An Educational Program for Blind Infants[1]

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Our longitudinal studies of blind infants have provided us with new information regarding the adaptive problems in the sensori-motor period and the impediments to development posed by blindness. We have reason to believe that some of the severe ego disturbances and cognitive deficits commonly found among blind children have their origins in the first eighteen months of life during the critical period of ego formation.

As our research has progressed we have been able to translate these findings into a program of education and guidance for the blind infant which may be of interest to other professional workers with the blind.

In this essay we will describe some aspects of our educational work with the blind baby and his parents and place our report within the context of our research findings.

INTRODUCTION

It is known that among children who are blind from birth there is a high incidence of mental retardation and gross disturbances in early ego functioning (Norris, Spaulding & Brodie, 1957; Keeler, 1958). Even when we exclude cases of known brain damage and multiple handicaps, which occur more frequently in a blind child population, there remains a large group of uneducable blind children who live out their lives in something like a sensory void. A high percentage of such children are committed to institutions. Since central reporting of blind cases is not obligatory in many states, precise statistics are not available. From the metropolitan samples of Norris (Chicago), Keeler (Toronto), and an intake survey of a blind child program in New Orleans (Fraiberg & Freedman, 1964), a conservative estimate can be made that 25 percent of the blind child

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population will be unable to attend school because of severe cognitive disabilities and/or emotional problems.

Our present research, "The Early Ego Development of Children Blind from Birth" has been supported by NICHD since June, 1966. The senior author has been engaged in longitudinal studies of blind infants since 1961 and clinical studies of autism in the blind for the same period.

We are now engaged in longitudinal studies of infants blind from birth. We are studying the unique adaptive problems of blind infants and pre-school children in order to find the ways in which blindness impedes adaptive functioning in the early years of life. We are particularly concerned with the ways in which adaptive solutions to developmental problems are found by healthy blind children.

The babies selected for this study are totally blind from birth or have only minimal light perception, and have no other sensory or motor deficits and no signs of central nervous system damage. The babies are followed from birth or as soon as possible after the diagnosis of blindness has been made. This paper is based on observations of ten babies beginning in infancy and covering a period up to the end of the third year.

The babies are followed through twice monthly visits to the homes for observations and testing in specific areas of development during a one and a half hour session. Motion picture samples of behavior in each of the areas under study are recorded and continuous notes of the babies' behavior throughout the visit are taken by an observer. The observations cover five major areas of development: (1) attachment behavior, (2) behavior toward inanimate objects, (3) gross and fine motor development, (4) language, (5) self and object concepts.

We provide guidance and education for all parents of babies in our longitudinal studies who wish to take advantage of it. We have also provided, and continue to provide, consultation service to families of blind babies and young children who, because of location at a distance, or age at time of referral could not be included in the study.

In this paper we will discuss our educational approach and techniques in four general areas of development: human attachment, the discovery of objects, prehension, and locomotion.

I. HUMAN ATTACHMENT

When we consider the role of vision in the estabilshment of human bonds during infancy we can appreciate the extraordinary problems for a blind baby and his parents in making the vital human connections. The response smile to the configuration of the human face, the selective smile for the face of the mother, the father and siblings, the discrimination of mother and stranger, the entire sequence of recognitory experience which leads to mental representation and evocatvie memory, are organized through visual experience. To a very large extent, eye to eye contact is the matrix of a signal system which evolves between mother and child. If the blind baby is cut off from this archaic language, so, tragically, are his parents.

When we learned through our study of blind babies how nonvisual experience can serve the binding of a baby and his human partners we were able to translate this knowledge into a body of useful information for our parents to help them find a tactile-auditory "language" which brought

babies and their parents into human partnership. Of all the things we have done to promote the early development of blind babies we place greatest value on our work in promoting the love bonds between the baby and his parents.

No educational strategies can succeed if a baby has not found meaning in his world through his human partners and if he is not bound to this world through affectional ties to his parents. No toy will have value if the human figures in the baby's environment are not valued. No device will give meaning to sound if the human voice has not united sound with the totality of tactile intimacy, comfort, and pleasure that can only be provided by a human partner.

In our guidance work with parents, we maintain a role that is primarily educational and supportive. The guidance work is done by clinicians trained in psychoanalysis and clinical psychology. We value our clinical training and need it in the continuous diagnostic process that underlies the educational program but we do not consider ourselves psychotherapists for our parents. If psychotherapy is needed, we feel that it is best provided by an agency that is not directly involved in working wtih the baby. Furthermore, parental neuroses or life-long personality problems cannot be undone in one and one half years, the earliest and most crucial period for the baby, when the foundations of his own personality are established. Through support and education, however, we have been able to bring about significant change in parents' attitudes toward their blind baby and we have brought most of our parents the rewards that come to all parents when a baby smiles, laughs, embraces, "talks" and tells them unmistakably that they are the most interesting and delightful people he has ever met.

Without such signs no mother or father can find joy in parenthood. Yet the blind baby may not become warmly responsive if his parents cannot find their way into his experience and help him to discover pleasure and meaning in his world. The danger for the blind baby is that he can live for a perilously long time in something like a void.

When we first encounter these parents they are nearly always immobilized by grief and they are without hope. If this was a first pregnancy we can see the ruins of parental daydreams all about us. There may be a "baby book" in which nothing is written. Usually there are no pictures of the baby. The gift toys for the new baby, the rattles, cuddly toys, the cradle gym are put away. "What can he do with them?" Grandparents, relatives, friends, all participate in a conspiracy of silence. No one uses the word "blind." Visitors do not coo at the baby. No one says the baby is cute or adorable. The unspeakable thought, "He would be better off dead" is translated "as if he were dead."

