

The Role of Kinesthesia in Pre- and Perinatal Bonding

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Full Text: Headnote ABSTRACT: At birth mother and infant are in a common state of "kinesthesia." This constitutes a "kinesthetic bond." It results from the motion tracking between mother and child throughout the pregnancy. They feel each others' motion by means of touch through the uterine wall. If the sensory information they use to define their relationship is disrupted by physical separation after birth, before other sensory modes of relating are established, the relationship may suffer. When parent-infant bonding is understood in this light, movement following skills can be learned to enhance it or repair it when it has been harmed. Kinesthetic bonding is enhanced when parents become skilled in using the components of space, timing and effort to match their movement to that of their baby. This skill is based on understanding the anatomical and functional characteristics of babies' little bodies. Bonding also benefits when the environment where babies and parents interact is organized to compensate for the difference in scale of their bodies. In this way parents and babies move and interact mutually based on their kinesthetic bond. Despite intensive research over half a century, the details of how parents and babies manage to attach themselves to each other are still cloudy. Bowlby (1969, 1973, 1980) made it clear that normal relations between mothers and babies are disturbed by separation. Other research has illuminated what kinds of interactions parents, (mostly mothers) and babies do together that are important to bonding. Condon (1974), Sander (1970), Trevarthen (1977) and others have shed light on the timing of some of these interactions. Ainsworth (1973), Barnard and Eyres (1979), Richards (1974), Winnicott (1985) and many others have attached importance to the quality of parent-infant interactions. In most of these investigations "quality" is inferred by the effectiveness of the interactions. These excellent studies have brought us to our current understanding of which activities contribute to parent-infant bonding. Less attention has been given to understanding how these activities are actually accomplished. Before much can be done to intervene and effect the quality of parent-infant interactions, the functional efforts that make up these activities and contribute positively or negatively to the parent-infant bond must be better understood. Klaus and Kennell's (1981, 1983) contributions to the subject of bonding have resulted in world wide re-assessments of perinatal policy in many institutions of birth. Mothers are again allowed to stay with their newborns for the simple reason that they fare better when they do. But, even though the out-come is improved, no one would argue that sharing the same hospital room explains how the bonding between mother and child takes place. In the case of humans much more attention has been given to what mothers and babies do to attach themselves, rather than to how they do it. The time spent in physical contact, the amount of en face gazing, mothers' fantasies and expectations and many other factors have been correlated with the quality of relationship outcome. Still, not enough is known about how these interactions work to actively use that understanding to devise instruction and training to help parents solve their specific bonding problems. With the present knowledge we can only set up the conditions that seem to be effective and passively wait for a positive outcome. Why is it that bonding only happens between the family members or at least to those who are critical to the fulfillment of the infant's needs? Persons non-essential to the relationship, including medical staff and family friends, are rarely drawn in. The mother and baby, and later father and siblings have a quality of being that allows them to synchronize their behavior to become "one" together. This quality of "oneness" which is unique to each family may be, in large part, due to their way of moving with each other. Others have alluded to movement following between parents and babies (Winnicott, 1985, Trevarthen, 1977, Maratos, 1982, Field, 1977 and Gardner, Garland et al., 1989). Klaus and Kennell (1983) may have identified an important clue in their study of the highly effective handling

