Behavioral Reactions of Preterm and Low-Birthweight Infants to a Program of Tactile Stimulation

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Abstract: None available.

Full Text: Headnote ABSTRACT: The behavioral reactions were monitored of a group of premature and low-birthweight infants (mean gestational age at stimulation was 37 weeks) in a special care baby unit to two sessions of the Tac-Tic program of stroking. Arm and leg movements were found to be the most frequent reactions and a striking similarity occurred between maternal and paternal stroking, in the pattern and frequency of infant reactions elicited. No significant differences were found in the type or number of reactions elicited by strokes of different bodily areas (head, trunk or limb). Parental feelings towards the stroking procedure were also examined and they quite clearly enjoyed performing the stroking and felt they would continue to perform the stroking procedure, on their infant, in the future. INTRODUCTION The effects brought about by programs of supplemental tactile stimulation with premature and low birthweight infants have been multiple and varied. Accelerated weight-gain (Adamson-Macedo, 1984; Field et al., 1986) enhanced mental and motor development (Adamson-Macedo, 1991; Bushnell et al., 1990; Field et al., 1986) and increased parental visiting rates (Rosenfield, 1980) have been found by some studies but not others (de Reiste, 1991; Jay, 1982; KoniakGriffin &Luddington-Hoe, 1987). Such a lack of consistency in research findings has been attributed to variance in the procedure, nature and amount of stimulation employed, as well as differences in the subject sample used in such attributes as degree of respiratory illness, gestation and birthweight, all factors known to affect developmental outcome. As a consequence, to enhance both study replicability and consistency of results, several programs of tactile stimulation have been developed which delineate the precise nature and amount of stimulation, the procedure followed in it's administration, the variables investigated and how they were examined and also the characteristics of the subject sample used. The "Tac-Tic" stroking program of Adamson-Macedo (1984) and the stroking program of Field et al. (1986) are examples of such programs. These programs however have failed to provide a detailed descriptive account of how infants react to the stimulation administered though Scafidi et al. (1990) found that during the tactile stimulation segments of the stimulation program used by Field et al. (1986), preterais experienced more multiple limb movements than during the kinaesthetic segments of their program. They concluded from this that the tactile stimulation was more arousing and activating than the kinaesthetic segments of their program. Such information may be a means of elucidating the mediating mechanism through which programs of tactile stimulation bring about their beneficial effects and determining whether particular strokes or stroking of a particular bodily area is especially significant for the effects brought about by the program. General stroking has previously been found to elicit motoric arousal effects in low-birthweight preterais (Oehler et al., 1988). This, in conjunction with the significantly greater weight gain in stroke as compared to non-stroke preterais in the study of Field et al. (1986), has previously been interpreted by Scafidi et al. (1986) as reflecting increased metabolic efficiency. This increased metabolic efficiency may underlie the benefit in weight-gain found in infants who had received the stroking program of, for example, Field et al. (1986) or Adamson-Macedo (1984). It is also of value to determine whether the infant reactions elicited by the various strokes of a stimulation program differ or remain the same when the same stroking program is performed by another person. If they do remain the same it would suggest that the strokes themselves rather than any inter-stroker variable, such as exact pressure of touch, was accountable for at least the behavioral effects brought about by stroking program. By employing the parents to look at this question it is also possible to discover parental attitudes towards a stroking program such as Tac-Tic (Adamson-Macedo, 1984) in terms of their own enjoyment performing the program and whether they perceive their infant as

