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ABSTRACT

Prior to considering the ability of infants to think, this discussion attempts to dispel prevalent myths about babies' thought processes. The fact that infants do not intentionally manipulate their parents; are not identical; are not simply hedonistic seekers of bodily pleasures; and are not passive, disorganized beings needing training into regularity is pointed out. In fact, infants are well-organized, individual in their responses, curious, active, and capable of learning. After establishing these premises, the question of the precise nature of infants' thinking abilities is explored in discussions of perception, physical activities with objects, the development of intention, the development of causality, construction of the permanent object, person permanence, motor memory and symbols, cognitive representation, development of self-awareness, and self-recognition. It is pointed out that (1) a baby's developing perceptual competence is remarkable; (2) processes of intentionality and causality have to be learned and are at first comprehended through infants' own bodies and their handling of objects; (3) symbolic representation at first appears to be of a motor nature; and (4) infants learn about themselves as reciprocating persons in interaction with caretakers. Throughout the discussion, emphasis is given to the need for parents to accept and facilitate children's development without feeling threatened. (RH)

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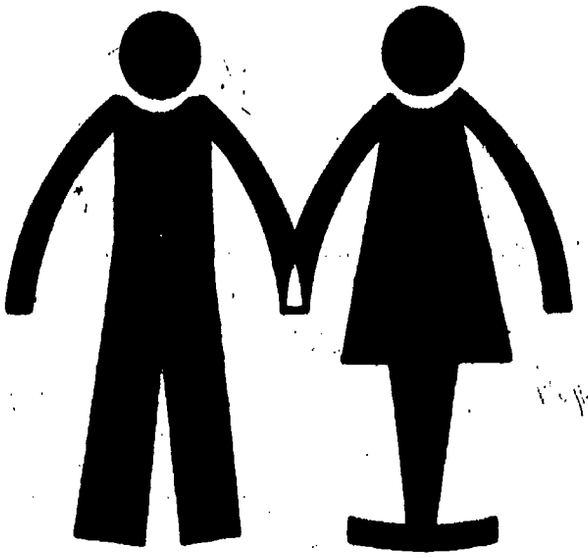

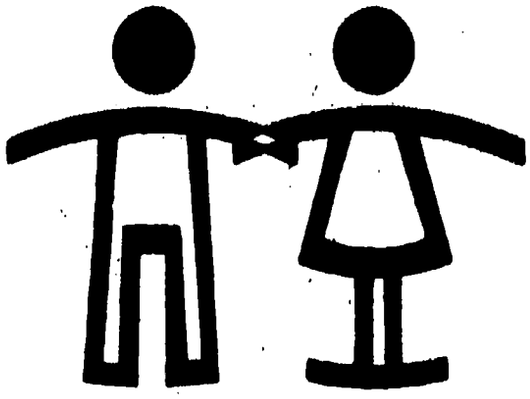

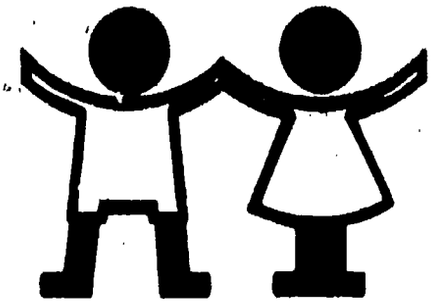

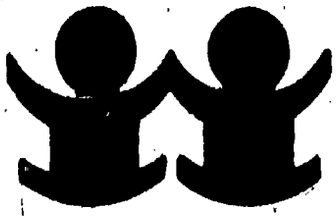

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DO BABIES THINK? HOW DO BABIES THINK?

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INTRODUCTION

In this paper I hope to demonstrate that babies think, but not as adults do, and that one can enjoy observing the development of their capacity to understand the world and can help to improve the quality of that developmental process by understanding it.

However, one cannot begin to consider how babies think without first dispelling some hostile and ill-founded myths about how babies think, which are all too prevalent in our society. Perhaps the most unfortunate of these myths involves the idea that newborn babies engage in power struggles based on intentional manipulation of their parents.

A. MYTHS ABOUT MANIPULATION

Projections

In part, myths about the manipulative powers of newborns spring from the anxiety adults experience when their baby is not behaving as they believe the ideal baby should, and they do not know why. For example, in a recent case quoted in the press, a father hit his 3-month-old baby boy and claimed that by his incessant crying the baby was being deliberately annoying and "trying to be boss". I will later indicate that, at this stage, although babies are learning rapidly, and can do remarkable things, they cannot plan nor can they intend. Thus, the father, in this case, was the one who was anxious to be boss and stop the baby crying. To reduce his feelings of helplessness, he appears to have *projected* his own thoughts into the infant and believed that the infant was trying to have a power struggle with him.

Parents' anxiety may also spring from expectations that a baby can make up for lack of mothering or fathering in their own childhood. One such mother hit her two-month-old baby girl because she believed her to be actively indicating that she did not love her when she cried. This young woman saw her baby in terms of her own need for love and had unrealistic notions of her two-month-old baby's capacity to recognise and understand this need. Hence, she could only see the baby as an extension of herself and not as a separate individual and, consequently, misinterpreted her baby's attempt to communicate that she was hungry or uncomfortable by the one means available to young babies, namely crying. The young mother failed to recognise the communication factor, became anxious and irritated, and saw it as a rejection of herself because the irritating crying behaviour did not fit her expectations of how an ideal baby behaves.

Young mothers also sometimes feel that their baby is rejecting them when he/she refuses the breast. Some of the greatest misunderstandings here, stem from the fact that young babies push toward the stimulus. Hence, when the mother presses the baby's head toward her breast the baby responds by pressing his/her head back toward the mother's hand and away from the breast (Craig, 1979, p 152). While this is not the only reason a baby moves away from the breast it is the most commonly misunderstood one.

Social Sanctions versus Reality

The belief that babies are thinking the same anxious, angry or wilful thoughts as an adult is sanctioned in our culture. Crying is commonly accepted as an attempt by a young infant to control the parents. Many a midwife has instructed a young mother to put the newborn infant in a room where it cannot be heard crying so that he/she "will not get the better of you". Yet the realities of infant crying have nothing to do with adult-like notions of power seeking. As I will indicate later, the infant has neither the abstract thought nor the psychological capacity for such behaviour.