practices of nurse Louise. They noticed that she was particularly skilled in getting problem infants to respond. They speculated that it was because of the way she seemed to follow the infants' movement with a slight time lag. If this is the case, their observations fit nicely into several fields of research unrelated to parent-infant studies. One is that of behavioral cybernetics where shared motion following plays a major role in explaining human interactions. The second field that can help give a better understanding of how parents and newborns carry out their complex exchanges with each other is kinesics. BEHAVIORAL CYBERNETICS Researchers in the field of behavioral cybernetics, mainly led by K.U. Smith at the University of Wisconsin, have analyzed the sensory-motor relationships in human function and communication. The results of their work explain just how motion following between individuals is accomplished. Smith (1962, 1963, 1971, 1972) established a body of knowledge that describes the sensory and motor processes of behavior in terms of the following of self-made movement. He demonstrated in great detail how human beings generate sensory input for their own use, as well as for others, by means of motion. This motion-caused sensory input is continuously used for individual control of behavior as well as for control of others in the process of communication. This means that one moves, then attends to the effects of that movement with one's senses in order to control the next movement in the course of day-to-day behavior. Everyone also follows the movement of others and uses that sensory input to control their own motion. This indicates that humans are co-dependent upon each other even for their motor and sensory experience. KINESICS Kinesics is an observation method developed by the anthropologist Ray Birdwhistle (1970) to analyze and record human motion in the course of communication. His studies showed that families develop unique patterns of movement that bond them together and mark them as members of the same family. We know of no studies of newborns using the kinesics methods, but, the work of Maratos (1982), and Meltzoff and Moore (1977) have revealed to what extent babies are able to follow and imitate the facial movement of adults, especially that of their parents. Since they can do this within the first days of life it is almost certain that this movement following ability is learned before birth. We assume that a preonate follows the family specific movement patterns for moths from inside the mother. As a result, the newborn is intimately familiar with the family's motion patterns. This shared movement experience is an essential bond between mother and infant at the time of birth. It enables the mother and infant to synchronize their motions and sensory experience so that they are able to continue their experience of "oneness" after the birth. The findings from behavioral cybernetics and kinesics suggest that movement, made and sensed at first by the mother and baby throughout the course of pregnancy and later by other members of the family, is a fundamental element of parent-infant bonding. In this view, every level of physiological, developmental and social function of infants and their parents are inter-related by means of mutually shared motion-generated sensory experience. Babies follow the movement of their mother and in turn mothers follow the movement of their babies. They use this movement experience to create their mutual reality. We have chosen to call this important aspect of the attachment process "kinesthetic bonding". Kinesthetic Bonding The literature on bonding is full for fascinating illusions to "sensitive periods" (Richards, 1974), "remarkable warm glow" conditions coming over the mother (Klaus and Kennel, 1983), and Winnicott's (1985) description of a "Primary Maternal Preoccupation" state. He likened this condition to a "heightened sensitivity, almost an illness." These descriptions brought to mind the writers' experiences as a professor of dance and a body-oriented psychotherapist. The heightened states of awareness and sensitivity achieved by careful attention to movement, which is common to these professions, are often described in the same terms that the attachment literature uses to describe the "sensitive period" of new parents. Toward the end of the writer's (LM) first pregnancy she was rolling around on the floor. She expressed that in her pregnant condition she had greater flexibility than ever before. Rolling around holding her feet like a chimpanzee, she had the thought that her overall feeling state throughout most of the pregnancy was similar to what the writers call in their work, a state of "kinesthesia". This is a condition that can be achieved by engaging in carefully constructed movement activities. It is an experience that is common among primitive and traditional cultures that engage in movement dominated rituals. Hatch (1972) pointed out that heightened kinesthetic following is an important

means of giving people a sense of belonging in primitive and even many modern societies. Kinesthesia "Kinesthesia" is a condition comparable to some drug-induced altered states. The difference is that while the senses are extremely excited and alert, the motor faculty is not impaired as it often is in substance-induced altered states. There are no toxic side-effects or addictive after-effects as is often the case with chemically caused conditions. Induction The means of inducing states of "kinesthesia" are relatively well understood. They are similar to those used to entrain subjects in hypnotic trance states. To experience a state of "kinesthesia" one need only become highly focused on a specific movement activity. Any of the senses, alone or in combination, can be used. The activity for induction can be some aspect of one's own movement or that of someone else. As the focus becomes more pointed, the use of space, time and force become compliant with the movement being followed until it is impossible to recognize the difference between one's own movement and the movement being followed. This is the state of entrainment or trance. It can be said that a mother and baby are engaged in a trance-inducing movement process throughout the pregnancy and beyond. Beginning with the earliest movements of ovulation, fertilization and cell division and continuing through the intrauterine and birthing movements at the end of the pregnancy, mother and baby follow each other's motion. According to modern biological doctrine, this motion tracking is precise and coordinated on many levels including cellular (Adolph, 1982) organic, systemic and social (Kao and Smith, 1971). By the time of birth, baby and mother have been following and adjusting to each other's movement for many months. They are mutually dependent on each other's motion for their very experience of themselves (Smith, Zwerg and Smith, 1963 and Teng, Smith and Smith, 1972).

