NORTHERN ILLINOIS UNIVERSITY

THE INFLUENCES OF CAREGIVER EXPERIENCE AND CRY TYPE UPON ADULTS' CAREGIVING BEHAVIORS

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Abstract

Past research has investigated both cry perception and cry acoustics to determine whether cries elicited by differing stimuli can be distinguished by adults and whether caregiving experience affects this ability. Although these questions have been studied since the 1920's, a state of controversy still exists. More recently, Wolff (1969) and Murray (1979) have proposed that cries elicited by hunger and pain are not discrete cry types, but rather, are two different levels of one single, graded signal. According to Wolff, a cry's causal stimulus can be identified only during the initial wails, after which, the cry settles into a basic pattern. The present study tested the distinct cry type and single graded signal theories in a two-part experiment. In Part 1, 16 mothers and 16 nonmothers were placed in a simulated babysitting situation in which they were asked to "babysit" an infant manikin. Subjects were exposed to either a hunger or a pain cry. The measures were latency to first response to cry, latency to appropriate response, latency to feed, latency to undress/check diaper, and latency to remove pin. Part 2 required these same subjects to listen to a tape of 16 pain and hunger cries extracted during the first minute of crying

(early cries) as well as the third minute of crying (late cries). Little support was found for the distinct cry type theory. All subjects had trouble distinguishing cries elicited by pain from those elicited by hunger and reacting appropriately toward them. The results indicated that the single graded signal theory is a more plausible idea. Subjects easily identified the early cries of Part 2, but failed to do as well at identifying late cries, implying that all cries do settle into a basic pattern after the initial wails. Caregiving experience seemed to be a slight advantage in Part 2's cry recognition task.

The Influences of Caregiver Experience and Cry Type upon Adults' Caregiving Behaviors

The infant's cry is considered to be a powerful social force by many researchers today. As expressed by Shaffer (1971), the cry initiates infant-adult interactions and promotes sensory stimulation for the infant. For several decades, researchers have studied the specific influences that the cry contains. In particular, do young infants possess a repertoire of different cries to signal different needs, or do they have but one basic cry type? If there are in fact different types of cries, do adults react differently to the various cry types, such as a pain cry as opposed to a hunger cry? Does amount of caregiving experience affect adults' abilities to distinguish between and respond appropriately to different cry types?

Research on these questions has pursued two separate courses; some studies have attempted to specify cry types by showing the effects of cries that differ in cause on adults' perceptions, while others have attempted the same distinction between cry types acoustically.

Studies of Cry Perception

Sherman (1927) first investigated the ability of adults to perceive different cry types. Adult subjects

listened to stimulus-evoked cries of infants placed behind a screen and tried to identify the infants' reasons for crying. Both pain (needle pricks to the face) and hunger (past feeding time) were among the stimuli applied to the infants. Sherman found that the subjects were unable to identify cry antecedents. This finding was generally accepted to be true for several decades. More recently, Sherman's technique has been criticized (Murry, 1980) because it confounded several variables, and Illingworth (1955) has pointed out that Sherman did not mention amount of caregiving experience of the adult subjects.

Illingworth (1955) was among the first researchers to question the belief that cries do not carry distinct perceptual information. He posed the theory that cries do in fact vary with cry antecedent and can be identified accordingly. In 1964, Wasz-Hockert, Partanen, Vuorenkoski, Michelsson, and Valanne tested nurses' abilities to identify cry causes using a multiple choice test. Their results demonstrated that trained nurses were able to identify the cause of the cry most of the time. Again in 1964, Wasz-Hockert, Partanen, Vuorenkoski, Valanne, and Michelsson found that caregiving experience does indeed affect cry identification ability. Adults experienced at caring

for infants were significantly better at recognizing cry types than were inexperienced adults. In 1968, Wasz-Hockert, Lind, Vuorenkoski, Partanen, and Valanne again varied experience of their adult subjects and found amount of experience to be a significant factor in cry recognition. They concluded that cry identification is the result of a learning process. Valanne, Vuorenkoski, Partanen, Lind, and Wasz-Hockert (1967) also found that caregiving experience promotes identification ability when mothers successfully identified the hunger cries of their own infants.

Berry (1975) also provided support to the theory that cries contain distinct perceptual information by testing children aged 7 to 13 years to find whether they could identify the causes of cries using a multiple choice questionnaire. His results indicated that even children are able to identify cry antecedents, and that this ability improved with age. It should be noted, however, that all of these studies used the same stimulus tape, and that the distinctiveness of two cry types on this tape (i.e., the gargling sounds of the birth cry and the cooing sounds of the pleasure "cry") may have inflated the recognition scores.

Other recent studies have concluded that adults

are unable to perceive cry type differences. Muller, Hollien, and Murry (1974) used mothers of infants as their subjects. Mothers were asked to listen to both familiar cries (their own baby's cry) and unfamiliar cries and to guess the stimulus that evoked the cries. The researchers concluded that cries do not carry distinct perceptual information because mothers were unable to identify the cry stimuli. Murry, Hollien, and Muller (1975) again varied cry types for mothers, and once more found them unable to recognize a cry elicited by pain as opposed to one elicited by hunger.

Studies of Cry Acoustics

Cries have been studied for acoustic differences through the use of sound spectrography. Michelsson (1980) and Wasz-Hockert, Lind, Vuorenkoski, Partanen, and Valanne (1968) described the general characteristics of all cries, such as cry latency, shift, quality, and tenseness. Wasz-Hockert et al. went on to characterize a typical pain cry as having long latency, a falling melody form, and a high maximum pitch; as being very tense; and as often containing a shift as well as subharmonic breaks and vocal fry. They characterized the typical hunger cry, on the other hand, as having a rising-falling melody form and lower maximum pitch, and as commonly containing glottal

plosives but rarely having a shift or subharmonic breaks. Wolff (1969) distinguished the pain cry as having a loud and sudden start, a long wail followed by a long silence, then short gasping inhalations; whereas the hunger cry starts arrhythmically and at a low intensity and gradually builds up to a loud rhythmical cry. Thus, several researchers have reported spectrographic differences between cries elicited by pain and those elicited by hunger.

