal experimenter for her child with behavior under the control of instructions received via the earphones from the experimenter. The two treatments were alternated within Phases B and C and administered in two distinct ways. The Contingent-Attention (CRF) treatment consisted of presenting maternal attention contingent on every infant protest in a 12-s trial. Infants emitted no more than three protests on each 12-s trial. For every protest exhibited, contingent maternal attention was provided for 3-s duration. The Differential-Attention (DRO) treatment consisted of presenting maternal attention contingent on infant behaviors other than protests in a 12-s trial. In the absence of emitted protests, for every nonprotest emitted during a trial contingent maternal attention was provided for 3-s duration. Each trial was scored as containing at least one protest or nonprotest response.

When an infant's protest occurred at the end of a trial, an additional 5-s period was allowed before the initiation of the new trial to preclude an overlap with the new trial.

very effort was made to provide the same density (number and duration) of attention stimuli during both treatments.

### Phases

Phase A (Baseline). Sessions during baseline continued until each infant's protest responses showed stability in both light and dark conditions. Stability of the protest responses was determined by the subject's performance within the last three to four 20-trial blocks for each of the 10 subjects. For the ten subjects, the mean total number of trials presented for light and dark conditions during the baseline phase was 70.5.

Phase B and Phase C. During Phases B and C, the treatments were alternated within each phase across the 20-trial blocks until the joint behavior criterion was attained. For Group 1, Phase B consisted of CRF in DARK and DRO in LIGHT. In contrast, Phase C, which served to counterbalance the order of treatments given in Phase B, consisted of CRF in LIGHT and DRO in DARK. These phases were reversed for Group 2. Joint behavior criteria for both treatments (CRF and DRO) were established for Phases B and C. These criteria required that subjects emit concurrently within both treatments 7 or more protests under CRF, and 3 or fewer protests under DRO, for two consecutive 20-trial blocks. Because of the inherent complexity of alternating two very-different treatments schedules (CRF/DRO) within the same phase, these criteria appeared to be too stringent (six subjects met the first established criterion only in one phase). Consequently, somewhat more relaxed criteria were established. These criteria consisted of infants showing a difference of at least 4 protests between CRF and DRO trials for at least 3 consecutive 20-trial blocks.

Phase D. During this last phase, DRO was administered in both light and dark conditions (DRO in LIGHT and DRO in DARK). The criteria to terminate this phase consisted of infants emitting no more than 3 protests for at least 2 consecutive 20-trial

blocks. In this final phase, the rate of protest responses exhibited previously under the CRF treatment of either Phase B or C was expected to return to base level or lower.

### Behavior Definitions

Three different infant responses were coded from the videotapes: protest responses, social referencing responses, and fearful facial/body expressions. The infant's protest responses included brief fussing, whining, whimpering, or instrumental crying apparently unrelated to pain, hunger, or distress. Elicited cries were differentiated from operant cries on the basis of the presence of an intense, continuing or lengthy-duration, rhythmic wail lasting more than 15 s, showing tears, a grimace or sad face and/or a fearful face, indicating extreme apprehension or involving an emotional outburst. Operant cries are maintained by their consequences. Social-referencing responses included the infant's turning to look, touch, hear, or approach the mother. These turns indicated the infant's searching for cues to determine how to behave in the ambiguous dark or light conditions. Only infant responses that resulted within 5-s of a change in a condition (dark or light) were counted as social referencing. Fearful-facial expressions denoted extreme apprehension or fear. These may include shivering, head lowered, forehead wrinkled transversely with eyes wide open, staring with mouth open, nostril dilation, eyebrows raised, and/or reaching for the mother while appearing distressed or startled. These fearful facial expressions could also be accompanied by cries of a shrill, intense, continuing nature or lengthy rhythmic wailing with tears (but no more than 15-s of continuous crying), a grimace, a furrowed brow and/or a reddened or sad face.

### Coding of Responses and Interobserver Agreement

Two undergraduate research assistants who were trained, and who observed independently, coded the occurrences of the infants' protests, social-referencing responses, and fearful facial expressions for each light and dark 12-s trial. Coding was

recorded on a scoring form designed to include daily session scores and total scores of each behavior category per 10-trial block under light and dark conditions (see Appendix E/Session Scoring Form). These independent observers were trained separately to code the behaviors of the infants and mothers from the videotapes. An observer agreement check were conducted at regular intervals during the study by the main experimenter to assess for the possibility of observer drift.

Interobserver-agreement reliability on the behavior categories was calculated. Reliability of the behavior measures was determined separately for four randomly chosen subjects on all experimental sessions for protests and social referencing. Percentages of agreement among observers was computed in the following manner: The number of agreements on the presence and absence of a protest and social referencing separately in each 12 s dark or light trial was recorded and divided by the total number of trials (total number of agreements plus total number of disagreements) and multiplied by 100. The number of agreement trials for all four randomly-selected subjects across the four phases of the design for trials with protest was 1447 (numerator); the total number of observations was 1489 (denominator). The percent agreement was 97.2. The number of agreement trials for the same four randomly selected subjects across the four experimental phases of the design for social referencing was 1471 (numerator); and the total number of observations was 1489 (denominator). The percentage agreement was 98.8. Observer agreement on elicited behavior data denoting fear could not be reported as no fearful faces were reported in any of the four design phases.

The occurrence of contingent maternal attention under each treatment (CRF or DRO) in each of the intervention phases (B and C) was recorded for four randomly chosen subjects. Data are available in the records (Appendix F). Mothers' contingent attention responses were monitored during the four experimental phases for each of the 10

participant infants to insure that they were provided appropriately contingent upon protest response under the CRF treatment and upon alternatives-to-protests as required under DRO conditions.

## CHAPTER III

### RESULTS

Due to the complexity of this study regarding the administration of the two treatments (CRF and DRO) in two contexts (LIGHT and DARK), using two reversal phases (B and C) with two order-of-treatment groups (Group 1 and Group 2), a short indication of how results will be presented follows: (1) Data concerning trials with a protest response by 20-trial blocks and (2) data concerning the number of trials to attain the criterion. The outcome of the results has been arranged in five distinct ways:

(a.) First, by using visual inspection of each individual graph, an analysis of trials with a protest was conducted for each subject across all experimental phases. (b.) Second, this section presents an overall analysis of the ten conditioning patterns. (c.) Third, both the between-groups Wilcoxon-Mann Whitney U nonparametric tests and parametric t tests, results of the differences in the number of trials to attain the criterion levels between the two groups, were used to assess the effect of treatment order. (d.) Fourth, by using the within-subjects Wilcoxon Signed-Ranks nonparametric test, differences in the number of trials to criterion between the Dark and Light context conditions under the same treatment by subjects were examined. (e.) Finally, a Wilcoxon Signed-Ranks test was again employed to determine differences in the number of trials to attain criterion by subjects between the two intervention phases (B and C).

#### (a) Visual inspection for Within-Subjects Analyses Across Phases

Figures 1 and 2 show graphs for the individual performance of each of the 10 infant participants in the study. Each data point in the chart represents the number of trials with protest responses observed in each Dark and in each Light condition separately in a 20 trial block for the same condition. Visual examination of the variability, level of the data and trends in the data was done for the ten subjects.

Individual performances on the number of trials with protest responses during the Baseline phase were relatively low. For the 20-trial Baseline blocks of each condition separately, light and dark, no infant emitted more than 4 protests in the Dark and 2 protests in the Light condition. All 10 infants achieved response stability in Baseline in fewer than five 20-trial blocks. In each individual graph, the increase in trials with protest from baseline in both Dark and Light conditions of Phases B and C, under the CRF treatment, can be observed. As shown in the graphs, the almost complete absence of an overlap between the two distinct maternal-attention schedules in the light and dark contexts confirms that the differential responding of the subjects was relatively homogeneous.

The pattern of increase under the CRF treatment and the decrease under the DRO treatment in the number of protest responses was clearly observed in each of the ten subjects. All ten subjects in Phases B and C exhibited differential responding between the light and dark conditions under the two treatments, CRF and DRO. Specifically, the findings were that: (1) CRF can function as a reinforcer for the exhibition of infant protests denoting fear in darkness. Results of the figures showed that each of the 10 infants had more trials with protests under the CRF treatment than under the DRO treatment in both light and dark contexts. (2) In contrast, DRO can function as a reinforcer for other often more-constructive behaviors in the infant (playing contentedly in both darkness and in illuminated settings) which are responses incompatible with those protests denoting fear. In dark and illuminated contexts, the efficacy of CRF treatment as a reinforcer of the protest behavior, and DRO treatment as a reinforcer of other-than-protest behavior in 10 subjects across four phases has been demonstrated. Behavior change for each of the 10 subjects can be attributed to the experimental manipulation of the two distinct maternal attention styles compared under two different contextual



conditions. For every subject, protests exhibited in the last two 20-trial blocks of each condition separately was several times higher under the CRF treatment than under the DRO treatment. This pattern confirms that subjects behaved differentially in the two treatments. As expected, differential responding under the two maternal attention treatments described (CRF vs. DRO) in both conditions (light and dark) held was homogeneous and consistent for all 10 infants. The trial-block points showing the effects of CRF and DRO administered concurrently during each of the intervention phases demonstrated a learned discrimination between light and dark conditions within the same phase by all infants. During the final phase (Phase D), trials with protest responses for each subject decreased to baseline level or lower under both light and dark conditions. Total number of trials with protests in the last two 20-trial blocks under this phase (DRO treatment alone) for both Light and Dark conditions resulted in fewer trials with protests than originally shown in baseline. This pattern of results demonstrates the effectiveness of the DRO treatment in reversing protest responses.