So, to our amazement, we were usually the first visitors to these mourning households who could say such things as, "He's a fine baby," or "He's a beautiful baby," or "He is such an active baby!" and apart from anything else we did for our families, we were often the first people in the lives of these young couples who cared about the baby, who talked to the baby, asked to hold him, admired his accomplishments, found him a person.

Neither we nor anyone else could take away the grief of these young people, but several of our parents told us after we had known them for some time that we had brought them hope when they had none, and we understood that they meant that even profound grief can be managed if there is some reasonable hope that a blind child will one day talk, walk, play, go to school, marry, have children and enjoy every human experience that can be given without vision itself.

From the beginning we told the parents that there are some important differences in the ways in which blind babies develop during the first two years. While we assured them that a blind baby who is otherwise normal would be able to achieve many of the things that a sighted child does at school age, and be able to fully use his intelligence, he would need their special understanding and help to get there. Some parents had been told by physicians and other specialists, "Just treat him like any other child and he'll turn out all right." It is hard to know what is meant by this much quoted statement. If it means that a blind child should be treated as a person and has all the human needs that any other child has, this is true. But if it means that parents must expect a blind child to develop at the same rate and in the same ways that a sighted child does, the parent who follows such advice will only compound his troubles in rearing a blind infant. By preparing parents for *differences* in the patterns of development we diminished their anxieties and by helping them understand stage by stage the unique adaptive problems of a blind infant they could use the insight gained in flexibly meeting related problems in development.

The first task with the parents of newborn blind babies is an answer to one of the first questions of the mother, "How will he know me?" The mothers were fascinated to learn that a baby who has known cuddling and physical closeness in the arms of his mother and father will show preference during the early weeks for the parent, would "know" them in this way and would, in fact, squirm in the arms of a stranger. We told the parents that a blind baby who is "talked to" a fair amount will begin to smile around the same stage that sighted babies do when he hears mother's or father's voice, and that we had seen this as a "special" smile which was often reserved just for mother or father.

In all this we stressed the importance of "learning to know" through tactile and auditory experience. We encouraged holding and talking to the baby during feeding and also creating "social" times of holding, singing and playing lap games as the baby's awake times increased. We weren't always sure how well depressed and anxious parents could carry out these suggestions but we needn't have worried. A blind baby, like all babies, has a hunger for experience. As the parents began to satisfy this hunger, the baby, of course, responded with the smiles, the cooing, and the churning of arms and legs which every parent responds to as the first demonstrations of love. And once the conditions had been set up which created a "dialogue" of signals and response between the baby and his parents we knew we had achieved the first guarantees for the blind baby's development.

All this sounds so simple and mundane that it seems hardly worthy of

a report in a professional journal. In the end, when we have reached this point in establishing a dialogue, we have only achieved, through interpreting a blind child's needs to his parents, that which is normally insured through visual experience in the intact baby. Yet, in the absence of this biological guarantee, many parents may never find their way into a blind baby's experience. In our consultation work we see blind babies who have spent much of the first year in a sensory desert – babies who have worn a groove in their crib mattress, babies who make no sounds, who rarely smile and who spend most of their 24-hour day in sleep.

For some parents, our initial advice was not easy to follow. "To talk to the baby" is perfectly natural for some parents and completely alien to the style of others. There are parents who never "talked to" their sighted babies. Usually the worst thing that happens to a sighted baby who isn't "talked to" is that he may be retarded somewhat in language development. But if the same parents are rearing a blind baby, they can cut off their baby from his primary source of "knowing" his parents and there is a danger that this impoverishment of his world will result in gross retardation in all sectors of development. For the parent who does not naturally talk to his baby we provided tactful demonstrations through the guidance worker and the observers in situations in which it was natural for us to talk to the baby. One couple who found it unnatural at first to talk to a baby as if he were "a person" was highly amused to see the psychologist carrying on a lively monologue with the baby on such diverse subjects as the forthcoming election or the problem of keeping booties on the feet. When they saw their baby responding with beautiful small sounds, they understood. From this demonstration we were able to discuss with the parents the importance of such "conversations" and the need to reinforce all actions with words. "Give me your hand," when taking the baby's hands, "Let me wipe your mouth now." "Oh, that's a good hug!" "That's a lovely smile!"—All commonplace remarks to the professional reader, yet vital for linking experience with words, giving meaning to action where vision would already have provided meaning.

Adequacy in tactile experience is normally provided through the physical intimacy of feeding, comforting, holding, playing lap games. Three of our children "didn't want to be cuddled" during the early weeks, and resisted being fed in the arms of their mothers. These three children were premature and had spent the first weeks after birth in the hospital in isolettes. This means that, of necessity, they had little opportunity to be held and cuddled. Rarely, if ever, did they have the combined experience of being held in mother's arms while being fed. For many weeks, they were given propped bottles.

Too often, in the absence of advice to the contrary, a mother will perpetuate these conditions, perhaps in an attempt to follow the baby's "own desires," and thus, with the best of intentions, seriously interfere with the baby's earliest emotional and physical development. When we consider the importance for all babies of the experience of feeding and physical intimacy in the mother's arms, we can see that for the blind baby there are great hazards to development if feeding and tactile intimacy with the

mother are dissociated.