Wolff (1969) argued, however, that both the hunger and the pain cry reflect but one "basic" cry in the neonate. Wolff claimed that the cry popularly known as a hunger cry is actually just a basic, rhythmical pattern not causally related to hunger. The pain cry, according to Wolff, eventually settles down to this basic pattern after the initial two or three expiratory wails.

In a review of the cry literature, Murray (1979) also supported the view that infant cries are not acoustically distinct signals. Rather, they constitute one graded signal. She argued that adults identify the causes of cries primarily on the basis of the degree of intensity of the signal. Therefore, a cry that slowly builds in intensity would more likely be interpreted as a sign of hunger, whereas a sudden, sharply intense cry

would be interpreted as one of pain.

More evidence against the distinct cry type theory came from Murry, Amundson, and Hollien (1977). These researchers found no significant difference in mean fundamental frequency between hunger and pain cries, and a recent review by Murry (1980) concluded that acoustic differences among cries are insufficient cues to underlying motivation.

Rationale for the Present Study

In summary, since the 1920's, scientists have explored the notion that parents, particularly mothers, are able to distinguish the eliciting stimulus of an infant's cry simply by listening to the cry itself. Early studies found this notion to be false. More recently, some support for the idea that a mother can perceptually identify the cause of an infant's cry, whether it is due to hunger or to pain, for example, has been developed. At the same time, however, an impressive series of recent studies has failed to support the idea. Attempts to differentiate cry types acoustically have also yielded equivocal results.

The state of confusion may be a result of several problems with past studies. For instance, some evidence does exist (Murry, 1980) to suggest that mothers use cues other than the cry itself to identify

an infant's needs (e.g., time since last feeding). These situational cues may have confounded past results. Another problem of the past was the use of very distinct cries, such as the birth cry and the pleasure "cry," which may have inflated the recognition scores of subjects. Finally, none of these studies observed the actual caregiving behaviors under study. Subjects were merely given paper-and-pencil questionnaires about how they thought they would behave, or what they thought was the causal stimulus.

An alternative to the notion of distinct cry types has been proposed by authors such as Wolff (1969) and Murray (1979), who assert that, regardless of specific stimulus, cries constitute one basic cry that is graded on different levels of intensity. Wolff and Murray's ideas, if correct, would help to explain why previous studies have yielded mixed results.

The first purpose of the present study was to assess actual caregiving responses given to cries elicited by pain versus hunger. To avoid the problems with studies of the past, a controlled laboratory setting was used to provide the same situational cues to all subjects. Any variable cues that would occur in different home settings were eliminated in the laboratory. Also, instead of the traditional paper-

and-pencil questionnaire for responses, the current study examined actual subject responses to a simulated babysitting situation, using only cries elicited by pain and hunger as stimuli. The rationale was that adults' behavioral responses to cries are the responses important for infants' survival and development.

The present study put both parents of young infants and nonparents into a simulated babysitting situation and exposed these subjects to either a hunger or a pain cry. It was hypothesized that if experienced caregivers are indeed able to distinguish cry types, then this study would yield both significant parental status and significant cry type factors, as well as an interaction between the two. A significant parental status factor would indicate that parents responded appropriately to a cry more quickly and more accurately than a nonparent. Also, past research indicated that the pain cry is a more aversive stimulus, at least initially, than the hunger cry and brings about a caregiver reaction quicker than the hunger cry (Wolff, 1969). The current study was expected to yield a similar difference in latency of response to cry type. Finally, a significant interaction between parental status and cry type was predicted, with the reasoning that mothers would be significantly faster to react to

a pain cry than to a hunger cry. Nonparents, on the other hand, would show less of a difference in latency of response to cry types because they would be less able to distinguish the urgency between the two cries.

A second purpose of this study was to test Murray's (1979) and Wolff's (1969) contention that hunger and pain cries are not discrete cry types, but rather, are two different levels of one single graded signal. An implication of this idea is that any clues identifying a cry's causal stimulus should occur early in the cry's onset. That is, a cry that slowly builds in intensity would more likely be interpreted as a sign of hunger, whereas a sudden, sharply intense cry would be interpreted as one of pain. In the present study, subjects listened to cry segments recorded near the onset of cries elicited from pain and hunger stimuli, and they also listened to those recorded well into the cries. It was predicted that identification would be better for the early cries. Also, mothers were expected to do better than nonmothers overall.

Method

Subjects

Subjects were 16 nonparent females who were enrolled in introductory psychology courses. Participants received extra credit toward their course grades. The mean age of these nonmothers was 18.5 years. Also, 16 mothers of infants aged 6 months or younger were asked to participate. The mean age of mothers was 30.25 years. No remuneration other than babysitting was provided for these mothers. Letters asking for participants in this study were used to recruit the mothers (see Appendix A for Letter to Mothers).

Part 1

Design

Part 1 of the study employed a 2 (cry type) x 2 (parental status) factorial design. Both factors were between-subjects. The cry type levels were hunger and pain cry, while the levels of the parental status factor were mothers and nonmothers. Each nonmother was randomly assigned to either hunger cry or pain cry, as was each mother.

Stimuli

The Anne Baby Infant Manikin, manufactured by Armstrong Industries, Inc., was used as a stimulus in

the babysitting situation. The manikin weighed 6.5 pounds (2.95 kg) and was physically very similar to a real infant in that it could drink and wet, had flexible joints, and had soft "skin." In addition, the manikin's mouth could hold a bottle when subjects tried to feed it. A diaper pin was embedded in its abdomen for the pain cry conditions.

The cry stimuli were recordings of young infants' hunger cries (Green & Gustafson, 1983) that had been rated as moderately aversive in another study (Gustafson, Green & Jong, 1985) and infant pain cries recorded in the hospital during circumcision procedures (recorded by Dr. Frances L. Porter, of Washington University Medical School). All cries were played through a JBL studio monitor speaker, placed below the infant's bassinet, at approximately the volume of a real infant's cry (82 dB).

