PERCEPTION OF BODY IMAGE AND SPATIAL AWARENESS IN VISUALLY IMPAIRED AND NORMALLY SIGHTED PRESCHOOL CHILDREN

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CHAPTER I

INTRODUCTION

Vision is considered the primary means for obtaining the most accurate information for spatial awareness and for the cognition of objects. Each individual throughout the course of a lifetime discovers his physical self, his body, through the mental comprehension of objects. In his self discovery the individual constructs a self-perception of his body, that is, his body image. He supports a mental image of himself in regard to the world around him and the way he sees himself in motion in the space surrounding his body. Body image development and the awareness of the body in space is the basis for all other life experiences (Schilder 1964). The maturation of one's body image may be thwarted or the rate of progress altered at any stage. An alteration due to a physical or mental illness may drastically change the perceived body image and the concept of the space surrounding the body. Since the sense of vision is of primary consequence for body image formation, the visually impaired child or congenitally blind child who has never seen his body requires special attention in order that he may approximate normal perception.

Development of body image during infancy is of a sensorimotor nature. The perceptions of sensations provoke

movement which initiates the experiences necessary for the infant's integration of visual and cognitive processing. The normally sighted infant explores himself and his environment by tasting, looking, feeling, listening, and moving. As the infant ontogeny advances, these sensory experiences become more meaningful. What has been seen and otherwise experienced is remembered, and this is the beginning of cognition. Toward the end of the first year of the infant's life, objects take on permanence; for example, he sees his mother leave and he knows from experience that she will return. He is creating a concept of himself through his ability to control his microcosm. This developing self concept is the perceived body image.

A child with a visual impairment, congenital blindness, or adventitious blindness misses the elementary ability for the coordinated visual and prehensible activities so necessary for accurately manipulating objects. The impaired visual system is, at best, distorted. Objects, or his body parts, are not visually understood. The visually impaired child does not see his mother leave, therefore he cannot know that she will return. The visual perceptual cues needed for spatial awareness are missing. The child with a visual impairment will utilize the remaining senses such as touch, small, and/or hearing to develop some self-image and spatial awareness.

Positive sensory perceptions from all modalities enable a child to function with more confidence motorically psychologically, and socially. A visually impaired child needs special help in order to experience what the normally sighted child learns casually. A child's self concept is derived from successful physical performance and effective, intellectual and emotional growth.

Piagetian theory of sensorimotor development has implications for nursing practice. Explicit measures of cognitive functioning in a young child may be beyond the scope of nursing. However, a nurse's knowledge of growth and development in all of the competencies (physical, inner, social, and learning and thought) will aid in the nursing assessment of the child with developmental lags (Chinn 1974). This study will provide nurses with information for assessing the preschool child's level of cognitive functioning. Goals of nursing intervention can then be established with the child's parent to augment the level of wellness of the visually impaired child and, collectively, for all children regardless of their visual acuity.

STATEMENT OF THE PROBLEM

The problem of this study was to explore the development of a perceived body image and the spatial awareness

of visually impaired preschool children as compared to normally sighted preschool children.

STATEMENT OF THE PURPOSES

The purposes of this study were to:

1. Identify and compare the role of vision in the development of body image in visually impaired preschool children and normally sighted preschool children

2. Identify the role of vision in the development of spatial awareness in visually impaired preschool children and normally sighted preschool children

3. Determine if Piagetian theory of the stage of sensorimotor cognitive development can be identified as the same in normally sighted and visually impaired children

4. Gather data for nursing which will substantiate the nurse's role in the care of children in the areas of protection, nurturance, and stimulation as identified in the Johnson Model

BACKGROUND AND SIGNIFICANCE

Many concepts and theories attempt to substantiate the development of a body image. The theories concerned with the development of a body image have been researched extensively. Tests of measurement of a perceived body image are available and information gathered can be reviewed.

Research studies relate to positive and negative feelings about one's body. Perceptions of body size, interest displayed by an individual when looking at a mirror image of self or interest in one particular body part have been explored. Other work has been evaluated concerning body boundary phenomena. Body boundary has been identified as how an individual experiences the demarcation between the body and the outer world. Such phenomena are important in considering that an individual's spatial judgments indicate how separation from self and object is developed. The ability to judge body position in space gives context to posture and spatial orientation (Fisher 1970).

> Concerning the image of the body, we have to suppose there is a factor of maturation which is responsible for the primary outlines of the postural model of the body (Schilder 1964:44).

The way in which these outlines develop and the tempo of this development depends upon experiences, training, and emotional attitudes. These concepts augment the development of the body image (Schilder 1964). Two researchers worked with blind children over a five-year period and came to the conclusion that,

> . . . whatever difficulties the congentially blind subjects may experience in problems of spatial orientation are more likely to be caused by lack of experience than by blindness itself (Leonard and Newman 1967: 1413)

Anxiety concerning one's body can be measured by innumerable indices. A common device is the use of figure drawings (Koppitz 1968; Cratty and Sams 1968). Another test employed is word associations to homonyms with body and non-body meanings, for example, the words colon and graft. These word associations have been used to determine how concerned a person is about his body. Responses to pictures with pain themes and ratings of pictures showing different forms of body disablement are available (Fisher 1970). These particular forms of anxiety measurement are applicable to the normally sighted child, but not useful devices for the visually impaired child.

Visually impaired children cannot be tested appropriately with two dimensional draw-a-person tests (Cratty and Sams 1968). Clay models and three dimensional manikins have been used for body figure reproduction (Wallach and Bordeaux 1976). Tests which elicit verbal identification of parts are available. Cratty and Sams (1968) are critical of the use of these tests for the visually impaired child because of the reliance on verbal understanding.

One study conducted on ninety-one blind children used a tool which tested body image on the basis of a five part survey form. The most significant finding was that these children were found to be unable to project themselves

into the tester's left-right reference system. Overall knowledge of body parts and of body places was found to be fairly well developed as was knowledge of left-right body discriminations. The implication that a blind child's perception of space is a serious problem is obvious (Cratty and Sams 1968).

> For the blind to gain any insight into the nature of space, it is believed that they must be led through tasks that are carefully sequenced and accompanied by explicit instruction. To leave such training to chance is not only a disservice but may have deleterious effects on person and personality (Cratty and Sams 1968:44).

Vision plays a dominant role in the creation of the body image (Schilder 1964). A visually impaired infant first learns about the body parts through the movement of the extremities when they touch other parts of the body. This is the beginning of the establishing of behavior patterns. These perceptions are internalized by kinesthetic and tactile stimulation, not visual, as they augment the infant's spatial awareness. The visually impaired infant needs constant tactual and kinesthetic manipulation by others to explore the world. This will aid in establishing acceptable behavior adaptations in the maturing child (Barraga 1976). Visually impaired infants seem to have only a vague notion of what is part of their body and what is not (Whitcraft 1972).

The blind infant does not go through periods of behavioral learning as does the sighted infant. Visual impairment impedes reaching with the arms, using the hands to reach for objects, and seeing the hands when playing with them. Touching the hands at midline is essential preparation for crawling (Knight 1972).

The transition from gross motor skills to fine motor skills can be missed and the visually impaired child frequently reverts to more primitive motor skills. This indicates an inability to effectively cope with the environment. The child does not reach out if there is nothing to reach for in an empty visual sphere. Early infancy coping mechanisms are then employed such as rocking, kicking, slow waving, and patting movements of the arms. When the child does not receive sufficient physical and sensory stimuli, self stimulatory behavior is used (Knight 1972).

"The blind child does not have the visual reassurance that his mother is near, or that she exists" (Knight 1972:299). Tactile and movement sensations of rocking and patting are representative of the mother's nurturing role. The ability to reach out for her or to seek her by crawling to her is important in developing an awareness of self and the cognition of the world. Many blind children never

learn to crawl. A normally sighted child of thirteen months can visually locate an object. A blind child cannot locate that object if he cannot touch it. Auditory clues are not helpful before ten months. If an object cannot be monitored with the sense of touch or of hearing, the object does not have permanence (Knight 1972). In a study by Stephens (1976) the congenitally blind child did not perform as well as the normally sighted child on spatial relationships of objects. This was seen by this researcher as a developmental delay that increased with the chronological age of the child. For the congenitally blind child, there was a developmental delay of four years in tasks which involved object displacement.

Fraiberg (1969) conducted a longitudinal study based upon an educational program using ten infants who had been blind since birth. Interest was in establishing the importance of human attachment of the infant and the mother. Since eye contact was not possible, a touching-auditory "language" was substituted. It was hypothesized that this would promote a "joy of parenthood" and bonding between mother and infant. It was found that " . a blind baby who is 'talked to' a fair amount will smile around the same stage that sighted babies do when he hears mother's or father's voice. . ." (Fraiberg 1969:124). The program was

designed to elicit the same pattern of ear-hand coordination in blind children, during the first four to six months of life that parallels eye-hand coordination in sighted children. The first six months the blind infant usually holds the hands tightly fisted at shoulder height and no finger play occurs at midline.

> . . . in the blind infant coordination of the schemas of sound and grasping may not occur until 10 or 11 months. 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 of "grasp ability" until the last fourth of the first year (Fraiberg 1969:133).

The child's cognition of the external world exists when certain criteria are present. These five criteria are:

1. An object must be recognized as a permanent object and continue to exist when not perceived by the child

2. An object must be distinguished between its inherent properties and its relation to the space in which it exists (the size, weight, and color remain unchanged when moved around, yet the position of the object is changed when moved. These rules must be independent for object permanence)

3. The child must develop some sense of knowledge of movements in space (objects can be turned around and

they are reversible; the child must know he can move himself in more than one direction to retrieve the object)

4. All the senses must be integrated to give the child information about a single external world

5. The child must recognize that objects and movements occur outside of the child (the child must distinguish between his own body movements in the external world and must have some idea of himself as an object in the space around him) (Haimowitz and Haimowitz 1973)

Piaget's theory of sensorimotor cognition states that in early infancy, overt sensorimotor activity is the infant's only means of awareness of the environment. Cognitive development begins in the sensorimotor period and constitutes approximately the first two years of life. This period is divided into six sub-stages. It is during this period of time, from birth to the appearance of meaningful language, that the development of object permanence occurs (Piaget 1973).

Utilizing Piaget's theory of sensorimotor development, Uzgiris and Hunt (1975) developed the Ordinal Scales of Psychological Development which looked at behavioral actions of infants. The objective for these scales would indicate the infant's level of cognitive organization at various levels of development. This group of six scales

was designed to facilitate the study of the influence of different kinds of circumstances on infant development. This would then serve as a guide for intervention measures to enhance the development of a young child. The rate at which infants progress along behavioral sequences varies individually. The emergence of behavioral landmarks stem from a combination of sources based on hierarchical organization. ". . . psychological development derives from the coordination of simpler sensorimotor schemes into more comprehensively organized systems" (Uzgiris and Hunt 1975: 32)

Nursing research is directed toward substantiating, clarifying, and testing existing theories. Research based on theoretical concepts serves as an explanation for observable concrete events, phenomena, and will also predict the occurrence of unobserved events (Brown 1964).

Johnson's Nursing Model, based on a systems theory, represents a conceptual framework, a model, for nursing practice (Riehl and Roy 1974). Johnson's Nursing Model (Appendix A) considers man as a human system, a behavioral organism, continuously in interaction with the environment. Man is a whole system divided into eight subsystems, or minisystems, each with its own goals and functions. Each subsystem is interrelated and interdependent. The particular goals (behaviors) and functions which serve to achieve

the goals of each of the subsystems can be maintained if the human system is not subjected to excessive stress and change. The role of nursing, as an environmental regulator on the human system, is seen as intervening in the stress of illness and disability. Nursing interventions are protection, nurturance, and stimulation. These three areas are referred to as sustenal imperatives. It is in these three areas the role of the nurse can influence the development and maintenance of stability of human behavior (Riehl and Roy 1974).

Holaday (Riehl and Roy 1974) combined the Johnson Nursing Model and Piagetian theory to assess the cognitive development of a six year old chronically ill child. Holaday looked at the eliminative subsystem of the Johnson Nursing Model (Appendix A) in regard to the child's ability to express herself verbally. Observations of play behavior, utilizing Piaget's tests for centering and irreversibility and egocentricity in the representation of objects, revealed the levels of the child's cognitive development. This was invaluable information for the nurse in preparing the child preoperatively for surgery (Riehl and Roy 1974).

HYPOTHESES

The two hypotheses that were tested in this study are that there would be no significant difference between:

1. The perceived body image of visually impaired preschool children and normally sighted preschool children

2. The spatial awareness of visually impaired preschool children and normally sighted preschool children

DEFINITION OF TERMS

For the purposes of this paper, the following terms are defined:

1. Body image -- a child's increasing ability to perceive himself and other objects as permanent entities (Guldager 1970)

2. Spatial awareness -- knowledge of self and objects in the environment (Strelow and Hodgson 1976)

3. Visually impaired child those children who receive special educational provisions because of vision problems (Barraga 1976)

4. Visual impairment -- a visual fact of difference or limitation in the ability to see (Halliday 1971)

5. Residual visual -- that amount of vision that is of functional use

6. Low vision -- a limitation in distance vision (ability to see objects within a few inches or maximum of few feet) (Barraga 1976)

7. Visual acuity -- a clinical measurement of the

ability to discriminate clearly the fine details of objects at a specified distance (Barraga 1976)

8. Blind(ness) -- a corrected visual acuity of 20/200 or less in better eye or a visual field of no more than 20° in better eye (Vaughan and Asbury 1974).

9. Perception knowledge of objects from direct contact with them (Piaget and Inhelder 1967)

10. Visual perception -- ability to interpret what is seen (Barraga 1976)

11. Tactile discrimination -- the process of detecting differences in objects or reacting differently to objects by using the sense of touch or feel (McCarron and Dial 1976)

12. Haptic manipulation -- the palpation of an object in the hands in order to discriminate its size, shape, texture, or position through touch or feel (McCarron and Dial 1976)

13. Kinesthesia -- the sense that yields knowledge of movements of the body (McCarron and Dial 1976)

14. Self concept -- person's feelings, knowledge about, and reaction toward his being (physical, emotional, social, intellectual) (Guldager 1970)

15. Schema -- a model which the child uses to arrange information (organized and classified) (Lewis 1969)

LIMITATIONS

The limitations of this study were the following:

1. Sample sizes of the experimental group and the control group were less than twenty

2. Any physical or mental handicap (except visual impairment) a preschool child may have was not documented in this study

3. Visually impaired subjects included in this study received classroom instruction in experiencing the body and its parts

4. Mental age of the subjects

5. Cause of visual impairment

6. Amount of residual vision of the visually impaired group of subjects

7. Chronological age

8. Sex

DELIMITATIONS

The following delimitations were identified for this study:

1. The sample population consisted of preschool children between the ages of birth and four years

2. The sample population of visually impaired preschool children were receiving special education provisions for their visual handicap

ASSUMPTIONS

The following assumptions were made for this study:

1. Development occurs from relative globality and lack of differentiation to increased differentiation and hierarchy (Lowe 1973)

2. An infant's body image develops as the ability to use his body develops (Guldager 1970)

3. The perception of space is gradually constructed by the sensorimotor actions of an infant on the environment (Piaget and Inhelder 1967)

SUMMARY

Exploration and comparison of the concepts of body image and spatial awareness are important tasks that must be undertaken to expand nursing knowledge. These concepts relate to Piagetian theory of sensorimotor cognitive development in preschool children. This study identifies and compares the results of the application of Scales I and V of Uzgiris-Hunt's Ordinal Scales of Psychological Development administered to two groups of preschool children. Group A was comprised of preschool children who had visual impairments. Group B was composed of preschool children who were normally sighted. Chapter I has presented a brief overview of the study and attempted to identify from the literature

a sound basis for further exploration of the development of the concepts of body image and spatial awareness.

In Chapter II, the Review of the Literature presents in detail the development of the concepts of body image, spatial awareness, and perception. Piaget's theory of cognitive development is explored as it relates to these concepts. A discussion of the Johnson Nursing Model, as a systems approach for nursing practice and its application to the nursing process, concludes Chapter II.

Chapter III presents in detail the procedure for the collection of data. Analysis of the data based on the findings of the study is described in Chapter IV and includes the use of tables. Concluding with Chapter V, the investigator summarizes the entire study and delineates all conclusions derived from the results of the statistical analysis, identifies implications relevant to nursing, and suggests recommendations for future study.

CHAPTER II

REVIEW OF THE LITERATURE

A visually impaired preschool child suffers a deprivation of visual experiences which hinder cognitive development. This review of the literature is concerned with concepts relevant to visual impairment such as sensory perception, body image, and spatial awareness. This review will also present a discussion of Piaget's theory of sensorimotor cognition and the Johnson Nursing Model. Both of these areas of discussion contribute to the conceptual framework chosen for the topic of investigation.

Visual Perception

"Vision is the dominant system for perceptual integration" (Cohen 1966:26). An absence of visual experience significantly affects the development of other perceptual systems (Walker 1971). Perception begins as a function of sensory stimulation and then is influenced by the action of the individual as the result of this perception. What is seen and how it is seen, is determined to a large extent by what Piaget calls sensory motor activity (Piaget 1969, 1973).

> Whether or not one can trust one's perceptions will have a bearing not only on one's sense of physical

> stability but also on self perception, body image, reality constancy, and the sense of self (Lipton 1970:159).

At birth the eyes of the infant remain closed most of the time, but when the eyes are open, the pupils do constrict with a stimulus from light (Nelson et al. 1975). The method that records the quality of vision in infants is called optokinetics. Optokinetics measures that specific movement of the eyes invariably produced in response to the stimulus of moving visual material. While one faces the side of a spinning drum upon which there are alternating vertical black and white lines of equal width, the eyes follow the moving lines slowly for several degrees in accordance with the speed of the drum. Suddenly, the eyes break into a very fast reversal movement, retaining the original starting position and then repeat the same slow following phase. The sustained, repetitious cycle of slow following phase is called optokinetic nystagmus. Since it occurs voluntarily in a person observing a landscape through a window of a moving train, it is often referred to as "railroad nystagmus" (Nelson et al. 1975).

Optokinetic response has been produced in infants of ages from 1 1/2 hours to 5 days. Also, visual acuity in infants has been measured by grading the width of the vertical lines on the drum moving at a constant speed.

Using this method, the estimated visual acuity of infants at birth is approximately 20/670 (Nelson et al. 1975). If no optokinetic nystagmus can be elicited by the time an infant is two months old, it may indicate a loss of integrity of the afferent visual pathways. If it is more pronounced in one direction or another, a visual field defect may be present. Impaired vision of blindness usually results in a nystagmus (a rhythmic occilation of the eye or eyes) (Vaughan and Asbury 1974).

At about two weeks of age, the infant can attend briefly to large objects and follow to some extent with his eyes. As age advances, the infant's visual acuity increases as does ocular motility. Later, binocular vision and convergency develop which enhance the infant's ability to see (Nelson et al. 1975). According to Bower (1966), infants have a lower processing capacity for visual stimuli than do adults. The infant's perceptual system can handle only a small fraction of the information which comes into view. Infants can register the real shape of an object and its orientation. If their processing capacity, because of a visual impairment, is limited to a greater extent than that of the normally sighted infant, they may be able to process only the shape of an object or only the location of an object (Bower 1966). Newborns will also look at pictures

of patterns if they resemble the human face (Bowlby 1969).

Many experiences of an infant are visualized, at first, as previously attested to by Nelson (1975). For example, the infant views his mother's breast before he begins to suck with his mouth. The sequence of these events plays a paramount role in the perceptual organization of these events which gives substance and connection to the environment (Wolff 1966). The infant is continually acquiring and processing knowledge of the world. This cognitive processing is the developing ability of the infant to perceive, recognize, conceive, judge, and reason, and is viewed on a hierarchial order. Knowledge of the world is received through all the senses (Lowe 1973; McCarron and Dial 1976).

Role of Vision in Development of the Concept of Permanence of Objects

Easton (1976) demonstrated, in a study of normally sighted subjects, that vision exerted dominance over the other senses in relation to perception of objects and the development of the concept of permanence of objects. Permanence of objects is not innate and it takes many months to be formed (Piaget 1973). The infant recognizes the human face very early in life. The recognition of the

bottle takes longer and the recognition of the position of the bottle takes even longer (Schilder 1964). The infant can recognize and remember his mother by a number of different modalities such as smell, touch, warmth, and heart beat. By the age of five months, visual and auditory recognition are the principal organizing modalities (McDevitt 1975).

Behavioral systems in the young infant are not structured at first but are easily activated, terminated, and strengthened by outside stimuli. These systems have a marked bias for human stimuli from the voice (auditory), the face (visual), touch (arms), and kinaesthetic (body). These senses mediate attachment to the mother in infancy and childhood. The perceptual equipment of the infant (vision, hearing, tactile, and kinesthetic) helps the infant become acquainted with the mother. The effector equipment (hands, feet, head, and mouth) helps the infant get in contact with the mother. The signaling equipment (crying, smiling, babbling, and arm gestures) determines how the infant's mother moves and cares for the infant and these are the fundamental inborn "attachment behaviors" (Bowlby 1969).

Wolff (1966) in his studies with blind children re-emphasizes Bowlby's (1969) concept that vision is one

of the four fundamental and inborn "attachment behaviors." Anxiety that is created by separation of a child from the mother will end when the child sees or hears the mother (Wear 1974).

Smiling, sooner or later, becomes the selective social response to the infant's visual contact with the mother or primary caregiver. However, the earliest smiles may be provoked also by non-visual stimuli, especially the human voice. The absence or late acquisition of the infant's smile may inhibit the mother from engaging in social contact with the infant. This may be especially true if the mother values smiling as the infant's indication that he distinguishes her from other adults (Wolff 1966). There is a wide variation in the amount of time the mother and infant spend in mutual regard (Friedman et al. 1976). However, Friedman (1976) found in his work with forty-eight mother/infant dyads, that the more time the infant and mother spend in face to face interaction, the more smiling the infant engaged in. It was also documented that frequency of episodes of mutual regard correlated significantly with the frequency of smiling of six to eight month old infants. Also, as the age of the infant increases, less time is spent by the infant and mother in face to face regard. There seems to be less visual

interactions as the infant grows older and the sense of touch seems to compensate for this change (Friedman et al. 1976).

When the mother leaves the room and the normally sighted child of one year can no longer "see" her, he experiences separation anxiety (Fraiberg 1971). The development of the eight to twelve month old blind infant is not parallel to the development of the normally sighted infant. This is partly because the blind infant cannot visually "track" the going and coming of his mother. Vision in the normally sighted infant is continuous; that is, the infant can track his mother by sight. A break in the visual tracking indicates the mother's absence to the infant. If the mother is not visually seen, then she is gone. The senses of sound and touch are not continuous (not stable or predictable) and, therefore, do not connote separation. Studies (Fraiberg 1971) of infants who are blind from birth indicate that signs of separation anxiety continue to occur after the age of two years in the blind infant. Such signs denoting anxiety are crying, inability to be comforted by others, and clinging to the mother. These signs of anxiety are observed during the normally sighted infant's second year of life. The normally sighted child that exhibits these signs in the second year of life

is able to produce a mental image (a memory) of the mother. The blind child's memory is delayed if measured by standards of the normally sighted child's development (Fraiberg 1971).

