Fathers' and Mothers' Responses to Infant Smiles and Cries*

ANN M. FRODI

University of Northern Iowa

MICHAEL E. LAMB

University of Michigan

LEWIS A. LEAVITT AND WILBERTA L. DONOVAN

University of Wisconsin at Madison

Forty-eight mother–father pairs watched a 6-minute videotape presentation of an infant during which time their skin conductance and blood pressure (systolic and diastolic) were monitored. Mood scales were also administered. Half of the subjects saw a crying baby, while the other half viewed a smiling infant. The baby was labeled as "normal," "difficult," or "premature," to equal proportions of the sample. All parents completed standard questionnaires concerning their own child. The smiling infant triggered positive emotions and negligible changes in autonomic arousal, whereas a crying infant was perceived as aversive and elicited diastolic blood-pressure and skin-conductance increases. Skin-conductance increases were especially apparent when the infant was described as "premature." Mothers and fathers did not differ either in their responses to the stimulus baby or in their perception of their own child.

The present study had two major goals: to explore the effects of infant stimuli on adult behavioral propensities, and to determine whether mothers and fathers differ in their responsiveness to the infant signals crying and smiling.

Research on the effectiveness of infant stimuli has commenced only recently, following evidence contradicting the once popular belief that infants are passive recipients in their social interactions. As Lamb (1977) indicated in his recent review, most studies have involved inferring stimulus–response relations among maternal and infant behaviors embedded in the course of neonaturalistic interactions. The conclusions drawn from such investigations – that infants actively direct and modulate the nature of their social interactions – have provided the impetus for studies, like the present one, which use different methods and measures in order to determine more precisely what types of effects various infant signals have on adult behavioral propensities.

In one recent study of this nature, Donovan, Leavitt, and Balling (1978) showed that pictures of smiling and crying infants elicited a predominantly deceleratory heart rate response indicative of attention (cf. Lacey, 1967). Surprisingly, crying and smiling did not elicit unambiguously different psysiologic responses. Unfortunately, however, Donovan et al.'s presentations were brief (10 sec) and their stimuli were soundless. One goal of the present study was to determine whether crying and smiling would elicit clearly differentiable physiological responses when more realistic stimuli were used. Our prediction was that infant smiles (accompanied by coos and gurgles) would be perceived as pleasant whereas the sight and sound of a crying infant would be perceived as aversive. This prediction was based on the assumption that in the course of evolution, smiling and crying have come to elicit very different responses from parents, though both are of survival value. Both Bowlby (1969) and Lamb (1978b) argue that in the "environment of evolutionary adaptedness" smiles may have served as cues to seduce adults into remaining near the infant. Adults may do so in order to continue interaction which is gratifying to them though at the same time they provide important social experiences for the infant. Crying, on the other hand, may lead adults to approach in order to relieve the cause of the infant's distress. The adult's role involves alleviating the distress and thereby terminating the infant signal. Since crying should elicit responses aimed at termination of, while smiling elicits responses aimed at prolongation of, the infant signal, we predicted that smiling would be perceived as a positive and pleasant cue, while crying was perceived as an aversive stimulus. We tested our predictions concerning the differential effects of cries and smiles using physiological and self-report techniques.

Donovan et al. (1978) found that mothers of "easy" and "difficult" babies responded differently to visual presentations of infant stimuli. Mothers who perceived their babies as difficult, unlike those whose babies were easy (cf. Thomas, Chess, & Birch, 1968), failed to respond physiologically to changes in infant expressions. These mothers failed to respond to the picture of a smiling infant when it was preceded by displays of a crying infant. Similarly, they did not respond to the crying infant when it was preceded by exposure to the smiling infant. Donovan et al. reasoned that the failure of these mothers to respond was a consequence of caretaking experiences which had been so stressful that the women had come to perceive changes in their infant's behavior as stimuli not requiring immediate attention.

The extent to which such cognitive sets may influence interaction appeared important enough to merit further attention. Consequently, we attempted in the present study to replicate the finding by correlating indices of parental response to the stimuli with parental reports concerning their child's temperament. Besides using different stimuli and different measures, furthermore, we attempted to broaden the generalizability of Donovan et al.'s findings in two ways.

First, we attempted to establish cognitive sets experimentally by describing the stimulus infant as "difficult," "normal," or "premature," in hopes of eliciting differential responses to identical infant signals. We predicted that description of the stimulus infant as either difficult or premature would increase the likelihood that the infant was perceived as aversive — especially when it was crying. Second, we wished to determine whether similar associations occurred among both mothers and fathers.

