FIVE PHASE PROGRAM FOR DEVELOPMENTALLY SLOW INFANTS BIRTH TO ONE YEAR OF AGE

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ABSTRACT

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By

Sister Barbara Cline, F.S.E.

The purpose of this study was (1) to review selected literature and research in five areas of infant development, (2) to develop a checklist of normal developmental milestone of an infant from birth to 12 months, and (3) to develop a systematic program of stimulation which would positively assist the handicapped infant to achieve a higher level of perceptual-motor integration than he would have without the program.

Five areas of infant development were explored: vision, hearing and speech, motor development, cognition and socialization. A nucleus program was developed around these five areas for parents to use with their infant in a home situation.

This stands as an untested program with time yet to be spent on further development and critical inspection of field test results. It is hoped that the parents and teachers to use this program will find it a real aid towards working with the infant who is "one step behind."

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A THESIS

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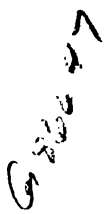

DEDICATION

This work is fondly dedicated to

Rusty, Doug, Marc, and Marcy

who made me realize that so little

is available for those infants who

must always follow a step behind.

ACKNOWLEDGMENTS

This study is the result of the consideration and encouragement of many individuals. I am especially grateful to Dr. Eileen Earhart, committee chairman, whose thoughtful advice and prompt assistance throughout this study was invaluable and cheerfully offered. I am also grateful to Dr. Margaret Bubolz for her continued support in completing this study and to Dr. Ellen Strommen who so willingly accepted the position of her colleague Dr. Hirman Fitzgerald, while he was on leave, for the many hours she spent and the valuable assistance and advice she gave I am grateful. And to Dr. Hiram Fitzgerald for his help in the proposal writing of this study, gratitude is due.

Finally, deep appreciation goes to my religious community who by their patience, understanding, and support gave me the encouragement to see this project through to completion.

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INTRODUCTION

At birth infants possess rather primitive systems of functioning. For some, these primitive systems extend through a much longer period of their infant life, than for others. From this undeveloped and uncoordinated state of functioning the general level of infant development proceeds toward greater and greater differentiation, organization, and integration of the various spheres of activity.

Whether a child is diagnosed as retarded at birth or later, the limited results of natural maturation generally becomes apparent in such signs as low responsiveness to the environment and failure to meet the simple milestones of growth at the expected ages. The anxieties of the parents as they realize that their child is not developing the way other children do and their lack of awareness of the special training techniques he needs can become highly destructive in terms of the child's future development and the parents' ability to cope with this stress and uncertainty. Merely giving parents a diagnostic label without counseling or an intervention program for the child can hardly be regarded as a real service.

A major emphasis of this study is upon the need to explore methods of stimulation which might be employed by parents in the home setting to optimize aspects of the deviant child's development.

Concentration upon a systematic program of perceptual-motor stimulation must not be regarded as a rejection of the historically held conviction that an infant's primary needs are affectional. The period of infancy is a perceptual-affectional period and while investigators may argue about which of the two takes precedence over the other, it is imperative that both be viewed as primary.

According to Barsch (1967) there are two major obstacles which stand in the way of developing and implementing an infant curriculum. One obstacle is traditional, holding that "the singular need is affectional and any form of seemingly mechanical procedures would serve to distort the spontaneous and free flow of mother to infant affective interaction" (p. 550). This obstacle is more semantic than factual but must be taken into account in pursuing the concept of curriculum.

The second obstacle is an "ignorance factor." Investigators have been far more skilled in delineating characteristics of perceptual and effective insufficiency than in describing the constituents of an adequate program. Our present state of knowledge permits a clear indictment against "what should not be allowed to happen" but there is very little documentation regarding what "should happen." Negative inference seems to be our main recourse.

The development and implementation of a suitable program/curriculum for the retarded (and/or normal) infant is based on a series of interrelated assumptions about human development. (1) Maturation is not a simple unfolding of genetic potentialities, but a process that is intimately involved in the interaction of the developing individual and the external and internal environment. This emphasis may be somewhat less important for the normal than for the

retarded infant, since the former can generally utilize the usual stimuli in the environment to obtain much of the stimulation he needs. However, the retarded infant, because of defective motor or perceptual abilities, cannot do so. His development must be carefully fostered, nurtured, and stimulated. (2) A crucial period of learning is the first three years of a child's life, and foundations for future achievement being laid in infancy. (3) The specific kinds of experiences that are most facilitating for learning as well as maturation in the retarded infant are still insufficiently understood. We can only assume that the best course is to provide him with the kinds of stimulation that approximate the level of stimulation the normal infant receives. The detrimental effects of understimulation of the normal infant are already well known and documented. The effects of understimulation of the retarded infant can be catastrophic. (4) The parents are the infant's chief teachers. They may require help to enable them to assume and maintain this role.

Based on the foregoing assumptions, the object of the study is (1) to review selected literature and research in five areas of infant development: vision, hearing and speech, motor development, cognition and socialization; (2) to develop a checklist of normal developmental milestones of an infant from birth to 12 months; and (3) to develop a systematic program of stimulation which will positively assist the handicapped infant to achieve a higher level of perceptual-motor integration than he will have without the program.

Therefore, this study will be divided into two major parts. Part I includes a selected review of the literature and research as it pertains to the growth and development patterns of normal infants from

birth to one year of age. It will be composed of six chapters, each chapter reviewing a major area of research. Concluding each of the first five chapters will be a sequence of developmental milestones. From this knowledge the foundations for a curriculum will be established. Chapter VI informs the reader as to how early stimulation is to be given to the infant, and hence a review of the literature on early infant stimulation is made.

Part II is composed of three chapters. Chapter VII introduces the reader to the bases of the curriculum. Chapter VIII presents the checklist derived from Chapters I-V and to be used in conjunction with the proposed program in Chapter IX.

Chapter IX includes the beginnings of a developmental curriculum. It should be noted that this curriculum is left in a drawing board stage. Time must still be devoted to the development of ideas and combinations of ideas which must be subjected to field test and immediate critical inspection for possible revision according to its results.

An infant curriculum holds promise for making a significant contribution to a synthesis for parents, physicians, researchers and childworkers at all levels.

PART I

REVIEW OF LITERATURE

CHAPTER I

VISION

The facility with which the infant organizes his visual world depends on his rudimentary intelligence, as well as the sophistication of the visual apparatus.

Infant Ocular Characteristics

Visual response in the infant is limited. With the exception of the fovea, all parts of the eye necessary for sight are completely formed at birth (Pieper, 1963). The sensory cells of the retina (the rods), functioning immediately after birth, detect the intensity of light and make vision possible. Therefore, the newborn can respond to strong light and objects before his face. Later the other sensory cells, the cones, develop. These ensure recognition of color and contribute to the recognition of form. According to Stuart and Prugh (1960), eye movements begin to coordinate after the first few months and for most, are well coordinated by eight to nine months. The eye ball is short and shallow in early life, producing a normal farsightedness, which diminishes as the diameter of the eye ball increases and reaches its adult dimension by six years. Piaget (1952), while looking at the development of vision as related to intelligence states:

> Perception of light exists from birth and consequently the reflexes which insure the adaptation of this perception (the pupillary and palpebral reflexes, both to light). All the rest (perception of forms, sizes, positions, distances, prominence, etc.) is acquired through the combination of reflex activity with higher activities (p. 62).

The infant is born with several basic ocular attributes (see Fantz, 1958, 1961b, 1963, 1966). These include the ability to fixate briefly on stable objects and the tendency to briefly track slow-moving objects with both eyes through relatively short arcs (Keeney, 1951). The newborn infant can generally accommodate at a distance of about seven and one half inches and this accommodation seems to be initially "locked in" at this distance (White, Held, 1966). According to Brown (1961) it is less than two feet. A few weeks later the child can fixate at several distances and is able to track with increased facility (Brown, 1961). He employes binocular cues gained from the simultaneous viewing of three-dimensional objects. Also, he becomes able to employ "movement parallax cues" obtained from his neck and head musculature as he moves his head while looking at stable and at moving objects (Bower, 1966).

A number of investigators have studied tracking behavior in the newborn and have found an unexpected amount of relatively efficient ocular concordance (both eyes working together) in infants only a few days old (While, Held, 1966) as well as the ability to pursue moving objects with appropriate eye movements (Brazelton, School, & Rohey, 1966).

The ability to blink is present at birth. It occurs in response to a sharp sound, sudden movement, or corneal stimulation. It does not occur, however, in response to visual stimulation of an object moving

suddenly towards the eyes. The protective response which is so characteristic of the older child and adult develops during the first six months. A young infant usually responds to something moving quickly towards the eyes with a gross avoiding action, by turning of the head and trunk.

At birth, the infant's eye exhibits no "pupillary unrest," which is normally seen in the adult eye. Not until the fifth or sixth month does the infant's pupil evidence rapid fibrillations as he looks at objects or becomes aroused emotionally; and not until the age of two years do these rapid movements reach the speed seen in adults (from 3-120 per minute) (Peiper, 1963). Although it is not clear what functional connection these movements of the pupil have to visual perceptual behaviors, some have speculated that they support visual alertness and involve a type of sophisticated scanning behavior helpful when the organism is under emotional, perceptual, and/or intellectual stress (Cratty, 1970).

Also absent at birth is the tendency for the head and eyes to work in unison. Characteristically, the head will lag behind as the eyes follow an object moving across the space field[1] (Pieper, 1963; White, Held, 1966).

In summarizing a number of researchers (Guernsey, 1929; Irwin, 1941; Ling, 1942; Redfield, 1937; Sherman & Sherman, 1925; Weiss, 1934; and others) Spears and Hohle (1967, p. 64) conclude:

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[1]It should be noted that this is not the same as the "Doll's Eye" Phenomenon in which the infants head is turned and the eyes are observed to stay fixed and do not move with the head.

> . . . there is ample evidence of light sensitivity in the young infant. There are also some data suggesting that at the age of one month the infant has an absolute threshold possibly two log units higher than the adults as well as photopic and scotopic luminosity curves similar to those of the adult. While fixation of light appears soon after birth, it is generally held that fixation of objects at that time is neither sustained nor accurate enough to permit smooth pursuit movements and binocular fixation. Foveal immaturity together with deficiencies in accommodation due to incomplete development of the ciliary muscles and to the proportions of the eyeball, may result in lack of clarity of retinal image. Even though optokinetic nystagmus can be demonstrated shortly after birth, convergence and coordinating movements of the eyes are passive and slow (and more reflexive) than is true later. The pupillary response, blinking, and the palpebral response show a similar gradual development.

By the time an infant is a month old he will visually pursue objects through increasingly longer arcs (from 45° arc at birth to a 90° arc at four weeks [Brown, 1961; Illingworth, 1966]) with more facility usually exhibited in the horizontal than in the vertical plane. Increasing also is the amount of time each day that the infant spends looking at his emerging world. And even during these early days the visual environment to which he is exposed will significantly influence the duration as well as the quality of the visual inspections in which he will engage (Fantz & Nevia, 1967; Hershenson, 1964; White & Castle, 1964).

Operationally the visual behavior of the infant of one month is changing. He begins to integrate other components of his muscular system with his eye movements. The head is more likely to move with the eyes. These head movements probably afford him movement parallax cues.

With the development of the ability to fixate upon a nearby object and to follow it as it moves, there develops the ability to respond to stimulation of the peripheral retina. This is first seen at

two to three weeks of age and by three months the infant will be seen glancing frequently from side to side in response to peripheral visual stimulation.

During the second month, the infant's ability to accommodate at various distances increases significantly. According to Brown (1961) the infant starts to pay attention to objects up to six feet away. His retina will develop further, and the second layer of cones in the retina will appear. By the third month the infant will evidence changes in accommodation comparable to those seen in the adult (Haynes, White, & Held, 1965).

By the second and third months the infant can track vertically and horizontally, and he becomes aware of the shapes and relative distances of objects. At three months he can follow moving objects with head and eye movement through the whole visual field (180°) and the movements are becoming smoother. Visual acuity is improving, and he will take glances at smaller objects around an inch in diameter (Brown, 1961). Also by this time the eye-blink response to approaching objects may be seen (Pieper, 1963; White & Held, 1966). Generally this reflex is more likely to be first elicited as an object is brought toward the eyes from the front, and not until two or three months later will peripherally approaching objects cause this protective reflex to be triggered.

During the third and fourth months the infant will discover the movement of his hands and feet and will begin to spend a considerable amount of time examining them. This phenomena, known as hand regard, is the first step in an extremely important chain of events that leads toward oral as well as manual examination of the shapes, textures and

weights of objects coordinated with simultaneous visual activity (White & Held, 1966).

At five months coordination of hand and eye is beginning to develop and the infant will start making efforts to grasp a rattle with some success. The attempts are at first clumsy raking movements, and are successful only if the object is large and well within reach. Co-ordination of the eyes and ears is also developing. Thus, if a noise is made somewhere in the room, the infant will look around towards it (Brown, 1961).

By the sixth month of life the infant is visually alert about 50% of the time (White & Held, 1966). He will visually track targets through a wide range of angles, in several directions and at many speeds. He can recognize faces up to six yards away. In general, he begins to exhibit a number of competencies in the use of his ocular apparatus that are comparable to those of adults.

Forehead wrinkles will appear and other facial muscles will be seen to interact with the ocular apparatus as the infant engages in visual behaviors of various types.

At nine months further improvement in all visual achievements has occurred. Visual acuity is better and he can see tiny pieces of white paper two or three mm. in diameter lying near him. He looks intently at expressions on faces and attempts to respond with a similar expression. His ocular movements are smooth in both horizontal and vertical directions of gaze.

Visual Attention

Several experimenters have begun to study the factors influencing the duration and quality of visual attention in the infant. They have explored the neruological basis of attention, as well as various parameters of the stimulus conditions to which infants are exposed. They have also studied the nature of various physiological modifications occurring as the infant's attention is "caught" by various kinds of visual displays (Sanders).

A number of techniques have been utilized to measure attention in infants and a variety of stimuli have been placed before the newborn infant in these experiments. Although it is possible to photograph the reflection on the cornea of objects at which an infant is looking, most investigators have been able to obtain reliable measures of attention by simply clocking the duration an infant's eyes are observed to look at an object. The measures that may be obtained by utilizing this method of recording infant attention include total fixation time, longest fixations, first fixation and number of fixations within a given interval. Lewis, Kagan, and Kalafat (1966) found that the best general indices are the longest fixation and the first fixation.

Several types of stimuli have been presented to infants in order to study attention behavior, including the human face, representations of distorted and blank human faces, grids of varying degrees of complexity, and various targets. Age and sex differences have been explored as variables influencing attention in infants (Berlyne, 1958; Fantz, 1966; Kagan, 1967).

In addition to simply clocking the duration of time an infant seems to look at various stimuli; researchers have also recorded

various other changes accompanying visual regard. For example it has been found that the heart beat characteristically slows down during the initial phases of attention to a new stimulus in infants, children, and adults (Kagan, 1967).

It is difficult to determine when collecting physiological and behavioral measures, just why an infant is attending to a given stimulus. For example, he may be frightened by the presentation, interested in what is seen or just passively attempting to categorize what the experimenter has decided to reveal to him (Kagan, 1967).

According to Cratty (1970), the evidence from studies of attention may be summarized as follows:[2]

1. The most prolonged periods of attention are likely to be elicited by complex stimuli and stimuli to which the infant has not been exposed on prior occasions (Fantz, 1963; Fantz, 1961; Fantz & Nevia, 1967).

2. Presentations of the human face are likely to elicit fixations of longer duration than will the presentation of designs (Kagan, 1967; Haaf & Bell, 1967).

3. Infants show marked changes in visual preferences during the early months of life, especially when different patterns are shown them.

4. Early experience is likely to influence visual preference changes and some experimenters have suggested that the quality and nature of visual attention in infants are likely to prove to be more helpful in assessing later intellignece than are the traditional measures of perceptual-motor efficiency presently employed (Fantz & Nevia, 1967).

5. Relatively few sex differences are seen in visual attention during the early months of life (Kagan, 1967).

6. Objects of intermediate complexity and intermediate brightness are preferred to objects that are extremely complex in design

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[2]Cratty's summary is further substantiated by additional references furnished by the author.

or are too bright, or are not sufficiently illuminated (Hershenson, 1964; Kagan, 1967).

Color Discrimination and Form and Pattern Perception

Most of the early studies of developmental responses to color were mere observations of what one child, or a very few children would do in terms of the stimuli presented; these have failed to provide consistent information on the development of color discrimination in the young child.

Shinn's (1893-1899) rather thorough observations of her niece revealed that chromatic rather than achromatic objects attracted far more attention up to the third month, and that for the first year, color liking had little part in color interest, though the small number of observations seemed to indicate that yellow, orange, red, and pink attracted notice while blue, violet, and green hardly attracted the child at all. There are few indications that Shinn controlled for saturation and brightness, lighting or any of the dependent variables. (Since the cones are not developed at birth it would seem that these dependent variables are more likely to be effective stimuli.)

Holden and Bosse (1900) investigated the color preferences of 30 infants under twelve months of age and obtained no definite reactions before six months, but found prompt reactions in precocious six-month-olds to red, orange, and yellow, but sluggish reaction to green, blue, and violet. The ten to twelve-month-olds preferred red. However, they found that the achromatic colors were preferred before any chromatic colors.

Marsden (1903), McDougall (1906-1908), and Valentine (1913-1914) observed fixation, reaching, and grasping responses and concluded that

infants do discriminate color within an age range of six weeks to eight months, while Malrieu (1955) suggests that differential color reactions probably could be evoked at the third month. Brown (1951) reported the same developmental color order found by other observers, but noted that Garbine had reported a white, black, red, green, yellow, blue order, while Windh, as well as Neuman had reported a black, white, red, blue, green, yellow, orange developmental order.

Chase (1937) tested wave-length discrimination in twenty-four infants, fifteen to seventy days old, by projecting a small circle of one color within a larger circle of another color onto a screen above the infant's field of vision so that the small center color, when moved, appeared to move within the field of the other color. If an infant detected that movement, discrimination between the two colors was assumed. Observation of eye pursuit showed discrimination between red and yellow-green; red and green; red and blue-green.

Peiper (1926, 1937) tested premature infants in order to determine the brightness of gray, red, green, blue, and yellow needed to produce an eye-neck reflex, and found that premature infants responded to the same brightness values as did adults. He felt that his findings established that the Purkinje phenomenon[3] occurs in, and therefore that the cones in the fovea of the newborn infant were short, ill-defined, and probably non-functional.

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[3]Purkinje phenomenon--fields of different color and equal brightness become unequally bright when illumination is decreased in brightness. (Blakinton's New Gould Medical Dictionary.)

Studies of shape or pattern discrimination and preference have a more difficult problem with stimulus definition than do those on color discrimination.

Fantz (1961a) tried various patterned visual materials and found a differential response to pattern at all ages. This he interpreted as some degree of form perception being innate, with further development of visual behavior being a complex interplay of innate ability, learning and maturation. He then (Fantz, 1961b) presented a sphere and a circle to one-to-six-month-old infants for twenty second periods in order to determine the preference. He recorded a preference for the sphere when both objects were textured and exposed to direct light under both monocular and binocular conditions, and found that these preferences showed no correlation with age. Watson and Lowrey (1962) reported that associations between sight and higher centers were developed to the extent that an infant three months old could recognize such familiar objects as his bottle, and that by five or six months, the visual images were retained so that increased recognition of familiar objects appeared.

The findings reported by Spears (1964) appear to extend to an earlier age level the form or shape dominance reported by Brian and Goodenough (1929)[4] in their study of the relative potency of form and color. A number of studies on form discrimination together with Fantz's findings (1959) on visual acuity in young infants, suggest that

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[4]Brian and Goodenough reported form dominance at below three years; color dominance over the next three to four years and then the return of form dominance. (It should be noted that they used three dimensional stimuli with the youngest children, but two-dimensional with the older.)

capacity for such discrimination is present at the age of four months. The results of Spears study in conjunction with those of Fantz (1958, 1959) and Berlyne (1958) indicate that such discrimination is probably fairly precise at the age levels involved. Preference is not dominated by saturated color and preference for a given shape is not necessarily dependent on color. If we consider these results together with those of Brian and Goodenough (1929) and Kagan and Lemkin (1961) the sequence of form and color dominance would seem to be as follows: form dominating at ages three-four months to about three years, color dominating to about the age of six years and then once more form.

The Modification of Visual and Visual-Motor Responses Through Experience

Several researchers during recent years have reported the effects of early handling on the development of animals (Beach, 1954; Riesin, 1958) and the various maternal deprivation studies contain inferences that the quality of early experiences to which the infant is exposed will significantly alter his later behavior. Brody (1956), for example, noted that infants who were handled more often were consistently more attentive visually than those who were not handled as much. Additionally, the former exhibited a significantly greater amount of visual motor behavior during the early weeks of life.

In 1962 White and Held (1966) carried out an investigation utilizing reasonably exact assessment procedures, the purpose being to determine the influence of various degrees of visual enrichment of the early environment of infants. They obtained base-line data on 63 infants to determine the time in life in which visually directed reaching occurred and the time during which the eye blink to approaching

objects was seen. The duration of time in which the infants displayed visual attention was also plotted, together with the emergence of visual tracking and increased flexibility of accommodation.

Following the establishment of average parameters for various visual and visual-motor behaviors, they sought to create conditions that would conceivably modify the time of the appearance of such behavior in the life of infants. One group of infants was left in rather bland surroundings and used as controls. A second group was afforded twenty minutes a day of extra handling by nurses from the sixth through the twenty-sixth day of life. The changes noted in the experimental group were a significantly greater amount of visual attention and the delay of hand regard by eight days.

An additional experimental group was given even more visual and motor stimulation of various kinds. Not only were they afforded extra handling similar to that given to the other experimental group, but their crib liners were removed, so that the ward activities could be seen. Their mattresses were flattened, which facilitated hand, arm, and trunk movements. Multicolored bumpers were substituted for flat white ones, and finally, a special visual stabile containing contrasting colors and forms was suspended over their cribs from the thirty-seventh to the one-hundred-twenty-fourth days.

Following regular and frequent observations it was determined that hand regard and swiping behavior in this second group were delayed by two weeks and by five days, respectively. However, when visual-manual activity was begun, accurate prehension was achieved forty-five days ahead of the controls.

It is thus probable that with increased amount of attention by adults, such as more handling and providing an enriched environment, measurable changes can be elicited in the visual and motor behaviors of infants. At the same time the data emanating from this study suggest that although visual attention will tend to delay the onset of manual activity, an excess of external visual stimulation will lead toward increases in visual attention by the infant which in turn will result in qualitative and quantitative changes in his visual-motor behaviors early in life.

The relationship between vision and social response will be covered in Chapter V, Socialization.

Figure 1 depicts visual development during the first year of life.

- - - time of initial development and/or cessation of a phase of development
----- time that a particular visual pattern is operative in most infants

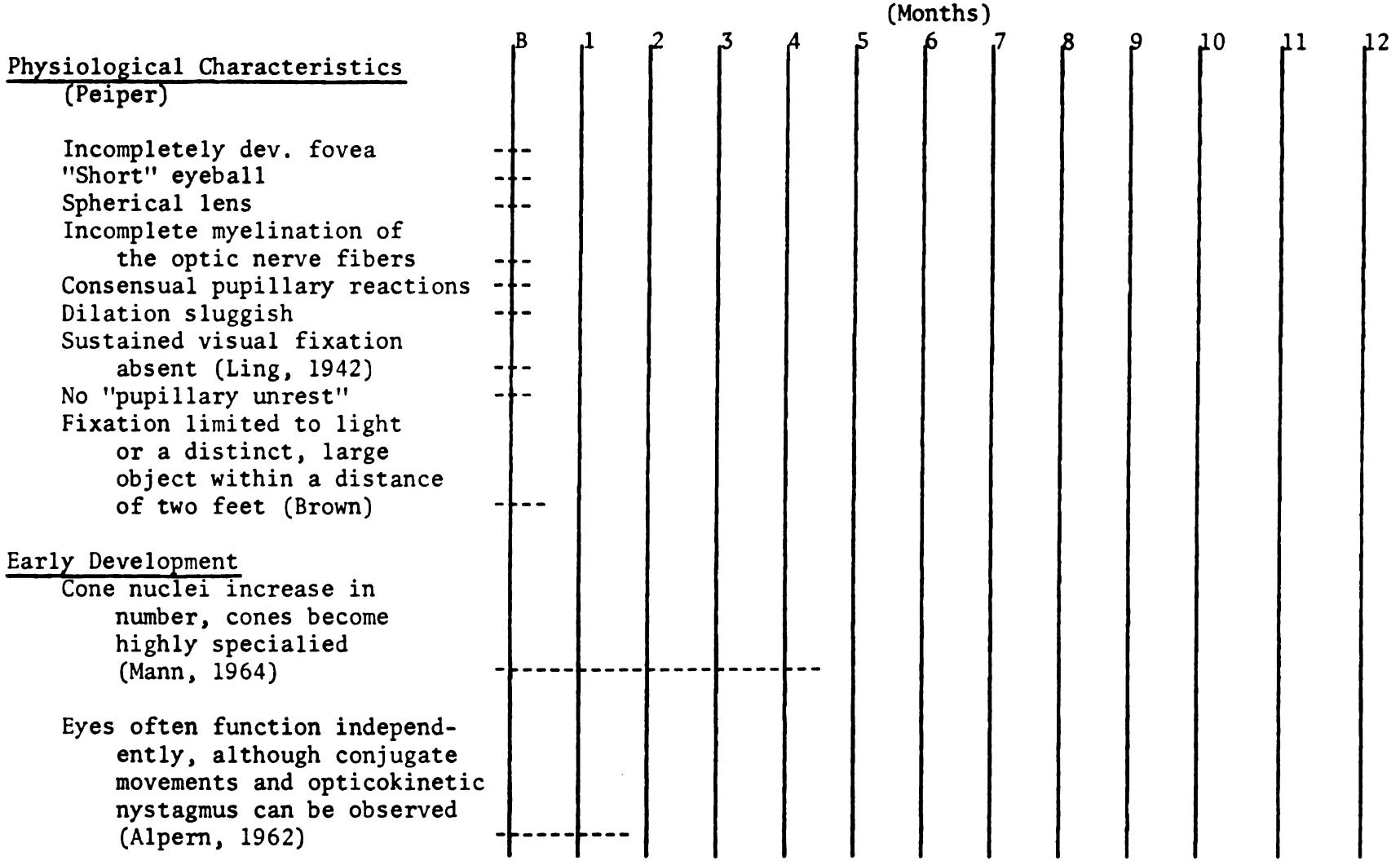
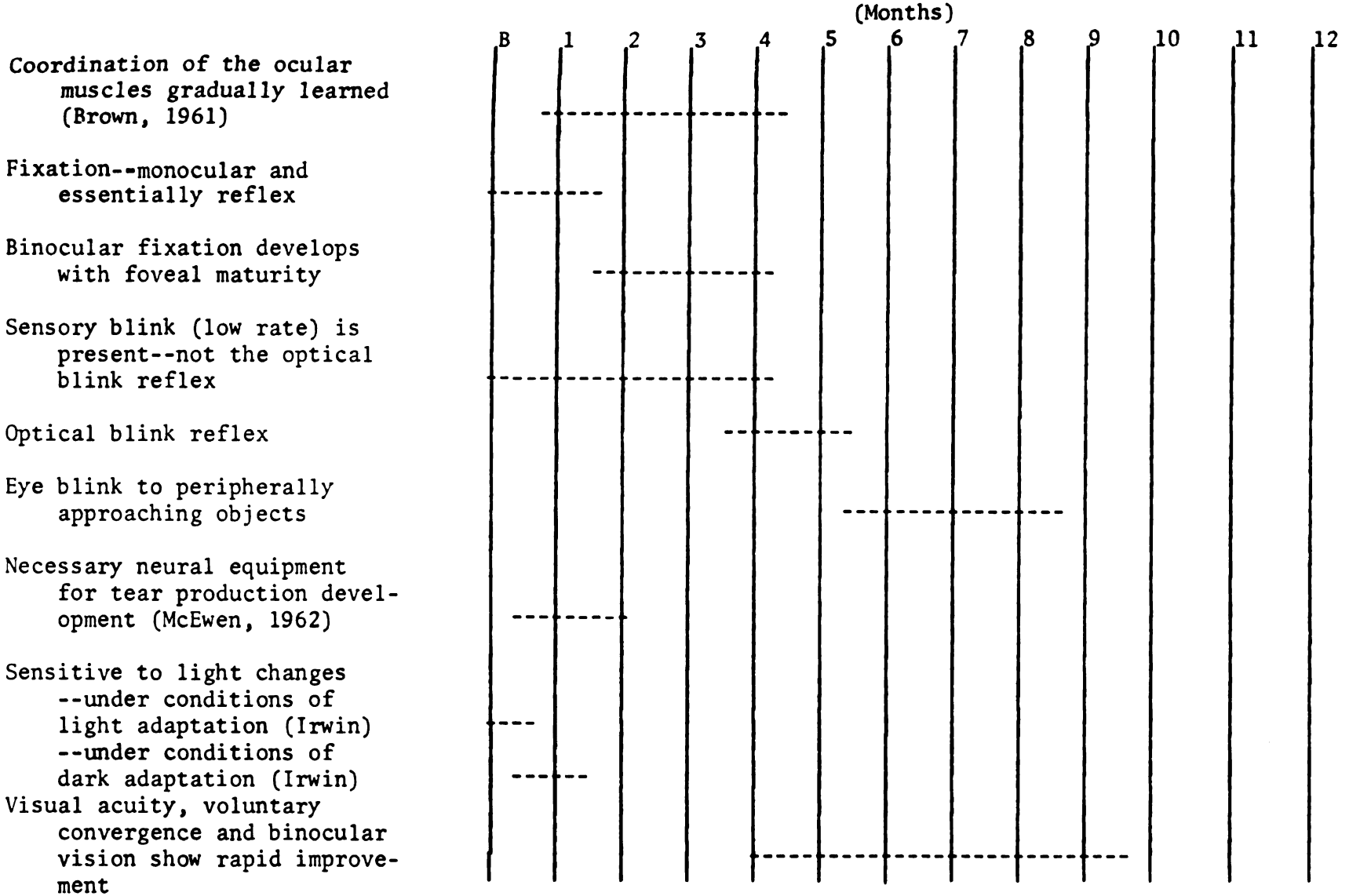


Fig. 1. Visual Development in the Infant During the First Year of Life.