#### (b) Overall Analysis of the Ten Conditioning Patterns

An inferential statistical test can examine such data patterns as have been described under binomial-theorem logic. Each condition and reversal pattern across the four single-subject design phases can be termed a “success” if: the protest curve across 20-trial blocks rose systematically from Phase 1--Baseline to the end of Phase 2--CRF/DARK, while DRO/LIGHT remained constant or declined; protest under CRF/LIGHT rose systematically in Phase 3 while declining systematically in DRO/DARK; and protests declined after CRF/LIGHT or remained constant or decreased after DRO/DARK in Phase 4. (It is restated again that for half of the subjects, the order of Phases 2 and 3 is reversed.) On these bases there were 10 “successes” or “heads” found out of the 10 throws. Under the binomial theorem, in an unbiased series of throws, the likelihood of

finding 10 identical such conditioning pattern “successes” for 10 subjects, with no contrary patterns (or “tails”) having been found is  $p=0.0004882$  (one tail) or, grossly,  $p < .0005$  (one tail).

(c) Between Groups Comparison in Number of Trials to Attain Criterion

Wilcoxon-Mann Whitney U-tests and parametric  $t$ -tests were used to determine if the number of trials to criterion was affected by the order of treatments between groups. The total number of trials required to reach criterion under each treatment order were the bases of these analyses (Appendix G). No significant differences were obtained for any of the four tests conducted within each Phase ( $p \geq .10$ ). Thus, these findings of the Wilcoxon-Mann Whitney U-tests and parametric  $t$  tests for Phases B and C between the two groups suggest that order of treatment (CRF in DARK presented first in Group 1 versus CRF in DARK presented second in Group 2; and CRF in LIGHT presented first in group 2 versus CRF in LIGHT presented second in Group 1) was not a factor in the number of trials required to reach criterion in either phase. Therefore, data for Groups 1 and 2 were combined to analyze differences in number of trials to criteria between the light and dark conditions.

(d) Between Conditions (Dark versus Light) Comparison in the Number of Trials to Criterion

The data of all 10 subjects were collapsed and analyzed using the Wilcoxon Signed-Ranks Test. These analyses were conducted to determine differences (1) between light and dark condition under the same treatment (CRF or DRO) in the number of trials required for criterion, and (2) between Phase B vs. Phase C in the number of trials required to attain criterion. Thus, two signed-ranks tests were conducted to determine differences in the number of trials to criterion under the same treatment between the two distinct light and dark conditions during the second and third phases (intervention phases).

First, a significant difference was found in the number of trials the infants required to reach criterion between the light and dark conditions under the CRF treatment ( $p = .0039$ ). That is, fewer trials were required to reach criterion under the dark, than under the light condition, when CRF was in effect. In addition, a significant difference ( $p = .002$ ) was revealed in the number of trials the infants required to reach criterion between the light and dark conditions under DRO treatment. That is, fewer trials were required to reduce protests under light as compared to the dark condition. Under the CRF treatment, all infants required fewer trials to reach criterion in the dark as compared to the light condition.

In contrast, under the DRO treatment all infants required more trials to reach criterion in the dark condition as compared to the light condition. These two findings support two observations. First, infants more readily protest in the dark than in the light when the protest is followed by contingent maternal attention (CRF). And, second, infants' protests frequencies take longer to decrease or be eliminated when followed by differential maternal attention (DRO) in the dark than in the light condition.

(e) Between Phases Comparison in the Number of Trials to Criterion

A third within-subjects signed-ranks test was conducted to assess differences in the distributions of number of trials infants required to reach criterion between Phases B and C. A significant difference ( $p = .0039$ ) was found in the distribution of numbers of trials infants required to reach criterion between phases B and C. The distribution of trials which the subjects required to reach criterion in Phase B was lower than for Phase C.

(f) Differences in Trials with Protest Between Light and Dark Condition During Baseline

Even though an analysis of the data points in the 10 individual graphs show very little difference in performance between the light and dark conditions in baseline, to determine

any potential difference existing, trials with protest of the last two-20 trial baseline blocks between the light and dark conditions were compared using a within-subjects Wilcoxon-Signed Ranks Test. This test reveal a higher distribution of trials with protests in the dark than in the light condition ( $T=2.50$ ;  $p=.02$ ).

### Ancillary Responses

Although not part of the preceding analyses, the information on ancillary responses is of interest. In particular it is of interest to consider the fearful face and social referencing responses to the first 12-s dark and light trials of 21 infants. Note that these 21 infants include the 10 infants who completed the study, the 6 infants reported earlier whose mothers discontinued participation, and 5 subjects who participated in a pilot stage of this study. The importance of knowing the infants' initial reactions to potentially aversive stimuli (darkness) has been emphasized in the literature, where darkness is recognized as a potential eliciting stimulus for fear. First, a fearful face was absent for 21 infants in the very first 12-s light and dark baseline trial. Second, only three infants showed instances of social referencing in the first light trial, and one infant showed social referencing in the first dark trial. Only two subjects showed social referencing in both the first dark, and the first light, condition. And, third, one subject protested in both the first light and the first dark trials, while one subject emitted protest only in the light condition. Protest response did not occur for all subjects in the dark condition. These findings suggest that, based on the absence of a fearful face, nondifferential social referencing, and protest responses, the dark context was not a threatening setting (one that elicits fear) at the beginning of the study for infants age 6 to 9 months. The demonstration of how infants confront dark and light conditions with no sign of physical distress is of some importance to the fear of the dark literature. Observing that none of the infants protested on the first 12-s dark trial implies that darkness does not elicit avoidance responses or, in other words, that darkness

is not an inherently aversive stimulus for infants unless it is paired with punishment or an unconditioned negative stimulus such a loud noise. Although this finding in infants with six to nine months of post-partum experience, does not support the notion that fear of the dark is an inborn trait.

## CHAPTER IV

### DISCUSSION

A clear causal relationship between contingent maternal behavior and infant protests denoting fear in darkness was shown in this study. The assumption that mother's contingent attention to her infant's protest in light or dark contexts serves as a reinforcer of infant protest responses was confirmed. The opposite was also demonstrated. The effectiveness of the DRO treatment, in which maternal contingencies followed alternative-to-protest behavior, reduced (extinguished) infant protests in both light and dark contexts, was also confirmed. All ten infants showed higher protests in light or dark when attention was administered contingent on protests (CRF) as compared to when attention was administered contingent on alternative-to-protest responses (i.e., being quiet, happy or content while playing in darkness or illuminated settings) (DRO). Light and dark conditions in this study functioned as discriminative stimuli to control infant differential responding under the two distinct maternal-attention-consequence conditioning series.

#### Main Findings

At the same time, the charted 20-trial block data points showing the effect of the presumed CRF and DRO reinforcement schedules administered concurrently during Phases B and C manifested *a discrimination* between light and dark conditions within the same experimental phase by every one of the 10 infant subjects, to date one of the few demonstrations of a learned discrimination in the first year of life. Infants under the differential-attention treatment (DRO) emitted far fewer protests relative to the protest emitted under the contingent-attention treatment (CRF). Thus, maternal attention contingent on infant protests in dark and light conditions can function as a determinant of protests. Both findings are important for the children's fear literature. The contribution of contingent maternal attention in shaping and maintaining protest responses that to many

denote child fear of the dark, under laboratory conditions can balance the questionable assumptions found in the literature that fear results from maturational factors (meaning simply the passage of time) (Rutter & Garnezy, 1983).

Even though a significant difference was found in the number of trials with protests between light and dark conditions in baseline, a clear differential in responding between these two conditions was not observed until the contingencies provided by the mother's behaviors were presented in the intervention phases. Number of trials with protests increased significantly only when contingencies during CRF were provided in either the dark or light condition. However a possible explanation of why there were more protest in the dark compared to the light context during the baseline period could be that:

(1) Infants come to the laboratory with a history of reinforced protests in dark settings (e.g., intermittent maternal contingencies at bedtime when the room is dark).

(2) Since darkness is not the customary context when infants are awake, infants may show certain uneasiness when lights are extinguished during their waking periods.

(3) Because both, visual and other customary stimulation are terminated in darkness, infants are forced to make use of other sensory modalities which they may not have been trained to do (e.g., exploring quietly darkness by listening to the absence of noise, or playing with rattles and/or musical toys).

In addition to the analysis in the graphs of the frequency of protest responses in light and dark conditions under CRF and DRO treatments discussed above, other significant results such as the (rate of attaining criterion in the conditioning of protests or, alternatively, in the reduction of protests in both light and dark conditions, need to be discussed. The following are the significant findings: First, fewer trials were required to attain criterion under the dark, than under the light, condition when CRF was in effect; second, more trials were required to reduce the protest under the dark compared to the

light condition when DRO was in effect; third, a significant difference was obtained in the distribution of numbers of trials infants required to reach criterion between the two intervention phases (Phase B and Phase C). Fewer trials were required to reach criterion in Phase B than in Phase C; and, fourth, during the baseline phase more trials with protest were found in the dark than in the light condition.

The above findings may have come about on several bases. Two findings of this study related to specific context features. Infant protests attained criterion faster when CRF was administered in the dark as compared to in light condition. This calls for recognition of specific features associated with darkness:

(1) The process of adaptation from an illuminated context to darkness may cause certain uneasiness in the child, and perhaps in many adults too, possibly leading to a more rapid exhibition of protesting behaviors.

(2) Darkness cuts off visual stimulation and there is no longer access to the customary environment. Nevertheless, protest behavior exhibited by children in familiar dark contexts should not be considered fearful, but rather protests evoked by termination of customary events.