Rather, the infant's crying has to do with bodily things. His/her birth is a dramatic physiological event. For the first time the newborn must exert effort to breathe, eat, and regulate his/her own temperature and posture (Craig, 1979). While formerly he/she was warm and enclosed, he/she is now naked and exposed. These drastic changes and the adjustment and inevitable discomfort they involve in the early months are the more likely causes of crying. Some believe that it is better if the birth can occur in a warm gentle human environment rather than under glaring lights in a surgery. This may ease a little, some of the drastic adjustments required of the newborn. It is also believed that (if possible) a natural childbirth with less medication allows the newborn to be more alert and responsive.

B. MYTHS ABOUT THE PLASTIC BABY

Related to the myth of the manipulative baby is a contradictory myth - that very young babies are all alike and nonentities. "There's nothing much going on" is a common statement, accompanied by a stereotyped expectation that all babies are "cuddly".

Individual Differences

Yet individual differences between babies are marked (Craig, 1979). Some babies are very "difficult" and find it hard to adjust to new surroundings, food or routines. Their reactions are often negative. Others are "slow to warm up" to changes, but adapt reasonably well if given time. Then there are the "easy" babies who approach new events and food positively. Many of these babies quieten down with no trouble and have regular self comforting methods (Brazelton, 1973) while others require frequent soothing and are "fussy". The latter are often given a lot of attention at first, but parents tend to find difficult or unresponsive babies less rewarding and in the long run spend less time with them. Some babies, while responsive to their surroundings, are not at all cuddly and some of these are very active and their gross motor development is more advanced than most. In view of these differences, it is clear that parents need to adjust to their baby's style of responding.

Effects on Parents

Yet it is only recently that investigators have begun to question the effects of this individual infant behaviour on their caregivers (Lewis & Rosenblum, 1974). What are the dynamics between the baby's response style and that of the parents? The mother/father may learn very quickly how to soothe and quieten their child and the newborn may easily adjust to the mother's manner of handling. On the other hand, there may be differences between mother and infant; sometimes the mother's handling, at least during the early weeks, may intensify the frustration of both

(Brazelton, 1969).

Researchers disagree about how important the first few weeks of life are in establishing the mother/infant relationship. Some contend that the first few weeks, or even hours, are crucial for forming a strong positive attachment (Kennell, Trause & Klaus, 1975). Others feel that it is the type of relationship that has developed by 3-4 months that is important (Dunn, 1976). Whatever the answer, differences in responding style between mother and infant are probably fairly common, at least for brief periods of time.

C. THE HEDONISTIC MYTH

Sigmund Freud argued that infants are driven by their id impulses or instincts to seek pleasure. Pleasure, he said, is the principle by which infants live and that pleasure is derived from bodily functions. Hence, infants focus on themselves in a state of primary narcissism or self love and can make no distinction between themselves and the objects that give their pleasure - such as the mother's breast. The infant is seen as at first obtaining most pleasure from sucking and is thus described as being in the oral stage of development. However, modern researchers (Craig, 1979) see this description as too restrictive. Infants exhibit not only pleasure but curiosity and exploratory behaviour and these are present even when the infant's needs are satisfied and reinforcing adults are absent.

Further, babies seem to go in for activity for its own sake. Activity and pleasure seem to be occasioned not only by feeding and contact with the mother, but in other ways. Robert White (1959) suggests that much of what is seen as purposeless infant activity by adults is, in fact, pleasure in developing competencies; for example, infants may laugh when they are able to make a noise with a rattle.

D. MYTHS ABOUT PASSIVITY AND DISORGANISATION

Another common myth is that newborn babies are disorganised and passive, do not hear or see much, and must be trained into a regular routine by the parents.

Daily Self Regulated Patterns

However, anyone who observes newborn babies carefully will notice that there are periods when they sleep calmly and barely move, and other times when they grimace and twitch frequently, although their eyes are closed. Sometimes they are awake and quiet; at other times they thrash about wildly. Sometimes they cry; sometimes they drowse. Until recently, most people believed (and many still do) that all these movements and reactions were random and disorganised or that they were nothing more than reflex activity (Craig, 1979).

But more recent research suggests that newborns have a definitive pattern and organisation to their behaviour (Brazelton, 1973; Korner, 1972: Wolff, 1966) and that six states which have a regular length and occur in predictable cycles can be observed as follows:

1) Regular sleep - eyes closed; breathing regular; no movement except for an occasional startle.
2) Irregular sleep - eyes closed; small movements; breathing faster.
3) Drowsiness - relatively quiet; breathing regular; opens and closes eyes.
4) Alert activity - eyes open; alert but quiet and relaxed.
5) Waking activity - eyes open; diffuse movements, breathing irregular.

6) Crying - vigorous, expansive movements; eyes partly or completely closed.

A newborn responsiveness depends on the state he/she is in. Thus, a baby in a quiet state is readier than at other times to pay attention to, and learn about things around him/her. It is very important to take account of a newborn's state when assessing his/her reactions to objects, events and people. Parents and caretakers need to learn to recognise and adjust to the state to get their baby to respond or attend.

Orya[illegible] Behaviours

Not only is the baby's daily rhythm organised in a way that is often not recognised, its other behaviours exhibit the same characteristics. Sucking, for example, appears not to be a simple reflexive response as was once believed. Rather, there seems to be an initial period in which the baby learns to adjust to the shape of the mother's breast and the rate at which her milk flows. This involves organisation of sucking, breathing and swallowing, and a synchronisation of the mother's and the baby's responses. These kinds of observations also suggest that earlier beliefs that newborn infants are only capable of reflex behaviour such as sucking, crying or grasping are ill-founded. From the moment of birth these become adaptive and involve adjustive type learning.

Attending to Objects

The view that babies are relatively passive learners and that parents "teach" and initiate their interests also seems unwarranted in view of the research. For almost three decades Schaffer (1977) has been demonstrating, through film, something that has only recently been commonly accepted, namely that the baby can and does initiate interest and attention to objects and events. The parent is led by this behaviour and follows it by attending to whatever the baby finds interesting. Of course, some parents are better at picking this up than others, but the fact remains that more often than not the baby is the initiator.