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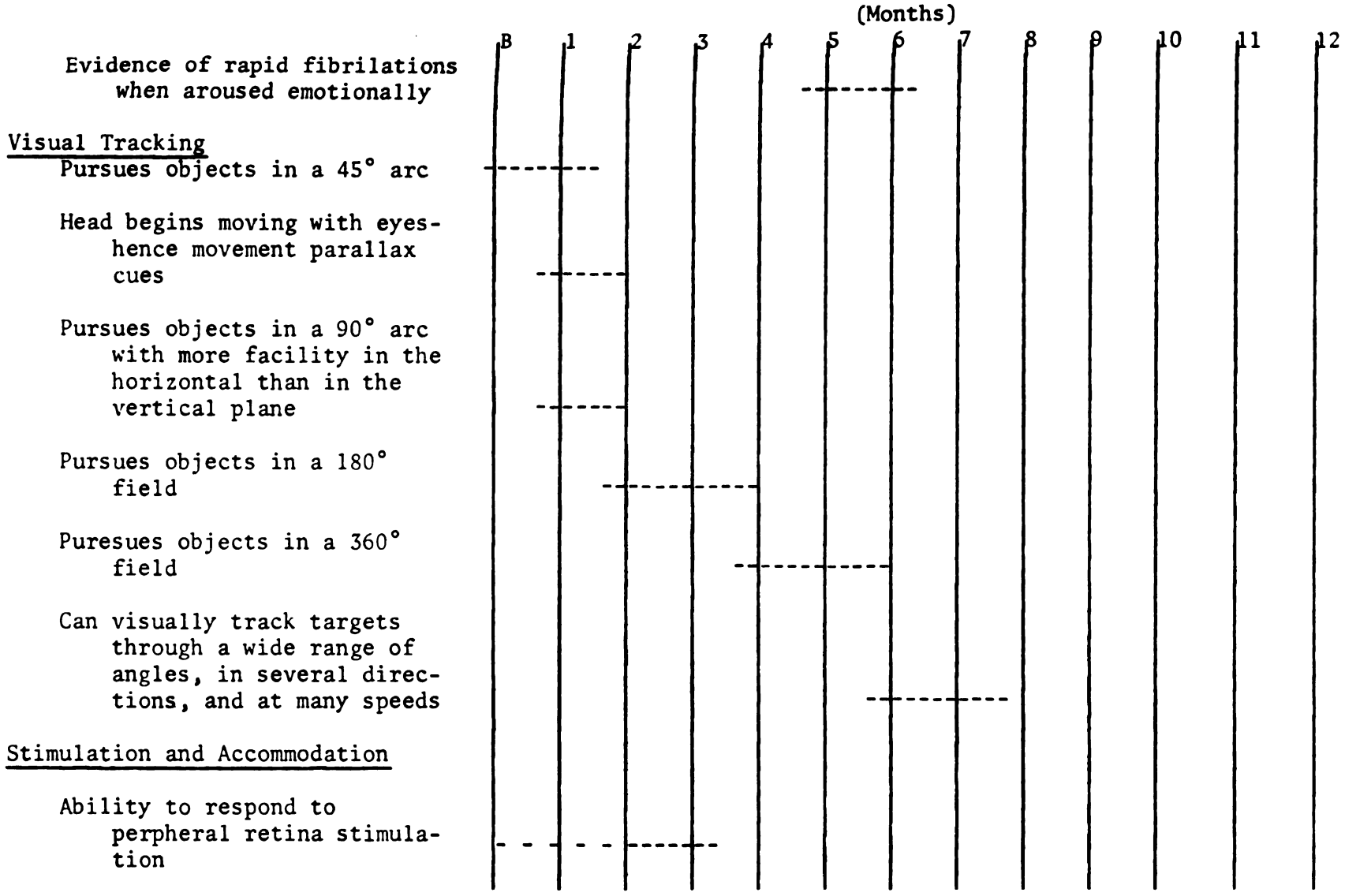

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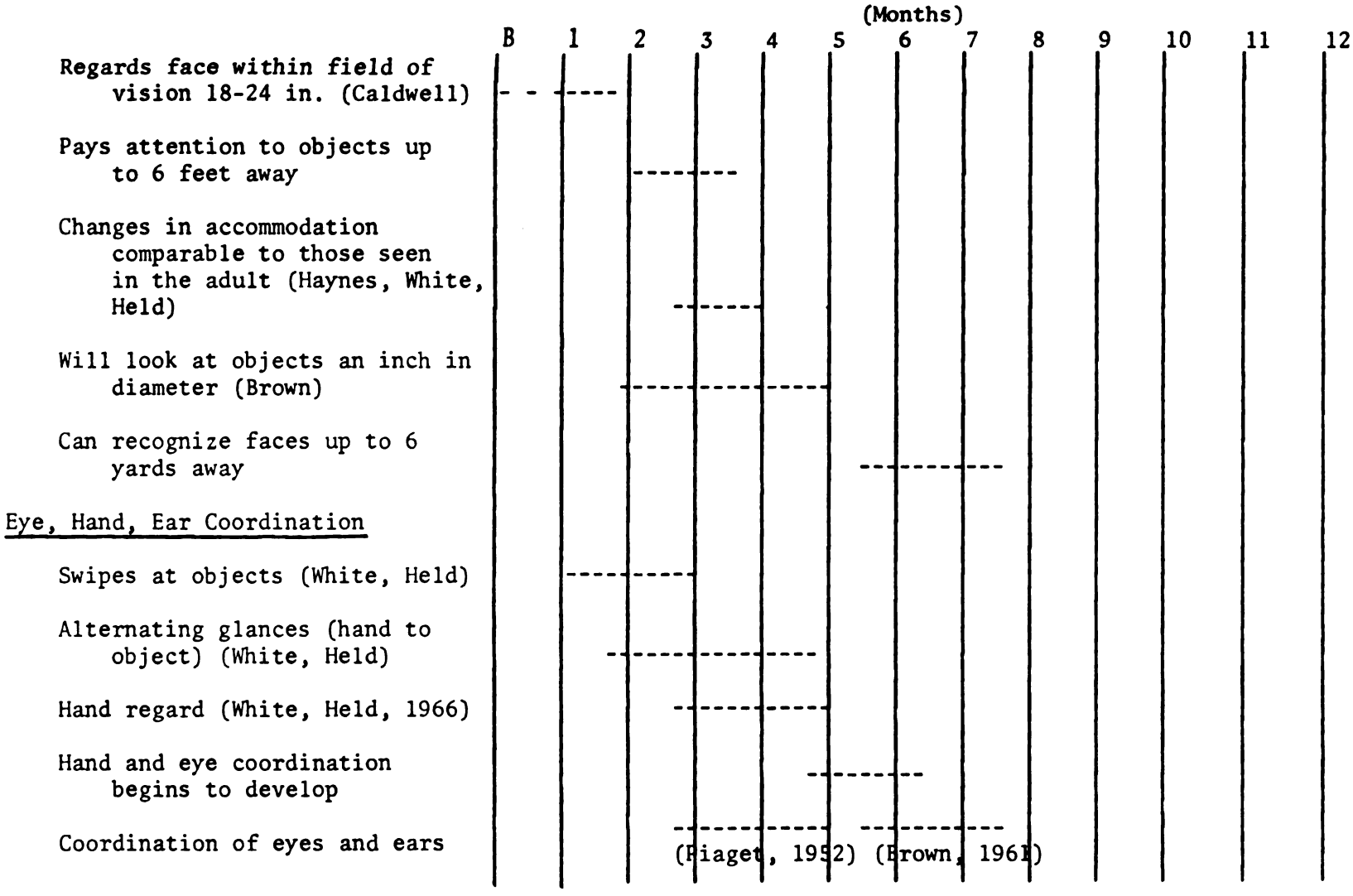

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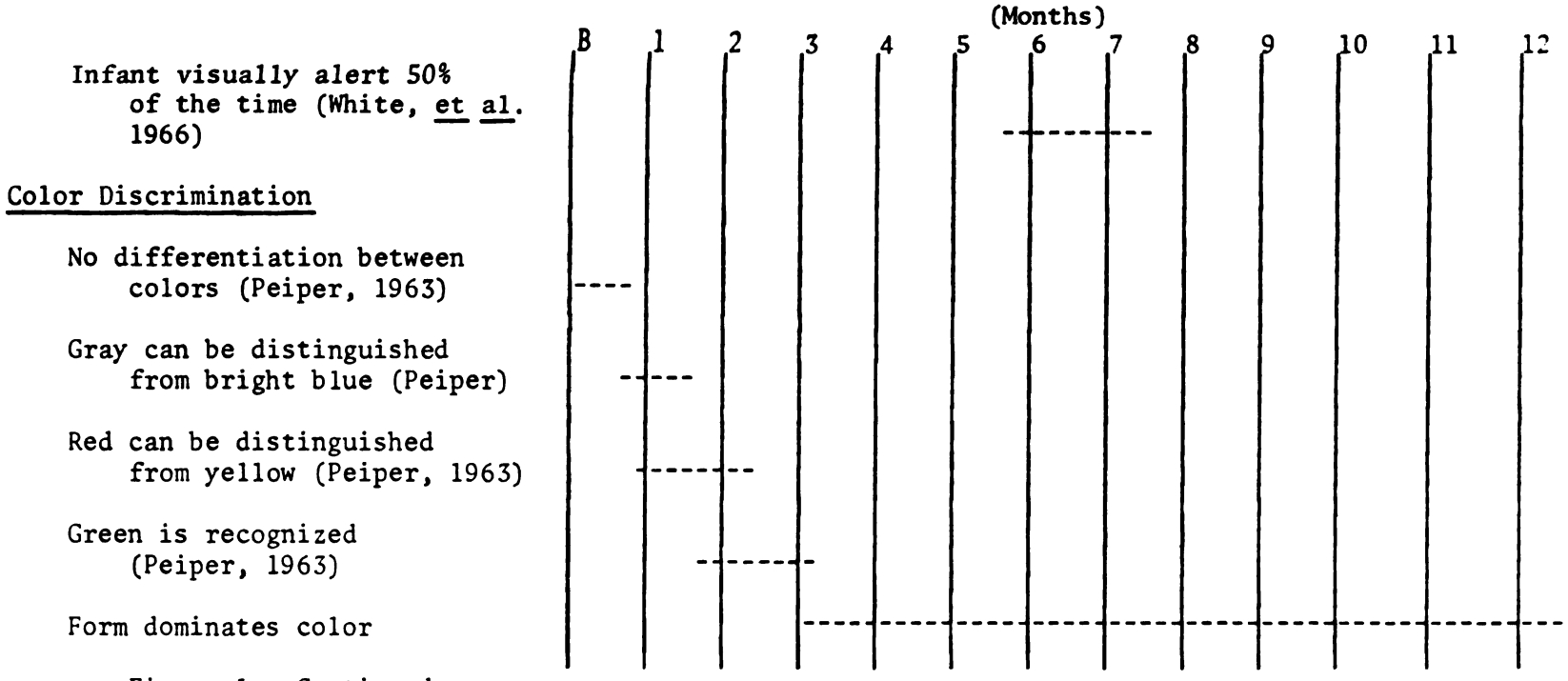

Figure 1. Continued.

CHAPTER II

HEARING

Infant Auditory Characteristics

The anatomic structures for hearing are essentially complete by the later stages of fetal development (Patten, 1953). However, at the time of birth the middle ear cavity is filled with a residue of connective tissue and amnionic fluid which greatly restricts full movement of the ossicles. Absorption and drainage of this substance proceeds fairly rapidly. The ear drum of the newborn has almost reached its final size, while the tympanum and the middle ear bones grow only very little after birth.

The initial immobility of the middle ear structures led some researchers (Martin & Vincent, 1960; Meyer, 1912; Remplein, 1952; Stern, 1924; Tumlira, 1955) to conclude that newborn infants are deaf.

Today there is general agreement that the normal infant has the capacity of hearing acoustic signals which are audible to young healthy adults. A large number of studies (Hardy, Dougherty, & Hardy, 1959; Lustman, 1953; Stechler & Carpenter, 1967; Suzuki, Kamijo, & Kiuchi, 1964; Wedenberg, 1956) have reported observing a variety of reflex responses by newborn infants to auditory stimuli. The reactions to sound consist generally of the following phenomena: When the eyes are

open, closing of the lid is elicited on sound stimulus. When the eyes are closed, there is a tighter shutting of the eyes. Other reactions include, facial grimacing, turning of the head to the sound source, blinking, opening of the eyes, making a fist, restless movements, the startle reaction, wide opening of the mouth, cessation of movements, cessation of crying, extension of the arms, spreading of the fingers, sucking movements, smiling. Other observations have indicated that loud sounds can elicit responses even from a human fetus in utero (Peiper, 1963). However, it is questionable whether the response results from auditory cues per se or vibro-tactile cues.

We conclude that the newborn infant has the capacity for receiving acoustic stimuli and exhibiting evidence such stimuli have been received. However, the interpretive appartus is still neurophysiologically immature. (Interpretation is based on experience.) During the early months of life the infant learns to attach meaning to certain repeated sounds, e.g., mother's voice, the rattle of utensils at feeding time, footsteps of an approaching adult. He also learns to listen, i.e., pay auditory attention to certain sounds coming from his environment. Both these abilities are absolutely essential for the child's future development. Some babies appear to be deaf because they have not developed the cerebral organization which enables them to distinguish significant sounds from the background noise, and to listen.

Problems in Auditory Research

Auditory perception from the developmental viewpoint has not been one of the major interests of American psychologists, a fact which a cursory glance at any bibliography on auditory perception or audition

would confirm. Several reasons for this lack of interest have been proposed (Kidd & Kidd, 1966):

1. Poor instrumentation in the production of stimuli, thus limiting the control in experiments in auditory perception;
2. Lack of meaningful response in determining the auditory sensitivity of infants and young children;
3. Concentration of research on deaf and severely hard-of-hearing children and not on the normal development of auditory perception.

Instrumentation has been a major flaw in experimentation because the devices used--noisemakers, whistles, clackers, bells and tuning forks--produced stimuli with variable loudness and timbre which could not be controlled and compared with the instruments of other studies. It has been only in the last few years that technology has developed audiometry to the degree that experimenters have sufficient control over the stimulus to conduct really valid and comparable experiments. Difficulty in evaluating responses to auditory testing has added to the variability of test results. Because of the variety of individual differences due to varying health conditions and stages of development the responses of the subjects could not be categorized as "typical" or "normal." The amount of variation in both stimulus and response, therefore, has made the results of experiments incomparable and the provision of a developmental continuum impossible.

Before discussion of the studies of auditory discrimination, an explanation of terminology is necessary. As with visual discrimination, the problem arises concerning the differentiation between

acuity and actual discrimination. Wepman (1960) in an article relating audition to speech describes the developmental stages of audition:

> Audition develops sequentially on at least 3 levels. There is both a sequence of development in the acquisition of the three levels and within each level. First to develop is acuity. This is the ability of the ear to collect sounds from the environment and transmit them to the nervous system. Second is understanding--the ability of the central nervous system to extract and interpret meaning from the patterns transmitted to it, patterns that in this instance originate aurally. Next to develop is the level of discrimination and retention, the abilities that permit the individual to differentiate each sound from every other sound and to hold each in mind well enough and long enough for the individual to moderate his speech or to make accurate phonic comparisons (p. 327).

It is clear that these levels of audition could be applied to aural discriminations other than those involved in spoken language; this same delineation of levels could also be applied to other sensory processes of discrimination such as the visual and the tactile.

Auditory Discrimination

Bridger (1960), in conducting habituating studies with the human newborn used habituation to determine the capacity of infants to discriminate auditory frequencies. In investigating the capacity for discrimination in infants, Bridger found that "all previous literature states rather unequivocally that babies do not show sensory discrimination in any modality" (p. 991). By habituating an infant's response to a pure tone and then substituting a different tone, Bridger and his team were able to measure a differential heart rate response. The measurement of cardiac response with the sensitivity of present-day instruments is a technique which was not available to earlier investigators, a fact which may account for the negative findings of earlier studies with neonates (Bartoshuk, 1964). By measuring cardiac response, Bridger was able to demonstrate pitch discrimination in the

infants, in one instance a discrimination as fine as the difference of 200 cycles per second and 250 cycles per second. Although some form of sensory discrimination is obvious, it is not the same as that of more developed infants:

> This primitive type of sensory discrimination is of a different order from that shown by mature organisms which is really discrimination by learned differentiation. . . . Since conditioned inhibition is poorly developed in infants they have a low capacity for learned sensory discrimination, even though our habituation experiments demonstrated some sort of primitive sensory discrimination (p. 994).

Bronshtein et al. (1967) used the extent to which an infant's regular and vigorous sucking movements ceases when he hears various sounds as their index of orienting. They concluded

> . . . external inhibition of the unconditioned sucking reflex by sound shows that the auditory analyzer of the neonate is already able to function and that its excitation leads in turn to the development of inhibition around the centers that control the act of sucking (p. 168).

Wertheimer (1961) by making clicks near the infant's ear and then observing its response, was able to demonstrate localization as well as acuity in neonates less than ten minutes old:

> Within 10 minutes after birth rudimentary directional auditory localization is possible; so is directional oculomotor (perhaps visual?) response. Moreover, at least on a reflex level, a rough coordination between auditory space and visual (motor) space can be observed (p. 1692).

Primitive as these sensory responses might seem, evidence of such hearing in infants is important because of the range of possibilities for learning which unfold. It is entirely possible that the young infant in his waking hours may be busily perceiving and organizing his sound environment. Recognition of this possibility immediately raises the question of the potential of an enriched environment to "informally

educate" the baby's auditory discriminations and accelerate their development.

Three Russian experiments using conditioning techniques (Kasatkin & Levikova, 1935; Mirzoiants, 1954; Nechaeva, 1954) have demonstrated the ability of infants between two and one-half months to seven months to respond to musical tones. An interesting finding of the Nechaeva study (1954) is the evidence of development between the ages of four-month-old and six-month-old infants. The younger group, with training could differentiate pitches seventeen half-steps apart; two months later they responded differentially to sounds which were one-half to 1 1/2 steps apart.

It may be too early in this sort of experimentation to be able to describe the auditory process in the neonate, but there is mounting evidence that such a process is present and functioning (Eisenberg, Griffin, Coursin, & Hunter, 1964):

> There can be little question, however that some sort of neuronal organization is present at birth; there is no other way to explain the systematic relations between signal input and behavioral out-put or the systematic effects of activity state. The behavioral repertoire is limited in comparison with that observed during the later stages of development, and this organization clearly must be less elaborate than that found in the more mature organism. It is, nonetheless, a very complex organization which cannot be very different in kind from that present during later life (p. 262).

The work of Hardy, Dougherty, and Hardy (1962) with infants throughout the first year of life traced the habit of listening in the baby as it goes through the stages of language development immediately preceding the onset of speech, a development which indicates discrimination in the strict sense of the term as well as retention and other cognitive processes. Judging from the pace of language development from this age, the auditory perception of the young child is extremely

acute. Language learning begins at birth with the child beginning to speak towards the end of the first year, from then on the number of discriminations and generalizations steadily increase (Fowler, 1962; McCarthy, 1954).

Lillywhite (1958) and Zigmond (1968) broadly review the infant and young child's developing response to sound. The following landmarks summarize this maturation:

Newborn--the infant responds to loud noise by crying or startling.

Two weeks--the infant assumes listening attitudes to the sound of the human voice.

Two months--the infant changes activity or attends to the human voice and no longer startles to familiar loud noises.

Four months--the infant turns head in search of sound or voice as he develops localizing skill to position sound and a sense of space in relationship to himself.

Murphy (1962, 1964) described the sequence of development of sound localization making a sound approximately 18 inches from the ear. These are as follows:

1. The infant turns the head to the side at which the sound is heard (three months).
2. The infant turns the head towards the sound and the eyes look in the same direction (three to four months).
3. He turns the head to one side and then downwards, if the sound is made below the ear (five to six months).

4. He turns the head to one side and then upwards, when the sound is made above the level of the ear (at about six months), i.e., downward localization occurs before upward localization.
5. He turns the head in a curving arc towards the sound source (about six to eight months).
6. The head is turned diagonally and directly towards the sound (about eight to ten months).

By the first year the ability to localize a sound source is almost as good as in the older child and adult.

From about nine months the baby learns to control and adjust his response to sounds. He may delay his response or inhibit it altogether. He may listen to hear the sound again and not attempt to make any localization. This represents a further step in maturation towards understanding and controlling his environment..

The child's understanding of language is usually several months ahead of his own speaking ability. This coupled with his proficiency in listening to vocal tone and "reading" body language enables the child to be far more understanding of communications around him than many adults are aware.

The average norms for the development of comprehension are derived from Lillywhite (1958) and Zigmond (1968):

Fifth to sixth months--the infant can distinguish friendly from angry tone in talking.

Eighth month--the infant may respond to his name.

Twelfth month--the infant can follow a few simple commands, responds to "no-no" and to "patty cake" and "bye-bye" with gestures.

From the work of Fantz and Nevis (1967) there appears to be strong evidence that perception precedes motor activity in the development of the young infant. This conclusion is in opposition to the frequent assumption that postnatal maturation and learning of sensory-motor responses is a prerequisite for perceptual-cognitive development.

Speech and the Prelinguistic Period

There have been several extensive studies on the speech of the infant. A good simple review of the subject was provided by Lillywhite (1958) and Sheridan (1964). Sheridan describes the stages of perverbal and verbal communication as including smiling, nestling, clinging, vigorous welcoming, frowning, resistive stiffening or pushing away, formless emotionally charged vocalizations and pulling the mother in his direction. Laughter, screaming and temper tantrums are other methods of communication.

The vocal behavior of an infant, particularly during the first few months of postnatal life, has been identified by Sheppard and Lane (1968) as a "matrix of later language development" (p. 64). Therefore, the differentiation and organization of infant vocalization as a function of maturational and environmental factors are of considerable interest.

The growth and development of the child during the prelinguistic stage, including his vocal behavior, have been the subject of study by representatives of many different disciplines applying a variety of descriptive and research methodologies. Some have focused in the mental and physiological development of the whole child and have described in some detail the prelinguistic development. For example,

Gesell and Amatruda (1964) in their classic studies of the development of the neonate and infant, describe the "average" child as he develops "language" and other behaviors. From the developmental scales of Gesell, other authors have prepared topical designations for certain landmarks or stages of prelinguistic development. Thus Berry and Eisenson (1956) describe four stages of prelinguistic development which precede true speech. They indicate that the early cry sounds of the newborn are entirely reflexive vocalizations. Then, at about six or seven weeks of age the infant begins to evidence his awareness of his own acoustic production. It appears at this time that the child definitely enjoys producing sound and that he produces it for his own pleasure. This cooing and gurgling and general vocal play is called babbling.

Van Riper (1963) indicates that a good deal of this type of vocal play is carried on when the child is alone and it seems to disappear when someone interrupts him. The infant's verbal behavior at this time is also characterized by stimulus generalization. Many different stimuli will evoke a rather similar response.

There appears to be general agreement that deaf babies begin to babble at a normal time, but because they are unable to hear the sounds they produce, they apparently lose interest and hence produce much fewer babbling sounds than the hearing child.

Berry and Eisenson (1956) have stated that the infant's babbling appears to contain the sounds of many different languages. There appears to be wide-spread agreement that infants from a variety of racial and linguistic backgrounds all babble alike. The implication

of this statement is that babbling is preparation for the later stages of prelinguistic development.

Until recently, theories of language development stressed the following sequence of events: imitation by a child of his parent's speech; reinforcement of the child's beginning sounds and words by his parents repetition; expansion and/or modification of them; repeated imitation of these modified sounds and words by the child.

More recent studies (Chomsky, 1967; Lennenberg, 1967; McNeill, 1966) question this theory and propose that the initial onset of speech and language is more likely innate, dependent mainly on a child's central nervous system maturation rather than on his environment.

At around the fifth or sixth month when the child is beginning to visually fixate and grab at attractive objects, the babbling seems to change from the more reflexive beginning to a stage that has been termed lalling. The great significance of lalling is that hearing and sound production have now become associated. The child appears to be using vocalization to attract attention of others and to express his interests and needs. As in the babbling stage there appears to be more vowel-like sounds than consonants in his utterances.

Two prelinguistic vocal behaviors appear to emerge at nine or ten months: "inflected vocal play" and "echolalia." During "inflected play" the child's pitch begins to rise and fall in patterns similar to that of his parents language and appears to take on general characteristics of the inflection and rhythm of adult speech.

The term echolalia refers to the vocal behavior of the infant when he appears to imitate the sounds that others make and particularly those sounds which he has made during the lalling stage. There may not

yet be evidence of a complete association of the word with a particular item or part of the environment to make it worthy of the title, true speech. Finally, following this sequence, true speech will on the average emerge at around twelve to eighteen months of age.

We continue to need more refined research data which can establish the relationship between the infant's acuity for sound throughout the speech frequencies and the acquisition and development of speech and language. According to Kavanagh (1971)

> . . . there is accumulative evidence that the newborn may be meaningfully studied at a fundamental level with regard to his perceptual strategy, his ability to match externally presented stimuli against an internal model and to store information in a short-term memory (p. 224).

Figure 2 depicts the development of audition and language in a young infant.

- - - time of initial development and/or cessation of a phase of development
----- time that a particular auditory or vocal response pattern is operative in most infants

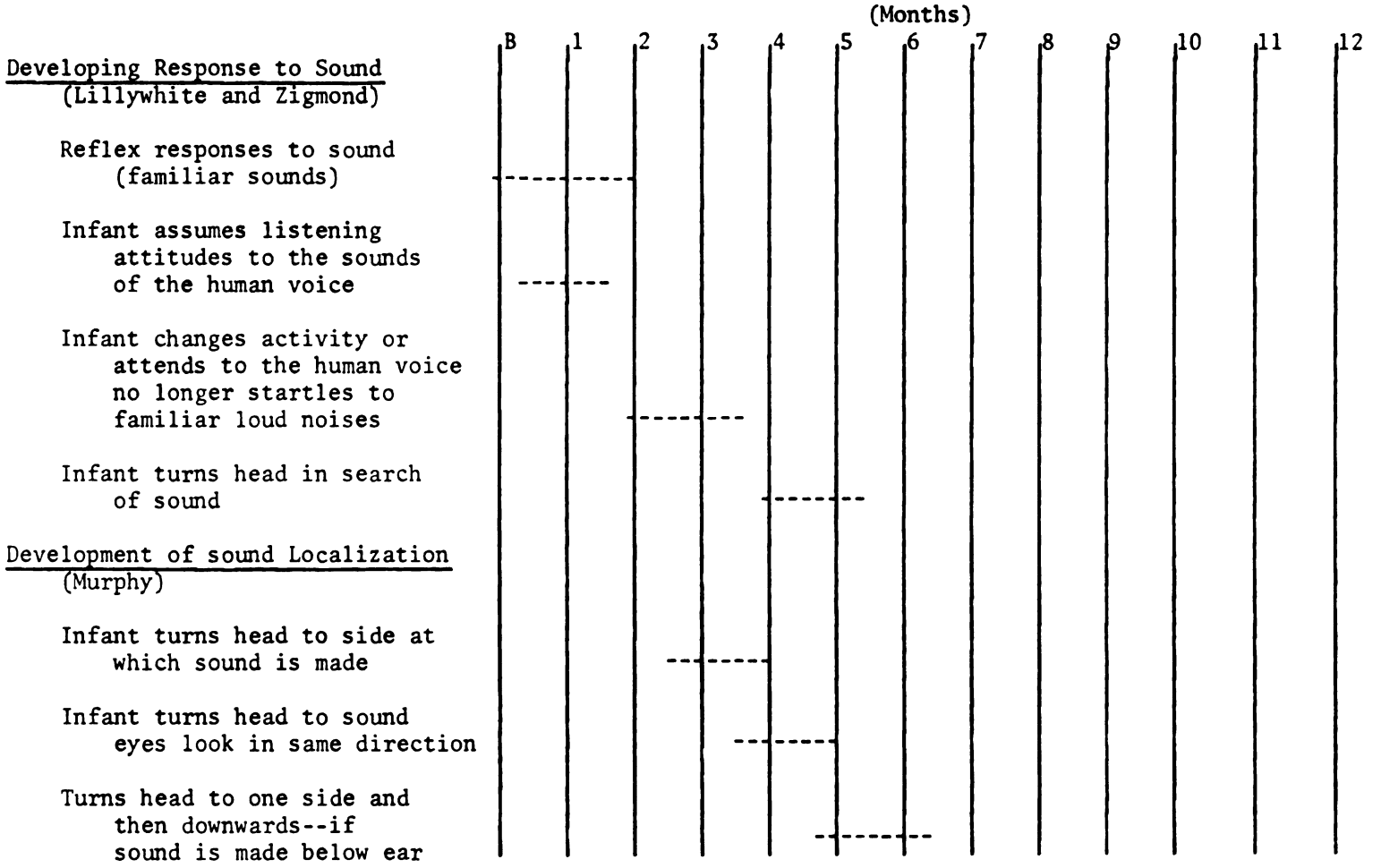

Figure 2. Auditory and Speech Development in the Infant During the First Year of Life.

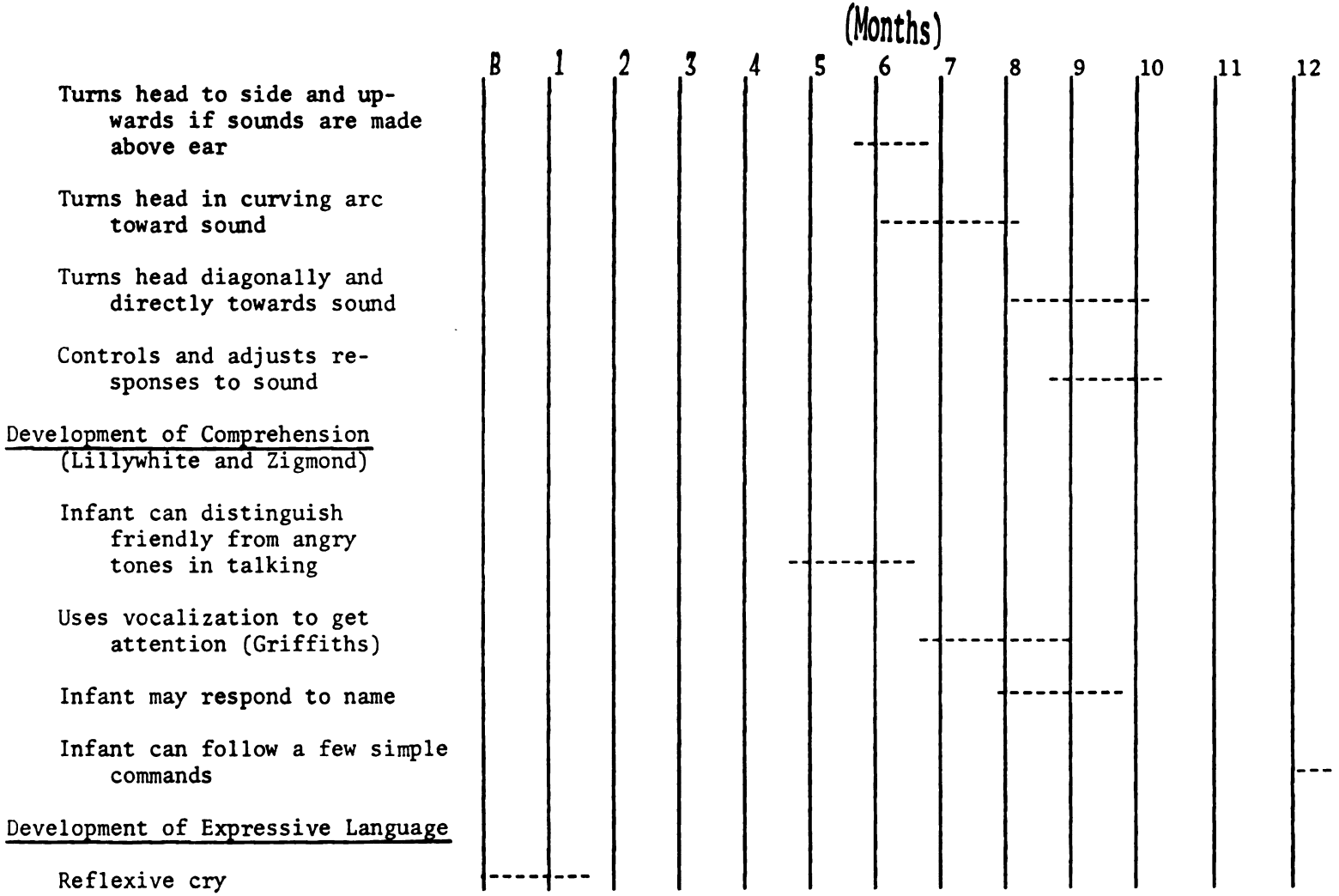

Figure 2. Continued.

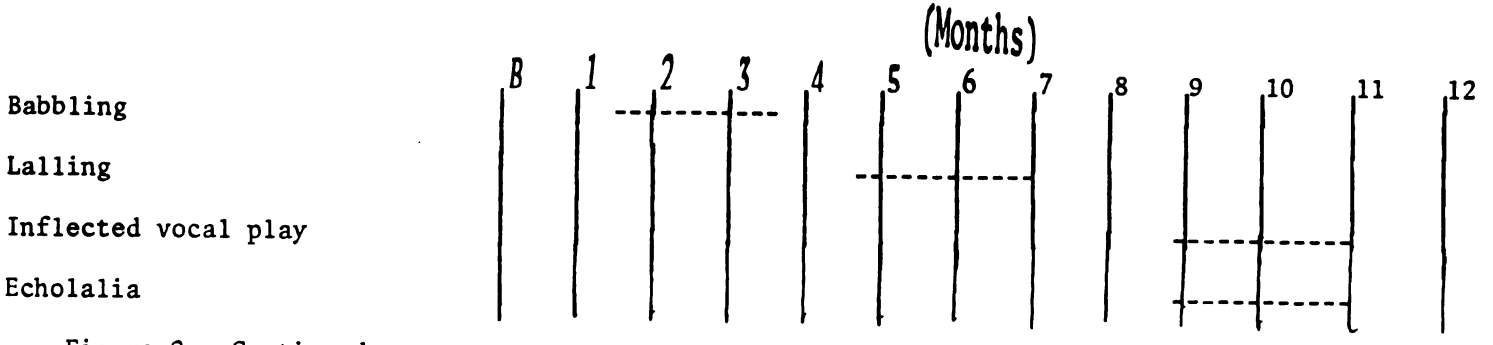

Figure 2. Continued

CHAPTER III

MOTOR DEVELOPMENT

Infant motor development and motor behavior have attracted insufficient attention during the past 20 years. The reason for this may be as Crowell (1967) states:

> Even though motor acts are the primary means of expression for the young human, this activity, until very recently, has been incorrectly regarded as playing a relatively minor role in total development. This conclusion stems from a variety of reasons. There is, first, the fact that early motor acts superficially appear simple and descriptively the same from infant to infant. Second, the behavior of the infant is without much content and seemingly involves little meaningful direction or purpose. This difficulty in relating motor activity to events in the environment is further compounded by characteristics of instability, evanescence, and rapid changes in early behavior. Even if it be granted that motor patterns are basic to complex psychological processes, it is still difficult to relate early overt responses in any meaningful way to later development (p. 125).

This section will give a short resume of theoretical approaches and will then trace the development of early motor patterns in normal infants including infant reflexes, motor development, manipulative development and concluding with a developmental profile of the infant during his first year of life.

Theoretical Orientations

In the study of motor development two theoretical orientations have emerged, namely behaviorism and the maturational approach.

Behaviorism

One of the central principles of behaviorism was ". . . that all complex behavior is a growth or development out of simple resources" (Watson, 1925, p. 325). This progressive development of behavior was reflected in the notion of "the activity stream" of the individual. Within this activity stream behavior was originally observed as a set of unlearned acts, stimulus-response connections or innate reflexes, from which would evolve stabilized habits through conditioning. This emphasis on the genesis of behavior became the setting for infant laboratory investigations and the background for genetic psychology as a field of independent study.

Maturation Hypothesis

Gesell, as the foremost proponent of the maturation hypothesis definitively described the new view in his statement against behaviorism:

> The extreme versions of environmentalist and conditioning theories suffer because they explain too much. They suggest that the individual is fabricated out of the conditioning patterns. They do not give due recognition to the inner checks which set metes and bounds to the area of conditioning and which happily prevent abnormal and grotesque consequences which the theories themselves would make too easily possible. Although it is artificial to press unduly a distinction between intrinsic and extrinsic factors, it must after all, be granted that growth is a function of the organism rather than of the environment as such. The environment furnishes the foil and the milieu for the manifestations of development, but these manifestations come from inner compulsion and are primarily organized by inherent inner mechanics and by an intrinsic physiology of development. The very plasticity of growth requires that there be limiting and regulatory mechanisms. Growth is a process so intricate and so sensitive that there must be powerful stabilizing factors, intrinsic rather than extrinsic, which preserve the balance of the total pattern and the direction of the growth trend. Maturation is, in a sense, a name for this regulatory mechanism (Gesell, 1929, p. 318).

Gesell firmly supported the idea that structure developed prior to function. Although he admitted two processes of development, maturation and learning, development during infancy was chiefly due to maturation.

Gesell advances five principles as basic in the ontogency of infant motor behavior. These were the principles of (1) individuating maturation, (2) developmental direction, (3) reciprocal interweaving, (4) functional asymmetry, and (5) self-regulatory fluctuation.

