

AESTHETIC SENSITIVITY IN THE YOUNG CHILD

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DECLARATION

This is to certify that :

- (a) this is my own unaided work
- (b) no part of it has been submitted in the past
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C.F. Birrer.

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ABSTRACT

Based on their extensive investigations during the past 50 years Piaget and his collaborators claim that the child's objective knowledge of the world is gradually constructed, either from the manipulations, or actions, the child performs upon the concrete attributes of objects, or from the actions themselves. These actions differentiate from a limited repertoire of congenital reflexes, and the child uses discursive thought forms to represent his knowledge of the objective world.

Early investigators concerned with the nature-nurture issue, and working with salamanders and chicks among other animals, found that in some cases the growth of acts was indeed a progressive development of reflexes whereas in others, before any reflexes appear, there is autonomous movement in many muscles. The import of the possible distinction between two components within the motility system has not been pursued by psychologists dealing with the evolution of general cognitive competence. No consideration has been given to the non-reflexogenous component of the motility system as the possible source of a form of knowing which does not coincide with the Geneva findings.

However, the origins of subjective as opposed to objective thought have received close scrutiny from thinkers outside psychology. In particular, Susanne Langer has been concerned with the biological foundations of aesthetics; she proposes that the physiological rhythms of the human being are synonymous with forms of feeling. In other words, the rhythms inherent in the autonomous component of the motor system are the prototypes of graphic forms and all art is a symbolic transformation of these. The forms, like the cognitive categories studied by Piaget, are universal and therefore relatively free of socio-cultural influences, at least in the young child.

However, unlike scientific knowing, aesthetic competence is presented by means of non-discursive or presentational thought forms.

Among those who have studied the subjective and objective aspects of the child's competence there is disagreement regarding the relationship between them. On the one hand is the claim that changes related to discursive thought have been mistaken for universal shifts which influence all psychological development. On the other is the supposition that in neither case is the development autonomous; while aesthetic development may have independent roots, it is subject, at least in the early years, to the same reorganisations of cognitive structure that underlie discursive thought.

In this dissertation a theoretical analysis of one aspect of genetic epistemology is undertaken. This is the concept of a motility system which has two distinct components : that is, an autonomous and a reflexogenous component. They are called the primary motility system and the secondary motility system respectively. The first is related to the acquisition of conceptual structures for dealing with events not given to perception, the second to the acquisition of the physical and logico-mathematical polarities of knowing. The concrete manifestations of the first are non-discursive symbols and of the second discursive thought forms.

The easel paintings of boys and girls at three, four and five years of age were analysed. Thus a behavioural item involving maximum gross motor movement was obtained. The principal aim was two-fold : first, to explore at a very simple level the validity of the concept of a motility system which has two distinct components. The non-discursive symbols which derive from the biorhythms of the primary motility system, and

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which are presented in an aesthetic composition, were selected for this purpose. Secondly, to gain some indication of whether the reorganisation of cognitive structure which, according to genetic epistemology occurs between five to seven years of age, could also affect aesthetic development.

CHAPTER 1

INTRODUCTION

1.1 General

The development of aesthetic sensitivity in the preschool child involves the acquisition of conceptual structures for dealing with events not "given" to perception; that is, with the physiognomic or dynamic qualities as opposed to the objective attributes of objects. Arnheim (1957; 1969) has argued cogently that the former are as much part of an object as its shape or colour, and has labelled them perceptual concepts. However, the expression of human feeling by a non-human object, which may be analysed without spatio-temporal relations, presents a paradox and psychologists generally, if not aestheticians, accept that physiognomic properties are subjective in nature. Since they are not readily amenable to experimental manipulation, they have not become part of the contemporary notion of general cognitive competence; instead this is defined solely in terms of the child's knowledge about the world which is stored as schemes and operations, and logically described in terms of groups and groupings. The formal principles which describe the relation between the spatio-temporal aspects of experience and those beyond the scope of these are also absent. However, a competence model should constitute an adequate abstract representation of all that a child knows, or could do in an ideal environment; thus more than the current findings of Genevan psychology regarding logical thought need to be written into it. The point has been made that "of paramount importance is a very large and ill-bounded category which pertains to the child's stored information about self as well as information of a somewhat more nebulous and non-specific kind..." (Flavell and Wohlwill, 1969, p.75).

The Genevan theory of competence is crystallised in genetic epistemology. This painstakingly traces the course of rational thought

from a limited repertoire of reflex behaviour in infancy to the ability in adolescence to reflect on thought itself. However, this psychogenetic analysis does not take into account the effects of several important reflex systems, in particular the congenital affect ("attachment") and anti-gravity reflexes. Piaget (1936) has also neglected the effect of his own presence on the behaviour of his three children in his formulation of the origins of intelligence. Thus the profound distinction between a symbol which is the transformation of a social signal that ensures proximity between caregiver-infant as well as joint attention to an object that slowly acquires conventional reference during early childhood, and one generated by the basic functioning of human physiology has been missed. Nevertheless, discursive symbolism is the only valid instrument for practical communication and scientific knowledge; it is probably inevitable therefore, that the central role of non-discursive or presentational symbolism (1942; 1953) in the evolution and conceptualisation of human sentience is not acknowledged. These critical omissions urge amendments to the Piagetian conception of objectivity and shed some light on the sources of subjective knowing, as well as the intricate link between inter-subjectivity and the morphology of these.

The young child's subjective knowing, with which he infuses a perceived object or event, is not governed by his perception of objects, nor by any mode of abstraction or feedback from them. It arises initially from, and differentiates within, the marks he makes in some expressive medium. These graphic elements are the result of the spontaneous functioning of the primary motility system which generates the fundamental biological rhythms, such as patterns of rest and activity. Langer (1942; 1953) equates this rhythmic activity with forms of feeling, presumably because they mark discernable changes of state, and often comments on their universal

appearance and appeal. These "equivalent forms" (Arnheim, 1957) were also found by Kellogg (1968) in her extensive analysis of the forms and formal elements in more than one million examples of preschool child art. Thus aesthetics has sources of its own; it is not a by-product of psychosexual development, or of emotional states or, in fact, of anything of this nature. This means simply that the young child's compositions are not the symptomatic expression of unpleasant psychological events with which he is unable to cope.

In a mature work of art the aesthetic form conveys the creator's understanding of sentient life, though he himself may never have experienced the feelings he has conceptualised. The aesthetic form is not derived from affects, nor is it intended to evoke them; but it does reflect what the maker knows about them. In short, an aesthetic composition does not constitute a guide to thoughts or feelings from any source other than the aesthetic form itself. At the preschool level it conveys little more than the child's familiarity with the expressive medium he is using since aesthetic development occurs partially within the medium itself. Only when research has advanced sufficiently to establish norms in this regard can child art be used for diagnostic purposes. The first step, however, is to determine the origins of aesthetic sensitivity.

This view is a departure from the popular conception of child art. For one thing, it challenges the common assumption that child and adult compositions have little, if anything, in common; in general, only adult work is recognised as fine art, child art being seen as play, or perhaps, as promise of future artistic ability. Pritskell (1958) enumerates several elements of design. All of these, except those that require technical sophistication, appear early in child art (1968). Thus the forms of art,

child and adult, are universal, due not to a collective unconscious, but to the relative immutability of the rhythmic functioning of the information bearing biosystems by different social and cultural practices. In other words, the process of early aesthetic development is the search for form in a chosen medium that is structurally equivalent to the rhythmic manifestations of human biology. The child does not attempt to copy reality; nor, under normal circumstances, does he draw what he knows. His drawing is emphatically not an index of his concept of the object (Goodenough, 1926; Harris, 1963). Rather his task is to invent structurally adequate forms and these are non-discursive: that is, the child presents his understanding of vital life. The forms the child uses in drawing are not provided by any object; they are created by him in terms of his fundamental biological constitution. However, they appear to be subject, at about seven years of age, to the same reorganisations of cognitive structure that underlies discursive thought.

1.2. The Motility System and Non-Discursive Thinking

The investigations of the Genevan psychologists suggest that the child's objective knowledge of the world is gradually constructed, either from the actions he performs on objects (physical abstraction or feedback) or from the actions themselves (formal abstraction or feedback). Piaget assumes a developmental continuity between reflex and later non-reflex behavior sequences. For example, voluntary prehension is seen as deriving from a primitive sub-cortically regulated grasping reflex via the mechanisms of "generalised" and "reciprocal" assimilation (1936). This is in disregard of the fact that reflex behaviour is, by definition, stimulus bound; how, therefore, does it acquire intentionality? However, if the implication is instead that the reflex apparatus (plus other controlling and inhibiting neural mechanisms) is channelling "drive or automatism" (Weiss, 1941)

into adaptive behaviour patterns, it is non-reflexive behavior that is the developmental precursor of intentional voluntary action, wherein the appreciation of means-ends relationships play a central role. That is, motor development is essentially an outgrowth of non-reflex rather than reflex activity (Connolly, 1973). A crucial issue in Piaget's (1936) analysis of the roots of intelligence, and in many subsequent works, is the failure to give the term "act" definitive meaning.

Nevertheless, early investigators concerned with the nature-nurture dichotomy, and working with salamanders (e.g. Coghill, 1929) and chicks (e.g. Hamburger and Balaban, 1963) among others, did find that in some cases the growth of acts was indeed a progressive development of reflexes whereas in others, before any reflexes appear, there is autonomous movement in many muscles. Hamburger's (1963; 1968) observations and experiments demonstrated the existence of two behaviour-components that could be dissociated from each other on the basis of behaviour characteristics.

Beginning with the stage at which the first neuromuscular connections are established and continuing through the greater part of the incubation period, there exists a motor action system [primary motility system] ... Independently of this system, there develops the reflex apparatus [secondary motility system] which begins to attain functional maturity 3-4 days after the onset of spontaneous motility ... we assume that these two components are represented by different intracentral neural mechanisms ... when the reflex system is structurally completed, it does not 'take over' or 'incorporate' the motor action system in the sense that the latter loses its identity as an operational unit. The motor action system has its own progressive differentiation and probably persists throughout life, as suggested by Coghill, Tracy and others. (Hamburger, 1963, pp. 351-352)

Although there is some information on stimulated movements in the human infant (Lipsitt, 1963) there is little, if any direct data on its spontaneous motility. The existence of non-reflex motility can be demonstrated only if there is a sufficient time interval between the onset of such motility and sensibility and if it can be shown that, once sensibility is present, it does not influence the spontaneous motility. In the human, however, reflexes appear to operate from the very beginning of motility and the first spontaneous movements that have been recorded occurred in later stages, or simultaneously with reflexes (Hooker, 1952).

The severe constraints of traditional methodologies on the exploration of learning phenomena are distressingly obvious. It is not even clear that the term learning is always applicable, for example to the infant, in any non-trivial sense (Birrer, in press). However, a different approach based on the concept of state and the consequent regulation of attention suggests new possibilities, and suggestive evidence of a primary motility system in the human comes from recent studies on sleep-waking. These data indicate the existence of an ultradian cycle which is not specifically related to sleep, but constitutes instead a basic physiological rhythmicity (Serman and Hoppenbrouwers, 1971). Kleitman (1963) terms this the basic rest-activity cycle (BRAC). The BRAC is the fundamental aspect of physiology, both functionally and in terms of the structural evolution of the central nervous system (CNS). It is clearly detected in the infant continuously throughout the day and night and it has a differential development to sleep-waking states. In order to determine the physiological origins of sleep states, Serman and Hoppenbrouwers (1971) undertook an extensive in utero study of behavior in the human fetus. They proceeded on the basis that the BRAC could be studied by reference to motility patterns in the fetus.

Fetal activity was recorded in eight normal pregnant women 21-28 years of age whose sleep and waking patterns were measured according to a Sleep Scoring Manual (Rechtschaffen and Kales, 1968). Quantitative analysis of the data across subjects as a function of gestational stages disclosed two significant periodicities which were essentially the same at all gestational ages. One was relatively short, ranging from 30-50 minutes, and the second longer, ranging from 80-110 minutes. At term the infants displayed REM state cycles which were virtually identical to the faster cycle. Since this cycle was observed as early as 21 weeks gestation age and the existence of functional sleep and waking states at this and even later points in fetal development is most unlikely, a differentiation of the rest-activity and sleep-waking cycles is indicated in ontogeny. Furthermore, developmental changes observed in sample EEG tracings taken from birth to two years of age in the same infant during REM and quiescent states suggests that very little change occurs in the polygraphic pattern of the REM state during development. Conversely, there is a dramatic developmental change in the quiescent state heralding the emergence of an essentially adult quiet sleep mechanism, which contrasts with the presence of the REM state even prior to birth. If this state is specifically rooted in the physiology of sleep any influences which alter sleep should also affect its temporal manifestation. However, this was not the case, lending support to Kleitman's (1963) contention that REM is the manifestation of a more fundamental physiological rhythm.

The slower of the two cycles detected in fetal activity was not manifest in the newborn. This suggested to the investigators that its origin resided within the intrauterine environment and implicated the mother as a possible physiological source. A comparison of fetal

activity data with simultaneously recorded maternal sleep physiology provided some evidence that the slower motility cycle is related to the REM cycle of the mother (Sterman, 1972).

In Sterman's own words, the 'dissociation of the REM state from the process of sleep is an important departure from current interpretations...' (Sterman, 1972, p.177). He admits, too, that the functional significance of the cycle is unclear. It has been suggested that it provides a framework for the development of other important physiological periodicities, such as sleep-waking and feeding (Kleitman, 1967). It may also provide a basis for the organisation of cognitive functions during both wakefulness and sleep (Sterman and Hoppenbrouwers, 1971). Clarification of this tentative assumption depends upon an elaboration of the relationship between the REM state and the saccadic system (Birrer, in press). The saccade is the intrinsic informational unit of vision.

The extensive contemporary research on visual perception and attention has shifted the focus of cognitive development from the learning to the attending process (e.g. McCall, 1971). This opens the way to a radical change in our view of infant learning. First the visual system develops very early providing the infant with some measure of control over perceptual input. Secondly, this early functional maturity of the visual motor system permits voluntary control of gaze and this uniquely qualifies gaze behaviour for the regulation of pre-linguistic social contact. Interestingly, research on the differences between those people who break gaze to the left and to the right lends support to the concept of two kinds of thinking. Left-shifters appear to have dominant right hemispheres, and to be interested in music and the arts; right shifters appear to be left-hemisphere dominant and engage more in verbal rational

thinking. This suggests that non-verbal processes are localised in the right hand half of the brain (Argyle, 1975). Thirdly, the presence of saccadic movements in the newborn suggests that in 'human psychological development the functions of inspecting detail structure at designated places in surroundings develop inside an already established primary context of space for orientations, a space that is centred on the body with co-ordinates that refer to body symmetry' (Trevvarthen, in press). Space is continuously elaborated within these co-ordinates until the second reorganisation of cognitive structure at approximately seven years of age.

No attention has been given by psychologists dealing with general cognitive competence to purely physiological functioning as the possible source of a form of knowing which does not coincide with the Geneva findings. For many, the reflex itself is of scant psychological interest. Yet it is likely that spontaneous, self-generated motility is the major issue in the early development of behaviour. 'The fact of spontaneity introduces a tremendous contribution from the system itself into its behavior... besides the beat of the heart, there is reason to believe in spontaneity as the basis for many forms of peristalsis, of swimming, flying, breathing and perhaps even the elementary rhythm of walking' (Bullock, 1961, p.103). Further, there is solid evidence (e.g. Basmajian, 1963; 1967; 1972; Budzynski, Stoyva and Adler, 1970) that spontaneity, defined as 'the determination by internal factors of when the alarm shall ring to a steady application of energy or accumulation of something' (Bullock, 1961, p.51) may resolve many of the problems of subjective knowing.

Subjective thinking has received its closest scrutiny from scholars outside psychology. In particular, Susanne Langer (1942; 1953; 1967; 1972)

has been concerned with the biological foundation of aesthetics; she proposes that the rhythms inherent in the primary motility system are the prototypes of visual concepts, since both manifest the same logical form, and that all art is but a transformation of these. An empirical investigation by Kennedy (1975) of line depiction, which appears to be synonymous with the child's first spontaneous pictorials, and which is therefore more sophisticated than the early graphic forms, lends some support to Langer's contention. Kennedy attempted to determine whether there was a common basis to outline depictions from different early isolated cultures in the antipodal regions of the globe. He surveyed monographs showing rock art from eight regions and concluded that line depiction of depth change and slant change is a perceptual phenomenon that arises without training, and that line drawings act directly on perceptual depth analysers. According to him, line depiction is a function discovered, rather than invented, by early man. 'It is a cultural tool, but unlike language, its units are not referential by conventional agreement. It is deeply rooted in "abstract" physiological structures, not purely visual ones ...' (p.525).

Thus graphic forms, as well as early pictorials are, like the formal categories of thought, universal. They are therefore an integral aspect of the child's conceptual competence. Their recognition extends genetic epistemology beyond the ontogeny of scientific and logicomathematical knowing to the knowing and conceptualisation of human sensibility. In fine, it introduces a second major category of symbolism into the concept of competence; that of presentational as opposed to discursive symbolism.

There can be no doubt that Piaget and his collaborators have gone a long way towards illuminating the objective aspects of man's experience which are formed in the course of his action in relation to the physical environment. In essence, however objective knowing is public knowing and

and conceptually, at least, its close ties with inter-subjectivity are quite obvious. Nevertheless, there is no acknowledgement of this fact in the formulation of the early beginnings of intelligence (1936). The relationship of objectivity and subjectivity is more obscure and considerable theoretical refinement, as well as experimental data, is needed to clarify the problem. Piaget has not been concerned with conceptual systems which deal with events not "given" to perception despite the fact that shape, hue and absolute size are not the aspects of a configuration most likely to be noticed first. These attributes achieve psychological meaning only after sensitivity to general dynamic properties has dominated experience (Lashley, quoted Adrian, 1947, p.85). Progress in genetic epistemology calls for a valid conceptualisation of the primary and secondary motility system. Reflex and non-reflex behaviour are thoroughly confused in genetic epistemology and there are many times when Genevan writings flounder hopelessly in descriptive and explanatory chaos (e.g. Piaget and Inhelder, 1956).