ROLE OF MOTION IN SENSING AND BEHAVIOR

The idea of mutual motion tracking adds a new dimension to the bonding story. Understanding that the movement sense supports integration of all other sensing and affects all behavior, provides useful insight into the process of how relationships develop between parents and newborns. At the turn of the century the renowned French mathematician Henry Poincare (1905) pointed out that none of the senses are functional without motion. One cannot see, hear, taste, smell, or experience touch without motion. It is the change in position of the stimulus or the receptor that makes it possible for the sensing organ to register a difference. These differences are the raw material of perception. The sense of motion is fundamental to one's existence. It is so basic that it is taken for granted. One experiences one's self through one's sense of motion from the earliest time in development. One uses it to keep track of one's own movement and to correlate it with that of others in the course of relating. The sense of movement has a somewhat more central role than the other senses in survival and the experience of being. In the critical period after birth, motion exchanges between parent and newborn are of central importance because they are the longest existent and the most developed. They form the foundations for relating through the other senses that will effect the family members' quality of relating for the rest of their lives.

Touch and Motion

In order to follow motion that takes place outside of one's own body, at least one of the other senses in combination with the sense of motion must be used. One can follow motion with sight, hearing, smell, taste and touch. But, the early exchanges between parents and babies are carried out primarily in the form of touch-guided motion interactions.

Experiencing the Difference Between Touch and the Other Senses through Finger Dancing

The sense of touch has a special relationship to motion following. In order to experience that relationship directly, put the palm of one of your hands together with that of another person. Then, close your eyes. One of you will take the lead by moving your hand. The other will follow. At some point try to make movements that will cause the other to lose contact. In most cases it will be almost impossible to cause your partner to make an error in staying with your movement as long as touch is the medium for following. Now, compare that experience to following your partner's hand movement with sight. Hold your hand ten centimeters from your partner's hand and try to go where you are led. A clear difference will be obvious at once. Following motion with sight is slower, less accurate and much less effective than with touch. The same goes for motion tracking with the other senses as well. Just try talking your partner's hand into the positions you choose! This comparison yields the same results with everyone. It is evidence that touch-guided motion tracking is more fundamental than that of the

