

THE BEHAVIORAL RESPONSES OF PRESCHOOL CHILDREN  
(THREE AND FIVE YEARS OF AGE) TO STRUCTURALLY  
MODIFIED SELF-MANIPULATING PLAY SYSTEMS,

by

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## Chapter I

### People/Behavior/Environment/Play: Introductory

#### Statements to this Research

##### Children, Space, and Their Environments

Children, unlike adults, usually respond to environmental spaces with intense, unbiased curiosity. This curiosity induces much of their activities, play, and learning. As they fondle their toes, fingers, and other bodily parts, they learn the many ways their muscles, senses, and mind exert and limit their actions. To explore, to rearrange, and to invent are a few ways they manipulate and control their own development.

As children adapt to their environment, they structure new experiences from past learnings; manipulate ongoing experiences with symbols to communicate their concepts; and envision future experiences in their imagination, thought, and planning. In their initial movements, they attempt to satisfy their basic biological needs before any other. In so doing, they experience a continual internal-external adjustment as they form their attitudes, responses, and reactions to stimuli. Through muscular and glandular behavioral reactions to such stimulation, they adjust to environmental spaces.

Human behavior occurs in spaces with specific physical entities. Behavior, formally defined as the "activity that is released when sense organs are stimulated adequately; that is, when the energy of

stimulation is sufficient to excite them so that a related neural discharge is instigated" (Harmon, 1945, p. 4), is suggested and manipulated by designers and planners as they create these spaces.

Space affects behavior:

. . . insofar as it affects the social system and culture of the people involved or as it is taken up into their social system and cultural norm which define and evaluate portions of the physical environment relevant to the lives of the people involved and structure the way people will use and react to this environment. (Gans, 1968, p. 5)

Specifically, space affects the behavior of preschool children who are strongly conditioned by the environment to which they are exposed. Few environmental spaces offer substantial stimulation necessary to develop children's perceptual modalities (Rosenthal, 1973).

An environment, defined as "the aggregate of surrounding things, conditions, or influences" (Barnhardt, 1967, p. 402), can support or discourage the creative, freeplay of children. It can stimulate learning or it can instill deviant actions given inadequate components. Proshansky, Ittleson, and Rivlin (1970) reiterated the significance an environment has on occurring behavior when they stated:

Human behavior in relation to a physical setting is enduring and consistent over time and situation; therefore, the characteristic pattern of behavior for that setting can be identified. (p. 29)

Barker and Schoggen (1973) also observed:

. . . when a person is within the bounds of a behavior setting, he behaves in accordance with the resultant of its ongoing pattern of forces (their strength and direction) and his own properties (dispositions, skills, intentions). These may lead to the separation of his setting, but while he is in it, the person behaves according to the resultant pattern of forces . . . (p. 248)

Hence, the underlying framework of this thesis dwelled in the inherent assumption that a relationship existed between the behavior of people and the space or environment they inhabited (Schneekloth, 1975).

For children who learn primarily through action and movement, their physical surroundings must be more than mere shelters or enclosures; rather, they must stimulate, interest, and aid in the adaptation process and development of a foundational framework. Creating strong foundational frameworks for children parallel the development of sound physical and mental traits. If a child's groundwork is insecure, attempts to correct unacceptable behavior patterns later in life may result in futile, expensive ventures. Harmon (1945) supported this concept when he stated:

Anything that retards, accelerates, or distorts the innate processes of maturation lays the foundation for developmental deviation; and any factor in a child's environment creating stress or tension in him, beyond his matured capabilities or in excess of his physiologic tolerances lays the foundation for developmental deviation. (p. 8)

Thus, attitudes, relationships, self concepts, and physical development are affected by environmental cues and stimulation. The inability to respond to the environment may actively lead to psychological, sociological, and mental tensions, which in turn, create dissatisfaction and frustration even in young children.

#### Play Environments for Children

Play, defined in one manner as children's "raison d'etre" (McLellan, 1970, p. 86) or in another as their careers, instinctively

appears in a newborn. Regardless of the definition or theory of play, it is as spontaneous and continuous as physical growth. Play, in part, provides preschoolers with a mode for achieving balance in their relationships with people they meet and with encompassing environments. From their play, children discover how to operate without the complete control and guidance of their mothers whether in the home or social community. Children repeatedly relive experiences, whether frightening or pleasurable, until they understand and/or accept the event. They approach play situations and its resulting behaviors with impulsive emotions rather than with controllable understanding. They develop dexterity, agility, keen perceptual senses, and socially acceptable dispositions during play--qualities which aid them in later life interactions. Resultingly, play becomes an "organizational mode, pulling fragmented learnings into a more coherent and meaningful whole" (Ankara, 1973, p. 5).

The environment that supports children's play can encourage or hinder activities, learning, health, socialization, and overall growth. True play occurs in conditions of freedom; it is permitting children to do what they want to do when they want to do it. Thus, their play environments should continuously support, stimulate, and strengthen these free, creative inclinations. Yet, within our social and structural settings, the innate creativity and inventiveness which children possess is inhibited and destroyed.

Around 1870, one of the first public playgrounds was established in New York City's Central Park. Its appearance indicated the



inadequacy of existing play locations selected by children. Furthermore, this public playground served as the first official statement that children needed a specialized place for learning and interaction. It may also have been a declaration that playsites generally chosen by children had finally become dangerous (Dattner, 1969).

The play environments and structures currently built for preschoolers emphasize adventure playgrounds where children create their own activity settings. Whether these new forms provide a higher degree of stimulation over the play equipment and mock-ups of yesteryear; whether they provide greater social, mental, and physical learning; and whether they increase individual and group interaction has been unexplored. Presently, existing research inadequately investigated play environments and their available facilities for today's children in relationship to the behavior and interaction accompanying growth and development. Many psychological studies explored the behavioral criteria that should be present and/or encouraged in children by a certain age to avoid acquisitional deprivation; but, they failed to convey how to achieve these behaviors in physical facilities and settings. Furthermore, these studies emphasized the necessity for children to manipulate their environments for heightened contentment, successful growth, and adequate uniform development.

## Chapter II

### People/Development/Play/Philosophy/Milieu-Material:

#### A Selective Exploration of the Literature

The concepts underlying this thesis drew upon information from many different areas of study. Child development, psychology, sociology, environmental design, and education represented some of those areas investigating children's relationships with their environment and its encircling elements. Because of the complexity and amount of information available under each discipline, only selected works pertinent to the present research are reported and discussed in this chapter.