Environment and Equipment

A nursery facsimile was set up in which subjects were asked to babysit with the Anne Doll. This nursery was 8 ft x 13 ft in size, and was furnished with a bassinet, rocking chair, changing table, mobile, infant swing, mirror, posters, bottle, and diapers (see Figure 1 for Nursery Layout). Two video cameras and a microphone were set up in the nursery so that subjects'

actions could be recorded by the experimenter.

Procedure

After subjects entered the nursery, they were instructed by the experimenter, acting as Anne's "mother," that their task was to "babysit with an infant." Each subject was asked to treat this exercise as if it were a real life situation (see Appendix B for Experimenter Instructions to Subjects). Necessary equipment such as diapers and bottle was then pointed out and the "mother" left the subject alone in the nursery. An infant's cry was heard by the subject 5 minutes after the session began. Meanwhile, the subject's actions were videotaped. Once the subject finally responded to the cry correctly, either by feeding the infant if the subject was hearing a hunger cry, or by pulling a diaper pin out of the infant's skin if the cry was one of pain, the cry ended, completing the first phase of the experiment. The session automatically ended for any subjects who were unable to respond correctly to the cry within 9 min of its onset. Then the subject was asked to have a seat and to fill out a cry perception questionnaire (see Appendix C for Cry Perception Questionnaire). Nonmothers were asked to complete a questionnaire on babysitting experience as well (see Appendix D for

Babysitting Questionnaire).

Measures

The videotapes were studied in order to measure the five dependent variables. The first variable, latency to first response, was defined as the time from cry onset until the time when the subject made her first attempt to quiet the infant. Second, latency to appropriate response was the time from cry onset until the subject began the appropriate response, whether it was to feed the infant or to pull the diaper pin out of its skin. Third, latency to feed was the time from cry onset until the subject fed the infant. Fourth, latency to undress/check diaper was the time from cry onset until the subject began removing the manikin's clothing in order to check its diaper. Finally, latency to check pin was the time from cry onset until the subject removed the diaper pin embedded in the manikin's abdomen.

Part 2

Design

Part 2 of the study employed a 2 (parental status) x 2 (time into cry) factorial design. Subjects were the same mothers and nonmothers who participated in Part 1. The time into cry factor was within-subjects, and the levels were early and late in the cry.

Stimuli

The stimulus tape used in Part 2 of this study contained a series of 16 short cry segments extracted from the recordings of hunger and pain cries (previously described in the stimuli section of Part 1). From the recorded cries of each of four infants (two experiencing pain and two experiencing hunger), two 15-second segments were extracted from the first minute of crying, and two 15-second segments were extracted from the third minute of crying. These 16 cries were recorded onto a test tape in a random order. An announcement preceded each cry, and subjects were allowed 5 seconds to respond after each cry.

Procedure

Following the completion of Part 1 procedures, the subject was instructed both orally and by means of a sheet of instructions (see Appendix E) that 16 short cries would be played, and that her task was to mark an answer to the question, "Why is this baby crying?" on a multiple-choice answer sheet after each individual cry (see Apppendix F for Sample Page of Answer Sheet). For each cry, the 6 alternatives were "baby is hungry, baby is sleepy, baby is in pain, baby needs a diaper change, baby is mad or angry, baby is frightened or startled."

Scoring

The answer sheets were scored in two ways: number correct using a strict scoring scheme and number correct using a dichotomous scoring scheme. First, the answers were strictly graded for absolute correctness. Then, the 6 alternatives were grouped into two categories based on degree of cry intensity. It was assumed that cries elicited by hunger, sleepiness, and need for diaper change are less intense than cries elicited by anger, pain, and fright. The answer sheets were also scored on this dichotomous choice basis.

Results

Part 1

The means and standard deviations for the five measures of behavioral responses can be found in Table 1. Due to the apparent lack of homogeneity of variance, log transformations were performed on scores prior to analysis (tests for homogeneity of variance were inappropriate because distributions of scores were skewed). A 2 (cry type) x 2 (parental status) analysis of variance (ANOVA) was performed on the transformed scores for each of the five measures (Appendix G).

A significant interaction between parental status and cry type was predicted for latency to first response to crying. In other words, a pain cry would

bring about a caregiver's initial response quicker than would a hunger cry, and the difference should be more pronounced for mothers. The ANOVA, however, revealed no significant cry type main effect or any significant interaction of the two factors.

For the measure of latency to correct response, main effects of cry type and of parental status were predicted. An interaction of these two factors was also predicted. Specifically, it was predicted that mothers would respond appropriately to a cry stimulus before nonmothers were able to solve the same task, that latency to correct response would be shorter for pain than for hunger cries, and that the cry type effect would be more pronounced in mothers. The ANOVA did yield a significant main effect of cry type, $F(1,28) = 25.7$, $p < .001$, but, contrary to predictions, correct response to hunger cries came about quicker than to pain cries. There was no effect of parental status and no interaction.

The other three dependent measures, latency to feed, latency to check diaper/undress, and latency to remove diaper pin were all used to help interpret the previous measures (latency to first response and latency to correct response). The latter two measures, latency to check diaper/undress and latency to remove

pin, yielded no significant results. However, when latency to feed was measured, a significant interaction of parental status and cry type was found, $F(1,28) = 5.8$, $p < .05$. Follow-up tests were performed using Tukey's procedure. These tests indicated that nonmothers who heard the pain cry responded by feeding sooner than those who heard the hunger cry. A similar effect was not found for mothers. The nonmothers in the pain cry condition also tried to feed the manikin more quickly than mothers in either the pain cry condition or mothers in the hunger cry condition.

Analysis of the cry perception questionnaire (Appendix C) was performed. Answers to the 2 questions were categorized as "right" or "wrong." Scores were nearly identical for mothers and nonmothers, so the two parental status groups were collapsed. Chi-square analyses for pain versus hunger cries on each question indicated no cry type difference in correctness of answers. Analyses of the babysitting experience questionnaire (Appendix D) were also performed. In all of several tests of relationship between experience and performance, no significant results were found.