One of our very experienced and expert mothers, who has four older children, described to us the early resistance of her premature blind baby to being held. Very tactfully, but with strong convictions, she gradually induced her baby to take the bottle in her mother's arms and to enjoy being held. Another, less experienced mother took the baby's resistance as a sign that "he didn't want to be held" and gave up the effort to hold the baby during feeding. This mother felt as if the baby were rejecting her and felt consciously deprived of the pleasure of holding and feeding the baby in her arms. The baby, of course, was deprived of his first experiences in "knowing" his mother through feeding and in associating pleasure and satisfaction with her person. With help from the guidance worker, this mother came to understand the importance of uniting feeding and physical intimacy, and thus gradually to "teach" her baby to enjoy being fed in her arms.

In view of the fact that the feeding situation remains for many months a central area of interaction between mother and infant, it is important to note a further significant instance where the signal system between the blind baby and his mother may go awry. Usually, in the last quarter of the first year, a sighted child moves progressively toward self-feeding. No mother of a sighted child needs to "decide" when to introduce self-feeding. A baby who has been grabbing everything in sight for months will grab for the feeding spoon, the jar of pureed vegetables, or the bowl of cereal and does not wait to have his mother "decide" when he is ready. But the blind baby can remain a passive participant in his feeding for a very long time. In the absence of vision, the blind child has much more difficulty recognizing the complex of activities that leads up to the spoon-with-food touching his lips.

But for many reasons, sometimes because it is tidier, or easier, or simply because, in the absence of active demands from the baby, they have never thought of it, many mothers of blind babies neglect the initiation into self-feeding at the time when it would usually occur. They are then baffled and disturbed when at two or three years of age, the child still makes no attempt to feed himself.

Because of this, we encourage our mothers to provide finger foods on the tray as soon as the baby is able to sit, to begin with hand foods (cookies, etc.) during the second half of the first year. Use of the cup is initiated in much the same way as with a sighted child, beginning with a few drops of milk or juice in the bottom of the cup and guided hand movements toward his mouth. With only a small amount of encouragement our blind babies begin to grab the spoon from mother and grab the cup and create as much disorder in the kitchen as any sighted baby. Self-feeding of finger foods from the tray can become great sport and is, at the same time, good practice for pincer grasping of small objects in other situations as well.

Unfortunately, substitution of tactile experience for visual experience with feeding is often a messy and disruptive one in comparison with passively feeding a baby who can do nothing else but wait to receive food in his mouth. Mothers often find it hard to tolerate the period of messiness and uncoordinated attempts that are part of the early learning. Or, if the mothers themselves can cope with it,

they often meet with open criticism or implied disapproval from relatives, grandparents, and other persons close to them. Moreover, the blind baby will be slower to acquire skill in the use of tools for eating and mothers often need support during this period. Our own experience with the ten babies we have followed already demonstrates the rewards of our mothers' patient efforts. We have no babies who did not learn self-feeding. Only one child resisted solid food for a short time. We have no children who are unable to masticate, though this is a problem frequently reported among blind children. Our feeling is that the introduction of solid food at the appropriate time, and the introduction of self-feeding through providing the opportunity to experiment with food and feeding utensils is an essential factor here.

Mothers are not, of course, the only important persons in the early life of the baby. All the fathers of our babies have been as deeply involved in the educational program as the mothers, within the limitations of their occupational demands. While fathers were always invited to be present whenever possible during our visits, we were not prepared for the kind of effort they were willing to make. We would not have asked them to take time off from work to be home during our visits, but many of them did, "just to be there". We found them full of questions, eager to know how the baby was doing, wanting to tell us themselves about the baby's latest accomplishments.

When we understood how much these exchanges meant to them, we offered appointments to suit their schedules in order to help them with their questions and support their involvement in the baby's development. One of our staff men took over the major guidance work with several of our fathers. In other cases, the mother's guidance worker made special arrangements to involve fathers in discussions concerning the child. Out of this work has come a deepening of our understanding of these young fathers and much help to them in achieving satisfaction as fathers.

Without exception, among the fathers we know well, the birth of the blind baby has been a severe wound to their masculinity. In the case of the blind baby boy, the baby was somehow not a boy, or less a boy, or certainly a damaged boy in the father's eyes. Sometimes it was too painful for a young father to come to grips with a shattered fantasy of fatherhood and we would see the father's unconscious urging of his blind baby toward an impossible goal.

Some fathers have been athletes and had naturally dreamed of sons whom they could coach, who would love sports as they did, who would carry on, or perhaps even exceed, the father's skill and competence. We, also, recognize the need for a blind baby to develop athletic skills as he grows older, but we have found that it is very important that the parents' drives in this direction be brought into realistic relationship with the child's handicap. Otherwise both the father's dreams and the baby's progress toward them end in disappointment and despair.

Let us cite an example. One baby appears in his first films wearing a miniature baseball uniform. A year later, he is wearing another—several sizes larger. Neither parent is aware of the irony, nor did it seem overwhelmingly important to us then. It was some time before we realized that the inten-

sity of the father's original dreams for his son was leading both parents in a dangerous direction in relation to the baby's immediate motor development. When these two good parents came into conflict with their baby at the end of the first year it was precisely in the area of motor achievements. They were afraid that the baby would not learn to creep and to walk independently. Here all of our reassurances and our advice seemed to reach deaf ears. The anxiety of the father and mother led them to push the child in trying to teach him the motor patterns of creeping. And, of course, the blind baby's own anxiety at being pushed beyond his capacity created balkiness and a slowing up of experimental motor activities. Here, it was not enough to give advice; we had to help the parents deal with their anxieties and their unrealistic expectations before our advice could be used.