#### People, Their Growth, and Their Development

Designers should have a first hand experience and knowledge of children's behavior and an understanding of their physical and social needs and cognitive learning processes. (Nicholson, 1970, p. 34)

Humans are never static. From the moment of conception until death, they undergo continuous change. At all ages, these changes are at various stages and conditions--some just beginning, some at their peak, some declining, some antagonistic, and some interrelated. Each change experienced in growth and development pulls young organisms closer to the privileges, freedoms, and responsibilities of adulthood. Thus, development, whether physical or mental, is not uniform for everyone.

The plasticity of the human physical, biological, and mental structures compels children to conform to and accept various

socialized practices. They learn, unlike other animals, ways to adjust their behavior to heighten their level of development. Although this trait has many positive aspects, it is not always advantageous. Like clay that can be transformed into a work of art or a monstrosity, children can be shaped into well-adjusted or maladjusted people. As Westman et al. (1967) concluded from a study involving the adjustment level of nursery school children in relation to mental health,

Evidence contradicts the time-honored notion that children outgrow behavior problems seen in early life and supports the thesis that drastic shifts in manifest behavior tend not to occur during the first 18 years of life. Children with adjustment problems in nursery school tend to have adjustment problems in later school life and these problems tend to be of the same order. (pp. 725-731)

Humans, because they are generalists (Lorenz, 1956; Morris, 1964), are capable of adjusting to a multitude of varying environments. The degree to which they adapt to these settings is influenced by early growth experiences.

### Early Childhood Development

Play behavior serves as one means for children to make adequate, adaptive responses to differing environments. It "fosters the behavioral variability of an individual, and therefore a species, and thereby increases the probability of future adaptation to unpredictable circumstances" (Ellis, 1973, p. 117). Studies in child psychology, emphasizing the periodic play behavior of children, investigate forms of play characteristic of specific age levels. In order to understand behavior patterns in a playground, knowledge of these traits become necessary.

During the first year of life, babies explore with their senses and gross muscles in people and object play. Their movements are simple, repetitive, and imitative of occurrences observed in the immediate environment. Because their organs are primitively developed, large moving objects attract their greatest attention. Until three months of age, their play consists mainly of visually observing and randomly grabbing for people and objects. Increased control of voluntary movements enable them to grasp, to hold, and to examine. Once they learn to walk and stand upright, they manipulate mechanical toys by pushing, pulling, and lifting. Waddle (1918) stated that babyhood play is selfish, self-centered, and individualistic while Kirkpatrick (1922) stressed that any attempt to control and direct infant's play through set rules were resented. Buhler's (1930) observations indicated that by nine months of age, babies display a desire for companionship play. But, not until they were two years old did they actually engage in organized, cooperative play activities.

Between the ages of two and three, children imitate, pretend, and constantly alter their behavioral play responses. They desire independence but still lack the necessary skills needed to fulfill their imaginative play demands. Assigning life qualities to play objects, interacting with imaginary companions, and dwelling on the material qualities of elements rather than its specific physical characteristics, children reenact daily occurrences. Because of their fantasy and manipulative actions, their play materials should be as ambiguous as possible. A few studies have recorded the duration times of young

children at play. Bridges (1927) found that the longest median time three year olds would give to any one play activity was 15 minutes. The following percentages of time were given by Bott (1928) for three year old play: raw materials, 29%; locomotor, 25.3%; pattern, 23.4%; and mechanical, 22.5%. Herring and Koch (1930), observing 80 infants, showed that interest span increased with age. Particularly for two year olds, recognition and familiarity rather than novelty stimulate and maintain interest.

At three years of age, children need outlets upon which to release frustrations. Shaking, waving, hitting, and hammering are natural actions for them. Because of greater dexterity, finer muscle control, and heightened form awareness, they successfully assimilate realistic experiences and replicate basic structures. Being more of conformists than previously, they share their possessions, desire company over solitude, are responsive to simple patterns and rhythms, and understand the relationship of individual, elemental segments to the total. Blatz and Bott (1929) supported the observation that two year olds were solitary in play while three year olds, along with older children, showed the rudiments of team play. Parten (1932) discovered that at two and one-half years, there was more solitary play than at any other age level; the most common form of social participation during this age was parallel play. Bott (1928) found that raw materials such as sand and blocks were preferred over conventional play toys among three year olds. Hetzer (1931) found that below the age of two, construction was primarily unspecific manipulation; after the age of two, construction was, first, in the form of specific manipulation, and then, in the

form of meaningful manipulation. Van Alstyne (1932) found that at the age of two to six years, blocks, clay, and doll corner play in nursery school settings were the most captivating toys.

Four year olds sustain the heightened energy level of three year olds but do not demand as frequent an activity change. This age group enjoys the company of others but is equally capable of amusing themselves in solitary play. They express an interest in adult world and family household activities; require limited rules but a guiding hand due to their uncanny understanding of their ability limits; and hold a longer, more complex sequence in their excursions. Like three year olds, their play reflects realistic occurrences. Creating products that are complex, symmetrical, and intricately detailed, these young people are possessive and proud of their end results. Buhler (1933) discovered that after the age of four, children use play materials specifically to produce objects in contrast to mere manipulation which is characteristic of earlier years. Bridges (1929) found that four year olds spent, on the average, 6.2 minutes in toy play. Farwell (1930), sampling 271 children working with one constructive play material, discovered that 31.3% of this sample spent 50% to 100% of the total working time on this single material. The average attention span, according to Van Alstyne (1932), for the eight most popular play materials was 7.0 minutes for the two year olds, 8.9 minutes for the three year olds, 12.3 minutes for the four year olds, and 13.6 minutes for the five year olds. In addition, she found over 50% of the children, ranging in age from two to six years, playing solitarily

when occupied with specific materials; only 40% of her observations revealed socialized groupings.