At present it is simply not known what role reflexes play in volitional acts:

It is easy to find stereotyped aspects or phases of movements, but such invariances do not necessarily reflect an identification with reflexes, even though they may have much in common with them. The coincidence of volitional movement invariances with reflex patterns may be attractive and suggestive, but it is nevertheless coincidence, transformable into proof of the hypothesis only by the electrophysiological demonstration that the same cells fire in the same way to activate the muscles on reflex activation as on volitional activation. (Easton, 1972, p.598).

And this comes from an enthusiastic proponent of reflexes as the principal components of volitional behaviour.

Similarly, little can be said yet in regard to a primary motility

system. On the basis of contemporary work on bio-rhythms such a system appears to be characterised by at least three features : first, intrinsic automatic rhythm; secondly, binary state (on-off), and thirdly, change in periodicity with development. The greatest advantage this approach offers the genetic epistemologist is a new tool for the exploration of the human mind : bio-feedback.

1.3 Practical Intelligence and Discursive Thinking

From the viewpoint of genetic epistemology, Piaget (1972) distinguishes two periods : first, that of sensory-motor actions prior to all symbolic systems and secondly, that of actions completed by the new properties which symbolism introduces.⁺ In other words, with the emergence of symbolism a new type of action is imposed on the earlier, simple actions. This action is interiorised and more precisely conceptualised; for example, the child can not only move from A to B, but is able to represent conceptually the action AB.

There are obvious difficulties in the notion of the interiorisation of action and Piaget himself emphasizes the two most salient. For one thing, conscious awareness of action is always partial and the details are elusive. Even an adult would have great difficulty in translating into concepts the flexor and extensor movements of the limbs during a change of position. In the words of Werner and Kaplan (1967) 'sensory-motor patterns possess qualities which defy a merely physical analysis of the movements of specific bodily parts: they have such qualities as direction, force, balance, rhythm and enclosingness" (pp.86-7). For another, the conceptual representation of the actions AB, BC, CD, etc., requires the translation of

+ it is important to note that despite his wider analysis of representation and the symbolic function in early childhood, (Piaget, 1962) Piaget's primary concern is discursive symbolism. The underlying dynamics of overall intellectual development, as Piaget understood them, are set out in the *Origins of Intelligence in Children* (1936) and *The Construction of Reality in the Child* (1955). *Play, Dreams and Imitation in Childhood* carries the story further, but is only a partial and incomplete complement of the earlier book.

the sequence into a set of elements occurring almost simultaneously. Taking account of the difficulties of schematising conscious awareness, and of condensing successive actions Piaget (1972) is led to suggest 'that the schemes immanent in action be regarded as labile concepts which, in representing the latter, are able to transcend them' (p.26).

Bearing in mind that the motility system at birth is an amalgam of both reflex and non-reflex behavior and leaving aside the vexed question of the derivation of voluntary behavior, it is apparent that Piaget's reference is necessarily to the primary motility system. That is, there are indeed labile schemes but these are immanent in the functioning of the primary motility system. They constitute a source of knowing, of dynamic rather than abstract concepts which, at least initially, exist apart from rational thinking or emotional states and are freely expressed in the child's lines, patterns, diagrams and early pictorials.

The interiorisation of actions in the form of symbols constitutes conceptualised action i.e. it transforms the schemes into rudimentary concepts or precepts which will eventuate in discursive thinking. This structure defines the child's competence; it is increasingly elaborated, both by feedback from objects and events in the environment, and by feedback from the structure itself. However, if labile schemes are to achieve definition, this purely psychological conception must be supplemented by physiological information. At present there are only cursory suggestions, primarily in the pediatric literature, of the modifications to the Piagetian forms of knowing that bio-feedback might indicate.

For example, feed-back from the labile concepts of movement may substantially affect the evolution of the concept of space. There is no

reason whatever why the sensory-motor groups of displacement should be the only significant experiences which give rise to the global concept of a physical space. An internalised space which integrates gestural and postural components, two particularly neglected aspects of the child's repertoire of movements in Geneva psychology, as well as the displacement of objects and self through a plane, may differ radically from the space Piaget has defined, both psychologically and logically. Moreover, the mere addition of proprioception still does not provide a completely satisfactory explanation for the acquisition of this concept. The data about muscle activity which the sensors in muscle cells relay to the central nervous system is post facto data : it tells what has happened. These mechanical functions cannot account for the learning of new muscle tasks. It is necessary to go further, to a synthesis of physiologic, psychologic, and mechanical information, if we are to understand how muscles learn (Brown, 1974).

The properties of the labile schemes which enable the individual to experience his own subjective world are generalisations from concrete and phylogenetically determined motility patterns. The child experiences them within his own body, and in relationship to the environment, in a consistent manner and they feature in his overt movement, such as gestures, and attention. That is, the child tends to discriminate the same kind of configurations he produces in the stimuli he attends to; he will modulate his state, and consequently his attention, accordingly. In Langer's words, 'to project feelings into outer objects is the first way of symbolising and thus of conceiving those feelings' (Langer, 1942,p.111).

Presentational symbols, or non-discursive thought, arise from the most fundamental levels of human physiology, namely the rhythms of the

physiological or biosystems which are information bearing systems in a very real sense. As such they are relatively immune to variations in cultural and early socialising practices. There is evidence of this in a study by Paraskevopoulos and Hunt (1971) of the contribution of infant-environment interaction, defined in terms of infant-caretaker ratio, to object construction and gestural and vocal imitation. These investigators examined the distribution of ages at which three groups of children achieved the various levels of object construction and imitation. The sample comprised two orphanages with differing conditions of child rearing, and a group of home reared children. It was found that the variance in the ages of the children at each level of object construction and vocal imitation was significantly different among the three groups. Conversely, the rearing conditions were found to be a non-significant contributor to the variance in ages at the successive levels of gestural imitation. It follows from this that whatever promotes the development of gestural imitation must differ appreciably from what promotes object construction and vocal imitation. Paraskevopoulos and Hunt note this implication but do not offer an explanation.

In their introduction to the Uzgiris-Hunt Scales (1966) (which were used in the Paraskevopoulos and Hunt study) the authors discuss the progression of gestural imitation. 'The infant begins to imitate simple gestures which are within his repertoire i.e. the earliest motor schemas' (p.20). According to one dictionary, a gesture is 'a motion of the face, body or limbs, used to express emotion' (Cassell, 1939). English and English (1958) distinguish gesture, used in its technical sense in psychology, from both posture and manipulation. The latter involves the use of 'the hands (or by extension, the feet or teeth) to alter the physical character of an object without destroying it : e.g. piling up blocks...' (my italics).

This, of course, is the essence of the acquisition of the concept of *invariance crucial* to discursive thought; gesture, on the other hand, is a purely motoric phenomenon expressing the rhythms of the biosystems. These findings can best be explained by maintaining a clear distinction between reflex and non-reflex motility.

Contemporary research suggests that there may be a distinct difference between the co-ordinations formed between physical actions and physical objects, and those formed between social actions and social objects. In the latter case there is the question of how dialogue is established between caregiver-infant in the first place, and then of how this gives rise to discursive symbolism. Adaptation between caregiver-infant and the relationship of this to cognitive development is a matter of considerable complexity and has been discussed in detail elsewhere (Birrer, in press). Discursive symbols emerge as instruments for the effective regulation of joint action and joint attention within the caregiver-infant dyad. In other words, *discursive symbolism is an extension of shared action which acquires conventional reference in the course of social interaction. It is the result of the transformation of those mechanisms which assure co-operation such as the congenital affect reflexes which are ignored by Piaget.*

The primary social signal is the cry and although the infant makes many sounds apart from crying, these are his earliest modes of communication and they appear to lead directly into speech. Bruner (in press) has attempted to analyse what needs to be added to these noises to transform them into legitimate linguistic utterances. Initially the infant is equipped innately with communicative routines called the demand mode. If these are responded to promptly they create an expectancy in him that his needs will be met (Lewis, 1967; Lewis and Goldberg, 1969).

When this expectancy has been established at least three changes occur. The first marks the beginning of the request mode. Next an exchange mode appears. For example, by eight months the infant not only calls for and receives an object, but he hands it back, calls again, receives it and hands it back again. The exchange mode is gradually transformed into a reciprocal mode : that is to say, the interactions between caregiver-infant are now organised around a joint task or activity. This becomes the object of the joint attention of caregiver-infant. It is the progress from demand to request to exchange to reciprocity during the first year that underlies the development of speech and, eventually, discursive symbolism. A clear line must be drawn between this and presentational symbolism if subjectivity in all its complexity is to be understood.

1.4 The Art of the Preschool Child : A Natural Biofeedback System

The aesthetic compositions of young children all over the world embody certain elements of graphic expression 'addressed only to sight and very delightful to that sense' (Langer, 1953, p.60). On the basis of her analysis of preschool child art, Rhoda Kellogg (1968) defines it as the free use of lines to make self-taught forms or Gestalts. These are not works of art but they lend themselves to composition and are therefore incentives to artistic creation. They are organising devices that impel the imagination and so motivate the work and guide its progress. Any form made of separate lines is structured but it is not to be confused with shape. The latter refers to the spatial aspect of an object whereas the former is a visual concept.

The forms that a child makes show a developmental sequence, but it is not simply a progression from simple to complex line formations. This is because the young child derives his forms mainly from his own scribbles,

which stimulate his eye; that is, the process is largely independent of the observation of things, or of drawings by adults. According to Langer, the purpose of these fundamental forms is to permeate and transform perception. 'It is the education of plastic imagination. Decorative design offers to the percipient ... a logic of vision [although] this logic is not the conceptual logic of space relations which leads to geometry.' (Langer, 1953, p.62).

The system of child art is visually logical because the child proceeds step by step. He produces variations of forms known through his scribbling and these, in turn, suggest new forms. As the child scribbles on paper it yields a new visual stimulus to which he responds as he draws. Recent research suggests that the visual system is predisposed to detect certain lines, and combinations of lines and to ignore others. Spontaneous child art seems to provide the child with a balanced, self-regulated source of biologically appropriate stimuli. The resultant bio-aesthetic development can be found in both abstract formations as well as later spontaneous pictorials. The basic visual concepts, the aesthetic forms found in early child art, are patterns, shape, design and pictorials. The manner in which these are arranged in the child's composition defines the formal aspects or dimensions which are unity, balance, tension, vitality and rhythm.

Child art, therefore, constitutes a natural biofeedback system. The body expresses its activities through changes in physiological functioning. The biorhythms are the body's means of communicating important information about itself. Development in infancy consists in the entrainment of such rhythmic occurrences to exogenous changes (Birrer, in press). Learning, at least in the early months of life, is a function of behaviour while the behaviour is occurring (Brown, 1974); because it is not a function of the consequences of behaving, it resists external control devices and procedures. The infant must generate both the behaviour to be learned as well as his own reinforcements. The actual consequences of his behaviour become organised into a flexible structure which eludes semi-logical and logical formulations such as functions (Piaget et al, 1968) and groupings.⁺ This structure utilises the information provided by itself to learn about itself, and the other. To paraphrase Langer, the projection of feelings, generated by a change of state, into external objects is the first avenue of conceptualisation.

Learning by means of biofeedback is a cognitive process which evolves from an internal circular process. Biofeedback experiments indicate that complex learning occurs on a pre- or subconscious level, and that this learning is 'orderly, symbolic, specific and highly discriminating' (Brown, 1974, p.367). The behaviour that is learned is the awareness of the relationship between subjective activity and the feedback signals generated by the activity of a biosystem. However, the feedback signal itself is not the response to be learned. This is without import until

+ Blanco (1974) may offer some solution to this problem. However, his starting point is Freud's observation that the logical laws of thought do not apply in the id and this is true above all of the law of contradiction. Thus Blanco has applied logico-mathematical tools to the study of unconscious processes. His principle of generalisation and principle of symmetry together give an account in logical terms of all the characteristics of the unconscious described by Freud. He has used these principles to explore the relation observed in man between his spatio-temporal and non-spatio-temporal aspects, as well as those aspects which are not bounded by the law of contradiction.

it becomes an abstract label for a dynamic event having certain temporally reproducible characteristics. Serial temporal pattern (cyclic and periodic) is more basic than spatial pattern. 'Given either one, a suitable system can provide the other, but it seems more likely that in actuality spatial patterns are not so often the real origin of temporal patterns as they are the consequence, in the nervous system' (Bullock, 1961, p.48). Initially the feedback signal is activated accidentally and only later is its activation intentional. This is in accord with Golomb's (1974) early comment in her study of formal competence in aesthetic thinking: 'In the pure scribble stage motor joy rules supreme and the child is unconcerned with the "looks" of the final product ... at this stage he is primarily engaged in [movement] and (re)presentational intention or pictorial possibilities simply do not exist' (p.3).

An aesthetic form can only reflect the morphology of feeling i.e. it conveys general forms of feeling in much the same way as an operation constitutes the morphology of action. Thus an aesthetic composition is an articulated analogue of emotive life: that is, its internal structure is presented for the viewer's consideration. A form has significance in so far as it constitutes a general reference to the realm of reality from which it is abstracted, 'a reflection of the laws of that realm, a "logical picture" into which all instances must fit, yet not a "picture" of any actual instance' (Langer, 1942, p.203). Its import, rather than its meaning, is the articulation and presentation of concepts, in this case concepts concerning vital experience; namely the pattern, or logical form, of sentience. In short, a significant aesthetic form in some medium expresses conceptually the nature of sentience as this is understood by the maker. Clearly, the significance of an aesthetic form is something different from meaning. Meaning implies permanent

content, and the assignment of one rather than another possible meaning to any form has not been made, nor is it appropriate. It is the ambivalence of content that permits significant forms to reflect the life of feeling in a way language, or any other discursive symbolism which has conventional reference, cannot. Aesthetic form has no unequivocal reference; it is free to convey any idea that can be conceptualised in its logical form. Nevertheless, aesthetic forms are charged with the logical possibility of meaning and they have truth value; this resides in their degree of equivalence with the forms of feeling.

Aesthetics then, is the semantics of vital and emotional facts. If art has any significance it is semantic, an articulation of lines, masses, colours and textures; it is not the symptomatic expression of feelings that overwhelm the creator. It is not derived from affects, nor is it intended to evoke them; it is about them. The symbolic function of an aesthetic form is the logical expression of feelings which may, or may not have been experienced by the artist, the conceptualisation and presentation of sentient life. Put another way, art is the creation of forms symbolic of human feeling in general (Langer, 1953).

Of central concern to genetic epistemology broadly conceived, is the mechanism for the origin of aesthetic forms; that is, which of the body's activities is the child translating into outward signs. There are relatively few naturally occurring signals such as the pulse, which can be felt, thereby providing information about the individual's interior activity. Piaget (1972) and Werner and Kaplan (1967) have already been cited to the effect that we can become aware of muscle activity (or heart or brain function) only by directing our attention to them and using some

effort, and then only to a limited extent, if at all. For the most part the functioning self gives very little external evidence of inner activities. It is for future research to determine which of the biosystems is the principal communication channel for feedback information about various discrete subjective activities. Contemporary evidence tentatively points to the rhythmic electrical charges carrying the messages of the motor nerve to the muscle cells as the source of the labile schemes. Human subjects are able to isolate - and activate - tiny twitches in striated muscles. Yet as Brown (1974) notes, there is no sensation, 'there is no clue except the rhythm which in a very real sense, is artificial to the person ... is it that our complex brain machinery is so accustomed to the task of discriminating rhythms that no conscious mental effort is required? If so, then doesn't muscle biofeedback offer us whole new vistas for exploring unconscious, productive mental effort?' (Brown, 1974, p.165). This feedback is probably also supplemented by rhythmic discharges generated by the spontaneous functioning of other biosystems.

However, aesthetic development must go beyond this, since it occurs partially within an expressive medium. The difficulty this raises is that some record of the resultant eye movements must be made in the central nervous system. This possibility has been questioned because of the controversy about feedback from the eye muscles; it is known, for example, that proprioceptive (mechanical) input from the eye muscles is poor (Howard and Templeton, 1966). Moreover it is not known exactly what things are included in the category of proprioceptive input. On the other hand, Festinger and Cannon (1965) have shown that the outflow of impulses to the eye muscles in saccadic movement, though not in pursuit movements, is recorded. Knowledge of saccadic movements of the eyeball is not, therefore, dependent on proprioception.

This, and other evidence (Gaarder, 1968; 1975; Gaarder et al. 1964; 1966) implicates visual homeostatic regulation of information or, more precisely, image processing. Three concepts inhere in this notion : first, the brain affects vision by moving the eye in a determinate patterned way by means of the saccades, and thereby regulates the rate of processing; secondly, there is a specific discrete response by the individual to a specific discrete stimulus; and thirdly, these responses are triggered by the saccades and not by external events. The movement of the eyes through the saccades (and eye drifts and tremors) is controlled in a way which, in turn, exerts control upon the resultant visual input (Gaarder, 1975). In other words, the line (or lines) of an aesthetic form which are transmitted is centrally controlled because the saccade is centrally controlled feedback which, therefore, selects the particular line optimal to the perceptual task. Thus each visual environment created by the child presents to him a unique combination of areas that change and areas that do not change during saccadic movement.