Problem Solving and Learning Games

Recent research also suggests that the newborn's ability to learn and solve problems at the physical level has been greatly underestimated. Improved methods of observing newborns indicate that they can learn to discriminate at the physical or bodily level some fairly complex responses.

For example, Kalnins & Bruner (1973) wired some dummies to a slide projector. If the infants sucked the slide came into focus; if they did not suck the picture remained blurred. Bruner noted that the infants readily learned to focus the picture and also adapted quickly if conditions were reversed and learnt to stop sucking to allow the picture to come into focus. In other words the infants, some as young as three weeks old, not only co-ordinated sucking and looking but also effectively controlled the slide show. And their only reward was a clear rather than a blurred picture.

In fact, infants seem to enjoy learning games of this kind. For example, infants have been taught to turn on a light by turning their head to the left (Papousek, 1961). Infants, of course, have a short attention span and quickly lose interest, but after a short period Papousek found that he could revive the infant's interest by reversing the problem.

Habituation

These kind of learning games also indicated that infants quickly become accustomed to certain kind of stimuli and no longer respond to them. This is called *habituation* and this process has been used to discover much about the sensory and perceptual skills of newborns. For example, if a newborn hears a moderately loud voice he/she first responds with a faster heartbeat, a change of breathing and sometimes crying or general activity. If the sound continues the infant stops responding in this way. But if the sound is changed by a small degree and the infant starts responding again, it is clear that he/she perceives the change and thus we know that he/she can discriminate small differences in pitch. Such observational methods also indicate that babies can discriminate between speech and other sounds. Without this ability it would be impossible to learn to speak.

Touch

Much less research has been carried out on the senses of taste, smell and touch, although a few studies suggest that newborn infants tend to be finely sensitive in these faculties as well (Craig, 1979, p 157). Touch is especially important to the comfort of the newborn. Often the simple act of pressing a baby's stomach, or firmly holding his/her arm or leg will be enough to quieten him/her. Swaddling (wrapping a baby snugly in blankets) has the same quieting effect (Bra[illegible] '969).

Why have we changed our view of [illegible] so dramatically recently?

E. NEW RESEARCH METHODS

Better techniques, have permitted more accurate observations of infants. Thus, for example, new camera apparatus enables us to see reflections in the cornea of a baby's eye and to see exactly what baby is looking at and for how long. These methods have indicated greater activity than was previously appreciated. It seems that newborn infants prefer to look at complex patterns such as chequerboards rather than simple ones such as squares, and crosses or triangles (Craig, 1979). They prefer to observe regular faces rather than stylised or scrambled ones and their eyes can follow moving objects. These studies also tell us that infants are selective in what they watch and listen to. They show clear preference for complex stimuli, even within a few hours after birth and they pay attention to novelty and change.

Early studies were designed poorly and often the infant was placed in situations where he/she was least likely to respond. If a newborn is placed on his/her back in a cot and is covered up to his/her neck with a blanket he/she will do little more than cry, sleep and suck. But if the same infant is placed naked on the mother's skin in a warm room he/she will display a much greater repertoire of behaviour. He/she will root, crawl, grasp and hold him/herself in positions which require use of muscles to offset gravity (Craig, 1979, p 151). The greater understanding of how to handle newborns, along with new techniques, give us greater insights.

THE BUILDING BLOCKS OF THOUGHT

Everything that has been said so far suggests that babies are well organised, individual in their responses, curious, active and capable of learning. Once we have accepted these premises, we can explore the question of how babies think, more clearly.

A. PERCEPTION

Visual Scanning

All the time the infant is being pricked, watched and slapped by others he/she is making observations of his/her own. The newborn does not see objects in sharp focus, has a tendency to nearsightedness and usually focuses on objects about 7½ inches in front of him/her and is sensitive to bright light. At first, 5-10% of the newborn's day is devoted to scanning the environment. By 2½ months this has increased to 35% of the time. Up to 7 weeks of age when looking at a face, baby concentrates on the areas of most contrasts - for example, the dark/light contrast of face and hairline or boundaries such as the line between chin and clothing. Only a few weeks later he/she has developed focusing ability considerably and pays more attention to internal factors such as the eyes (Craig, 1979).

It is believed that infants enjoy doing what they can as their physical make-up matures and that visual scanning stimulates the visual part of the cortex. Also, because cognitive development depends greatly upon gathering information about objects and events by looking at them, this scanning process is very important in the development of concepts. Babies enjoy being propped up so that they can see everyday events and objects. To give a baby something new to look at may stop his/her crying. In our society, until recently the fashion was to lie babies in a prone position, thus limiting the baby's visual field. In societies where the fashion is to hold babies upright and carry them upright on an adult's back, perceptual development is more advanced (McCandless, 1967).

Competence

The developing perceptual competence of a baby, given the usual stimulation in the average family, is remarkable. As early as 1¼ months some newborns can not only perceive differences between forms but are also sufficiently sensitive to contours to prefer curved regular shapes (Haith & Campos, 1977; Fantz, Fagent, Miranda, 1975). By 2 months infants show a definite preference for three-dimensional figures over flat two-dimensional forms (Fantz, 1961). As early as 2 months infants can notice small differences between items in a matrix of 36 small squares which contain other small squares.

If one square contains a tiny diamond, triangle or circle the infant perceives it at once (Craig, 1979, p 208). Infants also see colours by at least 2-4 months of age and by 4 months their colour vision is similar to that of adults (Haith & Campos, 1977).

B. *PHYSICAL ACTIVITIES WITH OBJECTS*

Concepts are of a Motoric Nature

Most psychologists who are involved in research into the development of thought believe that thought is constructed, not only out of perceiving objects but also out of physical activities with them (Phillips, 1972). It is also believed that this activity is of two kinds. First, there is exploration of the shape, contour and surface of objects by manipulation with hands and fingers, which gives the infant, after many repetitions, a "motor" record of the object. Secondly, as the infant approaches the second year, this exploratory activity is supplemented by organisational activity.

For example, building a tower of blocks, or arranging them in rows, provides information about objects in spatial relationships.

The process of establishing in the cortex or sub-cortex a familiar physical record of objects such as the roundness of a ball, the squareness of a block, the opening and closing of a matchbox, is very much related to the child's motor development. Before an infant can inform him/herself of the contours of an object he/she has to master the motor skills of grasping, reaching and placing, and has to learn to coordinate hand and eye. The following milestones are thus very important in providing the bases whereby physical concepts of objects can be constructed.