Part 2

The means and standard deviations of scores on the cry recognition task can be found in Table 2. Separate

2 (parental status) x 2 (time into cry) repeated measures ANOVAs (Appendix G) were performed on the two sets of scores (the design was analyzed using the technique suggested by McCall & Appelbaum, 1973).

Number of items correct based on a strict scoring was analyzed. There was a significant effect of parental status, $F(1,30) = 5.2$, $p < .05$, indicating that mothers were better at the task of cry identification than were nonmothers. It should be mentioned, however, that both groups were poor at identifying the absolute differences between cries; even mothers missed more than they got correct. A significant main effect of time into cry, $F(1,30) = 26.5$, $p < .001$, was also found, indicating that subjects identified the early cry segments on an strictly scored basis better than the late cry segments.

To assess the effects of specific baby on performance, values from the strict scoring procedure were subjected to a 2 (parental status) x 4 (specific baby) repeated measures ANOVA. As expected from the results above, there was a significant effect of parental status, but there was no significant effect of specific baby and no interaction.

I tests were employed to assess whether the type

of cry heard during the babysitting task (Part 1) affected performance in Part 2. The 16 subjects who heard a pain cry in Part 1 were compared with those who heard a hunger cry. For the measure of total correct given the strict scoring scheme, these groups did not differ, t (30) = -.30, p = .76.

Number of items correct based on a dichotomous scoring was also analyzed. There was no significant parental status effect, but there was a robust time into cry main effect, F (1,30) = 466.02, p < .001. Subjects were much better at identifying early cry segments in the dichotomous sense than late cry segments.

Figures 2 and 3 show bar graphs depicting distributions of the specific answers to the Part 2 task by both mothers and nonmothers. These graphs illustrate the robust effect that early cry segments have on cry identification as opposed to late cry segments.

Discussion

One of the primary objectives of the current study was to investigate the theory that young infants possess distinct types of cries to signal different needs and that adults are able to interpret these cry types. The caregiving behavioral phase of this study

(Part 1) found that there was no latency difference between first response to pain cries and first response to hunger cries, as well as no interaction of cry type and parental status as predicted. These results indicate that subjects' initial reactions were not affected by the type of cry they heard. Part 1 did yield a significant cry type factor when latency to correct response was measured. However, contrary to the prediction, correct response to hunger cries came about quicker than to pain cries. This result probably occurred because feeding seems to be the most obvious response to a crying child.

Results of the cry recognition task (Part 2) also yielded evidence related to the distinct cry question. Analysis of the strictly scored data yielded a significant parental status factor, indicating that mothers were better at identifying the absolute differences between cries than were nonmothers. Mothers' performance was above chance level, but even they missed far more than they got correct. Thus, the results generally do not support the theory that cries contain distinctive, readily interpretable cues as to their underlying causes.

Results of the current study were also evaluated to test Murray's (1979) and Wolff's (1969) alternative

theory that cries elicited by various stimuli constitute a single signal graded on the basis of intensity. Part 1's behavioral test yielded a significant interaction of parental status and cry type when latency to feed was measured. Further analysis indicated that nonmothers tried to feed the infant during pain cries quicker than nonmothers hearing hunger as well as mothers hearing cries elicited by pain and hunger. This result implies that perhaps nonmothers were able to distinguish intensity of the two different cries. Hearing an initially sharp cry, nonmothers may simply have turned to the most obvious response to a crying child: feed it. This response would imply that nonmothers were unable to identify the specific causes of the cries, but were able to distinguish the initial intensities of the two different cries. A similar result did not occur for mothers, perhaps because mothers, possessing more caregiving experience, realize that there are many reasons besides hunger that might cause an infant to cry. They did not seem to turn to the obvious feeding response right away as did nonmothers hearing pain cries.

Part 2's cry recognition task also yielded results related to the graded signal theory. A significant

time into cry effect was found using both the strict and dichotomous scoring schemes. All subjects were better at identifying the early cry segments as predicted, indicating that Wolff (1969) may have been correct in that cries do contain all perceptual cues of causation during the initial wails and eventually settle into a basic pattern, and that Murray (1979) was correct in that all cries constitute one basic cry graded on different levels of intensity.

Generally, the current study found little evidence to support the distinct cry type theory. Mothers and nonmothers alike had trouble distinguishing a cry of pain from one of hunger and reacting properly toward them. Results of this study indicated that Wolff's (1969) and Murray's (1979) theory that cries elicited by various sources are one basic, graded signal is a more plausible idea. This indication was particularly evident in the cry recognition task (Part 2), where time into cry affected scores under both scoring schemes, strict and dichotomous. Subjects readily identified early cries, but failed to do as well at identifying later cries, implying that all cries settle into a basic pattern. Caregiving experience seemed to be a slight advantage only when mothers were required to identify the absolute differences between cries.

The current study investigated the influences of cry type and caregiving experience upon a caregiver's behavior in a simulated babysitting situation, a new method that could be criticized on the grounds of artificiality. How realistic was the babysitting situation in terms of actual behavior? The babysitting situation did seem to yield successful results in that it did pick up a difference between responses to cries elicited by hunger and pain. Additionally, behaviors other than those under study, such as singing to the infant, bouncing it, and speaking to it, were observed, implying that the setting was somewhat realistic to a large number of the subjects. Future study into the topics of cry types and caregiving experience can be performed to expand upon this study. Using men as subjects would be an interesting factor in this study. Also, cries elicited by other stimuli (e.g., sleepy and startled cries) could be used in Part 1 to investigate whether they too support the graded signal theory. Finally, mothers could listen to their own child's cries in Part 1 to investigate whether prolonged experience with a particular infant affects caregiver response.

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Appendix A

Letter to Mothers

To the Mother of

Sometime during the next week or two, we will telephone to ask if you will participate in a study being conducted in our laboratory in the Department of Psychology at Northern Illinois University. We are writing to you because of your special qualifications as the mother of a young infant. Your name was obtained from birth announcements published in the DeKalb Chronicle.