As we worked with the fathers and helped them to understand their babies' development they achieved their own parental rewards. To see a blind baby with all of his handicaps learn to creep, to climb, to run, ride a bicycle, and take his risks like any child can become a source of masculine pride to his father, too. If courage equals masculinity for some fathers, here it is.

With help to both parents in these areas and many others, we were able to promote the vital human attachments for each blind baby. At the end of the first year each baby demonstrated the kind of exclusive attachment to his parents that parallelled in all significant ways that of the sighted child. Differential smiling and vocalization followed the sequence for sighted children. The discrimination of mother and stranger was clearly demonstrated in the second half of the first year. Overt gestures of affection in response to "give mommy a kiss," "give mommy a hug" appeared before or during the last quarter of the first year. Grief reactions at separation from the mother were seen in relation to actual brief separations. Naming "mama," "dada" appeared early in the second year, following closely the developmental norms of sighted children.

We had a wide range of adequacy in mothering with our group of blind babies. At one end of the scale were two depressed mothers; at the other end of the scale three competent and highly intuitive mothers. We have reason to believe that even in the case of the depressed mothers we were able to insure a kind of minimum adequacy in nurture and stimulation. When we speak of adequacy in the human environments of our ten babies we mean simply that the experience provided these babies in a wide range of homes afforded at least the essential nutriments for development during the sensori-motor period as demonstrated by the baby's performance at the end of the first year. Our confidence in this assessment is supported by the presence of consistent gains in all areas of development.

Sleep patterns offer further confirmation of the adequacy of environmental stimulation. The children did not sleep an unusual amount. In any given quarter of the first year of life the distribution of sleeping and waking hours during the 24-hour day approximated that for sighted children. At the end of the first year, nearly all of our mothers brought in complaints that the baby disliked his naps and stalled in getting to sleep at night. Our mothers were themselves surprised at this resistance to sleeping. But, while it was

a bother to them, it was also an encouragement. They sensed the important meaning it had for the baby: that his world was so interesting to him that he resisted parting from play and wakefulness just as a sighted baby does.

II. THE DISCOVERY OF OBJECTS

For too long during the first year the blind child lives in a world of accidental encounters with "things." "Things" materialize out of nowhere, make chance encounters with his fingers or mouth and, upon loss of contact, disappear into nowhere. At the beginning of our research, we had expected that sound would provide equivalence for vision in reaching and attaining objects. We expected that the patterns of reach and grasp that develop gradually over the first four to six months in the sighted child when eye and hand become progressively coordinated, could be duplicated in the blind child through coordination between ear and hand. We now know that for the totally blind baby, there is no adaptive substitution of sound for vision in intentional reaching until the last quarter of the first year. In our sample, the modal age for attainment of the object through directional reach and grasp by sound cue alone was 10-11 months (Fraiberg, in press). Eye-hand coordination in the sighted child forms a nucleus from which many patterns of infant learning and development evolve. If the corresponding patterns of ear-hand coordination do not occur until four to five months later in the blind child, one can readily see that this must have important effects on his subsequent development. Moreover, just as a sighted baby will be greatly retarded in achieving eye-hand coordination in the absence of adequate stimulation, so the blind infant will be unable to achieve ear-hand coordination at the predicted age without previous adequacy of stimulation and experience.

In our consultation cases with older babies we hear repeated comments from parents that the blind baby is not interested in toys, or that the only object he seems to care about is his bottle or his pacifier. In our research group where we have been able to provide the necessary education for parents of blind children, the babies show interest in a good range of toys, and definite preference for certain toys by the middle of the first year.

The problem then is to help parents to understand the importance of play experiences in the earliest months before most people expect any baby to know or to care about things; to help them to create for the baby a limited space where interesting things may be found, to insure that the blind baby will find pleasure in toys and inanimate objects, will discover a world of interesting things. This is a crucial learning that leads to investment of objects with qualities of their own and to the organization of "self-other" experience and knowledge.

From the earliest weeks, we encourage parents to introduce some form of cradle gym, or hanging apparatus, over the crib of the baby. For the very young infant, this may be light, soft hanging toys that make occasional tinkly noises. During periods when the baby is awake, such a toy may be lowered over the baby so that random small movements will bring about touch and sound sensations. As the baby grows older, we introduce standard cradle gyms available in any toy store, encouraging the parents to experiment with different kinds in different places where the baby spends

waking hours. Arm movements in the supine position will virtually guarantee contact with the rings or balls suspended above him, small and light enough to be easily grasped. When released, they do not fall out of reach but remain where they may easily be found again and again. When bells are added, there is the additional pleasure in the sound that occurs as a result of the baby's own action. Often the cradle gym in the crib becomes a highly invested favorite toy that encourages practice in reaching for and grasping objects, in exploiting known and loved objects in many new and different ways. This gives the baby experience in organizing space at the midline for both hands.

Beginning also in these earliest weeks, we encourage placing rattles and other small light items in the babies' hands for added experience in "acting upon" a thing and providing elementary lessons in causality.

As soon as the baby is able to sit in a supported position, we recommend a play table with a built-in seat and a three-sided broad surface with a rail. Two or three of the babies' favorite toys are placed on the surface of the table. In this way we begin to construct "an interesting space" for the baby. In a short time the surface of the table becomes "the place" where things can be found. We see the five or six month old blind baby exploring the surface of the table, or patting the surface in search of toys. Again, a midline reach by the baby and a search of the tray usually guarantees contact with a toy.