The normally sighted child has experienced separations from the mother and he learns to cope with the separation because cognitively (the mentally stored image) he knows she will return (Lichtenburg 1975). True object relations is developed when the infant can maintain a tie to the mother through his mental representation of her (irrespective of the state of the infant's need). The infant misses her and exhibits distress. ". . . an object of attachment . . . has . . . a permanent existence in space and time which is independent of present perception" (Ainsworth 1969:1016).

Wills (1970) postulates that because a blind child cannot see his mother's face when she is angry and can only hear her angry, scolding voice, the infant may believe the mother has gone. He may then believe that there is now a different angry mother and this disturbs the development of healthy attachment behavior (Willis 1970).

Related Sensory Modalities

> Tactile sensation is more purely subjective than any other sensory experience; it immediately points

> to something going on in our own body. To a much greater extent, hearing, seeing, smelling, and taste are directed toward the outer world (Schilder 1964: 6).

Some normally sighted children react more to touch stimuli, some to sound, and some to visual stimuli (Wolff 1966). The infant's first intentional body movements are noted in the oral area as the ability to differentiate nutritive from non-nutritive objects. The infant's first intelligent act (i.e., sucking) is developed by repeated contacts with objects associated with food or non-nutritive stimulation (Piaget 1952).

Newborns are more responsive to tactile stimuli on the right side of their bodies than the left side (Hammer and Turkewith 1974). A study was conducted by these two researchers in which the newborn infants had their heads held in midline and their arms were bound to their sides. When the right perioral area was stimulated with a brush, the heart rate accelerated. Freedman et al. (1974) conducted a study on newborns' habituation to visual stimuli. These authors found that the newborn female is more responsive to sensory stimuli than the male newborn. Also, newborn females are in a state of alert inactivity longer than males. The conclusion was made that females get more perceptual learning as a result of this phenomena. This is supporting evidence (indicating) that the female is more

accelerated in mental processing and fine and gross motor skills during the first four years of life (Freedman et al. 1974).

Rock and Harris (1967), in their experiments with touch and vision, showed that vision dominates over touch when information received by subjects is conflicting. Subjects looked through a prism at a straight rod and by touching the rod they perceived it as being curved. The subjects were given another opportunity to substantiate whether vision or touch dominated. A small square of plastic was held under a cloth and at the same time the subject looked through a reducing lens. In each case, the hand determined that the object was smaller than it was when it was seen and not touched or felt by the control group (Rock and Harris 1967).

> Touch is obviously important in determination of self from the non-self of the body from the environment. Through it are mediated any perceptions of differences in temperature, texture, moistness, and many other subtle changes in kinesthetic vibratory sensations and pressures (Greenacre 1971:207).

Some time between the age of three to five months, there is a coordination of touch with vision. The normally sighted infant looks at his hands and plays with them at midline. Objects in the visual field are reached for as a means of identification by touch and then are explored tactually (Piaget 1967). The infant can deliberately grasp

visually with his eyes, but only if the hand that grasps and the object that is being grasped are both in the same visual field (Sherick 1976). The parts of the body that the infant cannot see correspond to parts on other individuals that he can see. Therefore, his needs for learning are developed by tactile, kinesthesia, and imitation of facial gestures (Piaget 1967). As the visually impaired infant develops, stimulation of the infant's hands with tactile experiences will lead the infant into more satisfactory gross motor achievements (Fraiberg et al. 1976).

A normally sighted infant of about sixteen weeks brings the hands to midline and engages in mutual finger play which indicates the capability of touching and being touched simultaneously. This activity aids the infant's self discovery of his body parts. Following closely to this stage of development, the infant explores other parts of his body (Sherick et al. 1976).

> Midling mutual fingering provides a sense of body boundary on both the life and on the right that . . . facilitates a sense of self and . . . helps distinguish the self from the environment and from the object (Sherick et al. 1976:179).

Blank (1975) agreed with Fraiberg's study (1969) of congenitally blind children. Blind infants, as well as normally sighted infants, do not respond to sound stimuli alone until approximately ten months of age (Freedman 1969).

Normally sighted infants, three to four months of age, grasp sound making stimuli by using visual cues to accomplish the hand grasp. But, blind infants will not reach to sound stimuli objects before ten months of age. Blind infants express their needs by using hand signals when they reach for objects that they perceive from the sound stimuli (Blank 1975).

> . the blind, regardless of cause, would tend to develop greater facility than the sighted in auditory focusing, since the blind are dependent on hearing as their primary mode of acquiring information (Levitt et al. 1972:948).

Wills (1970) reported in her studies that blind children do not eat "things" that they might find, as normally sighted children are prone to do. Some children without sight have problems with eating and biting, which results in problems of establishing satisfactory feeding patterns. Children without sight have difficulty in mastering new experiences; that is, they tend to cling to the familiar and routine experiences. Without adequate vision, a familiar routine appears to be the child's safeguard against confusion. Often the blind child will revert to earlier modes of behavior when a particular new experience is upsetting. The new experience could be placing the bare feet on the grass for the first time. This tendency to return to earlier behavior patterns is noted particularly

in parent-blind child relationships. Wills (1970) further noted that following a separation from the mother, the blind child would not spoon feed and returned to bottle feeding.

Regarding the care necessary for the visually impaired child, significant variables are the child's use and acceptance of touch. Also of great importance is the visually impaired child's reaction to temperature, motion, pain, sense of smell, and taste, as well as the knowledge of their body position (spatial awareness) (Curtis et al. 1974). A three year study of twenty deaf-blind children by Curtis and Associates (1974) showed that these children had severe communication problems. They did not interact with each other. There is a need for these children to learn to touch each other and relate and share together especially during unstructured play periods or at meal times and when school is not in session. Curtis et al. (1974) studied one hundred deaf-blind children over a five-year period. While a piece of scotch tape was placed on the child's arm, his behaviors were videotaped. In observing the behavior of each child coping with the situation, the author identified only one child who removed the tape and laughingly placed it on the examiner's arm as if there were just the two people relating and communicating. The other

ninety-nine subjects demonstrated no acts of communication with the examiner (Curtis et al. 1974).

There is a difference in interpersonal communications of blind children and normally sighted children in that the blind children cannot see, therefore cannot interpret nonverbal communications. These nonverbal communications constitute movements (gestures) of the body parts (hands, arms, face, etc.) of others in space. The visually impaired and blind children cannot use these appropriate gestures (shrugging shoulders, looks of surprise or anger) if they have not visually perceived them (Apple 1972).

The senses of movement and position are two-fold. The kinesthetic receptors are located in muscles and tendons and are stimulated by passive and voluntary movements of various parts of the body. These receptors provide the brain with information concerning the position of different body parts along with sensations of pain and temperature change. The inner ear contains the vestibular apparatus that consists of receptor organs that are sensitive to motion and to the position of the entire body (Spears and Hohle 1967). The vestibular sense helps the child know whether any sensory input (visual, tactile) is associated with the movement of the body or a function of the external environment. With this sense the child can differentiate

between whether he is moving or the room is moving about him (Ayres 1975).

Spears and Hohle (1967) state that an individual can survive without vision, hearing, taste, or smell, but will be confronted with difficulty to survive without kinesthesia to sense and control position and movements. In addition, kinesthetic pain receptors detect potential injury to the body. Kinesthetic receptors are necessary for maintenance of a stable body temperature.

Body Image

Fisher and Cleveland (1968) viewed body image as a psychological variable which evolves gradually as learning progresses. During the process of learning, an individual experiences his body in many situations and is cognizant of the varied reactions of others to his body as others perceive it. Body image is presented by Fisher (1970) to be what an individual is willing to tell others concerning how he feels about his body and the parts of his body. This idea can be identified by considering the following: 1) how negatively or positively one regards his body exemplifies a self concept rating, 2) how one perceives his body size identifies the individual's level of self exteem, and 3) how aware one is of his body may indicate the level of anxiety over his state of health (Fisher 1970).

the body, its performance capacities, and physical characteristics represent important components of a person's total self-concept" (Chasey et al. 1974:440).

Dillon (1962) studied twenty-one psychiatric patients and identified no significant difference between their perceptions of body size (height) and the peceptions of a control group who were considered to be without mental problems. Children who were ten years of age and who were considered not to be well adjusted were identified as having a lowered awareness of their body (Liebetrau and Piennar 1974).

Observations of a ten year old boy with long standing renal illness substantiates Schilder theory that, " . body image incorporates objects or spreads itself into space" (Ritchie 1973:145). The boy appeared to incorporate intervenous tubing and catheters into his body image. When others touched any equipment attached to his body he reacted as if it were an assault on his body (Ritchie 1973).

The sense of vision plays an important role in the development of body image (Schilder 1964). The organs for sight are located in the face and brain which are considered the "seat" of the personality. There is a close association to the individual's physique and identity. If blinded, feelings of loss of ego and a definite threat to personality

is experienced (Monbeck 1974). Ego disturbances and cognitive deficits have origins in the first eighteen months of life when the ego is forming (Fraiberg et al. 1969). Fisher (1968) maintained that body image depicts the nucleus around which the infant begins to build an ego structure. Two expressions of self develop in the first two years. The first is the "categorical self" (I am female, I am big or small, I am capable). The second is the existential self (I am distinct from others) (Lewis and Brooks 1975). Autonomy is essential for the establishment of an individual's body image (Ritchie 1973).

Throughout infancy, feelings that originate within the body itself, and on the surface of the body, contribute to the formation of an overall body image (the body self) (Lichtenberg 1975). The experiences that have to do with body surface and external perceptions of the mother as a caretaker, lead gradually to the infant's establishment of body boundaries. These boundaries contribute to a second group of self-images; that is, those of the self separated from a discretely perceived object. Then, there are experiences in which body parts are sources of greatly heightened sensations. The discovery of the body parts constitutes the third group of self images referred to as the "grandiose" self (Lichtenberg 1975). The infant can now experience

self not only as separate from an object but sharing self with the object with the capabilities of gradiosity and of omnipotence. The infant's first self images are those associated with instinctual need satisfactions such as hunger (Lichtenberg 1975).

The self images originate when the infant separates self from objects as seen by the ability to sustain brief periods away from mother. Then finally, the infant at about eighteen months has become autonomous, for he is able to practice locomotion, perception, and learning by himself. Lichtenberg (1975) further explained that the second half of the second year is a vulnerable period for the child. The child becomes unsure of parental acceptance. Erickson (1963) has described this time as the period of autonomy versus shame and doubt when there is a need to adjust the demands of socialization of the infant in order to retain the sense of autonomy. The child is beginning to be ready for independent functioning and the mother encourages the child's autonomy (McDevitt 1975).

If disappointments with parents are within tolerable limits,

> . the child can more effectively build inner capacities for self-control, confidence, and reliance, and thereby lessen the demands he makes on his parents for a magically perceived "perfect responsiveness" (Lichtenberg 1975:460).

Coopersmith (1967) indicated that if there is total or nearly total acceptance of the child by the parents, and if there are clearly defined and enforced limits placed on the child with respect and latitude of individual action, the child will develop a high level of self esteem (Coopersmith 1967). If the child's self concept is satisfactory he has a better self image and the sense of cohesion of self gives the structure to the perceived body image (the mind's picture of the body). As the sense of self changes, the body image is altered. Experiences of a sensorimotor nature that an individual has does effect body-self images. The individual's ability to coordinate what he perceives his movements to be and what he sees the movements are, helps in differentiating self from others and inanimate objects (Litchenberg 1975). Also, sensorimotor activities which happen before the eyes of an appreciative parent contribute important imagery to the sense of self-grandiosity and to omnipotence. The images integrate throughout development. This integration is known as assimilation; that is, experiences become structures (Lichtenberg 1975).

When a normally sighted and normally developing child is asked to draw a person or a picture of himself, the parts of the body are not always in correct position to each other. The parts are frequently seen juxtaposed; for

example, an arm may be placed against a leg. Children's drawing's reflect their knowledge and sensory experience of the body image. Children express the mental image (picture) that they have of their body and how they perceived it (Schilder 1964). In a study of 142 children across the age range of two to four years, Wallach and Bordeaux (1976) determined that if the child had knowledge of the meaning of the parts of the body, the child could successively assembly a manikin figure. These manikins were assembled without syncretism (juxtaposition of parts).

> There is a continual interchange between our own body image and the body image of others. We want to know about them. We want to project parts of our own bodies into others. We are never completely contented with our own body image. It is in a continual state of flux, it is always changing . . . we change by dancing. Clothes change our body image. We put on masks. We walk on stilts. Sometimes we tie the bodice tight and wear tight clothes . . . (Schilder 1964:52).

Children with vision experience the world in an articulated fashion and are, therefore, most likely to have an articulated body concept (Witkin et al. 1968). These children have an impression of the body with definite limits or boundaries. With normal sight, a child can view others and see how these others are "put together" which contributes to an articulated self concept. Lack of vision hinders a child's cognitive development and the concept of articulation (put together in a connected fashion). Witkin et al.

(1968) proposed the hypothesis that blind children would tend to be more global in their cognitive functioning than normally sighted children. Clay was given to a group of blind children to use to model "themselves." The model each child made was rated on a five point scale. The clay models did represent a less articulated self concept in these blind children as compared to figure drawings of normally sighted children. Few blind children were able to clearly represent the human form with the clay (Witkin et al. 1968). Suinn stated that,

> . . . early loss of vision significantly hinders articulation, but once an articulation style has been developed by an individual, then blindness has little effect (Suinn 1967:14).

Spatial Awareness

Gesell (1954) identified that the eyes take the lead in the conquest and manipulation of space. The infant's world is one of visual experiences long before these experiences can be grasped manually. The infant's vision can pick up a pellet seven millimeters in diameter twenty weeks before the fingers are able to grasp the object. Field (1977) in a research study, looked at Piaget's theory which maintains that infants are not able, at first, to coordinate their visual and prehensile activities. This behavior is achieved gradually. Integrated functioning of

the visual and prehensile abilities are necessary in order that the infant can accurately manipulate objects in space. The study further substantiated that, in the early period of prehension, vision plays the dominate role in the reaching attempts of infants. Information the normally sighted infant receives from tactual and kinesthetic modalities is of minor importance (Field 1977).

The newborn's spatial awareness is centered on the body (Piaget 1973). At first it is centered on what is labeled as egocentric spaces. These spaces consist of the buccal space (the mouth), the visual space, the tactile space, and the auditory space. These egocentric spaces lack coordination with each other in the beginning of the infant's life. After the infant is approximately eighteen months, the infant is aware of the space around and outside the body. This includes all objects that have taken on permanence including the infant's own body (Piaget 1973).

A child's understanding of space is progressive. The process begins in the sensorimotor stage when the infant is acting on the environment and progresses to the older child who can think about space; the child has a mental image of space (Hart and Moore 1976). The infant acts on the environment; the spatial actions become internalized (mental images) by two processes. The impressions from the

environment are assimilated into sensorimotor schemes and there is an accommodation of these schemes to the environment (Piaget 1969). Between the beginning of concept development in infancy to the full conceptualization of space during adolescence, from concrete to abstract, is the perception of space and the symbolic representation of space. The adolescent is capable of the concept of totally abstract space. This theory of the development of space has been identified by Cassierm, Werner, and Piaget (Hart and Moore 1976).

Three areas of spatial awareness have been described by Strelow and Hodgson (1976). At the perceptual level, the awareness involves the perception of objects and their spatial characteristics, such as location and size. The second level is the perceptual-motor level which constitutes an awareness of the body in space, the position of the body, the head, and the limbs, and includes the consequences of the movement of these parts. The final level, the cognitive level, is an awareness of the environment in terms of verbal labels used to identify objects and describe their physical characteristics (Strelow and Hodgson 1976).

Strelow and Hodgson (1976) developed a spatial sensing system for blind children. The purpose is to aid these children in the knowledge of the world at a distance.

This system assists the child's development of spatial skills by encouraging exploration by the use of sound. Different tonal patterns are used for different surface characteristics of objects. The world of the child is brought into focus by a sonic guide worn by the child to detect obstacles ahead of and to each side of the child. It gives a sound picture (Strelow and Hodgson 1976).

Immobility is accentuated in the blind child (Knight 1972) which deprives the child of optimum development of spatial awareness. The visually impaired child is much more dependent on locomotion than the normally sighted child in order that a crucial distinction can be made between self and the outer world. Without adequate locomotion skills, the visually impaired child may be arrested developmentally. The child is not able to cope with the environment and primative behaviors are maintained (Knight 1972). Cratty (1971) maintained that the visually impaired child's education must include help in movement in space to aid the child in better motor performances. According to Forgus and Melamed (1976) active spatial movement is important in the development of visual and motor integration.

The perception of space is divided into two areas. There is two dimensional space which means that objects can be located in space either to the right or left, or

up or down. The other area of division of space is called three dimensional space and constitutes the distance an object is away from the body and how objects relate to one another (Forgus and Melamed (1976). Spatial dimension is described by Fisher as ". . . probably part of a broader category related to one's ability to separate what is significant from its content" (Fisher 1970:147). Fisher (1970) further says that cognition is correlated to the ability to orient one's body in space and this gives substance to the theory that perception and cognition are juxtaposed.

Six visually impaired subjects were studied by Leonard and Newman (1967) to determine the subject's awareness of space. A tactual map with detour problems was used to define the ability of the child to move in space. The researchers determined from this five year study, that whatever difficulties these children had in spatial orientation was probably caused by lack of experience, not by blindness alone (Leonard and Newman 1967).

Piaget's Theory of Sensorimotor Cognitive Development

The first two years of a child's life is designated by Piaget as the sensorimotor period of cognitive development (Piaget 1969). During this period of time, from birth

to two years, the infant acts on objects and the environment. The infant tries to make things happen by the manipulation of objects. The infant then makes a mental image of the action on the object and repeats the action. The infant does not wait for environmental events to happen, but he seeks them out. A continuous progression of development is seen as the infant ontogency advances from spontaneous movements and reflexes to acquired habits (behaviors). The infant utilizes this early time of development to practice classifying, arranging, collecting, and dissociating sensory and motor experiences. The reconstruction of these actions into organizational patterns is called sensorimotor schemes (Ginsberg 1969).

Cognition (knowledge) of the environment develops from the sensorimotor schemes of sensory input and motoric actions. This organization begins gradually, yet consistently, and is unrelenting (Furth 1970). "Organization is the process of giving pattern and consistency to every act" (Chinn 1974:184). When the infant can look for an object that is not perceived, the concept of the object and the concept of space has been developed. The perception of the object from sensorimotor actions is gradually developed over the first two years of infancy. The perception (the sense of seeing) evolves into the conceptualization of the

object and of space. Perception is expressed symbolically as a mental image of imitative gesture or as the spoken word at about the age of two years (Piaget 1967).

This sensorimotor period is divided into six substages of cognitive development and can best be presented in Table 1 (Piaget 1969; Haimowitz and Haimowitz 1973; Uzgiris and Hunt 1975).

Uzgiris and Hunt (1975) developed six scales of psychological development based on Piaget's theory of sensorimotor cognitive development. These scales were designed to assess an infant's progress in different areas of intellectual functioning. The level of cognition can be established by observing the infant's responses to presented toys and objects along the continuum of development. These scales are not based on an intelligence quotient nor do they parallel the chronological age of an infant. Rather, the scales are designed to observe a period of an infant's development and identify sequential achievements within each branch of development. The scales are ordinal which implies a hierarchial relationship between what an infant is able to do at a higher level by incorporating what he has accomplished at a lower level. The main purpose of the testing and evaluation is to be able to describe a particular infant's performance in terms of the levels of

TABLE 1

PIAGET'S SENSORIMOTOR SUBSTAGES

	Substage	Age	Examples of Behaviors	Conceptual Description of Substage
I	Reflex Actions Exercises	0-1 mo.	sucking reflex palmar reflex kicking	when infant sees object and it is removed, he does not search for it
II	Primary circular reactions First habits	1-4 1/2 mo.	eye follows hand movements sucking thumb	beginning to put senses together, tactual sensations from hand, kinesthetic sensations from limbs, puts object in hand or hand to mouth
III	Secondary circular reactions Coordination of vision and prehension	4 1/2-8 or 9 mos.	grasping and manipulating	senses more refined, visual motor prehension, hits rattle, it moves and infant repeats action, does not search for object that disappears
IV	Coordination of the secondary schemes	8 or 9 11 or 12 mos.	beginning search for lost objects	beginning of means, ends relationship sees object and object is put out of sight, searches first hidden place (where last seen), acts are becoming intentional
V.	Tertiary circular reactions and discovery of new means	12-18 mos.	permanence of object established	can discover new ways to obtain desired goal (pulls pillow nearer in order to get toy resting on it) can follow tragectory of object and look to see where it landed
VI	Invention of new means Beginning of interiorization of Schemes	18-24 mo.	beginning of memory imagination pretending	invents new ways and new means (uses stick to reach desired object)

SOURCE: Jean Piaget and Barbel Inhelder. 1967. The child's conception of space. New York: Basic Books, Inc.; Morris L. Haimowitz and R. R. Haimowitz. 1973. Human development. New York: Thomas Y. Crowell Co.; Ina Uzgiris and J. McV. Hunt. 1975. Assessment in infancy: ordinal scales of psychological development. Chicago: University of Illinois Press.

cognitive organization achieved in each scale (Uzgiris and Hunt 1976).

Gottesman (1971) studied three groups of children for the purpose of comparison with a study done by Piaget and Inhelder (1948). Two groups of children were normally sighted and one group was blind (light perception or less). Each group was presented with objects to explore haptically. The results revealed a similarity in performance of both the blind and normally sighted children. The researcher concluded that Piaget's developmental research could be adapted to the understanding of blind children in relation to four areas: 1) observation of patterns of behavior, 2) formulation of developmental stages, 3) exploration of conceptual levels, and 4) functioning of concepts. It was concluded that this study of blind children could contribute to the further development of Piaget's theories (Gottesman 1971).

Infants from the age of one day to two years were administered Scale I from the Uzgiris-Hunt Psychological Scales of Infant Assessment for comparison with Piaget's theory of object permanence (Kramer 1975). The tasks given to the infants involved showing each infant an object of interest and placing it under one cover and then superimposed covers. The purpose of each task was for the infant

to find the object. This scale was identified by the investigator as being easy to administer and of value when information on infant cognitive development is desired. The conclusion of the study was that Piaget's theory of object concept development is sound (Kramer 1975).

In 1972, Gratch studied infants (ages six months) in Piaget's Substage III of sensorimotor development. This longitudinal study identified that none of the infants tested could, at first, retrieve an object that they had just grasped if it was covered subsequently by a washcloth. The infants were again tested a few weeks later and some were able to remove the cover from the object. Others failed the second test and seemed unaware they had an object in their hand when it was covered with the washcloth; they released their grasp of the object and removed their hand from under the cloth. Then the object was again brought into the line of vision and the infants immediately reached for and grasped the object. This substantiated the hypothesis that vision has a dominance over touch because these infants did not appear to have derived information about the location and nature of the object from having it in their hand. This corresponds to Piaget's theory (1952) that four to six month old infants will immediately bring a toy that is in their hand into the line of sight

if taken out of sight. Therefore, the infant is probably not able to derive tactual clues at this stage of development. The infant cannot see the object that is covered with opaque cloth, so interest in the object is lost. In addition, bimanual coordination is not well established at this age (Gratch 1972).