enjoying it or not. If it is found to be enjoyable by the parents, it may be worth looking into the effectiveness of the Tac-Tic stroking program in assisting parent-infant interaction within the special care baby unit. If effective, this would be valuable as preterais tend to be overrepresented in populations with such problems as child abuse and failure to thrive (Schmitt &Kempe, 1979; Vietze et al., 1980) and parent-preterm infant interaction has been seen to underlie these (Butterfield &Miller, 1984). Difficulty on the part of the parents to adapt to their infant's characteristics and develop appropriate interactive behaviors has been argued by Butterfield and Miller (1984) to be a contributing factor to these problems along with preterais being "less readable" as social partners (McGhee &Eckerman, 1983) in comparison to fullterms due to their poorer neurological maturation and behavioral organization (Nickel, Bennett &Lawson, 1982). This time period is also seen as important for early interaction and the development of a system of mutual interaction and optimal styles of interacting between parents and infant, which becomes increasingly reciprocal over time (Butterfield &Miller, 1984). Early parent infant separation has thus, understandably, been found to adversely affect later maternal attachment and behavior (Kennell et al., 1975). In accordance with these ideas, this study set out to investigate: 1. The amount and kind of infant behavioral reactions elicited by "Tac-Tic" strokes across different areas of the body, by both mothers and fathers with the experimental hypothesis that there would be quantitatively and qualitatively differential reactions elicited by various bodily region strokes, with the more frequent reactions elicited corresponding to the bodily area being stroked. 2. Whether both parents elicit the same reactions, from the infants, when using the same stroking technique (Tac-Tic) with the experimental hypothesis being that (a) no differences would occur in the reactions elicited by each parent when stroking her/his infant. This was hypothesized by performing the Tac-Tic stroking program, both parents would be stroking their infant in the same way, using the same movements, in the same sequence, with only the pressure employed, (which would be extremely difficult, if not impossible, to match), differing. METHOD Design The following design was used to determine the frequency and kind of infant reactions to Tac-Tic stimulation elicited by strokes of different bodily areas as well as the frequency and kind of infant reactions elicited when the mother as compared to the father is stroking the infant. Infant reactions which were only observed by the one parent and not also by the other parent or experimenter were removed from the data analysis as a safeguard for data validity. Tac-Tic strokes were categorized according to the bodily area they were performed upon (head, trunk or limb). The most common behavioral reactions (those reactions which occurred with a frequency greater than 7% of the total number of reactions) were then selected for in-depth data analysis. A 3 (head/trunk/limb) ? 6 (infant reactions: bodily stretch, mouthing, eye, head, arm and leg movement) design was used to address the first issue, with Cochran's Q and post-hoc Wilcoxon Matched-pairs Signed-ranks tests used for the data analysis. With the Tac-Tic strokes and associated data already categorized according to the bodily area that the strokes were performed upon, infant reaction data when the mother as compared to the father was the stroker were compared for each bodily area (head, trunk or limb) to address the second issue. A 2 (mother/father) x 3 (head/trunk/limb) x 6 (infant reactions: bodily stretch, mouthing, eye, head, arm and leg movement) design was employed here with Wilcoxon Matchedpair Signed-ranks tests used for the data analysis. Subjects All the subjects (n = 15; 9 male and 6 female) were infants cared for in the special care baby unit of the Queen Mother's Hospital, Yorkhill, Glasgow. Six of these infants were premature and the remainder were of low-birthweight. None of the subjects suffered from any debilitating condition other than jaundice. The mean gestational age and birthweight of the sample was 36 weeks (s.d. = 2.82) and 2.67 kilograms (s.d. = 0.89). Their mean Apgar at 1 and 5 minutes was 7.78 (s.d. = 1.54) and 8.85 (s.d. = 0.84) respectively. The mean age of the parents was 28.5 years (s.d. = 5.3). Stimulation The stimulation procedure, "Tac-Tic" (Adamson-Macedo, 1984), was performed when the infants were, on average, 9 days old (s.d. = 2.3). Tac-Tic stands for "Touching and Caressing. Tender in Caring" (Adamson-Macedo, 1984) and represents a systematic sequence of stroking movements covering the whole body, applied with gentleness, rhythm, equilibrium and continuity of touch. The stroker's hands are scrubbed, warmed and disinfected and all possible items of the baby's clothing are removed