On the premise that motor changes should reflect the state of maturity or immaturity of the developing nervous system, McGrew (1946) attempts a partial answer to the question. After evaluations of development in grasping, creeping, sitting, swimming, locomotion, and other activities, she offered evidence to the effect that motor patterns progressively reflect the time (1) when the motor response is under subcortical control, and (2) when cortical inhibitory influences are beginning to function, then (3) when cortical participation is involved in muscular movements, and finally (4) when the cortex is dominant and voluntarily controls muscular activity. Further, and perhaps more importantly, she proposed an interaction of structure and function, stating:

> It seems fairly evident that certain structural changes take place prior to the onset of overt function; it seems equally evident that cessation of neurostructural development does not coincide with the onset of function. There is every reason to believe that when conditions are favorable, function makes some contribution to further advancement in structural development of the nervous system. An influential factor in determining the structural development of one component may be the functioning of other structures which are interrelated . . . (McGraw, 1946, pp. 363-364).

Since 1950 this interaction hypothesis has emerged as a trend with indications of having considerable influence on the study of motor behavior.

Piaget's Interaction Hypothesis

Piaget's interest in sensorimotor background of intelligence avoided the maturation versus learning dilemma by conceptualizing development as the result of an interaction process. According to Piaget (1952), "It was only by studying the patterns of intelligent behavior of the first two years that I learned that for a complete understanding of the genesis of intellectual operations, manipulation and experience with objects had first to be considered" (p. 247). The ways the child would perceive and cope with reality had to develop from interactive contacts between the organism and his environment. The most basic aspects of intellectual and cognitive functioning were intimately tied in with the actions or motor activity of the individual. (For a further explanation of Piaget's theory see Chapter IV.)

Whether Piaget's theorizing will operate as a stimulus to more intensive motor development research remains to be seen.

Infant Reflexes

The normal newborn has a number of "primitive" inherent responses many of which wane during the first three or four months. If any of these primitive responses (e.g., the Moro or startle response) are absent in the neonatal period, it is a sign of disordered cerebral function. Similarly the persistence, after the age of six months, of a response which normally wanes by the age of four months, is also a sign of neurodevelopmental abnormality.

Many of the initial reflexes seen in infants are necessary to sustain life processes between the time the child is no longer nourished within the mother's amniotic fluid and the acquisition of useful voluntary actions. For example, the rooting reflex enables the infant to obtain nourishment as he reflexively turns toward a tactual stimulus applied to his cheek. Other reflexes resemble later voluntary activities. For example, when an infant is placed in a certain position he will demonstrate a walking pattern. However, these later reflexes usually disappear well before their voluntary counterpart is seen.

As the primitive responses wane, other inherent "secondary" responses emerge. These are concerned with righting, protection, and balancing.

The reflexes discussed in this paper will include:

1. Primitive responses
   --neck righting response
   --primitive grasp of fingers and toes (Palmer and plantar grasp)
   --placing response of lower limbs
   --supporting
   --primary steping
   --asymmetric tonic neck response
   --Moro response
2. Secondary responses
   --labyrinthine righting reflex

--parachute

--protective responses

Primitive Responses

The Moro Reflex

In the first three or four months, if the supine infant's head is allowed to drop there is a sudden extension and abduction of the upper limbs, with opening of the hands, followed by flexion to the midline. At times the infant elicits the reflex as he coughs or sneezes. The beginning of the Moro reflex is opposite to the startle reflex, which is only a flexion without the prior extension pattern. Also, the Moro reflex can be brought about rapidly and in succession, whereas the startle reflex needs some kind of recovery-from-fright time prior to its being triggered again (Cratty, 1967).

Persistance of the Moro response denotes lack of cortical inhibition (Dileo, 1967). An asymmetrical Moro response may indicate an Erb's palsy or an injury of an upper limb (Egan, et al., 1969).

Asymmetric Tonic Neck Response (TNR)

During the first three or four months when the infant's head turns to one side, the upper limbs take the fencers positions; the arm extends on the side to which the face is turned. The other arm is flexed. The lower limbs take a similar attitude to the upper limb on the same side. The trunk is concaved to the occipital side. In the second or third months the infant's limbs are in the TNR postures 50% of the time. If in the first month or two the infant keeps his head persistently turned to one side, there may be persisting fisting in the

occipital hand, apparent shortening of the occipital lower limb and curvature of the spine. There may also be later delay in turning the head to sounds made on what was the occipital side of the head.

Palmar and Planter Grasp

For the first two months the hands are shut most of the time. The thumb is inside the fingers. Touching both palms of the hand and the front part of the bottom of the toes tends to cause flexion of the hands and feet respectively. This reflex in the hands usually results in a grasping action that excludes the thumb and may be strong enough to support the infant's weight for short periods of time. The reflex grasp is replaced by voluntary grasp between four and five months. After the second month persistent "fisting" indicates delay in motor development. Fisting on one side suggests hemiplegis (Egan, et al., 1969). The toe grasp response normally persists until nine to twelve months. It is gone when the child walks.

Neck Righting Reflex

There is a lack of agreement among different investigators as to the age of onset and disappearance of the neck righting reflexes. This reflex generally appears between thirty-four and thirty-six weeks of gestation. However, according to Paine (1966) it is not until ten months of age that all infants demonstrate this phenomenon. This is in opposition to Peiper (1963) who reports that in the first half year of life it is usually possible to demonstrate this reflex. The reflex is obtained by turning the head of a supine baby to one side. When the reflex is present, first the shoulders, then the trunk, and finally the pelvis will turn in the same direction towards which the head is

turned. This reflex has its counterpart in the so-called "body righting reflex of the head" in which turning the trunk of a baby lying supine causes the rotation of the head of the same direction. The neck and body righting responses are believed to be primarily spinal reflexes.

Supporting Response

The infant is held erect and lowered so that the soles of the feet are in contact with the table top. In the first three to four months most infants extend the lower limbs and will support their weight. In the fourth-fifth-sixth months the response is less vigorous but from six months it is normally present again and persists.

Primary Stepping

The infant held erect and supporting his weight is then leaned forward. During the first six weeks he will usually respond by stepping forward. The response is useful for demonstrating the functional efficiency of the lower limbs and for detecting asymmetry as in hemiplegia.

Placing Response

The infant is held vertical and the dorsum of feet or front of the leg moved against the lower edge of the top of a table. The lower limb is flexed, swung forward and extended so that the child "steps over the curb." Response becomes less vigorous at six months, but persists into the second year of life. The reaction is of value in detecting asymmetry of response between the two lower limbs. In a child of five or six months a poor placing with a vigorous supporting

response suggests excessive extensor activity as is seen in the spastic child.

Secondary Responses

These appear at four to seven months of age and in some degree persist. They are not learned but inherent and can be demonstrated by evoking them before the baby has used them in voluntary activity.

Labyrinthing Righting Reflex

This reflex is seldom seen in the newborn, but becomes stronger during the middle of the first year. It contributes to the assumption of an upright head and body position and to the child's movement forward during the end of the first year.

Generally the infant evidences this reflex by his tendency to attempt to maintain himself upright by lifting his head upward when the body is tipped downward. Similarly, if the upright infant is held by the shoulders and bent backward, his head will move forward, still attempting to maintain its original position with relation to gravity. The reflex also may be seen if the upright infant is angled to his left or right. The head tends to maintain its original position with relation to gravity.

Protective Reactions

These are also called propping, saving, or parachute reactions. Balancing reactions are in the opposite direction to the displacing force (tilting); protective reactions are in the same direction. They appear in response to a sudden displacing force or when a slower force can no longer be compensated by balancing.

Parachute Response

An infant is vertically suspended and suddenly turned face down and moved in a downward direction to produce this response. A baby of seven months of age who is stressed in this manner will usually extend his upper extremities and spread his fingers as if to protect himself from falling. This reflex is present in all normal infants by one year of age (Paine & Oppe, 1966). The response is independent of visual stimuli since it occurs even when the infant is blindfolded. An asymmetrical parachute response with unequal arm or hand movements may be indicative of an orthopedic or neuromuscular disorder affecting one of the infant's extremities.

Lateral Propping

When a five-to-seven month infant is suddenly tilted to one side, usually from the sitting position, the arm and hand on the tilted side will assume the same position as described for parachuting.

Posterior Propping

This reaction is produced by pushing a sitting infant backwards. There is a posterior extension of both upper extremities in order to prevent himself from falling backwards.

A child cannot walk until he has both balancing and protective reactions.

The time of disappearance of the primitive responses and appearance of the secondary responses shows variation from infant to infant.

Motor Development

Following will be a short resume of the major areas of infant motor development. Included will be head control, sitting, swimming, rolling, creeping, erect posture, and locomotion.

Head Control

Roughly four groups of head control responses can be distinguished. In group one are responses, reflexive, which consist of head raising or head turning to the side when the infant is lying prone and from side-to-side when he is in a supine position. The head-turning and head raising are usually present at birth (Bryan, 1930; Shirley, 1931). Gesell (1938) listed "lifting the head when prone" as fully established by four months. The reflex pattern seen at this time can be defined as the labyrinthine righting reflex of the head which Peiper (1963) says:

> . . . is decisive for the ability to bring the body into upright position, i.e. to adjust it to gravity and move it forward. This reflex has the task of adjusting the head to gravity; vertex up and mouth horizontal. . . . The reflex is only faintly demonstrable in the neonate, but during the first year of life it becomes an important prerequisite for the infant's ability to lift his head and later also the upper part of his body while in the prone position, thus reaching the starting position for locomotion in the abdominal position. With the help of this reflex the infant learns to sit and stand, a prerequisite for the upright and free gait. For this purpose the chain reflexes, which depend on the labyrinthine righting reflex of the head, are very important (p. 175).

The side-to-side head turning behavior is usually considered as a head-orientation component of feeding.

The second group of responses involving the head, is the ocular neck-reflex (Peiper, 1963). The reflex is essentially a bendbackward of the head to a light flash and has little use as an experimental

variable beyond the well-known studies by Peiper (1963) and Trincker and Trincker (1955) of brightness vision in infants.

The tonic-neck-reflex (TNR) is a third type of head movement (see description given above). Gesell (1938) stated that the TNR was normal during the first sixteen weeks and by the twentieth week was replaced by a symmetric-tonic reflex. Initially the shoulder, pelvis, and leg on the same side of the body are involved in the response. From about eight weeks of age both legs are flexed in the TNR.

The fourth type of head movements involve head control. There is an implied assumption in clinical situations that head control is an index of muscular tone and rate of development and is probably the first instance of infant body control (Crowell, 1967).

Sitting

Outside of age-normative data sitting behavior has received little research interest. McGraw (1941) reported that contrary to phases observed in other motor patterns of human infants there was no definite reflex sitting posture comparable to the subcortical grasping or swimming or stepping movements. Because of this she concluded that sitting is of a recent phyletic origin.

Swimming

Accounts of swimming movements were reported by Shirley (1931), Ames (1937), and McGraw (1939). According to Shirley (1931) somewhere around 25 to 35 weeks, these movements reflect completion of postural control over the whole trunk and emerging control over the pelvic and leg areas. Swimming behavior in this context ". . . consisted in

drawing up the legs frog-like and in kicking them out suddenly as if swimming" (p. 48).

McGraw (1939) found that when immersed in water the neonate makes coordinated swimming actions with both arms and legs. Around four months these movements become disorganized, but at the beginning of the second year voluntary movements become evident.

Rolling Over

Turning from a supine to a prone position is a precursor of the human righting response and a component in the later development of erect posture. McGraw (1941) differentiated four phases in achievement of the ability to turn from prone to supine, and from her data concluded:

> It appears then that the righting response in an infant is composed of a complex series of reflexes developing in a cephalocaudal direction. After the series of reflexes attains a degree of integration at a nuclear level, the cerebral cortex gains dominance and the function becomes incorporated into the human mode of the righting response, viz. the assumption of an erect posture. Although observations on developmental changes in erect locomotion and the assumption of an erect posture were made under different conditions, the first signs of cortical participation in these activities occurred about the time deliberate rolling over was achieved, as revealed in these data. Evidence of cortical functioning was indicated in these activities by most of the children between eight and nine months, as the human righting response matures, rolling over becomes eliminated as an initial move in the performance (p. 394).

Creeping

Prone progression analysis is among the most completely covered sectors of motor development. The first detailed study is that of Burnside (1927) in which he showed the sequences of movements involved in the stages of progression preceding walking. Burnside differentiated crawling from hitching and creeping. Hitching, (defined as

progression in a sitting posture) as well as rolling, may occur as the first mode of progression. In crawing the abdomen is in contact with a surface and the body is pulled along only by the arms with the legs dragging. Later the arms begin alternate action and the legs come into use.

In creeping, the posture is changed to hands and knees making contact with the ground while the trunk is free above the floor surface. Shirley (1931) reported that creeping activity was going on while sitting up behavior was progressing, and that creeping appeared at the same time the infant rolled over. She listed seven stages as making up the creeping sequence: chin up, chest up, knee push or swim, rolling, pivot or rock, scotting backward, and then creeping. According to her observations babies proceeded through these stages in the same sequence regardless of speed of development.

Ames (1937) outlined 14 steps in the development of prone progression: (1) one knee and thigh forward beside the body [28 weeks]; (2) knee and thigh forward inner side of foot contacting the floor [28 weeks]; (3) pivoting [29 weeks]; (4) attaining inferior low creep position [30 weeks]; (5) attaining low creep position [32 weeks]; (6) crawling [34 weeks]; (7) attaining high creep position [35 weeks]; (8) retrogression [36 weeks]; (9) rocking [36 weeks]; (10) creep-crawling [36 weeks]; (11) creeping on hands and knees [40 weeks]; (12) creeping, near step with one foot [42 weeks]; (13) creeping step with one foot [45 weeks]; (14) quadruped progression [44 weeks] i.e., creeping on hands and feet.

Ames concluded that the development of prone progression proceeds from head to foot; during the first three stages of

progression--pivoting, crawling and retrogression--the arms are exclusively responsible for actual progression. Legs do not play an effective part in progression until stage eleven is reached.

Erect Posture and Locomotion

The most complete study on the development of erect posture and locomotion is that by Shirley (1931). The steps she found in the development of the upright posture or position were: (1) tensing the muscles when lifted; (2) sitting with support; (3) lifting the head when lying on the back; (4) sitting alone momentarily; (5) standing with support under the armpits; (6) sitting alone; (7) standing with support by holding; (8) sitting down from standing position; (9) pulling self to standing position; and (10) standing alone.

Progress toward walking was presented by Shirley (1931) in four stages: the early period of stepping; the period of standing with help; the period of walking when led; and lastly the period of walking alone.

Manipulative Development

Within the first few days of birth an infant becomes aware of objects within his space field. It will be several weeks however, before he attempts to contact and manipulate these objects.

According to Cratty (1970) the infant passes through four general phases when dealing with objects. Initially he becomes attracted by an object (later attracted to his own hand). The second stage involves general motor excitement as he is confronted with an object, with no coordinated attempt made to contact it. The third phase involves contact and manipulation to an increasing degree of

sophistication. The fourth stage involves various kinds of exploration of the object (e.g., stacking, throwing, shaking, hugging).

Early neonatal grasping is widely accepted as one motor act customarily present at birth. Though representative of an involuntary response, it is presumed to disappear between four and six months and to be supplanted by a voluntary grasping response.

According to McGraw (1939), studies on the grasping reflex are in agreement that (1) the reflex can be elicited in almost all newborns; (2) it wanes after the first few months; (3) individual differences in both strength of grasp and age of diminution are apparent; (4) the reflex attains maximum strength some few weeks after birth; and (5) following the waning phase, voluntary or deliberate grasping is seen.

Depending on the infant, the nature of the object, his previous experience with it, and the level at which the infant is aroused, he may evidence general excitation when he perceives an object, or he may begin to engage in simple "swipping" and "corraling" behavior. If he becomes generally excited, the motor activity he may evidence will sometimes consist of vertical arm movements, alternately moving the arms up and down, either in unision, one at a time, or only one. This is usually seen some time between the second and fourth months (White & Held, 1971).

During the latter portion of this period the child may begin to made crude, and then increasingly accurate, attempts to contact objects. Initially in his arm wavings he may accidentally touch an object, and then he will begin to "swipe" at mobiles and at other objects that come into his view. Initially, the contacts usually occur by chance. If the object is left on a surface in front of him, his

first attempts to contact it will come in the form of corraling movements, in which he reaches out with his entire arm-hand and sweeps the arms toward his body attempting to bring the object into a more advantageous position for viewing.

The most definitive work dealing with the sequence of prehensory development--the transformation of reaching patterns, the integration of arms and trunk in reaching, the speed of movement and patterning of errors in reaching from sixteen to fifty-two weeks of age--has been carried out by Halverson (1931, 1933, 1937). Halverson's findings have been supplemented and extended to earlier ages by the study of White, Castle, and Held (1964) on the visually directed prehension of thirty-four infants during the first six months of life. Although basically normative in design, this study tested hypotheses on the role of experience in the growth and maintenance of sensorimotor coordination. It is evident that the authors' interest bore on the interaction viewpoint of Piaget as well as the progressive neuromuscular maturation views of Halverson and Gesell. From a program of observation and testing designed to elicit visual motor and prehension responses, White et al. described the following normative sequence:

> In summary, then, given the proper object in the proper location and provided that the state of the subject is suitable, our subjects first exhibited object-oriented arm movements at about 2 months of age. The swiping behavior of this stage, though accurate, is not accompanied by attempts at grasping the object; the hand remains fisted throughout the response. From 3 to 4 months of age unilateral arm approaches decrease in favor of bilateral patterns, with hands to the midline and clasped the most common response. Unilateral responses reappear at about 4 months, but the hand is no longer fisted and is not typically brought directly to the object. Rather, the open hand is raised to the vicinity of the object and then brought close to it as the infant shifts his glance repeatedly from hand to object until the object is crudely grasped. Finally, just prior to 5 months of age, infants begin to reach for

> and successfully grasp the test object in one quick, direct motion of the hand from out of the visual field (p. 358).

Inherent in their analysis is an awareness of the distinct roles of visual-motor behavior which gradually become coordinated into visually directed reaching activity.

From the second to the sixth month, the infant's manipulative behavior evidences two trends. He begins to examine in more detail each object he contacts. Simple palmer grasp evolves into finite tactile manipulation using the tips of the fingers and the first finger in opposition to the thumb and to the rest of the fingers (Halverson, 1931; Uzigis, 1967).

During and following the sixth month of life the child begins to evidence numerous cognitive and social processes as he used objects in various ways. A sequence of steps in the infant's interaction with objects was discerned by Ungiris (1967) each step characterized by a dominant schema. The following schema typify these steps: mouthing (2 months); visual inspection (3 months); hitting; shaking (5 months); examining (6 months); differentiated schemes[5] (7 months); dropping (8 months); throwing (9 months); socially-instigated behaviors (10 months).

According to Gesell (1940) and Watson and Lowrey (1967) development progresses in a cephalocaudal and proximodistal direction. In the first quarter control of the eyes and the head is achieved. In

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[5]The infant acquires a number of new schemas soon after he begins to examine objects. These include tearing, pulling, crumpling, squeezing, rubbing, sliding, pushing, etc. This cluster of behaviors is distinguished by being differentiated according to the object with which the infant is interacting; they represent an adaptation of the infant's actions to particular characteristics of objects, and therefore, do not go through a period of indiscriminate use in relation to any object (p. 324).

the second quarter control of the upper trunk and arms. The third quarter sees the lower trunk and use of the fingers for fine prehension gaining control. Integration of the legs in the erect posture begins in the last quarter of the first year.

In conclusion we may say along with Knoblock (1967):

> Gross motor behavior includes the control of the head, trunk and extremities, and fine motor behavior pertains to the achievement of the control of five movements of the fingers. Although it is true that there is no evidence that any thinking has taken place unless there is some observable motor reaction, it is important to avoid the mistake of using acquisition of motor control as the criterion of intellectual ability. Motor behavior is most important in the evaluation of neurologic integrity and may sometimes be so disordered that the evaluation of intellectual potential is extremely difficult. Acceleration in motor development does not contribute to intellectual abilities, nor does motor defect necessarily mean that there is a concomitant defect in intelligence (p. 150).

- - - time of initial development and/or cessation of reflex
----- time that reflex is operative in most infants

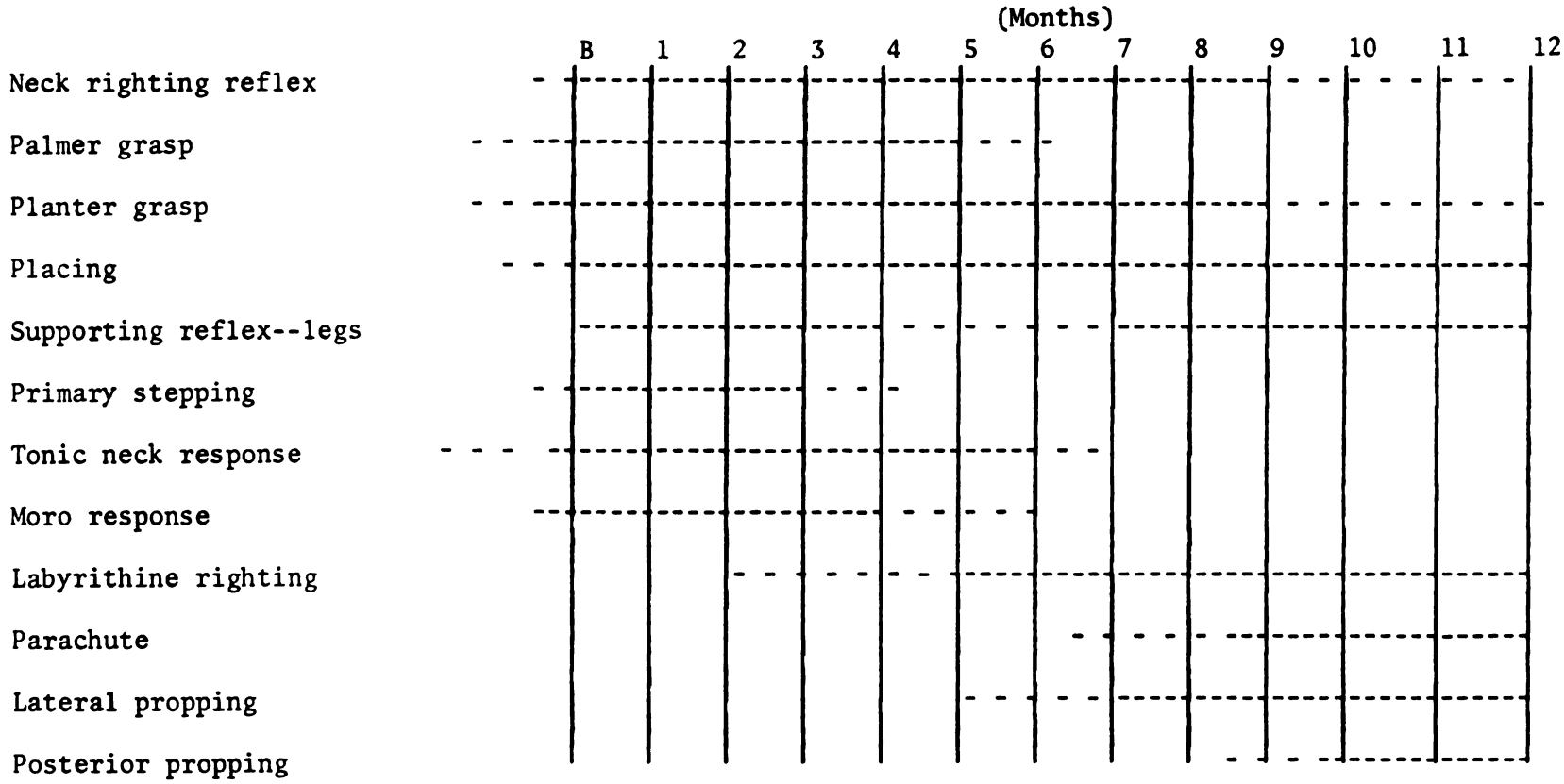


Figure 3. Infant Reflexes (Based on the Work of L. Taft, H. Colen, and J. Dileo).

- - - time of initial development and/or cessation of motor patterns
----- time that motor pattern is operative or has attained full development

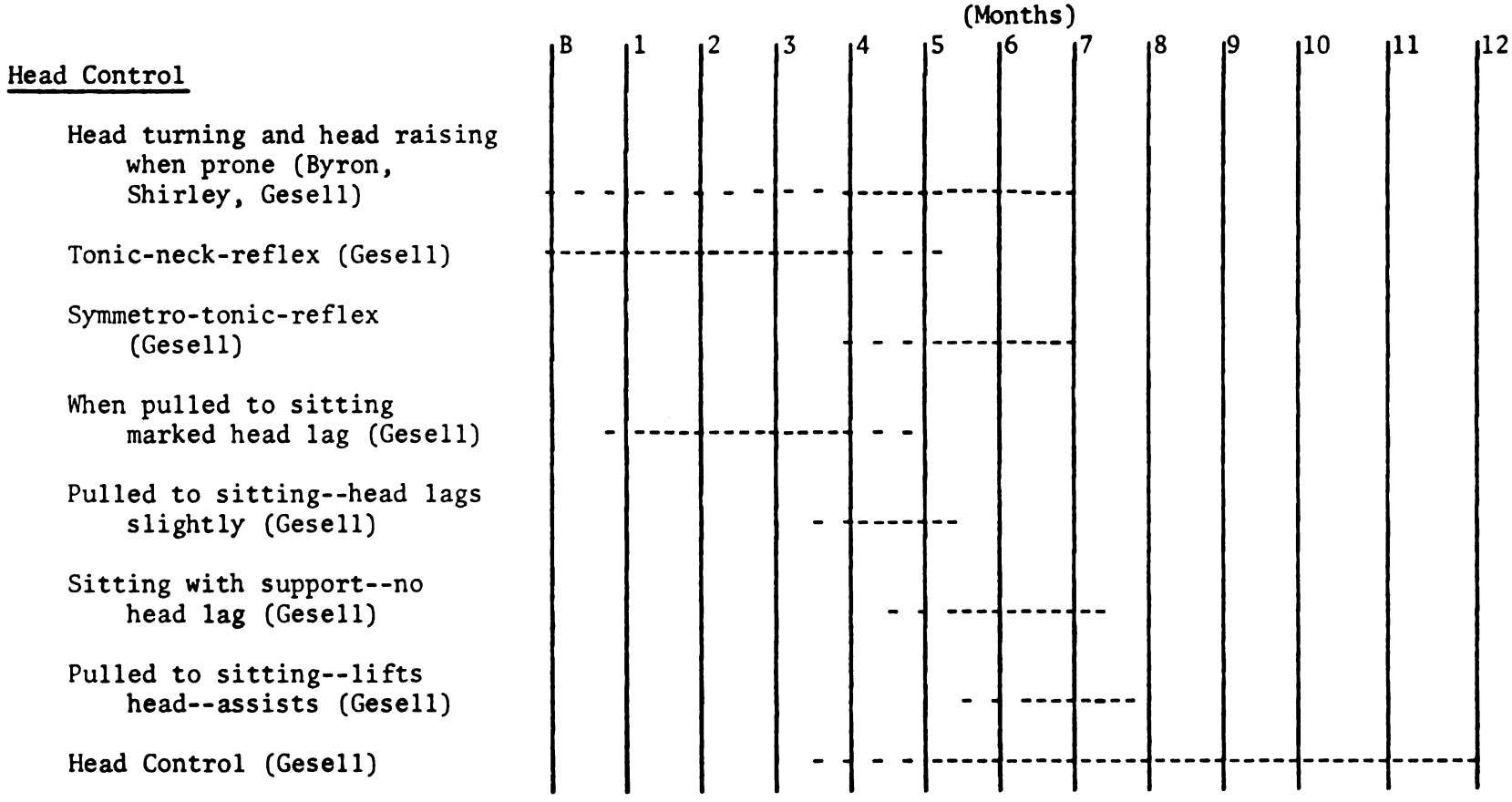
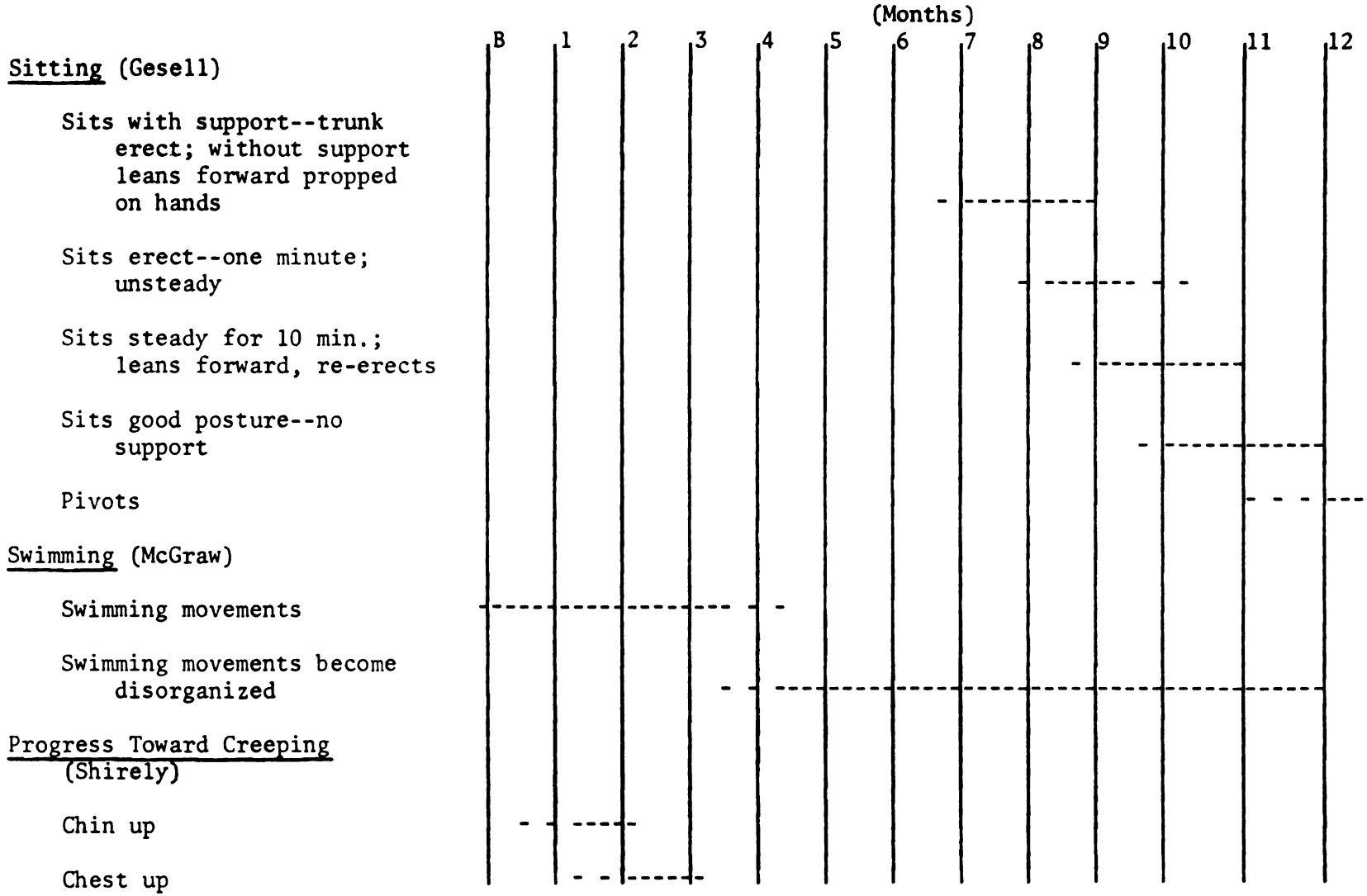


Figure 4. Motor Development During the First Year of Life.