Two sets of scales based on Piaget's theory of object permanence and spatial relationships were compared by using severely and profoundly retarded children as subjects for the study. Silverstein et al. (1975) determined that the scores derived on these children were similar on both the Corman and Escalona (1969) and Uzgiris-Hunt Scales. And differences found in the results of the use of these two scales were on the basis of intelligence quotent only.

Sixty-three severely retarded subjects, ages 42 to 126 months, were tested by using all six of the Uzgiris-Hunt Scales (Kahn 1976). The researcher found the scales were ordinal with these children and did correlate with Piaget's theory of sensorimotor development.

Kopp (1974) utilized the Casati-Levine Series of testing which follows Piaget's theory of sensorimotor development in Substages IV and VI to evaluate infants over seven months of age. Four behavioral areas were explored: 1) testing of object permanence, 2) testing of

relationship between two objects, 3) testing ability to separate objects into parts and integrate them, and 4) testing ability to invent a solution to solve a problem. The researcher in this study concluded that there were considerable differences in rates of development and there was a wide range for the acquisition of the behaviors tested. The study inferred that infants are not "passive receptacles" awaiting various environmental experiences. Infants exhibit a number of ways of interrelating with objects; the infant's development of competencies (language, cognitive, emotional, social, and motor) are dependent upon each other (Kopp 1974).

Education of Visually Impaired Children

A visual handicap places a burden on the normal development of the infant. A visually impaired child shows delay in cognition, language acquisition, social skills, and personality development. All of these areas of development interrelate with each other; one does not exist alone or develop separately (Warren 1976). There is a wide variation in the development of visually impaired children because there are so many variables and differences in the degrees of visual impairment. The differences are noted in the degree and nature of the visual functioning, the age of

onset of the impairment, the developmental, and educational and social history of each child. Frequently there are other coexisting physical handicaps (Scholl and Schnur 1975).

Visual perceptual problems are the most frequent symptoms of children's learning difficulties (Ayres 1975). Consequences of disturbed visual perceptions are related to maintaining sustained attention and behavioral deviations in children (Maslow et al. 1964). Following the administration of visual perception tests, standardized on twenty-one hundred children who were from three to nine years of age and had learning difficulties related to their school performance, five perceptual disabilities were identified. These deviations from normal are identified as follows:

1. Difficulty in writing (poor eye-hand coordination)

2. Difficulty in word recognition

3. Difficulty in recognition of letter or word in relation to size and color or if capitalized and used to lower case (poor form constancy)

4. Mirror writing and other reversals and rotations (difficulty in perceiving position in space)

5. Interchanging the order of letters in a word suggested difficulties in analyzing spatial relationships (Maslow et al. 1964)

There are no comprehensive standardized tools for the assessment of visually impaired preschool children in all areas of development. There are five tests that are used in evaluation of these children which do give some important information. These tools are:

1. A Social Maturity Scale for Blind Preschool Children (Maxfield and Buchholz 1957)

2. Vineland Social Maturity Scale (Doll 1975)

3. Preschool Attainment Record (Doll 1966)

4. Denver Developmental Screening Test (Frankenberg 1967)

5. Gesell Developmental Scale (revised) (Bell 1975)

Bell (1975) stated that the six most important areas of the assessment of visually impaired children are motor development, amount of residual vision, communication skills, self help skills, social and emotional development, and environmental exploration. All of these areas can be evaluated by observations of the child's self help skills and play activities; for example, the way in which a child manipulates toys and new objects, the reactions to familiar and unfamiliar sounds, and how the child plays with other children (Bell 1975).

Harley et al. (1975) emphasized the need for instruction in basic orientation and mobility skills for visually

impaired children. These areas encompass trailing and protective techniques, tactual discrimination, self help skills, movement in space, and sensory cues in traveling.

Three groups of school aged children, including one group of visually impaired children, one group of blind children, and one group of normally sighted children, were tested on their use of words. DeMott (1972) concluded that there was no difference in the concepts of the words used by these children because of their visual experience. Blind children have been criticized because they use words (verbalisms) that are meaningless because these words have not been visualized. The researcher postulated that to deprive a visually impaired child's use of such words is a form of severe deprivation (Demott 1972).

Adequate sensory stimulation can prevent a variety of undesirable behaviors in blind and visually impaired children. It is important that the child's family adopt a warm, affectionate, and positive attitude toward the child, realizing the child's limitations. In order to encourage sufficient sensory input for the child, a good plan for the family would include: 1) satisfactory feeding experiences with the mother, 2) extra amounts of body contact (touching, cuddling), 3) vestibular and auditory stimulation, and 4) an understanding and knowledgeable instructor (nurse, educator) for the family (Carolan 1973).

Blindisms can be described as a dintinct behavioral phenomenon associated with blindness in the young. These sterotypic behaviors isolate the child from the environment (Apple 1972; Hoshmand 1975). The child is self preoccupied and withdrawn in a similar fashion to the autistic child. These behaviors interfere with the child's learning and interactions with others. Many hypotheses have been suggested concerning the etiology of this problem. Most investigators believe that blindisms are related to parental understimulation and deprivation including poor parent-child relationships. As far as treatment is concerned, it varies from ignoring the behavior to substituting the stimulatory (autostimulation) behaviors with task oriented activities. The task oriented behaviors are often defeated because the frequency and intensity of the behaviors is high. Treatment is not always successful. Therefore, prevention of blindisms in the form of sensory stimulation is the best answer and must be carried out over the entire developmental years of the child (Hoshmand 1975).

A study which attempted to locate children who were visually handicapped and blind that exhibited blindisms (autostimulation) was done in a sector of Africa. Carolan (1973) reported that in a year's search no children were located. Mothers of the visually impaired and blind

children carried the children on their backs much of the day. The contact with the caregivers provided the infants with a lot of sensory input and a constant awareness of the parent's body. This kinesthesia took the place of autostimulation (Carolan 1973).

Apple (1972) has demonstrated that the blind child can benefit from kinetics, ". . . the systematic study of human communication through the use of gestures and body movement. . ." (Apple 1972:201). By teaching body rhythms, dance, facial expressions, gestures, and body posture, the blind can develop more satisfactory forms of nonverbal communication.

Morse (1975) has postulated four methods of effecting appropriate behavior in visually handicapped children. The first premise would be based on a satiation principle--that the child would eventually stop the undesirable behavior when the parents allow and insist that the child continue the undesirable behavior. The second is called the extinction principle when no rewards are given following undesirable behavior. The third, incompatible alternative principle rewards an alternative behavior which is inconsistent or cannot be performed at some time as an undesirable one. The fourth principle, negative reinforcement, is considered the least preferred method. This principle forces the child to

terminate inappropriate behavior when a parent substitutes something mildly unpleasant. Each child needs to be considered individually and one method of behavior modification intervention is not applicable to every child (Morse 1975).

Motor skills are frequently not satisfactory in the blind child. Integration of perception and motor functions are necessary for the visually impaired child's effective interaction with his total environment. This constitutes a learning program for motor orientation and spatial perception (awareness) (Whitcraft 1972). This researcher quotes from Chaney and Kephart (1968) by describing four motor generalizations of significance to be incorporated into a learning program for the blind and visually impaired child. These generalizations are: 1) balance and posture, 2) contact skills (reach, grasp, release), 3) locomotion (spatial direction and spatial orientation by teaching relationships to objects in space), and 4) receipt and propulsion (objects moving toward a child and away from the child) (Whitcraft 1972).

A Systems Model for the Nursing of Visually Impaired Preschool Children

Nursing can help meet the needs of parents with visually impaired preschool children. The sustenal

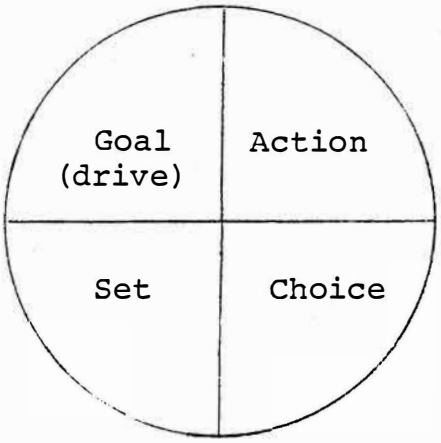
imperatives of nurturance, protection, and stimulation as proposed by the Johnson Nursing Model are basic to the care of the visually impaired preschool child (Appendix A). The imperatives are also applicable to the support needed by the parents of these children. It is possible to look at all eight subsystems that embrace this nursing model and relate them to the child with a visual impairment.

> Each subsystem has its own structure and function. The structure of each is comprised of a goal based on a basic drive, a set, choices, and the ultimate action or behavior (Riehl and Roy 1974:169).

The structure of each subsystem is shown in Table 2.

TABLE 2

SUBSYSTEM STRUCTURE



Factors (variables) outside of an individual's behavioral system can influence and change behavior.

Nine categories of these variables are outlined by the Johnson Model and are synonymous with the concept of environment. The categories are as follows: 1) biologic, 2) developmental, 3) cultural, 4) ecologic, 5) familial, 6) pathologic, 7) psychologic, 8) sociologic, and 9) level of wellness (Riehl and Roy 1974).

Familiarity with visual impairment and resultant handicaps and attitudes toward blindness comprise two explicit parameters of nursing knowledge. A nurse demonstrates her knowledge of the control of Ophthalmia Neonatorum by the instillation of a 1 percent silver nitrate solution (or other equally effective agent) in the conjunctival sac of the newborn infant. The nurse in this instance is acting in the protective role by protecting the newborn against possible blindness. In addition to the legal requirements for the control of Ophthalmia Neonatorum, the nurse in the newborn nursery needs to be cognizant that many visually impaired children do not exhibit clinical manifestations at birth (Barry 1973).

The nurse moves into the nurturing role if an infant is born with a visual anomaly. The nurse needs to provide support to the parents' Dependency and Restorative subsystems through her encouragement of effective behavior and discouragement of ineffective behaviors (Riehl and Roy 1974).

The nurse will assist the parents with the stress, guilt, and disbelief which accompanies the birth of a less than normal child. A nurse with knowledge of genetic counseling will initiate educational assistance to the parents if they have a child born with an inherited blinding disease process. Butani (1974), in reviewing the literature of mother's reactions to such a situation, identified that the mother feels that the birth of her "defective" infant is a personal failure. The goals the mother has set for her unborn child, the fantasies she has experienced, and the idealizations regarding the infant are destroyed (Butani 1974).

Having helped the parents work through the grief process and reach a successful adaptation to the crisis, the nurse through anticipatory guidance can further assist the family and the child. One area of guidance that is needed encompasses parental attitudes toward their visually impaired child. Attitudes of parents of blind children have been investigated and five categories are identified which include: 1) acceptance, 2) denial, 3) overprotectiveness, 4) disguised rejection, and 5) overt rejection (Monbeck 1974). The nurturing role of the nurse lends support to the parents' Affiliative subsystem in order that the parent will develop a healthy attachment to the child (Riehl and Roy 1974).

The parents need to know that visual impairment may affect the child's behavior (Foulke 1972). The nurse will help the parents in regulating the home environment to minimize behavioral deviations. This sustenance augments the parents' Achievement subsystem which gives the necessary control to their own life (Riehl and Roy 1974). Some behavior control for the visually impaired child can be established by an adequate stimulation program. This can be accomplished by aiding the child's Ingestive subsystem because of the visual deprivation. In addition, the child's physical, inner, social, and learning and thought competencies will be aided by adequate stimulation (Chinn 1974). Parents need to be encouraged to stimulate the infant's residual vision as well as the other sensory modalities (touch, sound, movement, taste, and smell). Consideration of the loss of vision is not of paramount importance, but the use of remaining vision is what is considered important. The infant needs extra touch and hand manipulation to discover the environment. The parents need a full explanation of the possibility of developmental delays that may accompany the visual handicap (Barraga 1976).

The nurse will be cognizant of the community resources and agencies available to the visually impaired child for educational purposes. The community nurse will give the

psychological and physical support that has been identified through a continuing assessment of the family and the child. The nurse is aware that each family has their own conceptualization of what their particular state of wellness should be. Following a complete assessment and continuing with the nursing process, the nurse will make a nursing diagnosis (a decision) concerning nursing intervention.

The Johnson Nursing Model identifies four diagnostic classifications. Disorders originating within any one of the subsystems may be due to insufficiency (subsystem not functioning or developing to full capacity) or discrepancy (behavior which does not meet the intended goal). Disorders seen within more than one subsystem are incompatability (goals of two subsystems conflict and harm the individual) and dominance (behavior of one subsystem is used more than any other and harms the other subsystems).

Once the problem is identified, the nurse will establish methods of intervention (sustenal imperatives) to be used. Long and short term goals of intervention are predictive of expective outcomes in the form of behavioral objectives. Examples of two possible short term goals for the family of a visually impaired child might be evidence of an affiliative bond between the child and the mother and indications that the father and other siblings are involved

in the child's care. These examples represent the tie of the Affiliative subsystem with the familial variable. The outcomes (observable patient responses) are seen as the parents' and the child's adjustment to a particular situation (the visual impairment) and adaptation to the stress of the disability (behavior stability and effective coping mechanisms) (Riehl and Roy 1974).

Lipton (1970) has identified that a child with strabismus (a deviation of the eye) when left untreated leads to disuse of the eye and eventual blindness (amblyopia exanopsia). The implication of this visual impairment is frequently associated with a child's distrust of his own perceptions with concomitant mental confusion. This may then lead to aggressive tendencies in the child as well as a negative influence on the development of the child's ego and superego. It affects the child's internal representation of object permanence, the development of abstract through, and the advancement of the child's autonomy (Lipton 1970).

The visually impaired child needs to be considered and evaluated as a total person who is allowed trial and error to encounter the challenges of life. This child needs to develop a feeling of self permanence which evolves from the development of the permanence of objects and the

meaning of space. Both of these concepts are developed by the child's experiences of acting on the environment as well as the child's adapting to the environment. As the child acts on the environment he assimilates the action which becomes part of his inner organization. The child accommodates to the actions of the environment which have acted on him. The resultant balance between these two mechanisms represents a state of equilibrium (Piaget 1973; Piaget and Inhelder 1969; Maslow 1977; Stephens 1972). This allows the child to differentiate self from others and leads to the development of a satisfactory self concept, autonomy, and independence.

The nurse assessing the visually impaired child, diagnosing and identifying problems, planning intervention measures, and evaluating goals must consider the child's feelings, needs, and desires along with those of the family. The Johnson Nursing Model encompasses the parameters for nursing practice and is a workable tool for implementing the nursing process.

Summary

Body image and spatial awareness encompass many concepts which include object permanence, maternal attachment, and self concept. These concepts have been discussed and their relationship to visually impaired preschool

children has been compared in the review of the literature. An analysis of visual perception as it relates to visual impairment and other sensory modalities was presented. Piaget's theory of sensorimotor cognitive development, as it applies to the Uzgiris-Hunt Scales of Psychological Development, was discussed. Cognizant of the needs of nursing to increase its body of knowledge and to develop a scientific basis for nursing practice, the investigator concluded Chapter II with an overview of the Johnson Nursing Model. This model, an adjunct to the nursing process, was adapted to the nursing assessment and nursing interventions for a visually impaired child and his family.

CHAPTER III

PROCEDURE FOR COLLECTION OF DATA

This study was based on a nonexperimental correlational research design. This design was chosen as most appropriate due to the complexity of the variables involved (Abdellah and Levine 1965). A cognitive developmental approach with a Piagetian theoretical framewrok provided the methodology.

Preschool children's perception of body image and awareness of the body in space was assessed by the tool chosen for this study. The measurements of behavioral responses provided the hypothetical conclusions of this study.

Settings

The settings chosen for this study are located in a metropolitan area of over one million persons in the southwestern part of the United States. The visually impaired subjects were selected from and evaluated in a nonprofit agency which offers educational services to infants and children from birth to eight years. The building houses offices for staff members, examining rooms for testing purposes, a kitchen used to prepare children's lunches, a large auditorium for children's activities, and

two classrooms. Each subject was evaluated indivdually in a well-lighted room where each subject was familiar with the surroundings. This room provided the atmosphere necessary for careful, safe, and controlled administration of the tool that was employed. The room was as free from distractions as possible and most nearly resembled a home setting as feasible. The subjects were free to move around in the room used for the evaluation. Objects in the room included a table, several chairs, a sofa, a high chair which came up flush to the table, an infant seat, and a rug which covered at least part of the floor (Uzgiris and Hunt 1975). The toys and objects that were to be used in the evaluation session (Appendix B) were within reach of the investigator.

The normally sighted children, used as the control group of subjects, were selected from an agency which provides day care services to infants and children. This is a church supported agency and the building provided the space required to accommodate this study. Each subject in this group (Group B) was evaluated individually as specified for Group A (visually impaired children). The room chosen for the administration of the tool to these subjects most nearly replicated the room chosen for testing the visually impaired group of subjects as possible. The room

was well lighted and as free from distractions as possible and most nearly resembled a home setting as feasible.

After approval of the proposed study was received from the Texas Woman's University, Human Research Committee, written consent for permission to utilize these agencies was obtained from the respective directors of each agency (Appendix C). These agreements were received in writing before commencement of the data collection phase of this study. In addition, anonymity was guaranteed to each participant in the study.

Population and Sample Selection

The testing of the hypotheses was undertaken with two groups of preschool children. One group, designated as Group A, consisted of seven visually impaired preschool children. These children were selected from an agency which offers educational services to visually impaired children within a radius of one hundred miles. These children were chosen by a purposive sampling technique (Abdellah and Levine 1965). All available children in the agency who met the stated criteria were included as subjects. The criteria used in the purposive sampling technique were that no subject had reached a fourth birthday and each subject possessed some residual vision. A control group, selected

from a day care center, designated as Group B, of seven normally sighted preschool children was matched as closely as possible to the subjects in Group A on the basis of age and sex. One visually impaired subject from Group A was omitted from this study because of absence during the data collection phase. Therefore, one matched subject was deleted from Group B, which left a total of seven subjects in each of the two groups.

Parents and teachers were informed by verbal presentation of the investigator of the purposes and procedures of this research study. This was accomplished prior to the initiation of the evaluation (Appendix D). Only children whose parents gave written permission were included in this study.

The age of the subjects was considered; that is, the younger infants (between the ages of one and two years) were not expected to participate for more than thirty minutes at a time (Uzgiris and Hunt 1975). Thus, the parents of subjects in this age group were informed that the entire evaluation might take more than one session. An optimal time for evaluation of each subject was chosen; that is, a time when the subject would ordinarily be engaged in play activities. Each subject was evaluated approximately thirty minutes to one hour after the subject's arrival at the agency.

and a nap. If the subject appeared to be more comfortable in the presence of the mother, then she was asked to be present,if possible, during the administration of the tool (Uzgiris and Hunt 1975).

Tool

The tool used in this study served as a nominal scale of measurement (Appendix E). This tool was not a test and did not yield a quantitative score. The tool, extracted from Uzgiris-Hunt's Ordinal Scales of Psychological Developmen (Appendix G) reported the observations of each subject's behavior and response at a particular developmental level (Uzgiris and Hunt 1975). Toys and objects (Appendix B) were presented to each subject as a play activity to elicit a spontaneous response. The purpose of these observations was to evaluate, descriptively, variations in the development of a perceived body image and spatial awareness of visually impaired preschool children and a control group of normally sighted preschool children. Based on Piaget's concept of the sensorimotor period, this tool will establish the child's cognition of the permanence of objects as well as spatial awareness of objects.

This ordinal scale is divided into six scales for assessment purposes (Appendix G). For the purposes of this study, Scale I (Development of Visual Pursuit and Permanence

of Objects) and Scale V (Construction of Object Relations in Space) was utilized (Appendix E). Each scale denotes certain expected norms of behavioral responses by scoring a situation that has been presented (a specified number of times) to each subject (Uzgiris and Hunt 1975).

In addition to the stated tool, demographic data were collected on each subject; that is, age, sex, race, and a statement of the existence or nonexistence of visual impairment. This information from the school records, parent information, and/or agency records was elicited in the form of a questionnaire, and included all the variables to be delineated in the research design (Appendix F).

Data Collection

Data for this study were collected by utilizing two component parts of the Uzgiris-Hunt Ordinal Scales of Psychological Development (Appendix E). These two scales were administered to each subject in the form of a play activity directed by the investigator. Observations of behavioral responses to toys and objects presented to each subject were made by the investigator and one observer. These observations were scored and recorded by the observer.

The parent of each child used as a subject was approached by the investigator and verbally given a description of the proposed study (Appendix D). Each parent

was informed that certain considerations would be necessary in arranging the evaluation of each child. These considerations included the following:

1. The session of play activity would not last longer than one hour

2. If the child was under two years, the session would be terminated in thirty minutes

3. Two sessions might be necessary for some of the subjects to elicit all the behaviors to be observed and evaluated

4. If the subject was more comfortable with the presence of the mother, she would be requested to be present, if possible, during the evaluation session

5. An observer would be present to score the child's behavioral responses to the toys and objects presented by the investigator

Each parent was given the opportunity to ask questions and refuse or consent for their child to participate in the study. Each parent who agreed for their child to participate in the study signed a written consent form before any participation was initiated (Appendix I).

Demographic data were obtained on each subject either from agency records, school records, and/or the parent (Appendix F). To determine the independent variable

to be controlled (visual impairment), question number four, was included in the questionnaire. The criteria used to define visual impairment was whether or not the child required special educational provisions because of visual problems or visual handicap. The normally sighted preschool children (control Group B) were limited to those children whose parents reported that they had not had any indication that a visual problem existed with their child. Therefore, these subjects of normally sighted preschool children were not receiving special educational provisions for visual problems.

During the administration of the two scales, each subject was supine on a flat surface, in an infant seat, sitting unaided, and/or propped in a sitting position. The position(s) of the subject was determined by the directions for each item to be tested on each scale and with regard to age of the subject or limitation due to physical inability(ies) (Appendix G). The objects and toys that were used for the administration of the scales were those that attracted the subject's attention by sight or sound, depending upon the item being tested. Observations were made and recorded by the observer as to how the subject responded to the objects or toys that were presented by the investigator.

Scale I of the Body Image Scales (Appendix E), consisted of fifteen separate items for evaluation. The investigator began with item number one for each subject, regardless of age of the subject, and proceeded down the item list in chronological order. Each item on the scale was presented at least two times to try to achieve success with the item. If the subject was unable to exhibit the expected behavior (perform task presented), after the specified number of trials, the investigator terminated that section of the evaluation and proceeded to the first item on Scale V. Scale V consisted of eleven items for evaluation. Again, each item was presented in chronological order and at least two times to measure successful accomplishment with the item.

Each subject was allowed freedom to examine more than one toy or object before the evaluation began. This experience attempted to establish an interest in a toy before it was used in the evaluation procedure. If the subject became disinterested at any time during the evaluation, another toy or object was presented to gain further cooperation from the subject. Play periods were allowed for all subjects, if necessary, to increase their interest and cooperation.