or loosened. Stroking commences at the head with the baby on his/her front and continues to his/her toes. The baby is then carefully turned and stroking is continued from head to toe. This program was chosen as it is the only known tactile stimulation program from premature and low-birthweight infants that has been developed in Britain and is currently being used in neonatal units across Britain. A full diagrammatic record of the Tac-Tic stroking procedure is available from the authors. Materials These consisted of the: (1) Infant reaction booklet (consisting of stroke sheets) An infant reaction booklet, consisting of record sheets was created for the purpose of this study. For each Tac-Tic stroke the booklet had a list of possible infant reactions (established by prior observations of infants during tactile stimulation and various other procedures e.g. nappy change), which were the same for each stroke and a panel beside the list of reactions, for the reactions to be ticked if they occurred during the stroke that had just been performed. Two copies of this booklet, one for when the father was the stroker and the other for when the mother was the stroker, were used by both of the parents and by the experimenter: (2) Parental questionnaire on the Tac-Tic stroking program This was devised specifically for this study consisting of 5 questions pertaining to the stroking program. Procedure For the purpose of clarity, the procedure may be divided into 4 sections: 1. Initial meeting 2. Demonstration of stroking procedure and infant reaction recording 3. First parent stroking infant with ongoing recording of infant reactions to each stroke by the first parent, experimenter and second parent. The latter two were observers of the stroking. 4. Second parent stroking infant with ongoing recording of infant reactions to each stroke by the second parent, experimenter and first parent. The latter two were observers of the stroking. Administration of the stroking questionnaire. Initial meeting. Parents were initially approached, on average 6 days after admission of their infant into the unit, to discuss the intervention program and to ask if they wished to participate. Altogether 21 couples were asked to participate in the experimental Tac-Tic program. Four couples (19.05%) refused to participate. In total, fifteen couples (71.43%) participated throughout. Demonstration of stroking procedure and infant reaction recording. At the second meeting of the experimenter with the parents (on average 2 days after the initial meeting) the experimenter demonstrated the Tac-Tic stroking procedure to the parents, outlining each of the strokes employed using a doll. Parents were then given two copies of the infant reaction booklet, one to be used when the mother was stroking their infant and the other when the father was the stroker. The experimenter read through this booklet with the parents, outlining the procedure that was to be followed. Parents were instructed to perform each stroke according to the sequence, filling in the appropriate stroke sheet in the booklet immediately after performing that stroke (taking no more than 1 minute to do this) and then proceeding on to do the next stroke and so on. When observing the other parent stroke the infant, the same recording procedure was followed. It was also emphasized to the parents, that only infant reactions that occurred when a stroke was actually being performed (i.e. not any reaction that occurred immediately before/after the stroke) were to be recorded for that stroke. The occurrence of a reaction rather than the number of times it occurred during any given stroke was to be noted due to the short duration of each stroke (approx. 3-5 seconds) and the difficulty in determining when a 1 incidence of a reaction stops and another incidence of it begins. The average duration of this stroking and reaction recording was 25 minutes. First parent stroking of infant with ongoing infant reaction recording. Shortly after having the stroking and infant reaction recording explained, either the Mother or Father performed the stroking, with the other parent taking her/his turn at the stroking afterwards (this was counterbalanced as much as possible given the odd subject number). The stroking parent was instructed to remove all garments (other than nappy) from the infant and to place their infant on her/his side before beginning the Tac-Tic procedure. This took approximately 3 minutes. The experimenter then verbally guided the stroking parent though the sequence of strokes. Second parent stroking infant with ongoing recording of infant reactions. Once the first parent had completed the sequence of stroking, a brief time lapse occurred (mean = 4 minutes) for the infant to "recover" from the stroking procedure. After this, the second parent performed the stroking with the first parent now acting as the "observing parent" and the aforementioned procedure was repeated. When all this was completed, parents were asked to answer a few questions pertaining to the stroking procedure. The

stroking questionnaire was administered both to mothers and fathers, which they completed there and then (completed in approx. 2 minutes). RESULTS What are the most frequent reactions elicited by the various Tac-Tic strokes, categorized according to bodily area stroked, for each stroker? Given the non-parametric nature of the reaction data (Table 2), Cochran's Q tests and post-hoc Wilcoxon matched-pairs signed-ranks tests were performed to determine: (1) Which reactions occurred significantly more than others to each bodily category of the Tac-Tic strokes (i.e. head, trunk or limb strokes)?