Development of Motor Acticities

As we examine the norms for infants at various ages, we should keep in mind that we are talking about the middle 50 percent of infants. We are not discussing those children who are nearer the two extremes of the developmental scale. Even within the middle group there are enormous variations due to temperament, child rearing practices and other factors.

At *one month*, learning about objects is very much limited by the fact that infants cannot hold up their heads. Nevertheless, the important beginnings are there and they turn their heads if their cheeks are touched, can follow a horizontal movement of a ball and can grasp a finger placed in their hands. By about *three months* of age the development of the large motor system enables babies to hold up their heads when they are lifted to a sitting position and they can lift their heads and upper chests when placed in a prone position. Thus, the possibilities for perceptual exploration of the world are enlarged and infants can now follow the vertical movement of a ball and they can look at their own hands and clasp and unclasp them.

These motor coordinations increase the baby's capacity for *self discovery*. Discovery about the parameters of body and limbs appears to be the major activity of the first *three to four months*. Once the infant discovers his/her own hands and fingers, he/she spends several minutes at a time watching them, studying their movements, bringing them together and grasping one hand with the other (Church, 1966). Some four-month-old infants also discover their feet and manipulate them in much the same way as they do their hands and fingers (Brazelton, 1969). It is quite normal, however, for an infant to be five, or even six months old before becoming aware of his/her feet, especially if he/she reaches this age during winter, when he/she is apt to be heavily bundled up (Stone et al, 1973).

While in the early months an infant's motor development enables them to record information about the physical aspects of themselves and their movements, *after four to five months* their attention is largely diverted to discovering the *physical properties of objects*. One of the most important milestones for these discoveries is when motor development and perceptual development have reached such a stage that the baby can co-ordinate them sufficiently to be able to reach out for objects. This co-ordination of grasping and seeing or the *visually guided reach*, enables infants to more readily explore objects and their properties such as shape and surface. In other words, it enables the infants to rapidly increase their register of sense patterns of what objects are like.

If an infant is given very little to look at, grasp or reach for, and if their hands are tucked under a blanket or into sleeves, then their visually guided reach will occur later than if they had been permitted more opportunity to move their limbs and see everyday things (Fein, 1978). Normally, the visually guided reach occurs at five months but some infants in a free and stimu-

lating environment may attain it as early as two-and-a-quarter to three months.

By the time they are *six months* old, babies have achieved a greater degree of gross muscle control. They can sit straight when they are supported and can kick strongly and grasp their own legs. Their fine motor systems have matured to the point where they can grasp objects with both hands (Appleton, Clifton & Goldberg, 1975) and by *nine months* motor development allows them to pass objects from hand to hand. They delight in filling both hands and are usually able to bang objects together. These abilities and processes enable them to learn still more about the physical properties of objects.

At this stage, or a little earlier, they are also able to bring objects to their mouths and *explore objects with lips and tongue* which adds enormously to information about them (Fein, 1978). Thus, caretakers need to permit this kind of curiosity in a safe environment without placing too many inhibitions upon the baby.

Infants at this stage *do not yet understand the function of objects* but turn them round, pound them, and throw them. These activities are a necessary part of basic information gathering and the later development of thought. The problem is, adults often project their own intentions into infants and see the pounding and throwing behaviour as destructive or even rejective rather than exploratory. An infant discovering that the eyes can be pulled off a teddy bear is gaining valuable information and adult's choice of toys needs to be geared to such exploratory activities.

At *nine months*, babies can sit by themselves, crawl and pull themselves to a standing position. The latter, in particular, gives a new perspective to many objects. A coffee table, for example, can now be seen from the top.

At this age the child also begins to develop the fine *pincer movement* between thumb and forefinger and soon can pick up grass, dead insects and cigarette butts and other small objects. Once more, the caretakers' task is to provide a safe enough environment for the infant to explore fully and not inhibit his/her developing curiosity with too many sanctions. This still applies later when infants learn to release the pincer grasp (at first they cannot deliberately release it) and can undo latches, open cabinets and explore bottles of cleaning fluid and other objects within. They can also open windows and turn on and examine electrical wall plugs. At *one year* they can put pegs in a pegboard thus collecting some early physical notions about inside and outside and fit. They examine objects much more closely before waving them about and may even use everyday objects such as combs appropriately. By *fifteen months* this will extend to attempting to drink from a glass or brushing their hair.

Learning to walk gives much more scope for registering motor and perceptual information about objects as one can pursue a ball or learn about pulling and the relationship between this and toys with wheels. The capacity to coordinate motor behaviours extends rapidly after twelve months and to such an extent that at eighteen months the infant can walk while carrying a toy and learn to step up and down stairs. At *eighteen months* the infant may also be able to partly undress him/herself (the ability to put on clothes generally comes later). In these activities they learn many co-ordinations and how to relate these to the properties of clothing. When walking they like to push or pull something or carry something. These co-ordinations advance their awareness of their capacities and the physical properties of objects in relation to themselves. By *twenty-one months* the physical explorations of the infant has enabled him/her to use everyday objects appropriately. Thus, the motor perceptual register about objects and what one can do with them by two years has

increased enormously.

At *two years* babies hold pencils and scribble, turn the pages of a book one by one, build tall towers with blocks and drink while standing up. Since two-year-olds are usually too young for most nursery schools and too old for regular monthly visits to the doctor, relatively few studies have been made of this age group. This is rather unfortunate since two-year-olds are beginning to acquire new motor skills while greatly expanding their knowledge of themselves and the physical properties of objects.

The toddler walks, runs, uses a pedal cycle, jumps in place on two feet, can balance briefly on one foot, and can make an overhand throw. Toddlers love to crawl under, over and around objects and furniture and carry, handle or push anything they see. They enjoy putting things into and taking them out of large containers, pouring water, moulding clay, stretching and bending things if possible, and transporting items on carts, wagons or trucks. They explore, test and probe. All this exploration contributes enormously to motor and perceptual concepts of physical things and gives a record of their shapes and symmetry and the forces and activities which may affect them.

From twelve to twenty-six months, increased motor and perceptual dexterity also enables children to *organise objects* in rows or in towers and this is the beginning of the motor record of bringing things together, in an organised fashion, and putting them apart, which forms the basis for an ability to later understand adding, subtraction, and similar conventionalities of thought.