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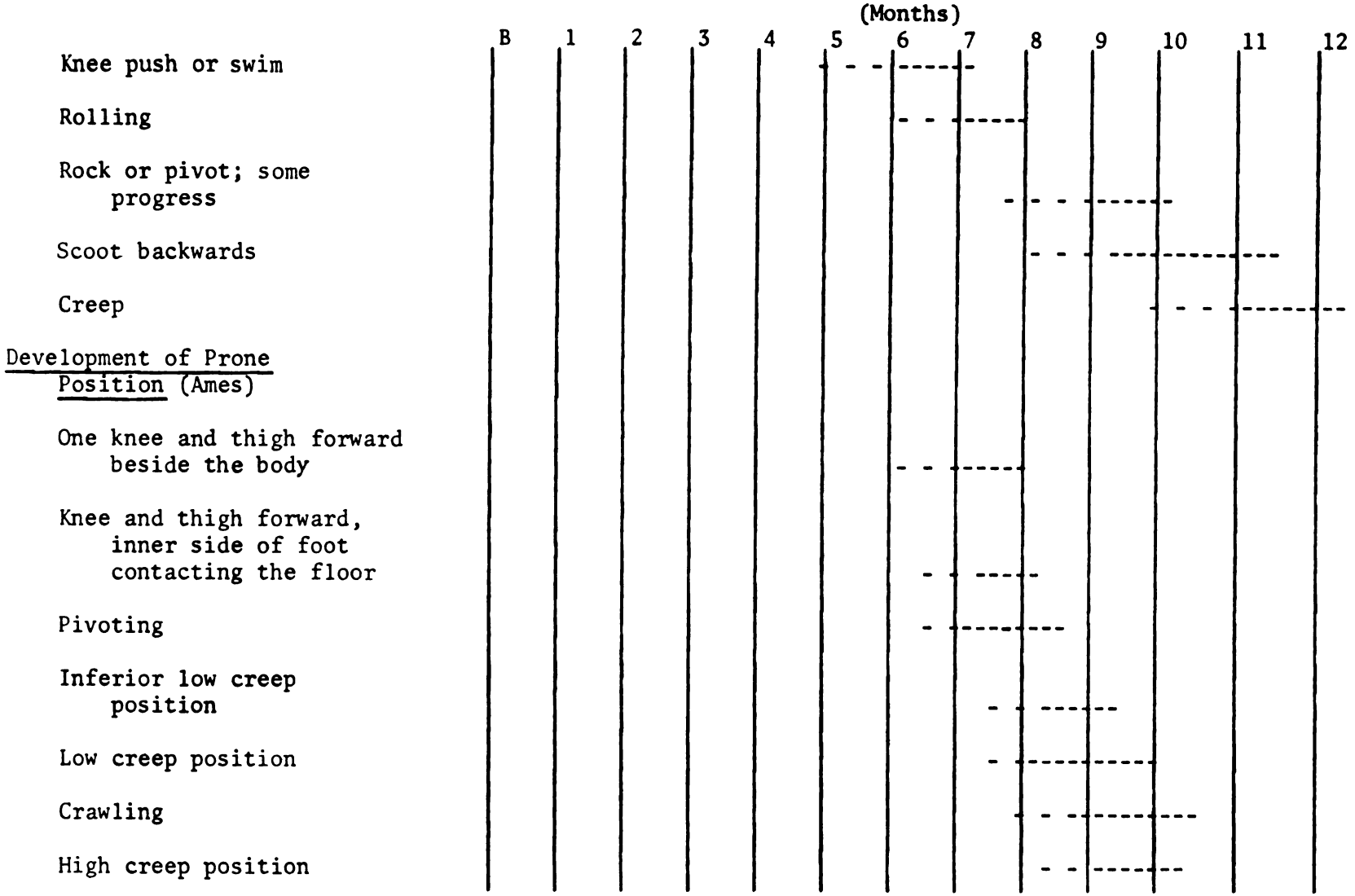

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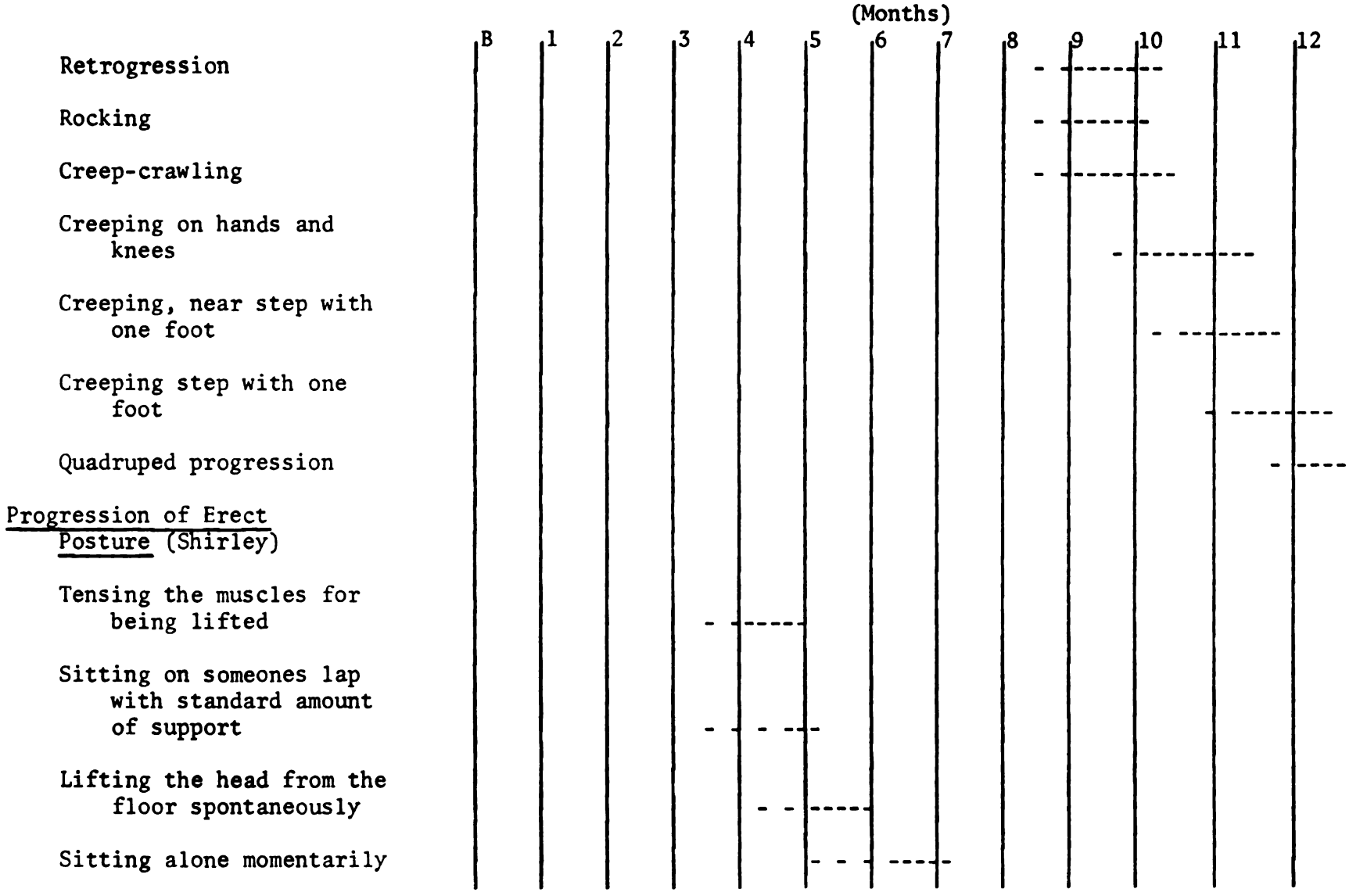

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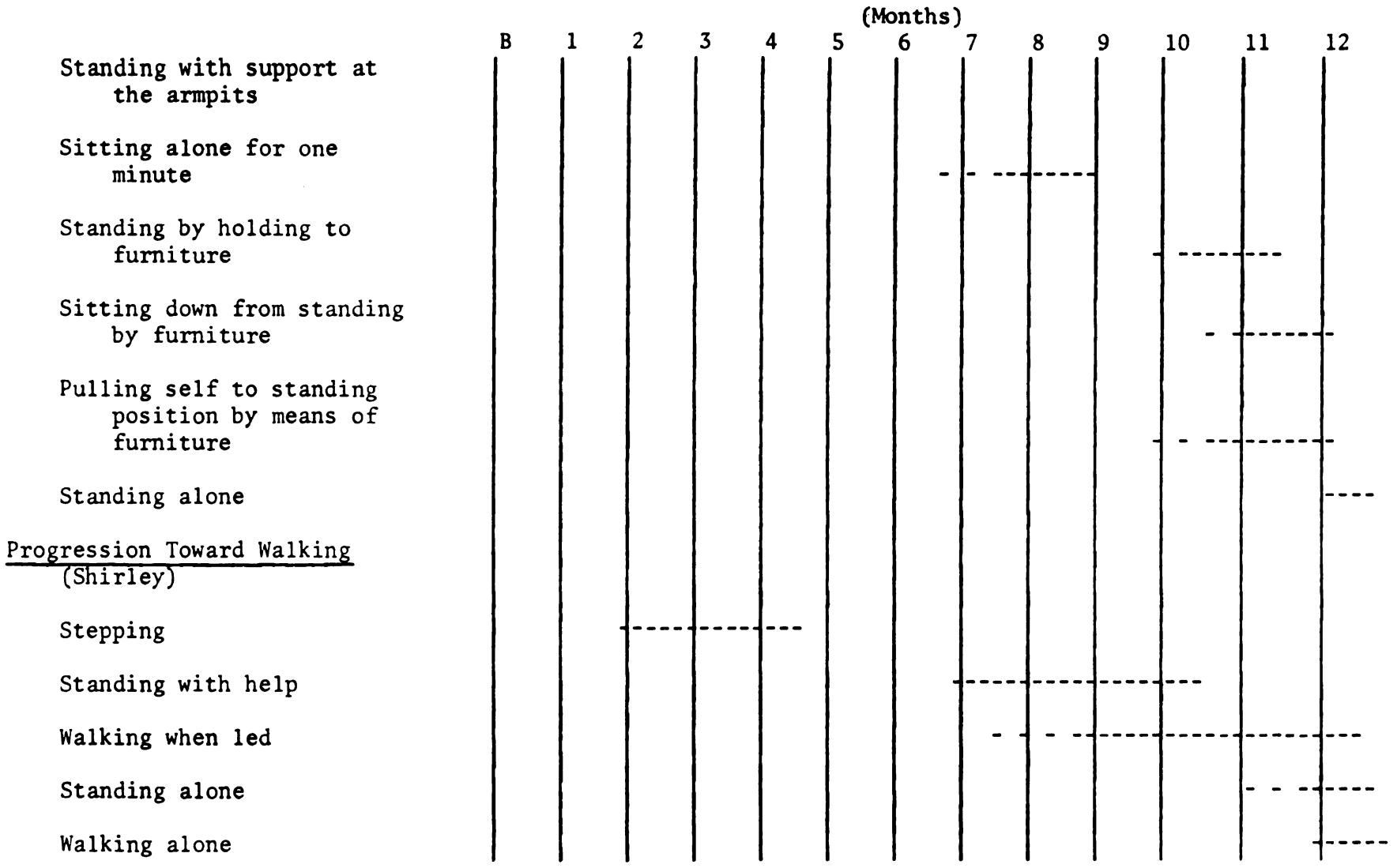

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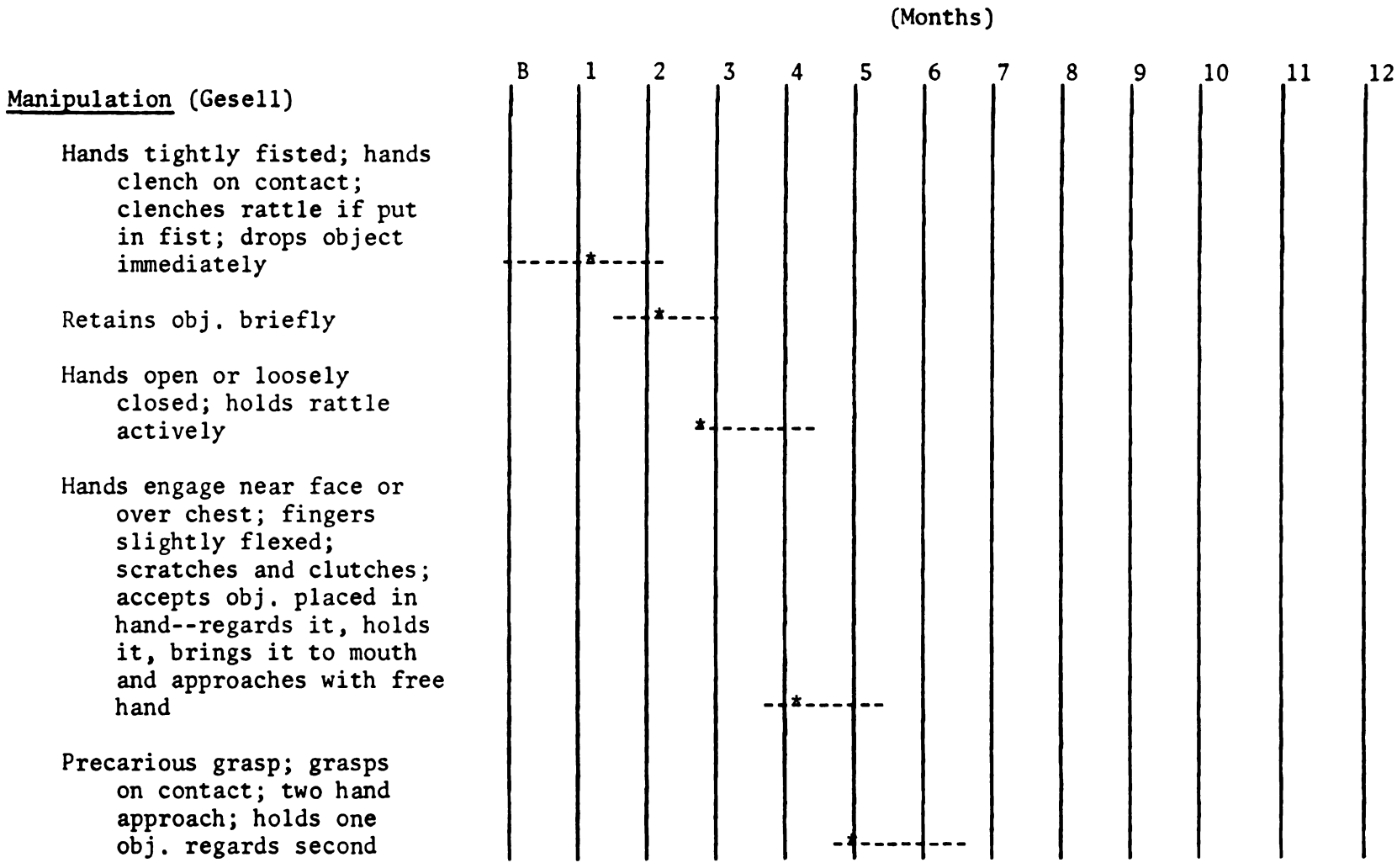
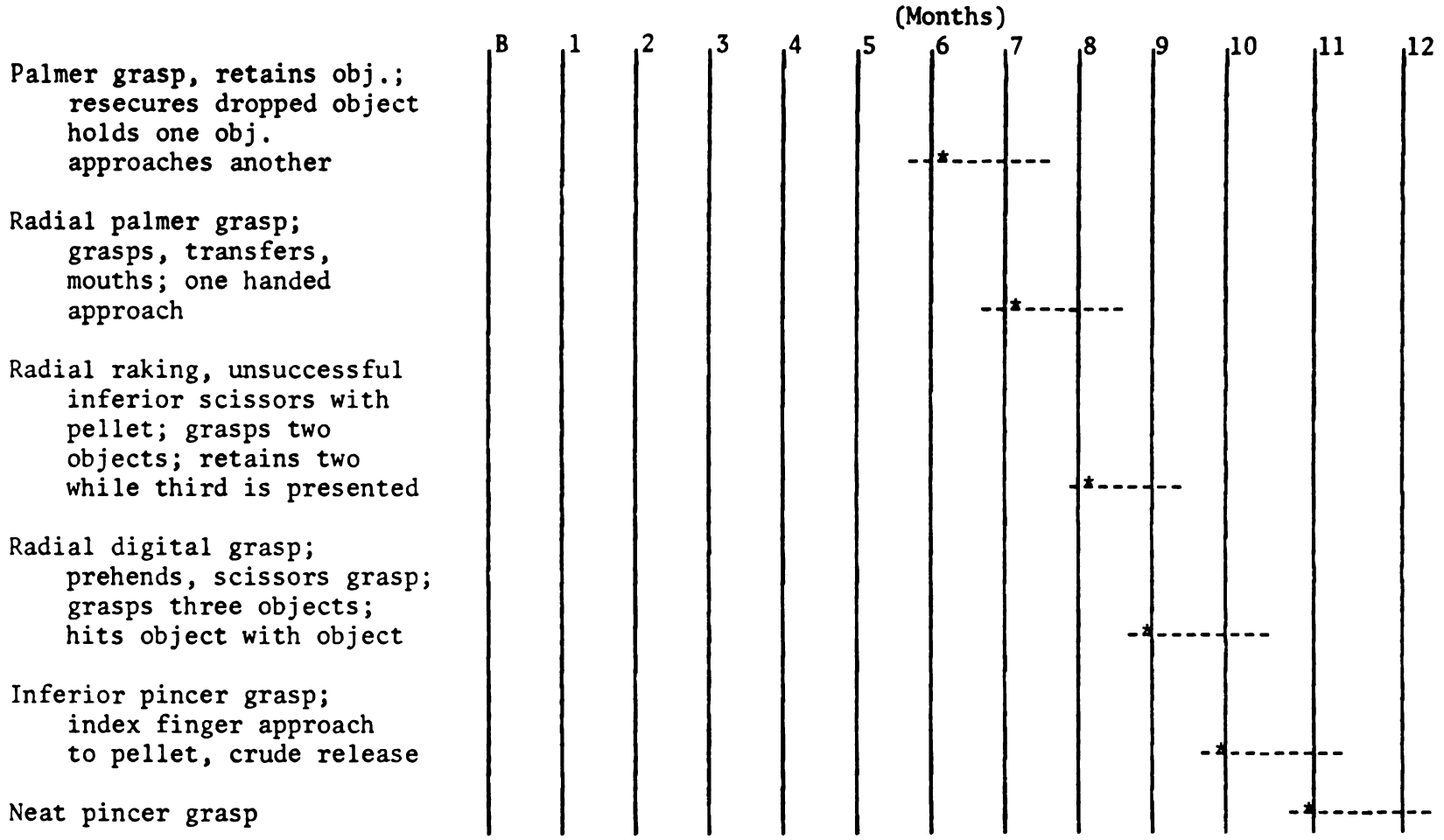


Figure 4. Continued

*Precise time of occurrance according to Gesell.



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*Precise time of occurrance according to Gesell.

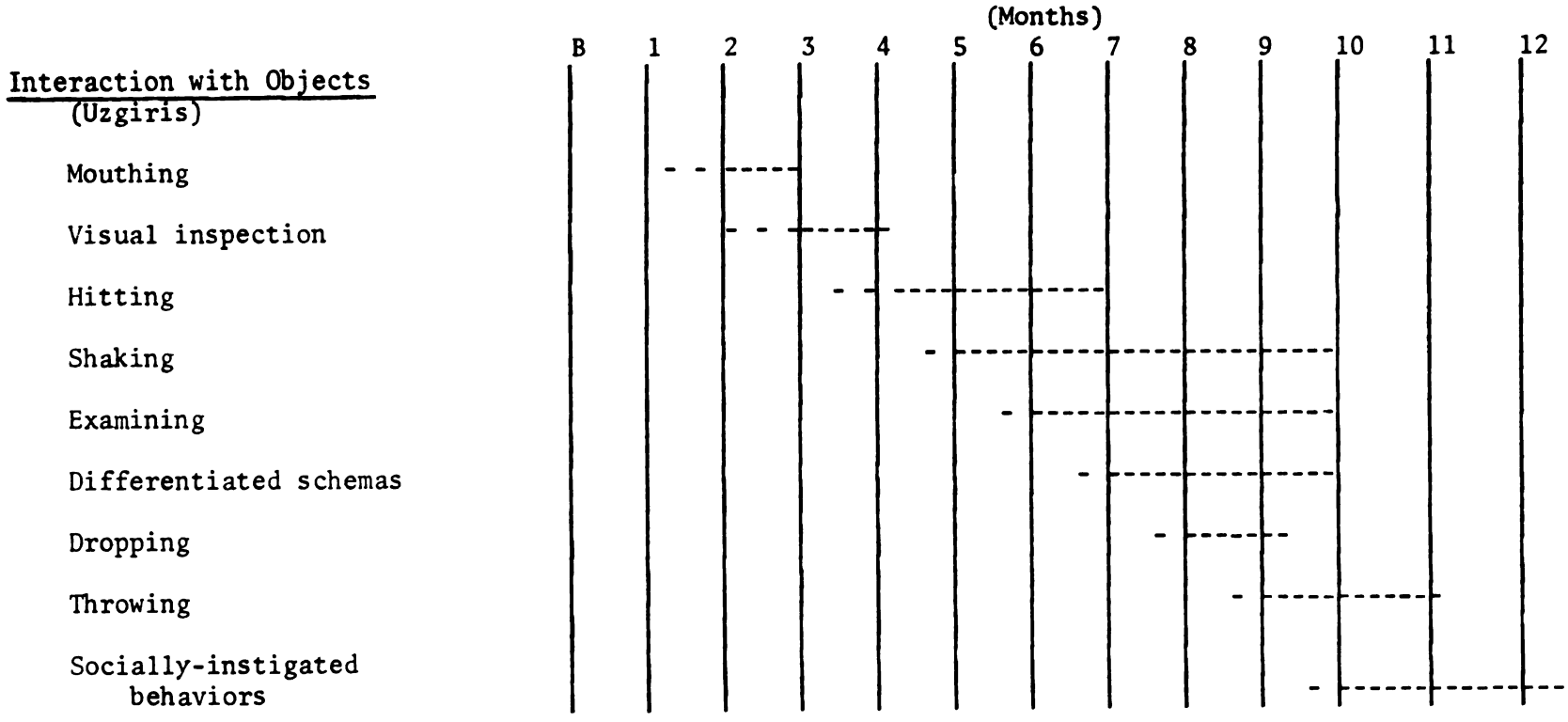

Figure 4. Continued.

CHAPTER IV

COGNITION

Cognition has to do with knowledge and with the processes by which it is acquired and utilized. Research on the development of cognition has gone in several different directions depending on the theoretical orientation of the investigator. This paper will mention very briefly the mental test approach and the developmental orientation. The major emphasis will be placed, however, on Piaget's development of sensorimotor intelligence.

Mental Test Approach

The Mental Test Approach starts from the assumption that knowledge and the capacity to acquire it exists in some amount and can be measured. Many who have reviewed the research in the area (Good-enough, 1949; Jones, 1954; Bayley, 1955; Cronback, 1962; Landreth, 1962) agree that the usefulness of infant tests as predictors of later intelligence varies as a joint function of (a) age of initial testing; (b) the time interval between initial examination and retest.

Reactions to the predictive value of infant intelligence scores have been of two sorts. As Bayley (1955) writes, "I see no reason to think of intelligence as an integrated entity or capacity which grows

throughout childhood by steady accretions" (p. 807). Again as Goodenough (1949) refers to

> . . . The unsettled question as to whether or not true intelligence may be said to have emerged before symbolic processes exemplified in speech have become established. Attempting to measure infantile intelligence may be like trying to measure a boy's beard at the age of three (p. 310).

Other writers have reacted differently. While granting the validity of the findings regarding quantitative prediction of intellectual standing from infant tests, they claim that qualitative estimates of intelligence made in infancy may still be of value. Although one may not be able to predict the later quantitative scores on the bases of scores attained in infancy, one can make successful predictions from the infant's general level of functioning (Illingworth, 1961; Simon-Bass, 1956; MacRae, 1955).

A perhaps simplified conclusion that we can draw from this is that if intelligence is conceived in strictly quantitative terms as a score on a particular test than infant tests are poor predictors of later ability. If, on the other hand, intelligence is conceived as a ranking relative to other children of the same age, then infant tests do seem to be able to predict the child's later standing with respect to his peers. (This has been interestingly contradicted by a recent discovery of Jerome Kagan while working in a small village in Guatemala where "the children broke all the 'rules' of development.")

A second issue taken up here is the hypothesis of infancy as a critical period in intellectual development. Infancy is a critical period with respect to healthy personality growth (Schaffer & Emerson, 1964; Erikson, 1963). Since the infant is particularly vulnerable to deviations from a normal expectable emotional environment (Ribble,

1943; Goldfarb, 1945; Spitz, 1945; Bowlby, 1969) and since, during infancy, cognitive and affective factors are closely intertwined it follows that if infancy is a critical period from the affective point of view, then it must as a matter of course also be a critical period from the point of view of cognition (Bayley & Schaefer, 1964; Kagan & Freeman, 1963; Fowler, 1962).

The Developmental Approach

Although the sphere of cognitive activities is much more limited and much less differentiated in infancy and early childhood than it is in older children and adults, it is still possible to distinguish such activities as problem solving, memory, and conceptualization.

Problem Solving

Generally speaking, problem solving situations are those in which the subject is desirous of attaining some goal, the direct access to which is blocked in some way. There are three major characteristics of problem solving: (1) the solution depends upon the child's past experience and learning; (2) the attainment of a solution amounts to a kind of learning; (3) the goal can be attained in any number of ways (Elkind, 1967).

In a study using infants and toddlers from six to twenty-seven months of age McGraw (1942) observed a variety of behaviors which ranged from gross emotional reaction to trial-and-error and sudden "insightful" solutions.

Others observing similar aged children in various problem solving situations noted similar results (Richardson, 1932 series of string problems; Gesell, et al., 1950 pellet and bottle). What is

important to note about those studies is how dependent the child's behavior is upon the nature of the problem situation as well as upon the age of the child. The child who fumbles with one task may solve another quickly and with apparent insight.

Memory Processes

Memory is operative to the extent that previous experience affects current behavior. Different forms of memory need to be distinguished. Sensorimotor memory involves the retention of sensorimotor coordinations learned in the course of adapting to the immediate environment. Representative memory involves the retention of certain means and relationships. (Rote memory and historical memory are more operative in later development.) To date very few studies in memory development have been carried out in infants under one year of age.

Concept Formation

From a developmental point of view, it would appear that "during infancy the extensive aspect of a concept is cognitive whereas the intension (see) is affective" (Elkind, 1967, p. 381). Infants can, for example, distinguish between different geometric forms even when these are varied in size and orientation (Zaporozhets, 1965). By the end of the first year, the child recognizes his parents and a variety of objects despite changes in their appearance; this reveals a large store of extensive concepts.

> The meaning of these concepts or their intention is, however, affective rather than cognitive. The mother means warmth and affection, and the intension of the many objects the child can distinguish is measured by their positive or negative feeling tone (Elkind, Ibid.).

Piaget and Sensorimotor Intelligence

Introduction and Description of Terms

Piaget believes the mind has structures much in the same way the body does. All animals have a stomach, a structure that permits eating digestion. To help explain why children make rather stable responses to stimuli, and to account for many of the phenomena associated with memory, Piaget used the word schema. "Schemata are the cognitive structures by which individuals adapt to and organize the environment. Schemata are structures that are the mental counterpart of biological means of adapting" (Wadsworth, 1971, p. 10). The stomach is a biological structure that animals use successfully to adapt to their environment. In much the same way, schemata are equivalent structures that adapt and change with mental development. Schemata can be simplistically thought of as concepts or categories.

At birth, schemata are reflexive in nature. That is, they can be inferred from simple reflex motor activities such as sucking, grasping, etc. The sucking reflex illustrates a reflexive schema. As Wadsworth (1971) states:

> At birth, infants typically will suck on whatever is put in their mouths--a nipple, a finger--suggesting that there is no differentiation, or that only a single global sucking schema exists. Shortly after birth, infants learn to differentiate: milk-producing stimuli are accepted and non milk-producing stimuli are rejected. At this point, a differentiation exists, or in Piaget's words, the infant has two sucking schemata, one for milk-producing stimuli and one for non milk-producing stimuli. At this time, schemata are not yet "mental" in the sense in which we usually think of the term. Schemata are reflexive. The infant makes real differentiations within his limited environment, but they are made via the reflexive and motor apparatus he has available (p. 12).

These differentiations on this primitive level are the precursors of later "mental" activities. As the child develops, schemata become more differentiated, less sensory, more numerous, and the network they form becomes increasingly more complex. During early childhood, an infant has a few reflexive schemata that allow him to make very few differentiations in the environment. An adult has a vast array of comparatively complex schemata that permit a great number of differentiations. The schemata of the adult evolve from the schemata of the child. The processes responsible for the change are assimilation and accommodation.

Assimilation is the cognitive process by which the person integrates new perceptual matter or stimulus events into existing schemata or patterns of behavior. The child has experiences and tries to fit these new events or stimuli into the schemata he has at the time. Wadsworth (1971) simply states it:

> Assimilation theoretically does not result in the development (change) of schemata, but does affect their growth. One might compare a schema to a ballon and assimilation to putting more air in the ballon. The ballon gets larger (assimilation growth) but does not change its shape (development) (p. 15).

Assimilation is a part of the process by which the individual cognitively adapts to and organizes the environment. The process of assimilation allows for growth of schemata: it does not account for change of schemata. Piaget accounts for the change of schemata with accommodation.

Upon being confronted with a new stimulus, the child tries to assimilate it into existing schemata. Sometimes this is not possible. Sometimes a stimulus cannot be placed or assimilated into a schema because there are no schemata into which it fits. The characteristics of the stimulus do not approximate those required in any of the child's

available schemata. What does the child do? He can do one of two things: He can create a new schema into which he can place the stimulus, or he can modify an existing schema so that the stimulus will fit into it; both of these are forms of accommodation. Accommodation is the creation of new schemata or the modification of old schemata. Both of these actions result in a change in or development of cognitive structures.

The process of assimilation and accommodation are necessary for cognitive growth and development. The complementary nature of assimilation--accommodation must not be overlooked. They nearly always occur simultaneously though balances may vary. An analogy, as given by Strommen (personal communication, January, 1974) best illustrates this complement aspect. As one puts on a sweater the sleeve simultaneously assimilates the arm while accommodating itself to the arm. This assimilation and accommodation is evidenced by its different appearance with and without the arm.

Of equal importance are the relative amounts of assimilation and accommodation that take place. If a person always assimulated stimuli and never accommodated he would end up with a few very large schemata and be unable to detect differences in things. Or if a person always accommodated and never assimilated he would have a great number of very small schemata that would have little generality. The person would be unable to detect similarities.

Piaget's system requires that the child act in the environment if cognitive development is to proceed. The development of cognitive structures is ensured only if the child assimilates and accommodates stimuli in the environment. This can only come about if the child's

senses are brought to bear on the environment. When the child is acting in the environment, moving in space, manipulating objects, searching with his eyes and ears, he is taking in the raw ingredients to be assimilated and accommodated. These actions result in the development of schemata. An infant cannot learn to differentiate between a nipple and an edge of a blanket unless he acts on them both.

The Sensorimotor Period

Mental development is a process that begins the day the infant is born. Sensorimotor behaviors that occur from birth on are necessary for and instrumental in later cognitive development.

Piaget (1952, 1954, 1967) divides the sensorimotor period into six stages in which progressively more complex patterns of intellectual behavior evolve.

Stage 1 (0-1 month).--Beginning at birth and throughout most of the first stage of sensorimotor development, the behavior of the infant is entirely reflexive. These basic reflexes include: sucking, grasping, crying, and movement of arms, trunk, and head. When the infant is stimulated, his reflexes respond. His reflex responses are more or less the same to all objects (his hand grasps anything put into it).

> . . . during this stage, the infant assimilates all stimuli through the reflex system. At birth, all stimulus events are incorporated (assimilated) into primitive reflexive schemata in an undifferentiated manner (Wadsworth, p. 38).

Within a few weeks of birth simple accommodations are usually observable. At birth the infant sucks on whatever is put into its mouth. Soon the infant begins to "search" for the nipple if it cannot

be found; in effect accommodating to the environment. "Searching" behavior cannot be attributed to any reflex system.

One of Piaget's important beliefs is that understanding of objects as separate from self is not innate. That is, the awareness that objects are more or less permanent, and are not destroyed when they disappear is not an inherited characteristic. Awareness of objects is developed out of sensorimotor experiences little by little (Piaget, 1954, p. 4). At birth the infant has no awareness of objects as separate from his experience of them. The infant is unable to differentiate between himself and the environment. Any object presented by the external environment is inseparable from the sucking, grasping, looking which it elicits.

Causality, an awareness of cause and effect relationship, is another important concept that develops during the sensorimotor period. At birth the infant is egocentric and not aware of causality at all. It is not until later that awareness of causality begins to evolve.

Stage 2 (1-4 months).--This stage of sensorimotor development begins when the reflexive behavior begin to be modified. Several new behaviors appear: thumb sucking becomes habitual and reflects the development of hand-mouth coordination; moving objects are followed by the eyes; and the head is moved in direction of sounds. These behaviors illustrate some of the cognitive differences between a typical child during the first month of life and the next few months. The younger infant makes undifferentiated reflex responses to stimuli. The older infant makes primitive sensorimotor differentiations and

acquires limited sensorimotor coordination. These developments come about as the infant acts using his reflexes.

During the second period of sensorimotor development the child develops an awareness of objects that was not present during the first period. As stated above, the infant tries to look at objects he hears. He may continue to follow the path of an object with his eyes after it has disappeared from view.

The range of responses the infant makes increases. While advances have been made, the infant's behavior still lacks intention in the sense that he initiates behavior directed at certain ends. Behaviors are still primarily reflexive (though modified) and goals are set off only after behavior sequences have begun (Wadsworth, 1971). Piaget (1952) writes:

> As long as action is entirely determined by directly perceived sensorial images, there can be no question of intention. Even when the child grasps an object in order to look at it, one cannot infer that there is a conscious purpose. It is with the appearance of . . . deferred reactions that the purpose of the action, ceasing to be in some way directly perceived, presupposes a continuity in searching and consequently a beginning of intention (p. 143).

Intentionality of behavior can only be inferred when the initiation of behavior is not a reflex act or a simple repetition of preceeding behavior.

Stage 3 (4-8 months).--During Stage 3, the infant's behaviors become increasingly oriented towards objects and events beyond the body. The infant grasps and manipulates any object he can reach, signifying coordination between vision and tactual senses. Prior to this time, the infant's behavior has been oriented primarily toward himself.

Infants now begin to reproduce events that occur that are unusual to them. When interesting experiences occur, they try to repeat them. A cord attached to overhead bells is pulled repeatedly. Grasping and striking acts are repeated intentionally. There are clear attempts to sustain and repeat acts. Piaget (1952) refers to this phenomenon as reproductive assimilation; the infant tries to reproduce events that are unique to him.

One of the characteristics of the sensorimotor period is the progress from non-intentional to a type of intentional behavior. During Stage 3, the infant begins to engage in a type of goal-directed (intentional) behavior. However, goals are established only after behaviors have begun.

During this period the infant begins to anticipate positions objects will pass through while they are moving; hence the indication that permanence of objects is developing. (See Piaget, 1954--Observation 6, pp. 14-15 for an illustration.)

During Stage 3 the child remains egocentric. He sees himself as the primary cause of all activity. Piaget (1954) writes:

> At 0;7(8) Laurent is seated and I place a large cushion within his reach. I scratch the cushion. He laughs. Afterwards I move my arm five cm. from the cushion, between it and his own hands, in such a way that if he pushed it slightly it would press against the cushion. As soon as I pause, Laurent strikes the cushion, arches, swings his head, etc. True, subsequently he does sometimes grasp my hand. But it is only in order to strike it, shake it, etc., and he does not once try to move it forward or put it in contact with the cushion.
>
> At a certain moment he scratches my hand; on the other hand, he does not scratch the cushion although this behavior is familiar to him (p. 245).

Laurent believes he alone can cause events. He is not aware that his father's hand is causing the sound. He acts on the hand and

on the cushion but never on the two together. To Laurent, he himself is the cause of all events.

Stage 4 (8-12 months).--Behavior patterns begin to emerge that constitute the first clear acts of intelligence.