In sum, then, the present study was designed to determine whether:

(a) differential physiological responses are elicited by smiling and crying infants;

(b) there are sex differences in the physiological and/or self-report responses to the infant signals;

(c) the labeling of the stimulus infant as "normal," "premature," or "difficult" will result in a differential response pattern, with the latter two being perceived as aversive;

(d) the labeling has differential potency for mothers and fathers; and

(e) whether responsiveness to the infant signals is influenced by the parents' perceptions of their own child's temperament.

METHOD

Subjects

Forty-eight white middle-class couples (N = 96) served as subjects ($\bar{X}$ = 2.21, SD = .92 on Hollingshead's [1957] Two Factor Index of Social Position). Subjects ranged in age from 20 to 38 years ($\bar{X}_{fathers}$ = 29.4, SD = 3.4; $\bar{X}_{mothers}$ = 27.5, SD = 3.4). They were recruited through published birth records to ensure that they all had an infant of approximately nine months. Forty-one of the couples had 1 child, while the remaining seven had 2 or more children.

Apparatus

An eight-channel Beckman Type RM Dynograph recorder (polygraph) was used to record heart rate (HR) and skin conductance (SC). Beckman bipotential electrodes were employed. Using KY lubricant jelly the SC electrodes were affixed to the palmar surface of the second phalanx of the index and middle finger of the left hand. A constant voltage of .5 V was applied to the electrodes from the polygraph GSR coupler. Cardiac activity (HR) was recorded via Beckman bipotential miniature electrodes applied with Spectra 360 electrode gel. Systolic and diastolic blood pressure (SBP and DBP, respectively) were assessed

using Technical Resources' B-350 sphygmostats with electronic pickups in the cuffs. The subjects were seated comfortably in separate, adjacent alcoves about 4 ft from the television monitor and about 15 ft from all physiological monitoring equipment. They could not see one another.

Procedure

Design.   A 2 (Sex of Parent) x 2 (Infant cue: smiling, crying) x 3 (Label: "Normal," "Difficult," "Premature") factorial design was employed. These three factors were between-subjects factors, while segments of the videotape (quiescence/crying or smiling/quiscence) constituted a within-subjects factor.

Both parents were tested simultaneously while assistants cared for their infant in a nursery. A male and a female experimenter alternated in affixing the SC and HR electrodes and the blood pressure (BP) cuffs to the two parents, and in delivering the instructions. Upon arrival, the subjects were seated in easy chairs in front of the TV monitor and encouraged to relax. The procedure was explained and each participant signed a consent form. After attachment of the equipment and a 5-min rest period, one experimenter described the task. Subjects were assigned to experimental conditions randomly, with both members of each couple receiving the same instructions. At this point the infant was "labeled" with one of three 100-word descriptions of its characteristics.[1] One third of the subjects

[1]The labeling descriptions were as follows:

a. *Normal* baby: "We are going to show you a videotape of a baby who is approximately 5 months old. We've chosen this baby because it seems to us to be a typical and normal baby. The baby was born after normal delivery without complications, it has been sleeping through the night since a few weeks after birth. The parents describe their baby as a delightful child, who is easy to take care of, easily soothed when upset, very regular and predictable in eating and sleeping habits, and also seems very relaxed around people other than the parents.

Well, we're interested in seeing how parents react to a typical and normal baby."

b. *Difficult* baby: "We are going to show you a videotape of a baby who is approximately 5 months old. We've chosen this baby because it seems to us to be a typical difficult child. At birth there were some minor complications. It has been colicky and fussy. The parents describe it as irregular in feeding and sleeping habits, and it cries a great deal. It reacts very intensely to changes in the environment such as new foods and the presence of people other than the parents.

Well, we're interested in seeing how parents react to a typical difficult baby."

c. *Premature* baby: "We are going to show you a videotape of a baby who is approximately 5 months old. We've chosen this baby because it seems to us to be a typical premature child. After the premature birth, the baby had to be put in an incubator for a couple of weeks, as there were some medical difficulties, e.g., it had difficulties breathing on its own. Since it was released it has shown very irregular sleeping and feeding habits. The parents describe it as fussy and very fragile. It also cries a lot. The parents are constantly worried that it will get sick and when the scale indicates it isn't gaining weight, they immediately consult their physician.