SENSORY-MOTOR THOUGHT - ITS ACHIEVEMENTS

Thus, in the first two years, the attention of babies is directed toward discovering the physical parameters and movements of their own bodies and the physical properties of objects and, later, some simple organisational properties. The abstractions of psychological motivation, manipulation and power is not within the range of this intelligence. This intelligence springs from the senses and motor movements. As was said earlier, if, as an adult, one could remove symbolic and abstract thought from one's repertoire, one might begin to understand how babies think.

Researchers believe that, in the beginnings, babies do not possess symbolic, abstract, or even physical grasp of intentionality or cause and effect (Piaget, 1969, Fein, 1978; Craig, 1979). These processes have to be learnt and are, at first, comprehended through their own bodies and their handling of objects.

A. THE DEVELOPMENT OF INTENTION

Jean Piaget (1967) has suggested that this begins *accidentally* sometime before the fourth month. For example, a baby may happen to notice his/her hands in front of his/her face. The event has occurred without deliberation but after it has happened the baby tries physically to prolong the event. Infants may also suck on their fists or fingers if they accidentally come to their mouths and, through a process of physical trial and error, gradually learn how to bring their hands to their mouths. These primitive beginnings of intention occur first in relation to the baby's own body.

Later, between four and ten months of age, as indicated earlier, babies' actions begin to centre on objects and events outside their own bodies. Again, things occur by accident. The baby may wave his/her hand, into which a rattle has been thrust; the rattle makes a noise and through physical trial and error the baby connects his/her activities and the result.

The baby's physical activity with objects does not appear to become fully intentional until about ten to twelve months and is demonstrated when something is in the way of an object that the baby wants. Babies already know that an object can be moved and begin to make the simple physical connection of moving "this" in order to get "that". The baby can now intentionally apply old behaviour patterns to new situations.

Between twelve to eighteen months babies love to experiment. They drop objects from different heights and positions. They physically invent new solutions to problems, although again, and generally, this is accidental in the first place. For example, the baby may reach for a toy sitting on top of a pillow and discover by accident that the toy comes closer when the pillow is moved.

Thus, intentionality develops through activity. In the same way, babies do not comprehend cause and effect at birth and learn about it through their own movements and interactions with objects.

B. THE DEVELOPMENT OF CAUSALITY

As indicated earlier, it seems that at first the baby's sensory-motor behaviour is largely involved in learning the effects of its own bodily movements. Some researchers suggest that this sensory/bodily awareness is overgeneralised by the baby into attempting to effect results which are not linked to their bodies (Piaget, 1967). For example, perhaps upon hearing a rattle in an adult's hand, they wave their own limbs about as though these movements can occasion the noise. The first rudimentary understanding of cause and effect appears to occur when they try to repeat accidental occurrences such as bringing their hands before their eyes. However, the goal is set after the event so this is not a foreplanned notion of cause and effect.

It is not until eight to twelve months or later that babies will set goals in advance such as moving an adult's hand to tickle their feet, indicating that they can recognise a physical cause outside their own bodies. At this stage they can also turn a bottle so that they can put the nipple in their mouth. This act involves recognising the constancy of the shape of the bottle in different perspectives. It also involves understanding something about objects in space and a measure of eye/hand co-ordination. These physical abilities result in an intentional act, with a goal and the ability to cause a result.

By twelve to eighteen months the trial-and-error behaviour of the baby with physical objects provides more extensive understanding of cause and effect. They love experimenting with toys in the bath, and pushing them under water. They may also be able to combine means and ends with physical objects. For example, they may be able to move a light play pen, that encloses them, toward a toy they have thrown out and wish to retrieve.

Time is an important dimension in an infant's comprehension of simple causal relationships. For example, while physical distance between objects related in a cause/effect sequence does not appear to bother them, long delay in time does. At eighteen months they know that a switch turns on a light, and pulling or pressing a button rings a bell or flushes the toilet because these events are closely linked in time.

During this period and later, children begin to explore cause and effect in simple situations. For example, they experiment with balls by rolling them, hitting them with a stick, and kicking them to see the outcome. Explorations with simple household objects also helps to advance the child's causal

concepts.

C. CONSTRUCTION OF THE PERMANENT OBJECT

Piaget's research suggests also that very young infants do not know that they live in a world of permanent objects. Although they soon learn to recognise certain things such as a bottle, they show no surprise or searching behaviour if it is hidden in front of them behind a cloth. They need to learn that physical objects continue to exist even though they are not actually physically visible to them. It is argued that the attainment of the concept of object permanence or the ability to symbolise it in the mind, when not there, marks the beginning of "thinking" in symbols, rather than through the senses and motor movements. However, the baby has much to learn in physical terms before this is achieved.

Piaget's research has been extensively examined and while in principle much of it is still accepted, some situations and interesting additional observations about infants have emerged. Bower (1971) found that *very young infants* continue to track a moving object even if it stops before their eyes and suggests that they are not aware that the stationary object is, in fact, the same as the moving object. Bower also found that while infants under sixteen weeks exhibited no surprise (increase in heart rate) if a new object suddenly appeared in place of one which they had been following, they were surprised if the speed of the new object, when it appeared, differed from the old one. Bower concluded that younger infants attend to movements of objects rather than their detailed features. Bower comments that infants under four months live in a grossly over-populated world. An object becomes a different object as soon as it moves to a new location or is turned upside down or sideways. The discovery that objects are the same whatever their location, rate of movement, or changed position, simplifies and depopulates the world of an infant.

Somewhere between *four to eight months* babies begin to show that they can maintain some contact with disappearing objects. When an object falls to the floor, they will lean over to look for it rather than simply stare at the point from which it disappeared. In addition, they can recognise that a whole object exists when they have seen just a part of it. If a large enough part of an object shows from behind a screen, they will reach for it. But, if the visible part is made smaller, the infant's reaching hand will stop abruptly. At this stage, children make no attempt to recover objects that have disappeared from view behind an obstruction such as a cloth or a cup, even though they are physically capable of doing so.

Around *eight to twelve months* babies show substantial progress in the development of the concept of object permanence. If an object is covered by a cloth or a cup, or if it is moved behind a screen, the child will search for it. At this stage babies love hiding and finding games, including hiding themselves by putting a blanket over their head or closing their eyes.