No parent of any subject from Group B requested to be present during the evaluation, but some of them did express interest in obtaining information regarding results of the evaluation. Of the seven subjects evaluated in Group A, on two occasions a parent remained with the subject throughout the evaluation period. Two sessions were required to complete data collection from one of the subjects from Group A because of increasing irritability and signs of fatigue.

To control for possible increased experience in the administration of the scales affecting results of the study, the investigator and the observer alternated between the two groups in the evaluation of subjects. Data were collected on two visually impaired subjects and then from two normally sighted subjects. This procedure was followed by alternating data collection between the two sample groups until all fourteen subjects were evaluated.

For the purposes of this study, only one critical action category (one denoted by the asterisk) in the assessment scale was used (Appendix G). This critical action category was used to judge the level of the individual subject's development for the statistical analysis of this particular investigation. If the subject exhibited an action other than the one to be observed, then this action was not delineated or considered critical for this

present study. The subject was evaluated as to whether or not the desired response was observed.

Each subject was brought (by the caretaker at the agency or the parent) to the room designated for the administration of the assessment scales. The subject was presented to the investigator and every attempt was made to provide for the subject's comfort, safety, and cooperation. Explicit directions for each segment of the assessment scale were followed as outlined in the assessment scales selected for this study (Appendix G).

An observer was present throughout the administration of the scales. The observer was a graduate student in Maternal-Child Health Nursing at Texas Woman's University, College of Nursing. The reliability of the observer was established by administering the scales to an infant that was not to be included as a subject in the study. The observations and scoring of the observer and the investigator were compared. When it was established that the same observations and scorings were made by successive evaluations, this validated the observer's reliability. The observer participated in that role throughout the data collection phase and marked either "yes" or "no" with an "x" for each item of the evaluation. This scoring indicated if the subject did or did not perform the action that was presented

by the investigator (Appendix H). Following the completion of the assessment, the investigator returned the subject to the classroom or activity he was participating in prior to the assessment.

Treatment of the Data

Upon completion of data collection, the data were treated in the following manner:

The behavioral responses of two groups of preschool children were compared by using the Fisher Exact Probability Test. This nonparametric test is applicable for comparison of data obtained from two independent groups of small sample size and when every subject in each of the sample groups obtains one of two possible scores. This data tabulation was computed for each item of the assessment (tool) scale used. The results for each group and levels of significance are discussed in Chapter IV. Frequency counts were obtained on demographic data to include sex and race. Age was summarized for each of the groups with computation of the mean, median, and range (Siegel 1956).

Summary

This study investigated the role of vision in preschool children's perception of body image and spatial awareness. A group of visually impaired preschool children was

compared with a control group of normally sighted preschool children, by using the Uzgiris-Hunt Ordinal Scales of Psychological Development. Two parts of these scales, conforming to Piagetian theory, provided the assessment tool (Appendix E). This tool analyzed the permanence of objects and the construction of object relations in space which are both necessary concepts for development of body image and spatial awareness.

CHAPTER IV

ANALYSIS OF DATA

The central issue involved in this investigation was to identify if a difference existed between the perceived body image and the spatial awareness of two groups of preschool children. Group A consisted of seven visually impaired preschool children and Group B was composed of seven normally sighted preschool children. The ages of all the subjects ranged from eighteen months to forty-six months. Both sexes were represented in each of the groups. The role that vision plays in the development of the concepts of body image and spatial awareness was investigated by utilizing two scales of the Uzgiris-Hunt Orginal Scales of Psychological Development. Objects and toys were presented to each subject by the investigator and the responses of the subjects were observed, scored, and recorded by an observer. Several methods were used to analyze the data collected for this study.

Demographic data, acquired in the form of a questionnaire, were collected on all subjects from both groups. Sex and race were tabulated according to frequency counts. The mean, median, and range were computed for statistical description of the age of subjects. The two independent

groups of subjects were compared on the data from the tool using the Fisher Exact Probability Test. Probability values of levels of significance were obtained for each item on each scale.

Demographic Data

Question number one requested demographic data on each subject in regard to age (birthdate), sex, and race. The distribution of sex by group is shown in Table 3.

TABLE 3

DISTRIBUTION BY SEX OF TWO GROUPS

	Group A	Group B	Both
Males	4 (57.1%)	4 (57.1%)	8 (57.1%)
Females	3 (42.9%)	3 (42.9%)	6 (42.9%)
Total	7 (100%)	7 (100%)	14 (100%)

N = 14

Group A consisted of 43 percent females and 57 percent males. In Group B, 43 percent were females and 57 percent were males. In each group there were four male subjects and three female subjects, making the total number of seven subjects in each group.

Of all the subjects evaluated (N=14), 7 percent were of Mexican descent and 93 percent were of Anglo

descent, as listed in Table 4. One hundred percent of the subjects in Group B were of Anglo descent. Group A was composed of 14.3 percent of Mexican subjects and 85.7 percent were Anglo.

TABLE 4

DISTRIBUTION BY RACE OF TWO GROUPS

Descent	Group A	Group B	Both Groups
Anglo	6 (85.7%)	7 (100%)	13 (92.9%)
Mexican	1 (14.3%)	0 (0%)	1 (7.1%)
	7 (100%)	7 (100%)	14 (100%)

N=14

Table 5 displays the distribution of the age of the subjects described by the mean, median, and range. The mean age of Group A subjects was 32.9 months. The median age of the Group A subjects was thirty-six months and the range was from twenty-one to forty-six months. The mean age for Group B subjects was 34.6 months. The median age for this group was thirty-eight months. The age range of Group B subjects was eighteen to forty-four months. The age range of all the subjects included in this study (N=14) was from eighteen to forty-six months.

TABLE 5

AGE DISTRIBUTION BY MONTHS FOR BOTH GROUPS

	Group A	Group B	Both Groups
Mean	32.9	34.6	33.7
Median	36	38	37
Range	21.46	18-44	18-46

Question number two was utilized to ascertain that all subjects in Group B had no visual problem or visual handicap. All subjects from Group A did have a visual problem.

Question number three elicited information regarding the cause of an existing visual problem. If a visual problem existed, information regarding the onset was requested. All subjects from Group A had a visual problem since birth. Distribution of the subjects of Group A, according to the specific cause of their visual impairment, is presented in Table 6. Two subjects, as reported by the parents, had a visual impairment that could be classified in the same category.

Question number four asked if educational facilities were being utilized for the subject because of visual problems. All subjects (100 percent) from Group A were attending

TABLE 6

DISTRIBUTION OF CAUSE OF VISUAL IMPAIRMENT
IN GROUP A SUBJECTS

MEDICAL DIAGNOSIS	NUMBER OF SUBJECTS	PERCENTAGE OF SUBJECTS
Optic Nerve Disease	2	28.6
Bilateral Colobomas	1	14.3
Retinitis Pigmentosa	1	14.3
Microphthalmos	1	14.3
Meningitis	1	14.3
Unknown	1	14.3
	7	100.0

N = 7

a speical program for visually impaired children. No subject from Group B was attending a special program because of visual problems.

Question number five requested information regarding the length of time the subject had been attending a special program for visually impaired children. This length of time ranged from four to thirty-two months for the subjects from Group A. The median length of time for all subjects in this group was computed at seventeen months. This question was not applicable to Group B subjects.

Based on the data analysis, significant differences were evidenced between the two groups, on both scales of the assessment tool. Of the fifteen items evaluated on Scale I, only items number two and three had probability levels which were not significant ($p < .23$). Therefore, due to the overwhelming number of significant differences, the hypothesis, that there would be no difference in the perceived body image of visually impaired subjects as compared to normally sighted subjects, is rejected. There were only three items on Scale V for which the differences between the groups were not significant. Of the remaining eight items, three were of borderline significance and five items were significant at the 0.05 level or less. The null hypothesis , that there would be no difference in the spatial awareness of the visually impaired subjects as compared to the normally sighted subjects, was rejected because of the proportionately larger number of significant differences in the two groups of subjects evaluated.

The data obtained from each subject in both groups was analyzed by using the Fisher Exact Probability Test. The probability values or significance labels obtained from each item on Scale I are displayed in columnar form in Table 7. The probability values or significance levels obtained from each item on Scale V are displayed in columnar form in Table 8.

TABLE 7

COLUMNAR REPRESENTATION OF SUBJECTS FROM BOTH GROUPS
AND RESPONSES TO ITEMS PRESENTED ON SCALE I
WITH SIGNIFICANCE LEVELS

Item Number	GROUP A Yes(%)	GROUP A No(%)	GROUP B Yes(%)	GROUP B No(%)	Significance Level p
1	4(57.1)	3(42.85)	7(100.0)	0(0.0)	< .10
2	5(71.4)	2(28.57)	7(100.0)	0(0.0)	< .23
3	5(71.4)	2(28.57)	7(100.0)	0(0.0)	< .23
4	4(57.1)	3(42.85)	7(100.0)	0(0.0)	< .10
5	3(42.85)	4(57.1)	7(100.0)	0(0.0)	< .05
6	3(42.85)	4(57.1)	7(100.0)	0(0.0)	< .05
7	2(28.57)	5(71.4)	7(100.0)	0(0.0)	< .02
8	2(28.57)	5(71.4)	7(100.0)	0(0.0)	< .02
9	2(28.57)	5(71.4)	6(85.7)	1(14.3)	< .10
10	2(28.57)	5(71.4)	6(85.7)	1(14.3)	< .10
11	2(28.57)	5(71.4)	6(85.7)	1(14.3)	< .10
12	2(28.57)	5(71.4)	6(85.7)	1(14.3)	< .10
13	0(0.0)	7(100.0)	6(85.7)	1(14.3)	= .005
14a	0(0.0)	7(100.0)	5(71.4)	2(28.57)	= .02
14b	0(0.0)	7(100.0)	5(71.4)	2(28.57)	= .02
15	0(0.0)	7(100.0)	5(71.4)	2(28.57)	= .02

SCALE I

TABLE 8

COLUMNAR REPRESENTATION OF SUBJECTS FROM BOTH GROUPS
AND RESPONSES TO ITEMS PRESENTED ON SCALE V
WITH SIGNIFICANCE LEVELS

Item Number	GROUP A Yes(%)	GROUP A No(%)	GROUP B Yes(%)	GROUP B No(%)	Significance Level p
1	4(57.1)	3(42.85)	7(100.0)	0(0.0)	$\leq$ .10
2	5(71.4)	2(28.57)	7(100.0)	0(0.0)	= .23
3	6(85.7)	1(14.28)	7(100.0)	0(0.0)	< .50
4	4(57.1)	3(42.85)	7(100.0)	0(0.0)	< .10
5	4(57.1)	3(42.85)	7(100.0)	0(0.0)	< .10
6	4(57.1)	3(42.85)	5(71.4)	2(28.57)	< .50
7	2(28.57)	5(71.4)	7(100.0)	0(0.0)	< .02
8	2(28.57)	5(71.4)	7(100.0)	0(0.0)	< .02
9	3(42.85)	4(57.1)	7(100.0)	0(0.0)	< .05
10	2(28.57)	5(71.4)	7(100.0)	0(0.0)	< .02
11	1(14.3)	6(85.7)	6(85.7)	1(14.3)	< .02

SCALE V

The last two items on Scale I, numbers fourteen and fifteen, presented by the investigator to the subjects were significant at the .02 level of significance. Item number fourteen, in which a subject must find an object (or toy) that was concealed in the investigator's hand and followed with a series of invisible displacements, consisted of two parts. The subject watched the investigator place the object in the investigator's hand. This object, while hidden in the investigator's hand, was moved in a path in one direction under a series of three screens with the hand that contained the hidden object reappearing between each screen. The object was left under the last screen and the subject was shown the empty hand. For this investigation, two actions were considered critical. The subject could search under all three screens in the same order presented (left to right or right to left) and find the object under the last screen. Or the subject could search directly under the last screen and successfully find the object on two successive trials. If the subject was able to perform this last action (searching directly under last screen), item number fifteen was presented immediately subsequent to item number fourteen.

Significant differences were found ($p < .02$) on items number seven and eight from Scale I. Subjects from

Group A had more difficulty with the tasks presented. Item number seven consisted of finding an object which was completely covered with a single screen. The object was moved and hidden in three different places using different colored screens. The addition of a third screen to hide an object added to the perplexity of the item and resulted in the inability of some subjects to perform the action (task) considered critical for that item. Item number eight, finding an object after successive visible displacements, also utilized three screens. Only 28.57 percent of the visually impaired subjects were able to find the object under the screen where it disappeared last. One hundred percent of the normally sighted subjects were able to find the object when it was hidden under the third screen. Therefore, items number seven and eight showed a significant difference between the two groups.

Item number thirteen, Scale I, represented a highly significant result ($p = .005$). Three screens were utilized again in the presentation of this item. None of the subjects from Group A were able to search directly under the correct screen to find the object. All but one subject from Group B were able to successfully find the object following one invisible displacement with three screens. There was a highly significant difference between the two groups on this item.

Significant differences ($p < .05$) were found between groups on items number five and six on Scale I. The subject was expected to find an object which was completely covered by one screen in one place and another screen in another place, and the subject locates the object under the first screen (first place of hiding). This was followed (item number six) by hiding the object in two different places, alternating between the two screens. More than 50 percent of the subjects from Group A could not locate the object under the correct screen, whereas, all of the subjects from Group B were able to perform this task by searching under the screen where the object disappeared.

Levels of significance ($p \leq .05$) were identified in Scale V on items number seven, eight, nine, ten, and eleven. Item number seven, placing objects in equilibrium one upon the other, was not performed by as many Group A subjects as the preceding item number six. The visually impaired subjects could not perform the action despite demonstrations and encouragement from the investigator. The appreciation of gravity by playing with objects, item number eight, was not realized by as many subjects from Group A. Item number nine ($p < .05$) explored the fall of dropped objects. Continuing with items number ten and eleven, the results showed significance levels of $p < .02$

for both items evaluated. Fewer subjects from Group A were able to make detours to retrieve a displaced object (item ten).

All subjects were questioned in item number eleven as to where their mother was. If the mother was present at this time during the evaluation, she was asked to leave for a short period of time. Only one subject from Group A was able to indicate verbally that his mother was not in the room. All the subjects from Group A had been separated from their mother no longer than an hour previous to the commencement of the evaluation. Six subjects in Group B were able to respond verbally and give an appropriate answer to "where is Mommy?" None of these subjects, by contrast, had seen their mother for three to six hours preceding the evaluation. This put the significance level at $p < .02$.

Items one, four, nine, ten, eleven, and twelve on Scale I were of borderline significance at the $p < .10$ level. Item one evaluated the subject's ability to follow a visually presented object through a 180 degree arc. Item four presented a completely hidden object to the subject and ascertained if the object was found by the subject removing the screen which covered the object. When the investigator identified that the subject was still interested

in the object used in item number eight, the object was covered with three superimposed screens. The subject had to remove each screen and find the hidden object to get a "yes" to item number nine.

Items number ten, eleven, and twelve evaluated whether a subject searched for an object following an invisible displacement. A box was used to hide the object. The subject watched as the object was placed in the box. The box was then turned over under a screen and the subject was shown the empty box and encouraged to find the object which had been left under the screen. Item ten used one screen, item eleven used two, and item twelve utilized two screens with alternating presentations. Seventy-one percent of the subjects from Group A could not perform these tasks while only 14.3 percent of the subjects from Group B could not perform the tasks.

No significant differences were found between groups on items two and three from Scale I ($p \nless .23$). Only two subjects from Group A were unable to notice the disappearance of a slowly moving object. The same number of subjects from this group could not find an object which was partially covered with a screen.

On Scale I, items one ($p \leq .10$), four and five ($p < .10$) were at the borderline significance level. The subjects

of both groups were presented with two objects placed about six inches apart and about ten inches from the subject's eyes. Observations of the movements of the subject's eyes were made by the investigator and the observer. Quick alternate glancing from one object to the other constituted a "yes" response. Forty-two percent of the subjects from Group A had difficulty because their visual impairment prevented the performance of this task. Forty-eight percent were able to alternate glancing. Item number four, following visually the trajectory of a rapidly moving object, was not possible for 42 percent of the Group A subjects. These subjects did not lean forward to search for an object which was dropped out of their line of sight. To evaluate the subject's ability to recognize the reverse sides of objects, item number five was presented. A borderline significance level of $p < .10$ was identified between the two groups. Forty-two percent of the subjects from Group A did not indicate knowledge of the difference between two sides of a baby bottle. The bottle was presented as the object to determine if the subject recognized the reverse sides of objects.

Item number nine from Scale V was significant at the $p < .05$ level. All of the subjects from Group B explored the fall of several dropped objects but 57 percent of the

subjects from Group A did not drop objects or look where the objects had landed if they were dropped by the investigator.

Three items, numbers two ($p = .23$), three ($p < .50$), and six ($p < .50$), did not discriminate between groups. Item number two was to visually localize an object by its sound. Only 28.6 percent of the subjects from Group A were unable to use their eyes in localizing the sound of a ringing bell. All subjects from Group B were able to localize the sound with their eyes. When presented with an object, item number three, six subjects from Group A reached and grasped the object after the investigator presented the object. All subjects from Group B grasped the object when it was visually presented. Each subject was given a container and several small blocks or wooden beads on item number six, to determine an appreciation of spatial relationship between objects. If the subject placed or dropped the blocks or beads into the container and turned the container over to remove the objects, this was considered the critical "yes" response. Subjects from both groups had difficulty with this item. The subjects that did not perform the task, as prescribed, reached into the box to remove the blocks or beads instead of turning the container over to "spill" the contents. The level of significance

as stated was significant at the $p < .05$ level.

A summary of the significance levels for items on each scale is presented in Table 9 with the percentage for each numbered item. This table gives a distinct picture of the number of items that fall into different significance levels summarized by percentage.

TABLE 9

PERCENTAGE OF ITEMS FALLING INTO DIFFERENT SIGNIFICANCE LEVELS

ITEM NUMBER	SIGNIFICANCE LEVEL	PERCENTAGE OF ITEMS RECEIVING THIS SIGNIFICANCE LEVEL
Scale I	Probability	
13	p=.005 (Highly)	6.66
7, 8, 14 (a and b), 15 5, 6	p < .02 p < .05 (Significant)	40
1, 4, 9, 10, 11, 12 2, 3	p < .10 (Borderline) p < .23 (Not Significant)	40 13.3
Scale V		
7, 8, 10, 11 9	p < .02 p < .05 (Significant)	45
1, 4, 5	p < .10 (Borderline)	27
2 3, 6	p < .23 p < .50 (Not Significant)	28

Summary

The behavioral responses of two groups of preschool children were compared using the Fisher Exact Probability Test. Group A consisted of seven visually impaired subjects. Group B, the control group, was comprised of seven normally sighted subjects. The data tabulation was computed for each item on the assessment scales (tool) used. The results of the evaluations for each group and levels of significance are listed in columnar form on Tables 7 and 8. Age was summarized for each of the groups with computation of the mean, median, and range. Frequency counts were obtained on demographic data to include sex and race. The null hypotheses, that there would be no significant difference between the perceived body image and the spatial awareness of the two groups, were rejected. The alternate hypotheses are accepted due to the overwhelming number of significant differences between the two groups on each scale utilized in this study.

CHAPTER V

SUMMARY, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Visually impaired and normally sighted preschool children, with whom this research study was concerned, were evaluated and compared on Scales I and V of the Uzgiris-Hunt Ordinal Scales of Psychological Development. These two Scales follow Piaget's theory of sensorimotor cognitive development during the first two years of a child's life. The conclusions of this study are presented along with implications for nursing practice and recommendations for further study.

Summary

The problem of this study was to compare the perceived body image and spatial awareness of two groups of preschool children. By using a group of seven visually impaired preschool children and a group of seven normally sighted preschool children, the investigator evaluated the role of vision in the development of object permanence and relation of objects in space. These two concepts are necessary for the development of the child's body image and for his awareness of the body and objects in the space surrounding the body.

The design for this study was one of systematic correlation. The primary steps taken in the data collection phase and in the methodology of the research design began with the selection of subjects. The visually impaired subjects were purposely chosen; that is, all children with some residual vision (some degree of functional vision) who were enrolled in a program for visually impaired children were included as possible subjects. No child over forty-eight months of age was included as a subject in either Group A or Group B. The normally sighted subjects, chosen from a day care center, were matched, as closely as possible, for age and sex, to the visually impaired subjects.

Two hypotheses were tested in this study. The first hypothesis stated that there would be no significant difference between:

1. The perceived body image of visually impaired preschool children and normally sighted preschool children. This null hypothesis was rejected in favor of the alternate hypothesis due to the overwhelming significant differences found between the two groups evaluated.

Uzgiris-Hunt Scales I and V, from the six Ordinal Scales of Psychological Development, was the tool used to evaluate the behavioral responses of the two groups of

subjects included in this study. Scale I, Object Permanence, parallels Piaget's theory of sensorimotor cognitive development. The role of vision was found to be significant in the development of this concept. Vision played a paramount role in the ability of the subjects in Group A to master the tasks on items evaluated.

Table 1 presents Piaget's Sensorimotor Substages. Substage IV, Coordination of Secondary Schemes, begins at about one year of age at which time the child begins a search for lost objects. The objects evaluated in this study were all beyond the chronological year of one year. The average age was equal to 32.9 months and only 57 percent were able to find an object that was covered by a screen. As the level of difficulty increased with each succeeding item presented, more subjects from Group A were unable to perform the task that depended upon adequate vision. Not one subject from this group of visually impaired children could find an object following an invisible displacement. Six subjects, which represented 85.7 percent of all the normally sighted subjects in Group B, were able to follow an invisible displacement of an object. The probability of this item was highly significant at the $p = .005$ level of significance. The one subject from Group B who did not receive a "yes" for this item had not reached

the chronological age, according to Piaget's Substage V, when permanence of objects is established.

The second hypothesis tested in this investigation stated that there would be no significant difference between:

2. The spatial awareness of visually impaired preschool children and normally sighted preschool children.

This null hypothesis was rejected in favor of the alternate hypothesis because of the proportionately greater number of significant differences between Group A and Group B subjects.

Scale V evaluated the behavioral responses of both groups in regard to the relation of objects in space. The visually impaired subjects, Group A, had not reached the level of development necessary to attain the more complex tasks on this scale. This level is reached at approximately twenty-four months of age (Piaget 1969; Uzgiris and Hunt 1975). The average age of these subjects was 32.9 months. All but one of the normally sighted subjects was able to perform the highest level item evaluated on this scale. This subject had not reached the chronological age of twenty-four months when a "yes" response to this item would be expected.

This study can be considered a guide for pediatric nurses for assessing the learning and thought processes (the cognitive development) of visually impaired preschool children as well as normally sighted preschool children. The investigation adds to basic nursing knowledge of visual impairment and the concomitant effect this sensory deprivation has on a child's developing body image and his awareness of the body in space. This knowledge and its adaptation to the Johnson Nursing Model gives direction for nursing practice. A nursing model and knowledge of the cognitive development processes of preschool children can serve as a conceptual framework for nurses in the implementation of the nursing process.