In general, our studies are concerned with how infants and parents learn to communicate with each other. In this particular study, we are interested in what experienced mothers do to soothe a crying baby, and how their strategies differ from those of nonparents.

If you agree to participate, we will ask you to make a single visit to our laboratory. Your task will be to babysit with our "baby" (a life-like doll), who, like a real baby, cries from time to time. We've set up a nursery complete with baby furniture, diapers, bottles, and the like. We would videotape the babysitting session for later analyses. After the babysitting session, we would ask you some questions about infants and cries in general. The entire visit would take about half an hour.

Although we cannot offer you monetary compensation, we will try to make your visit pleasant and convenient. If you drive to our laboratory, we will meet you at our reserved parking space behind the building. A sitter will be provided for your own baby and any other children who need to come along. When the study is completed, you will receive a written summary of the results. (Please be assured that specific information about the individuals who volunteer for our studies is kept absolutely confidential.)

We will be happy to answer any questions when we call, and of course, we will understand if for some reason you prefer not to participate. We look forward to talking with you.

Sincerely,

Karen Sears

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Undergraduate Honors
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Appendix B

EXPERIMENTER INSTRUCTIONS TO SUBJECTS

The study you're about to participate in is a babysitting experiment. This is Anne. She is 3 weeks old. Please take care of her as if this were a real life babysitting job. This session will be videotaped so that it can be reviewed later. But, of course, all information will remain confidential. Here are Anne's diapers and her bottle. Now I have to leave for awhile, but I'll be back soon. Please put Anne down for a nap, then go ahead and take a seat. You may read a magazine while you're waiting. Do you have any questions?

Appendix C

CRY PERCEPTION QUESTIONNAIRE

1. In your opinion, what was the reason for the baby's cries?

   a. baby was startled

   b. baby was hungry

   c. baby was happy and comfortable

   d. baby was in pain

   e. baby was mad and frustrated

2. In your opinion, what ended the baby's cries?

   a. when I fed the baby

   b. when I picked up the baby

   c. when I sang to the baby

   d. when I burped the baby

   e. when I changed the baby's diapers

   f. when I pulled a pin out of the baby's skin

   g. when I rocked the baby to sleep

Appendix D

Subject no. _____

BABYSITTING QUESTIONNAIRE

1. What is your age (to the nearest year)? _____

2. Do you have any younger brothers or sisters? yes no

(If you answered "no", skip now to question 3.)

If yes, how many? _____

How many years younger than you? _____

Did you ever take care of them as infants (that is, while they were still in diapers)?

yes no

If yes, how often did you take care of them?

rarely occasionally frequently

3. Have you ever babysat for an infant? yes no

If yes, approximately how many infants have you babysat for?

_____

4. Overall, how much experience would you say you have had in caring for infants?

none very little about average more than average a lot

Appendix E

Instructions, Part 2

WHY IS THIS BABY CRYING?

In this task, you will hear a tape of 16 cries. For each of the cries please choose the best answer to the question: WHY IS THIS BABY CRYING?

Each cry will last 15 seconds; then you will have 5 seconds to circle your choice. The number of each cry will be announced before the cry begins.

Take a minute now to look over and become familiar with the answer sheets.

When you are ready to begin, watch for the red light in the window in front of you. It will go on when the experimenter has the tape ready to play.

WHEN THE RED LIGHT GOES ON, WAVE YOUR HAND to signal the experimenter that you are ready to start.

The first sound that you will hear will be a male voice announcing "cry number 1".

Appendix F

Sample Page of Answer Sheet

Subject # _____

Cry #1

a. baby is in pain
b. baby is hungry
c. baby needs diaper change
d. baby is frightened or startled
e. baby is mad or angry
f. baby is sleepy

Cry #2

a. baby is in pain
b. baby is hungry
c. baby needs diaper change
d. baby is frightened or startled
e. baby is mad or angry
f. baby is sleepy

Cry #3

a. baby is in pain
b. baby is hungry
c. baby needs diaper change
d. baby is frightened or startled
e. baby is mad or angry
f. baby is sleepy

Cry #4

a. baby is in pain
b. baby is hungry
c. baby needs diaper change
d. baby is frightened or startled
e. baby is mad or angry
f. baby is sleepy

Cry #5

a. baby is in pain
b. baby is hungry
c. baby needs diaper change
d. baby is frightened or startled
e. baby is mad or angry
f. baby is sleepy

Cry #6

a. baby is in pain
b. baby is hungry
c. baby needs diaper change
d. baby is frightened or startled
e. baby is mad or angry
f. baby is sleepy

Appendix G

Summary of ANOVA for Latency to First Response

Source	SS	df	MS	F
A (Parental Status)	.077	1	.077	1.259
B (Cry Type)	.194	1	.194	3.171
A X B	.217	1	.217	3.547
Error	1.713	28	.061	
TOTAL	2.201	31	.071	

Note. Scores were log-transformed prior to analysis.

*p<.05
**p<.01

Appendix G (cont'd)

Summary of ANOVA for Latency to Correct Response

Source	SS	df	MS	F
A (Parental Status)	.002	1	.002	.019
B (Cry Type)	2.609	1	2.609	25.732**
A X B	.009	1	.009	.089
Error	2.839	28	.101	
TOTAL	5.459	31	.176	

Note. Scores were log-transformed prior to analysis.

*p<.05
**p<.01

Appendix G (cont'd)

Summary of ANOVA for Latency to Feed

Source	SS	df	MS	F
A (Parental Status)	.733	1	.733	5.229*
B (Cry Type)	.207	1	.207	1.477
A X B	.820	1	.820	5.851*
Error	3.926	28	.140	
TOTAL	5.686	31	.183	

Note. Scores were log-transformed prior to analysis.

*p<.05
**p<.01

Appendix G (cont'd)

Summary of ANOVA for Latency to Check Diaper

Source	SS	df	MS	F
A (Parental Status)	.355	1	.355	1.404
B (Cry Type)	.003	1	.003	.012
A X B	.426	1	.426	1.685
Error	7.080	28	.253	
TOTAL	7.864	31	.254	

Note. Scores were log-transformed prior to analysis.