However, the child's object concept is still limited to looking for an object where it was first hidden. Suppose an object is hidden behind one screen (A) and the child repeatedly finds it there; now, if in full view of the child, the object is hidden behind a different screen (B), the child will continue to search where it was first hidden (A), although he or she *watched* it being hidden somewhere else. Infants' behaviour at this stage shows that they realize that objects continue to exist when hidden. However, such knowledge appears to be accompanied by the belief that objects and place are interdependent as though an object is a "thing of place" (Fein, 1978). Thus, objects are recognised only when located at some *particular* point in space. There is, as yet, no realization that hidden objects con-

tinue to exist if moved from place to place.

One needs to question what infants are actually doing when they search at this stage. They apparently expect to find something but is it the same something? In one study by Le Compte and Gatch (1972), a big shiny toy was hidden in a trick box. When the infants looked inside the box, they sometimes found the toy which they had previously seen hidden there and sometimes they found another small drab toy. Nine-month-old children were mildly puzzled by this trick, but accepted this and did not search for the other toy. It is believed that this is because the child is able to recognise that the object has disappeared but is not yet able to "imagine" the missing object.

In the *twelve to eighteen months* period, babies learn to dissociate the object from the place where they are accustomed to finding it. They will search for the object where it was last seen, no matter where it was previously hidden but, suppose a small object, hidden from sight by the adult's hand, is moved from one hiding place to another. Children will search for the object in the place where they saw it last. At this stage, children do not yet reason that the object must have been moved to another place while it was covered by the adult's hand.

Beginning at *eighteen months*, children acquire a fully-fledged concept of object permanence. If a small object is hidden in an adult's hand and then placed in one hiding place after another, children will search in all of the hiding places, and even in the adult's hand, until they find the object (Fein, 1978). This suggests they have a concept of the object which they can hold in their minds and that they can also imagine where the object might be found (Le Compte & Gatch, 1972).

The level of locomotive ability is important. When the child can crawl and walk, he/she can more actively pursue his/her own hypotheses and guesses and test them out. If a ball rolls away he/she can follow and find it. If mother is out of sight he/she can go and find her.

D. PERSON PERMANENCE

With young infants, is mother out of sight also out of mind? Does the concept of the mother or father as a separate entity develop more rapidly than the concept of other objects? In one experiment Bower used an arrangement of mirrors to present infants with multiple images of their mothers. He found that infants less than twenty weeks old were not disturbed at seeing more than one mother. In fact, they were rather delighted (Craig, 1979). Older infants seemed to have learned that they had only one mother and were disturbed by multiple images. Person permanence probably develops earlier than object permanence but, like object permanence, involves some grasp of spatial and causal understanding at the sensory motor level. In the early stages (before four months), if a parent is dressed differently or is seen in different positions or angles (bending over the cot, upright, etc.), then he/she may be envisaged by the baby as being several familiar persons rather than just one. This needs more research.

MEMORY AND SYMBOLIC THOUGHT

A. MOTOR MEMORY AND SYMBOLS

What and how much do infants remember? It is believed that in the beginning memory, like concepts of objects, is represented in actions (Piaget, 1967). For example, six to seven month old infants will open and close their hands upon seeing dolls they have held. They may also open and close their mouths after seeing a matchbox open and shut.

They also appear to have a visual memory or the ability to recognise familiar objects perceptually. Here the length of their memories, as is to be expected, is considerably shorter than that of an adult. Using the habituation method, studies suggest that four month olds can recognise geometric patterns after not having seen them for as long as twenty-four hours; other studies suggest a memory span for patterns of forty-eight hours, and have demonstrated that infants can recognise photographs of faces after a delay of two weeks (Cohen & Gelber, 1975; Fagan, 1973).

Thus, in general, the research indicates that much of infant behaviour is dependent upon memory and that the ability to remember is present in very young infants. The ability to remember enables them to begin storing information about objects and events and improves with age. Memory involves not only storage capacity but the ability to represent things in a symbolic fashion.

As already suggested, symbolic representation at first appears to be of a motor nature. The sight of a bottle may occasion infants to make movements they have carried out on previous occasions. They smack their lips before the food or bottle reaches their mouths. Similarly, they may continue to make eating motions after feeding is over, or they may drop a rattle yet continue to shake the hand that held it. They may wave "bye-bye" before they can say the word. Researchers suggest that these actions are attempts to represent something not physically present (Craig, 1979). It is thought, therefore, that these actions are the earliest forms of symbolic representation. They are not symbols in the mind as adults or older children experience them. They are motor symbols based on actions.

B. *COGNITIVE REPRESENTATION*

Physiological Evidence

The big question is when does representation become cognitive? When does a concept become a symbol "in the mind"? When can infants hold simple expectations that are more than motor repetitions? A growing body of evidence suggests that this cognitive ability begins to develop between nine to twelve months and this is based on the following evidence derived from physiological monitoring.

When adults and older children attend to something that interests them, their heart rates decrease, just as do those of infants. But, when adults and children are actively thinking, whether memorising or making calculations, their heart rates increase (Fein, 1978). Studies show that one-year-old infants who watch a toy car rolling down an incline and knocking over a plastic object begin to anticipate the car's motion and look toward the object. As they do, their heart rates increase. Thus, if an increase in heart rate in infants indicates an increased rate of mental activity (as in the case with older children and adults) then this kind of research suggest that infants begin to symbolically represent things at about one year of age (Fein, 1978).

This symbolic thought is not abstract thought. The processes of logic have yet to be learnt. Symbolic thought is representational and, perhaps, rather like simplified picture record of objects and events. Deduction, induction, and psychological complexities are not part of it. Further, researchers believe that symbolic thought in infants is concerned with objects and physical actions (Piaget, 1969; Fein, 1978; Craig, 1979).

Surprise

Another factor which may indicate the presence of symbolic thought is surprise

because surprise occurs when incoming information does not agree with stored information and when expectations are not fulfilled (Fein, 1978). According to traditional theories, newborn babies are not capable of being surprised, although they can be startled. Newborns are not surprised to see a toy bear hidden by a cushion and a ball reappear in its place. However, by four or five months, babies who see an object disappear behind a screen look back as if searching for the original object if a different object appears on the other side. This is the beginning of object permanence or expectations about objects.