In short then, the learner 'must select the significant values of his own behaviour in order to generate a signal that is his own reward for successful learning, and it must be appropriate or learning does not occur. The circuits of the feedback system are either closed and operating or they are not closed and not operating.' (Brown, 1974, p.368). This is exquisitely illustrated by the operation of the saccadic system which, in conjunction with the messages relayed by the motor nerve, constitute a natural and simple biofeedback system. Thus the graphic forms and early pictorials are the result of the spontaneous functioning of the primary motility system in conjunction with visual perception in an expressive medium.

1.5 Summary

In summary, objective knowledge derives from the child's actions in relation to the world of objects and it gives rise to discursive thought. It may be constructed by the child as a result of direct contact with things, or it may be a function of the feed-back from his own actions, that is, from the conceptual system structured in the course of his actions. In either case, objective knowing in its initial stages involves an outward orientation toward the world. On the other hand, the child's subjective knowing with which he will later infuse a perceived object or event, is not governed by his perception of objects, nor by his actions on them; it arises initially from marks made by the spontaneous movements of his motor system which evolve in an expressive medium to constitute a fund of presentational symbols which are logically equivalent to the forms of feeling.

Hamburger (1963) has proposed a motor action system to account for his findings in the field of behavioural embryology. If there is anything analogous to this in man, and experiments in sensory deprivation suggest that there is, then the formal dimensions intrinsic to aesthetic compositions that have been valued by mankind through the ages, may well be found in the child's earliest productions. Nor is there likely to be a significant difference between boys and girls in their capacity to use lines prior to the imposition of cultural formulae. These are unlikely to be effective in the young child until his cognitive structures have undergone the qualitative reorganisation that renders him susceptible to formal instruction. However, the human being remains a biological organism

throughout his life and his fundamental rhythms are probably not ever substantially altered by experience.⁺

Further, the aesthetic forms that mark each stage of aesthetic development (Kellogg, 1968) will probably not differ significantly among young children, unless a child has suffered extreme deprivation and constraint in infancy. In other words, the forms of art, child and adult, are universal. The process of aesthetic development is the search for structural equivalences of form in a given medium (Arnheim, 1957). Neither child nor adult attempts to copy reality; his task is to invent structurally adequate forms which are non-discursive. The forms the child uses in drawing are not provided by any object; they are created by the child in terms of his fundamental biological constitution.

However, this implies that aesthetic development, where art is defined in terms of its forms and their arrangement, has sources and emotional effects of its own. This view of the autonomous roots of subjectivity is in direct contrast to those of psychologists who attempt to make aesthetics subservient to psycho-sexual development or to relate the child's drawing to unconscious personality dynamics, in particular his self-image (Machover, 1949; Bender, 1952; Hammer, 1968; Koppitz, 1968). For example, such characteristics as the size and placement of the figure,

⁺ It could be argued that sleep and waking rhythms are an exception to this. However, on the basis of recent evidence Sterman (1972) proposes that sleep-wakefulness are secondary phenomena. The rest-activity cycle is the fundamental aspect of physiology, both functionally and in terms of the structural evolution of the central nervous system; further, it has a differential development to sleep-waking states. A circadian rhythm of diurnal waking and nocturnal sleep is first manifest in the human infant during the second or third week of life (Rutenfranz, 1961) and becomes stabilised by six months of age (Kleitman & Engelman, 1963). In effect, therefore, sleep does not exist in the newborn infant. Moreover, while the duration of the sleep and waking components of this rhythm continue to change with age, the rest-activity cycle does not.

completion or omission of features, pressure of line, shading of body and limbs are regarded as signs of unconscious personality characteristics, needs, affects and motives related to the child's self-image. However, in his review of the literature on this subject, Swensen (1968) concluded that as far as children were concerned the evidence of body image projection in their drawings of the human figure was negative.

Among other interpretations were those by investigators who considered drawings symbols for reality (Sully, 1896); others interpreted them functionally, in terms of the parts that were important to the child. Eng (1931), in contrast, regarded the memory image which the child forms of an object as confused and therefore responsible for the imperfect drawings. The theory which holds currency today is that the child's drawing is an index of his concept of the object (Goodenough, 1926; Harris, 1963). According to this theory, early drawings reveal the child's deficient analysis of the object and his inability to synthesize the individual parts into a coherent presentation. They reflect conceptual immaturity and are symptomatic of syncretic reasoning (Piaget, 1926; 1962; Werner, 1948). Thus the emphasis was shifted from vision to knowledge. The child draws what he knows, not what he sees, and he draws what is most important to him. In both cases there is gross misinterpretation of formal development in the sphere of aesthetics.

CHAPTER 2

THE STUDY

2.1 Hypotheses

2.1.1 Hypothesis 1

The child's aesthetic compositions at three, four and five years of age manifest the same formal dimensions (i.e. rhythm, balance, tension, unity, vitality) that characterise a mature work of art.

2.1.2 Hypothesis 2

Aesthetic development undergoes a qualitative change after the age of five years.

2.1.3 Hypothesis 3

The formal dimensions which characterise an aesthetic composition are not influenced by the mother's reactivity to her infant's behaviour.

2.1.4 Hypothesis 4

There is no significant difference between the formal dimensions in the compositions of boys and girls.

2.2 Subjects

Sixty children contributed paintings and stories to this study, ten boys and ten girls at each of three age levels, 3-3:11, 4-4:11 and 5-5:11 years of age. The children at each age level were randomly select from the attendance lists provided by the supervisors of three Hebrew Nursery Schools in the Northern suburbs of Johannesburg. The school admission reports of the children selected, compiled by the supervisors in conjunction with the mothers, were then read and substitutes were found for children who had received unfavourable comments in regard to eye-hand co-ordination, 'perceptual' difficulties, and where there was a history of dyslexia in the family. There were no authenticated reports of behavioural problems, but children were excluded who, in the supervisor's opinion, showed evidence of deviant patterns, such as extreme withdrawal.

A standard letter was sent to the parents of each child selected, requesting permission for their child to take part in a study of artistic development at the preschool level, and soliciting the co-operation of the mother. Mothers were requested to make an appointment to meet the writer at the school for the purpose of completing a form to furnish information on their child's behaviour during infancy which might provide leads to the determinants of artistic giftedness (Maternal Interview Scale). There were no refusals.

Since they attended nursery schools, the children in the sample do not

form a group representative of white preschool children in Johannesburg. They are a group of socio-economically privileged children, the great majority of whose parents are professional people. There are no instances of siblings in the sample, so that the number of families represented is sixty. It is not known whether the children are representative in terms of their intellectual ability.

2.3 Procedure

2.3.1 The Data

The data in this study were derived from two sources :

- (a) Sixty easel paintings in the medium of poster paint, one obtained from each of twenty children, ten boys and ten girls, at each of the three specified age levels (3-3:11; 4-4:11; 5-5:11); analysed on the Scale of Formal Dimensions.
- (b) The Maternal Interview Scale (Appendix A) which was used to obtain :
 - (i) quantitative information concerning the patterns of reactivity of the child to his primary caregiver during the first months of life;⁺
 - (ii) quantitative information concerning the patterns of reactivity of the mother to her child during the first months of life. The degree to which the subsequent organisation of the child's biorhythms was influenced by the mother's patterns of reactivity was determined by correlating the scores obtained from each of the six categories on the Maternal Interview Scale with those obtained from each of the five categories on the Scale of Formal Dimensions.

+ In this context reactivity measures the level of operation of the infant's innate biological patterns of response. It is pointed out on pp.40 and 44 that there are now more appropriate measures available for use.

The method used to collect these data is detailed in subsection 2.3.2.

In an attempt to determine whether aesthetic development is autonomous and not a by-product of psychosexual development, for example, the child's compositions were analysed in terms of the formal dimensions which characterise a mature work of art (Arnheim, 1957; Gaitskell, 1958). The presence, or absence, of these dimensions in the preschool compositions was assessed on a Scale of Formal Dimensions. This was devised to detect the fundamental elements of graphic design in any composition by the writer, in conjunction with a candidate for a Masters Degree in Fine Arts and a lecturer in the Department of Fine Arts at the University, in 1973.

The dimensions are those which are thoroughly explicated by Arnheim (1957) which he, in turn, derived from an exhaustive evaluation of works of art over a vast period of art history. The dimensions were operationally defined by the authors where Arnheim had omitted to do this and examples of works which most appropriately illustrate one particular dimension, although they may also contain others, were selected. A panel of five local artists and ten Fine Arts graduate students agreed that these examples exemplified the dimensions as defined during a series of weekly meetings over a period of three months.

The criteria used to determine whether a dimension was present were developed in relation to Arnheim's (1957) hidden 'structural map' (Fig. 1). Arnheim himself has gone a long way in this direction, but his criteria were simplified quite considerably to deal with the less technically sophisticated compositions of adolescent and younger children. Since it was accepted that aesthetic development consists partially in the mastery of cultural formulae in an expressive medium, artistic maturity, as opposed to musical competence for example, is probably a relatively late development. Thus, the Scale attempted to ignore those facets that depend on the

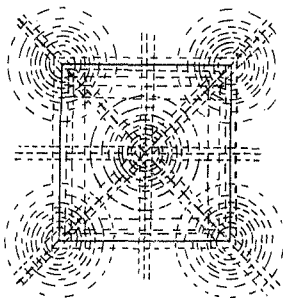


Figure 1 - The Structural Map

acquisition of specialised technical skill, such as the depiction of texture and light and shade, and concentrate instead on the basics of design which are intrinsic to any good composition.

The structural map comprises the horizontal and vertical axes as well as the right and left diagonals which are implicit in every composition. It constitutes a frame of reference for any abstract or presentational form. Unlike Arnheim, Barnhart (1938) has moved beyond a description of compositional arrangements to a psychological analysis of these complex relationships and the kinds of factors involved. This study is relevant to formal arrangements in child art since it deals with the simplest type of composition : a single simple figure on a two-dimensional field. Barnhart attempted to discover what positions the subjects would choose on the field for the placement of a single element and what reasons they would advance for those placements giving satisfactory

compositions. The figure was a small black dot and the field a white rectangle.

The subjects were 110 male and female college students. Each received three blank white library filing cards and a small circular dot. The subjects were instructed to find the best spot for the dot on each card and mark it. The reasons given by the subjects for their placements fell into four categories: formal compositions (75.5 per cent), depictive composition (1.8 per cent), suggestive compositions (17.2 per cent) and compositions without reasons (5.5 per cent). The majority of compositions constructed were those in which the factors considered were solely the parts of the rectangle and the dot and the achievement of some sort of relationship between them (i.e. formal compositions). The composition was the result of such patterning and was not influenced by external demands for representation.

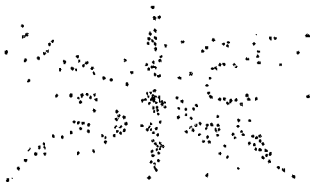


Figure 2 - The Relation of a Single Element to the Field

Figure 2 represents the dot placements of the two hundred and forty nine formal compositions. A number of fairly well defined regions of the field constitute the areas of maximum placement while

other regions were never or seldom used. The homogenous clustering of placements in the centre and in the mid regions of the horizontal and vertical lines from the centre to the sides shows that a large number of compositions were constructed with dots at these five locations. The long clusters of placements reaching in from the corners towards the centre along the diagonal zones in the upper quadrants indicate that many compositions were made with dot locations in these areas. Such agreement is not so clearly manifest in the lower quadrants. There are many similar compositions with placements in an inner region lying on the right and left sides of the upper vertical regions and close to the respective diagonal zones. Thus the four main lines which define Arnheim's structural map have received experimental support. It is the relationship of an aesthetic form or element to these four main structural lines that determine whether a composition has balance, rhythm, tension, unity and vitality.

(i) Balance. All forms and/or colours in an aesthetic composition must be distributed in such a way that balance is achieved relative to the horizontal and vertical axes. Compositions are assessed in terms of whether they manifest horizontal balance, vertical balance and diagonal balance (e.g.s Leonardo's 'Virgin of the Rocks'; Raphael's 'Alba Madonna').

(ii) Rhythm. Rhythm is defined as related movement which is achieved in one or all of three ways. First, through the repetition of forms. When forms are regularly repeated at intervals that are well proportioned, a movement is created which carries the eye from one form to the next. Secondly, it may be due to an easily connected or continuous line movement or, thirdly, to continuity of form (e.g.s Boccioni's

'The Forces of a Street'; Titian's 'Danae and the Golden Shower').

(iii) Tension. Tension refers to the perception of movement within an immobile form. The main device for distinguishing action from rest is obliquity. The primary condition for the effect is the amount of deviation from the basic spatial framework of vertical and horizontal. It is also dependent on the proportion of elements, one to the other, and of all of these to the overall frame (e.g.s Miro's 'Maternity'; Tintoretto's 'Finding of the Body of St. Mark').

(iv) Unity. This exists when the forms in a composition are arranged in such a way that the effect is harmonious. In adult art this is generally achieved by surface texture which is absent in preschool art. However, in the latter case, it may be achieved by similarity of aesthetic forms and/or similar, or monochromatic colour values (e.g.s Seurat's 'Les Poseus' and the works of Monet).

(v) Vitality. This constitutes the excitement created by the use of shape, form and colour. It generally depends on an off-balance of forms (e.g.s Klee's 'The Order of High C' and the works of Kandinsky). In preschool art it is assessed in terms of boldness of form and colour.

The scale was designed initially to assess eighty works produced by fifteen-year old male and female pupils at the School of Art, Ballet and Music, Johannesburg. The compositions were judged independently by two artists who achieved 98 per cent agreement. The scale was applied in the following year to a large selection of young children's paintings presented for display at the Preschool Child Conference (1974). These compositions were submitted by twelve nursery schools in Johannesburg, including several in Soweto Township collected by the Chief Inspectress,

City Health Department. Two judges who were thoroughly familiar with preschool child art, but who had not seen the scale previously, achieved 88 per cent agreement in their assessment. The primary source of disagreement was the definition of proportion, a criterion of tension, in the young child's work.⁺ Since this could not be resolved even after extensive consultations with artists and art educators, a painting was judged to exhibit tension if the forms manifested obliqueness, or if their arrangement was oblique, and if the composition was asymmetrical relative to the horizontal and vertical axes. The paintings were reassessed on the amended scale and the judges achieved 92 per cent agreement.

In this study each painting was scored by two judges independently. One judge was a nursery school teacher who, in addition, runs art classes for the preschool child. The other was an artist with no experience whatever of preschool child art. Ninety six per cent agreement was achieved between them in their assessments. The criteria which defined the five dimensions were judged to be either present or absent, and scored one to nought accordingly. These were summed to yield an item score for

⁺ Initially these difficulties appeared insoluble. In fact, the disagreements held up the analysis of the compositions for more than a month. The question of proportion in the child's productions needs to be thoroughly researched since the proportions of the humans the child draws are so often taken as an indication of 'inner state'. 'Asking a child to draw himself, his parents, or simply a boy or a girl has become one of a number of ways to appraise growth, development, intelligence, and in some cases a patient's psychological status'. (Coles, 1964, p. 40, my italics).

According to Golomb (1974) preschool children generally are indifferent to the relative size of their figures. The first circles are quite large and the other parts, of necessity, smaller. 'The sweeping motion which creates the large circle does not carry a specific emotional or projective significance' (p.61). Only when a figure has achieved a satisfactory level of graphic differentiation and can be drawn competently is the child ready to attend to differences of size, proportion, form, sex and direction. That is, only when the child has advanced beyond an appreciation of topological concepts (cf. p.77). The dominance of preferred forms over accurate proportion determine the size of the child's creations and emotional significance should not be arbitrarily attributed to them.

each dimension, as well as a total score for the scale. The item scores were correlated with the item sums for each category of reactivity on the Maternal Interview Scale (activity level, rhythmicity, approach/withdrawal, adaptability, intensity of reaction, attention span and persistence) to determine whether there was any relationship between the formal dimensions and the practices adopted in respect of the infant's patterns of reactivity or basic rhythms. The item scores were also intercorrelated to determine the relative independence of each item from any other. These intercorrelations appear in Table 11 (p. 77).

Percentages of boys and girls exhibiting the formal dimensions in their compositions at each age level were computed (Table 3; Figures 3, 4, 5). These were compared and reference made to the correlations between the categories on the Scale of Formal Dimensions and those on the Maternal Interview Scale, in an attempt to detect any possible developmental trends which might account for the depression in scores found on some dimensions. The scores of the boys and girls at each age level were then combined and the scores for the children at the three age levels compared to determine whether there was a significant difference between the means on the formal dimensions.

2.3.2 Method

The easel paintings were collected in the second term of 1973 during regular school sessions before 12.00 p.m. This time of the year is a quiet period in the school, relatively free of the disruptive preparations for festivals. The children, in particular the three-year olds, are generally settled. The material was requested from the children by the supervisor in each school since it was felt that a person familiar to the child would encourage the most spontaneous response. Also, none of the supervisors involved were responsible for any one group and therefore had more time than the group teacher to concentrate on the project and to

observe the standardised requirements in so far as possible.

During a period of five consecutive days (i.e. from Monday to Friday) which did not coincide in the three schools to give the writer the opportunity to make observations, pieces of manila paper $20\frac{1}{2}$ " x $16\frac{1}{2}$ " were attached to the one side of the double easels in the art area. The easels are tall enough to permit the child to stand at his work. The upper edge of the paper was about 42" from the floor permitting the arm to work at shoulder height. The supervisor wrote the child's name in the upper left hand corner when he had finished to facilitate orienting the painting for evaluation purposes. Powdered poster paint was mixed with water and placed in glass jam jars. It was furnished in five colours, red, yellow, green, blue and purple. However, although the strength of the paint was specified (i.e. one tablespoon powder paint and one-third pint water) this was clearly not observed in some cases, complicating evaluation where it depended on the weighting of a composition by the disposition of colour, thereby contributing to symmetry or asymmetry and to the judgment of 'vitality'. Moreover, the colours became somewhat mixed when a child painted over another colour or returned a brush to the wrong jar. Each jar of paint was provided with the large wash brush which is standard in nursery schools. It would have been desirable to colour the handle of the brush to match the paint in which it was to be used although it is doubtful whether this precaution would have obviated the accidental mixing of colours. Auxiliary materials were oil-cloth aprons and in one school, a linoleum under each easel.