Almost all of the play of five year olds is devoted to learning. Stimulated by playmates, five year olds easily succumb to cooperative ways. No longer intrigued by magic and absurdity, practicality and conformity are key motivating forces. Perfectionists by nature, these children note details, seek to copy exactness, and replicate real models as closely as possible. They are not designers as noted in earlier play periods. Practice and rehearsal are qualities of their play rather than invention. Thus, created objects must be both realistic and functional. Because five year olds exercise small muscle coordination needed to manipulate tiny objects, much of their dramatic play situations occur in small, miniature world spaces. The activity periods of five year olds should be limited in time, involve realistic models to serve as guides, be definite in task requirements, and result in an end product that illustrates their intense efforts. Although they are not ready for competition, group play in which everyone becomes involved interest them. The what of their activities is insignificant; it is the with whom and how that counts.

Young children imitate the play of older children who have imitated the play of the generation of children preceding them. Hence, for every culture, one generation hands down to the next forms of play it finds most satisfactory. This results in predictable patterns of play over each age period. In block play, for example, first year children merely handle, carry, and/or pile them in irregular masses;

next, they construct rows and towers; three year olds concentrate on balance, size, and ways of combining blocks--techniques that are later used in more complicated designs; four year olds begin building crude and sprawling structures loosely hung together; and five year olds dramatize and reproduce actual forms that are highly integrated and carefully balanced. By six years of age, children use the intricate shapes in dramatic play settings (Margolin, 1961; Moyer, 1956).

### Play: A Definition

Play is not a passive occupation for children. Rather, it represents their innate desires to explore, to manipulate, and to discover at their own pace and time. Play, like the experimentations performed by adults, serves as an adventurous research or exploit that is enjoyed. To learn about their world, children must have freedom to move and to play as they choose. As Lowenfeld (1967) asserted,

Children deprived of adequate opportunities of constructive play are children who later grow up deficient in constructive imagination, and are inhibited in experience. (p. 217)

Play contributes to all forms of learning for children whether it is social, cognitive, physical, or emotional. Prior to the seventeenth century, play was thought to be a nonproductive mode of activity. Consequently, children were treated as miniature adults and their play as an apprenticeship for acquiring socialized skills. Neumann (1971), analyzing literature on play, conceived of three criteria that determine whether children's activities are related to work or play. Basing the event on a continuum, the following guides are established:



1. control--based on a difference between internal and external control of activities; total control in activity is achieved only when the child is playing alone; external control of activity denotes work; internal control denotes play;
2. reality--the extent to which play is tied to the real world denotes work; external reality signifies work; internal reality signifies play; and,
3. motivation--the extent to which an activity is internally motivated is play; as soon as the motivation is external, it stops being play. (p. 57)

In contrast to this work concept of play, several studies (Buhler, 1930; Isaacs, 1933; Terman, 1933; and Lowenfeld, 1967) revealed that variables such as sex, play materials, environmental settings, economic and racial differences, languages, and intelligence affect play activity and behavior.

Collectively, educators and philosophers of many disciplines attempted universally to define play in relation to child development. For example,

Froebel [defines play as] the natural unfolding of the germinal leaves of childhood; Spencer: activity performed for the immediate gratification derived, without regard for ulterior benefits; Lazarus: Play is activity which is in itself free, aimless, amusing or diverting; Seashore: Free self expression for the pleasure of expression; Dewey: Activities not consciously performed for the sake of any result beyond themselves; Stern: Play is voluntary, self-sufficient activity; Patrick: Those human activities which are free and spontaneous and which are pursued for their own sake alone, interest in them is self-sustaining, and they are not continued under any internal or external compulsion; Allen: Play refers to those activities which are accompanied by a state of comparative pleasure, exhilaration, power, and the feeling of self-initiative; Curti: Highly motivated activity which, as free from conflicts is usually, though not always, pleasurable. (Mitchell and Mason, 1948, pp. 103-104)

### Play: Existing Theories

Theories on why children engage in play are numerous and all conceptually different. Gilmore (1966) categorized these theories into two classes: the classical and the dynamic theories of play. The classical theories, including the surplus energy theory, the relaxation theory, the preexercise theory, and the recapitulation theory, attempts to understand why people play. The dynamic theories, including the psychoanalytic theories of Freud and the concepts of Piaget, accept the precept that children play and methodologically explain their activities.

The surplus energy theory supports the seventeenth century philosophies of play. The proponents of this theory profess the naturalness of young children to engage in spontaneous activity and the possession of more energy than required for biological growth. The extra energy, thus, is expended in nongoal-directed (play) activities. Spencer (1945) felt that because children do not concern themselves with the serious aspects of adult living, they utilize their excess energies in play endeavors.

The relaxation or recreational theory stipulates that play replenishes lost energy and serves as a form of rest. The preexercise theory of Groos (1976), on the other hand, suggests that play is instinctive. The activities of children help to prepare them for future work. "The higher the organism is on the animal scale, the more necessary it is for young ones to have a period of preexercise in which they practice skills they will need to use in adult life" (Groos, 1976, p. 45).

Hall (1938) suggested that play was a form of reminiscence or recapitulation rather than preparation for future work. Hence, children's development patterns progressed evolutionally. Children's play "recapitulated the phylogenetic transition from animal to human play, and the cultural transformations through savage, nomadic, agricultural, and tribal stages" (Herron and Sutton-Smith, 1971, p. 51). Thus, their motions reenact and replicate earlier stages in man's cultural development. In addition, these activities serve as a release for innate biological impulses that are no longer consistent with modern conditions and socialization.

Each of the above theories contradict the other: the creation of energy versus the sloughing off of excess energy; the rooting of play in future endeavors versus its rooting in the past (Herron and Sutton-Smith, 1971). These classical theories fail to explain why play exists and why certain elements are preferred for play over others.

Froebel (1895) defined the significance of play in the following manner:

Play is the highest expression of human development in childhood, for it alone is the free expression of what is in a child's soul. (p. 50)

Play, in this context, is the purest spiritual product in young people's lives; from it springs everything positive. Children require play to integrate their physique with their environment.