> The infant begins to use means to attain ends; he begins to anticipate events, demonstrating prevision. Objects take on a noticeable measure of permanence for the child. He begins to search for objects that he sees disappear. Also, he comes to see that other objects in the environment can be sources of activity (causality). . . . The child begins to coordinate two familiar schemata in generating a single act; he begins to use means to attain ends that are not immediately attainable in a direct way. Children can be seen to set aside one object (means) to get to another object (end). . . . There is an intentional selection of means prior to the initiation of behavior. The end is established from the beginning, the means being used precisely in order to reach the end (Wadsworth, 1971, pp. 48-49).

The most important acquisition of this stage is undoubtedly that of the constancies of shape and size of objects. Commenting on shape and size constancy, Piaget and Inhelder (1956) writes:

> In fact, the constancy of shapes results from their sensorimotor construction at the time of the coordination of perspectives. During the first period (0-4 mos.) . . . when objects change their perspective such alterations are perceived (by the child) not as changes in the point of view of the subject relative to the object, but as actual transformations of the objects themselves. The baby waggling his head before a dangling object behaves as if he acted upon it by jerking about, and it is not until the age of about 8-9 months that he really explores the perspective effects of actual displacements. Now it is just about this age (8-9 mos.) that he is first able . . . to reverse a feeding bottle presented to him wrong way around. That is, to attribute a fixed shape to a permanent solid.
>
> As for size constancy it is linked with the coordination of perceptually controlled movements. All through the first period (0-4 mos.) the child makes no distinction between movements of the object and those of his body. . . . In the course of the second period (Stage 3 and 4) the subject begins to distinguish his own movements from those of the object. Here is found the beginning . . . of searching for objects when they disappear. It is in terms of this grouping of movements, and the permanence attributed to the object, that the latter acquires fixed dimensions and its size is estimated more or less correctly, regardless of whether it is near or distant (p. 11).

During period 4 a new dimension in the object concept of the child appears. Up until this time, if an object such as a rattle is placed under a blanket while the child is looking on, the child does not search after it. If an object is out of sight, it no longer exists to the child. Between the ages of 8 and 10 months (approx.) the child begins to search for objects that disappear. The rattle hidden under the blanket is retreived.

During this stage the child for the first time shows awareness that objects (besides himself) can cause activity. Up until this time, the child typically considers his own actions as the source of all causality. Piaget (1952) comments:

> . . . the cause of a certain phenomenon is no longer identified by the child with the feeling he has of acting upon this phenomenon. The subject begins to discover that a spatial contact exists between cause and effect and so any object at all can be a source of activity (and not only his own body) (p. 212).

For the first time, there is an elementary externalization of causality. The child is aware that objects can be the causes of actions.

People have questioned whether every infant passes through the stages outlined by Piaget. Piaget is not so much concerned with particular abilities as with the infants' methods of responding to their environment or organizing their experiences. What Piaget has drawn our attention to is the importance of each infant's activities and his ability to organize them in relation to opportunities afforded within his environment.

Both Piaget and other investigators (Goldfarb, 1955; Spitz, 1945; White, 1971) have led us to conclude that the provision of a stimulating environment together with considerable attention and

opportunities for conversation with parents and other adults during infancy is likely to result in the greatest possible development of abilities in the child and adult.

	Stage 1 (0-1 mo.) Reflex	Stage 2 (1-4 mos.) First differentiations Primary circular reactions
General	Reflex activity No differentiation	Hand-mouth coordination, differentiation via sucking, grasping
Object Concept	No differentiation of self from other objects	No special behavior regarding vanished objects; no differentiation of movement of self and external objects, tries to look at objects he hears
Space	Egocentric	Changes in perspective seen as changes in objects
Causality	Egocentric--not aware of causality	No differentiation of movement of self and external objects
Intentionality		Lacks intention; does not imitate behaviors directed at certain ends; goals are set only after behavior sequences are begun

Figure 5. Characteristics of Cognitive Development During the First Year of Life (Based Primarily on B. J. Wadsworth).

	Stage 3 (4-8 mos.) Reproduction Secondary circular reactions	Stage 4 (8-12 mos.) Coordination of Schemata Coordination of Secondary Schemas
General	Eye-hand coordination reproduction of interesting events	Coordination of schemata; application of known means to new problems; anticipation
Object Concept	Anticipates positions of moving objects (Permanence of objects developing)	Object permanence; searches for vanished objects; reverses bottle to get nipple; constancy of shape and size of objects
Space	Space externalized; no spacial relationships of objects	Perceptual constancy of size and shape of objects
Causality	Self seen as cause of all events	Elementary externalization of causality; aware that objects can be the cause of actions
Intentionality	A type of goal-directed behavior, tries to repeat unusual and interesting events; goals established during the repetitions of behaviors	Initiates a behavior sequence with a goal to be attained; selects means that will attain the goal

Figure 5. Continued.

CHAPTER V

SOCIAL DEVELOPMENT

Social behavior, broadly defined, is essentially a descriptive concept referring either to the interaction of two or more individuals or to the influence of one individual upon another. In this paper we are looking at the beginning interactions of an infant with some other primary person (attachment behavior). The section will be divided into six main sub-division: (1) theories that have dominated the field; (2) sociability as based on perceptual interaction, particularly vision and audition; (3) the infant's developing signal systems of crying and smiling; (4) attachment behavior as outlined by Bowlby; (5) determinants of attachment behavior; and (6) the developmental sequence of attachment formation. Following the body of the presentation will be charts depicting the development of social behavior.

Theories

Psychoanalysts and others have been at one in recognizing a child's first human relationship as the foundation stone of his personality; but there is no agreement on the nature and origin of that relationship. Until 1958 when Harlow's first papers were published and Bowlby presented his early views, there were four principal

theories regarding the nature and origin of the child's ties. According to Bowlby (1969) they were:

> i. The child has a number of physiological needs which must be met, particularly for food and warmth. In so far as a baby becomes interested in and attached to a human figure, especially mother, this is the result of the mother's meeting the baby's physiological needs and the baby's learning in due course that she is the source of his gratification. I shall call this the theory of Secondary Drive, a term which is derived from Learning Theory. It has also been called the cupboard-love theory of object relations.
> ii. There is in infants an in-built propensity to relate themselves to a human breast, to suck it and to possess it orally. In due course there is a mother and so relates to her also. I propose to term this the theory of Primary Object Sucking.
> iii. There is in infants an in-built propensity to be in touch with and to cling to a human being. In this sense there is a "need" for an object independent of food which is as primary as the "need" for food and warmth. It is proposed to term this the theory of Primary Object Clinging.
> iv. Infants resent their extrusion from the womb and seek to return there. This is termed the theory of Primary Return-to-Womb Craving (p. 178).

Of these four theories the one most widely held has been the theory of secondary drive. This hypothesis, however, has come increasingly under attack, for data from a number of areas have failed to support it. Schaffer (1971) mentions some of these attacks.

1. Studies of social development in precocial birds have shown that "imprinting" is generally formed by the young in the absence of any form of physical gratification.
2. A similar conclusion comes from the work of Harlow (1958) with rhesus monkeys. (It was perceptual contact with the object which determined social responsiveness.)
3. In Schaffer and Emerson's (1964) observations of human infants it was found that infants frequently formed strong attachments to such individuals as fathers, siblings and relatives who rarely or never participated in routine caretaking activities.

4. The intensity of emotional dependence appears to bear no unanimously demonstrated relation to such experiences as breast or bottle feeding, duration of feeding, rigidity of feeding schedule, age at weaning and severity of weaning (Sears, Maccoby, & Levin, 1957; Sears, Whiting, Nowlis, & Sears, 1953).
5. Studies of animal behavior have demonstrated that parental punishment, rather than discouraging the young animal's overtures to the parents, may actually enhance its approach behavior (Kovach & Hess, 1963 with chicks; Scott, 1963 with puppies; Harlow, 1962 with monkeys).

From the above data it appears that the secondary drive hypothesis is contradicted by too much evidence to be generally acceptable.

Sociability Based on Perceptual Interaction

Instead of searching for drives to explain social development we will look at sociability as being rooted in the infant's perceptual encounters with his environment. From birth, the infant is equipped with cognitive structures which ensures that he is selectively attuned to certain types of environmental stimuli.

The most firmly established conclusion about early perceptual functioning stems from the finding that the infant's attention is of a highly discriminative nature and that even the neonate can already select from among the stimuli available to him. Both the finding itself and the technique for demonstrating it come largely from the work of Fantz (1961, 1966).

Fantz based his approach on the observation that the infant, though motorically immature, spends much of his time visually

exploring his surroundings and apparently showing particular interest in certain aspects of his surroundings.

Fantz has shown that there are systematic differences among visual stimuli in the extent to which they are able to provoke the attention of infants. From the age of one week on the relative attractiveness of stimuli appears to depend on the presence of strongly patterned characteristics, so that almost any patterned surface is looked at more than a plain surface.

A number of other stimulus properties have been shown to have attention-provoking effects on young infants. Movement, for instance, is an alerting event in the neonatal period (Haith, 1966) as well as in older infants (Ames & Silfen, 1965).

Two further characteristics for which there is some relevant evidence are brightness (Hershenson, 1964) and solidity (Fantz, 1966).

> It is quite apparent that from the very beginning of life the infant is no passive recipient of stimulation, but can regulate his stimulus input by selective attention. . . . While a great deal of work still needs to be done on their possible arrangement in a developmental hierarchy, it does seem that the attributes which receive most attention early are those that are dependent on a high rate of change in the physical parameters of stimuli e.g. movement, making the stimulus distinctive both in terms of its internal composition and its figure-ground relationships. And the stimulus to which such a description is most applicable in the infant's environment is of course the social object (Shaffer, 1971, pp. 47-48).

Treated as stimulus objects, human beings have built into them a number of features that make them particularly prone to become objects of an infant's attentiveness (Rheingold, 1961). They are in almost constant movement, they emit a great deal of highly varied stimulation, they can appeal to a number of different sense modalities simultaneously, they are complex, possess a distinctive pattern and are

often responsive to the infant's own behavior so that a continuous and reciprocal sequence may thereby be initiated.

Work in this area has been dominated by research in visual stimulation. It is, therefore, important to note that a study of auditory responsiveness in neonates has brought to light comparable findings in auditory stimulation. Hutt et al. (1968) suggest that:

> . . . the structure of the human auditory apparatus at birth ensures both that there is a limit of basilar membrane excitation beyond which defensive reflexes are evoked and that a voice at normal intensities is non-aversive and prepotent. The survival value of this differential responsivity may lie in the part it plays in the development of the affectional bond between parent and child (p. 890).

Selective responsiveness to potentially meaningful stimuli appears, therefore, to exist in the auditory as well as the visual modality and to stem basically from the structure of the neonate's sensory apparatus (see Chapter II).

The psychoanalytic and Hullian learning theory led to an emphasis on the mother-child feeding relationship as the crucial context within which the infant develops its capacity for social responses (Sears et al., 1957).

Recent research indicates that the feeding agent is not invariably the primary object of the infant's early social responses (Harlow, 1958). Schaffer and Emerson (1964) found that "Satisfaction of physical needs does not appear to be a necessary precondition to the development of attachments, the latter taking place independently and without any obvious regard to the experiences that the child encounters in physical care situations" (p. 67).

The mounting evidence against the widely held view that gratification of an infant's "oral needs" is necessarily the principle

antecedent of social responsiveness does not, however, imply that the feeding situation itself is not of considerable importance for the development of attachment to the mother. During feeding, the majority of human mothers provide their infants with considerable auditory and visual stimulation as well as with physical contact. Haynes et al. (1965) discovered that alert infants in the early weeks of life have a fixed point of clearest vision at eight or nine inches and that objects either closer or farther away cannot be brought into sharp focus. Under normal feeding and other caretaking conditions the mother's face is frequently exposed at this optional distance for patterned vision. Consequently, in caretaking situations, the infant has many opportunities for the development of social responsiveness on a purely perceptual basis (Fantz, 1966; Rheingold, 1961).

As he interacts with a caretaker, the infant not only experiences a constantly changing configuration of facial features but also receives stimulation from the human voice. The role of auditory stimulation both within and without the caretaking situation has not been sufficiently explored. Kagan and Lewis (1965) found that on first being presented with human voices, especially that of a strange female, infants exhibited cardiac deceleration and quieting, followed by vocalization. On the basis of these findings, Kagan and Lewis suggest that human speech acquires psychological significance by the time an infant has attained the age of six months. Their suggestion is supported by Wolff's (1963) observations on infant smiling.

The conclusion that may be drawn from the limited available evidence is that visual and auditory stimulation occurring during caretaking plays an important role in the development of social

responsiveness. This conclusion does not, however, imply that physical-contact and need-reduction variables do not contribute to this development. One would expect an infant to form a stronger attachment to a caretaker who feeds, provides contact-comfort, and visual and auditory stimulation than to one who supplies a similar amount of visual, auditory stimulation but provides little contact or participates minimally in the feeding situation.

Signalling Systems

The bond between parent and child is not only based on the stimuli the infant receives from the parent, but also the stimuli the infant offers his parent. They may be regarded as signalling devices, the function of which is to ensure proximity of caretakers and to bring about interaction. The infant's cry and smile are powerful means of affecting the people around him and thus determining both the amount and kind of stimulation to which he is exposed. We will be looking at the cry and smile as they develop and are perceived by both parent and infant.

The Crying Response

Crying has been given less systematic attention than has the smiling response. While smiling can only take place when proximity to the other person has been attained, crying is to bring about proximity in the first place.

Wolff (1969) in one of the few intensive studies on crying, was able to identify four types of crying: (1) crying from hunger which starts gradually and becomes rhythmical; (2) crying from pain which starts suddenly and is arrhythmical; (3) an acteristic braying sound

usually interpreted as a signal of anger; and (4) a cry given mainly or only by infants with brain damage.

Initially, crying is mainly due to intense visceral activity, but with increasing age the eliciting and terminating conditions soon become much wider in range. Schaffer (1971) states that crying

> . . . has sometimes been attributed to "stimulus hunger"--the infant . . . who has been left to his own devices for a long period of time will summon in this way company and attention and so bring about a change of position and of scenery. It may, on the other hand, also stem from too much stimulation--whether the source is an overful stomach or an over-solicitous mother. In either case it is a signal for intervention and is usually responded to as such by the child's caretaker. It thus serves an essential function, for whereas the adult has a great many mechanisms available whereby he can modulate his own level of stimulation, the infant initially needs an external agent to take the necessary steps on his behalf.
>
> In the early weeks crying and smiling serve as signals only in the sense that other people will almost invariably be impelled to react to them. They are not signals in the sense that the infant uses them purposely in order to summon help and attention. They tend to be triggered off by certain primitive stimuli, with no foresight involved on the part of the infant as to the likely consequences of his actions. . . . All normal infants will in time graduate from the stage at which their inborn signalling patterns are elicited in a purely automatic fashion, but the speed with with which they do so, the extent to which they use these devices and the situations in which they employ them depend entirely on their social experience (pp. 78-79).

Smiling Response

Smiling has frequently been employed as an index of social responsiveness. In the first two weeks of life, most smiling is more dependent on the infant's internal state than on the occurrance of external stimulation and is, therefore, of little social significance. By the sixth to eighth week, however, the infant smiles differentially to various kinds of external stimulation while wide awake. At this stage, smiling may be regarded as a social response (Wolff, 1963).

Gewirtz (1965) found certain orderly, progressive changes in the development of smiling: (1) a phase of reflex smiling in which smiles occur in the absence of readily identifiable visual stimuli; (2) a phase of "social" smiling in which human faces in general, represent the necessary stimuli, and (3) a phase of "selective" social smiling when the infant no longer reacts indiscriminately to all social objects and only certain selected individuals continue to evoke the response.

How quickly and in what manner the child moves along this progression appears to be largely a function of the kind of social environment in which he is reared. Generally speaking, social development appears to be most rapid when the caretaking arrangements permit a great deal of sensory stimulation in a wide variety of social interaction situations (Ainsworth, 1963; Gewirtz, 1965).

Spitz (1946) studied the effectiveness of a variety of human and non-human objects for evoking smiling responses in infants. He reported that whereas human objects (face, masks, etc.) effectively elicited smiling, non-human objects were incapable of eliciting smiles.

Recent evidence (Wolff, 1963) suggests that sounds are at first more effective than visual stimuli for evoking social smiles in infants. And as early as the third week, social smiles are more frequently evoked by a high-pitched human voice than by a variety of other auditory stimuli. Very shortly afterwards, visual stimulation contributes to the eliciting of smiles and by the end of the third week, the sight of a nodding human head, accompanied by the sound of the voice, is for some infants a more effective stimulus than the voice alone. During the fourth and fifth weeks, the sight of a silent human face is

sufficient condition for the eliciting of smiles, provided there is eye-to-eye contact between infant and caregiver or the caregivers face is moving.

Ambrose (1961) has also emphasized the importance of movement and eye-to-eye contact. The available data suggest that very few infants commence to smile at a stationary immobile human face before they are six weeks of age, but that most infants will smile at such a stimulus by the eighth or ninth week of life (Gewirtz, 1965).

Salzen (1963) investigated the responses of an eight week old infant to a variety of non-human visual stimuli. Rotation increased the effectiveness of the cardboard stimuli and flashing increased the effectiveness of the light source.

The full range of signalling devices available to infants at different ages remains to be ascertained. Crying and smiling may be the most essential, but they are by no means the only ones even in the first half year. Babbling and cooing are certainly other signals, but in addition there appear also to be devices whereby infants can terminate interaction (turning the head, shutting the eyes, falling to sleep). Detailed study of mother-infant interaction will assess their role in the developing relationship between mother and child.

Attachment Behavior

As has been described the secondary drive theory of early social development has not given us the total picture. Bowlby (1958) proposed a new approach to the origins of a child's tie to his mother based on ethological principles. Attachment refers to an affectional tie that one person forms to another specific individual--a tie that

binds them together in space and endures over time. Attachment is thus discriminating and specific. Like "object relations" attachments occur at all ages and do not necessarily imply immaturity or helplessness. The first tie is most likely to be formed to the mother, but this may soon be supplemented by attachment to other specific persons.

The basic thesis ennunciated by Bowlby in 1958 is that an infant's attachment to his mother originates in a number of species-characteristic behavior systems, relatively independent of each other at first, which emerge at different times, become organized toward the mother as the chief object, and serve to bind child to mother and mother to child. Originally, he describes five such behavioral systems as contributing to attachment--sucking, clinging, following, crying, and smiling. In the course of development, these become integrated and focused on the mother and thus form the basis of what he termed "attachment behavior." It must also be said here that some discrimination is present from the start and there is a marked bias to respond to special ways to several kinds of stimuli that commonly emanate from a human being--the auditory stimuli arising from a human voice, the visual stimuli arising from a human face, and the tactile and kinaesthetic stimuli arising from human arms and body.

In his new formulation, Bowlby (1969) still holds these as important, but having come to a "recognition of the very sophisticated forms that behavioral systems controlling instinctive behavior may take" he introduces a control systems model and postulates that between the ages of about nine and eighteen months the simple behavioral systems become incorporated into "far more sophisticated goal-corrected systems . . . so organized and activated that a child tends to be

maintained in proximity to his mother." Whereas in 1958 he described his as a theory of component instinctual responses, in 1969 he describes the new formulation as a control theory of attachment behavior.

Bowlby (1964) distinguished four main phases in the development of attachment behavior:

Phase 1. Orientation and Signals Without Discrimination of Figure

During this phase an infant behaves in certain characteristic ways towards people but his ability to discriminate one person from another is either absent or extremely limited, e.g. he may do so by means of auditory stimuli only. The phase lasts from birth to not less than eight weeks of age, and more usually to about twelve weeks; it may continue much longer in unfavorable conditions.

The ways in which a baby behaves towards any person in his vicinity include orientation towards that person, tracking movements of the eyes, grasping and reaching, smiling and babbling. Often the baby ceases to cry on hearing a voice or seeing a face. Each of these sorts of infantile behavior, by influencing his companion's behavior is likely to increase the time the baby is in proximity to that companion. After about twelve weeks the intensity of these friendly responses rises. Thenceforward he gives "the full social response in all its spontaneity, vivacity and delight" (Rheingold, 1961).

Phase 2: Orientation and Signals Directed Towards One (or More) Discriminated Figure(s)

During this phase an infant continues to behave towards people in the same friendly way as in Phase 1, but he does so in more marked fashion towards his mother-figure than towards others. To auditory stimuli, differential responsiveness is unlikely to be observed before about four weeks of age, and to visual stimuli before about ten weeks. In most babies brought up in families, however, both are plainly evident from twelve weeks of age onwards. The phase lasts until about six months of age, or much later according to the circumstances.

Phase 3: Maintenance of Proximity to a Discriminated Figure by Means of Locomotion as well as Signals

During this phase not only is an infant increasingly discriminating in the way he treats people but his repertoire of responses extends to include following a departing mother, greeting her on her return, and using her as a base from which to explore. Concurrently, the friendly and rather undiscriminating responses to everyone else wane. Certain other people are selected to become subsidiary attachment-figures; others are not so selected. Strangers become treated with increasing caution, and sooner or later are likely to evoke alarm and withdrawal.

During this phase some of the systems mediating a child's behavior to his mother become organized on a goal-corrected basis. And then his attachment to his mother-figure is evident for all to see.

Phase 3 commonly begins between six and seven months of age but may be delayed until after the first birthday, especially in infants who have had little contact with a main figure. It probably continues throughout the second year and into the third.

Phase 4: Formation of a Goal-Corrected Partnership

During Phase 3 proximity to an attachment-figure begins to be maintained by infant and young child by means of simply organized goal-corrected systems utilizing a more or less primitive cognitive map. Within that map the mother-figure herself comes sooner or later to be conceived as an independent object, persistent in time and space and moving more or less predictably in a space-time continuum. Even when that concept has been attained, however, we cannot suppose that a child has any understanding of what is influencing his mother's movements to or away from him, or of what measures he can take that will change her behavior. That her behavior is organized about her own set-goals, which are both numerous and in some degree conflicting, and that it may be possible to infer what they are and to act accordingly, are likely to be still far beyond his competence to grasp.

Sooner or later, however, this changes. By observing her behavior and what influences it a child comes to infer something of his mother's set-goals and something of the plans she is adopting to achieve them. From that point onwards his picture of the world becomes far more sophisticated and his behavior is potentially more flexible. To use another language, it can be said that a child is acquiring insight into his mother's feelings and motives. Once that is so, the ground-work is laid for the pair to develop a much more complex relationship with each other, one that I term a partnership.

This is clearly a new phase. Since I know of no evidence to guide us, we can only guess at what age it begins. It is difficult to believe it does so commonly before a child's second birthday, and for many children it seems likely to be much nearer or after their third (pp. 266-268).

Much of the child's attachment behavior is mediated by behavioral systems which, once they are fully developed, have proximity to the mother as their set goal. Any deviation from the distance specified by the set goal, whether brought about through the action of the mother, the child, or of someone else, is likely to activate the systems until the distance specified is restored. The behaviors mediating attachment are of three classes: orientational, signaling,

and executive. To keep informed of the mother's where-abouts the child orients to her, tracking her movements visually and aurally. To attract his mother to him, he can signal through crying and a variety of other behaviors. As soon as he is mobile he can regulate proximity by approaching or following his mother, and he can achieve contact by climbing upon her and can maintain contact by clinging. His proximity-seeking behaviors soon become organized in a goal-corrected basis and before long, reorganized in accordance with a plan in which the set goal is constant but the techniques for achieving it are flexible.

The child's own state may alter his set-goal. Physical contact tends to be the set goal when the child is fatigued, ill, hungry, or in pain or discomfort. Certain environmental conditions may activate high-intensity behavior. In addition to alarm (caused by sudden changes of stimulus level, by strange objects or by strange situations), rebuffs by other adults or by other children may cause the child to seek his mother's proximity. Finally, the whereabout and behavior of the mother herself influence the form and intensity of attachment behavior whether she is present or absent, departing or returning, and whether she accepts or rebuffs the child's overtures. Thus the intensity of attachment behavior is situationally determined, at least in part, and, the tolerable distance specified by the set-goal differs from one set of circumstances to another.

Because of the diversity of attachment behavior and its differential arousal in different situations, there can be no simple criterion of attachment. Bowlby suggests that five main classes of behavior should be considered in any attempt to assess the attachment behavior of a child: (1) behavior that initiates interaction, such as

greeting, approaching, touching, embracing, calling, reaching, and smiling; (2) behavior in response to the mother's interactional initiatives that maintains interaction (the above behaviors plus watching); (3) behavior aimed to avoid separations, such as following, clinging and crying; (4) exploring behavior, as it is oriented with reference to the mother; (5) withdrawal or fear behavior, especially as it is oriented with reference to the mother.

So far descriptive material on the manifestations of human attachments derived from empirical investigations is still meagre. One exception is Ainsworth's (1967) investigation of early social development in Uganda, the data from which yield a useful picture of the great range of attachment behavior to be found in the human infant.

As has already been alluded to a principle change that habitually takes place during the ontogeny of behavior is for the range of stimuli that are effective in eliciting and in terminating a response to become restricted. This is conspicuously true of the friendly responses and crying of infancy.

Ainsworth (1967) lists different kinds of behavior that are shown by an infant during his first year and come to be elicited especially by and to be directed especially towards a particular figure.

Patterns of differential directed behavior:

--Differential stopping of crying on being held--baby continues to cry when held by someone other than his mother and stops crying when taken by her (9 weeks).

--Differential crying on mother's departure--a baby cries promptly when mother leaves the room, but not when others do so (15 weeks).

--Differential smiling at visual stimuli--a baby smiles more frequently, more readily, and more fully at sight of his mother than at sight of anyone else (10 weeks).

--Differential vocalization--a baby vocalizes more readily and more frequently in interaction with his mother than in interaction with others (5-4 weeks--20 weeks).

--Differential visual-postural orientation--when the child is held by someone else he keeps his eyes on mother in preference to others and is tensely oriented towards her (18 weeks).

--Differential approach--when in a room with mother and others, a child selects his mother to crawl towards (28 weeks).

--Differential following--attempts to follow mother when she leaves the room, but not to follow others (24 weeks).

--Differential greeting response--an infant greets his mother in certain typical ways when he sees her after an absence. At first a full greeting usually combines smiling, vocalising, and general bodily excitement; later it includes also lifting the arms (21 weeks).

--Differential climbing and exploring--an infant climbs over his mother, explores her person and plays with her face, her hair, or her clothes, and does so less, if at all, with other people (22 weeks).

--Differential burying of face--either in the course of climbing and exploring or on return after an excursion, an infant buries his face in his mother's lap or elsewhere in her person (28 weeks).

--Use of mother as base from which to explore--a child makes exploratory excursions from mother and returns to her from time to time, but does not use others in this way to the same extent.

--Flight to mother as haven of safety--when alarmed a child moves as fast as possible away from the alarming stimulus and towards mother, rather than towards others (8 months).

--Differential clinging--differential clinging to mother is especially evident when a child is alarmed, tired, hungry, or unwell (final quarter of first year).

Before sixteen weeks differential responses are few in number and are seen only when methods of observation are sensitive; between sixteen and twenty-six weeks differential responses are both more numerous and more apparent; and in most infants of six months and over differential responses are plain for all to see.

These findings do provide a striking indication of the great variety of responses through which attachments, even in the early months of life, may be expressed in the human infant.

Determinants of Attachment Behavior

What determines attachment behavior in the human infant? Schaffer (1971) indicates that five kinds of determinants can be discerned, namely "those associated with an individual's species, his age, and with social learning variable, individual difference factors and situational determinants" (p. 111).

1. According to each species particular sensorimtor apparatus, its place and mode of living each employ some responses rather than others, to ensure proximity to the caretaker. Since the human

infant cannot use following or clinging until the end of the first year other means are more important to bring the child in contact with the caretaker. Rheingold (1961) and Walters and Berke (1965) have pointed out that we need to be more concerned with the infant's distance receptors than his near receptors

> . . . for though the young infant may have little motor competence to bring about physical contact, his sensory apparatus is already sufficiently well developed in the early weeks of life to enable him to remain in visual contact with his mother. Perceptual rather than more active locomotor means, together with signalling devices, are thus the primary human vehicle for ensuring interaction with the parent (Schaffer, p. 112).

2. Age exerts its influence primarily through sensorimotor maturation.
3. Sooner or later the nature of a child's particular experience will begin to shape the expression of its attachments.
4. Not all diversity is a product of experience. There are a number of organismic factors which channel the infant's behavior in certain directions rather than in others, for example blind infants (Freedman, 1964), thalidomide children (Decarie, 1969), and infants labeled as "cuddlers" or "non-cuddlers" (Schaffer & Enerson, 1964b).
5. The human infant has a larger repertoire than other animals for eliciting or maintaining contact and hence can more easily select the response appropriate to each situation.

Developmental Sequence in Attachment Formation

"However adept an infant may be in recognizing his mother, he cannot be said to have formed an attachment to her if he remains as content in the proximity of a stranger as in his mother's proximity

and if the two individuals are thus responded to as essentially interchangeable (Schaffer, 1971, pp. 114-115)." If an attachment involves proximity seeking towards a particular individual, then the frustration of this tendency should lead to protest, emotional upset and vigorous attempts to regain the loved person. As Bowlby (1960) has put it, the separation response is the inescapable corollary of attachment behavior --the other side of the coin.

The findings of a study on the effects of short-term hospitalization (Schaffer, 1958; Schaffer & Callender, 1959) suggest that separation from the mother becomes a meaningful event only at the beginning of the second half-year. At this time a crucial milestone is reached as a result of which a change in mother-figure is no longer tolerated.

Further confirmatory evidence comes from a longitudianal study by Schaffer and Emerson (1964a) in which a sample of sixty infants was followed up at intervals of four weeks from the early months to the end of the first year and then seen once more at eighteen months. It was found that crying or some other form of protest on termination of contact with an adult was apparent from the early months on. However

> . . . the crucial characteristic of this early behavior lay in its indiscriminate nature; the first half-year infants were found to cry for attention from anyone, familiar or strange, and though responsiveness to strangers tended to become somewhat less immediate and less intense than to the mother both could quieten the infant and the departure of both could re-evoke protest. At the age of approximately seven months, however, a change took place. The infant still protested in the same situations, but now their protests were directed solely at certain specific individuals. The departure of these alone elicited crying and only their renewed attention terminated the infant's distress. Strangers, quite on the contrary, upset the infant by approaching him. This development . . . is not marked by the appearance of a new behavior pattern comparable, say to the onset of talking or to the first

> smile; it is marked, rather by the restriction of an already available response to certain individuals only (p. 117).

The onset of fear of strangers, however, is not sudden and dramatic. Only in the early week of life do infants show automatic responsiveness towards unfamiliar persons. From about three months on, a lag in the smile appears at first contact, during which time the infant stares at the stranger but without showing any sign of avoidance. With increasing age the lag grows longer, until in the weeks just before the onset of fear, a period of complete unresponsiveness occurs in some, when neither fear nor positive responses are observed and the infant remains "frozen."

Both Bowlby (1969) and Ainsworth (1967) proposed that the behaviors through which attachment develops are comparable to Piaget's (1952) initial schemata and that they develop through processes homologous to those which Piaget described for cognitive development. Piaget's theory of sensorimotor development seems a better fit for the empirical facts relevant to the development of attachment.

As his criterion for the beginnings of object conservation Piaget used the infant's orientation toward a missing object. The parallel development of social and non-social objects is strikingly illustrated by the fact that Schaffer (as mentioned above) found upset on separation from the mother to begin just at the same age that Piaget's infants began searching for objects that had been removed from the perceptual field. Both instances may be said to provide evidence that a permanent object with an independent existence external to the subject has been constructed. The infant after this point is no longer willing to accept any environmental attribute that will satisfy

his needs, but will search until he has found the particular toy or person that now forms the specific object of his need.

In conclusion Schaffer (1971) states:

> Explaining the onset of attachments constitutes one set of problems, explaining their nature, manifestation and developmental course once they are in being, another. Whether a child's first relationship is in any way the prototype of all future relationships we do not as yet know; the clinical material bearing on this point is hardly convincing. What is certain is that a child's security and psychological well-being at the time are very much bound up with the nature of this relationship and that, however antithetical attachment and exploration may be in terms of the opposing attractions of mother and environment, a child can hardly be expected to deal adequately with a strange environment unless he is assured of the existence of a haven of safety to which he can fall back at times of stress. Paradoxically, it is one of the principal functions of mothering to free the child from the mother (p. 151).