We can see the beginnings of generalization when we notice our babies reaching directly in front of them or on the floor between their legs to find toys *well before* they have learned to locate the desired object through sound cue alone. We now see that the blind baby can build expectancies of finding objects first in a familiar "place" in relation to his own body, and that later this knowledge becomes integrated with the use of sound as a directional cue.

Between eight months and a year we recommend the use of a play pen for the blind baby. This again provides a circumscribed space which the baby can begin to know. It gives a sense of protection and enclosure. It becomes another place to be explored, a place for finding toys with certainty, a place for exercise in standing and supporting oneself or for easing oneself down from standing position. It becomes an excellent prop for practice in cruising, and later, from the outside, a familiar base from which to launch experimentally into the "wide world."

The blind baby who has had rich and varied experience with toys and other inanimate objects during the first year begins to find pleasure in acting upon his toys, begins to experiment with sound and manipulation, and shows on objective tests during the last quarter of the first year that he is beginning to attribute qualities to his playthings that are independent of himself and his actions. Robbie at eleven months explored the interior of a bell with great interest, fingered its clapper, rang it experimentally, fingered the interior again. By fifteen months, he switched his transistor radio on and off with clear intentions of "making" the music or "stopping" the music.

Preference for certain toys begins to emerge noticeably between six and eight months and we see the fingers exploring surfaces and the beginning of "recognition" in tactile encounter. Richie, at seven months, had a squeaky

rubber soldier which seemed a great favorite. It was accidently packed away with our equipment. When we returned it to him two weeks later, he clasped it with both hands, snuggled it against his chest, and smiled with delight. When we gave him a similar squeaky toy, a fish from our collection, there was no such delighted reaction. Or Jackie, at eleven months, had a basket full of toys that he regularly played with. He had clear favorites. He would rapidly pull out and discard toy after toy until the favorite of the day was discovered.

As we watched exploration and recognition of toys become increasingly associated with tactile experience, we noticed that our blind babies did not use the mouth for exploring objects any more than sighted children do.

While there are no set rules for toys that will be attractive we have found that those which combine sound and textural interest, and are of relatively simple design, appear to have the greatest appeal to blind infants. Many such toys are available in any toy shop. When the baby has progressed beyond the simplest rattles, toys that produce sound through a specific type of manipulation—pulling a lever, winding a small crank, pushing a button, hitting together—are successful. Common household items (cups, spoons, etc.) begin to fall into this category, as does any object that permits the baby to initiate activity on his own that will bring about a pleasurable effect. A cloth or plastic ball with a bell inside gives pleasure in grasping, throwing, and learning about the displaceability of objects through tracking sound. Elementary "fitting together" toys, typically the cylinder and hole type have been very satisfactory and nesting cups have been enjoyed by some babies even though precision in nesting will still be too difficult for the blind child in the second year. There are many simple, sturdy manipulative toys on the market, and, as with any group of babies, there will be individual differences in what appeals to each child. One ingenious mother, baffled about what to try next with her baby, took him to the toy shop and let him try one thing after another, buying those that immediately appealed to him or that led to interested fingering and exploration.

Of course, xylophones, cymbals, drums and other rhythm instruments are fully as satisfactory for the blind child as for the sighted one. Simply operated music boxes are often of interest. For the musically inclined child, the piano can give both pleasure and rich experience in finger activity. For all babies, singing and little singing games, even in non-musical families, have a special place, and lead at two or three years to pleasure in children's records and stories.

We should emphasize, above all, that toys not only provide varied sense experience in the impoverished world of the blind child, but the good toy begins to teach "acting upon" and "causality" which are essential for the blind child in constructing an objective world. The sense of "me" and "other" which emerges first in relation to a human object will be strongly reinforced through experience with toys and inanimate objects. The blind child, under the most favorable circumstances, is slow to develop a sense of voluntariness, of intentionality, of being a "causer" of events. After his parents and other loved persons, his toys can help him make vital discoveries about himself, his body

and the independent laws that govern qualities of inanimate objects.

Up until now, we have been talking about toys which the blind infant may enjoy and become invested in, in ways that seem similar in many respects to those of the sighted child. But around the first quarter of the second year, there is a notable divergence, and one that has important meanings for the ego development of the blind child. At about this age, the little girl with vision will make an instant response to a doll; the little boy will know exactly what to do with a small replica of "Daddy's" car. But for the blind child, such representations of his familiar world will have no meaning.

We have no examples of doll play or domestic mimicry among our blind children in the second and third year —even among the most precocious of our chidren. The blind child of this age is quite unable to represent himself, or herself, through a doll, or to identify the facial characteristics of a doll even though he can demonstrate such knowledge about himself and other familiar people. Similarly, miniature cars and trucks, doll house furniture, and the like will bring no association with known and familiar objects in his everyday world.

While we know from examples of older children that the four or five year old blind child can achieve this, we are struck with the difficulties of the blind child, both in projecting and generalizing human characteristics and in making inferences from small-scale replicas of familiar objects in his daily life. We are impressed to see how much learning through toys is denied the blind child during the period when he needs to construct an object world.

We are beginning to discern some of the ways by which the blind child does construct his object world. We have noticed that the blind baby has little difficulty generalizing across size and shape of "real" objects. Kathy, at a little more than two years, has a stable mental representation of "chairness" which ranges from her father's big armchair through all varieties of chairs in her house. She can instantly label "chair" a child-sized chair of a design she has never encountered.

At about the same time, in December, we tried testing her for a generalized representation of "Christmas tree" using a small, imitation Christmas tree. She showed no recognition of the object, and when it was labelled "Christmas tree," she seemed only puzzled and finally said in a soft voice, "Feels like bwush."