According to Freud (1949), children utilized play to master and accept experiences that trouble them. By repeating these experiences, they understand its fear causing elements. Conquering fear through

fantasy play ease children's adjustment behaviors in realistic traumas. Lowenfeld (1967) and Isaacs (1933), in support of Freud's view, conceived of play as a way of externalizing, defining, limiting, and mastering one's thoughts. Play serves as an interaction of three forms of activity, it:

1. helps perfect bodily skills and muscular control;
2. concerns itself with physical objects that prompt questioning and develop reasoning; and,
3. involves imaginative actions which relieve inner tensions. It also helps children understand object relationships in the environment.  
(McLellan, 1970, p. 28)

In addition, Griffith (1935) and Jersild (1933) upheld the importance of fantasy and imaginative play:

Imagination is the child's method not so much of avoiding the problems presented by the environment, but of overcoming those difficulties in a piecemeal and indirect fashion, returning again and again in imagination to the problem, and gradually developing a socialized attitude which finally finds expression at the level of overt action and adopted behavior. (Griffith, 1935, pp. 353-354)

The writings of Piaget (1962) strongly influenced current play concepts. Cognitive thought, according to Piaget, involved two processes: assimilation and accommodation. In the assimilation process, individuals abstract information from their surroundings, add this knowledge to previously stored information, and develop new thoughts and opinions. Through imitation and modification, individuals adapt their behaviors to realistic settings. Accommodation is those cognitive and conduct changes resulting from this assimilation. "Imitation is a continuation of accommodation, play a continuation of

assimilation, and intelligence a harmonious combination of the two" (Piaget, 1962, p. 104).

Piaget also envisioned play as possessing three distinct stages or structures relative to children's cognitive development. The first, the sensorimotor stage in which actions or practice games are ends in themselves, involve no cognition. The second, a form of symbolic or dramatic play involving thought, imagination, and imitation, is most prevalent at the preschool level. Lastly, the third stage, involving rule games, encourage social development. Play, thus, becomes an intellectual activity.

The post war theories on play stimulated by mass media such as radio, film, and television entertainment demonstrate the need for children actively to be aroused. Unlike the classical theories which ask what is play, the psychoanalytic theories which ask what motivates children to play, or the cognitive theories which ask what mental processes form the basis for children's play, these latter theories question the conditions under which play occurs. Hence, play serves as children's vehicles for mediating the degree of external stimulation necessary to achieve an optimal level of personal functioning and satisfaction.

#### Play: Specific Environmental Needs

Bronfenbrenner (1974), active in the field of developmental and environmental psychology relative to children's growth, foresaw a closed web which forms three concentric spheres of influence entrapping children. The first sphere represents the physical,

behavioral, and interactionary properties of the setting such as the physical design, structural materials, object-people and people-people relationships, and ongoing pattern activities. The second sphere incorporates the social structures and institutions of this first region. Because they operate according to rules and guidelines, these social institutions encourage or hinder activities within children's immediate settings; in turn, their degree of restriction alters growth patterns. The third concentric circle includes these ideological concepts and principles that organize, structure, and control children's environments.

The White House Conference on Children in 1970 further revealed the importance the environment plays in children's development by stating:

Injuries to children, whether physical, psychological, social, or environmental, cannot and should not be isolated from the human settlement in which they occur. Here, "human settlement" refers to the relationship between man and his surroundings whether those surroundings are natural or manmade. (p. 209)

The United States National Education Association in 1974 also observed:

Research shows clearly that the first 4 or 5 years of a child's life is the period of most rapid growth in physical and mental character and of greatest susceptibility to environmental influence. Consequently, it is in the early years that deprivations are most disastrous in their effects. Experience indicates that exposure to a wide variety of activities and of social and mental interactions with children and adults greatly enhances a child's ability to learn. (Allen, 1974, p. 10)

Numerous field studies, influenced and initiated by Lewin (1941), revealed an important relationship between individual's activity

behaviors and their naturalistic habitats. Barker (1971), in particular, organized several Kansas studies to explore relationships between living environments and behavioral responses in relation to allocation of space differences and time limitations (Prescott, 1973; Spivak, 1973; Schneekloth, 1975). In his text, Midwest and Its Children, he observed and discussed children's responses to two environment elements: one social (people) and the other nonsocial (objects describable in physical terms and possessing specific behavioral patterns). Three children for a period of three days responded to various forms of these environmental elements. Approximately 2,216 object interaction patterns recorded and analyzed per child per day indicated that:

The transactions per social behavior object were about four times as great as those per nonsocial behavior object. The result is that total object transactions were about equally divided between social and non social behavior objects. (Barker, 1971, p. 317)

Children encounter varying object and people stimuli throughout their days transactions. This study reinforced existing information on the need for diverse, stimulating interactions (Schneekloth, 1975).

Kritchevsky (1969), in conjunction with Prescott (1973), performed extensive studies on the physical environments in daycare centers. Much of their research also indicated the influence environmental factors such as space, space arrangement, and artifacts have on the behavioral responses of children. Children's play and ongoing activities are often affected by the content and arrangement of the encompassing space (Schneekloth, 1975):

Tired or irritable teachers; apathetic, hyperactive, or uninterested children; high noise level; large amounts of time spent in routine management and excessive use of teacher-directed activity, all have a high likelihood of being spatially induced. (Kritchevsky, 1969, p. 42)

Gump and Sutton-Smith (1971) watched a group of children in two different activity settings at a camp, swimming and craft working. How activities limit, provoke, and coerce the expression of children's needs and problems were questioned. Their general hypothesis, based on this query, explored the reality and behavior influencing power of activities. An activity, once entered, could exclude some potential behaviors, necessitate other behaviors, and encourage or discourage still others. This coercive power of activities rests upon the behavioral limitations and the possibilities posed by the environment and its accompanying objects. A significant difference in the kind and amount of social interaction was found. In addition, activities apparently could be developed for specific age groups. Furthermore, anticipated behavioral responses from children in activity settings with specific characteristics could be prejudged.

Research assessing the validity of current child educational programs has emphasized an evaluative approach. Of particular significance to this study was an inventory assessment of the specific abilities nursery school children were expected to possess (Angrus, 1923). Observations from the Manhattanville Nursery School system were obtained. From Angrus' study, attempts were made to develop a tentative inventory of specific habits and abilities of children from two to four years to be used in classifying and evaluating their



activities; to assert the reliability of the data by employing several different types of observers for this study; to assert the influence differing amounts and types of training had on children's abilities; and, to determine the significant differences among children's abilities at that age. Angrus successfully developed what she felt was an effective inventory scale for evaluating and assessing children's motor, mental, personality, emotional, and social abilities. In addition, this inventory evaluated the growth of individuals and groups, motor abilities and physical performance tests, curricula equipment and character of instruction, and intelligence of students.