Well, we're interested in seeing how parents react to a typical premature baby."

were told that the infant to be viewed on the 6-min videotape was a perfectly *normal* full-term and content infant. Another third were informed that the infant, though the product of a full-term pregnancy, was a *difficult* child (cf. Thomas et al., 1968), while the final third were led to believe that the infant was born *prematurely*. The parents were told not to communicate with each other and to pay attention to the baby on the screen.

The videotape was then shown. Half the couples viewed a quiescent—cry— quiescent sequence, while the other half saw a quiescent—smile—quiescent sequence. SC and HR were monitored throughout the session, while BP was measured at rest and twice in each tape segment (within the first 30 and last 30 seconds of the segment). Thereafter the electrodes were detached, and the parents independently completed a mood adjective check list immediately, and two standard questionnaires regarding their own child after moving to a neutral setting.

Stimuli.   Two videotapes served as the stimuli. Each was divided into three 2-min segments. Both tapes depicted the same infant and had identical first and third segments portraying an alert but quiescent 5-month-old infant. In the middle segment, one tape showed this infant smiling and gurgling happily, whereas the other tape portrayed the infant crying. Both tapes had soundtracks. The volume was adjusted so that the auditory signal for all couples rose to 65– 70 db peaks.

Dependent Measures.   Skin conductance (SC) and diastolic blood pressure (DPB) were selected as major dependent variables because several studies (e.g., Frodi, 1978; Geen, Stonner, & Shope, 1975; Schachter, 1957; Weerts & Roberts, 1975) have shown that diastolic blood pressure is a sensitive index of an aversive state, feelings of anger, and a disposition to aggress, while SC is a more general index of autonomic arousal to aggress.

SC was measured continuously for 2 minutes before and 6 minutes during the videotape sequence. The following time segments were selected for analysis: the last 30 seconds of rest and the first and last 30 seconds of each tape segment. The unit of measurement was a change score reflecting the total amplitude of deflection expressed in micromhos. The reading taken in the last 30 seconds of the first Quiescence segment was used as a baseline since the reading from the first 30 seconds was likely to have been affected by the onset of the videotaped sequence. Analyses were performed on $\log_{10}$ transformed scores.

Systolic and diastolic blood pressure were measured at rest and during the first and last 30 seconds of each tape segment. For the reason given in the last paragraph, the reading in the last 30 seconds of the first Quiescence segment was used as the baseline with respect to which readings were expressed as change scores.

As noted earlier, heart rate was also recorded. Because of recording difficulties, however, much of these data were lost and consequently we excluded heart rate measures from our analyses.

After the videotape presentation the parents filled out a mood adjective checklist (MACL) consisting of three parts, each referring to one of the tape segments, and each consisting of 10 adjectives (happy, annoyed, irritated, disturbed, indifferent, attentive, distressed, alert, frightened, and sympathetic). The subjects circled a number from 1 (= not at all) to 5 (= very much) indicating how much the mood applied to them.

About 15 minutes later, the parents completed the other questionnaires in a different and more comfortable setting. The questionnaires concerning their own child were the Carey Infant Temperament Scale (Carey, 1970) — a 70-item multiple choice questionnaire — and the Broussard Scale (Broussard & Hartner, 1971), comprising four subscales, namely, Perception of the Average Baby, Perception of Own Baby, Neonatal Perception Inventory, and a Bother Inventory. The parents were not permitted to communicate while completing these questionnaires. Finally the subjects completed demographic information sheets. Before the parents left, the purpose of the study was described and questions were answered. Generally the parents reported that the study had been pleasant and of interest.

RESULTS

Blood Pressure

Blood pressure readings were taken on eight occasions: upon arrival, at rest, and during the first and last 30 seconds of each of the three tape segments. The last six readings are referred to below as Q_1, Q_2, C/S_1, C/S_2, Q_3, and Q_4, respectively. Change scores were computed, using the Q_2 reading as baseline. Analyses across Trials include C/S_1, C/S_2, Q_3, and Q_4. A repeated measures analysis of the diastolic BP yielded significant main effects for Cue ($F(1, 84) = 4.51, p < .05$) and Trial ($F(3, 252) = 23.88, p < .0001$). There was also a significant main effect for Sex ($F(1, 84) = 4.99, p < .05$), which disappeared ($F = 2.36, p < .20$) when the data were range corrected (cf. Lykken, Rose, Luther, & Maley, 1966) to take account of absolute differences between the sexes. As can be seen in Table 1, DBP measured at C/S_1 and C/S_2 yielded strong Cue effects; the crying infant elicited a substantial increase from Q_2 to C/S_1 while the smiling infant triggered no such change. The two groups did not differ at baseline ($t = 0.38$).