other senses in motion regulation and communication. The sense organs for touch develop later than those for motion (Blechs Schmidt, 1960). Even so, they are present very early in the development process. Very young preonates are sensitive to touch. During pregnancy, the preonate and mother are in constant physical touch with each other through the uterus wall. Both experience their touching only because of the movement that goes with it. Without movement the point of contact would quickly become desensitized. Nothing would be felt. You can check that out for yourself by placing your finger or a hand on your leg. Let it lay there without pressure or movement. In a short time you will forget that it is there if you do not move it. Touch and motion go hand-in-hand. Without motion one cannot experience touching or being touched. Both, before and after birth, the primacy of touch-guided motion in communication gives this mode of exchange a central role in parent-infant bonding. By the time of birth touch-guided following between mother and infant is the most developed means of communication between them. Motion Following Before Birth It is through touch that the unborn child follows the mother's movement and adjusts to it in ever more compliant ways. With time, as the baby grows and makes more direct contact against the uterus walls, the mother becomes more and more absorbed with the movement of her baby and tends to accommodate that movement with her own movement. As the mother becomes more preoccupied with her infant's motion a state of "kinesthesia" begins and increases in intensity throughout the pregnancy. In this state the mother synchronizes her motion more and more to those of her developing child. As they follow each other's movement on a continuous basis, the motion of one becomes the feedback upon which the other basis his or her motion. They become highly dependent on each other's motion input in order to control their own movement at every biological and social level. By the time of birth, a major part of their reality is based on this shared and highly synchronized motion. The extensive work on parent/infant timing done by Condon (1974), Sander (1970, 1974), and Trevarthen (1977) over the years provides great detail about the movement synchronization of mothers and infants that persists after birth. This ability of mothers and infants to maintain highly compliant motion relationships at the time of birth is the result of the mutual touch-guided motion following that goes on between them beginning with conception. This mutual following is critical to the development of the preonate on physiological, corporeal, and social levels throughout the pregnancy. As pointed out by Gardner, Garland et al (1989), mutual motion following is surely just as important to continued development and well being of the child and mother after birth. SEPARATION Imagine what must be the experience for mother and baby if suddenly, and for a prolonged period, they are separate and no longer have each other's movement to follow! The meaning and sense of purpose and belonging that was founded upon the mutual following of each other's movement is no longer there. A bond that has been growing over many months is broken. The touch-guided following of motion is impossible when mother and infant are separated even for the distance beyond an arm's length. Kinesthesia Withdrawal When a newborn is separated even for a short time from the mother, confusion and disorientation of both can be anticipated. In fact, the reports from literally all parent-infant separation studies can be understood as showing typical movement deprivation responses. At this time, no systematic investigation of the specific movement related behavior characteristics that accompany mother-infant separations has been made. Such a study will be necessary to determine if that behavior is typical of the "kinesthesia" withdrawal symptoms observed in other circumstances. Symptoms Based on our experience with dancers and movement therapy clients, we have observed symptoms of withdrawal following highly developed movement tracking experiences. They are parallel to the findings of Harlow (1961) in his studies of monkeys and to those of Bowlby (1969, 1973, 1980) and his colleagues with small children. There is a sense that something is missing. Sometimes, there is a woody or hollow sensation in the extremities, chest, and belly. One feels as though there is a need to reach out and re-establish the feeling of belonging to something bigger than oneself. Sadness and unexplainable tears sometimes occur. There is often a feeling of depression or let down. If new experiences of "kinesthesia" are not repeated soon after, there is a tendency to feel resistant and unwilling to take the risk of seeking it again. Anxiety and a feeling of resistance to new experience sets in. Based on the reading of reports of mothers separated from their infants (Robertson, 1953

and Heinicke and Westheimer, 1966), there may be similarities between the symptoms of "withdrawal" from a "kinesthetic high" and being separated from one's infant at the time of birth. There has been limited experience in directly observing the negative effects of movement tracking deprivation on parents and infants. However, the positive effects of teaching parents and infants movement following skills has been investigated by the authors. Maietta (1986) studied the effect of handling training on parent-infant interaction and infant development. At one month post-partum, trained parent-infant teams scored significantly higher than untrained teams on developmental and relationship tests. Trained parents and infants were more mutual in their exchanges during caretaking and play activities than those who were untrained. This study showed it is possible to positively influence the quality of parent-infant interaction with experiential training in mutual, touch-guided interaction skills just before and after the baby's birth.

DEVELOPING MUTUAL FOLLOWING SKILLS

The rest of this paper describes the elements found by the authors to be critical in helping parents and infants establish or re-establish mutual following skills. The ability of parents and infants to meet each other part way in exchanges that acknowledge the traits and capabilities that each brings to the interaction is crucial to nurturing relationships. The skills that make this mutuality possible are based on the ability of each person to follow movement. It has been pointed out that at the time of birth, the touch and movement sensing systems are best developed to do this in both the mother and the infant. If the kinesthetic bond is broken shortly after birth, for what ever reason, it can be rebuilt by teaching parents and infants how to follow and understand each other's movement again. Of even greater importance is the idea that it is possible to enhance "kinesthetic bonding" in most families by simply showing family members how to follow each other's movement and giving them proof that it is important to their ability to relate to each other.

The Elements of Touch and Movement in Parenting

If parents are to engage their infant in ways that take advantage of the infant's best resources for relating they must have a clear idea of how sensitive babies are to motion and touch. They must also be sensitive to touch and movement themselves. It is helpful if they know about the qualities of movement and touch from early on so that they can attend to their baby's movement and respond to it throughout the pregnancy. In this way their skill to follow the movement of the baby will be developed to its highest possible level by the time the baby is born. In order to teach parents these skills, conceptual, experiential, and practical instruction is used.