Table 1
Frequencies of Infant Reactions

Stroker	*Mother*	*Father*	*Mean*
Bodily Stretch	33	47	40
Eye Open/Close	33	49	41
Head Movement	64	66	65
Arm Movement	111	124	117.5
Leg Movement	120	128	124
Mouthing	61	52	56.5
Jump Startle	7	6	6.5

(2) Which bodily category of the Tac-Tic strokes (i.e. head, trunk or limb) elicited significantly more reactions than the others? This was conducted for each stroker session and Wilcoxons were performed comparing each bodily category of the Tac-Tic strokes (head, trunk or limb) on overall (across both parents) number of reactions elicited. Which reactions occurred significantly more than others to each bodily category of the Tac-Tic strokes (i.e. head, trunk or limb strokes)? Overall, arm and leg movements were the most frequent reactions, and bodily stretch and eye opening/closing movements the least frequent infant reactions across all the categories of Tac-Tic strokes, during both maternal and paternal stroking sessions. During these sessions, Cochran's Q tests indicate that within all the bodily categories of Tac-Tic strokes, head, trunk and limb, significant differences occurred between number of the various reactions elicited (Table 2). Head strokes. Post-hoc Wilcoxon tests performed on the head strokes reaction data revealed that: 1. During head strokes, head, arm, leg and mouthing movements all occurred significantly ($p < 0.05$) more often than bodily stretch movements in both maternal and paternal stroking sessions and more often than eye opening/ closing movements ($p < .001$) in the maternal stroking session only.

Table 2
Cochran's Q Tests

			Maternal Session		*Paternal Session*	
	Cases	*D.F.*	*Cochran Q*	*Significance*	*Cochran Q*	*Significance*
Head Strokes	88	5	92.23	.001	113.92	.001
Trunk Strokes	66	5	123.18	.001	89.10	.001
Limb Strokes	33	5	41.80	.001	53.06	.001

2. Arm and leg movements occurred significantly more often ($p < .01$) than either head, mouthing or eye opening/closing movements during head strokes in both maternal and paternal stroking sessions. 3. No significant differences were found in the occurrence of arm as compared to leg movements, head as compared to mouthing movements and bodily stretch as compared to eye opening/closing movements during head strokes. Trunk strokes. Post-hoc Wilcoxon tests performed on the trunk strokes reaction data revealed that: 1. Arm and leg movements occurred significantly ($p < .001$) more often than either bodily stretch eye

opening/closing, head or mouthing movements during trunk strokes in both maternal and paternal stroking sessions. 2. No significant differences were found in the occurrence of arm as compared to leg movements or head, mouthing, eye opening/closing and bodily stretch movements as compared to each other during trunk strokes in both maternal and paternal stroking sessions. Limb strokes. Post-hoc Wilcoxon tests performed on the limb strokes reaction data revealed that: 1. Arm and leg movements occurred significantly more often ($p < .01$) than either bodily stretch or eye opening/closing movemerits during limb strokes in both maternal and paternal stroking sessions. 2. Leg movements occurred significantly ($p < .002$) more often than head or mouthing movements during limb strokes in both maternal and paternal stroking sessions and than arm movements in the maternal session ($p < .03$). 3. Arm movements occurred significantly more ($p < .02$) than head and mouthing movements in the paternal stroking session only 4. No significant differences were found in the occurrence of head, mouthing, eye opening/closing and bodily stretch movements as compared to each other during limb strokes in both the maternal and paternal stroking sessions. Which bodily category of the Tac-Tic strokes (i.e. head, trunk or limb) elicited significantly more reactions than the others? With regard to this question, the overall (both parental stroking sessions) reaction data was first converted into percentages of the maximum possible number of reactions, for each bodily category of Tac-Tic strokes. This was done since there were a different number of strokes within each bodily category of the Tac-Tic strokes, (e.g. number of head strokes = 8, trunk strokes = 6, limb strokes = 3), and so a different number of reactions was possible for each of these categories (Table 3). No significant difference was found though, by Wilcoxon matchedpairs signed-ranks tests, in the percentage number of reactions elicited by head as compared to trunk strokes ($z = -1.44$, 2-tailed $p < .147$), head as compared to limb strokes ($z = -1.34$, 2-tailed $p < .177$) and trunk as compared to limb strokes ($z = -0.18$, 2-tailed $p < .850$). Overall head strokes elicited the least percentage number of reactions, in comparison both to trunk and limb strokes which elicited virtually the same percentage number of reactions. What is the number of reactions elicited by the various categories of Tac-Tic strokes, when the mother as compared to the father is the stroker? To answer the question of whether, paternal as compared to maternal Tac-Tic stroking, elicited a different number of reactions across each of the bodily categories of Tac-Tic strokes, Wilcoxon matchedpairs signed-ranks tests were performed on the data. These tests found that no significant difference occurred between the number of reactions elicited by maternal as compared to paternal Tac-Tic stroking across head ($z = -1.67$, 2-tailed $p < .093$), trunk ($z = -0.05$, 2-tailed $p < .954$) and limb ($z = -0.90$, 2-tailed $p < .363$). Overall, in fact there was a striking similarity, between maternal and paternal stroking sessions, in both the pattern (indicating similarity in reactions elicited) and frequency of infant reactions, for the 3 categories of Tac-Tic strokes head (Figure 1), trunk (Figure 2) and limb strokes (Figure 3).