Through observations like this, we have learned that the blind baby needs much more experience with his "real" environment, before he can bridge gaps that include, not only size differences, but other differences that have no correspondence in his experience. We help our mothers to understand the educational value of continual tactile experience with common household items. The universal appeal of Mother's pots and pans for babies has more importance for the blind infant than for the child with vision. In addition to increasing his knowledge of these central household items, they provide him with a wide range of experience in "fitting together," in-and-outness, and perhaps most valuable, banging. It is our impression from our observations to date that this helps him to associate his own knowledge of these utensils with the sounds that he hears daily as mother prepares dinner.

Child size furniture, cars and trucks

that the child can sit in (or on) and make go, chairs that are his size, etc. are part of his "real" world and of course provide the avenue through which the concept of smaller and less directly perceivable equivalences can be built.

In the second year, as the baby becomes more mobile, the house becomes his "plaything." A healthy baby, one who has been adequately stimulated during the first year, will be into everything, exploring drawer and cupboards and creating as much disorder as a sighted child will at the same age. His prolonged absorption in opening and shutting doors, moving from one kind of latch to another, going from drawer to drawer, etc., is an excellent learning situation. For the blind baby, this kind of play and exploration may continue for a much longer period than in the sighted child—precisely because it cannot be duplicated by the substitution of scale-model replicas.

We encourage our mothers to indulge their babies in this kind of exploration. When they understand and see for themselves how much learning takes place in this way, they become actively involved in providing increased experiences of this sort. Jackie's mother reported each new intrusion on her drawers and closets with increasing pride in her baby's cleverness in "messing up her house."

It is reassuring for the parents to see that, as the child's knowledge of his environment grows, he can be taught to distinguish between activities that are permitted and those that are not, i.e. that some places can regularly be play places, while others are "off limits." And once this learning takes place, she finds that the baby will "tease" and be just as "naughty" as any two-year-old.

We have by no means exhausted the possibilities of techniques that will help the blind infant develop pathways of self-representation through play, though it has become one of our central areas of interest. We have yet to explore the possibilities of plastic materials such as clay, cookie dough, playdough, etc. and while our observations, so far, have dealt primarily with the use of standard, commercial toys, we are constantly searching for ways of constructing toys and playthings that will provide enrichment and learning specific to the needs of the blind child.

III. PREHENSION

Prehension, the activity of the baby's hands, their organization and progressive development, is intimately related to each of the other areas discussed. It is through the earliest tactile experiences with the mother, and soon after, through experiences with inanimate objects provided by her that the blind baby's hands are stimulated and become coordinated, inquisitive and truly useful. These well-developed hands will then lead the baby into the major gross motor achievement of crawling which will, in turn, provide ever increasing possibilities for knowledge and pleasure.

The cliche "The hands are the eyes of the blind" becomes an irony in the case of a large number of blind infants whose hands may be blind too. The hands of the blind infant must serve him in many ways. They must seek for things constantly and persistently, they must search and locate, as eyes do for the sighted. They must become acutely sensitive to such details as shape, weight, and textural qualities, without vision to supply the immediate overall impression and without the exciting and inviting stimulation of color.

In addition, they must serve, as any child's hands do, to grasp well, to hold, and to manipulate.

From our research we now know that the critical period for the adaptive development of the blind infant's hands occurs during the first eighteen months. Typically, for the first six months the totally blind infant tends to maintain his hands slightly fisted at shoulder height in the neonatal posture, a position in which they are least likely to encounter each other or to find objects. Typically too, there is no finger play at midline. The sustained mutual fingering normally found in the sighted baby at sixteen weeks requires vision for its practice and pleasurable repetition. In the absence of vision as an "organizer" for midline engagement of the hands, and without help from the parents, the totally blind infant's hands may not unite at midline at all, and the maturational sequence that leads to coordinate use of the hands and recriprocity between the hands can be impeded.

In the sighted infant the coordination of vision and reaching takes place just under five months with early swiping motions at the object which is seen. *In the blind infant the coordination of the schemas of sound and grasping may not occur until considerably later, at 10 or 11 months.* In short, there is no early and immediate adaptive substitution of sound for vision. In the absence of vision, sound does not give directional cues for search for most of the first year. And, equally significant, the sound of an object does not imply substantiality or "graspability" until the last quarter of the first year.

This can be seen as a conceptual problem for the blind infant. Our evidence, from tests of "object concept" in the blind infant (following Piaget's scale), gives strong support to this hypothesis (Fraiberg, Siegel & Gibson, 1966).

A well-stimulated blind baby at five months of age will grasp objects well on contact, will make fleeting pursuit movements following removal of a grasped object, will explore the table surface by patting or sweeping across it. A blind baby who has been grossly deprived of tactile stimulation and grasping experience has hands and fingers that are not at all useful to him. In fact the hands of these understimulated babies are like grotesque appendages; they grasp weakly and awkwardly and show very little spontaneous and flexible movement of the fingers.

Whether or not the hands will take over as primary perceptual organs appears to be linked to the adequacy of early tactile experience such as is normally given any baby through the daily routine events involved in physical care, cuddling and physical expression of affection. Through our guidance of the mother we try to insure this, as has been described in the section on human attachment. We have been impressed to see that even in certain cases of severe emotional deprivation in a blind infant, work with the mother can bring about significant changes in the mother-child relationship and rapid strides in the baby's development. One of the earliest positive signs is seen in the activity of the baby's hands and in the first pursuit movements following loss of a tactile object.