The approach to each child was standardised: 'I am collecting children's paintings to put into a special book. I would like to put one of your paintings in it. Every day this week our activity is going

to be painting. Will you make me a lot of paintings so that I can choose the one I like best ?'. No rules were imposed since children in nursery schools are prevented from the first from abusing art materials. They are taught to wear an apron when painting, to wipe the brush against the side of the jar before using it and to return the brush to its own jar, though this does not always occur. No suggestions whatever were made or restrictions imposed in respect of the actual painting. After the child had completed a painting it was removed from the easel and allowed to dry on a flat surface to prevent the paint from running.

At the end of the week one painting per child was chosen by the supervisor from his total output during the preceding five days. The choice was made on the grounds that the composition represented the child's best effort among those produced. Willingness to comply with the supervisor's request, and therefore the quantity of paintings produced varied considerably among the children, as well as among the three schools. One aspect which was overlooked was the influence of a double as opposed to a single easel on the quantity, and possibly the quality, of the child's productions. In most cases the children were not given access to both sides of the easel. Thus it is not known whether an increase in painting facilities would have affected a child's desire to participate in so far as it would have extended both physical and social facilities.

This method was an attempt to increase the incidence of the elementary aesthetic forms and their formal arrangement in a composition. It was felt that this called for a special set of conditions which included the following aspects :

(i) a motoric condition, since it is postulated that the rhythmic electrical charges carrying the messages of the motor nerve to the muscle cells are the primary source of the labile schemes. The child was therefore asked for a behavioural item which involves maximum gross motor movement and which can be recorded with a minimum of equipment.

It is submitted that the request for a painting meets this condition and that it cannot be interpreted as action upon the environment. Action is behaviour with volition or intent (English and English, 1958). However, investigators concerned with the course of the child's ability to draw agree

... that the child's first productions are purely motor phenomena or merely hand movements or scribbles without meaning, and that his first satisfaction is derived from the simple rhythmic movement ... this purely motor stage persists even at an age when the child recognises and reacts to many complicated sensory patterns in his world' (Bender, 1932, p.196; also c.f. p.20).

More importantly, it is very difficult indeed to see how the production of a composition can be confused with manipulation, which is the essence of an act within the context of genetic epistemology, when the objective attributes of an object, the manipulanda, which make manipulation possible, are absent.⁺

The crux of this dissertation is that there are at least two kinds of knowing, one with logical and physical polarities and expressed in logic, language (prose) and formal languages, and a second designed to express and articulate feelings by means of non-verbal symbolism. Similar

+ This confusion is due to the failure to distinguish (or to maintain the distinction) between key terms, in this case the criteria of action as opposed to movement. Such confusions present a serious barrier to the conceptualisation of the foundational issues in early human development, and consequently to any major advance in this field. The main problem lies in the fact that there is a crucial difference in all aspects of cognitive acquisition between the first steps - which are relatively independent of controlled environmental input and probably not 'learned' in the usual sense - and subsequent refinements (Hebb, 1949; Wolff, 1969).

dichotomies of two kinds of thinking have been put forward by Polanyi (1958) and others. In this context Bruner's (1968) speculations are extremely interesting. Bruner proposes a similarity between manipulative hand skills and some formal language skills - specifically the notion of subject and predicate - and suggests that in infant action on the objects in his world, one may find direct precursors of the formal aspects of language. The speculation here is that the prototypes of expressive or labile schemes and concepts are to be found in the infant's motility patterns.

An attempt was made initially with 20 five-year olds from a fourth school to assess the relative merits of a crayon composition and a painting in meeting the requirement for a concrete manifestation of the functioning of the primary motility system. Both media present the transformation of one or more of its discrete activities. It is definitely felt that crayon is the more appropriate medium. For one thing, it is more 'transparent' and reveals underlying forms which all young children have a tendency to conceal under layers and layers of the expressive medium. However, the children apparently had had little experience with it, or confidence in its use, and the idea was abandoned.

While it is claimed that the motoric condition has been met and that child art constitutes a natural and simple biofeedback system it is obvious that the experimental study of the primary motility system, of subjectivity and of concomitant issues such as the relationship of the latter to objectivity is considerably more complex. Bioelectric recording techniques, and in particular the electromyograph may perhaps be used for investigating the acquisition of conceptual structures for dealing with events not 'given' to perception.

(ii) consequently, a condition that limits the vehicle of expression. This was met by the request for a painting.

(iii) the absence of relevance of this behaviour to the immediate environmental situation, or to any other concrete situation. This implies fictitiousness and was intended to encourage the spontaneous production of abstract forms which characterise preschool art, rather than representations that accrue only when the graphic forms have been adequately articulated.

(iv) the lack of specification of what the painting should be about increased the child's dependence on internal, individual resources.

An attempt was made to assess whether the infant's patterns of reactivity which elicit individual parental patterns of reactivity influence the manifestation at three, four and five years of such elements as rhythm and balance in an aesthetic composition. The scale used to gather this information was adapted from Thomas et al. (1963). This scale was designed to measure what Thomas et al. call the individuality of behavioural responsiveness of young infants. It is, therefore, thoroughly ambiguous in that responsiveness is a relational term in its fullest sense: behaviour is always a reaction to an endogenous or to an exogenous stimulus. Each category in the Scale (in both its original and adapted form) is primarily concerned with the infants' responsiveness to his caregiver; even in the case of sleep-waking, behavioural patterning is susceptible to caretaker influence. For example, Sander (in press) has studied the differentiation of sleep and wake states in three infant-caretaker dyads in the immediate postnatal period. The experiment was designed to discover whether the initial adaptation between infant-caretaker is due to non-specific factors related to feeding, holding and quieting, or

whether it depends on idiosyncratic factors related to differences in the characteristics of the caregiver and the infant. He found an effect of individual caretaker on duration of longest sleep and longest awake period per 24 hours. Between days 11-29 the infant cared for by one of the two surrogate mothers developed significantly longer sleep and awake periods per day than did infants cared for by the other.

However, the infant not only responds to his caregiver; he also exerts considerable influence on her. As Stern (1974) points out, interaction between mother-infant is a unique human interchange. Many behaviours performed by mothers occur only in the presence of their infants and represent unusual variations of normal adult behaviour. Similarly, many of the infant's behaviours are seen in their fullest form only during interaction with a caregiver. Thus 'we consider as does almost everyone else in the same research area, that individual differences can have no factual definition or meaning except in the context of universal characteristics of neonatal functioning' (Escalona, 1962, p.13). In the introduction to a volume devoted to the neglected topic of the effect of the infant on its caregiver, Lewis and Rosenblum (1974) point out that the almost exclusive emphasis on the effect of certain maternal behaviours on specific infant functions is not only false but illogical: '... the mere size of a child in terms of its height and weight, immediately and with no other information, acts upon an approaching adult...' (p.xvi, my italics). Thus a concern that was first tentatively broached by Escalona as early as 1953 in her important monograph on emotional development in the first year of life is now receiving increasing clarification in contemporary psychology.

The infant's environment, which include his caregiver's patterns of reactivity are constantly modified by his own body form, and his behaviour. The child with nothing more serious than infant eczema alters his image

from one of a rewarding and reassuring evidence of his mother's charm and femininity to that of an unattractive and sticky creature requiring an inordinate amount of time and attention. On the behavioural side the work of Ainsworth and her colleagues (1972) has demonstrated, for example, how tightly knit are the infant's cry patterns, the mother's intervention patterns and the child's adoption, in the last quarter of the first year, of modes of communication other than crying. A measure of 'responsiveness' says at least as much about the 'individuality' of the mother as about the 'individuality' of her infant.

It is legitimate therefore to use the Scale in either, or both, of two ways : as a quantitative measure of the young child's patterns of reactivity, or as a quantitative measure of the caretaker's patterns of reactivity. As such, it is not possible to specify what a high score on the Activity Level measure indicates about maternal practices compared with maternal practices for a child with a low score. However, this flaw is endemic to the Scale itself and is, in any case, irrelevant in this study but it is also a difficulty which is common to other analyses of the effects of caregiver on the infant and vice versa. In the study mentioned above, Sander, who is perhaps the leading contemporary thinker in the area of early human development, observes that

both women were under our daily observations, both were adhering to the rule of not waking the baby for a feeding, both were recording sleep and wake onsets reliably. The key determinant [was simply] which of the two women did the caretaking. There were many differences between the two women. We are unable to specify causative factors..' (in press).

Recent reviews of research on the effect of parental practices or techniques (Mussen, 1970) now uniformly recommend caution in interpreting correlations between parent and child characteristics in a unidirectional fashion, and some even go further, offering substantive interpretations of

the correlations in terms of the effects of children on parents (Bell, 1975). Today, there are a variety of research strategies applicable to the contemporaneous study of mother-infant interaction which do make it possible to isolate child and parent effects (e.g. Ososky and Danziger, 1974; Lewis and Freedle, 1974). Conversely, although Thomas et al. do not explicitly recognise the fact, their Scale is a measure of what Bell (1975) calls an appetitive system, in that both parent and offspring behave in a manner that produces or maintains the behaviour of the other. No logical leap is involved in exploiting the chronic ambiguity of such a measure.

The choice of instruments in this study was limited by its retrospective nature. There are serious indictments of the use of retrospective methods to gather information regarding the impact of child rearing experiences on child behaviour (e.g. Yarrow, Campbell and Burton, 1968) and the unreliability of the resultant 'facts' is also evident here. However, the premises regarding early learning which underlie this undertaking differ from current views on the subject and these are stated in the introduction (Section 1.4). On this approach qualitative measures were not required.

The experimental investigation of the primary motility system, and the conscious or unconscious transformation of its various activities⁺ into non-discursive or presentational symbolism involves, on the one hand, a detailed interactional analysis which can isolate mother-infant effects. On the other, there is the necessity for continuous - preferably automatic - monitoring of infant activation or motility⁺⁺ possibly by the appropriate use of telemetric devices. The potential contribution of bioelectric recording techniques to an understanding of the primary and secondary motility systems has been noted. The advantage of the stabilimeter

+ These include at least the GSR, EMG, ECG and EEG.

++ Activation and motility are treated as synonyms. However, they are not identical, but the distinction demands considerable theoretical refinement.

designed to assess motility type in neonates (Sander and Julia, 1966) is that it also provides round-the-clock monitoring of caretaking intervention.

The interactional analysis which could be most revealing of the role of the primary motility system in general cognitive competence is recent and offers an undeveloped methodology. This was impracticable for use in a study of this limited scope. Motility assessment is currently - and probably inevitably - dependent on costly instrumentation. Under these circumstances the integral duality of the Maternal Interview Scale was accepted and exploited.

The mothers of the children in the study sample were, in most cases, interviewed by the writer at the appropriate school. However, a few interviews were conducted in the parents' homes. The Scale was completed during the interview, which rarely exceeded one to one-half hours in length. According to the authors of the Scale, the oft-noted degree of distortion in a retrospective report is largely due to the lack of specificity and objectivity of the questions asked. Accordingly, the data sought from the mother were descriptive, not interpretative, facts of behaviour; the emphasis was on how the baby behaved in specific situations. Nevertheless, it was quite obvious that the accuracy of the mother as a reporter of behavioural events is critically affected by the distance in time of the interview from the event described. The longest period from birth to the first interview in the Thomas et al. (1963) study was three months; in this study it was five years. Furthermore, it was clear by the end of the interview that while the majority of mothers claimed to have been the primary caregiver, African servants had made a substantial

contribution in this regard, and that many of the infant's initial reactions to novel stimuli and situations were probably missed by their mothers. However, an overall picture of the child's patterns of reactivity, and in particular, his motoric patterns, did emerge.

The scale used in this study was modified in two ways. First, Thomas et al. (1963) used nine categories to assess the infant's patterns of reactivity. Only six of these were included in the present scale: activity level, rhythmicity, approach or withdrawal, adaptability, intensity of reaction, attention span. Threshold of responsiveness, quality of mood and distractibility were omitted after the completion of the first ten interviews. There appeared to be considerable overlap between threshold of responsiveness and intensity of reaction, quality of mood and approach/withdrawal, and distractibility and attention span. In order to assess the overlap amongst those categories that were retained, the intercorrelations among them were computed. These appear in Table 12 (p. 84). The time needed to complete the interview was thereby reduced to approximately forty-five minutes.

Secondly, Thomas et al. (1963) adopted a three-point scale in order to score their protocols. The three points selected for each category of reactivity were the polar extremes and a middle level. Therefore every behavioural record was scored for each of the categories on a three point scale which resulted in a specific item sum for each category of reactivity, as well as a total score: (p.57).

In the present study a concerted attempt was made to use this method. However, in view of the lengthy interval between the occurrence of the

infant's behaviour and its description, a two-point scale was adopted instead. The Scales were scored by the writer in this way. The type of difficulty encountered may be illustrated by an example from the category Approach/Withdrawal.

Q : What was the response to solid foods ?

A : He liked it; he couldn't stand it; etc.

These answers are interpretations rather than descriptions and, as such, are ambiguous. However, it was very difficult indeed to elicit from a mother precisely why she had deduced that 'he hated it': for example, 'he spat it out', 'he turned his head away' which, in any event might simply have been an indication that the child was not hungry. The standard answer in these circumstances, particularly from mothers of five year olds was 'I don't remember'. Interpretations were therefore accepted and scored on the same basis as descriptions : the infant either exhibited approach behaviour or he did not. 'He couldn't stand it' and 'he cried' were granted the same status for purposes of scoring, although they are clearly not equivalent manifestations of withdrawal although they are probably adequate for the limited purposes of this assertion. Thus every Maternal Interview Scale was scored for each of six categories of reactivity in binary fashion. These were summed to yield both :

(i) an item sum for each category of reactivity. Each item sum on the Maternal Interview Scale was correlated with the item sum for each category on the Scale of Formal Dimensions to determine whether there was any relationship between the two;

(ii) a total score.

The correlations among the eleven test variables were subjected to factor analysis on the IBM 360/50 Call Service. The analysis was undertaken to determine whether the claim that a motor factor is predominant during the preschool years in aesthetic development, defined in terms of forms and their arrangement in the child's compositions, can be supported. The analysis is based on the intercorrelations among the eleven categories on the Scale of Formal Dimensions and the Maternal Interview Scale.

(ii) a total score.

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CHAPTER 3

RESULTS

3.1 The Scale of Formal Dimensions

The percentage of boys and girls in whose compositions the formal dimensions were reflected at each of the three age levels is shown in Table 3 and in Figures 3, 4 and 5. Figure 6 compares the composite scores of the children in each of the three age groups in terms of the presence of balance, tension, rhythm, unity and vitality in their compositions.

Scrutiny of the combined scores (Figure 6) clearly indicates that the first hypothesis has been confirmed. The factor analysis of motoricity (pp. 52-54) which is implicated by this hypothesis, suggests that the particular discrete activities of the primary motility system which the child is translating into presentational symbolism is the rhythmic electric charges of the motor nerve.

Table 3 : Percentages of Children Reflecting Formal Dimensions in Their Paintings

Group		Balance	Tension	Rhythm	Unity	Vitality
	No	%	%	%	%	%
3 years						
Boys	10	50	60	90	90	100
Girls	10	80	60	90	100	90
4 years						
Boys	10	60	70	70	100	80
Girls	10	90	50	100	60	70
5 years						
Boys	10	80	90	70	80	70
Girls	10	100	40	30	90	100

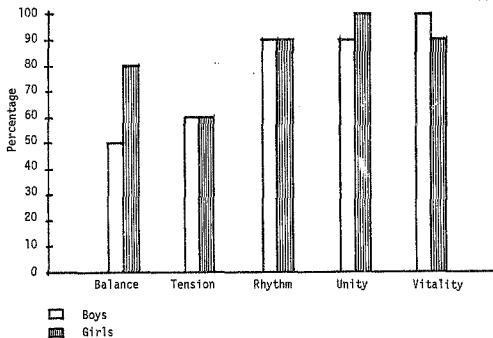


Figure 3 - Percentages of Children Reflecting Formal Dimensions in Their Paintings : Three Years

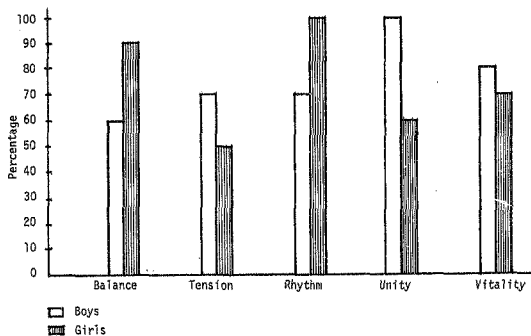


Figure 4 - Percentages of Children Reflecting Formal Dimensions in Their Paintings : Four Years

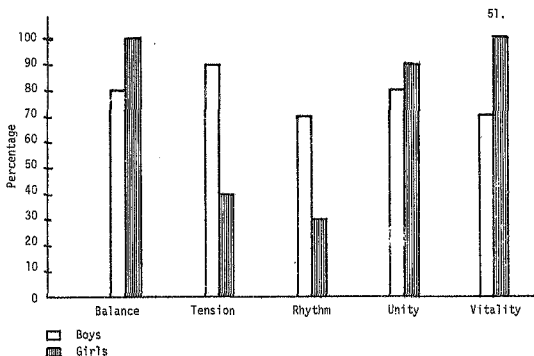


Figure 6 - Percentages of Children Reflecting Formal Dimensions in Their Paintings : Five Years

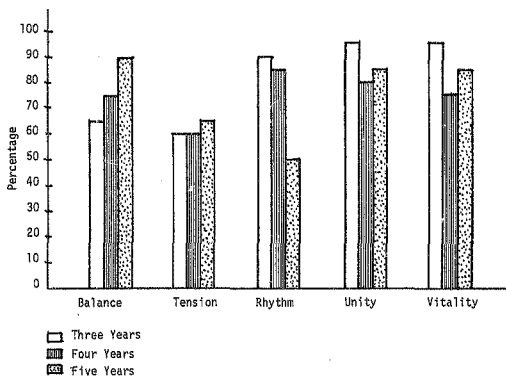


Figure 6 - Percentages of Children Reflecting Formal Dimensions in Their Paintings : Combined Scores

3.1.1 A Factor Analysis of Motoricity

The correlations among the test variables were subjected to factor analysis on the IBM 360/50 Call Service. The matrix of intercorrelations appears in Table 4.