Table 3
Percentage Number of Reactions Elicited

	Bodily Categories of Strokes		
Stroking Session	*Head*	*Trunk*	*Limb*
Maternal	22.77	30.18	23.70
Paternal	26.80	28.88	30.37
Overall	24.79	29.53	27.03

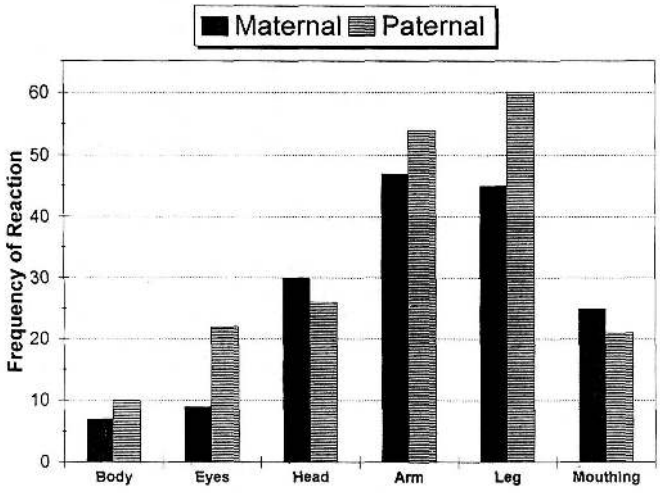

Figure 1
Head Strokes: Infant Reaction Frequencies

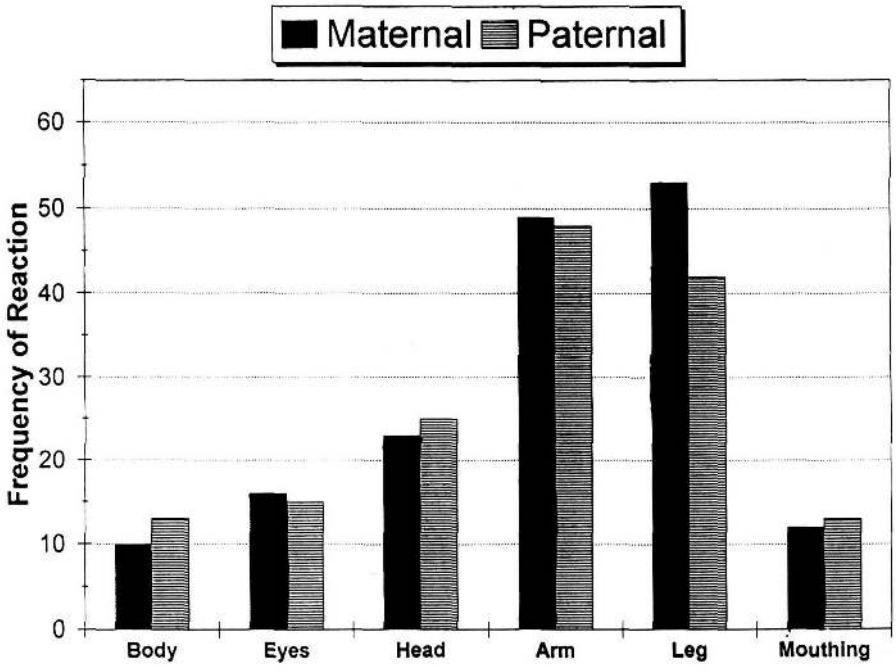

Figure 2
Trunk Strokes: Infant Reaction Frequencies

Correlations Pearson correlations were performed on the percentage number of reactions (of the total possible number of reactions) overall across both maternal and paternal stroking sessions, marked down as seen by each of the parents and the experimenter prior to the removal of reactions not seen by at least two of the three

observers (mother, father &experimenter). Significant positive correlations were found (Table 4) between the number of reactions seen by the experimenter, mother and father during both the maternal and paternal stroking sessions.