(3) The specific characteristics found in darkness may serve as an establishing operation precipitating the conditioning of protests more easily for the reason stated above. However, this does not necessarily mean that darkness is an aversive event.

Alternatively, the difference obtained in rate of attaining the criterion under DRO between light and darkness suggests that infant protests are more difficult to decrease (reverse) in the dark:

(1) In the case of darkness at nighttime, for example, parents should ignore the child's protest behavior, and only reinforce with attention selective desirable behaviors, as



demonstrated in this study with DRO, such as staying happy and content when alone in darkness, specially at bed time.

(2) It appears that because illuminated contexts are the customary settings for infants when in alert periods, they cope in more natural way and show more participation than in the dark. Thus, DRO was more effective in decreasing the protests in the light than in the dark condition.

(3) The illuminated context possesses an array of familiar (some potentially reinforcing) stimuli (e.g., access to mother's face, colors, toys). Thus, the opportunity for infants to engage in explorative-play is facilitated in the light condition. It is recalled that the application of DRO to the infant's behavior other than protests in the dark required more trials to reverse (extinguish) the infants' protests than under the light.

#### Darkness as an Establishing Operation or Setting Event

The significant difference obtained between Phase B and Phase C in rate of attaining the criterion suggested that, regardless of treatment order (first or second), all infants achieved criterion faster when Phase B was implemented compared to Phase C. When CRF in DARK is concurrently administered with DRO in LIGHT (Phase B) discrimination learning was facilitated (fewer trials required to attain criteria) than the CRF in the light condition with DRO in darkness (Phase C). Thus, some contexts acquire discriminative properties that may inhibit or precipitate the exhibition of certain behaviors, in this case, the protest in the infant in the light or dark condition. For this reason, this investigation calls for special recognition of subtle contextual antecedents that may be present in a particular context which could affect the performance of the exhibition of any behavior. In contrast to illuminated contexts, darkness served as a discriminative context that facilitated the conditioning of protests in infants.

A particular contribution of this study was to highlight the prevention of problematic behaviors denoting fear at later ages. By demonstrating how fear-denoting protest in infants can be shaped, reduced or extinguished in darkness, specific techniques to reduce problematic behaviors in darkness has been identified and demonstrated. Consequently, parents are advised to start as early as possible, shaping desirable behaviors in their infants when darkness is confronted. Also, it was demonstrated (specifically during baseline) that darkness does not need to be taken as a threatening stimulus, but mainly as an event where children need time, or need training, to adapt.

The emphasis of this study was on the exhibition of infants' instrumental crying (protest responses consisted of brief cries, whimpers, fusses) in dark and illuminated settings. Contingent maternal attention was studied as an isolated variable and systematically analyzed to demonstrate that infants can learn to protest in darkness. Additional research on the effect of contingent maternal attention with children confronting darkness, not just in a laboratory but in more familiar places, is advised. The results of the present study extends the scarce literature on the effect of maternal attention on infant behavior.

#### Limitations of the Study

Two important issues need to be discussed regarding limitations of this study: There were individual differences that forced the experimenter to deviate from regular procedures. Two infants required nearly 20 minutes in some sessions (exceeding the five minutes habituation period) to show an absence of protest behavior in the laboratory before the session was initiated. These infants exhibited more protests when placed in the high chair at the time they were separated from their mothers, compared to the other infants. Thus, specific direction were given to these mothers on how to calm their infants before the session started. The second issue or limitation is that in some instances mothers

did not follow the exact instructions given by the experimenter on how to administer attention to their infants which may have cause some variability in the data.

An important point to consider relates to the intervention phases and infant protests. Because trials were presented consecutively and two opposite distinct patterns of behaviors were expected, on some light or dark trials when CRF was implemented, some protest responses turned into continuous crying. Thus, an intertrial pause was required to have the infant again ready to confront the next trial.

A disadvantage in this study consisted of not achieving clearly differential responding (protest vs. nonprotest) at all times during the intervention phases for some subjects. A reason for this may be due to the inherent complexity of the way the study was designed, with two such distinct behaviors occurring so closely in time in consecutive intervals.

Also for some infants, the protest sometimes turned easily into operant crying. However, because procedural criteria did not permit infants to cry for more than 15 seconds, pauses had to be given. If a similar<sup>56</sup> study is carried out, no session should last more than 25 minutes, as longer sessions may result in infants getting tired and bored and thus acquiring a negative association with the laboratory room.

### Future Research

Future research should continue investigating the impact of maternal attention in the formation of negative behaviors denoting fear in other settings and with others stimulus presenting no danger. DRO is recommended as an important basis for precluding or minimizing fear-denoting protest in young infants confronting dark and light contexts. Training young children as early as possible to tolerate darkness in a natural and positive way may prevent the learning of behaviors indicating fear of the dark at a later age. DRO procedures are often recommended for the amelioration of children's fear of the dark or for infants showing sleep disturbances (e.g., France & Hudson, 1990; Mikulas & Coffman,

1989). Furthermore, the application of this technique is inexpensive and transfers easily to other situations. Thus, it is recommended here that parents, in general, should often apply DRO procedures to shape an array of nonfearful responses, not just in darkness but also in other common nonthreatening settings such as the school. It is suggested that parents ignore unnecessary infant protests, and differentially reinforce desirable behaviors while the wakeful infant remains in darkness. The above recommended directions (using DRO) may serve as a training that should be carried out on a daily basis to prepare infants to tolerate darkness in a positive way, thus avoiding at later ages fear-denoting protest indexing fear of the dark.

An issue emphasized here is that mothers tend to provide unnecessary contingent attention to their children's protests in contexts where no objective threatening stimulus is present (e.g., in the child's dark room at bed time). Unnecessary "soothing" (maternal attention administered to the child's protest when in darkness), such as helping the child to avoid being alone in the dark, or removing the feared stimulus (e.g., leaving lights, radios, or television sets on, removing the child from his/her bed to the parents' bed) generate inappropriate or, often dependent, behaviors of the operant class that can denote fear. Fear in children very often is "a source of unnecessary distress (Jersild, 1935)." Thus parents should be more aware of the context where they provide the special attention to the child to preclude this problem class.

For better discrimination of when an event requires that parents deliver "special attention" to a protesting (apparently "fearful") child, of particular importance in this study has been the emphasis on recognizing in children the features accompanying respondent and operant behaviors. For example, instrumental protests consist of brief manipulative cries maintained by positive reinforcers, in contrast to the respondent behaviors which consist of reflexive, elicited-type responses due generally to physical

distress involving pain, hunger or discomfort. Thus, it has been the researcher's intention that infants can be taught to tolerate darkness alone or with company, that the achievement of a good night sleep can be possible, and that the exhibition of dependent behaviors denoting fear (with the absence of respondents) of the dark is unnecessary.

## CONCLUSIONS

In sum, if parents are aware or informed of the specific discriminative stimuli found in a context, they then could determine why a particular behavior is emitted more often in that context, and thus could anticipate sound and healthy ways of behaving towards the child (e.g., fostering independent skills such as teaching the child to sleep alone in darkness), with behaviors more likely to be exhibited in a particular context. This information could be useful in the sense that parents or caretakers can develop an understanding of what needs to be done in a particular context with a particular behavior.

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## Appendix A

### LITERATURE REVIEW

#### Overview

In a study of methods for overcoming children's fears, Jersild and Holmes (1935) explained that the most practical methods of overcoming fears "are those that help the child to become more competent and skillful and that encourage him to undertake active dealings with the thing that he fears" (p. 102). However, in the subject of childhood fear of the dark, research has been contradictory as to the determination of what constitutes the things children fear. Various theories have been proposed in the developmental-psychopathology literature to account for the origin of children's fears. However, none adequately completely explain or define the origin and subsequent course/patterns of fear behaviors (Graziano, DeGiovanni, & Garcia, 1979).

Various approaches to fear acquisition (e.g., the psychoanalytic) have recognized that innate factors may be the determinants of some infant fears, including fear of the dark, fear of strangers, and fear of the visual cliff (Rutter & Garmezy, 1983; Scarr & Salapatek, 1970a). Valentine (1930) stated he did not detect fear of the dark in any of his studied children in the early years. Scarr and Salapatek (1970b) have argued that it is uncertain that all fears follow maturational patterns and genetic mechanisms.

The present behavioral approach to children's fears suggests that behaviors denoting diverse fears may be learned on the basis of an operant-learning process involving inadvertent parent-supplied reinforcers. That is, child behaviors denoting diverse fears may be inadvertently conditioned by contingent attention provided by the well-intentioned parent, as Graziano et al. (1979) have asserted:

Operant models hold that reinforcement rather than anxiety, primarily social reinforcement such as parental attention, is the

central aspect of phobic behavior. Children are presumably taught to be afraid by parents and other significant persons who selectively, albeit unintentionally, attend to and reward fearful behavior. (p. 806)

In one of the first experimental study of children's fear using direct observation procedures, Jersild and Holmes (1935a) reported that a large proportion of children's fears are cued by adults who deliberately or unthinkingly respond to the children's fears. In reference to darkness, the authors noted that "most observers seem to agree that fear of the dark seldom appears before two years of age" (p.173) and that "fear of events associated with the dark is reported most frequently as the most intense fear of childhood" (p. 124). In their study, 105 children, ages 24 to 71 months, participated in eight experimental situations, including exposure to a dark room. A fearful response was indexed by a child's refusal to enter the room with or without company. The eight fear situations (being left alone, falling boards due to an insecure platform, dark room, strange person, high boards, loud sound, snake, large dog) were said to elicit the aforementioned index expressions of fear. "The animals...were the most effective in causing fear. The dark elicited the next largest number of fear responses" (p. 289).