*p<.05
**p<.01

Appendix G (cont'd)

Summary of ANOVA for Latency to Remove Pin

Source	SS	df	MS	F
A (Parental Status)	.039	1	.039	.386
B (Cry Type)	.056	1	.056	.554
A X B	.003	1	.003	.030
Error	2.829	28	.101	
TOTAL	2.927	31	.094	

Note. Scores were log-transformed prior to analysis.

*p<.05
**p<.01

Appendix G (cont'd)

Summary of ANOVA for Cry Recognition Scores

Using Strict Scoring Scheme

Factor	df	approx. F
A (Parental Status)	1,30	5.204*
B (Time into Cry)	1,30	26.501**
A X B	1,30	.661

Note. This design was analyzed by a multivariate technique (McCall & Appelbaum, 1973).

*p<.05
**p<.01

Appendix G (cont'd)

Summary of ANOVA for Cry Recognition Scores

Using Dichotomous Scoring Scheme

Factor	df	approx. F
A (Parental Status)	1,30	.240
B (Time into Cry)	1,30	466.022**
A X B	1,30	.328

Note. This design was analyzed using a multivariate technique (McCall & Appelbaum, 1973).

*p<.05
**p<.01

Appendix G (cont'd)

Summary of ANOVA for Effects of Specific Baby

Factor	df	approx. F
A (Parental Status)	1,30	5.204*
B (Baby)	3,28	.280
A X B	3,28	.313

Note. This split-plot design was analyzed by a multivariate technique (McCall & Appelbaum, 1973.)

*p<.05
**p<.01

Table 1

Means and Standard Deviations (in Secs) of the Raw Scores for the Five Measures of Behavioral Responses to Cries

	Group			
	Mothers-Pain Cry	Mothers-Hunger Cry	Nonmothers-Pain Cry	Nonmothers-Hunger Cry
Variable				
Latency to First Response	10.00 (4.57)	5.87 (4.29)	8.25 (2.60)	8.62 (3.90)
Latency to Correct Response	396.87 (202.98)	102.75 (69.17)	333.37 (161.25)	114.87 (91.10)
Latency to Feed	193.62 (215.63)	102.75 (69.17)	36.62 (27.02)	114.87 (91.10)
Latency to Check Diaper	167.75 (172.67)	305.50 (253.46)	152.37 (128.50)	161.75 (234.19)
Latency to Remove Pin	396.87 (202.98)	481.12 (166.52)	332.12 (162.00)	426.87 (209.78)

Table 2

Means and Standard Deviations of Scores on Cry Recognition Task

	Scoring Scheme					
	Strict (6-Choice)			Dichotomous		
	Time into Cry			Time into Cry		
	Total	Early	Late	Total	Early	Late
Mothers (n=16)	6.00	3.75	2.25	12.31	7.87	4.44
	(1.83)	(1.29)	(1.18)	(.95)	(.34)	(.81)
Nonmothers (n=16)	4.69	3.37	1.31	12.12	7.87	4.25
	(1.40)	(1.45)	(1.14)	(1.20)	(.34)	(1.06)

Note. Maximum possible for "Total" columns = 16. Maximum possible for "Early" and "Late" columns = 8.