Table 4:

	1	2	3	4	5	6	7	8	9	10	11
Balance	1	-.36	.03	.20	.02	-.31	-.29	-.25	.0	-.03	0
Tension	-.36	1	.01	-.02	.13	.02	.08	.01	.19	.06	-.04
Rhythm	.03	.01	1	.18	.20	.35	.34	.39	.02	.16	0
Unity	.20	-.02	.18	1	.25	.15	.14	.18	.17	.09	-.12
Vitality	.02	.13	.20	.25	1	.05	.0	.04	.07	-.10	-.05
Activity Level	-.31	.02	.35	.15	.05	1	.95	.89	.11	-.04	.17
Rhythmicity	-.29	.08	.34	.14	.0	.95	1	.88	.15	-.05	.10
Approach/Withdrawal	-.25	.01	.39	.18	.04	.89	.88	1	.20	.10	.18
Adaptability	0	.19	.02	.17	.07	.15	.20	.20	1	.14	.09
Intensity of Reaction	-.03	.06	.16	.09	-.10	-.04	-.05	.10	.14	1	.42
Attention Span	0	-.04	0	-.12	-.05	.17	.10	.18	.09	.42	1

The number of factors to be extracted was estimated by Kaiser's criterion (Kaiser, 1958). Four factors appeared to be significant according to Kaiser's decision rule. The eigenvalues and cumulative proportions of these factors appear in Table 5.

Table 5 :

	Eigenvalues	Cumulative Proportions
I	3.254	.296
II	1.521	.434
III	1.465	.567
IV	1.337	.689

The principal axes were then extracted. The matrix of factor loadings appears in Table 6.

Table 6 : Factor Matrix

	I	II	III	IV
1. Balance	-.353	.547	.404	-.304
2. Tension	.137	-.247	-.202	.798
3. Rhythm	.497	.359	.184	.023
4. Unity	.235	.671	.253	.187
5. Vitality	.120	.550	-.039	.440
6. Activity Level	.949	.026	-.136	.181
7. Rhythmicity	.940	.030	-.171	.149
8. Approach/Withdrawal	.942	-.008	.014	-.135
9. Adaptability	.253	.040	.305	.492
10. Intensity	.114	-.286	.780	.176
11. Attention Span	.210	-.441	.642	-.100

The principal axes were rotated to the orthogonal varimax criterion (Kaiser, 1958). The rotated matrix appears in Table 7.

Table 7 : Rotated Factor Matrix

	I	II	III	IV
1. Balance	-.309	.329	.058	-.704
2. Tension	-.053	.148	.024	.855
3. Rhythm	.449	.425	.097	-.136
4. Unity	.129	.749	.021	-.163
5. Vitality	.009	.670	-.184	.168
6. Activity Level	.972	.034	.100	.077
7. Rhythmicity	.960	.034	-.017	.115
8. Approach/Withdrawal	.933	.109	.142	.059
9. Adaptability	.067	.395	.352	.342
10. Intensity	-.037	.079	.852	.041
11. Attention Span	.149	-.197	.772	-.062

Rotated loadings of .60 or greater were considered significant in defining the factors. The interpretation of the factors is dealt with in Section 4.1.1.

3.2 Cognitive Reorganisation in Aesthetic Development

The percentage of compositions of boys and girls at each age level in which obliques and diagonals occur.

There is no significant increase in the percentage of diagonals and obliques found in the children's compositions between three to five years of age. However, the majority of normal children do acquire diagonal and oblique forms before the stage of formal operational thought. This is interpreted to mean that between three and five years of age there is no qualitative change in aesthetic development. Gathering additional compositions by children at six, seven, eight or even nine years of age merely to demonstrate the acquisition of the diagonal would not have shed any light on the important questions which have to be resolved in this respect. These are of theoretical nature, namely :

- (a) the actual fact of qualitative change;
- (b) the nature of this change.

A definitive answer to (a) would require a detailed analysis of the concept of stages in cognitive development. However, it is unlikely that such an analysis could yield valid implications for this study at this time. In any event the concept of stages is itself exceptionally confused. Attention was therefore centered on (b) and in this regard it is argued in the following section (pp. 71-81) that taking into account perceptual, motor and cognitive aspects there is strong theoretical support for the claim for a qualitative change or cognitive reorganisation in aesthetic development after five years of age. There is, of course, no experimental support for this claim in this dissertation or elsewhere.

Table 8 : Percentage of Diagonals and Obliques in Children's Compositions ⁺

	3 Years	4 Years	5 Years
Diagonality			
Girls	20%	10%	50%
Boys	0%	10%	10%
Obliquity			
Girls	10%	10%	20%
Boys	20%	20%	0%

3.3 The Influence of Maternal Reactivity on Aesthetic Development

The correlations among the categories on the Scale of Formal Dimensions and the categories on the Maternal Interview Scale which test the hypothesis that the formal dimensions are not influenced by the mother's reactivity to her infant's behaviour appear in Table 9. It is submitted that hypothesis 3 has been confirmed.

⁺ It should be noted that the presence of the diagonal in 50 per cent of the five year old girls occurred in one school only. No tests were applied to determine the cognitive status of these girls, nor were the teachers questioned regarding their teaching practices. However, although teachers may possibly 'teach' the child the diagonal in the last year of nursery school it is doubtful whether they would do so before the second half of the year.

Table 9 : Correlations Between the Categories on the Maternal Interview Scale and the Scale of Formal Dimensions

	Balance	Tension	Rhythm	Unity	Vitality
Combined					
Activity Level	-.312	.027	.359 ⁺	.154	.057
Rhythmicity	-.292	.082	.344 ⁺	.143	.003
Approach/Withdrawal	-.254 ⁺⁺	.016	.398 ⁺	.186	.048
Adaptability	-.006	.192	.023	.172	.076
Intensity	-.037	.062	.167	.097	-.108
Attention Span	-.002	-.045	-.062	-.122	-.057
3 Years					
Activity Level	.197	-.234	.349	.086	-.045
Rhythmicity	.056	.065	.063	-.078	.007
Approach/Withdrawal	.066	-.105	.115	.565 ⁺	-.082
Adaptability	.044	.031	-.274	-.067	.211
Intensity	-.218	.053	.228	.246	-.393
Attention Span	-.096	-.268	.337	.098	-.693 ⁺
4 Years					
Activity Level	-.229	-.042	.098	-.062	.278
Rhythmicity	.161	.134	-.156	.200	-.134
Approach/Withdrawal	.119	-.128	.279	-.100	.166
Adaptability	-.159	0	.146	.112	-.075
Intensity	.181	0	.269	.069	.108
Attention Span	-.043	.109	-.047	-.385	.182
5 Years					
Activity Level	.225	-.379	-.298	.390	.046
Rhythmicity	-.089	.237	-.021	-.021	-.055
Approach/Withdrawal	-.116	.195	.154	.051	.203
Adaptability	.120	.416	.003	.360	.179
Intensity	-.116	.195	.154	.051	0
Attention Span	.246	-.138	-.327	.109	0

+ p < .01

++ p < .05

3.4 Differences Between the Means of Boys and Girls on the Formal Dimensions

At the three and four year age level, as well as in the case of the combined scores, assuming equal variances between the means, there were no significant differences between the formal dimensions in the compositions of boys and girls. However, at the five year level the t value approached significance. Furthermore, in this latter case, assuming unequal variances, the difference between the means just reached significance. The results appear in Tables 10 (a) and (b).

Thus hypothesis 4 has been partially confirmed.

Table 10(a) : t Test of a Difference Between Means, Assuming Equal Variances

(a) Combined Scores

t value	= -0.91368
df	58
Mean of A	= 32.99989
Standard Error of A	= 0.93218
Mean of B	= 31.66658
Standard Error of B	= 1.12273

(b) 3 Years

t value	= -1.29159
df	18
Mean of A	= 35.09998
Standard Error of A	= 1.26885
Mean of B	= 32.3998
Standard Error of B	= 1.66132

(c) 4 Years

t value	=	1.65418
df	=	18
Mean of A	=	29.99997
Standard Error of A	=	1.18322
Mean of B	=	34.09998
Standard Error of B	=	2.17792

(d) 5 Years

t value	=	-2.09246
df	=	18
Mean of A	=	33.89998
Standard Error of A	=	1.95192
Mean of B	=	28.49997
Standard Error of B	=	1.68819

Table 10(b) : t Test of a Difference Between Means, Assuming Unequal Variances(a) Combined

t value	=	-0.91368
df	=	58
Mean of A	=	32.99989
Standard Error of A	=	0.93218
Mean of B	=	31.66658
Standard Error of B	=	1.12273

(b) 3 Years

t value	=	-1.29158
df	=	19
Mean of A	=	35.09998
Standard Error of A	=	1.26885
Mean of B	=	32.39998
Standard Error of B	=	1.66132

(c) 4 Years

t value	=	1.65418
df	=	19
Mean of A	=	29.99997
Standard Error of A	=	1.18322
Mean of B	=	34.09998
Standard Error of B	=	2.17792

(d) 5 Years

t value	=	-2.09246
df	=	19
Mean of A	=	33.89998
Standard Error of A	=	1.95192
Mean of B	=	28.49997
Standard Error of B	=	1.68819

CHAPTER 4

DISCUSSION

4.1 The Scale of Formal Dimensions

In discussing the results which substantiate the first hypothesis, there are three points to be made :

1. *The intercorrelations among the categories on the Scale of Formal Dimensions based on individual data from the three, four and five year age levels are with three exceptions, independent (Table 11). Theoretically, therefore, they cannot be explained in terms of one single underlying mechanism. However, it is proposed that they are the behavioural manifestation of the functioning of the primary motility system. It has been pointed out that this has several components and a detailed analysis of these is unfortunately not possible.*
2. *The results pertaining to hypothesis 4 indicate that there are no significant differences between the means of the scores on the formal dimensions in the compositions of boys and girls at the three and four year age level. At the five year level, however, the t value does approach significance. This analysis cannot reveal any differences which may exist between boys and girls on each dimension at each age level, whereas scrutiny of the data suggests that such differences may exist.*
3. *No attempt was made to determine whether the compositions of children at three years differ significantly from those at four and five years, or whether those at four differ significantly from those at five, although the combined results do not reveal any significant*

difference between boys and girls at the three age levels. This omission was due to the theoretical assumption that the young child's cognitive structure undergoes one re-organisation when he passes from the sensory-motor to the pre-operational stage, and a second between the ages five to seven. The lack of diagonal and oblique placements (as well as diagonal and oblique forms) in the compositions of children at three, four and five years suggests that there is no qualitative change at those ages. In other words, the underlying mechanisms do not appear to alter between three to five, despite the fact that genetic epistemology divides the pre-operational period into two sub-stages. However, normal children do acquire diagonal and oblique forms sometime between five to twelve years of age. Thus change in cognitive structure, either qualitative or quantitative does occur sometime after age five.

It is clear from an inspection of the data that in no instance does the incidence of a formal dimension in the children's compositions fall below the 50 per cent level. At three years of age there would not appear to be any significant difference between the means of boys and girls on each of the dimensions. The incidence of rhythm, unity and vitality is greatest; the incidence of balance and tension the least. In the former case this would seem to reflect the relatively unimpeded manifestation of fundamental biorythms in the children's productions. Socio-cultural influences do not appear, at this early stage in the first preschool year, to have had any appreciable effect. The scores in the latter case are depressed, as they are at four years of age (and to a lesser extent, in the combined scores) by the relative absence of diagonals and obliques.

At four years of age there is a proportional decline in the children's scores on vitality; there is a substantial decline in the girls' scores on unity while the scores on rhythm increase in the case of girls, but decrease in the case of the boys. The maximum incidence

Table 11 : Interrelations between the Categories on the Scale
of Formal Dimensions

	Balance	Tension	Rhythm	Unity	Vitality
Combined					
Balance	1	-.362 ⁺	.038	.204	.027
Tension	-.362	1	.011	-.022	.134
Rhythm	.038	.011	1	.185	.206
Unity	.204	-.022	.185	1	.259 ⁺⁺
Vitality	.027	.134	.206	.259 ⁺⁺	1
3 Years					
Balance	1	-.562 ⁺	.167	.077	-.040
Tension	-.562 ⁺	1	-.014	.080	.309
Rhythm	.167	-.014	1	.330	-.016
Unity	.077	.080	.330	1	.246
Vitality	-.040	.309	-.016	.246	1
4 Years					
Balance	1	-.358	.278	.161	-.287
Tension	-.358	1	-.179	-.025	.088
Rhythm	.278	-.179	1	.320	.441
Unity	.161	-.025	.320	1	.203
Vitality	-.287	.088	.441	.203	1
5 Years					
Balance	1	-.186	.068	.604 ⁺	.509 ⁺⁺
Tension	-.186	1	.186	-.114	.095
Rhythm	.068	.186	1	-.090	.169
Unity	.604 ⁺	-.114	-.090	1	.169
Vitality	.509 ⁺⁺	.095	.169	.169	1

+ p < .01

++ p < .05

of rhythm in girls' compositions during the fourth year may indicate some factor in common with their acquisition of language at an earlier age than boys. Both may be related to the fact that the fourth year is essentially one of fantasy, when the symbolic function is exercised by girls in a wide variety of spheres. Boys are less free in this respect, being subject to increasing restraint in accord with adult demands for the assumption of the appropriate sex role. However, it is very difficult to account for the plunge in this score for the girls at age five, whereas boys maintain their previous level. Furthermore, the inconsistencies between the scores of boys and girls at four and five years of age cannot be accounted for by the small size of the samples since at five the differences between the means on the individual scores approach significance, whereas there is no significant difference in this respect on the combined scores.

The rhythmic occurrence of events is fundamental to living systems and for the human circadian rhythm, social rather than physical zeitgebers are of primary importance. It is possible that the depressed scores are related in some way to this basic rhythm. The child's rest-activity cycle, on which sleep-wake states are gradually imposed during approximately the first six years of life, provides the framework within which all higher nervous (e.g. cognitive) functions are thought to develop. The capacity for attention, in particular, depends upon the consolidation of these processes into functional states. Attention is essential to the evolution of later shared symbolic knowledge; moreover, during the past decade, the focus of cognitive development has shifted from the learning to the attending process (e.g. McCall, 1971).

The mechanism controlling the rest-activity cycle has been

localised to the brain stem, and in the absence of forebrain integration expresses its influence overtly as a periodic modulation of neuronal excitability. In the young child, its function may be purely homeostatic. Since stability in this cycle appears to depend upon developments occurring at five to ten years of age (i.e. beyond nursery school age), perhaps related to changes in hypothalamic and pituitary functions (Sterman, 1971), such homeostasis may be seriously disrupted by the imposition of the highly artificial, routinised environment of the nursery school though younger children, perhaps partially due to egocentrism, may be relatively impervious to it. It is possible that girls are more affected by these strictures and because of developmental precocity, at an earlier age.⁺ In short, it may be that aspects of biological function that underlie a basic periodicity founded in infancy are adversely affected by the segmented timetable common to all three schools in this study, and to the majority of nursery schools in Johannesburg. There is some evidence that ignorance of the appropriate organisation of the young child's day is inimical to optimal development, interferes with concentration and in many ways teaches the child not to learn. Perhaps this effect, cumulative over two years and manifest in the child's decreasing rhythmicity, is more easily discernable in the older preschool child because his growing powers of rational thought render him susceptible to frustration and boredom with all their attendant difficulties.

⁺ There is tentative support for this in an unpublished study by Sander (1974) who found that female infants respond to the stress of non-contingent caretaking in the neonatal period by a precocious advance in day-night differentiation, while the male does not have this advance, or a response in the reverse direction. Thus there may be a different set of rules from the outset for the organisation of states in young boys and girls. This is of the essence in aesthetic development since, to reiterate, the internal rhythms are regarded as synonymous with forms of feeling because they mark discernable changes of state (c.f. p. 30). However, in this study the differences in the means on the Formal Dimensions just reached significance at five years, which is approximately the time sleep-wake states are stabilised.

Conversely, the trends displayed in the combined scores are predictable in terms of the postulate. In the case of rhythm, unity and vitality scores for the three year olds exceed those for both four and five year olds, suggesting the relative indifference in the youngest children of biorhythms to patterns of caretaking. The scores on balance are somewhat depressed in the case of the three and four year olds, but improve at five, undoubtedly due to the acquisition of the diagonal by 50 per cent of the five year old girls (Table 8). The scores on tension lag due to the virtual absence of obliquity from the children's compositions. It would appear that children embellish their graphic forms with diagonal lines, and achieve diagonal balance before oblique forms and placements are manifest in their formal arrangements.