Infants exhibit a multitude of fears from birth to 2 years in various situations, and the exhibition of fear of the dark in infancy has been reported (Scarr & Salapatek, 1970 a). Thus, important features of infants confronting darkness still need to be experimentally investigated.

In their study of emotional reactions, Watson and Morgan (1917) suggested that, even though it has been said often that children are instinctively afraid in the dark, reactions to darkness result when "darkness comes to be associated with absence of customary stimulation, with noises, etc." (p.166). The authors suggested that these reactions should be considered conditioned-fear reactions, such as when children have been "scared" in the

dark unintentionally, or in the attempt to control their behavior via aversive stimulation (i.e., punishment or the threat of it).

Even though the normative data suggest that most children manifest a "fear of the dark" by age 4 (Jersild & Holmes, 1935), a more detailed and specific picture of this typical problem behavior is lacking in the literature. Additionally, limited emphasis has been placed on the possible role of environmental determinants in producing and maintaining the chain of dark-associated problem/fearful behaviors. As in the acquisition of other social-behavior patterns during infancy, such as patterns of attachment and separation protest (Gewirtz & Pelaez-Nogueras, 1991), the social variables operating at the time the child confronts darkness for the first time remain to be identified. Thus, it is conceivable that inadvertent contingent caregiver responses may be responsible for shaping and maintaining the wide range of dark-associated problem behaviors in children pertaining to a fear of the dark. Darkness related problem behaviors may originate either when the child confronts darkness in the presence of the mother or caregiver, for instance in a familiar dark room at bedtime, or when inappropriate maternal attention is provided contingent on the child's behavior in contexts that present no danger or in no way could be considered threatening.

Fear of the dark has been studied in children ages 2 to 11 years in laboratories and natural settings like school or homes. Most studies have used children aged 3.5 to 7 years as subjects in laboratory settings dealing with dark tolerance or fear reduction (i.e., coping actively with the feared situation in laboratory dark-tolerance tests) (Giebenhain & O'Dell, 1984; Holmes, 1936; Jersild & Holmes, 1935; Kanfer, Karoly, & Newman, 1975; Kelly, 1976; Klingman, 1988; Leitenberg & Callahan, 1973; Mikulas & Coffman, 1989; Mikulas, Coffman, Dayton, Frayne, & Maier, 1985; Sheslow, Bondy, & Nelson, 1982).

Studies such as these have used various techniques to analyze the phenomenon of the child confronting darkness, including the child remaining in darkness either alone or with assistance, “reinforcement practice,” verbal- mediation instruction, self-control strategies, and exposure to fear reduction techniques. These techniques are comprised of parent self-help manuals, symbolic modeling, or bibliotherapy in the form of stories which present the dark in positive ways. Nevertheless, no empirical study has been reported to date on the role of maternal contingencies in the acquisition and maintenance of children’s responses characterizing “fear of the dark.”

Fear of the dark has been commonly said to appear when children reach their preschool years. It is one of the most common fears reported by children ages 4 to 6 (Jersild & Holmes, 1935). Fear of the dark is the most dominant fear appearing by age 4, and perhaps the most negative and frustrating problem of childhood (Mikulas & Coffman, 1989; Ollendick, 1979). This fear has been considered “usually age-linked and transitory” (p. 27) and parents who consider their children to be afraid of the dark often think of it as a minor problem that will disappear as the child matures (Leitenberg & Callahan, 1973). Others dealing with nighttime behavior problems have related fear of the dark to activities involving fantasy and cognitive components (Graziano & Mooney, 1980; Graziano, Mooney, Huber, & Ignasiak, 1979). Fear of the dark has also been discussed in the literature as a clinical fear in children who are often referred for treatment (King & Gullone, 1990).

The present investigation has attempted to fill several gaps in the literature. First it deals with infants ages six to nine months, an age group that has been underinvestigated. Second, it observes mothers’ and infants’ behavior patterns in two distinct setting conditions, light and dark, as opposed to referring to the darkness in descriptive terms (Scarr & Salapateck, 1970), or merely observing children as they approach various fear-

eliciting events (Jersild & Holmes, 1935). Third, this study attempted to differentiate and control for a number of proximal variables that cause either children's fear-denoting responses or independent-type behavior in dark settings. To this end, three distinct problems were identified that exist in the literature about children's fear of the dark. These problems if left unidentified may preclude correct diagnosis and treatment of fear of the dark in children.

#### The First Problem: Ignoring Contextual Determinants of Fearful Behavior

The first problem arises when researchers, clinicians, or parents treat children's fear of the dark as a maturational process, and refer to it as a normal or typical natural fear that the child will outgrow (Leitenberg & Callahan, 1973). Relying on such opinions can result in a failure to address environmental and contextual variables that may be supporting or intensifying the behavior problem. This view could serve as an obstacle to the development of healthy behaviors in children, including normal psychological and physiological growth and desirable patterns of behavior. For instance, parents may become permissive and/or tolerant of the unnecessary demanding requests of the child in this context. Thus, the recommended vital nine hours of sleep for children may be interrupted. In addition, parents who respond inappropriately to the child's demands are often responsible for the origin and maintenance of behavior problems exhibited in darkness (Mikulas & Coffman, 1989), such as sleep disturbance and frequent awakening mentioned as typical behavior problems in children that are afraid of the dark (Graziano & Mooney, 1980; Graziano et al., 1979; Mooney, 1985). In fact, Graziano et al. (1979) have noted that "normal" fear stimuli for children are socially determined and are appropriate for the individual's personal and social situation" (p. 813).

Nevertheless, adults do not seem to be aware of the detrimental effects of loss of sleep on the health, growth, and behavior in children, and especially the very young ones.

Studies of experimental insomnia in children have analyzed the effects of sleep deprivation. Reports indicate that frequent losses of sleep are deleterious to health and can precipitate behavioral disturbances in younger children; Renshaw, Miller, and Marquis (1970) reported the following effects of loss of sleep: “fatigue increases preservative movements, causing the reactor to continue doing the same thing even in the face of need for change” (p. 182); “important inhibitory controls which serve to prevent misconduct are weakened” (p. 185); and “tired children are the ones who fight hardest against being put to bed” (p. 183). Minde, Popiel, Leos, Falkner, Parker, and Handley-Derry (1993) also supported these findings, reporting that “poor sleepers had also more behavior problems, a more difficult temperament and more adverse early medical histories” (p. 521).

These findings support the often cited complaints by parents about their children who are afraid of the dark. Their children become very insistent in not going to sleep at nighttime, repeatedly awaken during the night, and protest continuously that they need company. Thus, for prevention, assessment and treatment purposes in addressing fear of the dark, the effects of sleep deprivation on children’s behavior problems should be explored and considered.

For researchers, clinicians and parents, to tolerate or accept behavior problems associated with fear of the dark because this “fear” is considered a typical, natural, maturational developmental phenomenon that will disappear as the child grows simply interferes with the development of healthy behavior patterns. In fact, some researchers dealing with the “fear of the dark” phenomenon have contradicted the view that this fear will recede. “A number of children do not grow out of this fear, and in some cases the fear actually becomes worse over the years...it makes much more sense to deal with the problem when the child is young to prevent it from becoming worse” (Mikulas & Coffman, 1989, p.185).



In investigating children's fear of the dark, significant contextual factors precipitating the exhibition of problematic behaviors in contexts where darkness is confronted, usually at night, need to be examined. The literature has addressed a number of these. Sleep deprivation (Renshaw, Miller, & Marquis, 1970), intermittent parental attention (France & Hudson, 1990), and parental attention that inadvertently maintains the habitual problematic sleeping pattern and causes waking behavior (Richman, Douglas, Hunt, Lansdown, & Levere, 1985). These issues have been explored as important factors in the exhibition of common child behavior problems during the night.

In the context of parental behavior, Bijou (1996) has described "setting factors" as circumstances that can inhibit or facilitate conditions in the child's behavior. For example, multiple setting factors "can strengthen incompatible behaviors and generate conflict, and in some cases compromise response patterns" (p.152). Thus, when treating this "typical fear," contextual conditions such as where (child's room) and when (nighttime) the child exhibits the protests indexing fear of the dark need to be considered rather than presumed to be innate factors. In addition, factors other than darkness, such as withdrawal of maternal attention, being alone, and termination of customary stimulation (Watson & Morgan, 1917) may prompt the child's protest initiation. In the present study, an analysis of infants' protests in two distinct contexts, light and dark, was conducted to observe possible differences in particular behaviors within the context presented.

Jersild and Holmes (1935) also have acknowledged the role of parental attention in the child's fear. The authors recognized the importance of parents learning to discriminate between a situation in which the child genuinely behaves fearfully and a situation in which the child merely simulates fear as a way of controlling others or just gaining attention. Thus, it is highly recommended that parents learn to distinguish between young children's protest behaviors denoting fear of the dark, and protests resulting from separation or from

attention withdrawal (e.g., Gewirtz & Pelaez-Nogueras, 1992). Such distinctions will set apart and discern valid indices of fear of the dark from separation protest and “attachment” problems which are often generally unclear in the clinical literature.

Confrontation with darkness typically occurs at a time when parents put the child to bed, alone in the bedroom (i.e., indicating separation from the main caregiver at nighttime when darkness prevails), and at a time when customary daytime visual and auditory stimuli has been reduced. Nevertheless, separation from parents and termination of customary stimulation should not justify special attention provided to the child in this instance. If parents provide unnecessary attention to the child’s protest within the danger-free setting when lights are extinguished, an array of attention-seeking/dependent-type behaviors (i.e., physical contact seeking) compatible with fear may be reinforced.