Figure 1

Nursery Layout

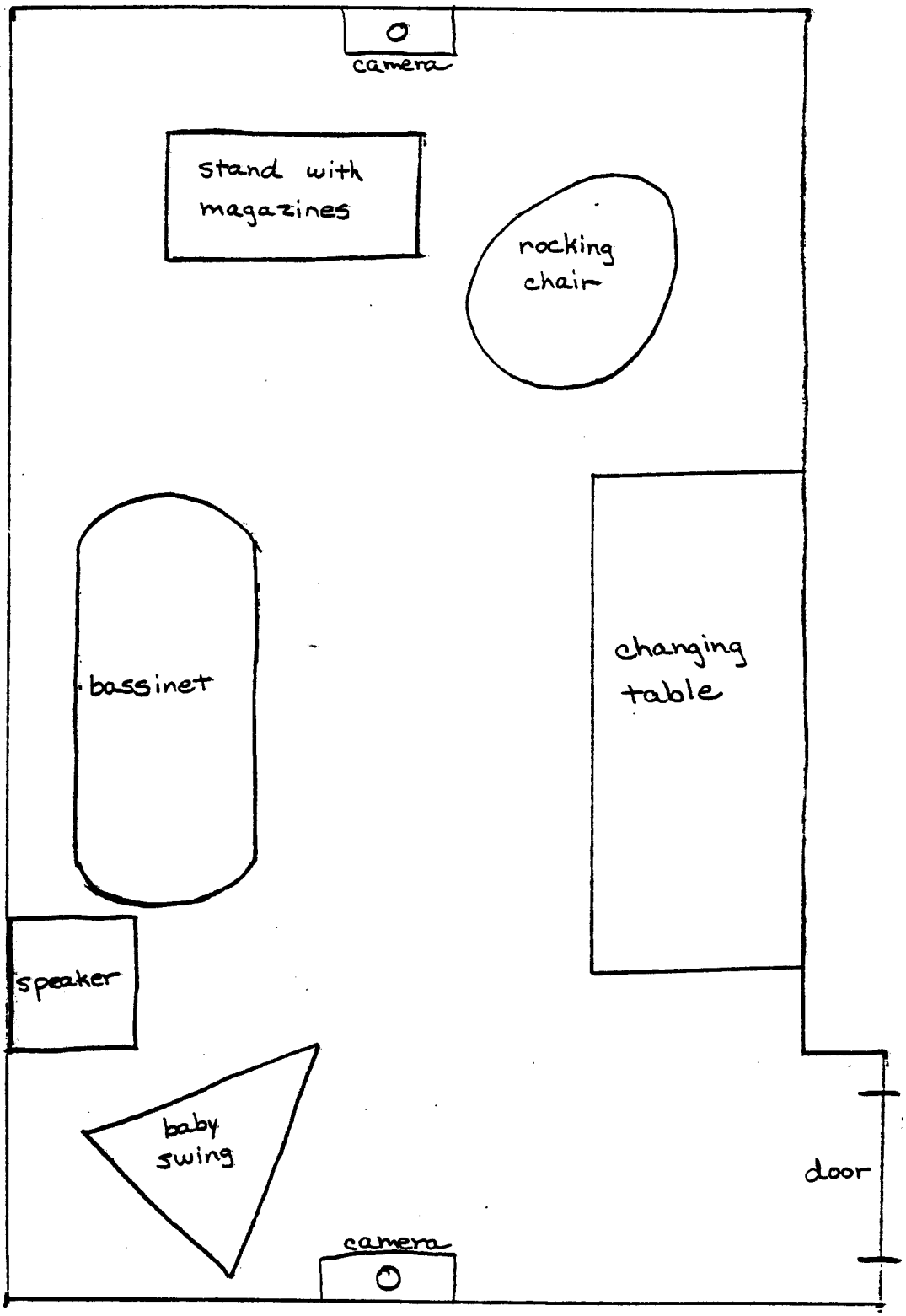
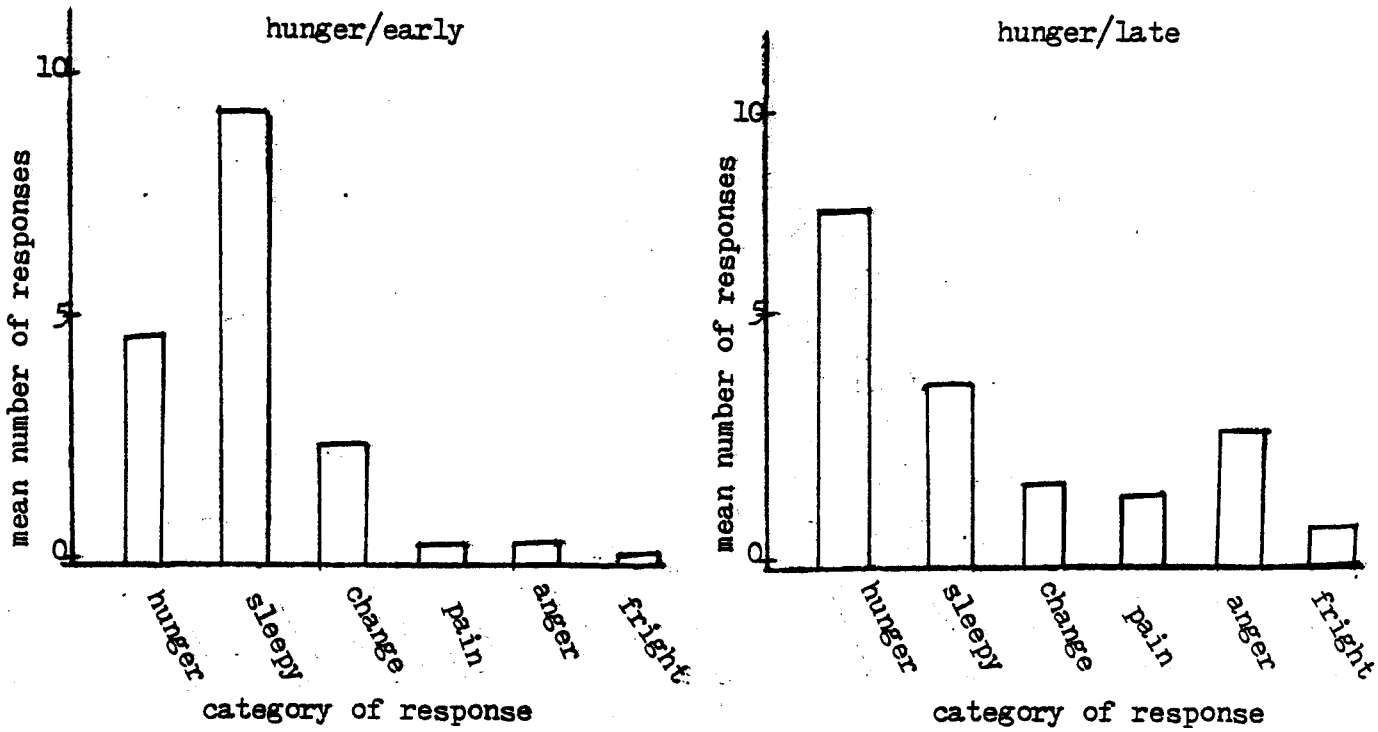