We promote organization of the hands at midline in a number of ways in the early months of life. We ask the mother to place the baby's hands upon his bottle. We suggest patty-

cake games and other informal improvised lap games which bring the hands together at midline repeatedly and thus encourage their engagement. Once mutual fingering and mutual grasping are elicited we see spontaneous progress in the move toward coordinate use of the hands and transfer, with close parallels to that of the sighted child. The mother must provide suitable stimulation and opportunity for the use of the hands, since he cannot seek these things for himself.

We encourage the participation of the hands in a rich variety of experience. Again, the "hands on the bottle" unites the oral tactile experience of the bottle with the manual tactile experience. The hands exploring the face of the mother unite other sense impressions of mother with manual tactile experience. Toys which unite tactile interest with sound will not only elicit pleasure and the blending of two sense modalities, but will later teach the identity of that toy as a tactile-sound object and promote the construction of an object concept. Toys which require the child to use them in different ways will afford him the first notions of causality and will lead him away from stereotyped hand behavior.

As we discussed earlier, we place great importance on the creation of an "interesting space" for the blind child to provide incentives for reaching "at random" long before the child can make an intentional reach on sound cue alone. We wonder, too, if we can develop educational measures for early reinforcement of the sound-touch identity of objects which could motivate reach on sound cue before the ten month median we have obtained in the present sample.

IV. LOCOMOTION

There is a marked delay in the onset of creeping and independent walking among totally blind infants. In spite of demonstrated maturational readiness for creeping (the child supporting himself ably on hands and knees) the blind baby typically comes to an impasse at this point and is unable to propel himself forward. We now understand why. We can demonstrate through our study of ten babies that the delay in creeping is due to the absence of the external stimulus for reaching usually provided by vision. Until the child can demonstrate "reach on sound cue alone" *(see previous section)* he will not propel himself forward. It is the reach for the out-of-range object that initiates the pattern for creeping. No baby in our series was able to creep until he had first demonstrated on our prehension tests "reach on sound cue alone." When a baby can demonstrate postural readiness for creeping and reach on sound cue alone, one can initiate the pattern for creeping by providing him with a favorite sound toy just beyond his reach.

But long before this point we can see how blindness becomes an impediment in gross motor achievements. We were puzzled for some time by the fact that three babies in our series and a number of babies in our consultation group resisted the prone position. As we reviewed our film documentation we began to see the problem for the totally blind baby. In the absence of vision, there is no incentive for the blind baby in the first three months to sustain an elevated head position. The sighted baby in the prone position searches with his eyes, strains upwards in his insatiable need

to see. The blind baby, who has small incentive to elevate his head in prone, may not even clear his head well in the third month and, in the absence of practice in head lifting, actually experiences the prone position as an impediment to breathing and freedom of motion. Later, when he needs practice for sustaining himself on hands and knees, he may resist the prone position on the floor.

Control of the trunk in sitting posture appears not to be markedly impeded and among our babies who have had adequate experience in the prone position, the elevation to hands and knees takes place without delay, even while there may be a considerable delay in the onset of creeping. Standing with support and taking steps with support also appear at the expected time. But independent walking has not been achieved by any of our babies before seventeen months. Our observations have shown us that even the most precocious of our babies, and those who have shown no marked anxiety in their development, will nevertheless experience anxiety in taking the first independent steps.

Even the child who seems quite familiar with his surroundings, who cruises confidently from chair to table to couch, or who has mapped his house thoroughly on all fours, finds the transition from the security of tactile contact to launching into space on his own an anxiety-filled experience. Often there is a period of increased clinging to mother, of unexplained fretfulness, a seeming regression on several fronts, and perhaps a brief retreat from experiments with walking that had previously been a source of pleasure.

In our educational work we help the parents to understand the ways in which blindness creates temporary road blocks in certain motor achievements. Above all we try to diminish the parents' own anxieties when the blind baby appears to reach an impasse. We have seen that a great deal of parental anxiety about the child's blindness is mobilized around locomotion. Fears surrounding a delay in creeping or slowness in learning to walk are easily translated into fears that the baby is retarded in other ways as well. Sometimes these fears are so overwhelming that the parents resort to anxious "pushing" tactics which in turn create anxiety in the baby and perpetuate the very situation they were intended to correct. We prepare parents for the possibility of delays in creeping and independent walking with assurance from us that the delay has nothing to do with intelligence in the blind child but rather that blindness makes it necessary for the baby to find another route, which he will most certainly find, even if he gets there a little later than the sighted child.

To insure practice in head and trunk control during the early months, we make certain suggestions to our parents while explaining the sequential development in gross motor achievements that leads finally to the upright position. We encourage our mothers to give the baby experience in a variety of body positions throughout the day—turning him from side to prone, propping him in sitting positions, even before he can initiate such activity on his own. Because we have found that the prone position is not as naturally pleasing to the blind child as to the sighted baby, we particularly encourage experience with this position in ways that will bring associations of pleasure and comfort to the baby. Dangle toys at the head of the crib may provide an incentive for some

babies. A baby in prone position on the couch, with arms and head elevated on his mother's lap, will listen to his mother's voice and reach upwards with his face.

As soon as the baby shows readiness for sitting in the propped position we encourage our mothers to provide as many opportunities as possible for propped sitting within the baby's range of tolerance. Once more there is a need to provide an incentive to the blind baby to lift and support his head. The sighted baby from the earliest weeks will find just looking at the world an absorbing, full-time occupation which will lead him on his way to struggle to keep his head upright and steady. The blind baby has no such incentive and needs help from the outside world to make this an interesting and absorbing thing to do. We have discussed specific recommendations for stimulating experiences in the sitting position in previous sections and need not repeat them here except to emphasize that, with ample experience, the blind baby will achieve good stability in sitting posture and will soon prefer it to all others. With two exceptions our babies have acquired stable, independent sitting postures at ages that correspond closely with those of sighted children.