As predicted, ANOVAs of SBP yielded few significant effects. Only the Trial effect in a repeated measures analysis across C/S_1, C/S_2, Q_3, and Q_4 was significant ($F(3, 252) = 6.83, p < .001$). This effect suggested that SBP increased

TABLE 1
The Effects of Infant Cue on Blood Pressure and Skin Conductance[a]

Dependent variables	Infant cue		$F(1, 84)$	p value
	Cry	Smile		
Diastolic blood pressure				
(mmHg) at C/S_1	1.96	− .04	7.64	.007
at C/S_2	2.73	− .00	14.36	.0003
Skin conductance				
(log micromhos)				
at C/S_1	0.270	0.095	11.75	.001
at C/S_2	0.076	−0.024	4.30	.04

[a]Note: All figures are mean change scores.

during the Cry—Smile segment and decreased during the last quiescent segment. Apparently, SBP was not differentially sensitive to the manipulations of either Infant Cue or Label.

Electrodermal Responses

Log transformed values of the total amount of SC at C/S_1, C/S_2, Q_3, and Q_4 were used for the analyses with the value at Q_2 (baselines) subtracted to obtain change scores. Repeated measures ANOVAs across C/S_1, C/S_2, Q_3, and Q_4 yielded a marginally significant effect for Cue ($F(1, 84) = 3.40, p < .07$), and significant effects for Label ($F(2, 84) = 3.70, p < .05$) and for Trial ($F(3, 52) = 20.17, p < .001$). The Cue effect was significant at both C/S_1 and C/S_2 (see Table 1). There was also a significant Cue × Trial interaction ($F(3, 252) = 4.98$, $p < .01$), suggesting that the crying infant elicited an increase in SC while the smiling infant did not. No group differences were found at baseline (F's < 1.14). The Label effect approached significance at both C/S_1 and C/S_2 ($F(2, 84) = 2.98, p < .056; F = 2.87, p < .06$, respectively). Table 2 shows SC values at C/S_1. It appears that when the infant was both crying and labeled as "premature," it elicited the greatest SC increases, though when it was smiling the groups did not differ.

Self-Report of Emotional Reactions

The 10-item MACL was completed in reference to each of the three segments of the tape. Note that the subjects had to recall their feelings *after* they had seen all three segments. In spite of this, repeated measures analyses yielded significant Segment effects for all moods, except "happy," at $p < .01$ or less. Furthermore, strong Cue × Segment interactions were found for five of the ten adjectives. These interaction effects suggested that the subjects reported feeling happier if

TABLE 2
Mean Skin Conductance Responses at C/S_1 (log micromhos)[a]

Infant cue	Infant label				
	Normal		Premature		Difficult
Cry	.228	<	.428	>	.230
Smile	−.040	≃	.104	≃	.220

[a]*Note:* The differences indicated are significant at the .05 level by *t*-tests.

TABLE 3
The Effects of Infant Cue on Subjective Emotions[a]

Moods during middle segment of videotape	Infant cue		$F(1, 84)$	Significance of difference
	Cry	Smile		
Annoyed	1.85	1.13	19.71	.00001
Irritated	1.83	1.04	30.82	.00001
Distressed	2.19	1.23	30.67	.00001
Disturbed	2.21	1.27	27.31	.0001
Indifferent	1.92	1.54	3.99	.05
Attentive	3.65	4.10	6.49	.01
Happy	1.96	4.10	115.14	.00001

[a]*Note:* Figures refer to mean ratings on 5-point adjective checklists.

TABLE 4
Mean Values on the Mood "Sympathetic"
as a Function of Infant Cue and Label[a]

Infant cue	Infant label				
	Difficult		Normal		Premature
Cry	2.79	<	3.40	>	2.79
Smile	3.00	>	1.92	<	3.13

[a]*Note:* The differences indicated are significant at the .05 level by *t*-tests.

the baby was smiling ($F = 80.71, p < .001$), but more annoyed ($F = 17.33, p < .001$), irritated ($F = 11.91, p < .001$), distressed ($F = 39.09, p < .001$), and disturbed ($F = 33.91, p < .001$) when the baby was crying (2, 168 degrees of freedom).