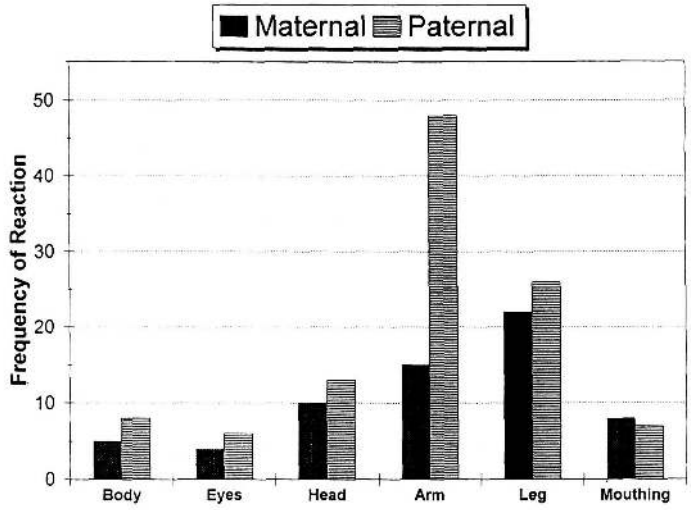

Figure 3
Limb Strokes: Infant Reaction Frequencies

Table 4
Correlations Between Mother, Father and Experimenter in No. of Reactions Seen

	Maternal		*Paternal*	
	Experimenter	*Father*	*Experimenter*	*Father*
Father	.82**	—	.76**	–
Mother	.87**	.79**	.64**	.73**

1-tailed Signif: ** –.001

This suggests a great similarity between the mother, father and experimenter, in the number of reactions each of them saw, implying validity in the reaction data.

Table 5
Reaction Correlations

Stroker	*Mother*		*Father*	
Reaction	*Mean*	*Range*	*Mean*	*Range*
Bodily Stretch	0.58	0.35-0.83	0.55	0.31-0.87
Eye movement	0.41	0.05-0.95	0.51	0.13-0.89
Head movement	0.57	0.29-0.83	0.55	0.15-0.84
Arm movement	0.69	0.13-0.88	0.45	0.01-0.85
Leg movement	0.54	0.36-0.79	0.67	0.40-0.89
Mouthing	0.46	0.07-0.70	0.65	0.20-0.94

Pearson correlations between the number of occurrences of each reaction seen by the experimenter, mother and father, in both the maternal and paternal infant-stroking sessions, were calculated for each reaction. This was done to determine inter-rater reliability in the perception of each reaction. The summary table (Table 5) of the correlations shows that no reaction had an overall mean correlation below r = 0.40. What parents thought about the Tac-Tic stroking procedure? From the stroking questionnaire data outlined below (Table 6), it is clear that all the parents, both mothers (n = 15) and fathers (n = 15), of the experimental sample, enjoyed stroking their infant using the Tac-Tic stroking procedure. The majority of this sample also felt that their infants enjoyed

it, that they would carry the Tac-Tic stroking program out on a regular basis and that some strokes were "better," (in their eyes) than others. In addition, over half of the sample felt that the Tac-Tic stroking procedure enhanced their confidence. Out of those (n = 21; 70%) who found that some strokes were, in their viewpoint, "better" than others, 36.6% indicated head strokes, 36.36% trunk strokes and 22.73% limb strokes to be the "best," in terms of the infant and her/his comfort.