- - - time of initial development and/or cessation of attachment patterns
----- time that attachment behavior is operative or has attained full development

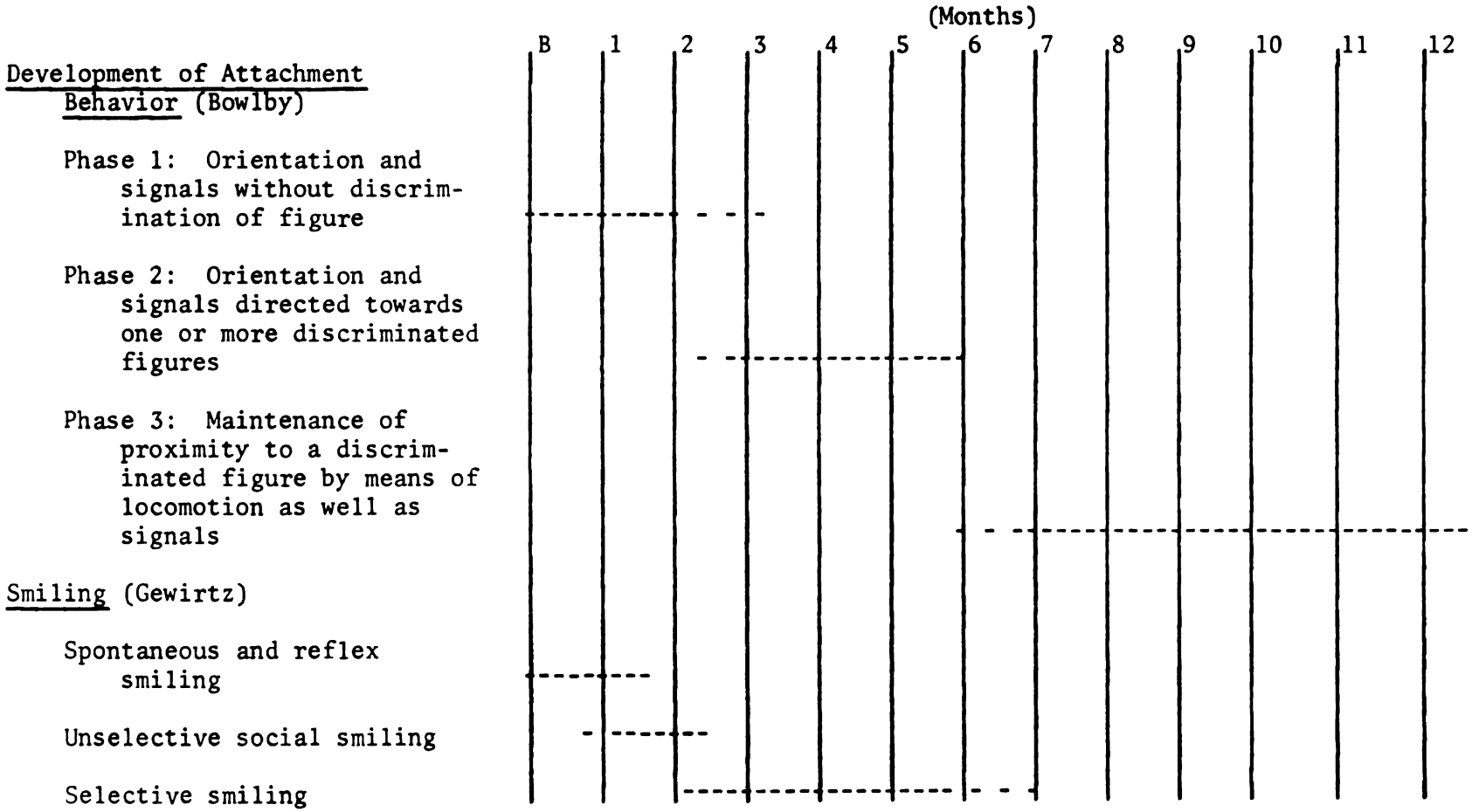

Figure 6. Attachment Development During the First Year of Life.

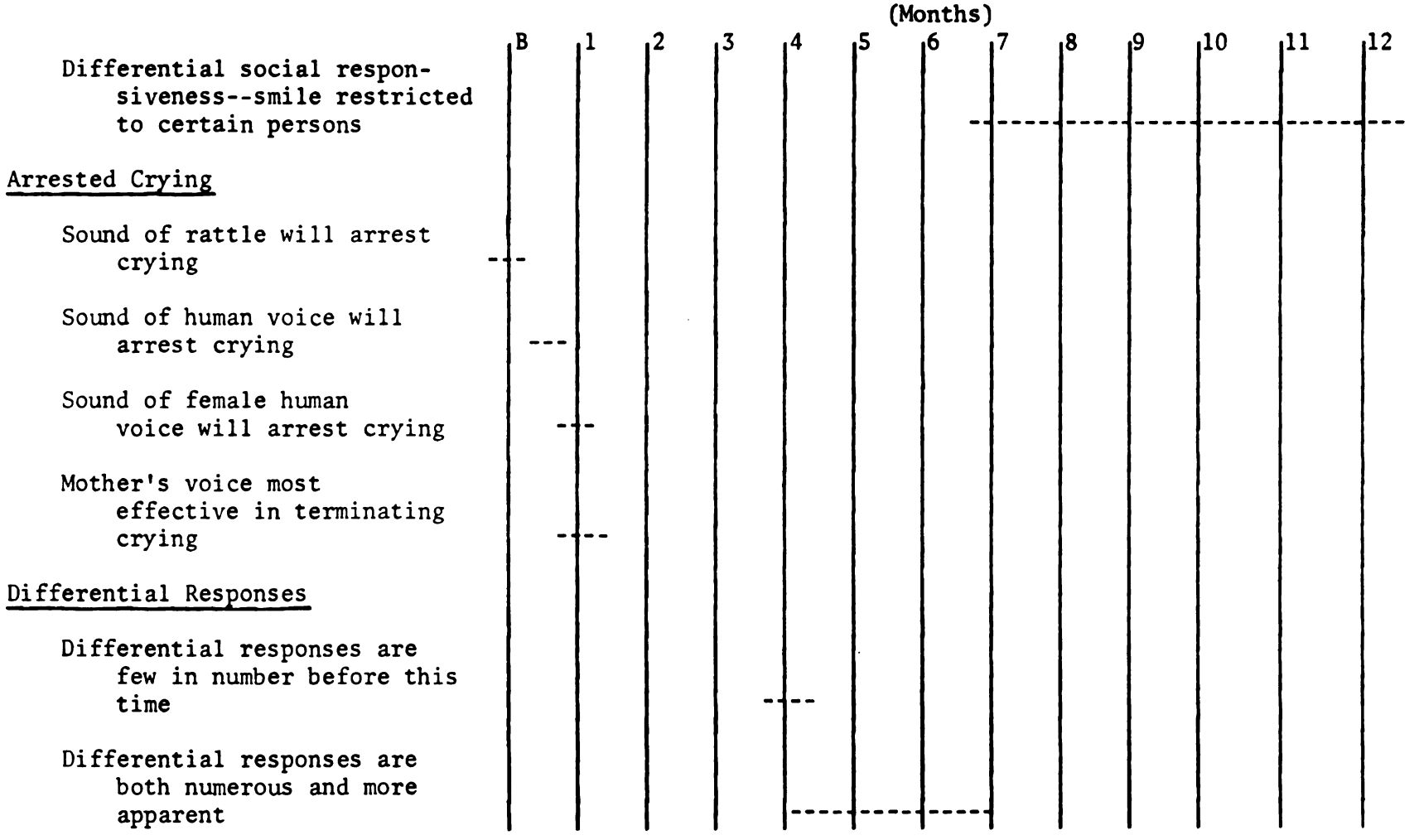

Figure 6. Continued.

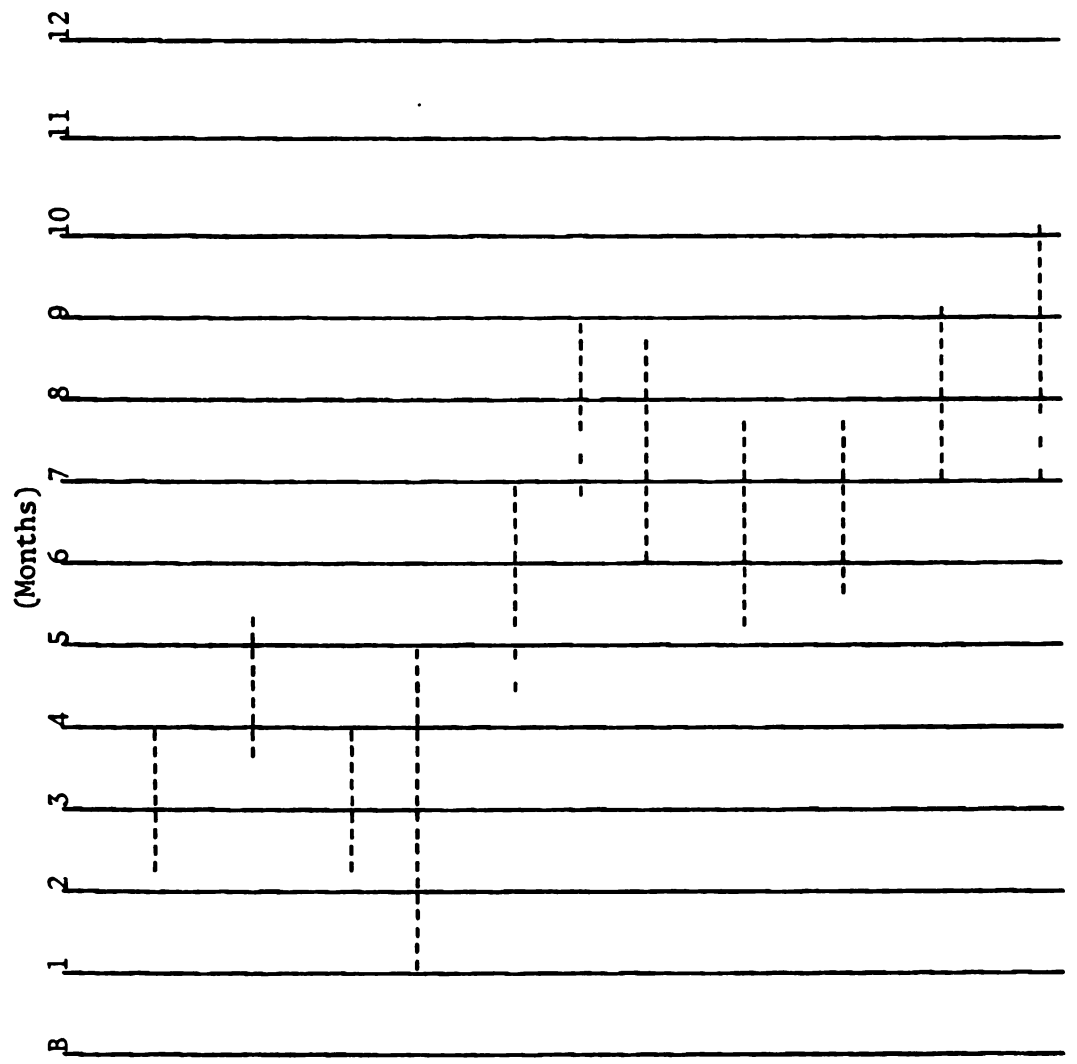

Figure 6. Continued

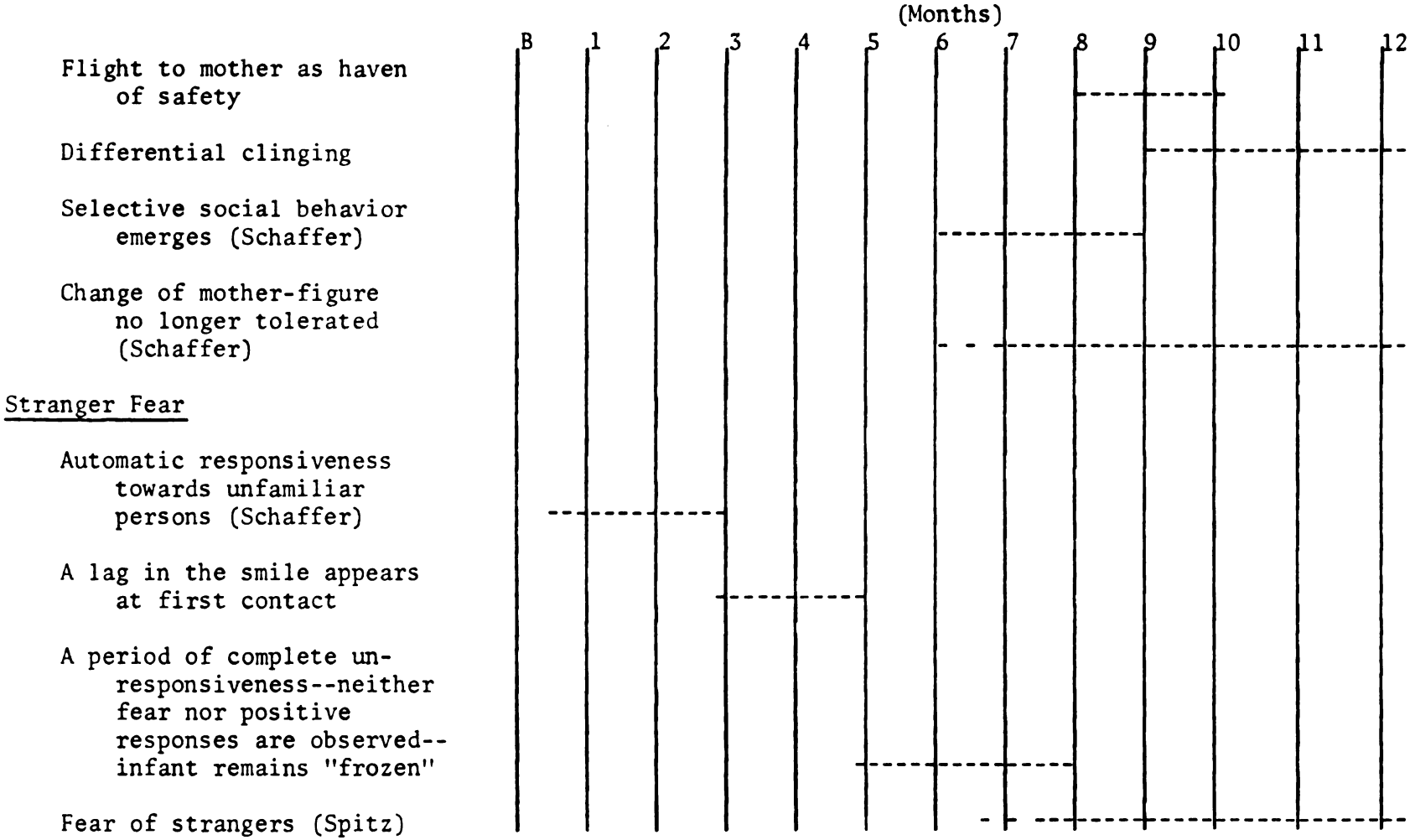

Figure 6. Continued.

CHAPTER VI

EARLY STIMULATION

One of the conditions that tends to favor optimal growth in the infant is that where moderate levels of stimulation are maintained. For instance, there is evidence that the occurrence of moderate stimulation enhances the infant's responsiveness toward the external environment. This responsiveness, in turn appears to facilitate the development of social attachments and to maximize early learning. The responsibility for maintaining an optimal level of stimulation for the infant falls largely on the mother, since the infant himself is relatively helpless in regulating the flow of stimulation that he experiences. Not only the intensity, but the tempo of stimulation to which the infant is exposed, must be modulated by the caretaking environment. The mother generally provides the infant with moderate stimulation through rocking, patting, caressing, and moving him about as well as by introducing auditory and visual patterns to his immediate surroundings. The infant at first is unable to recognize and communicate in the usual ways, but is responsive to variations in stimulation. The mother, by being the mediator of much of this stimulation, has a means for relating to and forming a bond with her infant. Some recent studies show the bearing stimulation has on the infant's function.

This section of the paper will briefly explore the following topics: (1) stimulus enrichment; (2) deprivation; (3) arousal level; and (4) stimulation-variety and timing.

Stimulus Enrichment

Recent years have produced an upsurge in the number of psychological studies involving human infants. A few investigators (Rheingold, Gewirtz, & Ross, 1959; Kagan & Lewis, 1965; Lipsitt, Pederson, & Delucia, 1966) have provided impressive demonstrations of early learning and conditioning.

Although most early stimulation studies have been conducted in just the past few years, work of this general nature can be traced back as far as that of Pratt (1934). His investigations concerned the effect of repeated auditory stimulation on the general activity of newborn infants. He found that gross total activity was increased during periods in which subjects were provided auditory stimulation.

Recent studies of the effects of early stimulation can be divided into at least two general classes. One involves an investigation (usually after the fact) of the amount of stimulation provided in the normal course of upbringing. These studies usually involve questionnaires obtained from mothers, or naturalistic observations of mothers, which are designed to assess their childbearing activities, and particularly the amount of sensory-motor and other forms of stimulation which they provide.

Moss and Kagan (1958) investigated a sample of 19 boys and girls. A Parent Behavioral Rating Instrument was administered in order to assess the rate at which parents "pushed" or otherwise showed

concern over the rate at which their child learned to walk, talk, roll over, etc. The results indicated a significant correlation between parental stimulation and IQ scores for boys at age three, but not at age six. It should be noted that the type of "stimulation" employed was a non-specific class of behaviors, presumably associated with maternal concern. It is probably not very similar to the usual forms of sensory-motor stimulation provided in laboratory studies where stimulation is experimentally manipulated.

Rubenstein (1967) conducted a similar investigation to that of Moss and Kagan. She time-sampled the maternal attentiveness (defined as the number of times the mother was observed to look at, touch, hold, or talk to her infant) provided for 44 five-month-old infants, and attempted to relate this to exploratory behavior at eleven months. It was concluded that early stimulation, in the form of maternal attentiveness, is capable of facilitating exploratory behavior (an important early indicator of cognitive development in infants).

Irwin (1960), who 40 years ago (Irwin & Weiss, 1934a, 1934b, 1934c) was conducting research on the effect of stimulation on infants, has carried out an intriguing study of the effects of naturalistic, or mother provided, stimulation. He investigated the effect of 15-20 minutes of auditory stimulation offered daily over an 18 month period. The stimulation consisted of mothers reading to their children. Although little difference was found in number of spontaneous vocalizations prior to the seventeenth month, from that time on the difference increased consistently, with the experimental group having higher scores than controls.

The work of Schaffer and Emerson (1968) constitutes something of a bridge between studies involving naturalistic stimulation and a second type of stimulus enrichment program for human subjects: experimentally induced stimulation provided in a laboratory setting. Their interests concerned the relationship between environmental stimulation and performance on developmental tests. The closeness in time of the stimulation to the testing period in this study, combined with the similarity of stimulation experiences to behaviors being measured by the developmental test, makes the procedure appear as something of a test "coaching" activity. This raises an important issue. Is early stimulation purely a means of increasing the rate of development of experimental subjects, or does it include components which serve primarily to increase subjects' ability to respond more effectively to criterion measures designed to assess their development.

Another significant study in the field of early stimulation of human infants was performed by Casler (1965a). Eleven experimental infants from an orphanage were provided with 1,000 minutes of increased tactile stimulation over a ten-week period. The effects of this procedure on performance of the eleven experimental infants on the GESELL DEVELOPMENTAL SCHEDULES was assessed. Significant differences were obtained favoring the experimental group.

Greenberg, Uzgiris, and Hunt (1968) have performed a recent investigation of the effects of early stimulation. They also chose the development of visual functions (age at which a blinking response appeared) for measuring the effects of early stimulation. Their results report acceleration of the blink response to changes in visible

stimulation as a consequence of continuous exposure to objects somewhat similar to those utilized in the work of White, et al. (1967).

Birns and Blank (1965) studied the effects of different forms of stimulation on soothing irritable infants, and they also evaluated whether infants were similar and consistent in terms of how easily they were soothed. The experimenters found that all four stimili (a loud continuous sound; a sweetened pacifier inserted in the baby's mouth; gentle rocking of the bassinet; and immersing the infant's foot in warm water) were equally effective in soothing an irritable infant, that the infants varied considerably in their ability to be soothed, and that the infants were consistent in their response to these stimuli on successive days.

In addition to the soothing effect of stimulation, an assumption held by White and Castle (1964) was that the stimulation an infant experiences also acts to increase his responsiveness and interest in the external environment. White and Castle (who were among the first experimenters to investigate the effects of experimentally induced stimulation on human infants in this country) studied the effects of additional handling on the amount of visual attention shown by a group of infants who ordinarily received very little handling. The results showed that the handled infants exhibited significantly more visual attention than the control infants, although this difference between groups diminished for the later assessments. The groups did not differ on other measures used in this study of overall development, health, weight gain, and visually directed reaching.

Schaffer and Emerson (1964b) studied the development of attachment behavior over the first eighteen months of life and in so

doing, evaluated the degree to which stimulation of the infant, as well as other maternal behaviors, contributed to the formation of attachments. They further attempted to determine whether the type of stimulation the mother provided for the infant had any bearing on his attachment to her. They found that the mode of stimulation did not matter, but that the intensity of the infant's attachment behavior toward the mother was simply a function of the quantity of stimulation that he received from her. From these results, the authors suggest the possibility "that the infant's need for the proximity of other people is not primary but arises, in the course of development, from his need for stimulation in general," and that his attachment to humans is facilitated, since "the most interesting object in his environment is the human object, with its high arousal potential and most varied stimulation propensity."

In addition to the above findings Schaffer and Emerson noted that the majority of infants form their initial attachment to a specific person somewhere between six and nine months of age. At first, the separation protest is most prevalent for situations where physical contact is interrupted, but as the child gets older, his protests occur more when the person to whom he is attached moves out of visual range.

Yarrow (1963) studied mother-infant interaction among a group of infants placed in foster and adoptive homes. By using foster mothers as subjects, correlations between maternal practices and infant behaviors can be explained quite convincingly in terms of environmental influences, since hereditary factors have been naturally controlled.

A highly interesting and important aspect of the work by Yarrow is the observation that the foster mother's behavior can be

influenced by characteristics of the infants, so that the same mother may exhibit grossly different behaviors towards different infants. This supports the point of view advanced by Bell (1968) concerning the effects the child may have on the mother.

Although the actual number of investigations has been few, the above studies do serve to reinforce the hypotheses concerning the facilitating effects of early stimulation and the debilitating effects of early stimulus deprivation.

Deprivation

The literature on the effects of institutional rearing is large (Yarrow, 1961). It does appear that impersonally reared children are prone to develop certain pathological features. Two in particular have been singled out for attention: a general developmental retardation and a deficiency in social relationships. Spitz (1945) described the progressive deterioration in developmental test scores of infants brought up in a highly unstimulating orphanage; similarly Dennis and Najorian (1957) found infants living in a very depriving institution in Lebanon to have developed at such a grossly inadequate rate that by the end of the first year they were functioning at mental deficiency level; and Dennis (1960) in a subsequent report, showed that such retardation could remain evident throughout early childhood and affect a wide range of perceptual-motor functions.

Social deficiencies are rather less easily demonstrated, for criteria employed are often vague and ambiguous. Spitz (1945) has provided some descriptive material on the grossly abnormal responses to other people of the deprived infants studied by him; Provence and

Lipton (1962) mentioned such symptoms in institutionalized babies as diminished vocalization to others, failure to develop discriminatory behavior, lack of any sign of either attachment behavior or of fear of strangers and absence of playful activity and social games; and both Bowlby (1951) and Goldfarb (1943) have commented on the superficiality of interpersonal relationships in the deprived.

Spitz (1945) believed that all deficiencies observed by him could be ascribed to the absence of a mother-figure and that it was the lack of "emotional interchange with a love object" that accounted for the symptoms of hospitalism. This conclusion must be questioned. A number of studies have shown that institutionalization per se need not result in retardation and that infants brought up without personalized mother love can remain well within the normal range of scores on developmental and intellectual tests (Klackenberg, 1956; Rheingold, 1956; Schaffer, 1965). On the other hand, it has been found that children may develop all the symptoms of hospitalism without ever leaving home and that mother-reared children can be just as deprived as institutionally reared children (Provence & Coleman, 1957; Prugh & Harlow, 1962).

If the presence or absence of a mother-figure cannot adequately account for the data, we must search elsewhere for the pathogenic element. A number of writers (especially Casler, 1961) have suggested that what is crucial in the early months of life is the total amount of stimulation (see Stimulation--variety--timing, below) that is available to an infant and institutionalized infants, therefore, suffer not from maternal deprivation, necessarily, but from perceptual deprivation.

There can be little doubt that in human development the level of psychological functioning varies with the amount of stimulation available. This is well shown in the studies of Dennis and Sayeg (1965), and Schaffer and Emerson (1968).

It may, therefore, be argued that one of the essential functions of mothering is the administration of an adequate amount of stimulation. Having only limited resources for self-stimulation, the young infant is dependent on others for this task. Only then can he perform at a level appropriate to his abilities. This applies to his social behavior too.

Arousal Level

The supply of an adequate amount of stimulation appears to be an important aspect of the mother process in infancy. Yet to identify maternal effectiveness with sheer quantity of stimulation is hardly satisfactory.

> Mothering involves a warding off of stimulation as well as an increase, a protection against excessive dosages as well as the supply of extra stimuli. The mother must, that is, help to modulate the infant's general arousal level.
>
> In early development this level can fluctuate considerably, changing fairly rapidly from deep sleep to intense excitement, and unlike the adult an infant has relatively few mechanisms available whereby he himself can bring about changes in arousal. He is dependent in this respect on others and a mother will accordingly supply particular types of stimulation in keeping with the infants state: bouncing on knee, swinging through the air, or laughing and tickling in order to induce upward changes of arousal; and physical contact, cradling or dummies in order to induce downward changes (Schaffer, 1971, pp. 158-159).

Scott (1962) has suggested that emotional arousal is a crucial part of being in contact with others and that the formation of social attachments is dependent on the extent to which it is experienced in the course of particular relationships.

Walters and Parke (1970) have drawn attention to the many studies which have established an association between arousal and attention, showing that changes in arousal level can influence cue utilization and perceptual organization.

The findings of Korner and Grobstein (1966) are similar:

> In psychological terms, the association of soothing and visual alertness may involve the protype of reaction which may hold true throughout life: By reducing the intensity of internal needs, the organism can turn outward and attend the external world. . . . Our data did not suggest that handling or the upright position alone induced a state of alertness. This was true because, in most cases, handling alone did not lower the infant's state of arousal sufficiently to reduce crying to the point of alertness. The observation that many infants are quietly alert when brought to a feeding suggests that handling and the upright position are more successful in inducing alertness in noncrying or sleepy infants. In those states of arousal, the stimulation of touch, motion, and positional change are rousing rather than soothing (p. 48).

In the earliest days of life, infant care, for the most part, invites soothing rather than rousing which may make the difference in neonates' earliest opportunities for visual experiences. Infants in institutions, while usually given adequate physical care, generally are not picked up and soothed when they cry. This may be partly responsible for their earliest deficit. It is observed that usually, home-reared, picked-up infants will have many more opportunities to get acquainted with the environment than babies left crying in their cribs. In particular, they will have many more occasions to explore their mothers. Their visual explorations will occur when comforted. This may lower their stimulus barrier under conditions which minimize the danger of being overwhelmed. This was found to be true in the study by Kagan and Tulkin (1971).

Stimulation--Variety--Timing

Denis (1960), writing of the severe retardation found by him in some institutions, considered the basic cause for such a condition to lie in the homogeneity and monotony of the stimulation provided. A stimulus constantly repeated produces habituation of attentional responses--variation is required to maintain interest. Too much variation is also harmful: an environment that is in constant flux will overload the child's processing capacity and evoke defensive responses. The stimulation provided by the mother will, therefore, need to meet a "happy medium," exposing the infant to carefully graded amounts of novel experience against a background of familiarity.

No less important than the variety of stimulation is its timing. The extent to which the mother acts as a source of reinforcement depends on her ability to respond contingently to her baby, that is, to administer stimulation that is appropriate in relation to the ongoing activity of the infant (Schaffer, 1971).

The studies of infant conditioning by Brackbill (1958) and Rheingold, Gewirtz, and Ross (1969) show very well the powerful reinforcing effects of contingently administered stimulation. When, on the other hand, stimulation is randomly administered it fails to bring about acquisition of behavior (Weisberg, 1963).

According to Lewis and Goldberg (1969), contingent reinforcement does not merely bring about the acquisition of specific responses, but also enables the child to develop a general motive which is the basis for all future learning. This is the effectance motive (White, 1959), characterized by the individual's belief that his actions successfully affect his environment. Lewis and Goldberg suggested that

such a motive is developed primarily through the interaction with the mother, for it is mainly in this context that the infant can learn about the consequence of his behavior.

It is apparent that the amount, kind and timing of stimulation must be adapted to the individual infant if it is to produce a predictable outcome. However, infants are not empty containers to be filled with as much experience as we can cram into them; they are active partners in even the earliest social encounters and we must take into consideration not only the nature of the stimuli offered by the mother but also the infant's own characteristics and what these, in turn, evoke in maternal responsiveness.

In conclusion, I would like to leave the reader with a statement of Burton White's which, hopefully, will answer the often posed question, "How will early stimulation help in the long run?"

> . . . enrichment procedures can produce remarkable effects on the course of early development. It may be said, as Eleanor Maccoby has pointed out before, that we've known for years that short-term effects on development are possible at various stages of growth. And one can ask, "Are there any long-term consequences of such experiences?" My answer would be that the question has usually been posed incorrectly. In education, one doesn't expect to provide instruction to a 6-year-old for six months and then find profound consequences at age 18. We assume that education is a continuing, long-term process. We therefore attempt to design the interventions of each succeeding year so that they mesh with prior events. Furthermore, we recognize the cumulative nature of the process. A deficit in elementary language or reading skills plagues the student at <u>every</u> succeeding grade level.
>
> We will never know very much about the maximal effects of experience on development until we can perform similar cumulative matching studies throughout the developmental years starting from birth (White, 1968, pp. 168-169).

PART II

DEVELOPMENTAL PROGRAM

CHAPTER VII

INTRODUCTION TO CURRICULUM

Some parents know from birth that their infant will be retarded and will develop slowly. No one can tell how slowly, or how much he will be able to do.

No matter what the diagnosis or when it is made, we know that this baby will have the same needs as all other babies. He will need a lot of patient tending to keep him fed, warm, clean, and dry. He will need to be talked to and held. He will need to be played with and enjoyed.

For the most part the day by day care of the retarded infant is the same as for all other babies. Sometimes feeding is difficult (feeding problems are not necessarily associated with retardation). Perhaps the baby will have a hard time learning to suck, will have difficulty in swallowing or will require frequent small feedings. Such babies need a great deal of patience and extra time.

As the weeks go by the baby will have more needs. He will need to be introduced to the general flow of the household. Just because he appears to be contented to lie in his crib, he must not be left there hour after hour. People will need to bring the world to this infant who is slow about look-around for himself. The baby will need

to be carried around, moved from place to place. Let him in on the smells and noises of the household. He must be talked to--told what is happening and what he is doing. Talking is VERY important. A variety of places for him to lie must be tried to get him used to different positions. The baby who never leaves the familiar crib may feel safe only when he is there.

It is through individually planned, sequencially organized sensorial stimulation that these infants can be helped, and parents begin to utilize whatever potential the baby may have. A child learns all he knows, very little comes with him at birth except the machinery for learning and children must even learn how to learn. The infant must learn to see, hear, feel, smell, and taste if the machinery for each is present and he can be helped to learn how to use it. Because the babies for whom this is written are all suffering some developmental lag, or from some form of sensory deprivation it will be necessary to provide experience for the baby to begin to learn.

It is well to caution at this point that over-stimulation is as bad for young children as under-stimulation. The most relevant and pertinent factor seems to be an abundance of stimuli presented in a variety of ways and at different times and in sequence, appropriate to the developmental level of the baby. Even young babies tend to block out an environment which contains sameness. Thus the child needs to be presented with a constant change of stimuli, even when presenting this stimuli for a constant goal. An example would be in teaching the young child to focus--use the flashlight, the ball with string, the rattle; the baby also needs to learn to listen, so the caretaker should use her

voice in speaking, in making vowel sounds, in singing, and also the use of various bells, noise makers, and rattles.

Everything that happens to the infant is important to him. Body games played to move all his limbs through a full range of motion appropriate to his age should be engaged in. The gentle pushing and pulling against some mild form of resistance will contribute to the development of his muscular strength. When the infant is ready, the planned procedure of pulling to a sitting or standing position should be done to equalize the use of both sides of his body to assist in attaining dynamic balance. Body awareness can be fostered in bathing, diapering--holding activities.

To emphasize spatial awareness the placement of the infant's crib should be varied to provide a variable relationship to artificial and natural light. Placement should be based upon a desire to provide variable visual stimulation and not the tendency to place the infant in the most convenient place for care and household traffic. When lamp lighting is used, the lamp should be placed in different physical relationships to the crib or play pen.

In the early act of feeding the mother should vary the holding side when giving the baby the bottle--this will provide the infant with tactile stimulation on both body sides, as well as to provide a variable spatial orientation to the bottle.

To increase tactual sensitivity the infant should be held and stroked, frequently employing various soft textures (cotton, soft wool, soft brushes, etc.) for such stroking in addition to mother's hand and cheek. Kinesthesia can be enhanced by moving body parts accompanied by a verbal reinforcement (rhymes, songs, nonsense syllables). On the

tactical level, textures which the child contacts should be as varied as possible. The auditory environment should be composed of quiet talk, music, and noise. The babbling sounds of the infant should be imitated aloud. The brightness of the "world" should be regulated by color, light intensity and alterations in frequency. The olfactory system can be stimulated by presenting variable odors. The gustatory system can be enhanced by oral stimulations of tasteable, nonswallowable substances. Flexibility is encouraged by varying sound, light, smell and other sensory experience.

It is hoped that this curriculum will deliberately supply the infant with a planned sequence of stimulation and give him more to be aware of. Parents should always ask themselves, "What can I do today to give my baby more visual awareness, tactical awareness, auditory awareness?"

The activities included in this program are meant to be used in the daily handling of the child. They are not to be looked at as something over and above the daily care given. No item should take an extended period of time to perform, nor should it put the parent or caretaker under undue stress. Developmentally slow infants need a variety of inputs to reach a developmental milestone. This program is meant to provide such variety, to aid the minute step by step movement that such children must know.

The activities listed here come under five main headings: vision, hearing, motor development, cognition, and socialization. Each of these, save socialization, are divided into two parts, so that the complete breakdown is:

1. Vision
    A. Visual response to the environment (1-1 to 1-11)
    B. Initial eye-hand coordination (1-12 to 1-15)
2. Hearing and speech
    A. Sound localization (2-1 to 2-7)
    B. Vocal response (2-8 to 2-21)
3. Motor
    A. Prone/supine development (3-1 to 3-15)
    B. Head/trunk development (3-16 to 3-36)
4. Cognition
    A. Manipulation (4-1 to 4-14)
    B. Intentiality (4-15 to 4-36)
5. Socialization

Each activity is coded for easy identification as to its area and level, e.g., the first number in the code tell the area: 1--vision; 2--hearing and speech; 3--motor; 4--cognition; and 5--socialization. The second number tells the location in the sequence of that area, for example 1-12 is in area of vision and it is the twelfth item in the vision sequence. All areas are sequenced developmentally. To see how each area corresponds to another area developmentally see Table 1. (Note: the developmental levels are equivalent to ages in months.)

CHAPTER VIII

THE CHECKLIST

The checklist has been developed based on the information found in Chapters I-V of this work.