If we focus specifically on the Cry/Smile segment of the videotape the effects of the Cue are even more striking. As indicated in Table 3, seven of the moods clearly differentiated the groups. Subjects viewing the crying baby reported feel-

ing more annoyed, more irritated, more distressed, more disturbed, more indifferent, less attentive, and less happy than did the subjects viewing the smiling infant.

Interestingly, there was also a significant Cue x Label effect for the mood "Sympathetic" in the repeated measures ANOVA ($F(2, 84) = 7.32, p < .001$). As can be seen in Table 4, parents felt more sympathetic toward the atypical baby than toward the normal baby when it was smiling, but less sympathetic to the atypical infant than to the normal when it was crying.

Sex effects and interactions involving the sex factor occurred less frequently than they would be expected to occur by chance. There was a tendency for females to indicate extreme feelings of both positive (e.g., "happy," "alert") and negative (e.g., "irritated," "disturbed") kinds to a greater extent than did males. Mothers checked more extreme scores than fathers on eight of the ten items. In all cases, the direction of effect was the same for both sexes, but more extreme among mothers than fathers.

Questionnaire Data

Both correlational and analysis of variance techniques were used to relate the questionnaire data to the treatment effects. Fewer significant associations were found than would be expected to occur by chance. Consequently, these analyses will not be discussed further.

Correlations Between Subjective Feelings and Physiology

Several investigators (e.g., Frodi, 1978; Schachter, 1957; Weerts & Roberts, 1975) have argued that feelings of anger can be differentiated on the basis of physiological responses. Several correlations supported this notion. Increases in DPB during the crying segment were significantly and positively correlated with ratings of annoyance, irritation, and disturbances for both fathers and mothers ($.25 < rs < .38$) and negatively correlated with happiness and attentiveness ($-.40 < rs < -.31$). SC amplitude was similarly correlated with annoyance, irritation, distress ($.20 < rs < .40$), and happiness ($-.34 < rs < -.31$).

DISCUSSION

This study has yielded clear answers to three of the major issues raised in the introduction (i.e., a, b, d), and more equivocal evidence concerning one other (c). In this section, we will discuss our findings in the context of the two major issues addressed and elucidated in this research.

First, there was clear evidence that crying and smiling infants elicit differential physiological responses from parents. Presumably, Donovan et al.'s (1978) failure to demonstrate such clear cue effects can be attributed to the nature of their brief and soundless stimuli. Perhaps more interesting, though, was the fact

that, as predicted, the cry of the infant was perceived as aversive, while the smile elicited positive feelings. Physiological and self-report indices strongly pointed to this conclusion. Thus it seems that response to a crying infant may be motivated not only by empathy or altruism, as is commonly assumed, but also by a desire to terminate an aversive signal from the infant. These findings lend credence to Lamb's (1978a) suggestions, noted in the introduction, that infant cries are aversive to adults, and that they are effective in eliciting adult attention partly because the adults wish to terminate unpleasant stimuli. Through a process of conditioning, Lamb argues, a child who cries a lot and/or who is relatively inconsolable, may become an aversive stimulus whether or not it is crying. Such a child would be more likely to elicit abusive parental behavior (cf. Berkowitz, 1974; Lamb, 1978a).

Clearly, of course, the formulations advanced here are highly speculative; they await replication in less contrived situations. In addition, it is possible that the cry signal is not initially aversive but becomes so when the ability to terminate it is denied the viewer. Just as response termination is impossible in our experimental situation, however, temperamentally inconsolable infants present parents with a similarly frustrating experience. This hypothesis, too, would be compatible with the abuse literature as well as with the data gathered in the present study. Both notions merit further investigation.

Unfortunately, our sample included too few parents of unambiguously difficult infants to test whether there was an association between the parents' experiences and their responses to the standard stimuli. Donovan et al.'s findings, however, clearly indicated an association in the direction predicted by Lamb's model (see introduction). In addition, the results of the present study indicated that the cognitive sets implied by Donovan et al.'s data can be established by brief experimental manipulations (labeling) as well as by personal experiences. We found that the skin conductance response to the "premature" cry signal was significantly greater than the response to the "normal" infant. Further, crying and smiling infants labeled as premature and difficult elicited less sympathy than the normal infant.