Moreover, the child may start to exhibit dependent-type behaviors in other situations other than the familiar dark room. Jersild and Holmes (1935) described the array of dependent-type behaviors frequently displayed by fearful children. Fearful children who were said to rely upon adults for help, showed a quicker tendency to be “emotionally upset,” showed more timidity and shyness, were unable to defend their rights on the playground with other children, and appeared generally vulnerable.

When adults consider fear of the dark to be a normal reaction in children, their exhibition of dependent-type behaviors becomes the norm, and other more-appropriate self-reliant behaviors may not develop. Even though darkness for some children may be associated with unpleasant events, this learned association should not be interpreted as a genuine original fear (Watson & Morgan, 1917). The customary nightly events such as separation from parents, termination of visual and auditory stimuli, and being alone in bed while in darkness are not more any dangerous than the customary events taking place during daylight hours.

Consequently, excessive parental differential attention contingent on the child's protests at night should be avoided. The child's protest behavior in familiar darkness settings may not be an indicator of fear, but as Gewirtz and Pelaez-Nogueras (1991, 1992) have shown, a protest to maternal separation. Thus, the behaviors shown by children while complaining about the dark may be occurring for secondary gains (i.e. postponing bedtime or sleeping in parent's bed). Considering such "fears" to be normal reactions in children at a particular maturational point may only preclude the identification of important proximal variables accounting for the formation of behaviors indexing fear in dark contexts. This could pose two problems. First, treating fear of the dark as "normal" ignores the detrimental effects on the health and conduct behaviors of the child that accompany this phenomenon. Second, this position impedes training of desirable independent-behaviors in children in darkness and in other contexts (i.e., purposefully going to bed alone and sleeping throughout the night, going to school rested).

#### The Second Problem: Respondent versus Operant Fears

Professionals and researchers have often depended on the subjective reports of parents and children to obtain information concerning fear of the dark in children (Jersild & Holmes, 1935). For a better understanding of behavior coupled with this fear, a distinction between respondent and operant responses should be made. It appears that professionals often overlook the need for the presence of unconditioned respondent responses in children in situations commonly said to elicit fear. The present study calls for a more precautions and precise approach in assessing and diagnosing children as being afraid of the dark in the absence of valid indices of fear.

If respondent behaviors (e.g., a fearful face with all its required components) are not observed in the child confronting his/her familiar dark room, nor has there been a report of pre-existing traumatic associations with darkness, a verbal statement indicating the child's

refusal to go to bed at night because it is dark should not be taken as an indication or evidence of fear of the dark.

The absence of respondent behavior (e.g., fearful face) when operant behavioral (e.g., protest) problems are shown may be an indicator of other behavioral problems. The features of behaviors involving protesting, going to bed, or chronic difficulty falling asleep alone at nighttime in a familiar dark room, are different from the features of behaviors called “respondents,” when the child confronts an aversive stimulus.

Thus, the second problem inherent in the fear of the dark literature deals with the criteria used to denote fear in general. For some investigators, the appearance of respondent reactions (i.e., fearful face, “fight-or-flight”) is the best indicator of a genuine fear (e.g., Jones, 1924; Valentine, 1930; Watson & Morgan, 1918). For others (e.g., Holmes, 1936), the child’s or parent’s subjective verbal report indicating avoidance or protest to the particular feared stimulus is enough of a criterion to index fear.

Consequently, this study argues the importance of accurately distinguishing between and understanding the nature of the exhibition of these two distinct responses, “respondent” and “operant” in dark contexts. Identifying and separating these two distinct fear denoting responses in situations commonly believed to elicit fear will lead to more accurate analyses of fear. A major question addressed is why problematic behaviors in natural familiar darkness settings are maintained in the absence of any objective aversive stimulus. In addition, the presence of a stimulus such as a fearful face in the infant’s behavioral expressions when confronting darkness is also assessed.

Overlooking or ignoring the appearance of respondent responses in the child who is said to be afraid of the dark may lead to erroneous and incomplete conclusions. On the other hand, operant responses may be overestimated as indicators of fear of the dark. The absence of respondents “fearful” expressions cannot serve as a sufficient criterion to

diagnose fear of the dark. The result may be a misunderstanding of the emotion of fear where no objective fear stimulus is present. The problem of using these operant responses as conclusive evidence to indicate fear is that this assumption ignores and underestimates the identification of reinforcers (e.g., maternal attention) that shape the common operant behavior problems often shown by children in this context. The contribution of maternal attention to the development of fearful behaviors in children confronting darkness has been acknowledged by investigators working with children afraid of the dark (Mikulas & Coffman, 1989).

Sufficient evidence supports the appearance of genuine, unconditioned, respondent reactions in the presence of unconditioned aversive events. Examples of respondent reactions indexing fear in infants and children observed in various experimental situations have been confirmed to appear at birth, these include: “sudden catching of the breath, clutching randomly with the hands, blinking of the eye lids, puckering of the lips, then crying,” and also in older children, as possibly flight and hiding, starting expressions, arms raised, sudden crying fits, screaming, falling flat on back (Jones, 1924; Watson & Morgan, 1917, p. 166; Watson & Rayner, 1920).

Several researchers have recognized the importance of identifying reactive respondent behaviors shown by children and infants in situations that elicit fear (Izard, 1990; Jones, 1924; Scarr & Salapatek, 1970; Valentine, 1930; Watson & Morgan, 1917). Valentine (1930) argued that if fear is an innate process, then unconditioned behaviors common to all ages, such as those involved in reflexes (respondent), would be the best criteria for diagnosing fear in children. Valentine identified reflex-like behaviors as the best criteria of fear in childhood. These include especially: "the dilated eye, the opened mouth, the gasping breath, the bodily shrinking or trembling, the muscular contraction and slight raising of the hands and arms" (p. 503).

Unfortunately, in many instances professionals overlook the need for the presence of these respondent behaviors to diagnose a child with a particular fear, in this case fear of the dark. Valentine (1930) identified reflex-type responses as the best criteria for indexing fear in childhood. However, the array of behaviors exhibited by children that have been diagnosed with fear of darkness in their own rooms or in an artificially-contrived dark room are not like reflex-type behaviors and therefore deserve separate study.

The present study calls for professional and parental discrimination of responses ranging from when a child is afraid of the dark (evidence by a fearful face) to when a child is merely protesting (whining) for parental attention or other unidentified reinforcers. With an awareness of these dissimilarities, parents could learn to behave differentially in order to preclude the shaping of inappropriate behaviors denoting "fear of darkness" at bedtime. Attending indiscriminately to and hence reinforcing any response for attention for the child in darkness may preclude the child learning functional behaviors that lead to a desirable array of consequences (e.g., sleeping the recommended number of hours for necessary physical/mental growth and development).

#### The Third Problem: Overlap of Diagnoses of Similar Behavior Problems

The third problem shown in the fear of the dark literature concerns the overlap of different diagnoses in children (i.e., fear of the dark, sleep disorders, nighttime fear behavior problems). These diagnoses have in common similar behavior problems which appear and occur in the same context (nighttime), and confuse fear of the dark with fear of being alone (Kanner et al; 1972 ) or bedtime and sleep pattern problems (Mikulas & Coffman, 1989; Weymouth, Hudson, & King, 1987). The following discussion demonstrates the clear overlap of the same behavior responses in the same context occurring at the same time which are said to index distinct phenomena.

“Children’s sleep behaviors,” “sleep disorders,” and “sleep disturbances in young children” (P. 37, 521, 581) (Durand & Mindell, 1990; Fisher, Pauley, & McGuire, 1989; Minde et al., 1993; Richman et al., 1985) were all identified as common behavior problems also observed in children classified as being afraid of the dark. These are manifested as restlessness, difficulty falling sleep, severe sleep problems, persistent night-waking problems, going into parents’ bed, refusing to go to sleep at bedtime, required parental presence to fall asleep, getting up to go to the bathroom, and complaints about not being able to sleep. “Children’s nighttime fears” (Graziano & Mooney, 1980; Mooney, 1985; Ollendick, Hagopian, & Huntzinger, 1991; Graziano, Mooney, Huber, & Ignasiak, 1979) were enumerated as comprised of the following similar problems: being afraid of the dark, delays and battles lasting beyond midnight; crying; severe panic behavior; refusing to sleep in own bed; crawling into parents’ bed; requesting bright lights, radios or TV turned on in children’s rooms, restless nights, fatigue and difficulty getting up to go to school in the mornings. “Waking problems in young children” (Richman, 1985, p. 591) were also described in similar behavior problems exhibited by children denoting fear of the dark, such as waking at nighttime, and spending time in parents’ bed. “Fear of the dark” (Giebenhain & O’Dell, 1984; Leitenberg & Callahan, 1973; Mikulas & Coffman, 1989) also reported behavior problems similar to the classifications above. Among them were bedtime and sleep problems, awaking problems, requesting attention at nighttime, tantrums, requesting radios and lights turned on, and wanting an adult next to their bed.

From such overlapping definitions, it appears that clarification is needed to identify accurate behavior indices of actual responses denoting fear of the dark. In order to determine and clarify proximal variables shaping common behavior responses denoting fear of the dark in dark settings, a functional analysis of protesting behaviors in darkness was conducted in the present study. The observations conducted in this study of original

reactions in infants confronting darkness will minimize such confusion as shown above and address inherent problems in the fear of the dark literature. In this study which involved a social-conditioning approach, children's fear-like behaviors in dark settings were conditioned as a result of patterns of receiving contingent maternal attention.

Hypothetically, "darkness" in the natural environment or customary context (e.g., going to bed at night) functions as a discriminative event signaling an array of potentially different reinforcers for emitted protests. These include remaining awake longer with the attentive mother, receiving bedtime extensions, and being permitted to have bright lights, television sets, and radios left on in their room.