Space, Time and Effort

Every human motion has three elements. They are time, space and force. They combine to determine how each movement is experienced. The space a movement uses can be big or small, and it always has a direction. Movement always takes time. And, finally, every motion requires effort. In the communication process, the space, time and effort elements of each person's contribution must be close enough to that of the other for an exchange to take place. If the parent-infant interaction is not satisfactory for any reason, the parent can adjust it by changing one of these elements. If the parent's movement is big, fast and strong and the baby's movement is small, slow and weak then it is unlikely that the two will manage to engage in a mutual exchange. In order to arrive at a common ground one of the participants must change their movement relative to the other so that both can follow. Only then is there a sense of doing things together. We believe that it is this feeling of mutual involvement that is the essence of parent-infant attachment. When parents handle their babies so the direction of their efforts to move them from lying to sitting, for instance, does not block their efforts to participate, the bond deepens. Both, parent and infant, feel more sure about the effectiveness of their nurturing relationship. The infant is grateful to be empowered and the parent is rewarded with the baby's response to the Tightness of the interaction. Each exchange of this nature builds the network of feelings and abilities that are shared by parents and infants. This is the stuff of which parent-infant bonding is forged. Parents and infants adjust their timing, use of space, and effort to make mutual sense out of their lives together.

The Anatomy of Handling Parents

are helped in the interaction with their baby if they have a basic idea about the nature of the infant's body. Human anatomy can be understood in a very simplistic way by pointing out that there is a head, chest, pelvis, arms and legs. All of these can be said to be masses because they are separated by areas that allow for a great deal of movement. The neck makes extensive motion of the head and chest possible. The waist and hip areas allow for

the movement of the pelvis and chest as well as the legs. And, finally the shoulder is the place where movement happens between the arms and the chest. Babies need to be able to move their masses in order to have any degree of control over themselves. If parents don't realize this, and block the spaces between their infant's masses as they hold them, they create a struggle for power and control with their baby that they may not even notice since the baby is so small and they are so large. An awareness of the basic anatomy of infants is essential to success in using the ideas of space, time, and effort to communicate with babies through touch and movement. In the absence of this understanding, parents hold their infants so that they become solid little monoliths. In order to experience the horror of being held this way, the reader should have someone hold them on their lap in such a way that they block the space between each of the masses. The holder should hold on tightly for a few minutes. If this experiment is carried out, one will discover that being held in this way limits one's motion and sense of self-control. No wonder many babies cry so much! Handling babies so that their masses can differentiate and move in sequence makes for happy babies and it gives parents a rich medium for interaction with their babies.

Basic Human Functions In order for parents to engage their baby intelligently and in ways that the baby is able to respond, it is necessary to know something of what the baby is learning to do with his or her masses. Babies are up to something as they move their masses about. That something is called human function. If parents have no idea of the functions that their infant's efforts can achieve, they cannot help. Worse yet, they are likely to block and inhibit their child's progress by getting in the way. Infants develop the basis of their functional abilities in interplay with their parents. For that reason effort is well spent in teaching parents to be more sensitive to their own body organization and functions. In that way they are able to help their infant begin to form a broad foundation of human functions. Human function is a complex subject. Only limited aspects of it that seem useful to parents as they seek to relate to their newborns will be discussed here. Human functions are the purposeful actions and positions that humans effect to interact with each other and the environment. Motion is essential to most human functions. An important quality of human movement is the direction that any given point in the body is able to move. Some places in the body allow only for forward and backwards movement. These places serve the function of posture. Posture is what the parts do relative to each other. Other places in the both allow for movement in all directions. These places serve the function of transport. Transport functions move body parts relative to the environment. Combining the functions of posture and transport results in locomotion. For example, walking is the locomotion that takes place when one maintains a postural position of standing and transports one's legs one after the other. Children learn these functions in interaction with their parents. The result is usually haphazard, since it is rare that parents have sorted out the basic functions in their own bodies to any level of sophistication. When they do, the quality of interaction they have with their babies is significantly improved. Not only do they then have an idea about the significance of their infant's movements, but they then have a medium for interacting with their baby in meaningful ways right from the start. Babies who have parents that do not try to rotate them where things only bend, will experience interaction in a much different light than those who are in a constant struggle with parents who move them and hold them in ways that don't fit their little bodies. Infants begin to form their attitude about learning and acting on the world based on the quality of these interactions with parents. If parents make things seem easy in the way they handle and relate to their infant, then a sense of ease and confidence will probably be carried into childhood and hopefully on into adulthood. All too often children grow up with the experience that there is no rhyme or reason to the way things develop in life. It may be because many parents don't know how to bring much order to their own physical lives. Where else will babies get it, if not from those who physically hold and nurture them.