The checklist is given to provide parents and caretakers with some format for locating a child's developmental level. It can also be used as a tool for home visiters to aid parents in determining various activities that they can perform with their child.

If a child can perform a given task on the checklist it is checked. If the child cannot perform the task, one must go back to the last activity the child did perform and work forward from there. All five areas are to be integrated, that is, one does not work in one area only (as vision) and wait until that is completed before beginning another (hearing). By checking Figure 8 determine what activities merge together and spend time in all the areas of that particular level.

When the child is able to perform each activity 8 out of 10 times, move on to the next activity in the sequence. Always continue playing with the child in areas that he has accomplished.

Some children may be severely impaired in one area, but developing well in others. In this case, each area must be looked

at separately and progress made according to the child's ability in each.

The activities given under each specific item are to provide a variety of ways of approaching a particular skill. They need not all be tried if the child does not need a variety of input in that particular area.

DEVELOPMENTAL CHECKLIST

for use with Curriculum

Vision	can do ✓	date when accomplished
A. Visual response to the environment		
1-1. BRIEFLY FOLLOWS MOVING STIMULUS (distance of about 12 in.)		
1-2. REGARDS FACE (Approach 18-24 in. within field of vision)		
1-3. FOLLOWS LIGHT WITH EYES, TURNING HEAD		
1-4. FOLLOWS MOVING PERSON (while supported upright)		
1-5. EYES FOLLOW MOVING OBJECT, HORIZONTALLY		
1-6. EYES FOLLOW MOVING OBJECT, VERTICALLY		
1-7. EYES FOLLOW 360° ARC		
1-8. GLANCES FROM ONE OBJECT TO ANOTHER (both objects stationary)		
1-9. WATCHES OBJECT PULLED ALONG BY STRING		
1-10. RESPONDS TO PERIPHERAL RETINA STIMULATION		
1-11. VISUALLY TRACKS TARGETS THROUGH A WIDE RANGE OF ANGLES IN SEVERAL DIRECTIONS, AND AT MANY SPEEDS		
B. Initial eye-hand coordination		
1-12. REACHES FOR DANGLING RING (does not make contact)		
1-13. CARRIES OBJECT TO MOUTH		
1-14. CLUTCHES AT DANGLING RING (contact is made, but not maintained)		
1-15. SECURES DANGLING RING (contact is made and maintained)		

Hearing and Speech

	can do ✓	date when accomplished
A. Sound localization		
2-1. STARTLED BY SOUNDS		
2-2. QUIETED BY HUMAN VOICE		
2-3. TURNS HEAD TO SIDE AT WHICH SOUND IS MADE		
2-4. SEARCHES FOR SOUND WITH EYES		
2-5. LISTENS TO SOFT NOISE (hum, song, music box)		
2-6. TURNS HEAD DELIBERATELY TO SOUND		
2-7. LISTENS TO CONVERSATIONS		
B. Vocal Response		
2-8. CRYING DUE TO CAUSE		
2-9. VOCALIZATION OTHER THAN CRYING		
2-10. LAUGHS ALOUD		
2-11. IMITATES SMILING		
2-12. COOS OR STOPS CRYING ON HEARING MUSIC		
2-13. BABBLES IN MORE THAN TWO DISTINCT SOUNDS		
2-14. RESPONDS WHEN CALLED		
2-15. IMITATES SOUND MADE BY OTHERS		
2-16. USES VOCALIZATION TO GET ATTENTION		
2-17. SAYS "MAMA" OR "DADA," ETC.		
2-18. RESPONDS TO "NO" (Temporarily ceasing activity)		
2-19. FOLLOWS SIMPLE DIRECTIONS		
2-20. ANSWERS SIMPLE QUESTIONS WITH GESTURES		
2-21. REACTS TO MUSIC VOCALLY		

Motor

	can do ✓	date when accomplished
A. Prone/Supine development		
3-1. LIFTS CHIN WHEN PRONE		
3-2. WHILE IN PRONE POSITION PUSHES WITH FEET AGAINST RAISED SURFACE		
3-3. MOVES HEAD FROM SIDE TO SIDE WHILE ON BACK		
3-4. LIFTS HEAD WHEN PRONE		
3-5. RAISES AND TURNS HEAD WHILE PRONE		
3-6. ROLLS FROM SIDE TO BACK, BACK TO SIDE		
3-7. LIFTS HEAD AND CHEST WHEN PRONE		
3-8. ROLLS FROM SIDE TO SIDE BUT NOT COMPLETELY OVER		
3-9. PLAYS WITH OWN TOES, SUPINE POSITION		
3-10. ROLLS OVER, STOMACH TO BACK POSITION		
3-11. ROLLS OVER, BACK TO STOMACH POSITION		
3-12. TRIES VIGOROUSLY TO CRAWL		
3-13. CAN TURN AROUND WHEN LEFT ON THE FLOOR		
3-14. MAKES SOME PROGRESS FORWARDS, OR BACKWARDS, CRAWLING		
3-15. CREEPS ON HANDS AND KNEES		
B. Head/Back development		
3-16. HOLDS HEAD ERECT BRIEFLY WHEN SUPPORTED IN UPRIGHT POSITION		
3-17. HEAD ERECT WITH BOBBING WHEN SUPPORTED IN SITTING POSITION OR WHILE BEING CARRIED		
3-18. PULLED TO SITTING HEAD LAGS SLIGHTLY		
3-19. HOLDS HEAD ERECT CONTINUOUSLY		
3-20. SITS WITH SUPPORT NO HEAD LAG		

Motor (Continued)	can do ✓	date when accomplished
3-21. TURNS HEAD FREELY IN SITING POSITION		
3-22. SITS WITH MINIMAL SUPPORT WITH STABLE BACK AND HEAD		
3-23. COMES TO SITTING POSITION WITH LAG		
3-24. SITS ALONE FOR A SHORT TIME, LEANS FORWARD		
3-25. SITS GOOD POSTURE, NO SUPPORT		
3-26. CAN SIT FROM A PRONE POSITION		
3-27. CAN SIT FROM A SUPINE POSITION		
3-28. STANDS WITH SUPPORT		
3-29. STANDS WITH MINIMUM SUPPORT		
3-30. STANDS, SELF PULLED		
3-31. CAN STAND HOLDING ON TO FURNITURE		
3-32. LOWERS SELF FROM STANDING TO SITTING POSITION		
3-33. SIDE STEPS ROUND INSIDE CRIB OR PLAYPEN HOLDING RAILS		
3-34. CAN WALK WHEN LED		
3-35. STANDS BY SELF		
3-36. WALKS INDEPENDENTLY		

Cognitive

A. Manipulation	can do ✓	date when accomplished
4-1. GRASPS FINGER		
4-2. HAND GOES TO MOUTH		
4-3. GRASPS TOY IN HAND FOR THREE SECONDS		
4-4. HOLDS RATTLE ACTIVELY		
4-5. LOOKS AT HANDS, PLAYS WITH OWN FINGERS		
4-6. CLASPS OBJECT PUT IN HAND AND HOLDS IT		
4-7. DROPS FIRST CUBE FOR SECOND		
4-8. PUTS OBJECTS IN MOUTH		
4-9. HOLDS TWO CUBES		
4-10. PASSES TOY FROM HAND TO HAND		
4-11. MANIPULATES TWO OBJECTS AT ONCE		
4-12. USES THUMB TO HELP GRASP TINY OBJECTS		
4-13. ACCEPTS THIRD CUBE WITHOUT DROPPING		
4-14. MANIPULATES BOX, LID, AND CUBES		

B. Intentionality i.e. actions which show intent on the part of the child. Not pure motor movements.

4-15. RESISTS TOY WITHDRAWAL		
4-16. REACHES FOR OBJECTS		
4-17. REMOVES BLOCK FROM BOWL		
4-18. PLACES BLOCKS IN BOWL		
4-19. ATTEMPTS TO ATTAIN TOY BEYOND REACH		
4-20. PLAYS WITH RING, SHAKES BELL, EXPLOITS POSSIBILITIES OF PLAY MATERIALS		
4-21. LOOKS FOR DROPPED TOY		

Cognitive (Continued)	can do ✓	date when accomplished
4-22. LIFTS INVERTED BOX OR BLANKET IN SEARCH OF TOY		
4-23. DANGLES RING BY STRING		
4-24. CLICKS TWO BLOCKS TOGETHER (IMITATION)		
4-25. LIFTS LID OFF SHOE BOX		
4-26. THROWS OBJECTS		
4-27. HANDS TOY WHEN REQUESTED TO DO SO		
4-28. PUTS SMALL OBJECTS INTO A CUP AND REMOVES THEM		
4-29. WILL RETRIEVE A HIDDEN TOY		
4-30. STACKS 2 OR 3 STACKING TOYS		
4-31. PLACES RING ON PEG		
4-32. REMOVES ROUND BLOCK FROM PUZZLE		
4-33. REMOVES PEG FROM PEGBOARD		
4-34. PLACES DISCS IN CAN		
4-35. BUILDS A TOWER OF 2		

Socialization

		can do ✓	date when accomplished
5-1.	LOOKS AT PERSON MOMENTARILY		
5-2.	QUIETED WHEN PICKED UP		
5-3.	SMILES IN RESPONSE TO ATTENTION		
5-4.	ANTICIPATED FEEDING UPON SIGHT OF THE BOTTLE WITH ACTIVITY CHANGE OR MOVEMENTS OF THE MOUTH		
5-5.	VOCALIZES WHEN TALKED TO		
5-6.	FRIENDLY TO STRANGERS		
5-7.	RESISTS ADULT WHO TRIES PLAYFULLY TO TAKE TOYS		
5-8.	IMITATES SMILING AND LAUGHS ALOUD		
5-9.	SELECTIVE SMILING		
5-10.	STOPS CRYING WHEN TALKED TO		
5-11.	ANTICIPATORY MOVEMENTS WHEN ABOUT TO BE LIFTED		
5-12.	HOLDS A SPOON		
5-13.	STRETCHES TO BE TAKEN		
5-14.	RESPONDS TO IMAGE IN MIRROR (change in activity and/or vocalization)		
5-15.	DRINKS FROM A CUP WITH HELP		
5-16.	DIFFERENTIATES STRANGERS FROM FAMILY		
5-17.	PLAYS UNATTENDED TEN MINUTES		
5-18.	DISPLEASED IF TOY IS TAKEN AWAY		
5-19.	PLAYS INTERPERSONAL GAMES: PEEK-A-BOO AND PAT-A-CAKE ROUGHLY		
5-20.	WAVES "BYE-BYE"		
5-21.	FINGER FEEDS		

Socialization
(Continued)

		can do ✓	date when accomplished
5-22.	GIVES AFFECTION		
5-23.	OBEYS SIMPLE REQUESTS: "GIVE ME THE CUP"		

Table 1.--Coded Items According to Developmental Level (Normal Development).

Developmental level	Vision		Hearing	
	A. Visual Response to environment	B. Initial eye-hand coordination	A. Sound localization	B. Vocal Response
1	1-1 1-2		2-1 2-2	2-8 2-9
2	1-3 1-4 1-5 1-6			
3	1-7 1-8 1-9		2-3	
4	1-10	1-12	2-4	2-10 2-11
5		1-13 1-14	2-5	2-12
6	1-11	1-15	2-6	2-13

Table 1.--Continued.

Developmental level	Vision		Hearing	
	A. Visual Response to environment	B. Initial eye-hand coordination	A. Sound localization	B. Vocal Response
7				2-14
8			2-7	2-15 2-16
9				2-17
10				2-18
11				2-19 2-20
12				2-21

Table 1.--Continued.

Developmental level	Motor		Cognitive	
	A. Prone/Supine Development	B. Head/Trunk Development	A. Manipulation	B. Intentionality
1	3-1 3-2	3-16	4-1 4-2	
2	3-3 3-4	3-17	4-3	
3	3-5 3-6	3-18	4-4 4-5	
4	3-7	3-19	4-6 4-7	4-15
5	3-8	3-20 3-21	4-8	4-16
6	3-9	3-22		4-17 4-18 4-19

Table 1.--Continued.

Developmental level	Motor		Cognitive	
	A. Prone/Supine Development	B. Head/Trunk Development	A. Manipulation	B. Intentionality
7	3-10 3-11	3-23	4-9	4-20 4-21
8	3-12	3-24	4-10 4-11	
9	3-13 3-14	3-25 3-26 3-27	4-12	4-22 4-23
10		3-28		4-24 4-25 4-26
11	3-15	3-29 3-30 3-31		
12		3-32 3-33 3-34 3-35 3-36	4-13 4-14	4-27 4-28 4-29 4-30 4-31 4-32 4-33 4-34 4-35 4-36

Table 1.--Continued.

Developmental level	Socialization	Developmental level	Socialization
1	5-1 5-2	7	5-15
2	5-3	8	5-16
3	5-4 5-5	9	5-17 5-18
4	5-6 5-7 5-8	10	5-19 5-20
5	5-9 5-10	11	5-21
6	5-11 5-12 5-13 5-14	12	5-22 5-23

CHAPTER IX

DEVELOPMENTAL CURRICULUM

1. Vision--A. Visual response to the environment

1-1: BRIEFLY FOLLOWS MOVING STIMULUS
(Distance of about 12 inches)

Activities: --Move a rattle or other bright object[6] close to your baby's face (12 in.) so that he can follow it with his eyes. When you're sure he sees it move it slowly so that he can keep it in sight by moving just his eyes without moving his head. Gradually increase the distance from side to side.

--Place a red ballon over your baby, secure it gently, let it bob with the passing breeze.

--Secure a pinwheel to your baby's crib, blow it so that it spins and attracts your baby's attention.

[6]For a further description of toys for very young children see Appendix A.

1. Vision--A. Visual response to the environment (continued)

1-2: REGARDS FACE
(Approach 18-24 in. within the field of vision--talk to infant.)

Activities: --Smile and talk to your baby, with your face close to his.

--Wag your head and sing (head must be in motion).

--Stoop down so that your baby is unable to see you, "pop" up so that your face is 18-24 inches from his. Begin by wagging your head and singing, then just sing, then just say his name, and finally, just smile. (This is sequenced over a period of days, weeks, months.)

* * *

1-3: FOLLOWS LIGHT WITH EYES, TURNING HEAD

Activities: --Hold a small flash light above your baby's head about 12 inches from his eyes--move it in a curved line all the way down to the side so that he has to turn his head to follow the light. Go to the left and the right.

--Use a rattle or noisemaker instead of a light.

--Use your own smiling face.

--Pull the curtains or shades. Shine a strong flashlight on the ceiling. Encourage the baby to watch the moving light. Use the light reflection of a mirror in the same way.

--Change the baby around in his crib so that light can strike his face from different locations.

1. Vision--A. Visual response to the environment (continued)

1-4: FOLLOWS MOVING PERSON
(While supported upright--moving person 36 inches away--speaking softly.)

Activities: --While your baby is supported upright, walk across the room speaking softly (make sure baby's eyes have captured you).

--Walk towards your baby with his bottle.

--Walk across the room with a noise maker, a music box, etc.

* * *

1-5: EYES FOLLOW MOVING OBJECT, HORIZONTALLY

Activities: --Ring a bell, shake a rattle or other noisemaker in your baby's range of vision (stay out of baby's line of vision so that he concentrates only on the object). Move the object back and forth horizontally. Vary the speed.

--Move the object so that your baby must turn his head to see it go all the way to the left and then to the right.

* * *

1-6: EYES FOLLOW MOVING OBJECT, VERTICALLY

Activities: --Shake a rattle a little behind your baby's head (baby is lying on his back) continue to keep out of sight. If his eyes look up, but can't see the object, bring it over his head until his eyes "grasp it," then move it slowly back out of sight so that he must push his head back to see it.

1. Vision--A. Visual response to the environment (continued)

1-7: EYES FOLLOW A 360° ARC

Activities: --Hold a rattle for your baby to see then slowly move it in a larger and larger circle until he must turn his head in all directions to see it. (Baby is lying on his back.)

--Use a penlight flashlight--click it on and off to gain your baby's attention before moving it.

--While your baby is lying on his back shake the object (ring of keys) gently until baby looks at it. Move the object slowly in a circle, in the air, around your baby's head. Change the direction of the circle.

* * *

1-8: GLANCES FROM ONE OBJECT TO ANOTHER
(both objects are stationary)

Activities: --Hang bright mobiles[7] or other crib attachments in your baby's crib for him to look at and gradually learn to reach for. Hang objects so that they are from 6-18 inches from your baby.

--Move one or both of the objects hanging from the mobile.

--Vary the color, design, and shape of these objects.

--Hang a mobile level with the crib rails and in line with your baby's eyes and gaze. Change sides every other day to improve focus on both sides.

--Sew different colored shapes on to a white crib sheet. Place the decorated sheet over the side or foot of his crib.

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[7]See Appendix A for a description of mobiles and other crib attachments.

1. Vision--A. Visual response to the environment (continued)

1-9: WATCHES OBJECT PULLED ALONG BY STRING

Activities: --Place your baby on his stomach or in a propped sitting position. Slowly pull a toy along in front of him making sure he sees it. Contrast the object and the background along which the object is being pulled.

--Gradually reduce the size of the object and the contrast with the background.

--Use an object that makes a noise (bell, clapper, etc.).

* * *

1-10: RESPONDS TO PERIPHERAL RETINA STIMULATION
(i.e., responds to things seen from the "corner of his eye")

Activities: --While your baby is lying on his back, wiggle an object at the side of the baby's head, if he does not see it, move it a little higher until he turns his head to see it. Gradually lower the object until the baby will no longer turn his head to see it.

--Use objects that make no sound--this is not an auditory game.

--Move your baby's crib around the room so that visual and auditory stimulation can come from all sides.

1. Vision--A. Visual response to the environment (continued)

1-11: VISUALLY TRACKS TARGETS THROUGH A WIDE RANGE OF ANGLES IN SEVERAL DIRECTIONS, AND AT MANY SPEEDS

Activities: --Change and feed your baby from alternate sides.

--Give your baby a chance to follow many kinds of objects through vertical, horizontal, and circular ranges.

Change the directions, left-to-right, right-to-left.

Vary the speed.

--Use bright colored objects, noise makers, light (flashing).

1. Vision--B. Initial eye-hand coordination

1-12: REACHES FOR DANGLING RING
(does not make contact)

Activites: --Bring the mobile closer to your baby so that he can hit it and make it swing and bounce.

--Wave a toy in front of him, and get him to reach and grasp for it.

--Encourage your baby to life his arm toward an object. Help him if necessary. Always allow your baby to play with the object after he has worked for it.

* * *

1-13: CARRIES OBJECT TO MOUTH
(object placed in hand or grasped accidently is carried to mouth)

Activities: --Help your baby find his mouth by taking his empty hand and feeling his lips, etc.

--Place objects (rattle, block, spoon) in your baby's hand, one at a time. Use objects that have a different feel, encourage him to put them in his mouth. (Make sure that all items are harmless to your baby. See Appendix B.)

1. Vision--B. Initial eye-hand coordination (continued)

1-14: CLUTCHES AT DANGLING RING
(contact is made, but not maintained)

Activities: --While your baby is lying on his back, shake a rattle about 12 inches from his tummy. Move it closer to his hands so that he can grasp at it, saying to him "Get the rattle."

--Mount a cradle gym on your baby's crib. This will allow him to reach for objects anytime he chooses

--Dangle a ring directly in front of your baby to gain his attention. Help him touch the ring by guiding his hand to the ring. Reduce your help as your baby gains in skill.

* * *

1-15: SECURES DANGLING RING
(contact is made and maintained)

Activities: --Dangle a ring directly in front of your baby to gain attention. Help him grasp the ring by guiding his hand to the ring, reducing help as he gains in skill.

--Gradually increase distance between child and ring to encourage reaching.

--Use an object attached to an elastic. Hold the object for your baby to grasp, then gently pull on the elastic so that he gets the feeling of pulling.

2. Hearing--Sound localization

2-1: STARTLED BY SOUNDS
(child will turn his head, cry, or startle in response to a loud noise)

Activities: --Ring a bell, clap your hands, squeeze toy, shake rattle near your infant. Observe the response.

--Stand so that infant cannot see you and do the above activities.

* * *

2-2: QUIETED BY HUMAN VOICE

Activities: --When your baby is fussy, talk quietly to him.

--Hold your baby and sing or hum softly.

--While baby is babbling to himself, stand so he cannot see you, call him softly. Watch to see if his expression changes and he listens. (You cannot do this activity until baby is making some sounds to himself.)

2-3: TURNS HEAD TO SIDE AT WHICH SOUND IS MADE

Activities: --Use a noise maker (rattle, beans in a can), shake it first on one side of your baby then on the other, so that your baby will move his head in the direction of the sound.

--Stand so that your baby is looking at you. Move so that he is unable to follow you with his eyes. Call his name.

--Make a noise as you enter the room where your baby is. See if he turns his head to you.

2. Hearing--A. Sound localization (continued)

2-4: SEARCHES FOR SOUND WITH EYES

Activities: --Use noisemakers (squeak toys) out of your baby's field of vision, to encourage him to turn his head and search for the sound.

--Call or whisper his name when his back is turned until he turns to the sound.

--Make a sound in front of your baby, then move the sound to the side. Will he follow the sound?

--Talk to him from different places in the room.

--Tie bells on your baby's booties or put them on his ankles. Help him to find his feet when he hears the bells.

2-5: LISTENS TO SOFT NOISE
(e.g., hum, song, music box)

Activities: --While baby is quiet, place a music box near him, watch to see if he is aware of the sound.

--While working around baby or while rocking him, hum and sing softly.

2. Hearing--A. Sound localization (continued)

2-6: TURNS HEAD DELIBERATELY TO SOUND

Activities: --Without your baby seeing you, make different sounds at various locations and distances. See if he turns immediately to the sound.

--Shake a rattle to the right (or left) of, and a little behind your baby's head. Wait a few seconds, say "Where is the rattle?" Shake the rattle right above the top of your baby's head. Wait. Say "Where is the rattle?"

* * *

2-7: LISTENS TO CONVERSATION

Activities: --Talk to your baby as you care for him. "It is time for your bath." "Isn't this good? mmm." Imitate the sounds that he makes.

2. Hearing--B. Vocal response

2-8: CRYING DUE TO A CAUSE

Activities: --Do not anticipate every need of your baby. Let him "ask" for what he wants.

--Let your baby come to know that vocalizations get results.

* * *

2-9: VOCALIATION OTHER THAN CRYING

Activities: --When your baby makes any sound usable in speech, tickle his tummy and smile.

--Respond to your baby when you hear him vocalize, imitate him, smile at him.

--Make vocal sounds to encourage his sounds.

--When you feed, bathe, and hold your baby, say his name or sounds that he can make, over and over again.

* * *

2-10: LAUGHS ALOUD

Activities: --Talk to your baby while you feed him or change him. Tickle his cheek, his tummy.

--Hide baby under a blanket. Say, "Where is (child's name)?" and then pull the blanket off and say, "There he is."

* * *

2-11: IMITATES SMILING

Activities: --Smile at your baby.

--Encourage his smiling response by tickling his cheek, under his chin, etc.

2. Hearing--B. Vocal response (continued)

2-12: COOS OR STOPS CRYING ON HEARING MUSIC

Activities: --If your baby is fussy, place a music box or turn on a record player or radio near him.

--Do not leave the music on for a long time or its effect may wear off (over saturation).

* * *

2-13: BABBLES IN MORE THAN TWO DISTINCT SOUNDS

Activities: --Talk and play with your baby, noting any sounds that he can make. Imitate the sounds he makes.

--Make new sounds for him--encourage him to respond.

--Encourage your baby to vocalize by holding a toy (rattle, bell, doll) in front of him while making one of the sounds that he can make. If he makes the sound, or any sound near it, repeat the sound as you give the toy to him.

* * *

2-14: RESPONDS WHEN CALLED

Activites: --Call or whisper his name when his back is turned until he turns to the sound.

--Call his name while in front of him until he looks at your face.

--Use a puppet to talk to your child.

--Use your baby's name when feeding him.

--Always use your baby's name to call attention to an event that is going on.

2. Hearing--B. Vocal response (continued)

2-15: IMITATES SOUND MADE BY OTHERS

Activities: --Hold your baby face to face and make sounds that he's been making on his own. When he initiates you laugh and smile and give him a squeeze.

--Imitate sounds that he makes such as tapping the table, clapping, etc.

--Respond to your baby's vocalizations.

--Say some sounds that your baby is not familiar with. "Nuzzle" him after you make the sounds.

--Make sounds that go with a physical activity or game, p/p/p/p; ah, ah; 00--00--00.

* * *

2-16: USES VOCALIZATION TO GET ATTENTION

Activities: --Encourage your child to use verbalization to get what he wants instead of all gestures.

--Respond selectively to crying.

--Respond to your baby's vocalizations, so that he knows they are worth while.

* * *

2-17: SAYS "MAMA" OR "DADA," ETC.

Activities: --Imitate the child's sounds and encourage him to repeat any combination of syllables i.e., ma, ah, ge, bah, mu, um, etc.

2. Hearing--B. Vocal response (continued)

2-18: RESPONDS TO "NO"
(temporarily ceasing activity)

Activities: --Remove your child's hands or the whole child from the "no" situation.

--Say the word "no" firmly, show him what you mean.

* * *

2-19: FOLLOWS SIMPLE DIRECTIONS

Activities: --Give simple directions for your baby to retrieve familiar objects. "Bring me the ball." "Close the door."

--Base your commands upon an act that your child can physically do. "Roll the ball," "Put it down," "Pick up the ----," "Come here," etc.

* * *

2-20: ANSWERS SIMPLE QUESTIONS WITH GESTURES

Activities: --Have your child imitate you by touching, pointing, clapping, etc. If the child cannot imitate you, move his hands for him. Gradually reduce your help.

--Ask simple questions, "Where is your nose?" "Where is your ball?" If the child does not respond, show him where the object is.

--Look at magazines and books with your baby. Point out and label the different pictures for him so that he can learn a larger word vocabulary.

2. Hearing--B. Vocal response (continued)

2-21: REACTS TO MUSIC VOCALLY

Activities: --Sing to your baby.

--Play the radio, record player, music box, etc. While playing music for your child or singing to him encourage his vocalization. As he associates the music with a pleasurable activity and vocalization he is more likely to vocalize during music with no other activity going on.

3. Motor--A. Prone/supine development
(Stomach/back position development)

3-1: LIFTS CHIN WHEN PRONE
(prone means child is lying on stomach)

Activities: --Lift your baby from the mattress, then slowly lower his face onto the mat. This encourages him to raise his own head.

--While your baby is lying on his stomach dangle a rattle directly in front of his head so that he must raise his chin just a little to sight the object.

* * *

3-2: WHILE IN PRONE POSITION PUSHES WITH FEET AGAINST RAISED SURFACE

Activities: --While child is lying on his stomach, place your hand against your baby's feet and gently push--watch if he returns your push.

--Place a hard pillow or bolster against your baby's feet--gently push it against baby's feet.

* * *

3-3: MOVES HEAD FROM SIDE TO SIDE WHILE ON BACK

Activities: --Use the same activities as following sight and sound localization.

--Move mobile or crib attachments from one side of the crib to the other.

3. Motor--A. Prone/supine development (continued)
(Stomach/back position development)

3-4: LIFTS HEAD WHEN PRONE

Activities: --While baby is lying on stomach dangle rattle directly in front of his head, slowly lift the object so that he must raise his head to follow it.

--Leave a noisy toy in the crib while your baby is lying on his stomach. This will encourage him to turn his head and look at the toy.

--Place a bolster under your baby's chest and arm pits. Ring a bell to the front and a little above his head so that he must raise his head to see the bell.

--Bend down, lightly say your baby's name--he must raise his head to see you smiling.

* * *

3-5: RAISES AND TURNS HEAD WHILE PRONE

Activities: --Use noisemakers to encourage your baby to turn his head from side to side while he is lying on his stomach.

--Have two people standing on either side of your baby. Have first one and then the other say something while smiling so that your baby will turn his head to the voice.

--While he is lying on his stomach, position your baby's arms so that they are flexed with his weight on his elbows and forearms. This positioning should help him push on his forearms when raising his head.

3. Motor--A. Prone/supine development (continued)
(Stomach/back position development)

3-6: ROLLS FROM SIDE TO BACK, BACK TO SIDE

Activities: --Guide your child in rolling from his back to his side by taking the upper arm and pulling the child over (pull right arm to left; left arm to right).

--Place your child on his side in the crib, walk to the other side talking to him so that he will roll over to see you.

--Ring a bell behind your child to encourage him to roll from side to back.

--Bring an object into the visual field and move it sideways to get the infant to adjust his body to the movement of the object.

--When he is lying on his back take your baby's arm and gently pull to side position. If necessary, gently turn his head to the side as you pull to this position. Do this several times to encourage rolling. Gradually reduce your help.

3. Motor--A. Prone/supine development (continued)
(Stomach/back position development)

3-7: LIFTS HEAD AND CHEST WHEN PRONE

Activities: --While baby is lying on his stomach, dangle a rattle directly in front of his face, slowly lift the rattle so that he must raise his head to follow it.

--Fasten a mirror[8] to the inside head of your baby's crib, so that he can see himself while lying on his stomach. Over a number of days or weeks slowly raise the mirror so he must get up on his arm to see his image.

--Place your baby on his stomach on the floor--place a toy (rattle, ball, doll) at eye level--slowly raise the toy about six inches above the baby's head.

--Place your baby over a bolster with hands on the floor. Encourage him to look up at you. Gradually replace the pillow with a smaller one.

--Position the baby's arms so that he can learn to push on his forearms and hands to hold his head up high. This can be encouraged with rattles and voice stimulation

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[8]See Appendix A for description of a mirror.

3. Motor--A. Prone/supine development (continued)

3-8: ROLLS FROM SIDE TO SIDE BUT NOT COMPLETELY OVER

Activities: --Encourage your baby by moving a bright or noisy toy in wide area in front of him to increase his movement from side to side.

--Take your baby's arms and slowly rock him from side to side.

* * *

3-9: PLAYS WITH OWN TOES, SUPINE POSITION
(Supine means child is lying on his back)

Activities: --Tie bells on your baby's booties or put them on his ankles.

--Help him to learn to kick the mobile.

--Lift up his feet for him, show him where they are.

* * *

3-10: ROLLS OVER, STOMACH TO BACK POSITION

Activities: --Place your baby on his stomach. Use a favorite toy just out of reach and encourage him to reach for it. Continue moving the toy so the child turns over.

--Place your baby on his stomach. Take his ankles and turn them allowing his whole body to follow.

* * *

3-11: ROLLS OVER, BACK TO STOMACH POSITION

Activities: --Encourage your baby to follow a toy with his eyes and hands as he is lying on his back. Assist his rolling by pulling his hand towards the toy and positioning his head to move in the direction desired.

3. Motor--A. Prone/supine development (continued)
(Stomach/back position development)

3-12: TRIES VIGOROUSLY TO CRAWL

Activities: --With your child lying on his stomach on the floor, raise the buttocks so the knees are under the buttocks. Extend the child's arms in front of him.

--Place your child on his stomach. Move his arms in a swimming motion. Raise his knees under him and encourage him to push and straighten out to gain crawl movements.

--Place a desired object out of your baby's reach so that he must crawl or move to obtain it. Start with object not more than six inches away and gradually increase the distance.

--If the floor is warm enough, place a sheet on the floor and your baby with no clothes on at all. Diapers may hinder leg and body movement.

* * *

3-13: CAN TURN AROUND WHEN LEFT ON THE FLOOR

Activities: --While baby is on the floor stand or sit behind him calling his name or encouraging him with a noisy toy (toy with a squeaker, bell).

--Help your baby turn by shortening the distance he must move to reach a desired toy.

3. Motor--A. Prone/supine development (continued)
(Stomach/back position development)

3-14: MAKES SOME PROGRESS FORWARDS OR BACKWARDS, CRAWLING

Activities: --Roll a ball and have your baby crawl to it.

--Place your baby on a roller board so that his tummy touches the board. Help him to move by moving his arms in a stroking manner, so that he is moving the board.

--Place your baby on the floor, place a toy or goodie just out of his reach encouraging him to move to it. Gradually increase the distance between object and child.

--From a sitting position encourage your baby over into a crawl position with a favorite toy placed just out of his reach.

3. Motor--A. Prone/supine development (continued)
(Stomach/back position development)

3-15: CREEPS ON HANDS AND KNEES

Activities: --Roll a ball, have your baby creep to it and roll it again.

--Place a towel under your child's chest holding the ends. Lift so only the child's hands and knees touch the floor. Move him slowly along the floor.

--Place your child on the floor. Move his arms and legs in an alternating fashion. Slide him along so he gets the idea of moving.

--Allow your child to get stuck in tight places i.e., under a coffee table. When he gets stuck show him how to get out. Don't just pull him out. Show him how he can solve the problem.

--Obtain a large cardboard box, cut out both ends to make a tunnel. Encourage him to crawl through the tunnel to you.

--Place some toys in the tunnel to encourage exploration.

3. Motor--B. Head/back development

3-16: HOLDS HEAD ERECT BRIEFLY WHEN SUPPORTED IN UPRIGHT POSITION

Activities: --Hold your baby against your shoulder with your fingers bracing the back of his head.

--Sit your baby on your lap, again use slight support for his head.

--Encourage your baby to look at an object. Move it up and down slightly to encourage him to follow with his head and eyes.

* * *

3-17: HEAD ERECT WITH BOBBING WHEN SUPPORTED IN SITTING POSITION OR WHILE BEING CARRIED

Activities: --Place your fingers at base of your baby's neck to support his head. Gradually reduce pressure of your fingers.

--Rattle a toy at your baby's eye level while he is being held. Gradually move rattle up so his eyes will follow and his head will be erect.

3. Motor--B. Head/back development (continued)

3-18: PULLED TO SITTING HEAD LAGS SLIGHTLY

Activities: --Place child on his back on the floor. Place your fingers in the child's grasp. Pull him to sitting position.

--If his head lags, have another person rattle a ball or noisemaker to encourage him to raise his head.

--Using two people--one kneeling behind the child supporting his head, the other taking the child's hands pull him to a sitting position. Gradually reduce support given to his head.