Here again the one aspect that eludes ready explanation is the depression in the combined scores for rhythm. This may be related to socio-cultural conventions connected with sex typing as boys, towards the end of preschool, grow increasingly aware of and anxious to exercise their motoric skills and use every opportunity to do so, while girls become more sedentary, spending a large proportion of their time in quiet activity. This receives tentative support from the positive and significant correlations between Activity Level-Rhythm, Rhythmicity-Rhythm and Approach/Withdrawal-Rhythm in the combined scores (Table 9). Activity Level, Rhythmicity and Approach/Withdrawal are the variables that load Factor I, defined as motor movement. It appears therefore, that the child's motoricity plays a significant part in the achievement of formal rhythm.

4.1.1 Interpretation of Factors

It should be noted that of the four factors identified, two are

confined to the Maternal Interview Scale and two to the Scale of Formal Dimensions.

(a) Factor I is defined as Motoric Movement (See Table 7)

<u>No.</u>	<u>Variable</u>	<u>Loading</u>
6	Activity Level	.972
7	Rhythmicity	.960
8	Approach/Withdrawal	.933

The primary and unambiguous emphases in these three categories, which account for 29.6 per cent of the test variance, is the extent to which a motor component (overt or covert) exists in the child's functioning.

The category with the highest loading on this factor contains some items concerned with gross motor activity, and others with the behavioural manifestations of the biological rhythms themselves. On the other hand, No. 7 is concerned solely with these rhythms. No. 8 is also saturated in this respect although it contains a fairly strong component related to permanency of the social object, a cognitive construction. However, since this is intimately related to the bond formed between the infant and his primary caregiver, in that it can accelerate or retard the 'sition of object permanency (Bell, 1970; also c.f. p. 27), it bears a direct but strong relation to the functioning of the rhythms. The labile concepts inherent in these movements are the formal constituents of works of art, effecting the transition from action to symbol. However, with more sensitively

designed tests this factor may be broken down further.

Essentially, the variables which load Factor I relate to the transition period which extends from the time of the infant's delivery to the establishment of his total physiological separateness. The independence of the correlations on the Maternal Interview Scale from those on the Scale of Formal Dimensions suggest that in this sample the transition period was patterned in such a way that it virtually ceased to exist. This would have a substantial effect on the child's developmental course. Therefore, it would be interesting to compare these results with those derived from a sample where a developed transition period, involving a set of interdependent mother-child patterns exist as, according to the hypothesis, there should be no significant difference.

(b) Factor II is tentatively defined as Dynamic Balance (See Table 7)

<u>No.</u>	<u>Variable</u>	<u>Loading</u>
4	Unity	.749
5	Vitality	.670

This is rather poorly defined with only two categories which seem to be very disparate having significant loadings on the factor. However, both categories appear to involve an intuitive grasp of the disposition of form and colour to achieve an overall equilibrium which nevertheless is not static. In other words, a dynamic balance is achieved without regard to the horizontal-vertical axes common both to experience and its formalisation.

- (c) Factor III is identified as Behavioural Control (See Table 7)

<u>No.</u>	<u>Variable</u>	<u>Loading</u>
10	Intensity of Reaction	.852
11	Attention Span	.772

This factor is defined by two categories which are significantly intercorrelated and which emphasize the extent to which a child is able to pursue positive/negative movements/actions under varying circumstances. It appears therefore, that this factor in some way involves both the ability to move or the intent to act. In view of its potential import, it is unfortunate that a more psychologically meaningful interpretation is impossible within the context of this study.

- (d) Factor IV is tentatively defined as Dynamic Presentation (See Table 7)

<u>No.</u>	<u>Variable</u>	<u>Loading</u>
2	Tension	.855

This is very poorly defined since only one category is significantly loaded on the factor. However, it is important since movement and its presentation appear to be so essential to the young child that he is able to introduce dynamism into his compositions despite the fact that adult techniques for so doing, or cultural conventions, are not yet available to him.

Table 12 : Intercorrelations Between the Categories on the Maternal Interview Scale

	Activity Level	Rhythmicity	Approach/Withdrawal	Adaptability	Intensity	Attention Span
Combined						
Activity Level	1	.958 ⁺	.892 ⁺	.111	-.041	.179
Rhythmicity	.958 ⁺	1	.886	.155	-.051	.103
Approach/Withdrawal	.892 ⁺	.886 ⁺	1	.205	.109	.186
Adaptability	.111	.155	.205	1	.147	.097
Intensity	-.041	-.051	.109	.147	1	.422 ⁺
Attention Span	.179	.103	.186	.097	.422 ⁺	1
3 Years						
Activity Level	1	-.437	-.022	-.294	.126	.071
Rhythmicity	-.437	1	-.026	.269	.061	.234
Approach/Withdrawal	-.022	-.026	1	.272	.403	.393
Adaptability	-.294	.269	.272	1	.066	-.056
Intensity	.126	.061	.403	.066	1	.686 ⁺
Attention Span	.071	.234	.393	-.066	.686 ⁺	1
4 Years						
Activity Level	1	.226	.227	.366	.224	.739 ⁺
Rhythmicity	.226	1	.153	.370	.136	.189
Approach/Withdrawal	.227	.153	1	.465 ⁺⁺	.443	.321
Adaptability	.366	.370	.465 ⁺⁺	1	.230	.248
Intensity	.224	.136	.443	.230	1	.477 ⁺⁺
Attention Span	.739 ⁺	.189	.321	.248	.477 ⁺⁺	1
5 Years						
Activity Level	1	.134	.248	-.047	.248	.264
Rhythmicity	.134	1	.599 ⁺	.270	.150	0
Approach/Withdrawal	.248	.599 ⁺	1	.386	.444 ⁺⁺	-.236
Adaptability	-.047	.270	.386	1	.246	.074
Intensity	.248	.150	.444 ⁺⁺	.246	1	0
Attention Span	.264	0	-.236	.074	0	1

+ p < .01

++ p < .05

4.2 The Missing Diagonal

In this study it was found that while the children's compositions were balanced along both the vertical and horizontal axes, the preschool child has a very limited concept of the diagonal. Furthermore, the scores for tension were depressed due to the absence of obliquity (Table 8). It is, of course, a well known fact that the young child experiences difficulty in constructing the diagonal. The ability to copy a diamond at an early age, for example, is regarded as indicative of superior intelligence. The child's inability to construct a diagonal spontaneously during the preschool (or pre-operational) period may be due to any, or all of at least three factors :

4.2.1 Difficulties in Visual Detection

Studies of eye movements of children looking at a shape illustrate the relation of optical movements to perceptual development (Zinchenko and Ruzskaya, quoted in Zaporozhets, 1965). At the age of three to four a child tends to fixate in the middle of the shape and to make only a few excursions to the contour; at five years old, the number of excursions is increased and at five to six, there is a much greater tendency for the outline of the shape to be scanned spontaneously by the eyes. The ability to perceive differences between similar shapes develops parallel with this habit of outlining the contour. From an optical point of view the reason why horizontal and vertical lines and orientations are prior to diagonals is due to the fact that oblique lines are outlined by different eye movements from those used for vertical and horizontal lines. (Yarbus, 1967). The latter are scanned

with straight saccades whereas oblique lines are scanned with curved ones.⁺ Yarus proposes that this is due to non-simultaneous movements of the eye muscles being made in following an oblique. It is possible that the greater complexity of such movements may contribute to some of the difficulty of seeing oblique lines (Abercrombie, 1970). When the perceptual task is too difficult relative to present competence, gross movements of the whole or parts of the body may be mobilised. A young child will run his finger along a line, or turn his head and shoulders to align with it, as though attempting to imitate it and incorporate it with bodily movements. In the case of horizontals and verticals these will have been so incorporated as the result of the child's body symmetry; the one runs along the principle axis of the body, the other across it. Oblique lines do not have any such associated contrast.

4.2.2 Motor Difficulties

The ability to represent differences in shapes by drawing lags behind the ability to perceive differences. Children will represent a circle, a square, a triangle and a diamond, all with a rough circle, when they can actually distinguish these shapes (Piaget and Inhelder, 1956). Indeed, the little twigs they may put on the circle representing the corners of a square show that they do perceive the differences between a circle and a square but cannot represent them adequately, or perhaps do not see the need to do so.

+ According to Schneirla (1959) 'in vision and other modalities, types of mechanism have evolved which, by regulating the potency or neural discharge in specialised ways, serve to canalise the stimulative conditions [for approach or withdrawal]' (p.9). In the visual system, the relevant mechanism is the saccadic movement. While these control foveal fixation in the adult, this cannot be the case in the neonate and young child, since their eyes are lacking both in adequate optics and the central receptor apparatus of the fovea. Instead it may be that, just as the rest-activity cycle provides the framework within which cognitive functions will eventually develop, the relatively stable distribution of saccadic movements constitutes the regulatory background within which expressive behaviour, such as gestural imitation (c.f. Paraskevopoulos and Hunt, 1971), develops.

From a motoric view the priority of circular and curved shapes may be explained in terms of the fact that the straight line is essentially a product of man, created because of its mechanical advantages in building and its visual simplicity (Arnheim, 1957). It is true that the rays of the sunburst patterns in the child's early productions often consist of straight lines. However, in this case the singling out of a particular direction, which is the essence of the concept of a straight line, is compensated by the symmetrical distribution of many lines covering all directions equally. Thus the sunburst does not yet go beyond the stage of the circle (Arnheim, 1957). Furthermore, single straight lines are rarely used to represent solids. Apparently a drawing must contain at least one two-dimensional unit in order to convey the solidity of 'thingness' in a way satisfactory to the child (Arnheim, 1957; Golomb, 1974).

The human body does not contain straight lines and the production of one in a drawing involves a complex motor process. Figure 7 (Arnheim, 1957) indicates the changes of speed, angle, and direction that are necessary if a jointed lever (pivoting around point C) is to trace a straight line (L) at even speed. To produce a reasonably straight line and, in particular, a diagonal is difficult for the child.

The vertical-horizontal relationship is the most common spatial system in the child's early compositions. As long as difference of direction is undifferentiated, it is rendered in the structurally most simple form - as a right angular relationship (Arnheim, 1957). Once the child has attained visual mastery of the simplest angular relationship, he is able to undertake the more complex problem of oblique directions. At first the diagonals are added to the vertical and horizontal; they

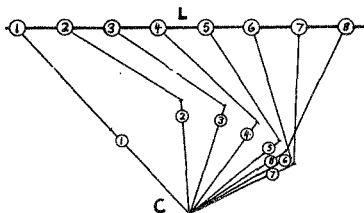


Figure 7 - Production of a Straight Line by a Jointed Lever

are then applied gradually to everything the child draws. Only when direction is fully differentiated will the child use the diagonal freely in his compositions.

4.2.3 Conceptual Deficiencies

In regard to cognitive development and the diagonal the question concerns what a child knows, that is, what the conceptual structure is that a child relies on that makes the construction of the diagonal possible.

In his detailed study of the acquisition of diagonality, Olson (1970) argued that the advance from the recognition of the perceptual configuration to its representation is dependent on the reorganisation of the child's knowledge. This is because the conceptual articulation of the diagonal such that the child can reconstruct it, is not provided by perception (or only with great difficulty, as suggested by Yarbus), but by coding it in terms of its parts, attributes or components. In short, the acquisition of diagonality is central to the basic problem of the development of conceptual structures for dealing with events not

'given' to perception which is the central issue in this dissertation.

Olson found that for his three to six year old subjects to be able to construct the diagonal, or to know in what a diagonal consists, it was necessary for the experimenter to provide the articulation, the segmentation or the attributes to the child, as well as how the attributes relate to the concept: only then could the child construct the diagonal. However, Olson does not specify how a child's sensory-motor experience is related to instruction (verbal or non-verbal) to produce a concept. In other words, then, the representation of the diagonal, and presumably obliquity, unlike horizontals or verticals, depends upon the development of a system for conceptualising in terms of a set of attributes.

This conclusion receives support from several independent studies. Zaporozhets (1965) reports that Boguslavskaya taught children how to draw by training them to analyse shapes, and not by drawing them. She shows a drawing made by a three and one half year old, of a cup and a shovel, which is just a scribble, and a recognisable cup and a house drawn by the same child after he had been taught how to analyse the shapes by modelling with sticks. The child's attention was directed towards the contour of the pattern.

In her study of the development of the human form Golomb (1974) used the technique of drawing on dictation. Unlike free drawing, where the child must decide what parts to represent, on dictation the specific parts and the sequence of their presentation are predetermined by the investigator. Golomb found that the majority of three year olds who produce non-figural designs during the free drawing task create on dictation a recognisable and spatially coherent presentation of the human

figure. Since both the free drawing and the drawing on dictation involve the same perceptual-motor skills, the difference between them can only be accounted for by the different structures of the two situations or tasks. Dictation provides the child with verbal parts which seem to facilitate non-discursive thought or the presentational process.

He still has to invent graphic forms to match the verbal ones, to recognise these forms as adequate representations, and to relate them to each other and to the whole spatially. However, the important step of defining parts has been facilitated, simplifying this complex process' (p.163)

Furthermore, Golomb (1969, 1973) was equally successful when she presented the child with simple geometric pieces which bore no resemblance to the human body. When confronted with a collection of seven geometric pieces and instructed to make a person, the majority of three and four year olds construct a complete figure consisting of head, body, arms and legs. In general, the puzzle figures surpass the drawn figure in degree of differentiation and organisation of the parts and the whole.

Apparently then, there is a plausible explanation for the late acquisition of the diagonal. The problem for the psychologist is to determine the nature of the reorganisation which the child's knowledge undergoes, facilitating his acquisition of more advanced forms, and this has become a hoary question in developmental psychology. On the one side is the position held by Gardner (1973) who has been strongly influenced by Bruner's (Bruner, Oliver and Greenfield, 1967) conception of cognitive development. On this view the transition to conceptual (discursive) thought which occurs between two to seven years of age does not involve different levels or types of mental activities. It is not

the result of the development of a new type of mental process but of looking at the perceptual world in terms of new tasks or requirements imposed by new media. For example, *Olson offers a novel explanation* of why diagonals present greater difficulty to the child than horizontals and verticals. The reason, according to Olson, is that the cues or features to which the child attends 'are not those that simply differentiate objects in the environment, but those cues are selected which differentiate alternatives in the contexts of performatory acts' (p.177). That is, cues are noticed because they provide information for the guidance of an act, such as locomotion. Cues pertaining to orientation will be attended to if they are invariant for basic acts. Oblique lines are low in invariance and provide little or no information for the guidance of acts, such as prehension, in which young children excel. Hence they are ignored. In fact, 'early perception appears to be attuned primarily to features which are invariant in ... locomotion and grasping' (p.186).

However, despite this ingenious proposal Olson is compelled, in addition, to postulate a system to account for the difference between the *diagonal* and the *non-diagonal* child. This has five characteristics :

- (i) It specifies, as elements, both the whole and the parts and the relations that hold between them;
- (ii) It makes possible the transition of a stable perceptual image into a temporal sequence for reproduction;
- (iii) It is stable and general;
- (iv) It is reversible;
- (v) The system is conceptual in nature. It is clearly differentiable from the earlier perceptual knowledge by the performance it leads to: that is, it prohibits prediction.

However, if this system originates in skill in the various cultural media, which appears to be the case, it is devoid of explanatory value. Furthermore, it is moot whether the system differs in any important way from the groupings that describe concrete operations. According to Piaget and Inhelder (1956) every mental mechanism

passes from [a rhythmic pattern of movement] to grouping by means of regulatory processes which begin by co-ordinating the component parts of the initial rhythms and culminate ... in various types of groupings. This is absolutely clear in the construction of geometrical shapes. It is on the basis of the rhythmic movement which the scribble constitutes that the rectilinear and curved shapes will later be gradually differentiated, through a series of perceptual-motor and intuitive regulatory processes (p.59 my italics).

This is a summary statement of this dissertation. Later, however, these investigators state that

the abstraction of shape actually involves a complete reconstruction of physical space, made on the basis of the subject's own actions and to that extent, based originally upon a sensory-motor, and ultimately on a mental, representational space determined by the co-ordination of these actions. This is the main conclusion to be drawn from the study of drawing, whether it is a question of topological relationships or euclidean relationships. From beginning to end ... all these structures are invariably derived from the general co-ordination of physical actions (p.77 my italics).

In their study, Piaget and Inhelder established the priority of the topological relationships of proximity, separation, order, enclosure, etc., in the child's productions during the pre-operational stage. From a spatial point of view, they note that the constitution of the permanent object during the sensory-motor stage requires a term-for-term correspondence between the elements given in successive states of the object.

But what can be the structure of such a correspondence ... it cannot be an euclidean structure since there is as yet neither constancy of size, nor any organisation of the movements of objects, as distinct from changes of physical state. And it can hardly be a projective structure since there is not yet constancy of shape, nor are changes due to perspective perceived as such ... [the object] is perceived in a manner only comparable to the plastic and flexible structures envisaged by topology; and the resemblance of [the object] to itself throughout all its transformations may be reduced to ... a simple topological correspondence, 'bi-univocal' and 'bi-continuous'; but necessarily one which is entirely intuitive and without any precise operation, since it is the work of perception alone (Piaget and Inhelder, 1956, p.9).

Following the sensory-motor period

thought has the task of reproducing at its own level (of representation as distinct from direct perception) everything that perception has so far achieved within the limited field of direct contact with the object. Besides this, there is a gap of several years separating the two constructions. For it is not until after seven to eight years of age that measurement, conceptual co-ordination of perspective, understanding of proportions, etc., result in the construction of a conceptual space marking a real advance on perceptual space (p.13).

In other words, representational thought (which implies reconstruction of relationships grasped at a perceptual level)... at first appears to ignore metric and perspective relationships, proportions, etc. Consequently, it is forced to reconstruct space from the most primitive notions such as the topological relationships ... applying them to the metric and projective figures yielded by perception at a level higher than that of these primitive relationships themselves (Piaget and Inhelder, 1956, p.4).