Yet, one cannot be certain that symbolic representation of objects is, as yet, fully present because at nine months infants do not seem surprised, as indicated earlier, if one toy is hidden in a box and a different toy is found when the box is opened. By eighteen months, however, infants refuse the new toy and continue to search for the first toy (Le Compte & Gatch, 1972). This suggests unfulfilled expectations and the ability to hold an image of the missing object in the mind. Thus, only at around eighteen months can we be certain that the infant is capable of symbolic representation of familiar objects.

Imitation

Imitation also suggests symbolic representation but at first it is also at the activity level. At four months, infants enjoy it when adults mimic their vocalisations; the infant responds by babbling the same sound. However, the imitation depends on the adult imitating a sound the baby has made first, not the other way around. Of course, the infant's state will influence how and when he/she responds.

Prior to nine to ten months, infants are able to imitate the movements of others only if they can watch their own movements and match them to those of the model, for example, waving a hand (Fein, 1978). After about ten months children can imitate movements, like blinking, that they cannot see themselves make, although in their first attempts babies may open and close their mouths instead of their eyes, or may close their eyes and keep them shut instead of blinking them.

By twelve to eighteen months infants begin to be able to imitate actions they have never performed before such as imitating an adult touching the tip of his/her tongue with his forefinger (Fein, 1978). Imitation is not mechanical behaviour. The infant has to recognise a correspondence between the thing being imitated and the part of themselves capable of performing the imitation. This involves relating one event in space to another. This relationship of "one thing above another", "one thing below another", or "one thing beside another", can be put together and taken apart "in the mind". By eighteen to twenty-four months these kinds of capacities and memory have advanced to the stage where a toddler can imitate a model when the model is no longer present.

Pretend Play

Infants' play activities change dramatically between the ages of twelve and twenty-six months. Play centred upon discovering the physical properties of objects is supplemented by interest in organisational activities with them. Above all, make believe play becomes more frequent. The emergence of pretend play suggests the child is beginning to be able to represent the immediate physical environment symbolically. "When children pretend, an activity is taken out of its typical context. Means are disconnected from ends. For example, the child "eats" without consuming food. Objects that are present are treated "as if" they were something else - a large box as if

it were a car, for example." (Fein, 1978, p 156).

At approximately twelve months infants pretend to do things they are already familiar with such as eating, drinking, or sleeping. By eighteen months the child's pretend play expands to include not just him/herself, but another person, and he/she may pretend to offer the mother a drink.

The pretend play of two-year-olds is dependent on the actual presence of objects that are similar to real things such as toy telephones, toy trucks, or toy cups and saucers. As the child gets older, pretend play gradually becomes more detached from the specific properties of objects. Thus, by three years they can pretend a stick is a telephone or a doll and a leaf a cup or a plate (Fein, 1978). At this age a more complex form of pretend play is also appearing, namely socio-dramatic play. It involves several children playing roles, imagining settings and evoking simple interpersonal relationships such as father getting annoyed with children when they make a noise or hugging the mother when pleased.

When using pretend play as a means of encouraging or assessing the presence of symbolic thought it should be noted that pretend play is sensitive to situational factors. Children's play tends to be disrupted and inhibited when strangers are present or when primary caregivers are absent. One study (Fein, 1978) showed that two-year old girls, more than boys, pretended more in the presence of a familiar adult than in the presence of a stranger. Children's play also becomes inhibited when adults tell them how to play. "Play flourishes in a familiar environment in which the material resources are interesting and diverse, in which the child commands the initiative, and adult expectations are scaled to the child's capacities. Allowing play to flourish provides children with an important opportunity to develop the cognitive abilities and intelligence that enable them to interact in the world." (Fein, 1978, p 157).

HOW BABIES THINK ABOUT THEMSELVES

A. DEVELOPING SELF AWARENESS

Body Separateness

It is believed that newborn babies do not experience themselves as separate from their environment and their primary caretakers. The sense of body separateness develops through being held by another body, that of the caretaker (mother, father, or foster parent) and through the departure and return of the caretaker. Grasping, and touching others and objects, help in this differentiation process. The overall moods and behaviours of the primary caretakers are also believed to be important. If the caretaker is a consistent provider of security in the form of food, bodily comfort and generous and genuine cuddling, the baby will probably gradually develop a comfortable sense of bodily awareness. This is the beginning of the bodily self-concept.

Also, in interaction with caretakers, the baby learns about him/herself as a reciprocating person in occasioning pleasure and smiles in others. As stressed throughout this paper, this occurs at the motor and sensory level because, at first, the baby thinks through his/her senses. It is believed that it is very important that caretakers respond to their babies as though they are individual and spontaneous beings. Some caretakers become so absorbed in their babies, that they see them as a projection of their own needs. For example, as indicated earlier, perhaps the baby is seen primarily as a provider of love that the caretaker has missed or is missing elsewhere. Thus, if the baby cries unduly, he/she may be regarded as being deliberately annoying and unloving. On the other hand, where caretakers can appreciate that

the crying of babies relates to the baby's bodily needs and that as yet, psychological intention is not in their repertoire, then they are more likely to treat their baby as a quite separate person and respond appropriately to their needs. As indicated earlier, false projections are the bases of many hostilities about babies in our society. They also confuse the developing sense of separateness in babies and toddlers because they cannot account for the bewildering hostility they occasion in others.

Once it was believed that if a baby had an unloving caretaker who treated him/her uncomfortably and with hostility, then the baby's ability to trust and love others was damaged for life (Erikson, 1964). However, more recently, research suggests that, while good caretaking is very important for the quality of the baby's life, nevertheless, bad caretaking can be largely overcome by excellent and patient caretaking in later life (Paulson, Stone & Sposto, 1978). The problem with past research has been that the child who begins life with a bad caretaker is generally subject to the same bad caretaker for the rest of his/her childhood, or else is shuffled from one foster home to another without any sense of security. These factors, were often overlooked in assessing outcomes.

The Beginnings of Social Interaction

By four months one can see the beginnings of the social aspects of self-concept or self awareness development in infants. Most smile, coo and laugh quite selectively in response to a wide range of persons and events. By eight months many babies begin to play even more social games, such as peek-a-boo, bye-bye, and patty-cake, and most enjoy handing an object back and forth to an adult. They also love to drop an object and watch someone pick it up and hand it back. This "game" is usually learned accidentally and is related to the baby's developing cognition of simple cause and effect emerging intentionality as discussed earlier. These games are very important in helping the baby develop a sense of self in interaction with others.