--Gently grasp child's hand, pull him to sitting position and then lower him to lying position. Repeat this to encourage pulling to sit and head control.

* * *

3-19: HOLDS HEAD ERECT CONTINUOUSLY

Activities: --Move a rattle up and down and from side to side. Have your baby follow the rattle with his eyes and head. Help him by gently moving his head in the direction of the toy.

3. Motor--B. Head/back development (continued)

3-20: SITS WITH SUPPORT NO HEAD LAG

Activities: --Prop your child into a sitting position in an infant seat, high chair, corner of a large sofa or chair.

--Sit on the floor, place your baby between your legs, so your legs and abdomen will be his support.

--As your child is on the floor rock him gently from side to side and from back to front.

--Place your baby on your lap, providing back support. For short periods of time encourage him to hold himself erect.

* * *

3-21: TURNS HEAD FREELY IN SITTING POSITION

Activities: --While baby is in a propped sitting position shake a rattle at his side so that he must turn his head to see it.

--Have your baby follow objects in 180° arc around him.

--Prop your baby up in a room where you are working so that he must turn his head to follow you.

* * *

3-22: SITS WITH MINIMAL SUPPORT WITH STABLE BACK AND HEAD

Activities: --Place pillows around your child keeping pillows high on the side.

--Place child between your legs and place his arms on your legs for support. Gradually sit farther away so he is supporting himself with his hands.

3. Motor--B. Head/back development (continued)

3-23: COMES TO SITTING POSITION WITH AID

Activities: --Pull your child to a sitting position with one hand rather than two. Let him use the other hand to aid himself.

* * *

3-24: SITS ALONE FOR A SHORT TIME, LEANS FORWARD

Activities: --Sit on the floor with your child sitting between your legs so he can support himself by placing his hands on your legs.

--While in a sitting position place your child's hands on the floor, palms down. In time he will learn to use his hands for support.

--Use a beach ball that is not totally inflated, place your baby on his stomach over the ball. Gradually roll him forward, encourage him to reach forward and stop himself with his arms. As he rolls back encourage him to stop with his feet.

3. Motor--B. Head/back development (continued)

3-25: SITS, GOOD POSTURE, NO SUPPORT

Activities: --When your child can support himself using both hands on the floor, encourage him to reach for you or a toy so that he will learn to sit independently.

--Hold a rattle to his side so that he can hear it, but has to turn his whole body from his sitting position to find it. Give him the rattle to play with then he finds it. Try his activity from both sides.

--Bounce your child on your knees. This will encourage back and head control.

* * *

3-26: CAN SIT FROM A PRONE POSITION

Activities: --Encourage your child while lying on his stomach to roll to the side, lift his knees toward his chest, push with his hands and sit upright. Put your child through the above motions if he is unable to do it himself.

* * *

3-27: CAN SIT FROM A SUPINE POSITION
(supine means lying on his back)

Activities: --While your child is lying on his back, encourage him to lift his legs, roll to the side and sit upright. Put your child through the motions slowly.

--While your child is on his back, give him something to reach for.

3. Motor--B. Head/back development (continued)

3-28: STANDS WITH SUPPORT

Activities: --Hold your child around his waist, bounce him so his legs support him for brief moments.

--Hold your child around his waist, allowing him to stand firmly on his two feet.

--Place a towel around your child's waist while you hang on to the ends of it. Child is standing on two feet.

--Stand child at the rail of a playpen or crib. Encourage him to stand on his two feet.

--Encourage your child to bounce on his feet while you hold him in a standing position.

* * *

3-29: STANDS WITH MINIMUM SUPPORT

Activities: --Stand your child at the side of his crib, hold your hands over his on the rail of the crib.

--Have your child grasp your finger while you pull him to a standing position.

--Place a towel under the child's arms. Support him by holding the ends of the towel. Gradually hold the towel looser and looser.

* * *

3-30: STANDS, SELF PULLED

Activities: --Place a favorite toy or goodie on a chair, encourage your child to pull himself up to obtain it.

--Take your child's hand pulling him to stand on his feet.

3. Motor--B. Head/back development (continued)

3-31: CAN STAND HOLDING ON TO FURNITURE

Activities: --Encourage your child to bound on his feet while he supports his full weight.

--Stand your child at a crib or playpen rail, have him use both hands to support his weight.

--Place your child in a walker and encourage standing.

* * *

3-32: LOWERS SELF FROM STANDING TO SITTING POSITION

Activities: --Help your child bend his knees to a squat position and move his hands down the crib rails, then lower him to sit.

--Place his favorite toy or goodies on the floor, encourage your child to get them when he is in a standing position.

* * *

3-33: SIDE STEPS AROUND INSIDE CRIB OR PLAYPEN HOLDING RAILS

Activities: --Encourage your child to move around his crib by presenting him with a favorite toy or goodie. Slowly move it so that he must step for it.

--Use yourself as the desired object. Stand away from your baby and encourage him to step to you.

3. Motor--B. Head/back development (continued)

3-34: CAN WALK WHEN LED

Activities: --Support your child's shoulders from behind, i.e., grasp child around his shoulders.

--Support him under his arms, grasp child under his arms.

--The rhythm of walking can be developed by pushing your child's feet alternately with your feet or by putting the child's feet on top of your feet as you walk.

* * *

3-35: STANDS BY SELF

Activities: --Support child by hanging on to his hips.

--Hold child's hand and help him to stand.

* * *

3-36: WALKS INDEPENDENTLY

Activities: --Stand the child against furniture. Stand a few feet from him, encourage him to walk to you. Have his favorite toy or goodie.

--Have your child walk while pushing a small chair or some other movable object.

4. Cognitive--A. Manipulation

4-1: GRASPS FINGER

Activities: --Move your finger over the midsection of your baby's chest for him to grab onto.

--Touch him under his chin and other parts of the body with your finger--talk to him and get him excited enough to grasp your finger.

--When holding your child, place your finger in his hand and rub the palm of his hand. Encourage him to close his fingers around your finger. Try the same process using a rattle.

* * *

4-2: HAND GOES TO MOUTH

Activities: --Help your baby find his mouth by taking his hand and putting it on his cheeks, his mouth, etc.

--Raise and lower the child's hands to his mouth.

4. Cognitive--A. Manipulation (continued)

4-3: GRASPS TOY IN HAND FOR THREE SECONDS

Activities: --Place objects of various sizes and textures in the crib for your baby to grasp, for example, round smooth rattle, textured ball, furry animal, wooden block, yarn pom-pom, terry cloth doll.

--Move a rattle over your baby's tummy shaking it--move it closer to his hands so that he can grasp at it--saying to him "grab it."

--Hold your baby's hand shut over the rattle so that he grasps it. Gradually reduce pressure on his hand.

--Touch the rattle to his fingers to encourage the grasping of it.

--Put rattle in one hand and then the other.

--Encourage your baby to reach for a toy by shaking it and making a noise with it. If he does not attempt to reach out for the toy, place it in his hand or gently move his hand to the toy. Place the toy close to the child's hand encouraging him by moving the toy. Prone, side, or sitting positions should be used.

* * *

4-4: HOLDS RATTLE ACTIVELY

Activities: --While holding the rattle show your baby how to shake it.

--Respond excitedly when the rattle makes noise.

4. Cognitive--A. Manipulation (continued)

4-5: LOOKS AT HANDS, PLAYS WITH FINGERS

Activities: --Move the child's hands to his face. Encourage him to look at his hands.

--Clap his hands, wave them, point to his nose, etc., with them.

--Move his hands around his face, let his hands feel his cheeks.

--Play peek-a-boo; hold your baby's hands before his eyes.

--Play patty-cake. At first move his hands together. Help him to know the many directions his hands and eyes can go.

--After your baby makes some swipes at the mobile, he may begin to notice his own fingers. At this point move mobile further away (for a short amount of time) so that your baby can look at his fingers with fewer distractions.

4. Cognitive--A. Manipulation (continued)

4-6: CLASPS OBJECT PUT IN HAND AND HOLDS IT

Activities: --Place small objects in front of your baby, then into his hand.

--Place the child's hand around the object, gradually release your hand as he is able to hold the object by himself.

--Use a toy that is very soft and has a sound.

--Provide interesting objects within reach for your baby to grasp, for example wooden block, plastic cup, terry cloth doll, foam rubber block, rattle, clothes pin (no spring).

--Hold a toy in front of your baby for him to see. Encourage him to hold the toy and glance at it in his hand; move his arm if necessary to let him see the toy. Encourage your child to move the toy to the midline by himself to regard it in his hand.

* * *

4-7: DROPS FIRST CUBE FOR SECOND

Activities: --Play toy passing games with your baby, do not use more than two toys. Pass them to the hand that is already holding a toy.

4. Cognitive--A. Manipulation (continued)

4-8: PUTS OBJECTS IN MOUTH

Activities: --Guide your baby's hand with the object (spoon, cube, rubber ring) in it to his mouth. Reduce help as baby can find his mouth by himself.

--Place a small piece of food on a tray in front of your child. Guide his hand to pick it up and put it into his mouth. Gradually reduce your help.

--Move your baby's hands about by clasping them, clapping them, and guiding them to his face.

--Use common objects around the house for your baby to explore tactually and orally. Talk to him about the objects. If he's in a safe place with safe objects leave them with him. Be sure they are too large to swallow.

* * *

4-9: HOLDS TWO CUBES

Activities: --Pass a toy small enough to be grasped to the hand that is already holding a toy.

--Present two toys so that your child can pick up an object with each hand.

--Let your child play with a set of small cubes. Place two cubes in one of his hands. (Give your child one than a second block to hold in his hand.

4. Cognitive--A. Manipulation (continued)

4-10: PASSESS TOY FROM HAND TO HAND

Activities: --Show your child how to transfer a toy from one hand to another.

--Place a toy in the hand the child uses less and have him pass it to the other hand.

--When your child is holding a toy, encourage him to move his other arm and hand to touch the toy. Help him take it in the other hand.

* * *

4-11: MANIPULATES TWO OBJECTS AT ONCE

Activities: --When your baby attempts to reach, touch, and feel things give him opportunities to explore and experience different textures and surfaces.

--Play passing games with objects. Encourage your baby to hold several objects at once.

* * *

4-12: USES THUMB TO HELP GRASP TINY OBJECTS

Activities: --Show your child how to use his thumb and forefinger.

--Encourage your baby to reach for small objects such as raisins or cereals.

--Have your child pick up buttons, corn, etc., and hand them to you.

4. Cognitive--A. Manipulation (continued)

4-13: ACCEPTS THIRD CUBE WITHOUT DROPPING

Activities: --Put one cube in each hand, place a third cube in one of his hands.

--Have child hold two objects, encourage him to pick up a third.

* * *

4-14: MANIPULATES BOX, LID AND CUBES
(shoe box type box)

Activities: --Give your baby a box with a lid (shoe box) and other small objects.

--Your baby already knows how to take lid off box, have him put objects in the box, put lid on, then take lid off and take objects out.

4. Cognitive--B. Intentionality

4-15: RESISTS TOY WITHDRAWL

Activities: --This is a landmark behavior--observable but to be taught. Baby may turn away with toy in his hand, or draw toy up close to himself. He may vocally resist by whimpering, or by beginning to cry. Or he may give up the toy, but begin to cry.

* * *

4-16: REACHES FOR OBJECTS

Activities: --Place objects of various sizes and textures in the crib for your baby to reach for.[9]

--Mount a cradle gym on his crib. This will allow your baby to reach for objects any time he chooses.

--Show your baby how he can kick the mattress and make the objects wiggle and make grasping for them more challenging.

--Use an object attached to an elastic, hold the object for your baby to grasp then gently pull on the elastic so that he gets the feeling of pulling.

--Hold a rattle near your baby's hand, move it or shake it to encourage him to reach.

--Guide your baby's hand toward the object, gradually reducing the aid as baby reaches on his own.

--Encourage your baby to reach for his bottle. Wait for him to reach out for it.

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[9]See Appendix A for listing of toys.

4. Cognitive--B. Intentionality (continued)

4-17: REMOVES BLOCK FROM BOWL

Activities: --Give your baby small blocks (one inch) to play with and a plastic bowl to put the blocks in. Show your child how to take the blocks out of the bowl, guide his hand. Gradually reduce your help.

* * *

4-18: PLACES BLOCKS IN BOWL

Activities: --Show your child how to put blocks into a bowl. Guide his hand if he is uncertain.

--Use much verbal reinforcement and encouragement. Explain to your child what he is doing. Praise him in small accomplishments.

--Show your child how to put blocks into a tin can. The sound of the blocks dropping will usually excite him.

4. Cognitive--B. Intentionality (continued)

4-19: ATTEMPTS TO ATTAIN TOY BEYOND REACH

Activities: --Tie a string to one of your baby's favorite toys. Place it out of his reach. Show him how to pull the string to obtain the toy.

--Place your baby on the floor. Put one of his favorite toys on a blanket near him, but out of immediate reach. When he reaches for the blanket tell him what he is doing "You're pulling the blanket, pull it and you'll get the toy."

--Shake a toy to call his attention to it. Move his arm if necessary to touch the toy. Encourage him to get it.

--Sit at a table with your child on your lap. Have a couple of shoe strings there for him to pull. Attach an object to the end of one string. Let him see what happens as he pulls each string.

* * *

4-20: PLAYS WITH RING, SHAKES BELL, EXPLOITS POSSIBILITIES OF PLAY MATERIALS

Activities: --Show your child how to ring a bell. Guide his hand. How to shake a rattle, etc.

--Demonstrate: tearing and crumpling newspaper, pulling a toy, rubbing a furry animal, squeezing squeakers, shaking rattles, sliding, pushing toys, etc.

4. Cognitive--B. Intentionality (continued)

4-21: LOOKS FOR DROPPED TOY

Activities: --Baby needs to throw rattle from his high chair so that he comes to know that objects have a permanence even when he can't see them. Pick up the toy and hand it to your baby so he can throw it again.

--Place objects on the high chair so that your baby can push them off and throw them to the floor. Play with your baby in this way, using words such as "There it goes," "All gone," and "Here it is."

* * *

4-22: LIFTS INVERTED BOX OR BLANKET IN SEARCH OF TOY

Activities: --Take one of your baby's toys, attract his attention to it and then partly hide it under a blanket so that he can see part of it. Then say "Where is the toy, find it."

--Cover your baby's favorite toy with a blanket and then show him it's still there. Cover it completely and have him find it.

--Hide a toy under a box or can and have your baby find it.

* * *

4-23: DANGLES RING BY A STRING

Activities: --Give your child a toy tied to a string. Show him how to dangle it, moving it up and down. Physically guide his hand if needed.

4. Cognitive--B. Intentionality (continued)

4-24: CLICKS TWO BLOCKS TOGETHER (IMITATION)

Activities: --Make sure your child is capable of holding two objects.

--Give your baby two blocks, one in either hand. Show him how to click the blocks together. Take your baby's hands and click blocks together for him. Laugh with him.

* * *

4-25: LIFTS LID OFF SHOE BOX

Activities: --Place something of interest to the child inside a shoe box. Put the lid on. Ask the child to get the object. If he doesn't know how, show him how to take the lid off the box.

* * *

4-26: THROWS OBJECTS

Activities: --Place your hand around your child's and help him throw a ball, a toy, or wad of paper.

--Sit near your child, encourage him to throw a ball to you by saying, "Throw it."

* * *

4-27: HANDS TOY WHEN REQUESTED TO DO SO

Activities: --Ask your child for a toy. If he does not give it, take it quickly from his hand and say "Thank you" giving it back immediately. Continue to do this until your child will hand you an object upon request.

4. Cognitive--B. Intentionality (continued)

4-28: PUTS SMALL OBJECTS INTO A CUP AND REMOVES THEM ALSO

Activities: --When your child has learned to pick up, grasp and hold a toy, give him some blocks and show him how to drop and put the toys into a container and how to take them out again.

--Put a box or basket and several objects in front of your child. Show him how to fill it up and turn it upside down to empty it.

4. Cognitive--B. Intentionality (continued)

4-29: WILL RETRIEVE A HIDDEN TOY

Activities: --While sitting at a table, put a piece of cardboard larger than a toy in front of the toy blocking it. Have the child find the toy. He may try going right through the cardboard at first, to get the toy. Show him how to go around the cardboard.

--Place a favorite toy in a box that is easy to open. Ask him "Can you find it?" "Let's look in the box."

--While your child is watching, place a toy in a box and place that box in another box. Show him how to find it. Then hide the object and let him find it.

--Wrap your child's favorite toy in a piece of paper while he is watching. Give the wrapped toy to the child, say "Get the toy out of the paper."

--While baby is watching, place his favorite toy in a pan. Cover the pan with a towel. Dump the object out onto the floor, keeping this operation hidden under the dish towel. Show the empty pan to the child and observe where he looks.

4. Cognitive--B. Intentionality (continued)

Prior to the following seven activities, provide your child with rich visual and auditory experiences and many opportunities for eye-hand coordination. Allow him to play with pots and pans in the cupboard, tissue paper, clean rags, etc. This will help him learn about tops and bottoms, insides and outsides, smooth and rough, soft and hard, big and little, light and heavy, and many other aspects of his world.

4-30: STACKS 2 OR 3 STACKING TOYS

Activities: --Get three different-sized nest cups, build a pyramid, encourage your child to try. "See what I'm doing, now you try." Do not insist that he stack them in order.

--Use different sized cans to stack, blocks, etc. Show your child how to knock the pyramid down.

* * *

4-31: PLACES RING ON PEG

Activities: --Show the child how to place a ring on a peg. Guide his hand in doing it. Slowly reduce your help.

--Encourage your child to place a circular bracelet over your out-stretched finger or a hoop over your arm.

* * *

4-32: REMOVES ROUND BLOCK FROM PUZZLE

Activities: --Makes a shape puzzle out of foam rubber pieces or a sponge. Show your child how to put the circular piece in the hole.

--Use a commercial puzzle.

4. Cognitive--B. Intentionality (continued)

4-33: REMOVES PEG FROM PEGBOARD

Activities: --Show your child how to remove a peg from a pegboard. Guide his hand.

--Place a clothes pin in your closed fist. Ask your child to pull it out. Grasp it very lightly.

* * *

4-34: PLACES DISCS IN A CAN

Activities: --Take a container like a coffee can, have your child watch while you drop cubes or chips into the can. Have the child do it.

--Take a container, cut a hole or slot in the plastic lid (hole for cubes, slot for disc). Show your child how to put objects through the holes.

* * *

4-35: BUILDS A TOWER OF TWO

Activities: --Place blocks in a pile in front of child. Build a tower of two blocks. Ask child to make his tower. Assist him if he needs help.

--Build a tower of cans.[10]

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[10]See Appendix A.

4. Cognitive--B. Intentionality (continued)

4-36: PUSHES A THREE BLOCK TRAIN

Activities: --Line up the three blocks and push them saying "choo-choo." Guide the child's hands to push the train.

--Line up three small boxes on a table. Encourage your child to push them.

--Line up three larger boxes on the floor. Encourage your child to push them using his whole body.

5. Socialization

5-1: LOOKS AT PERSON MOMENTARILY

Activities: --Stand in front of your baby, wag your head and sing (head movement and sound are important). Talk to your baby.

--Smile at your baby, with your face close to him.

* * *

5-2: QUIETED WHEN PICKED UP

Activities: --Hold your baby, rock him, sing to him.

* * *

5-3: SMILES IN RESPONSE TO ATTENTION

Activities: --Handle your baby, hold him close, pet him by kissing his neck and tummy and stroking his body.

--As your baby is being fed, held and diapered, talk and smile often to him.

--When your baby smiles, respond by smiling.

--Make a sound while moving back and forth over your baby.

--Hide your face behind a towel and reappear.

* * *

5-4: ANTICIPATES FEEDING UPON SIGHT OF THE BOTTLE WITH ACTIVITY CHANGE OR MOVEMENTS OF MOUTH

Activities: --Encourage your baby to reach for his bottle in front of him.

--Place his hands on the bottle, bring it up to his mouth.

5. Socialization (continued)

5-5: VOCALIZES WHEN TALKED TO

Activities: --Talk to your child about what you/he is doing. Stress important words such as names of objects or the action taking place. "We are putting on your shirt."

--Imitate the baby's own sounds when they occur and try to keep a dialogue going as long as possible by imitating the baby.

* * *

5-6: FRIENDLY TO STRANGERS

Activities: --Provide "stranger" with a toy to entice the child.

--Have the stranger wag his head and sing to your baby, talk to your baby.

* * *

5-7: RESISTS ADULT WHO TRIES PLAYFULLY TO TAKE TOYS

Activities: --Put finger into infant's hand and gently pull away with it.

--Place small objects in infant's hand, attempt to remove it.

* * *

5-8: IMITATE SMILING AND LAUGHS ALOUD

Activities: --Play peek-a-boo games with smiling first yourself.

5. Socialization (continued)

5-9: SELECTIVE SMILING

Activities: --Respond with affection and smiling when baby smiles.

--There is no specific program for this behavior. The behavior is used as a measure of social responsiveness, and the awareness of the activities of others.

* * *

5-10: STOPS CRYING WHEN TALKED TO

Activities: --Place a music box near the head of the infant.

--Make various sounds to your infant, talk to him, sing to him. Let your voice become very familiar and soothing to him.

* * *

5-11: ANTICIPATORY MOVEMENTS WHEN ABOUT TO BELIFTED

Activities: --Encourage your baby to raise his arms when about to be lifted.

--Ask your baby "Do you want to come?" Encourage some type of response before you pick him up.

* * *

5-12: HOLD A SPOON

Activities: --Let your baby hold an empty spoon while you are feeding him. This is to ready him for the time when he will begin to feed himself.

5. Socialization (continued)

5-13: STRETCHES TO BE TAKEN

Activities: --Encourage your baby to reach out his arms as you hold out yours to him and ask him if he wants to come to you.

* * *

5-14: RESPONDS TO IMAGE IN MIRROR
(change in activity and/or vocalization)

Activities: --Place your baby on your lap, have him look in a mirror so that he can see himself. Talk to him about what he sees.

--Fasten a mirror to the inside of your baby's crib so that he can see himself while lying in his crib.

--Hold a mirror so that your baby can see himself. Point to his reflection "I see Tommy." Pick up an object, move it behind the baby's head so that he can see it in the mirror along with himself. Name the object.

* * *

5-15: DRINKS FROM A CUP WITH HELP

Activities: --Place your hands around your baby's hands on a cup. Help him raise the cup to his mouth. Slowly reduce your help as he is able to do it himself.

* * *

5-16: DIFFERENTIATES STRANGERS FROM FAMILY

Activities: --If your child greets you with a smile, return his smile. If he shows displeasure to a given situation, comfort him, talk to him, sing to him, tickle him or give him a toy to play with.

5. Socialization (continued)

5-17: PLAYS UNATTENDED TEN MINUTES

Activities: --Place your baby within sight of you with several toys.

--Place your baby near a window so he can look out.

--Use many "kitchen toys" e.g., spoons, plastic cups, bowls, etc. for him to play with.

* * *

5-18: DISPLEASED IF TOY IS TAKEN AWAY

Activities: --Play with your child several times taking a toy and giving it back so that he learns he will get it back.

* * *

5-19: PLAYS INTERPERSONAL GAMES: PEEK-A-BOO AND PAT-A-CAKE IMPERFECTLY

Activities: --Play games with your baby: "Peek-a-boo," "Pat-a-cake," "bye-bye," "this little piggy," "where is baby's nose," "so big."[11] Move his arms until he is ready to make the gestures by himself.

--Play "Peek-a-boo" behind a blanket or around a chair.

* * *

5-20: WAVES "BYE-BYE"

Activities: --Take your baby's hand and wave "bye-bye" for him when someone else waves. Gradually withdraw your help.

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[11]See Appendix C for games.

5. Socialization (continued)

5-21: FINGER FEEDS

Activities: --Place a piece of "acceptable" food on a tray in front of your child. Encourage him to imitate you as you pick up a piece of food and eat it.

--Guide your child's hand to pick up the food and put it into his mouth. Gradually withdraw your help.

* * *

5-22: GIVES AFFECTION

Activities: --Give your child a hug, let his arms be free so that they can hug in return.

--Show your child that you like his affection, by responding to it.

* * *

5-23: OBEYS SIMPLE REQUESTS: "GIVE ME THE CUP"

Activities: --Place a few objects, familiar to the child near him. Ask him to "Give me the dolly." "Get the bell," etc.

--When the child brings the object, thank him.

APPENDICES

APPENDIX A

TOYS FOR VERY YOUNG CHILDREN

APPENDIX A

TOYS FOR VERY YOUNG CHILDREN

Toys for the young infant should be designed to stimulate the sensory experiences of the infant. Such toys should be colorful so that they attract the baby's vision as soon as he is able to see and focus his eyes. They should stimulate the baby to want to reach. Some toys should be "noisey" to stimulate the sense of hearing. They should excite and stimulate curiosity.

A variety of crib toys should be available. The toys should be changed frequently so that they are not commonplace to sight, touch, and hearing. Their use is to make the crib a more responsive and stimulative environment. Variety of color, shape, sound and functional response must be provided.

By the time a child has attained the capacity to creep, he has also gained in the ability to reach, grasp, listen, focus his eyes imitate and respond to various kinds of stimulation. Homemade and purchased toys should stimulate the curiosity of the child and sharpen his perception.

Toys for young children:

A. Toys that move (vision)

mobiles

bubbles

balloons with string

dangling toys for crib

wind up toys

B. Musical toys (hearing)

bells

rattles

squeeze toys with sound (rubber, plastic)

music boxes

small bells sewed on a piece of elastic

bottle with several pellets in it

band-aid can with corn in it

set of keys

Roly-Poly

Jack-in-the-box

xylophone

records

C. Cuddly toys (feeling)

teddy bear

wooly animals

teething rings

texture ball

soft rag doll

variety of textures and temperatures

D. Household items (exploration)

pots and pans

plastic cups, metal cups

plastic bowls

spoons

aluminum pie tins

oat meal boxes

margarine tubs

tin cans (carefully checked for rough edges)

E. Manipulative toys

cradle gym

unbreakable mirror

balls

beanbag

blocks

one inch cube blocks

children's book with large, clear, simple pictures

"feelie" book

nesting toys

stacking toys

floating bath toys

large plastic beads

pop beads

small ball attached with string or rubber

F. Equipment parents can use

hand puppet

paint brush (for stroking baby's skin)

feathers

flashlight

pieces of different textured materials (satin, velvet, fur, felt, burlap, etc.)

G. Items for mobiles

small stuffed animals

yarn pom-poms

clothes pins

bells

balls

spools

colored cubes

colored foam rubber or styrafoam forms

styrofoam forms covered with aluminum foil, figured materials, glitter, etc.

Instructions for Making Some Toys

Mobiles

Create moving objects for your baby to see. You may use painted wooden forms, cover forms with colored plain or flowered fabrics, wrap aluminum foil around some objects. Tie each object separately with pieces of string--each varying in length, attach to a bar or plastic clothes line across the crib. Change the moving objects frequently so that visual stimulation will be sustained.

Coat hangers may be used as the bar. Attach the hanger to the ceiling or some other high point. Attach mobile objects to the hanger by means of a string.

Crib Attachments

Make little cloth pouches. Fill with rocks, bells, macarroni, foam rubber, nuts and bolts, etc. Attach a string to one cornor of the pouch. Attach the other end of the string to the side of the crib.

Rattles

Fill empty salt shakers with different colored beans. Make sure that the top is securely fastened.

Fill an empty plastic bottle with beans, corn, jelly beans, etc. Secure the lid.

Fill a band-aid can with beans, secure the lid.

Cradle Gym

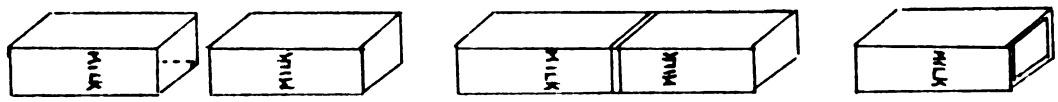
String old spools on a string, hang over your baby's crib. Also use karum beads, ring bracelets, jingle bells.

Blocks

Cut blocks out of a strip of foam rubber. Vary the size and the form.

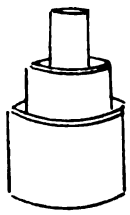
Make larger blocks from old milk cartons. Cut the top off two milk cartons (quart or pint). Push the two cartons together--one

fitting inside the other. This makes a sturdy block with double thickness.

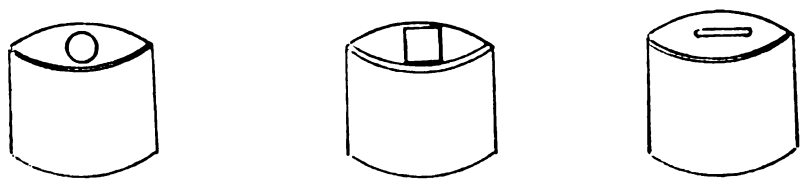


Tin Can Toys

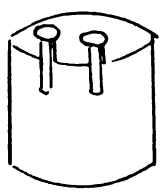
Cans with plastic lids of various sizes can be used for stacking. (Coffee cans, orange juice cans, margarine tubs, etc.)



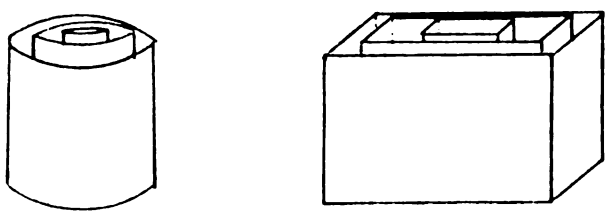
Cans with plastic covers make containers for blocks, clothes-pins, etc. Cut a hole in the plastic lid a little larger than the object put into it. (Make sure that can has no sharp edges.)



Place clothes pins (those without springs) on the edge of tin cans.

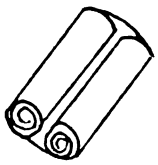


Nesting toys can be made from graduated cans, boxes, plastic bowls, cups.



Washcloth Doll

Roll a washcloth from opposite sides towards the middle.



Fold

Tie to form a head

Spread to make arms and cape

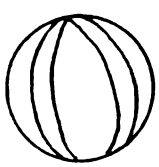
Embroider face and hair if desired

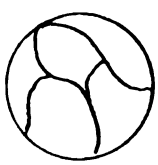
Stuffed Animals

Use any type of pattern. Make in various sizes and textures. Use different kinds of material when making the animals (cotton, wool, flannel, velvet, terry cloth, corduroy, silk, satan, fur pieces, yarn, foam rubber, vinyl, burlap, ric rac, etc.)

Texture Ball

Make a texture ball out of the different fabrics mentioned above.





"Feelie" Book

Paste different textures of materials onto pages to form a book. Use pieces of cardboard for your book. Punch holes in the side and string together with string or cord.

Ideas for pages in the book:

various textures of material

feathers

sand paper

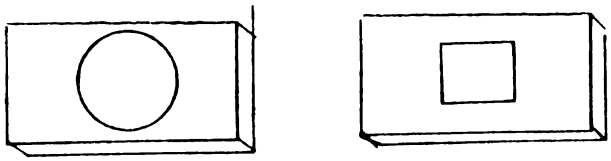
pieces of plastic, tile, carpet, wood,

small twig from a tree.

When using the "Feelie" book, sit with your child. Talk about what is on the page. Encourage your child to "feel" the object. Tell your child what the object feels like. "This is soft, so soft." "This is rough, oh!"

Form Board

Make a form board by cutting a form out of the middle of a sponge or piece of foam rubber.



Boxes

Boxes of many different sizes and shapes can be used for so many things. See what you can make out of an oatmeal box, a salt box, shoe boxes or a cigar box.

APPENDIX B

RULES FOR THE USE OF HOUSEHOLD OBJECTS

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RULES FOR THE USE OF HOUSEHOLD OBJECTS

1. When making rattles and noise makers, be sure the beans, corn, bell or whatever is fastened or enclosed is securely inside the container.
2. Be sure your baby is playing with objects too large for him to swallow.
3. All containers previously used should be washed thoroughly, remaining particles may be harmful if swallowed.
4. String should be tied tightly to objects so it cannot be pulled off and put into the mouth.
5. Your baby should be in a safe place with safe toys when left alone for play.
6. Be sure to examine the rim of cans for sharp edges.
7. Check boxes for loose staples.
8. Bleach bottles when cut in half, have sharp edges. Cover the edges with masking tape.
9. Plastic bags are VERY dangerous. Keep them out of the reach of your baby at ALL times.
10. When making wooden materials, be sure edges are not splintery or rough.

11. Glass and breakable objects should not be given to your baby as play toys.
12. When using a mirror with your baby, use an unbreakable mirror made of aluminum with a hardwood frame.
13. Eliminate lamp cords, percolator cords, safely pins, beans and buttoms from your child's immediate environment.

APPENDIX C

GAMES FOR YOUNG CHILDREN

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GAMES FOR YOUNG CHILDREN

Pat-a-cake

Pat-a-cake, pat-a-cake, baker's man

Roll 'em and roll 'em as fast as you can.

Prick them and pat them and mark them with a (baby's initial)

Put them in the oven for (baby's name) and me.

(Clap your baby's hands together.

Roll baby's hands around each other.

Make baby's initial.)

This Little Piggy

This little piggy went to market.

This little piggy stayed home.

This little piggy had roast beef.

This little piggy had none.

This little piggy cried wee, wee, wee all the way home.

(Wiggle each little toe of your baby for a little piggy.

Start with the big toe, ending with the little toe.)

So Big

Stretch your baby's hands up over his head as you say "So big." Let his hands fall and do it again saying "So Big."

Peek-a-boo

Hide your face behind your hands or a blanket or towel. Then pop your face out saying "peek-a-boo." Do it again. Your baby will enjoy this.

Where is . . .

As you say "Where is baby's nose" touch your baby's nose and say "There is baby's nose," or take your baby's hand and help him touch his nose. If your baby can do it without help just say "Where is baby's nose" and let him touch it. Use phrases such as; "Where is baby's toe," "Where are baby's eyes," "Where is baby's tummy," etc.

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