Unlike previous attempts to assess the skill abilities of students, Angrus attempted to discover not only the original tendencies and capabilities of the children but also to what degree these traits may be subject to formal learning and at what age such training may be given for a maximum profitability level. Rogers (1922) previously made efforts to develop an inventory of children's habits, but it could not be generalized to age groups below the kindergarten level.

Havighurst and Hilkevitch (1944) went beyond the inventory scaling of Angrus and, in support of her evaluations, determined the effects differing environments had on differing types of learning abilities at various age levels. As Ferguson (1954) stated, "Presumably children reared in different types of learning environments at different ages, develop different patterns of ability" (p. 55). He felt that different abilities may be required at different stages of learning a task. Using a sampling of 92 Hopi Indian children,

relatively remote from the standard United States culture, he demonstrated that these children scored substantially higher on performance and nonverbal intelligence tests than did Indian children living closer to the standard culture. This indicated a number of important considerations. Environmental factors can influentially affect childrens' skill abilities; hence, it is important that functional and purposeful equipment be developed to meet these curiosity and learning needs. Furthermore, varying cultural backgrounds must be considered in order to provide play settings beneficial to all children.

The effects of socialization on children was observed in Hofstaetter's study (1954) of infant intelligence tests. He suggested that these tests primarily tapped behaviors in sensorimotor alertness. He found that children who were advanced in sensorimotor skills scored higher on tests; those who were retarded, scored lower. Furthermore, infants who lived in institutions scored lower than children in homes with true or foster parents. Scores from intelligence tests given to children younger than 18 months had a low relationship to scores from intelligence tests taken later in life. These infant tests, in addition, could detect disabilities in children. Again, these findings support the concept that children need personal, identifiable, stimulating, and active environments. A sense of belonging and privacy that can be incorporated into a play setting is important for children's growth.

As Bronfenbrenner (1974) once stated, "If you want to understand something, change it" (p. 124). Studies dealing specifically with the behavioral relationship of play objects to children concerned

themselves with the changeability in arrangement and space allocation. In 1935, Johnson investigated the effect variation in the amount of play equipment had upon children's behavior. The same subjects and environment were analyzed before and after changes in equipment occurred. Her findings revealed that children were inventive regardless of available facilities. In addition, a change in the structural arrangement of the equipment resulted in behavioral pattern changes:

The more extensively equipped playground for each group is characterized by a greater combined amount of bodily exercise and play with materials and fewer social contacts in games and undesirable behavior. The less extensively equipped playground for each group is characterized by a lesser combined amount of bodily exercise and play with materials and a greater number of social contacts and social conflicts. (Johnson, 1935, p. 66)

Rohe and Patterson (1974), influenced by Johnson's explorations and findings, manipulated the amount of available space as well as available play material for the daycare children. Utilizing the matrix below, they found that a specific ratio of resources to density must exist for the occurrence of positive behavior or a marked increase in antisocial behavior and competition developed (Schneekloth, 1975).

HIGH RESOURCES

LOW RESOURCES

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HIGH DENSITY

---

LOW DENSITY

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The interest by children to act freely in their play was expressed further in a report by the Urban and Planning Institute of Nuremberg, Germany:

Children gauge their freedom not by the extent of open areas around them, but by the liberty they have to be among people and things that excite them and fire their imagination. (Bronfenbrenner, 1974, p. 2)

Hart (1974), after observing the natural activities of children for two years, stated that "large amounts of free time were spent in modifying the landscape . . . through building and modeling" (p. 356).

#### An Overview of Cited Literature

Play is:

. . . a free activity standing quite consciously outside "ordinary" life as being "not serious," but at the same time as absorbing the player intensely and utterly. It is an activity connected with no material interest, and no profit can be gained by it. It proceeds within its own fixed boundaries of time and space and according to fixed rules and in an orderly manner. It promotes the formation of social groupings which tend to surround themselves with secrecy and to stress their difference from the common world by disguise or other means. (Huizinga, 1949, p. 13)

From a phenomenological stance, the fun of playing resists all analysis and all logical interpretation (Huizinga, 1949). Because people are behaviorally diverse; because the how, why, and what of specific play pattern activities lack universal explanation; and because differing human backgrounds necessitate causal approach analysis, recordings on children's play activities are primarily descriptive observations. Anxiety, mastery, compensation, novel responses,

logical categories, instigating stimuli and agents, motive states, phylogenetic and ontogenetic sequences, response transformations, and the testing of power supply the functional contexts relevant to the understanding of play.

Characteristically, play is:

1. voluntary and universal; children are not forced to play; yet, they all engage in play activity in one form or another;
2. influenced by culture and tradition; in addition, it is not goal-directed as work and serves as an expression of personal meaning to the player; it also tends to follow a predictable pattern of development;
3. primarily a solitary, free, and spontaneous action with no rules and regulations in its earliest developmental stages; it transforms from informal structuring in early childhood to more formal requirements in later growth--specific appointments, clothing, equipment, and play environments arise during the gang age that were non-occurring in earlier play development;
4. influenced by the age of the child; as his age increases, the number of play activities, the level of physical action, the time engaged in specific functions, and the number of different playmates selected for play during a specific session decreases while the time spent in a specific activity increases; also, an increase in age accompanies a greater increase in sex appropriated play--certain objects are avoided and off limits because of their socially assigned sex connotations;

5. most creative for children during growth and development in the form of dramatic play, constructive play, and daydreaming; and,

6. positively rewarding for children when specific play activities satisfy personal and social needs.

From the literature reviewed, organisms, in relation to the present research, demand active interaction with responsive, changeable articles. Phylogenetically, man requires a certain stimulus level in order for basic function and need satisfaction. The more complex the presented stimuli, the higher the involvement and greater the object exploration. Because stimulus activation suggests motion, it seems that play, a form of voluntary movement, critically influences healthy development.

The literature revealed a number of person, object, and environment concepts relevant to the present research which are noted here:

1. Inherently, unnurtured organisms respond to their surroundings with an exploratory, curious, nonrestrictive, active behavior.

2. The artifacts in individual's environments provoke, coerce, and compel varying response patterns. Changeability and diversity in these objects aid interaction, learning, and growth.

3. The presence or lack of specific environment and object stimuli affect individual's social, psychological, intellectual, physiological, and behavioral development.

4. The relationship and occurrence of specific behaviors between organisms and their environment are paramount to the enlightenment of

human development; to explore one without **considerational** influence of the other can lead to an inaccurate analysis. The collective environments which organisms experience appear to mold resulting behavior patterns.