The reconstruction of space during the pre-operational period results from varying and eventually differentiating the primary rhythmic movements which

already contain in an undifferentiated state all those elements which will later (subsequent to a cognitive reorganisation or innovation which involves essential qualitative changes) go to make up the drawing of straight lines, curves and angles, even though the child cannot yet extract or 'abstract' these from the rhythmic complex (p.59).

During the pre-operational stage the features which tend to be extracted from the initial shapes the child makes are primarily topological. Progress from topological to euclidean shapes is dependent on arresting or interrupting the primitive rhythms of scribbling. As soon as the rhythmic movement has been broken down into discrete elements, the very fact of connecting or not connecting them together results in relationships of proximity and separation, enclosure and openness, ordered succession and continuity. When the movements are interrupted the rhythm of the whole is superseded by a series of individual movements. Since the pre-operational child is incapable of performing reversible operations of thought, 'it is obvious that the task of controlling the actual drawing of the shapes must ...devolve upon perceptual-motor and intuitive regulatory mechanisms ...' (p.65).

As a result, the elementary form in the child's compositions is the circle. The dominance of this form is not merely a question of visual motor ability (or the lack of it); it is a function of the method of composition itself.

In other words, [in terms of the] regulatory mechanism which will result in the construction of a shape on the basis of elements isolated from the original pattern ... drawing expresses in the simplest terms the relationships inherent to the actual organisation of the earliest compositions, as distinct from the more complex types of organisation which involve directions, such as parallels, angles, straight as against curved lines (p.66)

Thus, to paraphrase Piaget and Inhelder, the first shapes to be abstracted are topological rather than euclidean in character since topological relationships express the simplest possible co-ordination of the dissociated elements of the basic motor rhythms, as against the more complex regulatory processes required for co-ordination of euclidean

figures, which distinguish the diagonal from the non-diagonal child. It is clear therefore that until the process of composition is freed from perceptual-motor regulations and brought under the control of reversible operations, the diagonal will appear rarely in the child's spontaneous productions.

It is apparent, then, that despite the confusion between movements and actions in the Genevan study of space, aesthetic forms and therefore presentational symbolism have a source independent from that which subsumes discursive thinking. Nevertheless aesthetic and scientific thought evolve in parallel, each enriching the other at every point of cognitive development. During at least two critical periods of transition - at approximately two years and seven years of age - both classes of formal concept undergo a radical transformation. This is clearly demonstrated by the differences in the conceptual structures of the diagonal and non-diagonal child, in respect of those concepts which are only partially given to perception as a child experiments within any expressive medium. However, aesthetic development involves considerably more than an increasing mastery of such media.

4.3 Hypothesis 3

With the exception of a positive correlation between Approach/Withdrawal-Unity, and a negative correlation between Attention Span-Vitality at three years of age, the correlations between the categories on the Maternal Interview Scale and those on the Scale of Formal Dimensions are non-significant. It is interesting, however, in the light of the extraction of a factor of motor movement (p. 81) that

in the case of the combined scores Activity Level-Rhythm, Rhythmicity-Rhythm and Approach/Withdrawal-Rhythm are significantly correlated. It is possible, therefore, that although these results support the conclusion that the formal dimensions in the child's compositions are not influenced by the caregivers' patterns of reactivity toward the infant, this is an artifact of sample size.

It is also interesting that the three categories with the highest loading on Factor I are negatively correlated in the combined scores with Balance, although only the last correlation is significant. It may be that the child's motoricity interferes with the acquisition of the diagonal and consequently of formal balance in his compositions. This would lend credence to Olson's (1970) argument that environmental cues are attended to only if they provide information for the guidance of a movement or act. Since oblique lines are not helpful in this respect they are ignored. Only with a fall-off in motoric activity will the appropriate cues become salient to the child. Girls, of course, are generally less active than boys and, in fact, at each age level girls surpass boys in balance in their compositions (pp. 65-66). This explanation, however, cannot account for the disparate and inconsistent scores on tension; the variables loading Factor I are only slightly and positively correlated with Tension.

4.4 Differences Between the Means of Boys and Girls on the Formal Dimensions

Prior to the five year age level there is no significant difference between the means of boys and girls, suggesting that, in this sample at least, the rhythms which find expression in aesthetic compositions are relatively impervious to societal practices concerned

with sex typing. Thy rhythms manifest themselves in much the same way in all the children's products at three and four years of age.

At five, however, the difference between the means is just significant. Unfortunately, it is impossible to determine whether this difference is due to the imposition of cultural formulae or to a qualitative reorganisation of cognitive structure. It is doubtful, though, whether any advance in technique is possible in the absence of such a reorganisation.

CHAPTER 5

EDUCATIONAL IMPLICATIONS

During the preschool period children experience the world in a wide variety of ways. As society becomes more complex it is essential to extend those methods of control which are necessary to deal with this increasing complexity. For example, in situations where the connections that have to be made are neither unique or simply ordered, merely counting the arrangements may be irrelevant and the pre-eminence of this activity in early childhood education may be unjustified. We are all involved with other people in a vast number of different ways. These ways vary in quality and our ability to survive may finally depend on how skilful we are in dealing with intricate relationships at many levels. Increasingly more insight will be needed into the quality of the connections that can be made in the world.

Topology, once called analysis situs, the study of place and position, is not concerned with measuring, or comparing in some way, which is usually made a motive for the child to experience counting. Who has most? Least? Who is taller, shorter? Counting, of course is only one of the many ways of seeing the world. Furthermore, although measuring appears to be a way of dealing practically with many different situations, there are far more activities which do not rely on formal measurement than those that do. It is possible that in the West a too linear, too measurable view of space prevails, which prevents us from working easily with the complexities that actually face us. Topology deals with these more general ideas such as connection, inclusion and

closeness. Not only in abstract mathematical objects but in language, argument and relations with people there is a complexity of interconnections that requires a background of appropriate spatial thinking. The more general properties of connection are easily accessible; they are a necessary prerequisite of the ability to deal with the more precisely defined measurements of euclidean geometry.

It is possible that a preschool curriculum grounded in topology would facilitate the development of formal concepts in both discursive and non-discursive thought. In other words, such an approach, while recognising the relative independence of both logical (A) and aesthetic development (b) would build in a mediator topology (X) which would affect both A & b, whereas it is doubtful whether direct training in A would have any transfer value in respect of B, or vice versa. For example, in the case of closed curves it may be seen from Figure 8 (Sauvy & Sauvy, p. 36, 1974) that several different kinds of closed curve can be drawn.

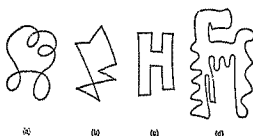


Figure 8

However, there is a difference between (a) and (c) in that in (c) the line does not pass the same place twice, whereas in (a) the line crosses itself at certain points. Thus (c) appears to be particularly straightforward as far as its topology is concerned. This curve can be subjected to a transformation by placing twelve pegs on a peg board and

stretching a length of elastic between them as indicated in Figure 9 (Sauvy & Sauvy, 1974, p.36).

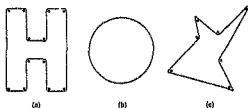


Figure 9

If the pegs are now removed, the elastic resumes its original circular form demonstrating that (a) and (b) are topologically equivalent. Thus a class of topologically equivalent figures is obtained whose model is the circular curve to which all polygons such as (c) belong. Any curve belonging to this class is said to be a simple closed curve. This may account for the fact that the young child renders any shape as a simple circle.

A method of inducing attention to contours is by means of classification of figures according to topological criteria. Children may be asked to sort cards (Figure 10) (Sauvy & Sauvy, 1974, p.49) according to one or more criteria of their choice. The child may recognise a distinction between lines and surfaces. The former can be grouped in terms of those which are open or closed, and those which are continuous or discontinuous. The latter can be divided into two equivalence classes : simple surfaces on the one hand and surfaces with holes on the other. These exercises may also be used to clarify

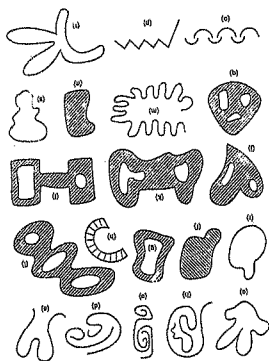


Figure 10

the logical and group concept of 'nested classes' which can be represented by diagrams such as the chest of drawers or tree variety (Figure 11) (Sauvy & Sauvy, 1974, p.50).

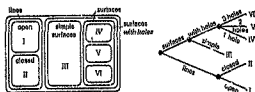


Figure 11

In their study of one aspect of the symbolic function, Bender and Schilder (1936) state that 'the geometrical and physical qualities of a given field are determining factors in the play of children' (p.254). The form of a three dimensional object, for example a cart, is another determining factor. It becomes a symbol into which the child can push something else (inclusion). During the preschool years, the tendency to put something into something else is very obvious. The formal principle of this activity is basic and is merely exemplified in the meaning which the child adds verbally. According to Bender and Schilder, the experimentation with geometry and physics is based upon the instinctive drives of children and, therefore, dependent not only on cognitive structure but upon their individual emotional problems, thereby constituting a link between intellect and affect.

The course of a child's aesthetic development and the extended period during which the young child is dominated by topological concepts which exclude ideas of proportion and direction calls into question tests based on the proposition that the way a child draws a man reveals his intellectual or conceptual maturity (Goodenough, 1926; Harris, 1963). Drawings are not an accurate reflection of the child's concept or percept of objects, including human bodies.

The Goodenough Draw-a-Man Test used fifty details of a drawing for scoring purposes. Later Harris added twenty-one more to include every item of the body or the clothing. These items must be drawn to standards devised by Goodenough and Harris in order to get 'credit'. Only one request drawing can be used and no second or third efforts are allowed.

Goodenough standardised her test on 3,593 request drawings, mainly

from children of four to eight years of age of low economic status. One hundred and nineteen drawings were used to standardise work at age four. Harris used 3,000 more drawings done by children of kindergarten through ninth grade ages. He also added a Draw-a-Woman Test and a Draw-Yourself Test. Formerly if a child drew a 'woman' the drawing was accepted as a 'man'. Both the original and the revised tests were analysed statistically.

However, neither Goodenough nor Harris were aware that the forms which children use in their compositions bear no resemblance whatsoever to the images which they form as a consequence of observing live human beings. Children's drawings may or may not reflect either their percepts or concepts of persons but children emphatically do not draw from 'life'; they are not realists. Instead they first learn to draw by observing their own drawings and those of their peers. Being unaware of the natural, visually logical system by which children teach themselves to draw by age six, neither Goodenough nor Harris make any allowance in their tests for the forms of this natural system, either as assets or liabilities in the scoring process (Kellogg, 1969).

Nevertheless, although the child's development in art involves the evolution of universal forms, this by no means precludes the early childhood educator from teaching; neither can she abdicate her responsibility for so doing by adopting a laissez faire attitude. Teachers of young children are practically unanimous in their opposition to intervention in the child's creative or artistic activities. They view such intervention as highly undesirable and possibly harmful to the natural development of the child's personality.

In these activities the teachers care content to provide the children with the 'right conditions' - toys, space, time and freedom from adult interference or instruction - being convinced that these 'conditions' promise a 'natural' unfolding and development of the child's creative and artistic powers (Smiliansky, 1968, p.142).

However, methods of analysing objects (c.f. p. 85), drawing on dictation, the presentation of simple geometric parts and incomplete representations of the human figure (Golomb, 1969, 1973, 1974) indicate clearly that facilitating the differentiation process as well as providing a limited number of parts enhances the presentational process. Furthermore, the overall differentiation of a figure and its degree of completion is heavily dependent on the expressive medium (Golomb, 1974). It is clear that the approach adopted in the majority of nursery schools today is quite uninformed about the development of both discursive and non-discursive thought as it is currently understood.

CHAPTER 6

CONCLUSIONS

Four principal conclusions emerge from this study which is equally theoretical and experimental in nature :

1. First, progress in genetic epistemology depends upon a thorough grasp of the theoretical issues involved. These concern the problems of subjectivity, objectivity and inter-subjectivity as well as the inter-relationships among them. An essential first step in this direction, which has not yet been undertaken, is the definition of key terms such as action and movement, or learning and development.
2. Objectivity has been exhaustively examined by Jean Piaget who has traced the course of rational thought from a limited number of congenital reflexes. The work of Piaget, when read in conjunction with that of Susanne Langer, clearly implicates a motility system which has two components, although considerable theoretical refinement of this conception remains to be done. Piaget's work on physical and logico-mathematical knowing rests on the reflexogenous or secondary motility system. Conversely, the conceptual structures which deal with events not given to perception derive from the functioning of the primary motility system.
3. The formal dimensions of an aesthetic composition, and the elementary graphic forms are examples of these. The formal dimensions which characterise a mature work of art were found in the compositions of the children in this sample. Since these compositions maximised the opportunity for gross motor movement and since these movements were not,

by definition, reflexive it is reasonable to suppose that the compositions are the result of the functioning of the primary motility system despite the fact that none of the Formal Dimensions has a significant loading on the Motoric Movement Factor. However, the theoretical link between this and dynamic concepts does receive support. This suggests further that the particular discrete activity of the primary motility system which the child is translating into presentational symbolism is the rhythmic discharge of the motor nerve.

4. Taking into account the perceptual and motor difficulties the child experiences in perceiving and constructing the diagonal, it is submitted that the lag in its spontaneous production by the child is principally due to the *initial immaturity of cognitive structure*. Space is reconstructed during the pre-operational period by differentiating the primary rhythmic movements. However, since the pre-operational child cannot perform reversible operations, the drawing is controlled by perceptual-motor mechanisms. Following the reorganisation of cognitive structure, probably beginning in the fifth year, control passes to the reversible operations and the child is able either to produce spontaneously or to copy a diagonal with ease. This implies a second cognitive transition involving considerably more than experience in and mastery of an expressive medium.

There are two subsidiary conclusions that may be drawn :

In view of the independence of the categories on the Maternal Interview Scale from those on the Scale of Formal Dimensions, the labile schemes of the children in this sample appear to have been relatively unaffected by their caregivers' patterns of reactivity. They spontaneously

manifest in their own compositions those forms and formal arrangements that characterise a mature work of art and there are no differences between boys and girls in their ability to do this. It is likely therefore that universal graphic forms are deeply rooted in human physiology.

A complete revision of the early childhood curriculum is suggested by the results of this dissertation. It would appear that the current emphasis on 'number work' and perceptual games derived from plane geometry may retard rather than advance cognitive development. This is an idea which calls for extensive research.

CHAPTER 7SUMMARY

7.1 This dissertation presents a limited theoretical analysis of one aspect of general cognitive competence. It represents an attempt to redress the imbalance inherent in genetic epistemology by considering in conjunction, the scientific and aesthetic aspects of human thought. Similar dichotomies of two forms of thinking generally only exist outside psychology.

The impasse met by psychologists in the first quarter of this century on the question of non-reflexogenous activity in the human embryo was mentioned. It is claimed that data in contemporary psychology concerned with the concept of state which subsumes the extensive investigations on sleep, as well as attention, offer substantial support for a human motility system which has two components. These are called the primary and secondary motility systems respectively. The primary motility system refers to autonomous movement which is probably myogenic rather than neurogenic in origin; the secondary motility system involves reflexive behaviour. Piaget has been concerned with the latter, claiming that the child's objective knowledge is gradually constructed in the course of his actions upon the world of concrete objects which provide logico-mathematical feedback to the cognitive structure, or from the objects themselves which provide physical feedback. The child expresses this knowing in discursive symbols.

Piaget has been at considerable pains to emphasize the difference

between these two forms of feedback. However, he has neglected the fact that, in addition, there is biofeedback from the physiological or biosystems themselves and that this feedback is the source of subjectivity. Biofeedback to the cognitive structure derives from the functioning of the primary motility system and is expressed concretely in presentational symbolism.

7.2 In view of the limited resources available a very simple method was used to

- (a) examine the validity of the concept of a motility system which has two distinct components. The non-discursive symbols deriving from the functioning of the primary motility systems and presented in an aesthetic composition by the young child were chosen to do this ;
- (b) assess whether the reorganisation in cognitive structure which occurs between five to seven could also affect aesthetic development.

The easel paintings of ten boys and ten girls at each of three age levels (3-3:11; 4-4:11 and 5-5:11) were assessed on the Scale of Formal Dimensions. Mother-infant patterns of reactivity were assessed on the Maternal Interview Scale. The categories on each scale were intercorrelated to determine the interdependence of the items. This gives some indications of the reliability of the scales. The categories on each scale were correlated and the correlations were subjected to factor analysis. The differences between the means of the boys and girls on the formal dimensions were computed.

7.3 Statistical analysis of the results indicated that :

- (a) a child's compositions at three, four and five years of age manifest the same formal dimensions that characterise a mature work of art;
- (b) in view of the fact that the compositions represented a behavioural item which maximised gross motor movement it is reasonable to suggest that the formal dimensions are the result of the functioning of the primary motility system. The connection between the formal dimensions or labile schemes, and the primary motility system received strong theoretical support.
- (c) the reactivity patterns of the mother do not affect the manifestation of the formal dimensions in the child's compositions, particularly at the youngest age level ;
- (d) there is no significant difference between the means of boys and girls on the formal dimensions until the five year age level when socio-cultural influences appear to be exerting some influence.

7.4 The analysis of the results provided confirmation of the first and third hypothesis. In no instance did the incidence of a formal dimension in the children's compositions fall below the 50 per cent level, though only in the case of the combined scores could trends begin to be detected. In every case scores on balance and tension were depressed. It was argued that this was due to the child's lack of an adequate concept of the diagonal or obliquity which, in turn, was principally the result of

conceptual deficits, rather than perceptual-motor problems.