Because of the almost universal fear that a blind baby will become an endless "rocker" (often the first and certainly the most persistent warning that parents of blind children are given) we have been cautious about recommending any of the bouncing, rocking, jumping and other "motion" furniture that is standard equipment in the homes of most sighted children. However, because we also hesitate to interfere with parents' natural inclinations when the babies are progressing well, we have had the opportunity to observe the effects of a variety of different approaches taken by our parents themselves in this regard.

From these observations, it now seems evident that the introduction and use of such items in the same ways that sighted children use them is not connected with the development of this kind of feared "rocking" behavior. As with any group of children, our babies show great variation in their personal needs to make use of, enjoy, or demand such activity. But even the babies who seemed to want a continuing supply of swinging, bouncing, and rocking experiences, when provided with a variety of such furniture, have moved progressively through those appropriate to their age and motor capacities without developing stereotyped rocking behaviors. For our babies with strong motor drives, such playthings seem to be a definite aid in their need to discharge large amounts of energy and to take pleasure in the increasing motor autonomy that this equipment allows.

We are, however, less convinced of the usefulness of the standard "walker" as an aid to independent walking. One of our babies seemed to make excellent use of a "walker" in order to map the territory of his house in ways that appear to have been useful to him when he began to walk independently. Another baby found his "walker" boring and troublesome from the beginning and it tended to become for him a barrier against the world rather than an aid to discovery. In addition, we have some evidence that the "walker" may in fact delay the onset of independent walking in a child who is ready to take this step on his own and for this reason we are still reluctant to recommend them.

Our experience with ten babies has shown us that, with proper aids to motivate him and proper interpretation of his special needs, the intact blind child will progress through the phases of gross motor development with little trouble, albeit at a somewhat slower pace than the sighted child. For some parents this aspect of the blind child's development does not present a major problem and these parents are able to lead their child successfully through the various stages. But many parents need special help and understanding of the particular hazards to motor development that are specific to the blind child. We often need to lend support through periods of fear that the child will hurt himself if he is allowed to try things on his own. Such fears easily lead to anxious overprotection that can seriously inhibit the child's spontaneous activity. On the other hand, each new accomplishment provides reassuring evidence of the baby's ability to learn to manage his own body. In the end, we find that the most important help we can give is that which promotes confidence in the child's eventual success in achieving motor autonomy.

CONCLUSIONS

Through our work with intact blind infants, we have attempted to analyze problems in development that are specifically related to the absence of the one sense modality—vision. We have attempted to discover techniques of education and guidance that will allow the child and his parents to maximize the baby's potential during the crucial first years of life in the expectation that this will provide a solid base on which his future achievements can rest.

The most severe deficit any baby can have is the absence of meaningful human relationships. But for the blind infant and his parents, the establishment of human ties is not the easy, automatic event it is in the sighted baby with adequate parents. In the absence of reciprocal communication and response, any mother and her baby can become dangerously alienated in subtle, imperceptible ways. Yet communication and response is a primary area of difference in the blind and the sighted infant. Many of the age-old signs of interest, pleasure and affection (smiling, cuddling, straining toward mother) are not easily available to the blind baby nor easily recognizable in the traditional ways by his parents. And in the absence of response, there is less expectation of response, and gradually fewer attempts to elicit response. Parents may feel increasingly out of touch with the baby and a spiral of estrangement, discouragement and withdrawal may begin.

It is for this reason that we place such importance on our earliest work in promoting the love bonds between the blind infant and his parents. The greatest benefits that accrue from the subsequent introduction of techniques for developing investment in inanimate objects, for "teaching" the hands to learn and to "see" and become adaptively useful, for surmounting the particular obstacles to gross motor development, depend first on the presence of a lively, rewarding relationship between the baby and his parents.

But the special needs of the blind infant do not end with the establishment of human ties, for at every stage the blind child needs help in reaching out to the object world and special understanding of the pathways that must substitute for those ordinarily

provided by vision. The primary investment of inanimate objects is mediated through the relationship with significant others, but leads to an investment in the objects themselves and to increasing interest and exploration of the "outer world."

The discovery that sound cannot substitute for vision in the early months of the blind baby's life becomes a focal point in understanding how compensatory routes to learning take place in the first year. In the absence of coordinated reach at the expected "normal" time, the blind infant can again seem unresponsive and slow compared to the sighted child. But we have found that the establishment of an "interesting place" where toys and other objects can regularly be found will provide an avenue for search and independent play with toys long before sound and directional reach can be firmly established. Without experience of this sort and the learning and practice of prehension skills that it provides, the blind child will be unprepared to make use of a directional sound cue at the time when this function matures at ten or eleven months.

Similarly, the phases of motor development that are the necessary precursors to independent mobility do not occur overnight and the blind child needs incentive and opportunity to develop motor skills that can become integrated into forward motion only after sound lends a degree of substantiality and directional certainty to the object sought. Without an understanding of the special hazards to "normal" development that occur throughout the early developmental phases of the blind child, both parents and child can become lost in a tangle of confusion and uncertainty.

We are aware that there are many cases where blindness is not the only handicap with which the child and his parents must cope, but our hope is that a delineation of the problems that are uniquely related to the absence of vision will eventually provide a useful guide for developing programs for the multi-handicapped child as well.

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