Table 6
Questionnaire Data

	Overall %	*Maternal* %	*Paternal* %
Did you enjoy the stroking?	100	100	100
Did it make you feel more confident?	60	60	60
Do you think you would carry it out on a regular/daily basis?	89.3	92.7	85.7
Do you think your baby enjoyed the strokes	96.7	100	93.3
Did you find some strokes better than others?	83.3	73.3	93.3

DISCUSSION Arm and Leg Movements: The Most Common Reactions to Toe-Tic Stroking Arm and leg movements were found to be the most common reactions to the Tac-Tic strokes across all of the three bodily categories of these strokes (head, trunk and limb) which is in agreement with the findings of multiple limb movements being more common during tactile (as compared to kinaesthetic) stimulation (Scafidi et al., 1990). Given that only reactions seen by at least two of the three individuals (experimenter and the 2 parents) present were included in the data analysis, as well the significant correlations found between these individuals in the frequency of reactions seen across the stroking, this data can be taken to be quite valid. Stimulation of nerves alone may account for the elicited arm and leg movements given the poor neurological and behavioral organization of preterm and low-birthweight infants. On the other hand, the arm and leg movements elicited by the stroking may reflect not behavioral arousal (Scafidi et al., 1990) or disorganization, but the elicitation of the Moro reflex as the Tac-Tic stroking elicited reactions akin to those of the Moro reflex. This reflex is characterised by the spreading open of both arms and legs, in an embracing movement, as if to catch hold of something (Fogel &Melson, 1988). Dropping of the baby's head, slightly but abruptly, usually elicits this reflex (Fogel &Melson, 1988) and this can be seen as a behavior which decreases the distance between caretaker and infant. The Moro reflex, on the part of the child, thus can be seen as an "attachment behavior" (Bowlby, 1969), seeking out greater proximity between caretaker and child, and it is possible that this reflex may also occur in response to a proximity seeking behavior, such as stroking, on the part of the caretaker. The abundance of tactile stimulation in mother-infant interactions (Day, 1982), the importance of tactile stimulation or "contact comfort" over food in early monkey infant-mother dyads (Harlow, 1959a, 1959b), as well as the seemingly innate patterns of touching infants for the first time by mothers (Rubin, 1963) lend further support to this notion of touching and stroking as "innate attachment behaviors." Such actions as arm and leg movements could however be reflections of the infant's state as it has been found that infants display a configuration of facial, arm and hand actions to express affective states (Fogel &Hannan, 1985; Legerstee et al., 1990). Open hand, eye gazing, arm extension and vocalization formed a "behavioral organization," according to Legerstee et al. (1990), during 9-15 week old infant-active mother interaction. Behavioral organizations such as these may "...induce the parents to respond to the infant in a certain way" (p. 783), and this ties in with the aforementioned "attachment behavior" theory (Legerstee et al., 1990). This view of stroking as an "attachment behavior" needs to be investigated further, for example, by comparing infant preference for being stroked as compared to being touched or by comparing the reactions of infants who are touched and also stroked in various ways to