Conclusions

To conduct a correlation analysis, the independent variable must be related to a reasonably continuous distribution of subjects in relation to, for example, age, sex, or measurements of intelligence. The selected (manipulated independent) variable, visual impairment, was not continuous. The sample showed a clustering of subjects in the 3 to 3 1/2 year age group of subjects who were predominately male. However, the population of visually impaired preschool children was limited, but the

sample chosen did include all children available for study that were visually impaired and had some residual vision of functional use. By definition these children were not blind; that is, their vision was better than light perception. Each subject had a different amount of functional vision due to the particular cause of their visual impairment. Two subjects were visually impaired because of optic nerve disease. The cause of visual impairment in the other five subjects were as follows: 1) bilateral colobomas, 2) retinitis pigmentosa, 3) meningitis, 4) microphthalmos, and 5) unknown. Each subject had been visually impaired from birth.

Other physical handicapping conditions were not controlled for and therefore had a bearing on the ability of the child to perform all of the items evaluated on each scale of assessment. Due to the extreme heterogeneous nature of the sample of subjects evaluated, the results are not generalizable to a larger population of visually impaired preschool children.

It can be concluded that because of a visual impairment (degeneration of the optic nerve, a tumor of the eye, or congenital cataracts, for example), not all visually impaired children will perceive their body image or spatial awareness in an identical way. The rate of the child's

development of these concepts will vary. Two of the visually impaired subjects, close in chronological age, reached the higher stages of sensorimotor cognitive development in regard to object permanence and the relation of objects in space. These subjects had developed the ability to integrate structures (items evaluated) at lower levels. These two subjects appeared to have more functional vision. A question could be posed as to whether or not these subjects had experienced more instruction in following displacement of objects, had continuous stimulation of their residual vision, or possessed a better intelligence quotient.

One focus of this study has been to identify the possibility of using Scales I and V in the assessment of learning and thought competencies of visually impaired children. These Scales were developed and validated for use with normally sighted infants from birth to two years. It can be concluded from this study that the results of the evaluation of the normally sighted preschool children further validate the use of these Scales for this population. Also, Scales I and V do give identifying measures of the cognitive development of visually impaired preschool children and are useful as tools to longitudinally record the progress of the child's development.

Implications

The implications of this study are directed to pediatric nurses and other nurses that may be involved in the care of visually impaired children and the education of their families. An understanding and awareness of the child's intellectual development is important in the assessment of the child and the establishment of necessary goals of nursing intervention. This development approximates Piaget's theory of sensorimotor cognitive development during the first two years of a child's life. Uzgiris-Hunt Ordinal Scales of Psychological Development can be of value to nurses in determining behavioral responses during play activities with children. These activities can indicate the child's development of the concept of permanence of objects.

By determining the level (the sensorimotor stage) of a child's thinking processes, the nurse can apply what the child is able to do in real life situations. Important criteria for satisfactory cognitive development are the child's perception of his body parts, mobility skills, self help skills, as well as the development of a good self concept. The child must have an identity separate from other people and objects in his environment.

Nurses can instruct mothers in the importance of the child's exploration of objects, toys, and the

environment early in life. The visually impaired child needs stimulation through all of the sensory modalities. This child needs visual stimulation to make optimal use of the residual (functional) vision that might be present. The child requires stimulation through extra touch by others and the introduction of all textures to be touched. Also necessary is increased auditory input (voices, music). Tastes and smells should be presented early to the visually impaired child which are taken for granted by the normally sighted child. A nurse's understanding of proper intervention techniques, that will structure environmental experiences to prevent possible developmental lags, is essential.

The birth of a visually impaired infant can be emotionally disturbing to parents and other family members. The nurse must assist the family unit to dispel fears and erroneous attitudes concerning the infant. Eye contact, so important in maternal-child bonding, may be missing but the nurse can encourage the mother to utilize extra touch and more vocalization to secure this bonding.

Frequent hospitalizations of visually impaired children is often necessary for medical and surgical attention of the visual problem. Nurses need to adequately assess the level of development of these children to be

able to adopt a nursing care plan to meet the particular needs of the child and establish goals for the child and the family.

Nurses equipped with knowledge of visual impairment can be sources for early case finding and referral. By using serial and sequential observations, the nurse can assess the visually impaired child to detect possible developmental lags. Health teaching, in the form of primary preventive measures and anticipatory guidance, can be instituted and directed toward the enrichment of the visually impaired child's environment.

Recommendations

Subsequent studies based on the findings of this investigation can be made. Nurses can conduct research in these areas which relate to the practice of nursing and add to a scientific base for sound nursing theory. These recommendations are:

1. A follow up study on the same visually impaired subjects to identify if added age would enhance their ability to perform at a higher level (stage) of cognitive development. Comparisons of data could be made on a correlation basis to another group of normally sighted subjects. A longitudinal study could be done to identify if

the intellectual rate of growth is normal by plotting this on a graph much the same as physical growth rates are plotted

2. Utilize the modalities of sound and touch as criteria of evaluation in addition to visual pursuit. This could be accomplished, for example, by the determination of the number of trials necessary before a subject can reach a certain level of accuracy in identifying objects by shape, weight, or other tactile properties

3. Establish some methods of control for the visually impaired subjects in regard to other handicaping conditions. This could be accomplished by using a "within group" analysis and evaluation

4. Plan a program of teaching strategies aimed at developing some expected behavioral responses then test, apply the learning treatment (an intervention), and follow with a post test

5. Establish a control for intellectual ability by the use of a testing procedure designed for visually impaired subjects. Suggested tests are: 1) Maxfield Buchholz's Social Maturity Scale for Blind Preschool Children, 2) the Perkins-Binet adaptation of the Stanford-Binet, and 3) Vision Up (from the American Foundation for the Blind). These tests would be administered prior to the

evaluation using the Uzgiris-Hunt Ordinal Scales of Psychological Development.

6. A follow up study could be done at a later time on the same group of visually impaired subjects and compare the results of this study to an investigation using Cratty's Body Image Scales normed on visually impaired school aged children

7. Comparative studies of stereotypic behavior (selfstimulatory of selfcomforting) in visually impaired and normally sighted subjects would increase the understanding of cognitive and adaptive behavior of these subjects. And, at the same time assess the effect these behaviors have on peers and/or siblings.

8. Other studies can be done to determine what criteria, based on the abilities of visually impaired subjects, are needed for the integration of these subjects into nurseries, day care centers, and eventually schools with normally sighted children

Additional testing devices and procedures need to be devised that can more accurately and effectively measure and evaluate the development of the concepts of body image and spatial awareness in the visually impaired preschool child. The Uzgiris-Hunt Ordinal Scales for Psychological

development do evaluate concepts when the subject possesses sufficient residual vision.

The Johnson Nursing Model, as a conceptual framework for nursing practice, can be utilized in the care of the visually impaired child as well as the normally sighted child and their families. Nurses using this systems model consider the holistic approach to the child and are able to implement the nursing process with competence and accountability.

It is anticipated that the results of this study will aid nurses in effective implementation of the nursing process. For this reason, the cognitive development of visually impaired preschool children, their learning and thought processes, could be more skillfully assessed. Proficient goals of intervention can be established based on a perceptive nursing diagnosis of an individual child's developmental level. The consequences of play as intervention can be evaluated for changes of significance in the quality of care afforded an individual child and his family. And finally, the evaluation examines the effectiveness of the plan for resolving any problems identified in relation to the child and/or his family.

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APPENDIX A

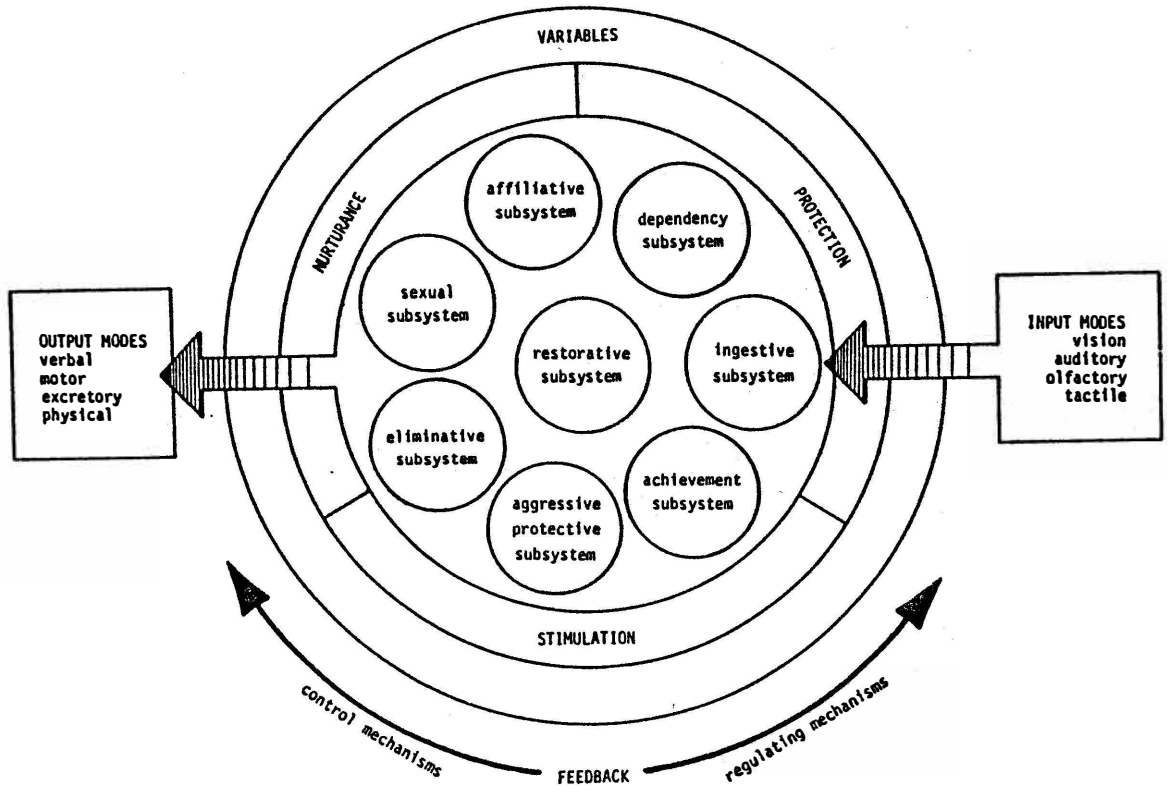

FIG. 1. Behavioral System: Man.

APPENDIX B

TOYS AND OBJECTS

1.	Aluminum Foil	Pieces 4 x 6 inches in size, of commercially sold aluminum wrapping foil.
2.	Ball	Colorful child's ball about 4 inches in diameter.
3.	Bell	A small, brass bell, with a handle, about 2 inches in diameter and 4 inches high and making a clear sound.
4.	Blocks	Ten one-inch-square wooden blocks, usually sold commercially with letters or numbers painted on them in different colors.
5.	Bottle	A commercially sold baby bottle of whitish plastic.
6.	Box	A plain cardboard box, about 5 x 4 inches and 4 inches deep. The box is completely unimportant in itself as long as it is not attractive to the infant, is big enough to make a small toy invisible when it is lowered into the box, and is still small enough so that it can be turned over while completely covered by one of the screens.
7.	Car	A small red car or truck (about 5 inches long) which can be operated by friction.
8.	Cardboard	A piece of neutral-colored heavy cardboard, 6 x 8 inches in size, to be used to construct an incline.
9.	Checkerboards	Two 4 x 4 inch cards with half-inch checkered squares taped on with plastic tape, yellow and red on one, and yellow and blue on the other.
10.	Container	A small container (about 6 inches high), narrow at the bottom and widening at the top, made of unbreakable material, such

		as plastic. It is important that it would be unsteady enough so that a piece of the necklace draped over its rim would topple it.
11.	Cotton	A ball of cotton as sold commercially.
12.	Cup	A regular plastic drinking cup (3 inches high) with a handle, and pale in color.
13.	Doll	Two different dolls: (a) a plastic baby doll, about 5 inches high, which does not squeak, and has eyes that close; (b) a miniature boy or girl doll, about 3 inches high, with a vinyl head and pliable arms and legs, dressed in appropriate clothes.
14.	Jumping Jack	a 5-inch wooden toy with movable joints, in the shape of a man, a bird, or an animal, painted in bright colors and activated by pulling a string.
15.	Mechanical Toy	A 4 to 6 inch toy in the shape of an animal (duck, bunny, squirrel) that moves on the floor in a characteristic way when wound by an unobtrusively located key.
16.	Multicolored Ring	A brightly colored ring made up of about 16 plastic snap-together beads, each about 2 inches long, of several shapes and colors.
17.	Musical Clown	A roly-poly toy in the shape of a clown that makes a musical sound when shaken. It consists of a ball, about 5 inches in diameter, topped by a smaller ball with the features of a face and a hat. It is weighted to return to an upright position when pushed from side to side.
18.	Musical Rattle	A colorful plastic cylinder, about 4 inches high, attached to a slender handle, which makes a musical sound when moved.

19.	Necklace	A long single-stranded necklace made of fairly small, shiny, pale-color beads with several larger, darker beads interspersed at 3-inch intervals. The necklace should be at least 32 inches long so that it would easily go over the head of the infant. It is extremely important that the string used would be very strong and that the beads would be made of hardy material, not glass, so that they could not be broken and swallowed by an infant.
20.	Pillow	A square 12-x-12 inch decorator pillow, covered with corduroy or some other sturdy material, and neutral in color (rust, olive, mustard) so that it would not be attractive in itself.
21.	Pinwheel	A plastic brightly colored pinwheel about 4 inches in diameter attached to a rod.
22.	Plastic Animals	Several kinds of plastic animals: (a) a 5-inch animal (fish, duck) made of soft vinyl in white or yellow, making a sound when squeezed; (b) a 5-or 6-inch animal (duck, porpoise) made of hard vinyl) designed to be a floating bathroom toy and, thus, with a flat, undecorated bottom side; (c) several 2-inch animals (cow, dog, lamb, horse) made of hard vinyl, sold commercially in farm animal sets.
23.	Plastic Flower	Commercially sold artificial flower blossom, 2 inches in diameter.
24.	Pull-Toy	A wooden toy on wheels, in the shape of an animal, about 5 inches high, designed to be pulled along by a toddler.
25.	Rattle	A small plastic baby rattle, with two round balls at each end and a slender, easy-to-grasp center.

26.	Screens	Several pieces of cloth used to cover objects. It is important for them to be unattractive in themselves, non-transparent, and large enough to be bunched over the object covered in a fashion which completely avoids revealing its shape. An 18-x-18 inch white scarf, a similar piece of cotton material in a small print, and one in a drab color are appropriate.
27.	Shoe	A white doll's shoe made of rubber, about 2 inches long, with a strap.
28.	Slinky	A coiled wire toy which flips over on a step.
29.	Spool	A wooden spool with the thread taken off with a stripe painted around the corner in red.
30.	Stacking Rings	A set of five flat plastic rings of equal size (about 2 3/4 inches in diameter and about 1 inch thick) that fit over a rod which is 6 inches long and unconnected to anything. Each of the rings used is of a different color. One of the rings is made solid by taping over its hole with tape of the same color, after stuffing it with cotton.
31.	Stick	A round, wooden dowel, about 18 inches long.
32.	String	Seven feet of strong wrapping string.
33.	Stuffed Animal	Two different-sized toys: (a) a furry, stuffed animal (dog or cat) in a sitting position, about 4 inches high; (b) a smaller, also furry animal in an upright position, about 2 inches high.
34.	Walking Toy	A plastic weighted animal (dog, cat) about 2 1/2 inches high, designed to move by itself on an incline.

APPENDIX C

TEXAS WOMAN'S UNIVERSITY
COLLEGE OF NURSING
DENTON, TEXAS

DALLAS CENTER
1810 Inwood Road
Dallas, Texas 75235

HOUSTON CENTER
1130 M.D. Anderson Blvd.
Houston, Texas 77025

AGENCY PERMISSION FOR CONDUCTING STUDY*

THE Dallas Services for Visually Impaired Children

GRANTS TO Beverley M. Small

a student enrolled in a program of nursing leading to a Master's Degree at Texas Woman's University, the privilege of its facilities in order to study the following problem:

"Perception of Body Image and Spatial Awareness In Visually Impaired and Normally Sighted Preschool Children".

The conditions mutually agreed upon are as follows:

1. The agency (may) (~~may not~~) be identified in the final report.
2. The names of consultative or administrative personnel in the agency (may) (~~may not~~) be identified in the final report.
3. The agency (wants) (~~does not want~~) a conference with the student when the report is completed.
4. The agency is (willing) (~~unwilling~~) to allow the completed report to be circulated through interlibrary loan.
5. Other: _____

Date 10-17-77

Chris Compton
Signature of Agency Personnel

Beverley M. Small
Signature of student

Tommie R. Wallace
Signature of Faculty Advisor

*Fill out and sign three copies to be distributed as follows: Original -- Student; first copy -- agency; second copy -- T.W.U. College of Nursing.

GMIS - 110

TEXAS WOMAN'S UNIVERSITY
COLLEGE OF NURSING
DENTON, TEXAS

DALLAS CENTER
1810 Inwood Road
Dallas, Texas 75235

HOUSTON CENTER
1130 M.D. Anderson Blvd.
Houston, Texas 77025

AGENCY PERMISSION FOR CONDUCTING STUDY*

THE St. Thomas Day School

GRANTS TO Beverley M. Small

a student enrolled in a program of nursing leading to a Master's Degree at Texas Woman's University, the privilege of its facilities in order to study the following problem:

"PERCEPTION OF BODY IMAGE AND SPATIAL AWARENESS IN VISUALLY IMPAIRED AND NORMALLY SIGHTED PRESCHOOL CHILDREN"

The conditions mutually agreed upon are as follows:

1. The agency (may) (~~may not~~) be identified in the final report.
2. The names of consultative or administrative personnel in the agency (may) (~~may not~~) be identified in the final report.
3. The agency (wants) (~~does not want~~) a conference with the student when the report is completed.
4. The agency is (willing) (~~unwilling~~) to allow the completed report to be circulated through interlibrary loan.
5. Other: _____

Date 10-18-77

Signature of Agency Personnel

Beverley M. Small
Signature of student

Signature of Faculty Advisor

*Fill out and sign three copies to be distributed as follows: Original -- Student; first copy -- agency; second copy -- T.W.U. College of Nursing.

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TEXAS WOMAN'S UNIVERSITY

Human Research Committee

Name of Investigator: Beverley M. Small Center: Dallas

Address: 3883 Turtle Creek Blvd., # 1212 Date: October 17, 1977

Dallas, Texas 75219

Dear Ms. Small:

Your study entitled "Perception of Body Image and Spatial Awareness On Visually Impaired & Normally Sighted Preschool Children", has been reviewed by a committee of the Human Research Review Committee and it appears to meet our requirements in regard to protection of the individual's rights.

Please be reminded that both the University and the Department of Health, Education and Welfare regulations require that written consents must be obtained from all human subjects in your studies. These forms must be kept on file by you.

Furthermore, should your project change, another review by the Committee is required, according to DHEW regulations.

Sincerely,

Geraldine M. Stone

Chairman, Human Research
Review Committee
at ~~Dallas~~

TEXAS WOMAN'S UNIVERSITY

DENTON, TEXAS 76204

THE GRADUATE SCHOOL
P.O. BOX 22479, TWU STATION

November 1, 1977

Ms. Beverley Menzies Small
3883 Turtle Creek Blvd., #1212
Dallas, TX 75219

Dear Ms. Small:

I have received and approved the Prospectus for your research project. Best wishes to you in the research and writing of your project.

Sincerely yours,

Phyllis Bridges

Phyllis Bridges
Dean of the Graduate School

PB:jp

cc: Miss Tommie Wallace
Dr. Anne Gudmundsen
Nursing Center
Graduate Office

APPENDIX D

VERBAL EXPLANATION TO PARENTS OF
CHILDREN TO BE USED AS SUBJECTS
PRIOR TO SIGNING OF CONSENT FORM

Ms. _____: I am Beverley Small and I am a nursing student in the graduate program at Texas Woman's University. As part of the requirements for a Master's degree, I am collecting information on a subject that is of interest to me to present as a thesis.

I am attempting to determine if there is a difference in the body image (how a child pictures his body) of two groups of children. One group will be children with a visual handicap and the other group will be children who do not have a visual handicap. In order to accomplish this goal, I need to examine the level of development of these children. I plan to do this evaluation in the form of a play activity. I will take the individual child into a familiar room in this agency and present toys and objects to him. There will be an observer in the room with me who will record on paper what the child does when presented with a particular toy or object. I will then take the child back to the area where he was previous to the evaluation session.

There are certain guidelines that I will follow for any evaluation session with your child. These are:

1. the session of play activity will not last longer than one hour

2. if your child is under one year of age, the session will be terminated after thirty minutes

3. two sessions may be necessary to complete all of the test

4. if your child appears more comfortable when you are present, I would like for you to be present during the testing, if possible, and

5. if you desire to be present during the testing, I would encourage you to be there.

In addition, I do need your signature on these two forms before I can begin any evaluation. If you volunteer to have your child participate in the data collection phase of this study, please read and sign the attached forms.

I understand if you select not to have your child participate in this study. Do you have any questions about anything that I have told you or about the evaluation procedure to be used in this study?