Figure 2

Distributions of Answers to Part 2 Cry

Perception Task: Mothers



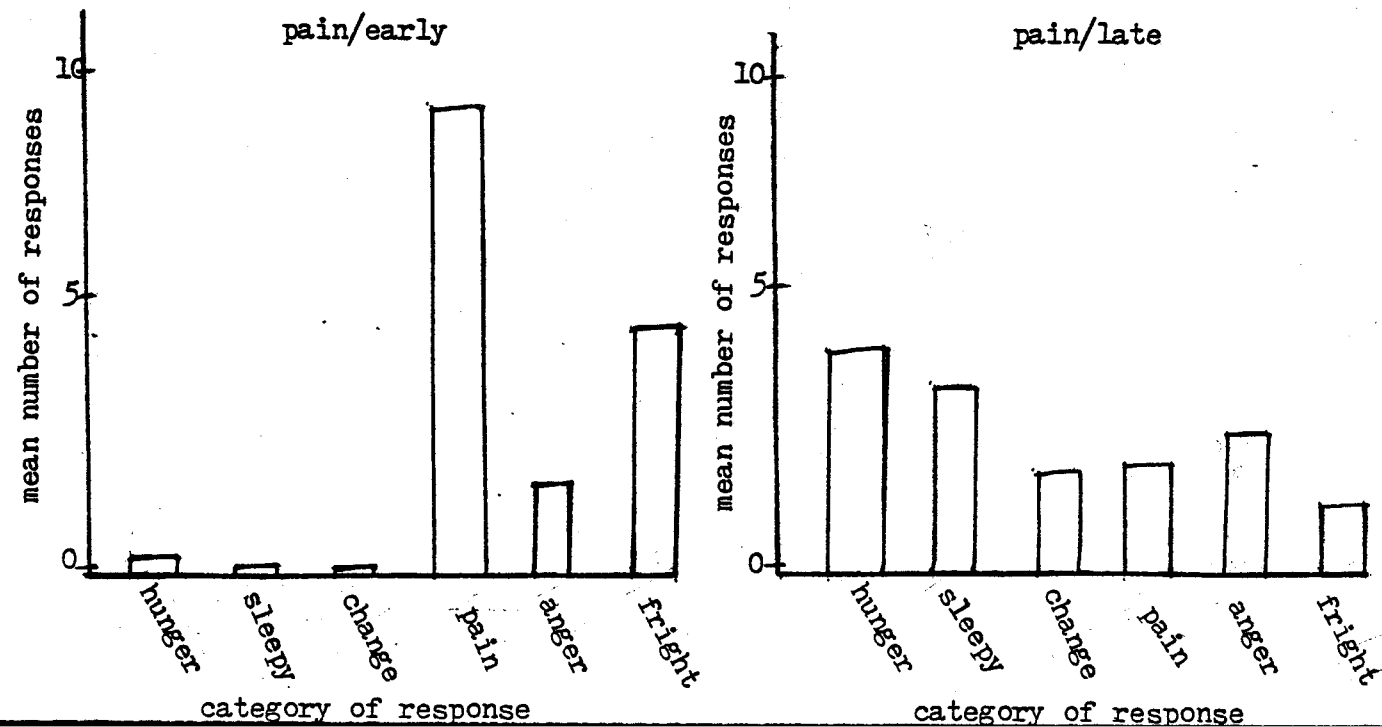
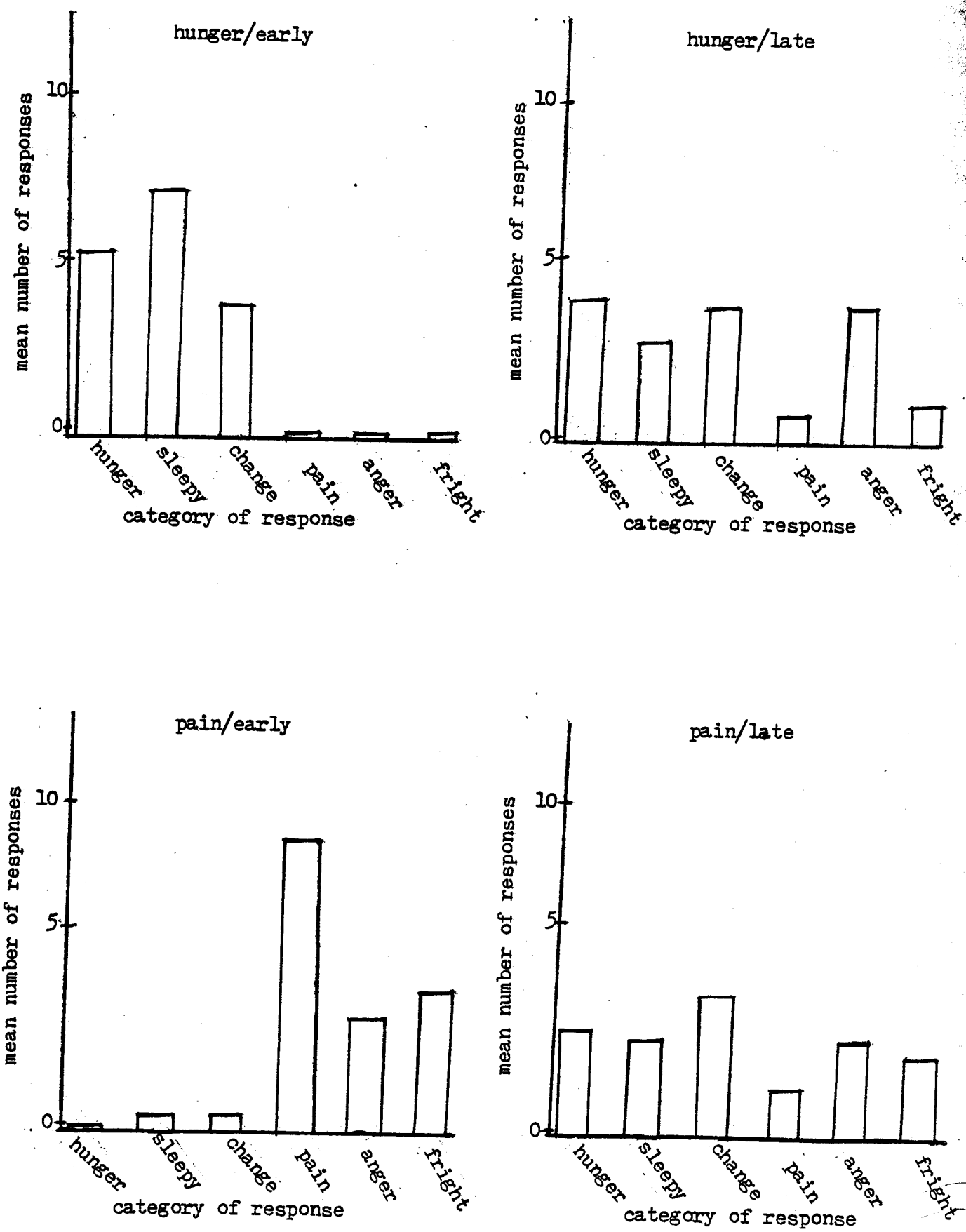


Figure 3

Distributions of Answers to Part 2 Cry Perception Task: Nonmothers



Karen Sears
[redacted]

5/28/85

Dear Dr. Godfrey:

Enclosed is a copy of my capstone project. I understand that it is required to send a final copy of this project to the Honors House for graduation with University honors, so I am sending it to you. It was completed during the last couple of days of finals week, so I was unable to send it until now.

Thank you.

Sincerely,

Karen L. Sears