7.5 In respect of the second hypothesis, no qualitative change was found in the aesthetic composition of the children between three to five years of age. However, since most normal children do acquire the diagonal sometime during the stage of concrete operations a detailed theoretical argument was presented in support of the second hypothesis. Unfortunately, the significant difference which was found between the means of boys and girls on the formal dimensions at the five year level only offers very little experimental support for this.

7.6 A revision of the preschool curriculum was suggested, which would involve the introduction of topological concepts at a very early stage as a means of promoting both discursive and non-discursive thought. It is possible that this approach also has important affective implications. It was suggested that the Goodenough Draw-a-Man Test is an invalid measure of the child's conceptual maturity.

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APPENDIX A

MATERNAL INTERVIEW SCALE

General Rule : In scoring and acquisition of data, use descriptive, objective items only. Avoid interpretation. Any item where description is vague/ambiguous is not to be scored.

Name of Child : _____

Address : _____

Phone No. : _____

Date of Birth : _____

Date of admittance to nursery school _____

	Age	Education	Occupation
Mother			
Father			

Brief obstetrical history : Full term, complications of pregnancy, delivery, postpartum

Neonatal : Birth weight and length, any unusual circumstances, physical disturbance

Responsibility for daily care of baby. In what degree are various adults involved in child's care : mother, father, other relatives, nanny

Parental description of child's personality. "If a friend who had never seen your baby asked you to describe his personality, what would you say."

FORMAL CHARACTERISTICS OF BEHAVIOURAL DEVELOPMENT IN INFANCY AND
EARLY CHILDHOOD

I. ACTIVITY LEVEL

This category describes the extent to which a motor component exists in the child's functioning.

	+	-
1. General description of level of motility. Can mother estimate whether baby was active, moderate, quiet.		
2. As an infant was sucking pattern desultory, mild, vigorous ?		
3. Description of movements and vocalisation during sleep. How much movement was there in the crib ? Was he found at different places in the crib ?		
4. Did he babble ? When did he start ? How much did he babble ? When did he first use words, phrases, sentences ?		
5. Motility during handling bathing eating dressing reaching crawling		
6. During the period of language development how much did he practice with new sounds and words ?		
7. How much did he imitate words of other people ?		
8. How much did he use verbalisation in his interpersonal contacts and in other activities ?		

9. Motility level during

bathing
eating
playing
dressing
running

II. RHYTHMICITY

This category is based on the degree of regularity of repetitive functions. Behaviour is considered variable if there is evidence that the child had established a pattern of functioning, but that there was some deviation from this pattern on occasion. Irregular denotes failure to establish even a partial pattern.

1. Rest and Activity Periods

- a. Does child nap for same lengths of time each day ?
- b. No discernible time pattern of function has been established.

2. Sleeping and Waking

- a. Does child fall asleep at approximately the same time each night ?
- b. Does child awake at approximately the same time each morning ?
- c. Is there a marked difference in time of retiring/ arising from day to day ?
- d. Does child go to sleep easily or not ?
- e. Is there any special ritual at bed time ?
- f. Does he sleep through the night ?
- g. If he awakens at night :
 - (i) What is the frequency ?
 - (ii) What is the behaviour on wakening ?
 - (iii) What is required to put him back to sleep ?

- h. Does sleep pattern change with illness, teething or change of surroundings? If so what is the change and how quickly does it revert to the previous pattern when the apparent cause of the change disappears? What is the behaviour on awakening?

3. Eating and Appetite Behaviour

- a. As an infant, bottle/breast-fed/combination of both?
- b. When was weaning started?
- c. How was it accomplished?
- d. What was the child's reactions to weaning? Describe the sequence of behaviour in detail.
- e. Self-demand/schedule/modified self-demand.
- f. Feeding schedule time intervals, regularity/irregularity in time and amount.
- g. Pattern of change of schedule as baby grew older.
- h. Was amount of food intake regular at each feeding?
- i. Was there any difference in the feeding pattern when the child was fed by different individuals?
- j. Does child demand/accept food readily at same time each day?
- k. Does child consume approximately the same amount of food on corresponding diurnal occasions?

4. Bowel Function

- | | + | - |
|--|---|---|
| a. How many bowel movements did infant have daily ? | | |
| b. Were they regular and at regular times ? | | |
| c. Did he have any consistent type of overt reaction to the passage/presence of the stool ? | | |
| d. When was toilet training started ? | | |
| e. What were the techniques used ? | | |
| f. What was the child's reactions to attempts at bowel and bladder training ? Describe the sequences of behaviour in detail. | | |
| g. Number and times of evacuations are constant from day to day | | |
| h. Time and number of evacuations are unpredictable. | | |

III. APPROACH/WITHDRAWAL

This category describes the child's INITIAL reaction to any new S-pattern

1. Food

- | | | |
|--|--|--|
| a. If the infant was initially breast-fed, what was his reaction to milk from the bottle on the first occasion and on subsequent occasions ? | | |
| b. What was the response to solid foods and how were they initially administered ? Note baby's response to each of 5/6 solids started and to subsequent ones where there was any different type of response. | | |

- c. What were the first and subsequent responses observed until a consistent long-term response was established ?
Did the baby let it dribble out or did he swallow it ?

Did he smile or have any other facial expressions ?

Did he whine/cry ?

Did he turn head toward/away from the spoon ?

Was any difference in response observed by changing the type/form of preparation used ?

2. Toileting

(i) Bath

- a. At what age was the first bath given and how did the baby react ?

- b. Was there a change from his first reaction at subsequent baths ? If so, was this a gradual or an abrupt change ?

- c. Did he behave differently in a different bath tub or if the bath was given by a different person ?

- d. If there was a bath-free interval of several days/ longer what was the infant's reaction to the resumption of the bath ?

(ii) Nailcutting

- a. Description of behaviour on first and subsequent occasions.

(iii) Hairbrushing

- a. Description of behaviour on first and subsequent occasions.

(iv) Washing of face, hair, nose, ears

- a. Description of behaviour on first and subsequent occasions.

(v) Dressing and undressing

- a. What was the response to dressing or any specific aspect of it e.g. pulling shirt over head ? Was baby's reaction consistent ? Did it vary with the time of day or with the person dressing him ?

b. At what age did he attempt to dress himself ?

3. Response to People

a. At what age was the first differentiated R to a person noted ? What was it ?

b. What was the reaction to strangers ? Did he take the initiative, respond quickly to a stranger's initiative, require a period of warming up, or show a general negative reaction ?

c. Did he show any special responses to any specific people, strange or familiar ?

d. What was the boy's behaviour with any older siblings ?

e. If a new sibling was born describe his reactions in detail and in sequence.

f. What was his behaviour with older and younger children, as well as with those of his own age ?

4. Play

a. Did he take to a new toy/game with people quickly, or did he prefer the more familiar toys and games ?

IV. ADAPTABILITY

This category describes the child's responses to an altered situation. The emphasis is not on the nature of the initial responses but on their successful modification in desired directions.

a. What was the response of the sleeping pattern to :

(i) any modification in handling by the parent ;

(ii) any unusual circumstances e.g. travel;

(iii) handling by different people.

- b. What parental attempts were made to modify the feeding schedule and what was the baby's response to such attempts ? e.g. if baby was awakened for feeding at 10.00 p.m. to eliminate 2.00 a.m. feed what was his response on being awakened ? What was his feeding like and how did it change/modify the 2.00 a.m. and later morning awakening ?

- c. What was baby's reaction to any special circumstances which interrupted feeding schedule e.g. noise, illness, travel ?

- d. Was there any difference in the feeding pattern when the child was fed by different individuals ?

V. INTENSITY OF REACTION

Emphasis is on the energy content of the response, irrespective of its direction. A negative response may be as intense/mild as a positive one.

- a. Behaviour on going to sleep and waking up.
- b. How did baby indicate hunger ? Did he cry ? What was the intensity of crying ? Was there a quick/slow building up of crying ? How easily was crying stopped/diminished by such devices as holding the baby ?
- c. How did baby indicate satiation ?
- d. If feeding was interrupted (e.g. for burping) did he fuss, cry, show no reaction ?
- e. Enumerate the specific types of situations that made baby cry. What made him stop ? How long did he cry ? How loudly did he cry ?
- f. What use was made of pacifiers and were they effective in stopping crying ?

- | | + | - |
|---|---|---|
| g. Did baby show any reaction to being wet/soiled?
What did he do ? | | |
| h. If he showed a characteristic reaction (e.g. fussing) did this stop only when he was clean/dry or did he stop at some specific points in the process of changing him ? | | |

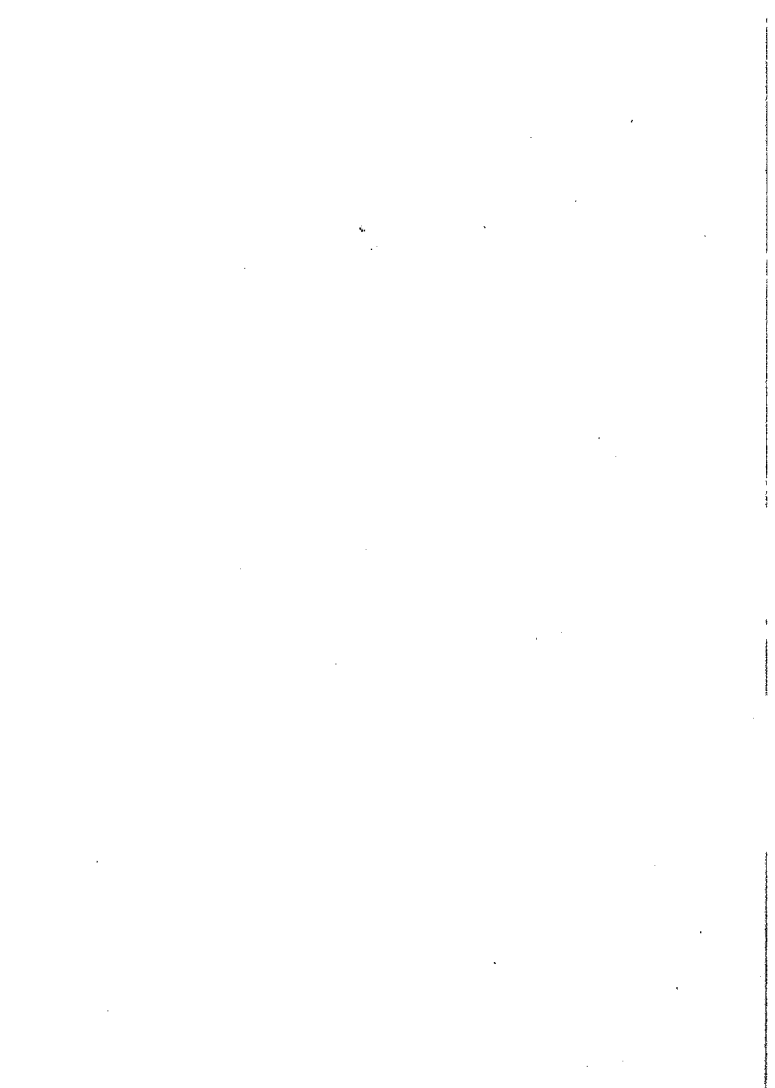
VI. ATTENTION SPAN AND PERSISTENCE

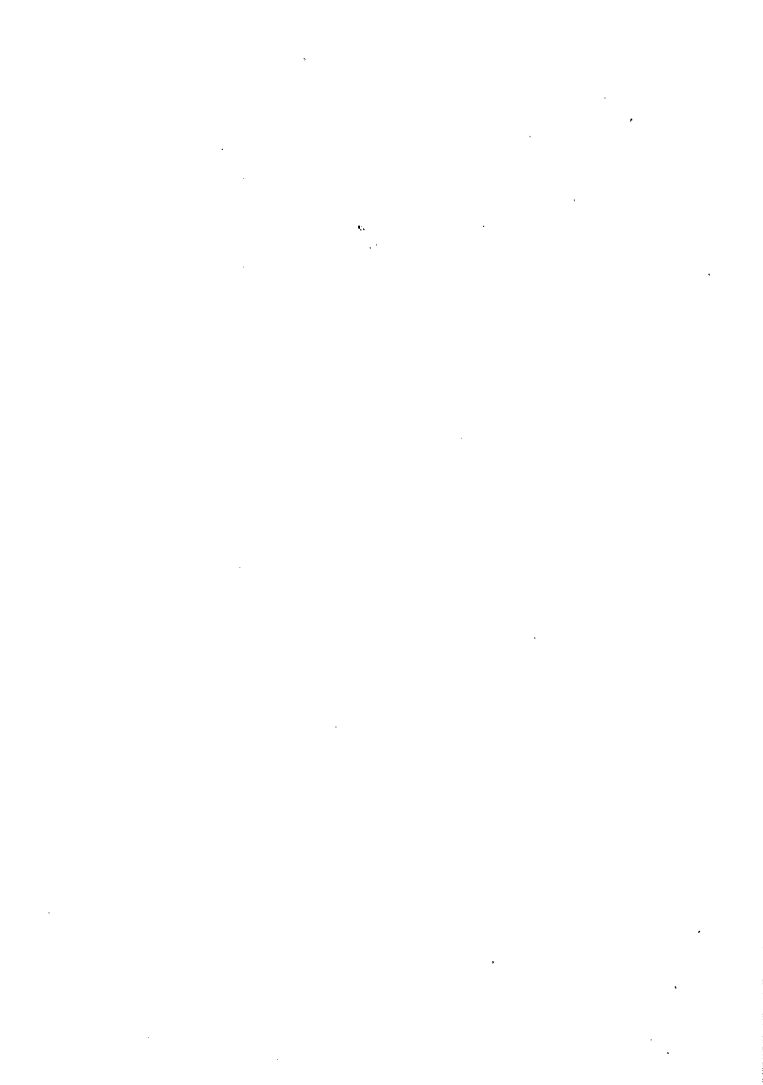
Attention span is the length of time a particular activity is pursued by the child. Persistence refers to the continuation of an activity in the face of obstacles to the maintenance of the activity direction.

- | | | |
|---|--|--|
| a. Did mastery of neuromuscular activities (e.g. sitting, walking) come suddenly or after a period of persistent effort ? | | |
| b. How long does your child play alone ? | | |
| c. How long does he concentrate on one toy/game ? | | |
| d. If a toy/game is too difficult, does he persist/ give up easily/ call for help/cry/have a tantrum/throw/ destroy the toy ? | | |
| e. What is the pattern of play with adults/older children/ children of his own age ? | | |
| f. What is his response to a parental 'no'/spanking ? | | |
| g. How easily can he be taught to avoid a prohibited item/activity ? | | |
| h. If forcibly moved from an activity, what is his reaction ? How easily can he be distracted ? | | |

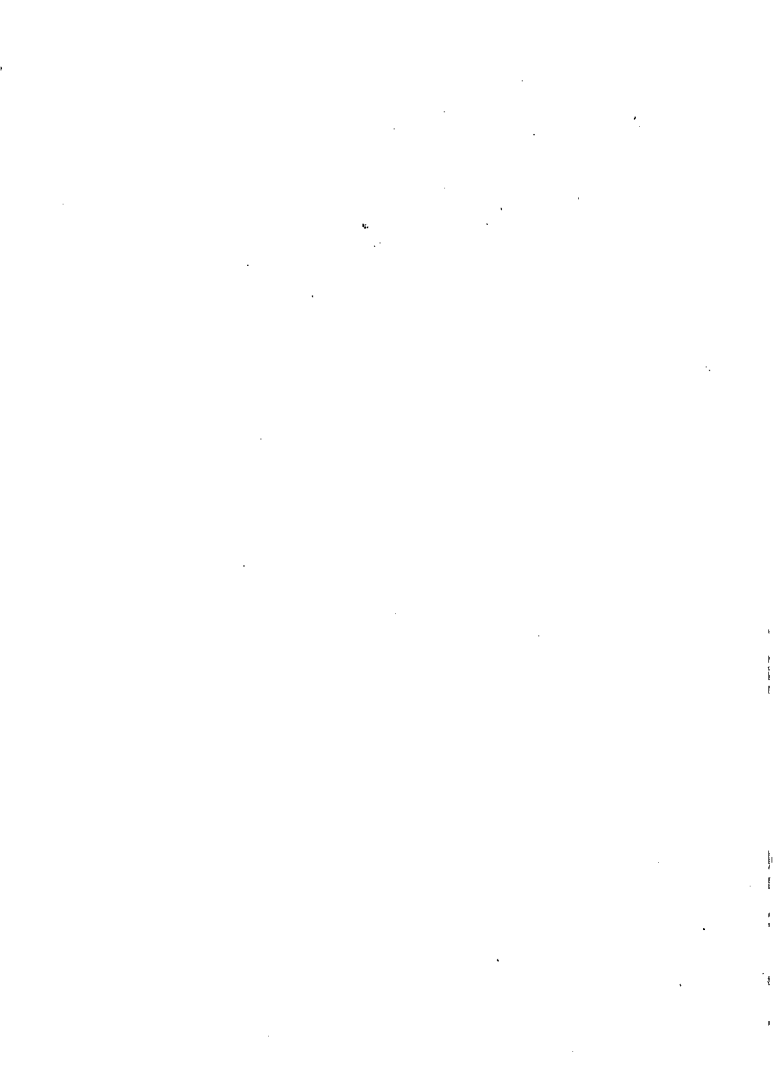
APPENDIX BSCALA OF FORMAL DIMENSIONS

1. Balance
 - Horizontal
 - Vertical
 - Diagonal
2. Tension
 - Oblique placement
 - Asymmetrical placement
3. Rhythm
 - Repetition of form
 - Continuity of line
 - Continuity of form
4. Unity
 - Similarity of composition : form
 - Similarity of composition : colour
5. Vitality
 - Boldness of form
 - Boldness of colour.









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