The common interpretation in clinical assessments is that when children exhibit protests in this context, these protest are due to "fear of the dark"(Graziano, Mooney, Huber & Ignasiak, 1979). However, researchers using the operant-learning paradigm have shown that, in many similar circumstances, such as when the mother remains out of sight, protests are shaped and maintained by the mother's responses, such as by her attending to or returning to pick up the protesting child. Gewirtz and Pelaez-Nogueras (1987, 1991) have demonstrated that infant protests to maternal departures and separations can be shaped and reversed by mothers behaving in different ways during these departures and brief separations. In their study it was found that young children learn to protest differentially in different settings, depending on whether maternal attention is made contingent or noncontingent.

The utility is not questioned of the different types of techniques developed that can be used to ameliorate behavioral problems in children in dark settings. Nevertheless, the present study hypothesizes that other approaches or techniques dealing with fear of the dark may employ only collateral variables, while failing to concentrate on the most important variable causing the change (i.e., maternal attention).



## Appendix B

### Recruitment Letter

Dear Parent:

The CHILD DEVELOPMENT RESEARCH LABORATORY at Florida International University is inviting you and your child to participate in a study on mother-infant interactions. We are interested in observing the role of maternal behavior in the development of infant behavior in the presence and absence of light in a room. It is expected that at the end of the study, each mother will understand how she could encourage desirable and self-reliant behaviors of her child.

For this research, we are looking for 6-8 month old infants who can be brought into the laboratory for a period of approximately 25 minutes for about 8 visits. On each visit, you and your child will be seated next to each other in the laboratory and will be observed. Your child's facial expressions and vocal sounds will be tape recorded. All information collected in this study will be kept confidential, and the safety of your infant can be assured.

Mothers who participate in these studies will come to understand about the normal development of children. Information gathered from these investigations could help educators as well as parents in applying effective methods to teach desirable behaviors in youngsters.

At the completion of this study you will receive a Child Development Lab certificate. If you are interested in arranging an appointment to take part in this study, you can contact me at 663-1596, or you can leave a message at the Department of Psychology at 348-2880/2881. We will return your call and save a place for you both.

Once again, remember that this study will be informative and interesting for anyone looking for better and effective childrearing techniques.

Sincerely,

Aida Sanchez B.A., CBA.  
Certified Behavior Analyst  
Child Development Research Laboratory

## Appendix C

### Informed Consent Form

I freely and voluntarily consent to be a participant in the research project entitled "Infant Tolerance of Darkness" to be conducted at Florida International University during the 1995-1996 academic year, with Aida Sanchez as Principal Investigator. I have been told that the sessions would last approximately 30 minutes each day for about 12 days.

I understand that the purpose of this research is to study the effects of maternal attention on my infant's behavior both when lights are turned on and when lights are turned off in the room.

I understand that the research procedure will involve my sitting on a chair next to my child as he/she is introduced successively to two light conditions. Lights in the room would be turned on and off every 15 seconds. My child will be seated in an infant high chair secured with a safety strap and will never leave my sight.

I understand that there are no known risks or benefits involved in my participation in this experiment. However, the overall investigation will teach me important information on how to train my child to be more independent in various settings. The result will be shared with me at completion of the study. There is no cost associated with my child for being part of this study. I have been told that all of the information collected during this study will be strictly confidential. All scores will be identified only by a code number. I also understand that my child will be one of 25 children recruited for participation in this study.

I understand that I may withdraw my consent and discontinue participation in this research project at any time with no negative consequences. I know that I have the right to ask questions concerning the procedures, and my questions must be answered to my satisfaction. I understand that, if I desire further information about this research, I should contact Aida Sanchez at (305) 663-1596 or Dr. Jacob L. Gewirtz at 348-3375. I have been offered a copy of this informed consent form.

I have read and I understand the above.

\_\_\_\_\_  
Participant's signature

\_\_\_\_\_  
Date

I have explained and defined in detail the research procedure in which the participant has agreed to participate, and have offered him/her a copy of this informed consent form.

\_\_\_\_\_  
Principal Investigator's signature

\_\_\_\_\_  
Date

Dear: \_\_\_\_\_

We would like to thank you for your commitment to participate in this investigation of the Child Development Laboratory at Florida International University. You should feel very proud to be supporting science by participating in a study that studies the normal development of infant behavior in everyday settings. We assure you that the training you will receive in behavior analysis (i.e., in desirable child rearing techniques) could be easily applied in your own home, and could be of great benefit to you for your future interactions with your baby.

Because this study involves the baby's memory, daily visits are being scheduled. Your participation must be continuous, preferably every day of the week, (unless you have made arrangements with us to miss a session). We would greatly appreciate your punctuality at each session.

For the study to be successful, parents should make sure that during every visit, babies are comfortable and well rested, that they have eaten, had his/her diapers changed, and are comfortably seated in a stroller.

Please place the blue parking permit on the front inside window of your car to avoid being ticketed. We would also like to emphasize that on your way to the building (Primera Casa, -Room #332-), be sure that your baby does not have any toy available, and try no to give the baby too much stimulation so that his/her performance can be optimal.

Again, we thank you for your participation. If you have any questions concerning this study, do not hesitate to contact me, Aida Sanchez at: (305) \_\_\_\_\_, or my supervisor, Dr. Gewirtz of the Department of Psychology at (305) 348-3375.

Thank you,

Aida Sanchez, B.A., C.B.A.  
Certified Behavior Analyst.

## Appendix D2

Estimada madre participante:

A través de la presente, queremos darle las gracias por su compromiso de participar en esta investigación que será conducida en el Laboratorio del Desarrollo Infantil en la *Universidad de la Florida (FIU)*. Sin duda, usted se sentirá muy orgullosa de poder aportar su ayuda a la ciencia participando en estudios que observan y analizan el desarrollo normal de la conducta infantil. Le aseguramos que el entrenamiento que recibirá sobre los conceptos de educación de la conducta normal del niño, le serán de mucha ayuda en sus futuras interacciones cotidianas con su bebé.

Por favor le pedimos en anticipación que sea puntual en sus citas y que recuerde que su participación debe de ser continua, es decir casi todos los días de la semana (s), (a menos que se le presente una emergencia), dado que este estudio involucra la memoria de el bebé.

En cada visita asegúrese de que su bebé se sienta cómodo, este cambiado de pañales, este comido, y bien sentado en su cochecito. También queremos enfatizarle que cuando entre al edificio de la universidad (Primera Casa PC#332) asegúrese de que el niño no tenga ningún tipo de juguete a su alcance y trate de no darle mucha estimulación.

Nuevamente le agradecemos su participación. Por favor si tiene alguna pregunta respecto a este estudio, llámenos a los teléfonos:

Aida Sanchez (# 663-1596)  
B.A., C.B.A. (Certified Behavior Analyst)

Dra. Martha Pelaez # 348-2090  
Especialista en Desarrollo infantil



## INDEPENDENT VARIABLE SCORING SHEET

TESTING DATE: \_\_\_\_\_  
 SUBJECT: \_\_\_\_\_  
 D.O.B: \_\_\_\_\_  
 AGE: \_\_\_\_\_

GROUP: 1 / 2  
 PHASE: \_\_\_\_\_  
 TREATMENT: \_\_\_\_\_

SESSION #: \_\_\_\_\_  
 SCORING PAGE #: \_\_\_\_\_  
 OBSERVER NAME: \_\_\_\_\_  
 # TRIALS COMPLETED per Session: \_\_\_\_\_

CONDITION																					TOTAL			
																					Light	%	Dark	%
<b>TRIAL #</b>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
<b>Protest</b>																								
Frequency of Maternal vocalization (V) and/or touch (T)																								
<b>INCOMPLETE TRIAL</b>																								

Appendix F

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**BEHAVIORS DEFINITION:**

**PROTEST**: A sound comprised of fussing, whining or whimpering with facial grimaces, or operant crying (not related to pain, hunger or physical distress) emitted by the infant under the light or dark stimuli.

**Maternal Vocalization**: A sound consisting of any vocalization directed to the infant, marked as a V underneath the protest.

**Maternal Touch**: Any touch administered to the infant that does not involve helping him or her to sit upright on the high chair, mark it as a T

*Score each box (/). Trials must last at least 12 seconds. If a trial last less than 12 seconds, mark it as an incomplete trial and continue scoring subsequent trials. To be scored, each behavior must occur at least once during each 12 second trial.*

Explanation  
Infant Tolerance of Darkness  
Aida Sanchez (305) 663-1596

Mothers may unintentionally teach their children to protest in dark or light conditions. Thus, we would like to know if contingent maternal attention does play a role on her child's protest behavior. The purpose of this study is to observe how infants respond when exposed to lights being turned on and off in the room in the presence of their mothers, and to determine the role of contingent maternal attention in the training and elimination of their children's protesting behavior.

It is intended in this study to teach mothers how to learn to differentiate their children protesting, dependent-type behaviors from those socially acceptable, independent-type behaviors that should be fostered in every child for a happier and psychologically healthier lifestyle.

We thank you for your help in this study. If you are interested in knowing more about how your infant can learn to tolerate darkness you can come by and talk with me or read the articles listed below. Also, if you would like to know more about how to identify protest behavior in your child, and administer your attention only in the presence of more independent-type like behaviors, you can call me at any time and arrange an appointment to talk.