APPENDIX E

BODY IMAGE SCALES

SCALE I: THE DEVELOPMENT OF VISUAL PURSUIT AND THE PERMANENCE OF OBJECTS

	Situation	Trials	Response to be Observed
1.	Following a slowly moving object through 180° arc	3-4	1. Follows object smoothly through complete arc
2.	Noticing disappearance of a slowly moving object	3-4	2. Returns glance to starting point after several presentations
3.	Finding an object which is partially covered	3	3. Obtains the object
4.	Finding an object which is completely covered	3	4. Pulls screen off and obtains object
5.	Finding an object completely covered in two places	2	5. Searches for object where it is last hidden

	Situation	Trials	Response to be Observed
6.	Finding an object completely covered in two places alternately	3-5	6. Searches correctly under each of the screens
7.	Finding an object completely covered in three places	5-7	7. Searches directly under correct screen
8.	Finding an object after successive visible displacements	3-5	8. Searches directly under the last screen in path
9.	Finding an object under three superimposed screens	2-3	9. Removes all screens and obtains object
10.	Finding an object following one invisible displacement	3	10. a. Checks the box and searches under the screen b. searches under screen directly
11.	Finding an object following one invisible displacement with two screens	2	11. Searches directly under correct screen

Situation	Trials	Response to be Observed
12. Finding an object following one invisible displacement with two screens alternated	3	12. Searches directly under correct screen
13. Finding an object following one invisible displacement with three screens	5-7	13. Searches directly under correct screen
14. Finding an object following a series of invisible displacements	4-6	14. a. Searches under all screens in the path in the order of hiding b. Searches directly under the last screen in the path
15. Finding object following a series of invisible displacements by searching in the reverse order of hiding	2	15. Searches systematically from the last screen back to the first

SPACIAL AWARENESS SCALE

SCALE V: THE CONSTRUCTION OF OBJECT RELATIONS IN SPACE

A. Development in Localization of Objects in Space

Situation	Trials	Response to be Observed
1. Observing two objects alternately	2-3	1. a. Alternates glance slowly between objects b. Alternates glance rapidly between objects
2. Localizing an object by its sound	5-7	2. Localizes the source of the sound visually
3. Grasping a visually presented object	2-3	3. Grasps object
4. Following the trajectory of a rapidly moving object	3-4	4. a. Follows object and locates it visually only when it lands in view b. Leans to search for object in the direction where it must have landed

Situation	Trials	Response to be Observed
5. Recognizing the reverse side of objects	2-3	5. Grasps object, but turns it around immediately or by comparing both sides indicates appreciation of reversal

B. Development in Appreciation of Spatial Relationships Between Objects

Situation	Trials	Response to be Observed
6. Using the relationship of the container and the contained	2-3	6. Puts or drops object in and reverses container to get object out
7. Placing objects in equilibrium one upon the other	2-3	7. Builds a tower of at least two objects
8. Appreciating gravity in play with objects	2-3	8. Acts with appreciation of the force of gravity
9. Exploring fall of dropped objects	1-2	9. Drops several objects repeatedly and looks to see where they land

Situation	Trials	Response to be Observed
10. Making detours	2-3	10. Goes directly around the barrier, thus making a detour
11. Indicating absence of familiar persons	1	11. Indicates knowledge of absence by gesture or word

SOURCE: I. Uzgiris and J. Hunt, "Scales I and V from Ordinal Scales of Psychological Development," Assessment in Infancy (Chicago: University of Illinois, 1976)

APPENDIX F

Date_____

QUESTIONNAIRE

1. What is your child's birthdate, sex, and race?
   birthdate_____ sex_____ race_____

2. Does your child have a visual problem or visual handicap that you are aware of?
   Yes_____ No_____

3. If yes, please give the cause of his or her visual problem, if known.

   _____

   Length of time present, if known

   _____

4. Indicate yes or no if your child attends a special program for visually impaired children
   Yes_____ No_____

5. If you answer yes to Question #4, how long has your child attended a special program for visually impaired children?

   Length of time: _____Years _____Months

APPENDIX G

SCALE I: THE DEVELOPMENT OF VISUAL PURSUIT AND THE PERMANENCE OF OBJECTS

A. VISUAL PURSUIT OF SLOWLY MOVING OBJECTS

1. Following a Slowly Moving Object Through a 180° Arc

Location:
The infant may be supine on a flat surface, in an infant seat, or sitting up by himself.

Object:
Any bright object that attracts the infant's attention, but does not make a sound when moved, e.g., the multicolored ring.

Directions:
Hold the object about 10 inches in front of the infant's eyes, until he focuses on it. With a young infant it may be necessary to shake the object lightly in order to attract attention or to vary its distance from the infant's eyes, to find the optimal focal distance. If an older infant tends to focus on the examiner rather than on the object, stand behind the infant. Once the infant has focused on the object, move it slowly through a lateral arc of 180°.

Repeat:
3-4 times.

Infant Actions:
- a. Does not follow object.
- b. Follows object through part of arc with jerky accommodations.
- c. Follows object through arc, with smooth accommodations.
- *[d] Follows object through the complete arc smoothly.[1]

[1]A letter in brackets before the description of an infant action indicates that the action is considered critical for achievement of a step in the scale. An asterisk indicates an action which has been used to judge the level of an infant's development for the scaling analyses of this investigation.

2. Noticing the Disappearance of a Slowly Moving Object

Location:
Same as in situation 1, but not on the floor.

Object:
Same as in situation 1.

Directions:
Once the infant has focused on the object, move it slowly to one side and away from the infant, making it disappear below the edge of the infant's seat or the surface on which he is placed. After a few moments, bring the object back in front and slightly above the infant's eyes from the opposite side (i.e., move the object behind the infant). Always move the object in the same direction and have it disappear at the same point.

Repeat:
3-4 times.

Infant Actions:
- a. Does not follow object to point of disappearance.
- b. Loses interest as soon as object disappears (eyes begin to wander and then focus on any interesting object within view).
- *[c] Lingers with glance at the point where the object has disappeared.
- *[d] After several presentations, returns glance to the starting point of reappearance (slightly above normal eye level) before the object has reappeared.
- e. Searches with eyes around the point where the object has disappeared.[2]

Note: If a tendency of the infant to move the head to one side and to keep it there is suspected in the course of the presentation, repeat the whole procedure at a later time, making the object disappear on the opposite side.

[2]This action appeared too seldom to be included in the scaling analysis so the asterisk is omitted even though "searching with the eyes around the point where the

object disappeared" may appear to be equivalent to a "lingering of the glance" in implying the beginnings of object permanence. The term "searching" is an interpretation. It implies movement of the eyes, and the meaning of such motion in this situation is still empirically unclear.

B. SEARCH FOR SIMPLY HIDDEN OBJECTS

3. Finding an Object Which is Partially Covered

Location:

The infant must be in a sitting position with both hands free to manipulate objects. A young infant may be propped up in an infant seat or on a sofa using pillows. An older infant may be seated in a high chair or on a rug on the floor. A working surface must be available in front of and to the side of the infant; it may be provided by placing a board across the infant seat, by pushing the high chair against a table, or by using a rug-covered space around the infant, if he is sitting on the floor. An infant feeding-table is also suitable.

Object:

Any object which the infant demonstrates interest in by reaching for

Infant Actions:

a. Loses interest in the object once it is partially covered.

b. Reacts to the loss of the object, but does not reach for it and does not obtain it once it is partially covered.

*[c] Obtains the object by pulling it out from under the screen or by removing the screen and picking up the object.

it; and, for a cover or screen, a white nontransparent scarf. It is important that the object be unitary, and that no portion of the object should look equivalent to the whole. A plastic doll or animal may be used, but an object such as a necklace would be unsuitable. Use of a white nontransparent scarf for the screen helps to minimize the interest of infants in the screen.

Directions:

To ascertain that an infant desires the object, place it on the surface and observe that the infant reaches for it. Take the object, while making sure the infant is focusing on it, place it on the surface within his reach, and cover it with the screen in such a way that a small portion of the object remains visible (the feet of the doll, the tail of the animal, etc.). If, in his attempts to obtain the object, the infant covers it up completely, start a new presentation. If the infant's interest in the object become doubtful, interpose a presentation in which the object is left uncovered on the surface to

determine if he will still reach for it.

Repeat:
3 times.

4. Finding an Object Which is Completely Covered

Location:
Same as in situation 3.

Object:
Any object in which the infant shows a strong interest and which is small enough to be completely covered by each of the screens without bulging too conspicuously may be used. A necklace has been very popular, but a small doll, car, and plastic flower have also been used. Use the same white, nontransparent scarf used in situation 3 on the screen.

Directions:
Ascertain that the infant desires the object by holding it out to him and observing whether he reaches for it. If the infant starts to reach for the object, place it on the surface within his reach and cover it completely with a screen, before the infant grasps the

Infant Actions:
a. Loses interest in the object once it is completely covered.
b. Reacts to the loss of the object, but does not search or obtain it from under the screen.
c. Pulls the screen, but not enough to uncover the object, and does not obtain the object.
*[d] Pulls the screen off and obtains the object.

object. Do not stretch the scarf flat, but bunch it up so that the contours of the object do not show through the screen. If the infant succeeds in obtaining the object on the first presentation, shift the work area to one side of the infant (left or right) and make all subsequent presentations on the same side. It is important here to differentiate the search for the hidden object from pulling at the screen out of a desire to play with the screen itself. In general, if the infant has demonstrated a desire for the object before it was hidden and reaches for it either while lifting the screen or immediately afterwards, one may assume that the infant is searching for the hidden object. On the other hand, if the infant lifts the screen and holds it for a considerable length of time before reaching for the now exposed object, possibly even looking at and handling the screen, one may assume that the infant has lifted the screen for its own sake.

Repeat:
3 times.

5. Finding an Object Which is Completely Covered With a Single Screen in Two Places

Location:

Same as in situation 3. It is important to work on a sound-absorbing surface or to use a soft toy so that the noise created in putting the object down does not serve as an additional clue to the object's location.

Object:

Same as in situation 3. Use as the second screen a piece of non-transparent cloth of a dull color different from that of the scarf.

Directions:

If the infant obtains the object covered by a single screen on two successive presentations, place the second screen on the opposite side of the infant during the last covering of the subject with the first screen, making sure both screens are within the infant's reach. Then, hide the object in the same manner under the second screen. Make sure that both screens are bunched rather than flat. To repeat the presentation, hide the object under the second screen two more times, and then switch to hiding

Infant Actions:

a. Loses interest in the object once it is hidden under the second screen.
b. Searches for the object where it was previously found, i.e., under the first screen on the first presentation.
[c] Searches for the object where it disappeared, i.e., under the second screen, on the first presentation.[3]

[3]Action [c] carries no asterisk here because the actions in this situation were not included in the scaling analysis. They are included here intuitively. Even though this situation may elicit actions which duplicate those in Situation 6, this situation would appear to put somewhat lesser demands on flexibility in dissociating objects from actions previously directed at them.

the object under the first screen, counting the last hiding as the second presentation of this situation.

Repeat:
2 times.

6. Finding an Object Which is Completely Covered With a Single Screen in Two Places Alternately

Location:
Same as in situation 5.

Object:
Same as in situation 5.

Directions:
Hide the object under each of the two screens alternately, covering the object completely with the screen each time.

Repeat:
3-5 times.

Infant Actions:
a. Becomes perplexed and loses interest in the object.
b. Searches haphazardly under one or both screens.
*[3] Searches correctly under each of the screens.

7. Finding an Object Which is Completely Covered With a Single Screen in Three Places

Location:
Same as in situation 5.

Infant Actions:
a. Loses interest in the object.

Object:

Same as in situation 5. Use the pillow or a third nontransparent cloth, discriminable from the other two, as the third screen and place it directly in front of the infant, within his reach.

Directions:

Hide the object under each of the three screens, selecting the screen to be used on each presentation at random. (Sample order: 2d, 1st, 3d, 1st, 1st, 3d, 2d)

Repeat:

5-7 times.

b. Searches haphazardly under or all screens.

*[c] Searches directly under the screen where the object disappeared.

Note: In most cases, it is best to present situations 3-7 in succession. It is extremely important that the infant have a strong interest in the object chosen for these situations. It is permissible to change objects at any point, but it should be recognized that loss of interest may also signify that the task is becoming too difficult.

If the examiner suspects that the infant is losing interest due to the difficulty of the task, the same object should be hidden in a simpler way (i.e., a way that the infant was previously able to handle) to see whether the infant will then search for the object. If the infant is still interested in the object, he will usually search for it in the easier situation.

The constant disappearance of a desired object often proves frustrating to young infants. When it seems that the loss of interest in the situation may be due to frustration, the infant may be permitted to play with the object for a short while without interference in an attempt to restore his cooperation and his interest in it. On the other hand, if the need to relinquish the object after each trial appears to be causing frustration,

it is best to pick up the object as soon as the infant removes the screen and is reaching for it, without permitting the infant actually to hold the object each time.

Since these situations are presented to infants varying considerably in age, certain adjustments in procedure are helpful with younger and older infants. The younger infants tend to become frustrated, and it is necessary to check their interest in the object being used as well as their attention to the task. Conversely, older infants tend to become bored with the simple hidings, and, if this basis for their behavior is clear, it is often desirable to cut the number of presentations of the simple hidings to a minimum required for assurance of competence in order to prolong their cooperation. The cooperation of older infants may also be secured by helping them see the situations as a game and by permitting them a turn at hiding the object, if they so desire.

C. SEARCH FOLLOWING MORE COMPLEX HIDING

8. Finding an Object After Successive Visible Displacements

Location:
Same as in situation 5.

Object:
Same as in situation 7.

Directions:
Hide the object successively under each of the three screens located around the infant by moving the hand holding the toy in a path from left to right or from right to left so that the object becomes

Infant Actions:

a. Does not follow the successive hidings.
b. Searches only under the first screen under which the objects disappeared.
c. Searches under the screen where the object was found on the previous presentation.
d. Searches under all screens haphazardly.

hidden under one of the screens, then reappears in the space between the screens, and again becomes hidden as the hand passes under another screen. Make sure the infant attends to the complete hiding procedure, the complete series of object appearances and disappearances. Check for position preference by reversing the direction of hiding after a few presentations. Check for screen preference by changing positions of particular screens after a few presentations.

Repeat:
3-5 times.

e. Searches under all screens in the order of hiding.
f. Searches directly under the last screen in the path (the one under which the object disappeared last).[4]

Note: If the infant fails to attend to the whole series of successive hidings, he may have to be moved back from the screens during the hiding and then moved closer again to within reach of the screens once the hiding is completed.

[4]Actions (e) and (f) in this situation carry no asterisks because there were too few to be included in the scaling analysis. These actions may point to more than one step between steps 7 and 9 which may reflect increasing flexibility in the spatial localization of the object constructs as well as greater persistence of the central processes representing the objects.

9. Finding an Object Under Three Superimposed Screens

Location:

Same as in situation 5.

Object:

Same as in situation 7.

Directions:

Ascertain that the infant is interested in the object and place it in front of him within his reach. Cover the object with one screen, then take a second screen and cover the first screen with the second, and so on. Arrange the screens in such a way that the infant cannot remove all of them with one swipe (e.g., use the pillows as the middle screen).

Repeat:

2-3 times.

Note: When multiple screens are used, an infant sometimes begins to pull all screens in sight without paying much attention to the displacements of the object. The examiner may check for this by going through the hiding procedures and retaining the object so that it is clearly visible to the infant, instead of leaving it under a screen. If the infant still persists in searching under screens, his behavior is no longer a valid indication of his construct of the object which is here of interest to the examiner. In such an instance, it is desirable to interrupt the presentation of this sequence and to intersperse other activities or a period of free play. In general, it may be advisable to introduce a break after each group of situations in order to minimize the occurrence of indiscriminate removal of all screens.

Infant Actions:

a. Loses interest in the object.

b. Lifts one or two screens, but gives up before finding the object.

*[c] Removes all screens and finds the hidden object.

D. SEARCH FOLLOWING AN INVISIBLE DISPLACEMENT

10. Finding an Object Following One Invisible Displacement With a Single Screen

Location:

Same as in situation 5.

Object:

Use a small object which would readily fit into the box to be used to hide the object in order to produce the invisible displacement (e.g., miniature doll, small stuffed animal, small car, etc.). Use a cardboard box, without a cover, which is deep enough to make the object invisible to the infant once it is lowered into it. Use as a screen a piece of nontransparent cloth which is large enough to allow the examiner to invert the box under it without exposing the object.

Directions:

While the infant watches, lower the object into the box and then hide the box under the screen. Turn the box over under the screen, leaving the object hidden, and remove the empty box. If the infant hesitates, show him that the box is empty. If the infant appears

Infant Actions:

a. Loses interest in the object.

b. Reacts to the loss of the object, but does not search for it.

c. Searches only in the box for the hidden object.

*[d] Checks the box and proceeds to find the object under the screen where the box disappeared.

*[e] Searches for the object directly under the screen where the box disappeared.

to lose interest in the object, check on the difficulty of the task by hiding the same object under the screen directly.

Repeat:
3 times.

11. Finding an Object Following One Invisible Displacement With Two Screens

Location:
Same as in situation 5.

Object:
Same as in situation 10. Use as the second screen another piece of cloth differing from the first in either color or pattern.

Directions:
Place the second screen to the side of the infant opposite to that of the first during the last presentation of situation 10. Hide the object in the same manner (using the box to produce the invisible displacement) under the second screen. To repeat the presentation, hide the object under the second screen two more times and then switch to hiding

Infant Actions:
a. Searches only in the box.
b. Searches under the screen where the object was previously found.
*[c] Searches correctly under the screen where the box disappeared.

the object under the first screen, counting this last hiding as a second presentation of the situation.

Repeat:
2 times.

12. Finding an Object Following One Invisible Displacement With Two Screens Alternated

Location:
Same as in situation 5.

Object:
Same as in situation 10.

Directions:
Hide the object, using the box to produce the invisible displacement, under one of the two screens, alternating on each presentation. Place the empty box in the center between the two screens.

Repeat:
3 times.

Infant Actions:
a. Loses interest in the object.
b. Searches haphazardly under the two screens.
*[c] Searches directly under the screen where the box disappeared.

13. Finding an Object Following One Invisible Displacement With Three Screens

Location:
Same as in situation 5.

Object:
Same as in situation 10. Use as the third screen the pillow or an obviously different piece of cloth. Place it on the other side of the first screen.

Directions:
Using the box to create the invisible displacement by first lowering the object into it, make the box disappear under one of the three screens at random on each presentation, leaving the object hidden under the screen each time.

Repeat:
5-7 times.

Infant Actions:
a. Loses interest in the object.
b. Searches haphazardly under all three screens.
*[c] Searches directly under the correct screen where the box disappeared.

E. SEARCH FOLLOWING SUCCESSIVE INVISIBLE DISPLACEMENTS

14. Finding an Object Following a Series of Invisible Displacements

Location:
Same as in situation 5.

Infant Actions:
a. Searches only in the examiner's hand or around the room.

Object:

Same as in situation 13. The object should be small enough to fit in the palm of the hand since it is more convenient to produce the invisible displacements by hiding the object in the palm of the hand.

Directions:

While the infant watches, place the object in the palm of one hand and hide it by closing the hand. Move the hand in a path in one direction (e.g., from left to right), making the hand disappear under the first screen then reappear between the first and second screens, disappear again under the second screen, and so on. Do not open the hand between screens. Leave the object under the last screen in the path and show the infant that the hand is empty. Repeat the presentations by following the path in the same direction each time.

Repeat:

4-6 times.

Infant Actions:

a. Searches only in the examiner's hand or around the room.

b. Searches only under the first one or two screens in the path and does not obtain the object.

*[c] Searches under all screens in the path in the same order as followed by the examiner's hand and finds the object under the last screen.

*[d] Searches directly under the last screen on at least two successive presentations following success in finding the object there.

15. Finding an Object Following a Series of Invisible Displacements by Searching in Reverse of the Order of Hiding

Note: Present this situation only to infants who search directly under the last screen at least twice in situation 14, and only immediately subsequent to situation 14.

Location:
Same as in situation 5.

Object:
Same as in situation 14.

Directions:
Immediately following the presentation of situation 14, having established an expectation that the object is to be found under the last screen, move the hand in which the object is hidden in the same manner and in the same direction as in situation 14, but leave the object under the first screen in the path. Continue the movement of the hand to the second and third screen, then show the infant that it is empty. In order to remember to stop momentarily under the last screen, open the now empty hand there also. This situation can be repeated only by repeating situation 14 first, and then presenting the "trick" of situation 15. To check for position

Infant Actions:
a. Searches only under the last screen and gives up.
b. Searches haphazardly under all three screens.
*[c] Searches systematically from the last screen through the middle screen to the first, following an inverse of the order used in hiding.

Note: It is important in step 15 that the behavior of the infant imply clearly that he holds a reversible image of the whole series of places where the hand holding the object disappeared. Only if he goes to the middle screen in the reversed series without the object having been hidden there is such an image implied, for before such a reversible image has been developed, he may learn through experience to find the object under

preference, repeat situation 14 by moving the hand in the opposite direction, thus making the screen which was previously first, last. To check for preference for specific screens, rearrange the order of the screens in the path, without changing direction of hiding.

Repeat:
2 times.

any of the three screens where he may already have found it.

SCALE II: THE DEVELOPMENT OF MEANS FOR OBTAINING DESIRED ENVIRONMENTAL EVENTS

A. DEVELOPMENT OF EYE-HAND COORDINATION

1. Appearance of Hand-Watching Behavior

Location:
The infant may be supine on any flat surface such as the table or the sofa, or in his own crib. There should be no other visually attractive objects within sight.

Object:
None.

Directions:
Observe whether the infant engages in hand-watching activities, i.e., whether he attempts to keep his hands within view and follows them with his eyes as they move out of sight. Allow a few minutes for this observation. Supplement it with any evidence of hand-watching that may be observed during the rest of the examination.

Infant Actions:
a. Hand-watching behavior is not observed.
*[b] Hand-watching behavior is observed.

2. Achievement of Visually Directed Grasping

Location:

The infant may be supine or propped up in a sitting position, as long as both arms are free to reach out.

Object:

Use a small bright object such as a rattle. Make sure at least a portion of it is small enough for the infant's hand to close around.

Directions:

Hold the object about 12 inches in front of the infant's face for at least 30 seconds. If the infant does not succeed in grasping the object, move it slowly toward the infant's hand, so that by following the object with his eyes he will come to see both the object and his hand at the same time. Hold the object a few inches from the infant's hand for at least 20 seconds.

Repeat:

3 times.

Infant Actions:

a. Reaches toward the object, but does not grasp it.

*[b] Grasps the object when both object and hand are in view simultaneously.

*[c] Grasps the object when it is visually presented by bringing the hand up to contact the object.

[d] Grasps the object when it is visually presented and opens the hand in anticipation of contact with the object.[1]

[1]No asterisk is provided for this action because it was noted too infrequently and, thus, was not included in the scaling analysis. The investigations of B. L. White (1967) on visually directed reaching and grasping would clearly imply that opening the hand in anticipation of contact with the object should be a satisfactory criterion of success for the fourth step on this scale.

B. DEVELOPMENT IN DIFFERENTIATION OF MEANS AND ENDS

3. Repetition of Actions Producing an Interesting Result

Location:

Any position suitable for eliciting a "secondary circular reaction" from the infant, usually a sitting position in an infant seat or a high chair.

Object:

An object which can be activated by one of the earliest motor schemes, such as hitting, and which provides visual and auditory input when so activated has been found to be most effective. For example, a brightly colored musical toy in the shape of a clown, a musical rattle in the shape of a cylinder attached to a handle, and a set of multicolored discs on a chain have been used with success.

Directions:

The presentation of this situation depends on finding some object on which the infant will act and through his action, produce a result which he finds interesting. After selecting such an object, hold it within easy reach ofthe infant's hand, but

Infant Actions:

a. Shows interest in the object by looking at it.
b. Intensifies arm movements in the direction of the object and activates it occasionally, but not regularly.
*[c] Repeats arm movements systematically and keeps object active consistently.
d. Only tries to grasp object.

in a way that discourages grasping (i.e., either the part of the toy closest to the infant should be too large for grasping or the toy should be held securely at a height where it can be touched but not grasped). If the infant does not contact the toy within 15 seconds, strike the toy against the infant's hand once, allowing the infant to see that the toy moves and makes a sound, then hold the toy in position again.

Repeat:
2 times.

4. Letting Go Of An Object in Order to Reach For Another

Location:
The infant should be propped in a sitting position or may sit in an infant seat or high chair, as long as both arms remain free to reach out.

Object:
Two small objects which the infant can hold, one in each hand (e.g., small plastic animals, or blocks), and a more desirable third object

Infant Actions:
a. Reaches toward the third object while still holding the others in his hands.
b. Reaches for the third object with a filled hand, but in the process of reaching, the first object slips out from the hand.

(e.g., a cookie, a watch, etc.) are needed.