Also, around this age, most babies become quite cautious with strangers, may peer suspiciously at them or burst into tears if the stranger persists in his/her attention. This marks a further advance in the baby's ability to discriminate perceptually and is probably linked to the emerging recognition of person permanence, and the ability to distinguish between others who are familiar or not familiar.

An eight month old baby also begins to pay more attention to speech and will turn toward a voice and perhaps imitate some speech sounds such as "ma-ma" and "da-da", although they will not "know" what they mean. Primitive language exchanges with adults by the repetition of sounds is also important for the emerging social self.

By twelve months the infant is able to play more complex social games and much of this capacity is due to developing motor development and eye/hand coordination. He/she can roughly throw objects to and fro with a partner, and roll back and forth with another person. This involves the ability to "expect" what the other will do in relation to self and depends on the development of symbolic thought and a rudimentary understanding of self and space.

The Emergence of Self Choice and Preference

These games enhance the sense of self in infants and, as they become more aware of themselves as individuals separate from their caretakers, they are likely to demonstrate the beginnings of self choice and preference. They

may suddenly and energetically refuse a food they have previously liked, protest loudly at bedtime or resist getting dressed or being placed in a high-chair. By fifteen months they may be asserting themselves even more and making demands such as wanting to play with toys or a pet rather than have a bath. If parents insist, baby will probably fight them.

These behaviours reflect another milestone in the child's self-concept development and should be a cause for satisfaction about developing individuality. However, caretakers who are unable to see the child as separate from themselves, may see these positive developments as negative attempts to engage in a power struggle or as an indication of "natural naughtiness". They may attack the child for its early attempts to be individual and separate from them. Caretakers, who are not threatened by these developments, avoid overwhelming the child with anger about its growing independence and confidently use diversion, rapid unemotional removal or turn the infant's assertion into a game. In this way safety, routines, and needs are attended to effectively and the child does not learn to regard his/her individuality negatively and as something that occasions hostility in others. Constant battles may intimidate infants or encourage aggressive responses. Much also depends on the temperament of the infant.

The Baby's Sense of Self Competence and Comfort

In this early process of self-concept development the infant needs to learn and be permitted a sense of competence. If a good, comfortable sense of bodily self, social self and individual self is not developed, the infant may become depressed. Bowlby and Spitz, in the forties, drew attention to the depression that can overcome babies without consistent affection and reasonable stimulation. While the research has been criticised for its poor control of variables, most research nevertheless suggests that infants require more than food and clothing if their early self concept development is not to be in need of later compensations in caring (Phillips, 1981). Infants can cry perpetually for many reasons as mentioned earlier. They can also suffer colic, feeding problems, sleep disturbances or begin head banging for many reasons. However, when all known possible medical causes have been investigated it is worthwhile seeking out whether some disruption in a comfortable bodily sense of self, social self and individual self is occuring (Gore, 1976). A perpetual sense of bodily unhappiness, due to the cartakers handling or over or under stimulation, may occasion colic, feeding problems or head banging as indicated in the case of Bridgette:

> *Bridgette, aged eighteen months, was the "golden" baby and the pride and joy of highly intelligent parents. She was constantly paraded before visitors as "outstanding" in everything for her age. She was indeed a very clever and attractive little girl. Once she had learnt how to climb out of her cot she began to bang her head on the floor whenever she was left alone. The distressed parents took her to the local doctor whose response was: "A lot of infants do that. Don't worry she'll soon grow out of it." Fortunately, the parents were not satisfied with the response and sought further advice from a child developmentalist. Investigation revealed that the parents had come from a very unresponsive family and rarely cuddled or expressed affection to Bridgette although they obviously loved her greatly. They were encouraged to cuddle the child more and parade her talents less. Although very willing, this was difficult for them and it took some months to effect much change. However, they succeeded in changing their interactions with Bridgitte and gradually things improved and the head banging stopped. This may have been coincidence, but many cases like this have been observed.*

By eighteen months, self awareness (and consequently awareness of others) is progressing considerably. Thus, infants imitate many behaviours going on around them and take them into their own self repertoire. They may be observed "reading" a magazine, "sweeping" the floor and "chatting" on a toy telephone. Language may have advanced to several words and phrases which greatly enhances social self development. It also enables them to define several things about themselves more precisely. Before toddlers are two they can associate different parts of their bodies with words. When asked to touch their nose they will be able to do so. This helps in the development of self image.

B. SELF RECOGNITION

Babies are fascinated by mirrors and first notice their reflections at about eighteen weeks of age. But at this point they do not realise that the face is not that of someone else (Fein, 1978). Amersterdan's research (1972) suggests a developmental pattern of three distinct phases in children's response to their reflections. At first, according to Amersterdan, the child believes the reflection is that of another child so that at about one year he/she may look behind the mirror, if possible, in an effort to find that child.

During the second stage infants may be observed admiring and preening themselves in the mirror. Amersterdan believes that we cannot conclude from this that the infants are admiring themselves. The infant may be imitating behaviour he or she has observed in adults looking in mirrors. The third phase is the period in which true self recognition appears between twenty and twenty-four months, according to Amersterdan, and is indicated when the child looks in the mirror to locate or check a spot that has been put on his/her face. Despite such evidence controversy and research continues to try and pin precisely when self recognition occurs.

C. CONCLUSION

By the end of the second year children are exhibiting increasing individuality in coping skills. In the urge toward self competence they attempt many tasks beyond their capacity and may throw tantrums if they do not succeed. Similarly, they may throw tantrums if frustrated in their curiosity and attempt to examine new things seen in such places as the supermarket. Again, quick firm removal, diversion, or unobtrusively leading the child to his/her own solutions is better than a battle which may inhibit self competence or encourage aggression. Children at this age hate to be helped and prefer "I do". This is another important milestone to be appreciated. Parents and caretakers and day care workers who feel threatened by these milestones, as indicated earlier, often have difficulty in accepting children's increasing separateness and self competence. They can often be helped simply by reliable information about how a child develops a healthy self concept and how babies think.

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