References

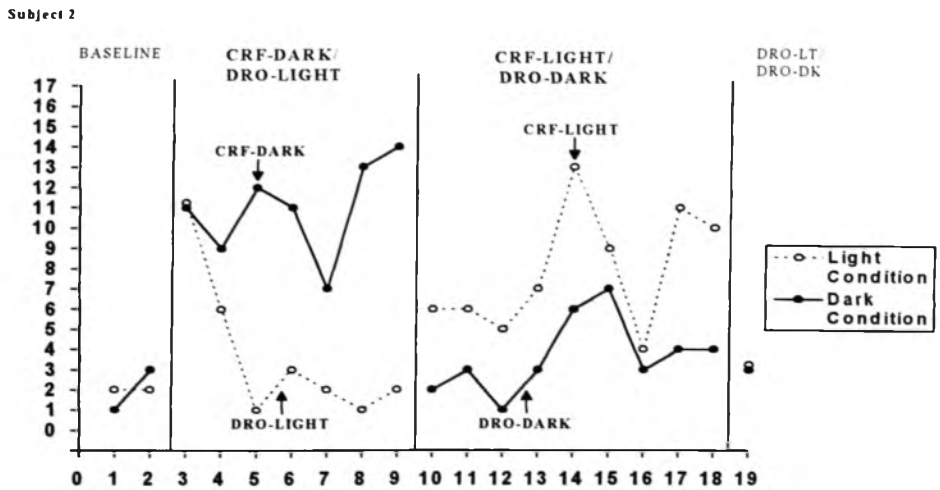
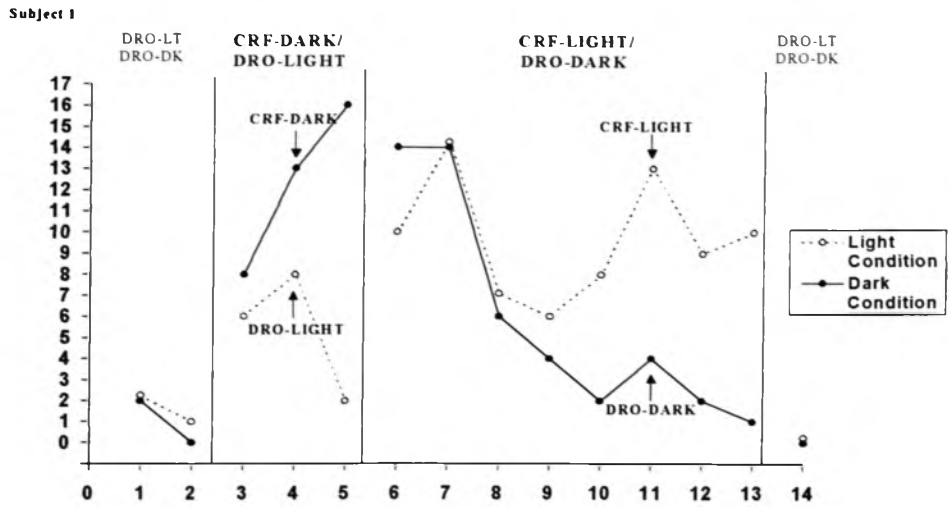
Gewirtz, J. L & Pelaez-Nogueras, M (1993) Leaving without tears: Parents inadvertently train their children to protest separation. Behavioral Development, Vol. 3, (3).

Schaefer, C. E. & Briesmeister, J. M. (1989). Handbook of Parent Training: parents as co-therapists for children's behavior Problems. New York: John Wiley & Sons.



# MATERNAL RESPONDING TO INFANT PROTESTS (CRF VS. DRO)

NUMBER OF PROTEST PER BLOCK OF 20 TRIALS UNDER LIGHT AND DARK CONDITIONS

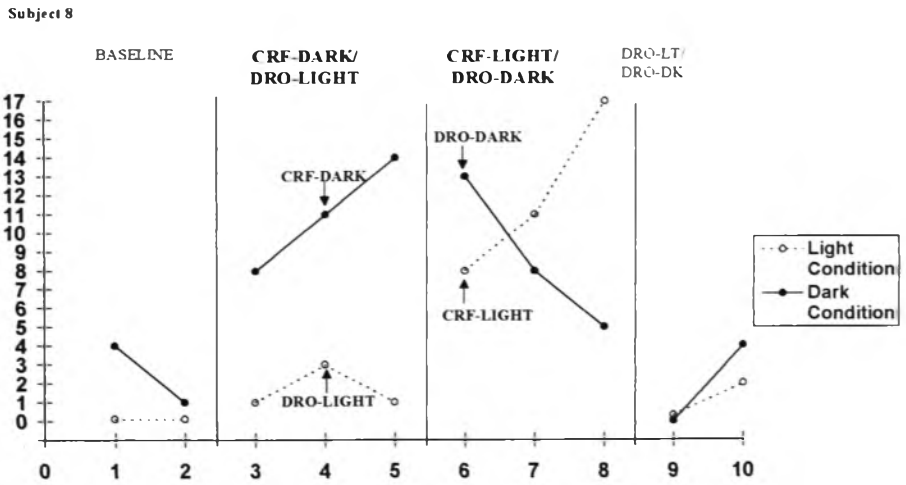
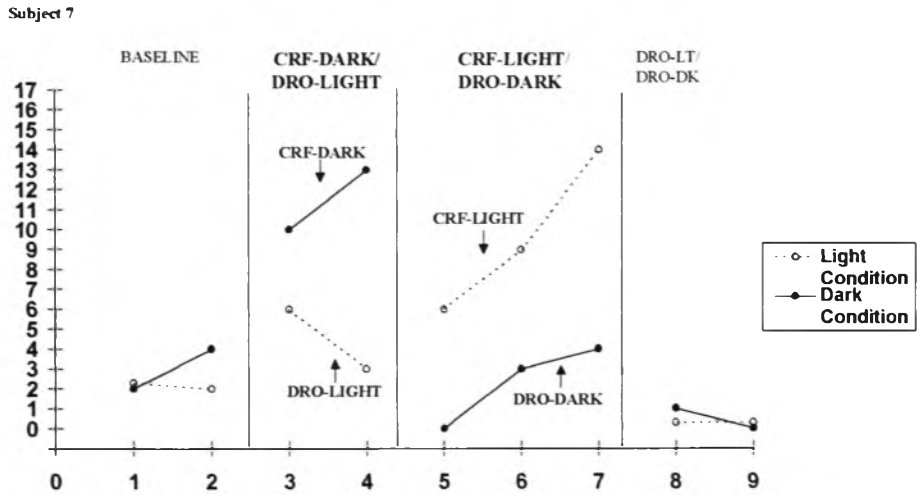


SUCCESSIVE 20 TRIAL BLOCKS

Figure 1: Number of protest under light and dark conditions for each of the infants in Group 1.

# MATERNAL RESPONDING TO INFANT PROTESTS (CRF VS. DRO)

NUMBER OF PROTEST PER BLOCK OF 20 TRIALS UNDER LIGHT AND DARK CONDITIONS

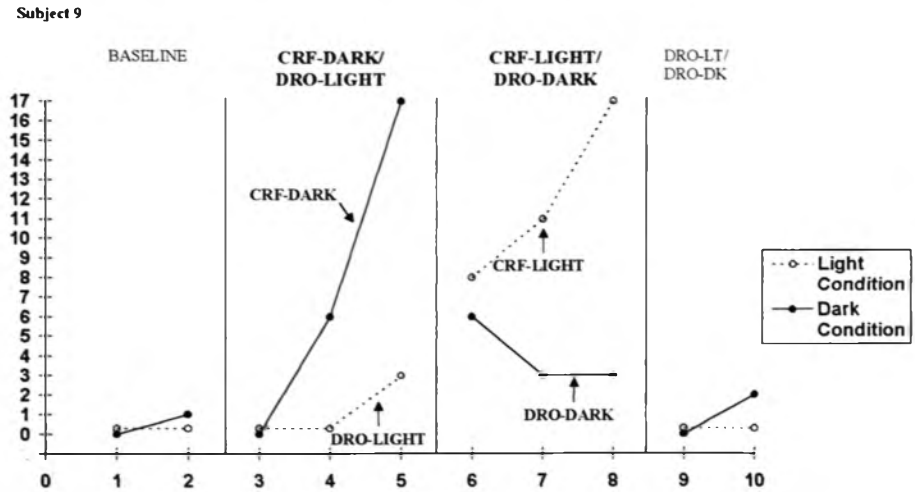


SUCCESSIVE 20 TRIAL BLOCKS

Figure 1: Number of protest under light and dark conditions for each of the infants in Group 1.