Directions:

Get the infant to hold an object in each hand simultaneously by offering the two objects, one to each hand if necessary. Once the infant has both hands full, quickly offer a third attractive object by holding it up in front of the infant, barely within his reach. The infant may accidentally drop one of the objects he holds. It is necessary to observe his actions closely and to repeat the situation until it becomes clear that the infant regularly and purposefully releases one of the objects to free his hand to reach for the more attractive one.

Repeat:

3 times.

*[c] Drops one of the objects he already holds and then reaches for the third object with an empty hand.

5. Use of Locomotion as Means

Location:

It is easiest to present this situation if the infant is seated on the floor, but it may be presented anyplace where the infant is free to crawl or move about.

Infant Actions:

a. Continues play and makes no attempt to retrieve the object.

Object:

Several pairs of objects which are often used jointly in play, e.g., blocks and cup, spoon and cup, doll and shoe, and so forth are needed.

Directions:

Present the objects to the infant and wait for him to begin using them in play. If the infant does not start any play using several of the objects, demonstrate an activity such as dropping blocks into the cup. Once the infant is actively engaged in such play, remove the most necessary object for the play (e.g., the cup) and place it to the side of the infant, out of reach, yet still visible to him. If the infant appears to treat the removal of the object as prohibition, it may be necessary to encourage him to go after the object and then to present the situation again at a later time.

Repeat:

2 times.

b. Indicates desire for the object (looks at it repeatedly, whimpers), but does not try to retrieve it.

*[c] Moves to regain the object and resumes play using it.

C. DEVELOPMENT IN THE USE OF OBJECTS AND THE RELATIONSHIPS BETWEEN OBJECTS AS MEANS

6. Use of the Relationship of Support

Location:

It is easiest to present this situation if the infant is seated in a high chair which comes flush against the table. However, it may be presented with the infant seated anywhere, as long as he can be restrained from moving and can have a working surface extending well beyond his reach.

Object:

Any object in which the infant shows a strong interest (e.g., stuffed animal, doll) and a larger object, such as a pillow, to act as its support.

Directions:

Interest the infant in an object and, while he is playing with it, place the support barely within the infant's reach. Take the object from the infant and place it on the center of the support, thus making it beyond the infant's reach. Encourage the infant to obtain the object, but do not allow the infant to climb out of the chair. If the

Infant Actions:

a. Reaches for the object on the support and indicates desire for it.
b. Tries to climb out and, thus, to reach the object.
c. Appeals to another person to get the object for him.
*[d] Pulls the support and obtains the object after demonstration.
*[e] Pulls the support and obtains the object without demonstration.

pillow is used as support, point a corner of the pillow toward the infant, making the pillow easier to grasp. Wait at least 20 seconds. Repeat by taking the object off the support and, after ascertaining the infant's continued interest (usually indicated by reaching), replace the object on the support. If the infant still does not attempt to grasp and pull the support, demonstrate the fact that the object moves with the support by pushing the support a short distance toward the infant and then pulling it back twice. Encourage the infant again to get the object.

Repeat:
2 times.

7. Understanding of the Relationship of Support

Location:
Same as in situation 6.

Object:
Same as in situation 6.

Directions:
If the infant obtains the object by pulling the support in situation 6, either at once or after

Infant Actions:
a. Pulls the support expecting to obtain the object.
b. Pulls the support while reaching for the object and looking at it and/or the examiner.

the demonstration, repeat the presentation once more, but instead of placing the object on the support, hold it about 4 inches above it. Hold the object from behind, so that your hand would not obscure it for the infant.

Repeat:
1-2 times.

*[c] Does not pull the support, but points, reaches, or looks at the object, or asks the examiner to give it to him or to put it down upon the support.

8. Use of String Horizontally

Location:
Same as in situation 6.

Object:
Any toy in which the infant shows a strong interest (e.g., stuffed animal, doll) and some sturdy string.

Directions:
Once the infant has demonstrated interest in an object, tie one end of the string securely around it. Place the object way beyond the infant's reach (2-3 feet away) although in full view, and extend the other end of the string toward the infant's hands. Encourage him to get the object, but do not allow the infant to climb toward it.

Infant Actions:

a. Reaches for the object and indicates desire for it.

b. Manipulates the string, but does not pull it enough to obtain the object.

*[c] Obtains the object by pulling the string after demonstration.

*[d] Obtains the object by pulling the string without demonstration.

Wait at least 20 seconds. Repeat by picking up the object, bringing it closer to the infant in order to ascertain his interest in it, and then returning it to the out-of-reach position. If the infant still does not use the string to obtain the object, demonstrate by pulling the string, making the object move closer to the infant, pushing it back, pulling the string again, and so forth, two to three times. Encourage the infant again to get the object.

Repeat:
2 times.

9. Use of String Vertically

Location:
Same as in situation 6.

Object:
Same as in situation 6.

Directions:
With one end of the string tied around the object, slowly lower it to the floor on one side of the infant's chair, calling the infant's attention to the process. Locate the object on the floor so that it is visible to the infant,

Infant Actions:
a. Indicates desire for object by leaning to look at it, reaching toward it, and so on, but does not use the string to obtain it.
b. Drops string to the floor and becomes unhappy.
c. Plays with the string itself.

if he leans down to look for it. Extend the other end of the string up to the infant's hands, draping it across his chair in front of him. Encourage the infant to obtain the object. Wait about 20 seconds. Repeat by lifting the object to the level of the table, and, after ascertaining that the infant still desires the object (usually indicated by reaching for it as it gets closer), lower it again as before. If the infant still does not use the string to obtain the object, demonstrate by slowly lifting the object to the level of the infant's hands by means of the string and then lowering it to the floor several times.

Repeat:
2-3 times.

d. Pulls the string, but not sufficiently to get the object.
*[e] Obtains the object by pulling the string after demonstration.
*[f] Obtains the object by pulling the string without demonstration.

10. Use of Stick as Means

Location:
Same as in situation 6.

Object:
Any toy in which the infant shows a strong interest (e.g., stuffed animal, doll) and a stick.

Infant Actions:
a. Plays with stick and loses interest in the object.
b. Reaches for or attempts to climb toward object, disregarding the stick.

Directions:

Place the object in which the infant is interested on the table, out of the infant's reach, and place near the infant's hand a stock which is long enough to reach behind the object and bring it toward him. Encourage the infant to obtain the object. If the infant fails to notice it, call attention to the stock. Wait at least 20 seconds. Repeat by picking up the object, ascertaining the infant's interest in it, and returning it to the out-of-reach position. If the infant fails to use the stick to obtain the object, demonstrate the use of the stick by taking the stick and using it to push the object closer to the infant and back again several times. Place the stick next to the infant's hands again.

Repeat:

2 times.

Infant Actions:

c. Plays with stick and object, without getting the object any closer (hits with stick, knocks it off table, etc.).

*[d] Obtains the object by means of the stock after demonstration.

*[e] Obtains the object by means of the stock without demonstration.

D. FORESIGHTFUL PROBLEM SOLVING

11. Foresight in the Problem of the Necklace and the Container

Location:

Have the infant seated on the floor,

Infant Actions:

a. Does not attempt to put

in a chair, or at a feeding table, with working surface available around him.

Object:

Use a long necklace of small, shiny beads, to maximize its attractiveness to the infant, and a tall, narrow container. The problem is created by the length of the necklace and the unsteadiness of the container doe to its dimensions.

Directions:

Present the infant with the necklace all stretched out and with the container placed next to the necklace. If the infant does not spontaneously attempt to place the necklace into the container, take both swiftly away, put the necklace inside the container behind your back, and show the infant the spectacle of the beads inside the container. If the infant appears interested, remove the necklace from the container and present both to the infant as before. Encourage the infant verbally, if it seems necessary, and carefully note how the infant goes about trying to get the necklace into the container.

Repeat:

2-4 times.

the necklace into the container even after demonstration.

b. Attempts to put in the necklace piece by piece without holding the container steady and fails.

c. Succeeds in putting the necklace in after several attempts resulting in failure.

d. Invents a method which takes into account the unsteadiness of the container after a previous failure (one or two), such as holding the container with one hand while stuffing in the necklace, and succeeds in putting the necklace in on subsequent attempts.[2]

*[e] Adopts a method which takes into account the unsteadiness of the container from the first attempt, such as rolling the necklace up before trying to put it in, dangling it in, and so on.

[2]No asterisk is provided for this action because it was not included in the scaling analysis. It may reflect the invention of an appropriate means through repeated experimentation and thereby point to an additional step in this scale.

12. Foresight in the Problem of the Solid Ring

Location:
Same as in situation 11.

Object:
Use a set of plastic rings which can be stacked on an unmounted rod, one of the rings having been made solid by filling the hole.

Directions:
Spread the rings in frong of the infant. Place the solid ring in a position where it is unlikely to be picked up first, in order not to discourage the infant. Take the rod and slip one ring over it. Encourage the infant to stock the remaining rings. If necessary, hold the bottom of the rod to make it steady for the infant, since the infant's manual dexterity is not at issue. If the solid ring remains as the last one and the infant does not stack it spontaneously, do not suggest that he stack it. Instead, remove all the rings and repeat the presentation, maneuvering the solid ring into a position closer to the infant's hands, so that it has a high probability of being picked up, if the infant is going to stack

Infant Actions:

a. Plays with rings, but does not stack them.
b. Uses force in his attempts to stack the solid ring and attempts to stack it repeatedly.
c. Attempts to stack the solid ring once and avoids it subsequently.[3]
*[d] Sets aside the solid ring without attempting to stack it.

[3]No asterisk is provided here because this action was not included in the scaling analysis. Like (d) for situation 11, it may reflect the invention of an appropriate means through experiencing the results of unsuccessful actions and thereby suggest an additional step in the scale.

it, and has to be deliberately
avoided, if he is not.

Repeat:
2-3 times.

SCALE IIIa: VOCAL IMITATION

A. DIFFERENTIATION IN VOCAL PRODUCTIONS

1. Use of Vocalization Other Than Crying

Location:
Any position comfortable for the infant.

Object:
None.

Directions:
Listen for spontaneous vocalizations of the infant and note whether he vocalizes sounds other than those indicating distress. Observe the infant by himself and also while maintaining face to face contact with him.

Infant Actions:
a. Vocalizes only distress sounds.
*[b] Vocalizes (coos) when not distressed.

2. Response to Familiar Cooing Vocalizations

Location:
Same as in situation 1.

Object:
Listen for spontaneous vocalizations of the infant or ask the person caring for the infant what non-distress (cooing)

Infant Actions:
a. Shows little interest in either adult of infantlike sounds from the examiner.
b. Listens attentively to both adult and infantlike

sounds he typically produces.

Directions:

While the infant is not vocalizing spontaneously, face the infant and talk to him in adult fashion. After a few moments of observing the infant's expression and behavior, utter one of the cooing sounds without genuine consonants that the infant typically makes himself (e.g., ah-i-ya, eh-uh-e, uh-ah-a--each with rising and falling pitch--uuh, alia, etc.) Vocalize the sound a few times, then stop to observe the infant's expression and behavior. Repeat the familiar vocalization. If the infant has been observed to utter several different cooing sounds, shift to a different sound in his repertoire after three or four presentations of the first one.

Repeat:

2-3 different vocalizations.

sounds, but does not vocalize.

*[c] Shows a more positive response to cooing sounds as indicated by brighter expression, smile, and mouth-movements, but does not vocalize.

*[d] Vocalizes in response to the examiner's presentation of familiar cooing sounds, though the vocalization may or may not be like that of the examiner.

e. Vocalizes similar sounds in response to the examiner, but does not shift to match the examiner when the examiner changes the cooing sound presented.

f. Vocalizes similar sounds in response to the examiner and changes his vocalization to match that of the examiner.

3. Response to Familiar Babbling Sounds

Location:

Same as in situation 1.

Infant Actions:

a. Shows little interest in the examiner's vocalizations.

Object:

Listen for spontaneous vocalizations of the infant or ask the person caring for the infant what sound patterns (babbling) the infant has often made.

Directions:

While the infant is not vocalizing spontaneously, gain the infant's attention and utter one of the sound patterns the infant typically makes himself (e.g., ba-ba-ba, at-da-da, ma-ma-ma, etc.). Vocalize the sound pattern a few times and then pause to observe the infant's expression and behavior. Repeat the familiar sound pattern. If the infant has been observed to make several babbling sounds frequently, shift to a different sound pattern in the infant's repertoire after three or four presentations of the first one.

Repeat:

2-3 different sound patterns.

b. Listens attentively to the examiner, but does not vocalize.

*[c] Shows interest in the babbling sounds as indicated by a smile, mouth-movements, and continued looking at the examiner during pauses, but does not vocalize.

*[d] Vocalizes in response to the examiner's presentation of familiar sound patterns, but the vocalization may not be like that of the examiner.

[e] Vocalizes similar sounds in response to the examiner when the examiner changes the sound pattern presented.

*[f] Vocalizes similar sounds in response to the examiner and changes his vocalization to match that of the examiner.

B. DEVELOPMENT IN IMITATION OF SOUND PATTERNS

4. Imitation of Familiar Words

Location:
Same as in situation 1.

Object:
Listen for the spontaneous vocalization of the infant and ask the person taking care of the infant what words or wordlike sounds the infant has in his repertoire.

Directions:
Inasmuch as the first words frequently denote familiar objects, it is often helpful in this situation to present the infant with a toy replica or a picture of an object corresponding to one of the words used by the infant. While the infant is not too engrossed in play with the object, repeat the appropriate word one or two times, wait to observe the infant's behavior, repeat it again, and so forth.

Repeat:
2-3 different words.

Infant Actions:

a. Listens attentively to the word uttered by the examiner, but does not vocalize in response.

*[b] Vocalizes in response to the examiner, but with sounds which are unlike the ones modeled by the examiner.

*[c] Imitates several familiar words modeled by the examiner.

5. Imitation of Unfamiliar Sound Patterns

Location:
Same as in situation 1.

Infant Actions:

a. Shows unhappiness or cries.

Object:

Listen for the spontaneous vocalizations of the infant in order to be able to select sound patterns clearly different from those which are familiar to him (e.g., brr, zzz, ree-ree-ree, faa-faa, etc.). Check with the person caring for the infant whether the sound patterns chosen are, in fact, novel.

Directions:

While the infant is not vocalizing spontaneously, gain his attention and utter one of the unfamiliar sounds. Repeat the sound several times, wait to observe the infant's behavior, repeat again, and so forth. If the infant's behavior is not clear after several presentations, repeat the situation by presenting a different unfamiliar sound pattern.

Repeat:

2-3 different sound patterns.

b. Shows no interest in unfamiliar sounds.

c. Listens to the sounds attentively while they are being uttered by the examiner, but does not vocalize himself.

*[d] Vocalizes in response to the examiner, but does not make sounds like those presented by the examiner.

*[e] Vocalizes in response to the examiner with sounds which approximate those modeled more closely with successive repetitions.

*[f] Vocalizes in response to the examiner with sounds which immediately resemble quite closely those modeled by the examiner.

6. Imitation of New Words

Location:

Same as in situation 1.

Infant Actions:

a. Listens to new words, but does not vocalize in response.

Object:

Listen for the spontaneous vocalizations of the infant and ask the person caring for the infant what words or wordlike utterances the infant has in his repertoire in order to be able to select for presentation words new to the infant. Choose simple new words for presentation.

Directions:

To maintain a playful mood, present the infant with a toy for which the mother says the infant does not have a name (e.g., "fish," "flower," "bus" are words often unfamiliar to infants). While the infant is not too engrossed in play with the toy, repeat the name corresponding to the toy one or two times, wait to observe the infant's behavior, repeat it again, and so forth. Alternatively, use adjectives which are not in the infant's vocabulary appropriate to objects highly familiar to the infant. With the object a baby doll, the words "young," "blond," "pretty," etc. may be tried. With a ball for the object, words like "blue," "red," "bouncy," etc. may be appropriate. Say each word distinctly, pause to observe the infant, then repeat once or twice more before trying a different word.

Repeat:

6-7 different words.

b. Vocalizes in response to the examiner, but the infant's vocalizations do not resemble the words modeled.

[c] Vocalizes approximations of the new words which become closer to the model with repetition.

d. Imitates a few (1-2) simple new words directly.

*[e] Imitates practically all simple new words (at least 5) directly.

SCALE IIIb: GESTURAL IMITATION

A. IMITATION OF FAMILIAR GESTURES

1. Systematic Imitation of Familiar Simple Schemes

Location:
Any position comfortable for the infant.

Object:
None.

Directions:
Observe the infant's play with objects in order to determine which simple schemes are familiar to him (e.g., patting an object, waving the arm, turning the wrist, etc.). When the infant is not applying a particular scheme, perform that action several times and wait to observe the infant's behavior. Perform it again a few times and wait. When the infant's behavior seems clear, perform a different familiar action.

Repeat:
2-3 different actions.

Infant Actions:

a. Shows interest in the examiner's action, but does not even attempt to reproduce it.

*[b] Performs some action in response to the examiner, consistently, but does not imitate the scheme presented.

*[c] Imitates a scheme presented by the examiner.

2. Imitation of Complex Actions Composed of Familiar Schemes

Location:

Same as in situation 1.

Object:

Use simple objects to demonstrate a more complex action for the infant. For example, blocks and a cup may be used to demonstrate putting a block into the cup and shaking it; several blocks or pieces of foil may be used to demonstrate hitting two objects together; and so on.

Directions:

Select a scheme which the infant has spontaneously applied to objects and incorporate it into a more complex action. For instance, if hitting is a scheme which the infant has applied, spread out several blocks in front of the infant, take one in each hand, and hit them together several times. Observe the infant's behavior. If necessary, help the infant to get a block into each hand. Repeat the demonstration or model with pauses for observing the infant's behavior several times. Or, if the infant has been observed to shake objects, model the shaking of a block inside a cup by presenting the infant with several blocks and a cup, putting

Infant Actions:

a. Attends to the examiner's demonstration, but does not even attempt to imitate the action.

[b] Performs some action in response to the examiner, consistently, but does not imitate the one demonstrated.

*[c] Attempts to imitate the action, but does not come any closer to success on repeated attempts (e.g., hits a block in the examiner's hand rather than the one he holds, tries to shake the cup, but spills out the block immediately).

*[d] Imitates the action modeled through gradual approximation.

*[e] Imitates the action modeled immediately.

one block inside the cup, and shaking the cup vigorously several times before placing the cup in front of the infant.

B. IMITATION OF UNFAMILIAR GESTURES

Note: A gesture is called visible if the infant is able to see himself performing it. For example, hitting a surface is a visible gesture, since the infant can observe his own hand while he attempts to hit, but wrinkling the nose is not visible, since without a mirror, the infant cannot observe himself performing this action.

3. Imitation of Unfamiliar Gestures Visible to the Infant

Location:
Same as in situation 1.

Object:
None

Directions:
Select several gestures that are thought to be unfamiliar to the infant (e.g., opening and closing the fisted hand, bending and straightening the index finger, drumming on a surface, scratching a surface, clapping hands, and so on). If at all possible,

Infant Actions:

a. Shows interest in the examiner's performance, but does not attempt to imitate the gesture.

b. Performs some movement in response to the examiner, consistently, but does not imitate the gesture.

[c] Imitates the gesture modeled through gradual approximation.

*[d] Imitates the gesture modeled immediately.

ask the person taking care of the infant whether the selected gestures are actually unfamiliar, since some of them may have been taught or frequently demonstrated to the infant. Demonstrate the unfamiliar gesture several times while the infant is attentive and observe his behavior.

Repeat:
2-3 different gestures.

4. Imitation of Unfamiliar Gestures Invisible to the Infant

Location:
Same as in situation 1.

Object:
None.

Directions:
While the infant is attentive, model a gesture which the infant is unable to observe himself perform (e.g., opening and closing the mouth, blinking the eyes, patting the top of the head, patting the cheek, pulling the ear lobe, wrinkling the nose, etc.). If possible, ascertain whether any of these gestures have been taught or

Infant Actions:

a. Shows interest in the examiner's performance, but does not attempt to imitate the gesture.

*[b] Makes some movement in response to the gesture modeled, consistently, but does not imitate the gesture.

[c] Imitates the gesture modeled through gradual approximation.

*[d] Imitates at least one invisible gesture immediately.

frequently demonstrated to the infant. Repeat the unfamiliar gesture several times and pause to observe the infant's behavior.

Repeat:
3-4 different gestures.

*[e] Imitates several invisible gestures immediately.

SCALE IV: THE DEVELOPMENT OF OPERATIONAL CAUSALITY

A. EFFORTS TO PROLONG INTERESTING INPUTS

1. Appearance of Hand-Watching Behavior

Location:
The infant may be supine on any flat surface. There should be no other visually attractive objects within sight.

Object:
None.

Directions:
Observe whether the infant will engage in hand-watching activities. Pay particular attention to whether the infant seems able to bring his hands into view and to move them while they are being held in view. Allow a few minutes for this observation.

Infant Actions:
a. Hand-watching behavior is not observed.
*[b] Hand-watching is observed.

2. Repetition of Actions Producing an Interesting Spectacle

Location:
Any position suitable for eliciting a "secondary circular reaction" from the

Infant Actions:
a. Shows interest in the object only by looking at it.

infant, usually a sitting position in an infant seat or a high chair.

Object:

An object which can be activated by one of the earliest motor schemes, such as hitting, and which provides a change of visual and/or auditory input when so activated has been found to be most effective. For example, a brightly colored musical toy in the shape of a clown, a musical rattle in the shape of a cylinder attached to a handle, and a set of multi-colored discs on a chain have been used.

Directions:

The presentation of this situation depends on finding some object on which the infant will act and, through his actions, produce a result which he finds interesting. After selecting an object, hold it within easy reach of the infant's preferred hand, but in a way that discourages grasping (i.e., either the part of the toy closest to the infant should be too large for grasping or the toy should be held securely at a height where it can be touched, but not grasped by the infant). If the infant does not touch or hit the toy within 15 seconds, strike the toy against the infant's hand once, allowing

b. Intensifies arm movements in the direction of the object and activates it occasionally, but not regularly.

*[c] Repeats arm movements systematically and keeps the object active consistently.

d. Only tries to grasp the object.

the infant to see that the toy does create a spectacle. Hold the toy in position again for 15-20 seconds.

Repeat:
2-3 times.

3. Use of a Specific Action as "Procedure"

Location:
Same as in situation 2. It is important that the infant's arms and legs be free to move.

Object:
Any object which produces a spectacle interesting to the infant when it is activated by the examiner may be used. Such objects as a musical toy, which can be made to tinkle while swinging back and forth, a colorful pinwheel, which can be twirled, or a jumping jack, which can be activated by pulling a string, have been found to be fairly successful.

Directions:
Hold the object in front of the infant and activate it while the infant is focusing on it; stop abruptly. Observe the infant's behavior for a few moments and then activate the object again.

Infant Actions:

a. Shows interest only while the spectacle is being produced.

b. Shows excitement and a higher level of activity throughout or only during the pauses, but no single act is dominant during the pauses.

*[c] Performs some act during the pauses consistently, suggesting that it serves as a "procedure" for the infant.

d. Reaches out to grasp the object, but does not attempt to activate it once he has it.

Alternate activation and pause 3-4 times. Observe whether some act stands out in the infant's behavior during the pauses. Acts which frequently serve as "procedures" include: a consistent vocalization, the hitting of a surface with the palm of the hand, kicking the legs, waving one arm, a swiping arm movement, etc.