Positions Another important aspect of function in babies is the position their little bodies take in each activity. At first, babies can only manage to lay on their backs or fronts by their own effort. There is a fundamental difference for a baby between front and back lying. In the back lying position babies have their front, which includes arms and legs, free to move about while the back part of their central masses bear the weight of all of their masses to the supporting surface. In this position babies can move their arms and legs

about and later even take hold of things for a closer look. In the front lying position their arms and legs are blocked by the supporting surface. In this position their central masses are not as firmly supported. When babies are strong enough to move their arms and legs against their own weight, the second position allows them to crawl. Before that, babies are simply blocked. They are forced to be still in this position. Brazelton recommends that mothers help babies learn to quiet themselves by laying them down on their chests. That way the baby's more active extremities are blocked. As parents come to know these kinds of functional differences, they can help their child take advantage of them. At least, informed parents will not block their infant's functional development out of ignorance. Hopefully, they will use their understanding of function to engage in even richer reciprocal exchanges with their babies. For example, when parents know that sitting is a human function in which the head and chest stack over the pelvis, which in turn bears the body weight onto a supporting surface, then they hold their infant so that he or she is not slumped over in a collapsed C form or held backwards in a half sitting, half lying position. When babies are held in their parent's laps so that they are really sitting, they can look around and hear and begin to make sense of what is around them. Parents need concrete information about human functions to be able to engage mutually with their infant in doing them. Modes of Interaction Ting, Smith and Smith (1972) at the behavioral cybernetics laboratory showed that learning between individuals is greatest when both the learner and the teacher follow and adjust to each other at the same time, relative to a common task. This is mutual interaction. They identified several other modes of interaction. They are stepped following, which is more conversational and unilateral following which is one sided imitation. Mutual following, in which the teacher and the learner adjusted to each other simultaneously, yielded superior performance and learning. The touch guided motion tracking that characterizes most of the handling between parents and infants is the ideal condition for mutual interactions. The other sensory modes of seeing, hearing, tasting and smelling are just too slow to make mutual following of motion possible. The finger dancing experience from earlier made that quite clear. The mutual following of mother and infant before birth that constitutes the kinesthetic bonding already discussed is the origin of mutual tracking ability in parents and infants. Mutual Interaction Mutual interaction is the simplest kind of exchange. There is the least differentiation between roles. Both participants engage in the same task, at the same time, using each other's sensory input to control what they do relative to the task. Nursing between a mother and baby is typical of mutual interaction. Each moves and responds physiologically, based on the other's motion and response to accomplish the task of nursing in the same time frame. Mutual interaction skill between infants and parents serves as the foundation for more complex and demanding relationship skills. The breadth and stability of mutual following skills that a baby achieves is critical to the development of all the other relationship skills. Contingent response ability (conversational or stepped type exchanges) and even monologue orations are founded on the polymorphic qualities of mutual interaction. Mutual and Contingent Response Until now, the terms "mutual" and "contingent" have been used interchangeably in the literature on parent-infant relations. We think that it is important to distinguish between them. Mutual interactions are bi-directional and simultaneous. Contingent response is more complex, bi-directional and sequential. In the first, meaning is determined by both participants at the same time. In the second, meaning is assigned in steps by each participant over time. A telephone conversation is typical of contingent response type interactions. One person says something. Then the second responds. The first person then corrects for the error he detects in the understanding of the second response, compared to his intention, and so on. In the observation of video tape recordings of parent-infant interactions, no examples of contingent or sequential interactions in the first several weeks after birth were seen (Maietta 1986). Remarkable stepped exchanges between infants and parents were observed by the third month and onwards. This seems to confirm the need to distinguish between the simpler and more complex forms of exchange that take place between parents and infants. It also makes it possible to focus more specific attention on the foundation skills of mutual exchanges between parents and infants. Using finger tracking exercises and other body contact, movement following activities parents can be shown how to vary the elements of timing, space and dynamic to conform to