# MATERNAL RESPONDING TO INFANT PROTESTS (CRF VS, DRO)

NUMBER OF PROTEST PER BLOCK OF 20 TRIALS UNDER LIGHT AND DARK CONDITIONS

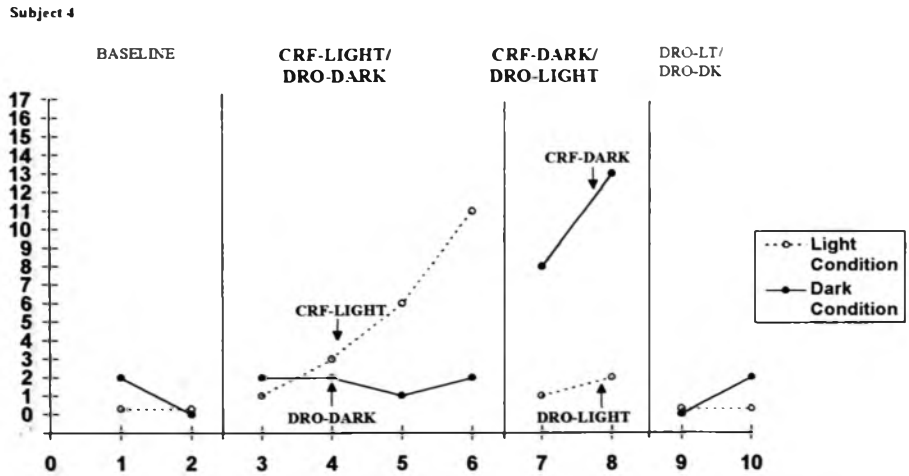
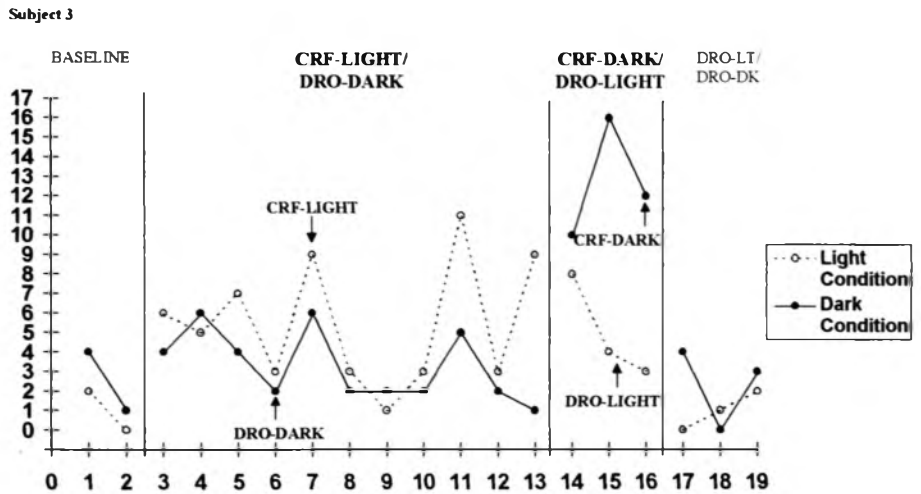


## SUCCESSIVE 20 TRIAL BLOCKS

Figure 1: Number of protest under light and dark conditions for each of the infants in Group 1.

# MATERNAL RESPONDING TO INFANT PROTESTS (CRF VS. DRO)

NUMBER OF PROTEST PER BLOCK OF 20 TRIALS UNDER LIGHT AND DARK CONDITIONS

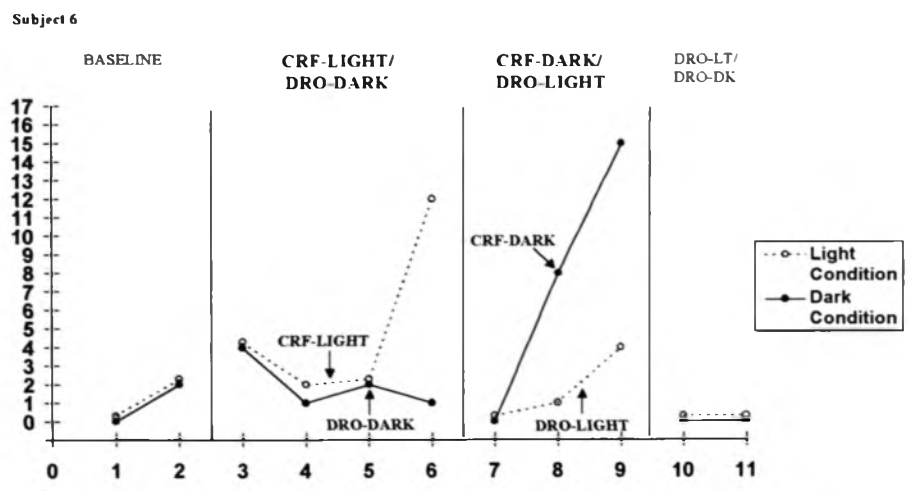
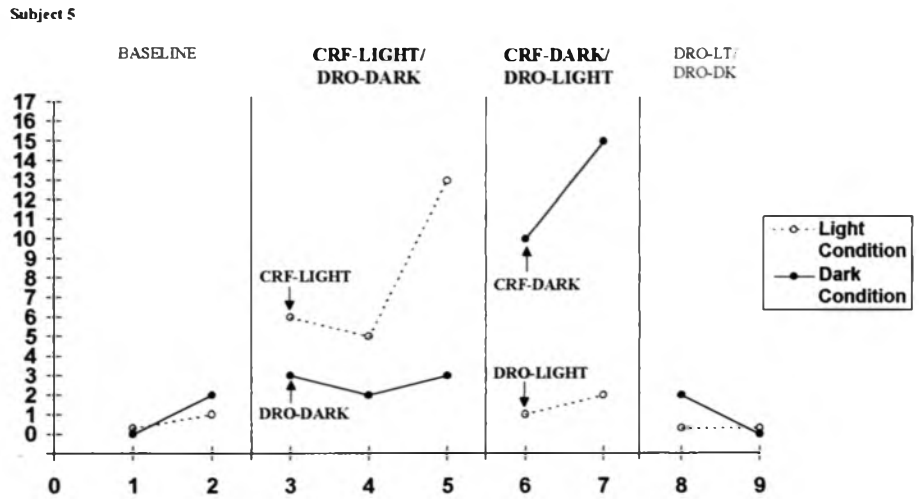


## SUCCESSIVE 20 TRIAL BLOCKS

Figure 2: Number of protest under light and dark conditions for each of the infants in Group 2.

# MATERNAL RESPONDING TO INFANT PROTSETS (CRF VS. DRO)

NUMBER OF PROTEST PER BLOCK OF 20 TRIALS UNDER LIGHT AND DARK CONDITIONS



## SUCCESSIVE 20 TRIAL BLOCKS

Figure 2: Number of protest under light and dark conditions for each of the infants in Group 2.

# MATERNAL RESPONDING TO INFANT PROTSETS (CRF VS. DRO)

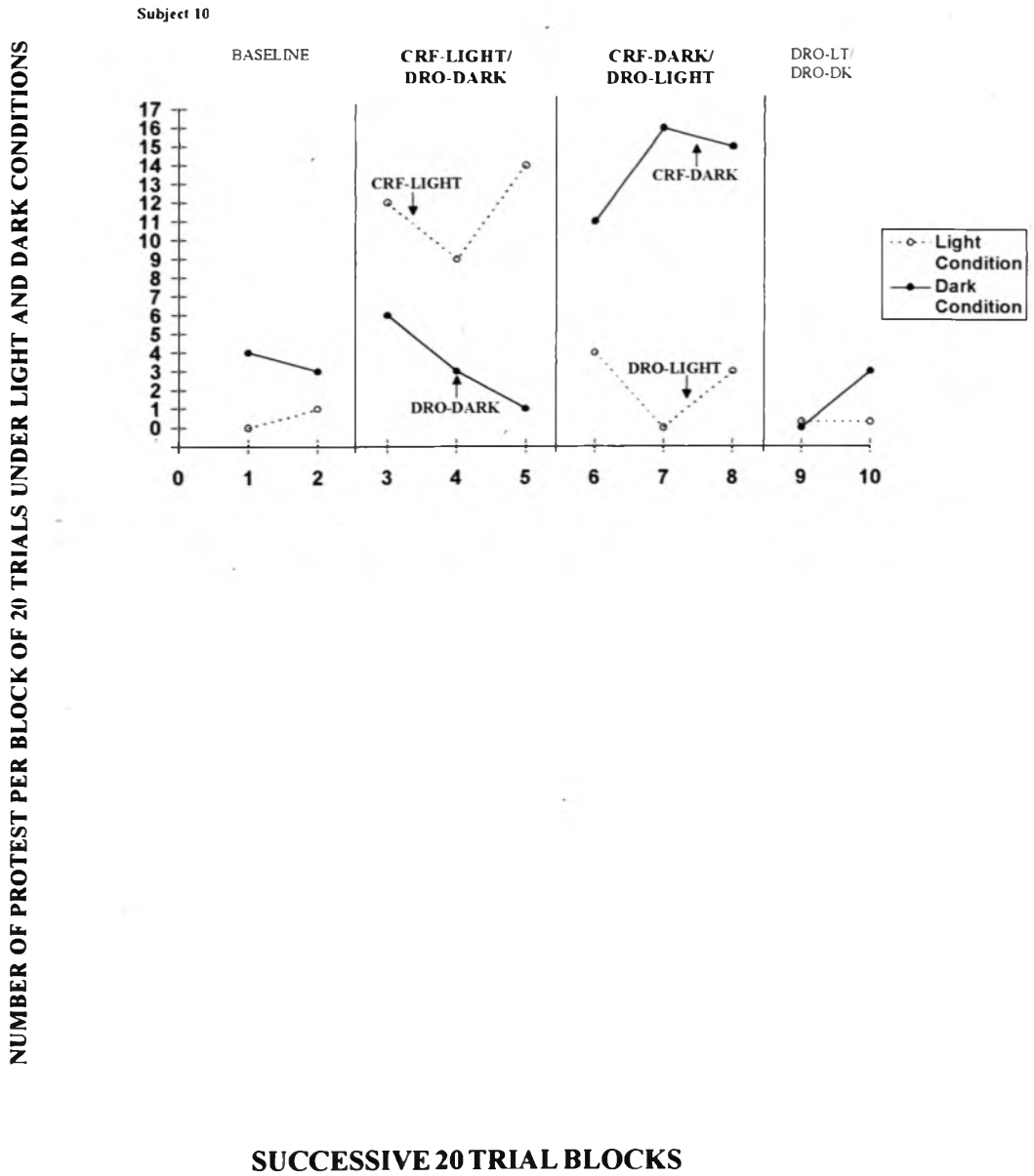


Figure 2: Number of protest under light and dark conditions for each of the infants in Group 2.