Repeat:
1-2 different spectacles.

B. ACTIONS TO REINSTATE INTERESTING SPECTACLES

4. Behavior in a Familiar Game Situation

Location:
A position suitable for and customarily used in the game to be played must be arranged.

Object:
Usually none.

Directions:
Find out from the person taking care of the infant what games are frequently played with the infant, such as pulling the infant up to a sitting or standing position repeatedly, jouncing the infant on the knee or foot, raising him up into the air repeatedly, playing a

Infant Actions:

a. Shows no interest in playing the game with the examiner.
b. Appears to enjoy the game, but remains passive during the pauses.
[c] Performs some act which can be considered a "procedure" during the pauses.
d. Attempts to start the game during the pauses by performing part of the activity (e.g., jumps up on the knee, strains to sit up or

hand game, and so forth. Start one of the games familiar to the infant and stop after a few repetitions, while the infant appears to be enjoying the game. Observe his actions and then start it again. Include 3-4 pauses in the game.

Repeat:
1-2 different games.

stand up, makes a hand movement).[1]

e. Touches the examiner during the pauses as if to attract attention, but waits for the examiner to start the game.

[1]None of these infant actions carries an asterisk because none of them was included in the scaling analysis. This situation is being retained, nevertheless, because the infant actions listed under (d) as well as those listed below under (b) of situation 7, appear to imply at least minimal appreciation of causality outside the self and thereby suggest the possibility of an additional step in this scale falling between present steps 3 and 4.

5. Behavior to a Spectacle Created by an Agent

Location:
The infant may be seated in an infant seat, a high chair, or a feeding table. The examiner should be able to face the infant and to have a working surface in front of the infant.

Infant Actions:

a. Shows interest during the spectacle, but does not attempt to recreate it.

Object:
None.

Directions:
Attempt to create a spectacle which the infant finds interesting by using your hands and face. Actions such as drumming on a surface with the fingers, snapping the fingers, or making facial grimaces often are successful. Stop abruptly and observe the infant's behavior for a few moments, then resume again. Pause 2-3 times during the spectacle. Leave your hand or face within the infant's reach during each pause.

Repeat:
1-2 different spectacles.

6. Behavior to a Spectacle Created by an Agent Acting on an Object

Location:
Same as in situation 5.

Object:
Any object which can be manipulated to create a spectacle of interest to the infant may be used. For example, a roly-poly toy which can be made to spin

Infant Actions:
- a. Shows interest during the spectacle, but does not attempt to recreate it.
- [b] Performs some act which can be considered a "procedure" when the object stops.
- b. Shows excitement, but no single act stands out as an attempt to reinstitute the spectacle.
- *[c] Performs some act which can be considered a "procedure" during the pauses.
- *[d] Touches the examiner lightly during the pauses and waits.
- e. Attempts to imitate the examiner.

around on the surface, a music box that has to be started by pulling a cord, a pendulum toy, or a "Slinky" toy create interesting spectacles.

Directions:

Obtain the infant's attention and set off the object. Once the object stops, wait a few moments to observe the infant's behavior, leaving both the object and your hand within the infant's reach. In contrast to situation 3, it is important that the examiner's role in creating the spectacle be quite obvious. However, this situation is most successful when the act setting off the object is not an easy one for the infant to perform. Set off each spectacle 2-3 times.

Repeat:

2-3 different spectacles.

7. Behavior to a Spectacle Created by a Mechanical Object

Location:

Same as in situation 5.

Object:

A mechanically moving toy which executes a definite action when wound is needed. For example, a duck which wobbles in a characteristic way, a

Infant Actions:

*[c] Touches the object or the examiner's hand lightly when the object stops and waits.

*[d] Picks up the object and gives it to the examiner to activate.

e. Attempts to activate the object himself.

a. Plays with the object, seemingly forgetting the spectacle.

b. Makes the object perform its activity manually (i.e., wobbles the duck,

bear drumming on a drum, a chicken pecking at a ball, and so on may be used. It is assumed the infant has not been taught to wind mechanical toys.

Directions:

Wind the object without letting the infant see it being done and present him with the object in motion. After the object stops, observe the infant's behavior toward the object. Wind the object up once more, surreptitiously, and present the moving object to the infant. Finally, demonstrate the action of winding up the object to the infant and again observe his behavior after the object stops.

Repeat:

1-2 different objects.

pushes the chicken to peck, etc.).[2]

[c] Touches the object or the examiner's hand lightly when the object stops and waits.

*[d] Gives the object back to the examiner and waits.

*[e] Attempts to activate the object by manipulating the winding mechanism after demonstration (the infant need not succeed).

*[f] Attempts to find a way to activate the object prior to demonstration by the examiner.

A. DEVELOPMENT IN LOCALIZATION OF OBJECTS IN SPACE

1. Observing Two Objects Alternately

Location:
The infant may be supine on a flat surface, in an infant seat, or sitting up by himself.

Object:
Two differing objects which are both attractive to the infant (e.g., two checkerboards of different colors, a large plastic flower and a colorful rattle) are needed.

Directions:
Hold the two objects in front of the infant, about 10 inches from his eyes and separated by about 6 inches from each other. After about 20 seconds, reverse the positions of the two objects. Observe the movements of the infant's eyes while he looks at the two objects. If the infant focuses on the examiner's face, attempt to move out of the infant's line of sight and hold the two objects at arm's length in front of the infant's face.

Repeat:
2-3 times.

Infant Actions:

a. Looks in the direction of only one object each time.

*[b] Looks at both objects, but switches the glance slowly from one to the other (once or twice in 20 seconds).

*[c] Looks at both objects, switching the glance quickly from one to the other in each burst of looking activity (four or five times in 5 seconds).

2. Localizing an Object by Its Sound

Location:
Same as in situation 1.

Object:
A sound-making object such as a rattle, a bell, or a squeaking toy may be used.

Directions:
Stand behind the infant and produce the sound for a few seconds to the right, the left, and above the infant's head in a random sequence. Make sure the infant cannot see the movements of your hand while producing the sound. After each presentation of the sound, hold the sound-making object in position and allow a few moments of silence before starting another presentation. Observe whether the infant searches for the source of the sound with his eyes and whether he stops upon seeing the sound-making object.

Repeat:
5-7 times.

Infant Actions:

a. Does not turn head to the source of sound.
b. Turns head toward the source of sound in one direction only.
c. Turns head in the direction of sound, but does not localize the source object visually.
*[d] Localizes the source of sound with his eyes.

3. Grasping a Visually Presented Object

Location:
The infant may be supine or seated, as long as both arms are free to reach out.

Object:
Any small, attractive object such as a rattle, a plastic animal, or a plastic flower may be used. Make sure a portion of the object is small enough for the infant's hand to close around.

Directions:
Hold the object about 12 inches in front of the infant for at least 30 seconds. Observe the infant's attempts to grasp the object.

Repeat:
2-3 times.

Infant Actions:
a. Raises arms and moves them in the direction of the object, but does not touch it.
b. Moves arms in the direction of the object, but clasps hands in front of the object.
c. Touches the object, but fails to grasp it.
*[d] Grasps the visually presented object.

4. Following Visually the Trajectory of a Rapidly Moving Object

Location:
The infant may be propped in a sitting position on a sofa or seated in a chair, as long as he is off the floor and free to lean forward and sideways from his seat. A sound-absorbing surface around the infant is helpful.

Infant Actions:
a. Does not follow the falling object and remains focused on the examiner's hand.

Object:

Any small, light object attractive to the infant is suitable. The object should not make much noise when released to fall to the floor. For example, a small plastic flower, a crumpled piece of aluminum foil, or a ball of cotton may be used.

Directions:

Hold the object slightly above the infant's line of sight so that he must raise his eyes to focus on it. Once the infant is looking at the object, release it to have it fall to the left or to the right of the infant, at random, retaining your hand in position above the infant's head. The object should land to the side of the infant, within view. After several presentations, release the object in such a way that it falls all the way to the floor, and thus, lands out of view for the infant. Observe the infant's attempts to locate the object.

Repeat:

3-4 times.

b. Turns eyes to the correct side or follows part of the object's trajectory, but does not locate the object.

*[c] Follows the falling object and finds it with his eyes when the object remains in view, but fails to locate it visually when the object falls outside his field of view.

d. Looks around for the object at the point where it was last visible (along the edge of the surface on which the infant is sitting) but does not extrapolate the trajectory of the object to its probable location on the floor and does not lean to find it there.

*[e] Leans forward to search for the object in the direction in which it fell, even though the last portion of the trajectory taken by the object was not observed by the infant.

5. Recognizing the Reverse Side of Objects

Location:
Same as in situation 3.

Object:
Any object of interest to the infant which has a definite reverse or non-functional side, such as a baby's bottle, a plastic animal designed to float in water, etc., may be used.

Directions:
Hold the object in front of the infant within his reach, with its functional or "right" end or side facing him. When the infant begins to reach for the object, quickly reverse it so that the infant is faced with the object's opposite end or side. Observe the infant's behavior after the reversal.

Repeat:
2-3 times.

Infant Actions:
a. Continues to reach and grasps the object, showing no indication that the reversal was appreciated.
b. Withdraws hands and appears surprised at seeing the reverse end or side of the object.
*[c] Grasps the object, but turns it to the "right" end or side immediately each time, or, turns the object over several times and examines both sides intently.

B. DEVELOPMENT IN APPRECIATION OF SPATIAL RELATIONSHIPS BETWEEN OBJECTS

6. Using the Relationship of the Container and the Contained.

Location:
The infant may be seated in an infant

Infant Actions:
a. Does not put objects into

feeding table, a high chair, by himself in a crib or on the floor so long as there is some working space in front of the infant.

Object:
Several small objects such as blocks or large plastic beads and a container large enough to hold them are needed.

Directions:
Present the infant with the small objects and the container. If the infant does not initiate play with the objects and the container spontaneously, put some of the objects into the container, without permitting the infant to see the procedure, and present the filled container to the infant. Observe the infant's behavior in both instances.

Repeat:
2-3 times.

7. Placing Objects in Equilibrium One Upon Another

Location:
Same as in situation 6.

Object:
Small 1-inch blocks or small stacking-rings may be used.

Infant Actions:
a. Does not attempt to build a tower.
b. Approximates two objects one on top of another, the container and only touches objects already inside the container.
b. Takes objects out of a filled container, but does not put any into it.
c. Places objects in the container and takes them out one by one.
*[d] Places or drops objects into the container and turns the container over to remove the objects inside.

Directions:

Present several objects to the infant and observe his play. If he does not begin placing them one upon another spontaneously, demonstrate by making a tower, 3 or 4 objects high. Scatter the objects in the tower, so that the infant does not start a game of knocking down the examiner's tower, and encourage the infant to build one himself.

Repeat:

2-3 times.

but does not leave the second one in place when removing his hand, or places it so that it falls off immediately.

*[c] Builds a tower of at least two objects.

8. Appreciating Gravity in Play With Objects

Location:

Same as in situation 6.

Object:

A small toy of interest to the infant which rolls readily on an incline (e.g., a small toy car, an animal toy on wheels, a spool), a piece of cardboard to make the incline, and a piece of sturdy string are needed.

Directions:

Construct an incline by raising one end of a piece of cardboard. Place an object on the top, release it, and let it roll down the incline. Encourage

Infant Actions:

a. Does not attempt the action demonstrated by the examiner.

b. Acts without taking gravity into account (e.g., guides the toy along the incline without releasing it, pulls the string to bring the object closer and, then, releases it before grasping the object).

the infant to do the same and observe his behavior. Alternately, tie a piece of string around an object which the infant desires. Lower it to the floor and pull it up by means of the string. Lower the toy again, leaving one end of the string within the infant's reach, and encourage the infant to pull up the toy.

Repeat:
2-3 times.

9. Exploring the Fall of Dropped Objects

Location:
Same as in situation 4.

Object:
Several small objects which can be safely dropped to the floor (e.g., wood or plastic farm animals, large plastic beads, small stuffed animals) are needed.

Directions:
Spread the objects in front of the infant. Observe his activities with them.

Repeat:
1-2 times.

Infant Actions:

a. Does not drop any of the objects to the floor.
b. Drops several objects repeatedly, but does not attempt to see where they land.
[c] Drops several objects repeatedly and looks to see where each lands.[1]
*[c] Acts with appreciation of the force of gravity (e.g., releases the object on the incline, or holds the string while grasping the object).

[1]None of the infant actions for situation 9 and none for situation 10 is marked with an asterisk, because these infant actions were not included in the scaling analysis.

The situations are, nevertheless, retained in order to increase the likelihood of eliciting actions pertinent to the two highest steps of this scale, listed under [c] for both situations.

10. Making Detours

Location:
The infant may be seated on the floor or in a chair from which he can get out on his own.

Object:
Any object which is of interest to the infant and which can be propelled along the floor (e.g., a toy car, a ball, a pull-toy on wheels) may be used.

Directions:
While the infant is interested in playing with the object, take it and roll it behind a barrier created by an armchair or a low table. Try to make the object come to rest underneath the more distant side of the barrier from the infant. Observe the infant's attempts to obtain the object.

Repeat:
2-3 times.

Infant Actions:

a. Loses interest in the object.
b. Attempts to reach the object by following the same path as the object took (i.e., attempts to reach underneath the barrier for the object).
[c] Goes directly around the barrier and attempts to retrieve the object from behind.[2]

[2]See Footnote 1, above.

11. Indicating Absence of Familiar Persons

Directions:

Find out from the person taking care of the infant which member of the family is not present in the home and whose leaving was observed by the infant. Ask the infant where this person is or to be taken to that person. Observe the infant's actions and his reply.

Infant Actions:

a. Does not seem to comprehend the question or request.

b. Goes to look for the person where he may be most often found.

*[c] Indicates knowledge of the absence of that person by pointing to the door or to the outside, saying "gone," or "bye-bye," etc.

SCALE VI: THE DEVELOPMENT OF SCHEMES FOR RELATING TO OBJECTS

1. Acting on Simple Objects

Location:
Any position comfortable for the infant which leaves the hands free to manipulate the objects is appropriate.

Object:
Simple objects such as a rattle, a plastic doll, a plastic animal, a piece of aluminum foil, a large block, a cup, or a necklace may be used.

Directions:
Present the objects one at a time and observe the infant's actions with each object. Encourage the infant to play with each object, but do not demonstrate any possible activities.

Repeat:
3-5 different objects.

2. Acting on Several Objects Available Together

Location:
The infant may be seated in an infant feeding

table on a sofa, or a high chair to have him off the floor.

Object:
Objects which can be used jointly and may facilitate elicitation of more complex schemes should be presented (e.g., 6 blocks at once, 3 or 4 blocks and a cup, a doll and a doll's shoe, a ball of cotton and a piece of aluminum foil, a plastic animal, a musical roly-poly toy, a toy car).

Directions:
Present one of the objects and, following some time to observe the infant's behavior, add a second object which might be used jointly with the first. After an interval for joint play, remove the first object and observe the infant's actions with the second.

Repeat:
3-5 different objects.

3. Acting on Objects With Social Meaning

Location:
The infant may sit on the floor or in a chair from which he can get out on his own.

Object:
Objects which have socially designated ways for using them should be selected

Infant Actions:
a. Holding an object for at least 30 seconds.
*[b] Mouthing of objects: Brings the object to the mouth immediately of after other actions with it.

(e.g., a doll, a stuffed animal, a cup, a necklace, several blocks, a ball, a doll's shoe, a plastic flower, a toy car).

Directions:

Present the objects one at a time and observe the infant's actions. If the infant requests another object for joint play, present the second object after an interval for play with the first object.

Repeat:

3-5 different objects.

In very young infants, the intent to mouth an object may be seen from anticipatory opening of the mouth.

*[c] Visual inspection of objects: Brings the object before the eyes or holds it and looks at it for a few moments in the course of other actions with it.

*[d] Simple motor schemes: The infant appears to be exercising his schemes for acting on objects and pays little attention to the kind of object that is presented to him. He may (1) hit or pat the object with his hand, (2) hit a surface with the object, (3) hit two objects together, (4) shake the object, (5) wave the object in the air, and so forth.

*[e] Examining of objects: When the infant begins to focus his attention on the objects themselves, he begins to show examining activity. This is distinguished from mere visual inspection by a combination of both visual attention to the object and manipulation of

the object in an exploratory manner such as turning it around, feeling its surface, touching various protuberances on the object, and so on.

*[f] Complex motor schemes: The infant begins to accommodate his schemes to the characteristics of particular objects and, thus, begins to show a number of more varied actions adapted to specific objects rather than applied indiscriminately. These actions include (1) sliding objects on a surface, (2) crumpling objects which are flexible, (3) swinging objects, (4) tearing objects which may be torn or stretching objects out, (5) rubbing one object against another or putting one object into another, and so on.

*[g] "Letting go" activities: The infant may (1) drop objects repeatedly and intentionally or (2) throw them considerable distances when playing with them. These actions may be differentiated from an infant's attempt merely to get rid

of an uninteresting object by his willingness, even eagerness, to pick up the object dropped or thrown as soon as it is retrieved and offered to him.

*[h] Socially instigated activities: The particular schemes shown depend on the objects presented to the infant, but they all indicate some appreciation of the activities deemed appropriate for the object in the culture. For example, (1) pretending to drink from the cup, (2) wearing the necklace, (3) driving the toy car, (4) building a structure with the blocks, (5) hugging a doll or a soft animal, (6) dressing a doll or putting the shoe on the doll, (7) sniffing a plastic flower, (8) making the doll or animal "walk," and so on, are considered socially instigated behaviors.

*[i] Showing of objects: When another person is present while the infant plays with objects, he may show some of these objects to the other person in a way suggesting social interaction

or a beginning in sharing of experiences. The infant extends the hand holding the object in the direction of the other person and waits a moment, or, he brings the object over to the other person to look at. This action may be differentiated from an attempt to get rid of the object by the infant's unwillingness to give up the object for more than a moment. The infant may also bring an object of his own like the one presented or in some way associated with the one presented, and show that object to the other person.

*[j] Naming of objects in recognition: The infant spontaneously names an object or a part of an object either immediately upon being presented with it or after a period of examining the object. The name used may be a childish name and it may be accompanied by showing of the object to another person. Naming in recognition may be differentiated from the use of the name to express desire for an object

by its occurrence in the presence of the object.

APPENDIX H

DATA COLLECTION RECORD

Date_____ Session #_____ Time_____

Age: Years_____ Group_____

Months_____ Number_____

SCALE I

Item	Trials	Response
1. Following a slowly moving object through a 180° arc	(3-4) _____	1. Follows object smoothly through complete arc Yes_____ No_____
2. Noticing disappearance of a slowly moving object	(3-4) _____	2. Returns glance to start-point after several presentations Yes_____ No_____
3. Finding an object which is partially covered	(3) _____	3. Obtains the object Yes_____ No_____
4. Finding an object which is completely covered	(3) _____	4. Pulls screen off and obtains object Yes_____ No_____

Item	Trials	Response
5. Finding an object completely covered in two places	(2) _____	5. Searches for object where it is last hidden Yes_____ No_____
6. Finding an object completely covered in two places alternately	(3-5) _____	6. Searches correctly under each of the screens Yes_____ No_____
7. Finding an object completely covered in three places	(5-7) _____	7. Searches directly under correct screen Yes_____ No_____
8. Finding an object after successive visible displacements	(3-5) _____	8. Searches directly under the last screen in path Yes_____ No_____
9. Finding an object under three superimposed screens	(2-3) _____	9. Removes all screens and obtains object Yes_____ No_____

Item	Trials	Response
10. Finding an object following one invisible displacement	(3) _____	10. a. Checks the box and searches under the screen b. Searches under screen directly Yes_____ No_____
11. Finding an object following one invisible displacement with two screens	(2) _____	11. Searches directly under correct screen Yes_____ No_____
12. Finding an object following one invisible displacement with two screens alternated	(3) _____	12. Searches directly under correct screen Yes_____ No_____
13. Finding an object following one invisible displacement with three screens	(5-7) _____	13. Searches directly under correct screen Yes_____ No_____

Item	Trials	Response
14. Finding an object following a series of invisible displacements	(4-6)	14. a. Searches under all screens in the path in the order of hiding b. Searches directly under the last screen in the path Yes_____ No_____
15. Finding object following a series of invisible displacements by searching in the reverse order of hiding	(2)	15. Searches systematically from the last screen back to the first Yes_____ No_____

DATA COLLECTION RECORD

Date_____ Session #_____ Time_____

Age: Years_____ Group_____

Months_____ Number_____

SCALE V

A. Development in Localization of Objects in Space

Item	Trials	Response
1. Observing two objects alternately	(2-3)	1. a. Alternates glance slowly between objects b. Alternates glance rapidly between objects Yes_____ No_____
2. Localizing an object by its sound	(5-7)	2. Localizes the source of the sound visually Yes_____ No_____
3. Grasping a visually presented object	(2-3)	3. Grasps object Yes_____ No_____

Item	Trials	Response
4. Following the trajectory of a rapidly moving object	(3-4)	4. a. Follows object and locates it visually only when it lands in view b. Leans to search for object in the direction where it must have landed Yes_____ No_____
5. Recognizing the reverse side of objects	(2-3)	5. Grasps object, but turns it around immediately or by comparing both sides indicates appreciation of reversal Yes_____ No_____

B. Development in Appreciation of Spatial Relationships Between Objects

Item	Trials	Response
6. Using the relationship of the container and the contained	(2-3)	6. Puts or drops object in and reverses container to get object out Yes_____ No_____

Item	Trials	Response
7. Placing objects in equilibrium one upon the other	(2-3) _____	7. Builds a tower of at least two objects Yes_____ No_____
8. Appreciating gravity in play with objects	(2-3) _____	8. Acts with appreciation of the force of gravity Yes_____ No_____
9. Exploring fall of dropped objects	(1-2) _____	9. Drops several objects repeatedly and looks to see where they land Yes_____ No_____
10. Making detours	(2-3) _____	10. Goes directly around the barrier, thus making a detour Yes_____ No_____
11. Indicating absence of familiar persons	(1) _____	11. Indicates knowledge of absence by gesture or word Yes_____ No_____

APPENDIX I

CONSENT FOR A CHILD TO ACT AS A SUBJECT
FOR RESEARCH AND INVESTIGATION

I have been informed by Beverley Small, R.N., of her study to determine the level of development of my child by administering a body image tool. I hereby authorize Beverley Small to perform this evlauation on my child, _____, who is a minor (age_____). I understand that the assessment and evaluation will be to observe my child's behavior when presented with certain toys and objects in the form of a play activity.

I understand that the evaluation will not take place when my child is tired or hungry and that if my child exhibits fear of the procedure or investigator, the evaluation will be terminated. I also understand that I may be present during the evaluation if I so desire and that my name or my child's name will not be used in this study. I understand that I will be informed concerning the information obtained on my child if I so desire and request the information from Beverley Small. I understand that the information may be shared with the personnel of the agency in regard to the care that my child is receiving in this agency.

Date_____

Signature of Parent or Guardian_____

Relationship_____ Phone_____

Address_____ City_____

Witness_____ Date_____