the slower, smaller and weaker motion of their babies. They can also be shown how to move their infants in ways that support the basic functions. As they learn to adjust their movement to fit that of their baby, the baby responds to them, at first by mutual tracking and then over time by stepped modes of communication. The high speed film studies of Condon (1974), Sander (1970), and Trevarthen (1977) as well as the Behavioral Cybernetics Laboratory studies of Smith (1962, 1963) have clarified much of the details of how humans follow one another by using each other's movement as feedback to control their own actions. These studies are useful in that they serve as the scientific foundation for designing ways to teach parents practical, mutual interaction skills to use with infants. Human Factoring to Make Relationship Easy The final element that enhances "kinesthetic bonding" is the process of organizing the physical environment to make babies accessible and to give babies easy access to their parents. Because of the enormous differences in body scale, babies often have to overcome almost impossible physical obstacles in order to interact with their parents. The basic thing that parents need to know is that they have to take the lead to place their infants in places that make it easy to get to them. For example a normal table is too low. If the parent tries to change their baby while they are standing and the baby is lying on the table their arms are at full extension and they have to lean over somewhat just to reach the baby. Most of the parents' muscles are occupied holding their own weight. That leaves very little functional resource for responding or adjusting to the child. Furthermore, the infant's face is way down below that of the parent, so the opportunity to engage in mutual eye following is limited. This situation can be improved if the parents arrange pillows and other props to bring the baby up into the space where they live their lives. Baby carriages and car seats can be factored with washcloths and rolled up towels so that the baby's masses are supported and the space between them are left free to allow for easy movement. That way the infant is supported in the environment to be able to look around and attend to what is going on. Parents as Environment The ultimate environment for babies is the highly sensitized and mobile body of their parents. As parents understand the problem that newborns have of making efforts that before birth resulted in changing position inside the mother and after birth accomplish nothing, they will arrange their bodies relative to the baby in ways that make the baby's efforts fruitful right from the first day on. When babies are supported under their masses by parents, the extension of a leg, for example, will cause various actions to result depending on the starting position. The baby may roll to the side or all the way to his or her back from the front, or possibly even to sitting. This is possible if the parent continuously moves to adjust to the baby's efforts. The important concept for parents to grasp is that to a large extent, and on many levels, parents are their baby's environment. SUMMARY There is a need to understand more about the details of how parents and infants are drawn to each other. Sufficient information is not known about how parents and their babies form nurturing relationships. Some of the circumstances that seem to help have been identified. But, for most of them there is still much speculation about the details of how they influence bonding. This paper has focused on the influence of the kinesthetic sense and its contribution to parent-infant bonding. The interpretation of the information available about the conditions of pregnancy and birth is that the movement entrainment that takes place between mothers and infants has a fundamental influence on attachment. The state of "kinesthesia" that mothers and perinatal infants achieve as a result of their mutual motion tracking, is called "kinesthetic bonding". Mothers and infants are highly sensitized to each other's movement by the time of birth. This mutual sensitivity to each other's motion is the single most potential resource for making sure that both maintain a relationship that assures survival for the infant. When their condition is understood in this light, there is much that can be done to enhance the bond between them. This is true for un-threatened relationships as well as in cases where the bond has been weakened or even broken for whatever reason. The methods developed to help parents enhance the bond with their children include body awareness and motion following skill-building activities. This constitutes an active approach to improving parentinfant bonding. Parents learn how to communicate with each other through touch guided motion following. They then are helped to transfer those skills to their interaction with their babies. This approach has been used with high risk parents, normal parents and with families who have encountered

problems in parenting. In every case there has been dramatic improvement in parent-infant relations, either in comparison to control families or to previous behavior. This demonstrates that attachment between parents and infants is dependent on motion tracking abilities of both the parents and their infants. If the "kinesthetic bond" is broken after the birth by separation, it can be systematically reestablished by teaching the parents and infant how to follow each other again.

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