The need for or the absence of those factors which support, encourage, and stimulate children's behavior and their activities in their play environments failed to interest former researchers. Based on the theories, concepts, definitions, and behavioral patterns cited in the reviewed literature, the factors of form diversity and manipulatory variation were incorporated in the present research. Specifically, the question of whether children need complete direction, partial direction, or complete absence of direction to support a positive, cognitive, and physical development was investigated in this present study.

## Chapter III

### Statement/Design Criteria/Constraints: A Foundation and Format for This Research

Exploratory in nature, this research investigated the behavioral responses of preschool children, three and five years of age, to several structurally modified play systems. The following relationships were examined: the individual to the structure and the group to the structure. Data and information were collected on the behavioral responses and interactions of preschoolers toward play environments and structures manipulated solely by them. Of prime concern, this present study attempted to demonstrate the feasibility of further research:

1. To determine whether children exert and accept control over their play environments to support their play activities or permit the existing surroundings to dictate and exert this control.

2. To determine to what degree the order of introducing static, semiflexible, and flexible play structures will affect preschoolers' responses with regard to age differences, characteristic variations, attention span and interest, play form preference, and behavioral responding on both an individual and group level.

3. To determine whether a static, semiflexible, or flexible play structure encourages greater individual and/or group interaction, attending, diversity in play form, variety in behavioral responding, and structural alteration.



4. To determine whether children replicate previous structural arrangements and the behaviors which result in physically similar settings; and,

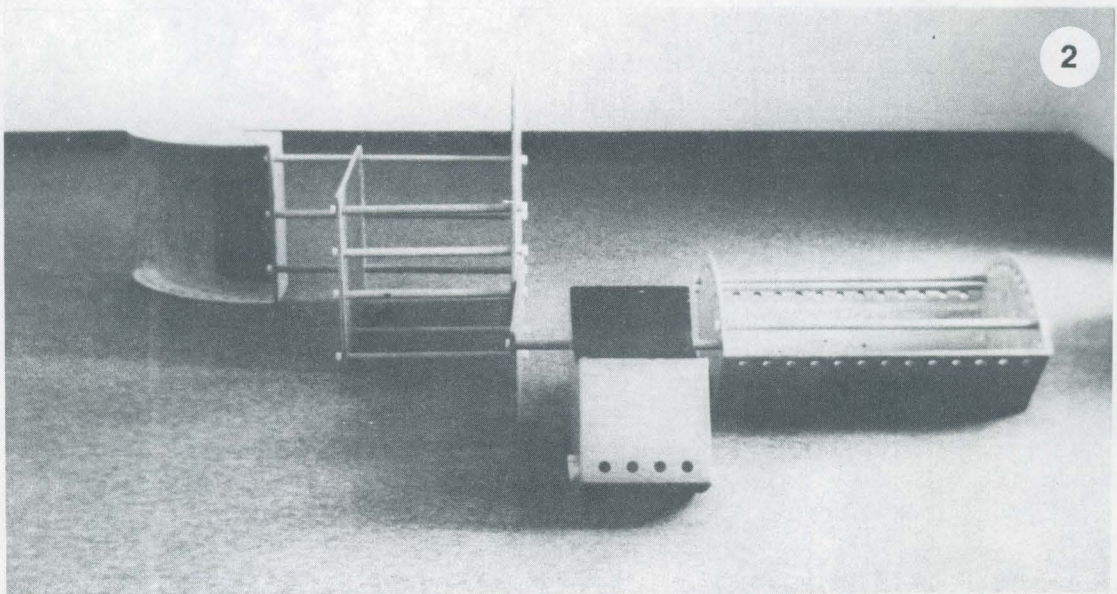
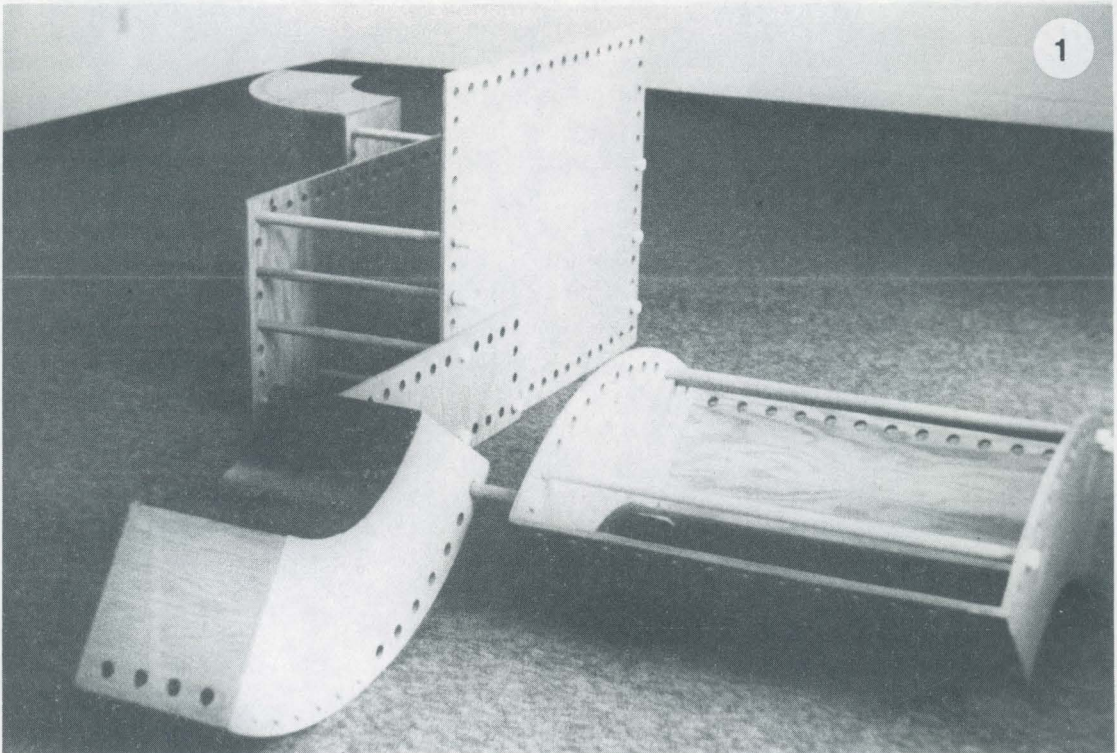
5. To determine how age influences children's behaviors and capabilities under varying conditions of manipulation.