determined which elicits the most attachment behavior. More subtle infant reactions such as twitches, degree of mouth opening and so on, which could not be picked up using the present procedure, could be assessed by videotaping parents performing the stroking program and then analyzing the recordings. These reactions might reveal other differences between the various strokes in terms of their behavioral effects. If this was conducted over time, it would also be possible to record whether infants had "habituated" to the stroking sequence, showing responses to be less aroused or vigorous the greater the number of times that the infants had experienced the stroking procedure. One-year-olds have been found to show a tactile recognition memory (Gottfried &Rose, 1980) but no known data exists on this in premature newborns. Equally, parental reactions while performing the strokes, could be collected using such a procedure. Comparing their reactions while stroking as compared to while in routine contact with their infant might reveal greater parental responsivity or interaction during stroking as compared to routine contact of their infant. This then may, over time, contribute towards the improved social and cognitive development found in the long-term in stroked infants (Rose et al., 1980; Koniak-Griffin &Luddington-Hoe, 1987). Finally, by investigating what the physiological effects of infant behavioral reactions during Tac-Tic stroking are, an attempt can be made to relate such reactions to the physiological improvements (e.g., weight gain) stroked infants display (Jay, 1982). Maternal and Paternal Tac-Tic Stroking As hypothesized, no significant difference was found between maternal and paternal stroking in either the kind or number of infant reactions elicited. This was expected as both parents were provided with a systematic, sequenced stroking program (Tac-Tic) and were both shown and instructed in the same way, what to do. This thus supports the reliability of the Tac-Tic procedure as performed by two different people, the mother and father of the infant. It also supports the argument for a greater number of tactile intervention programs in the future to involve the father as well as the mother, in infant stroking. Programs of tactile stimulation usually either involve the experimenter or the mother providing the stimulation (field et al., 1986; Adamson-Macedo, 1984). But, given that this study showed that both parents appear to be eliciting the same infant reactions, at least in an overt behavioral sense, fathers may just as well bring about, as many and/or as great benefits in infant development as mothers or experimenters. This supposes that such overt behavioral reactions are reflections of underlying effects, which yet remains to be determined. However, with fathers as well as mothers providing the stimulation, the father-infant, as well as mother-infant, relationship could also be benefited. Early tactile contact and interaction, between father and infant, has previously been deemed as essential by Pederson (1980) and Parke and O'Leary (1976) for the father-infant relationship, as well as possible enhancing paternal "engrossment" (Greenberg &Morris, 1974) with his infant and feelings of "fatherliness" (Hines, 1971). Furthermore, the findings from the stroking questionnaire administered revealed that both fathers and mothers enjoyed, and the vast majority felt their infant enjoyed, the Tac-Tic stroking program. Thus, this stroking procedure was obviously a positive, pleasant means of parent-infant interaction, which may be of particular benefit in a special care baby unit setting, where parents feel inhibited in interacting with their infant, due to their infants vulnerable and "at risk" health status. Head, Trunk or Limb Tac-Tic Strokes, in Comparison to Each Other In that the same pattern and frequency of reactions were elicited by the three categories of bodily strokes (head, trunk and limb), this suggests that they were equally effective in eliciting such overt behavioral reactions. Stroking of any one of the three body regions, thus was not more effective in eliciting overt behavioral reactions, in terms of either kind or frequency. Neither were reactions corresponding to bodily area being stroked, significantly more frequent than other reactions, except for arm/leg movements during limb strokes, which were the most frequent reactions elicited within the other two bodily categories of strokes (head and trunk) as well. A more precise and detailed examination, using video recordings of the stroking sessions, however might show this by detecting more subtle infant reactions, which vary significantly across the three bodily categories of Tac-Tic strokes. For example, opening or closing of the hand, a behavior which Papousek and Papousek (1977) found in infants to be related to affective state (closing reflecting distress, opening reflecting relaxation). Looking at more than just the three general body areas of head, trunk

and limb, may also reveal that stroking of a particular body area is more effective than stroking of other areas, in eliciting certain or all, overt behavioral reactions. The need for a more a detailed investigation into this is underlined by the findings of the stroking questionnaire. The very high percentage of parents (83%) who felt that some strokes (predominantly head (36.36%) or trunk (36.36%) as compared to limb (22.73%)) were better, in the sense of being perceived as more pleasurable for their infants, than others is suggestive that strokes may indeed vary in their effectiveness. Again, a combined behavioral and physiological investigation into the effects of the various Tac-Tic strokes, across different areas of the body, is needed to determine whether strokes perceived as more effective (in the sense of, for example, pleasurable, reaction inducing) exert moreAonger beneficial physiological effects (e.g., heightened tcpo2) than other strokes. The Stroking Questionnaire Given that all the experimental parents enjoyed performing the Tac-Tic stroking procedure on their infant and most felt that they would continue to perform the stroking procedure on their infant, this stroking procedure represents a positive way of encouraging parent-infant interaction in the neonatal unit and home. The simplicity of the stroking movements, the proximity of the stroker and infant, the relaxed pace of stroking, as well as the pleasant way in which the infant reacts to the strokes all contribute to making Tac-Tic stroking a pleasant experience for the stroker. As mothers of preterms, in comparison to fullterms, have been found to show less tactile and central contact with their infants (Leifer et al., 1972) stroking programs could serve as a positive means of removing this behavioral discrepancy from "normal" mother-infant interaction, thereby enhancing mother, as well as father-infant interaction. 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