The analyses also yield interesting data concerning differences and similarities between mothers and fathers. In almost all respects, mothers and fathers responded similarly to the infant signals although, interestingly, the mothers gave more extreme descriptions of their moods and feelings than did the fathers. This finding is consistent with the notion that females are socialized to be more expressive, while males are encouraged to deny their feelings and emotions (cf. Frodi, Macaulay, & Thome, 1977; Maccoby & Jacklin, 1974). The fact that indices of physiologic activation did not discriminate between mothers and fathers contradicts the notion that adult females but not adult males are innately predisposed to respond nurturantly to infant signals (cf. Klaus, Trause, & Kennell, 1975; Money & Tucker, 1975). Obviously, our data do not prove that there are no biological sex differences, but they do speak against the notion that "maternal"

responsiveness reflects predominantly biological influences. Future research might focus on sex differences among groups with varying degrees of experience with infants in order to determine whether parenthood provides the critical experiences from which these patterns of responses are learned.

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REFERENCES

Berkowitz, L. Some determinants of impulsive aggression: Role of mediated associations with reinforcements for aggression. *Psychological Review*, 1974, *81*, 165–176.

Bowlby, J. *Attachment and loss*. Vol. 1. *Attachment*. New York: Basic Books, 1969.

Broussard, E. R., & Hartner, M. S. S. Further considerations regarding maternal perception of the first born. In J. Hellmuth (Ed.), *Studies in abnormalities*, Vol. 2. New York: Brunner/Mazel, 1971.

Carey, W. B. A simplified method of measuring infant temperament. *Journal of Pediatrics*, 1970, *77*, 188–194.

Donovan, W. L., Leavitt, L. A., & Balling, J. D. Maternal physiological response to infant signals. (Paper presented to the Society for Research in Child Development, Denver, April 1975.) *Psychophysiology*, 1978, in press.

Frodi, A. M. Experiential and physiological responses to provocation associated with anger and aggression. *Journal of Research in Personality*, 1978, *12*, in press.

Frodi, A. M., Macaulay, J., & Thome, P. R. Are women always less aggressive than men? – A review of experimental literature. *Psychological Bulletin*, 1977, *84*, 663–660.

Geen, R. G., Stonner, D., & Shope, G. L. The facilitation of aggression by aggression: Evidence against the catharsis hypothesis. *Journal of Personality and Social Psychology*, 1975, *31*, 221–226.

Hollingshead, A. B. *The two factor index of social position*. Unpublished manuscript (available from the author, Department of Sociology, Yale University, New Haven, CT), 1957.

Klaus, M. H., Trause, M. A., & Kennell, J. H. *Human maternal behavior following delivery: Is this species specific?* Unpublished manuscript (available from the authors, Department of Pediatrics, Case Western Reserve University, Cleveland, OH), 1975.

Lacey, J. Somatic response patterning and stress: Some revisions of activation theory. In M. Appley & R. Trumbell (Eds.), *Psychological stress: Issues in research*. New York: Appleton-Century-Crofts, 1967.

Lamb, M. E. A reexamination of the infant social world. *Human Development*, 1977, *20*, 65–85.

Lamb, M. E. Influence of the child on marital quality and family interaction during the prenatal, perinatal, and infancy periods. In R. M. Lerner & G. B. Spanier (Eds.), *Child influences on marital and family interaction: A life-span perspective*. New York: Academic, 1978. (a)

Lamb, M. E. Social interaction in infancy and the development of personality. In M. E. Lamb (Ed.), *Social and personality development*. New York: Holt, Rinehart & Winston, 1978. (b)

Lykken, D. T., Rose, R., Luther, B., & Maley, M. Correcting psychophysiological measures for individual differences in range. *Psychological Bulletin,* 1966, *66,* 481–484.

Maccoby, E. E., & Jacklin, C. N. *The psychology of sex differences.* Stanford: Stanford University Press, 1974.

Money, J., & Tucker, P. *Sexual signatures.* Boston: Little Brown, 1975.

Schachter, J. Pain, fear, and anger in hypertensives and normotensives. *Psychosomatic Medicine,* 1957, *19,* 71–79.

Thomas, A., Chess, S., & Birch, H. G. *Temperament and behavior disorders in children.* New York: New York Universities Press, 1968.

Weerts, T. C., & Roberts, R. *The physiological effects of imagining anger-provoking and fear-provoking scenes.* Paper presented to the Society for Psychophysiological Research, Toronto, October 1975.