#### Structural State Design Criteria

In order to test the above objectives, a modular play system was constructed based on a three step progression from static to flexible. Due to the potential for this research to be highly expensive, only three stages of the progression from static to flexible were built and tested. It was felt that two extremes and a middle stage would sufficiently reveal the need for further exploration of the objectives of this study. The three states were modifications of each other and theoretically elicited equivalent behavior responses. Definitively, the three stages were classified as follows:

1. State I: Static--the structure was not changeable in any way, shape, or form by the preschooler; its arrangement theoretically remained stationary in accordance with the researcher's preorganization and structuring (see Photographs 1 and 2).

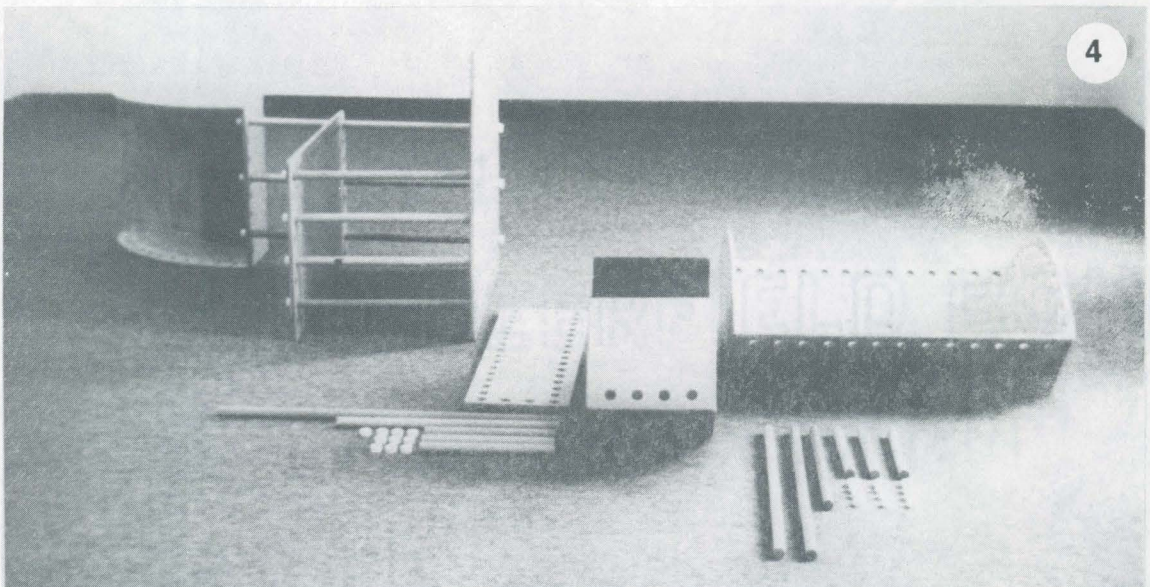
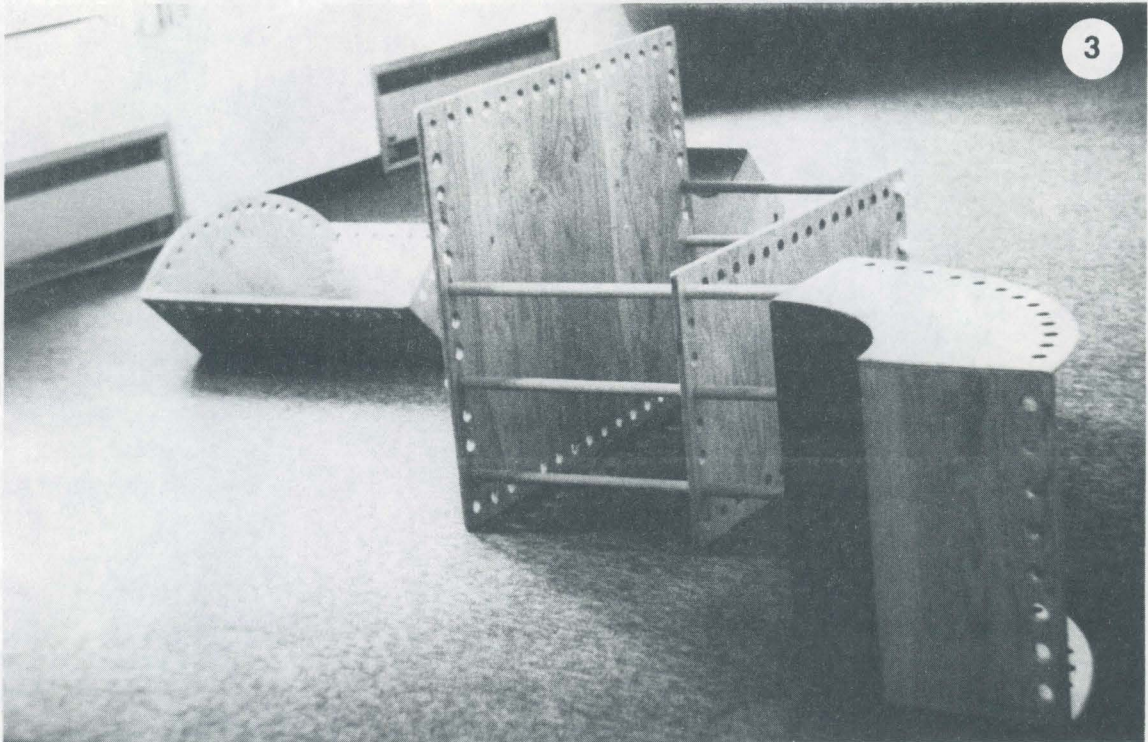
2. State II: Semiflexible--the structure was only partially changed and manipulated by the preschooler either through rotation, addition, and/or subtraction of the elements as it corresponded to the researcher's prearrangements (see Photographs 3 and 4).



Photograph 1. Photograph 2.  
Structural State I: Static.

OLD DEERFIELD BOND





Photograph 3. Photograph 4.  
Structural State II: Semiflexible.

3. State III: Flexible--the structure was completely controlled, changed, and manipulated by the preschooler; although this prearrangement had the greatest potential to change structurally, the elements were present for the elicitation of equivalent behavior to the first two systems; it was strictly within the control of the preschooler to develop and replicate similar responses to the other systems if so desired and compelled (see Photographs 5 and 6).

Appendix C contains further details (drawings and photographs) of these three structural state arrangements.

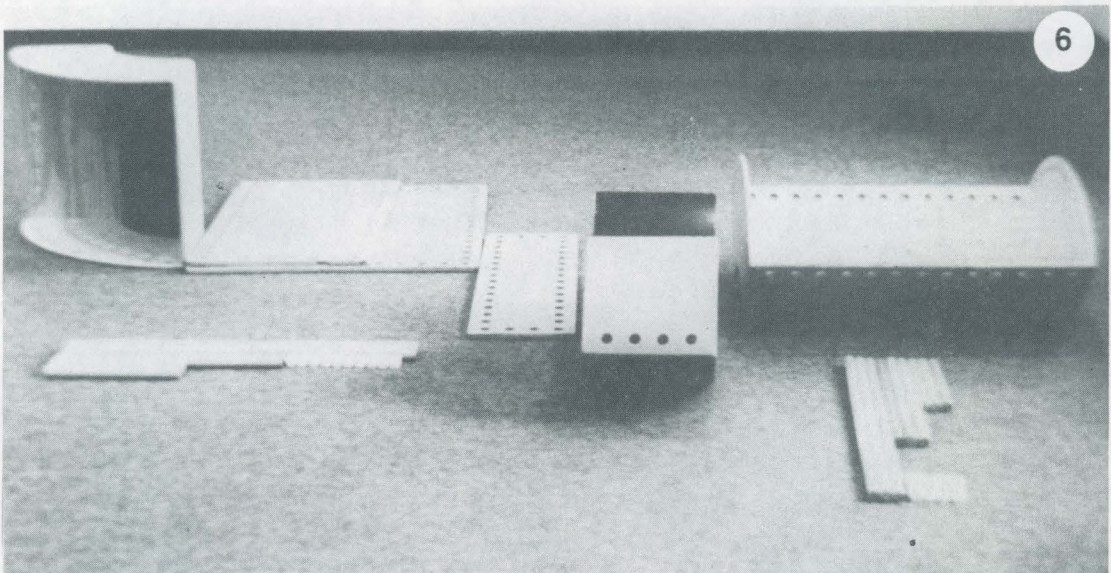
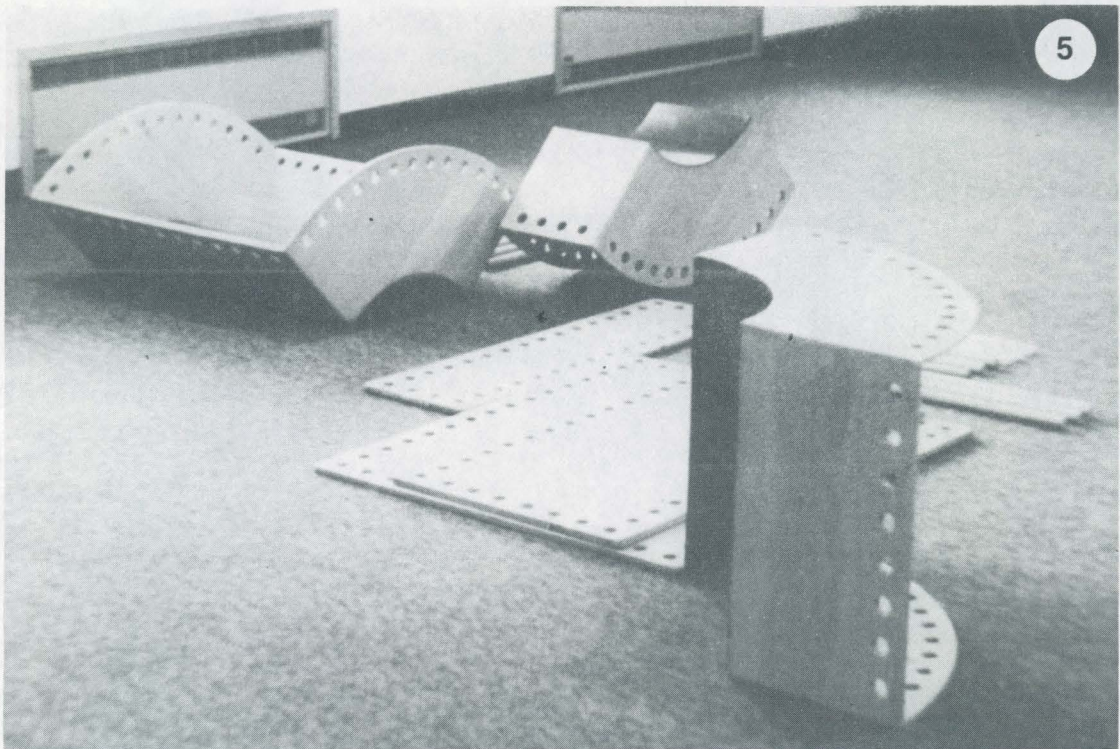
In developing the design for the above states, the following criteria served as a guide:

1. modular and basic in form and make-up; three main shapes or concepts were used with each system to form the overall structure;
2. permitted individual, group, and/or a combination of both activity responses to occur simultaneously; and,
3. physically moveable and handleable by the preschooler according to the classifications stated above for each system and to the dimensional proportions of the age group tested.

In general, the following conditions were constant in all the systems and their objects:

1. color--neutral in tone;
2. size--manipulable by preschoolers according to the criteria for each classified system as they were unassisted;





Photograph 5. Photograph 6.  
Structural State III: Flexible.

3. form--noncomplex in its shape, modular in its structure, and uniform along at least one dimension such as height, width, depth, or time motion ; and,

4. material--all forms were constructed of the same material--1/2 inch fir plywood and 1 inch fir dowels with a polyurethane finish; the specific material selected satisfied the following properties:

- a. availability--acquirable in adequate quantity;
- b. cost--minimal;
- c. construction--expeditiously formed according to the system and design; constructable and buildable by a single individual; adaptable to a joint system safe for children's play at all levels of activity and for all preconceived behavior responses; and,
- d. finish--safe for children's use such as the finish should not peel or contain lead.

Appendix C provides details (drawings and photographs) of the resulting design objects which form the three structural stage arrangements used in this present research.

### Research Constraints

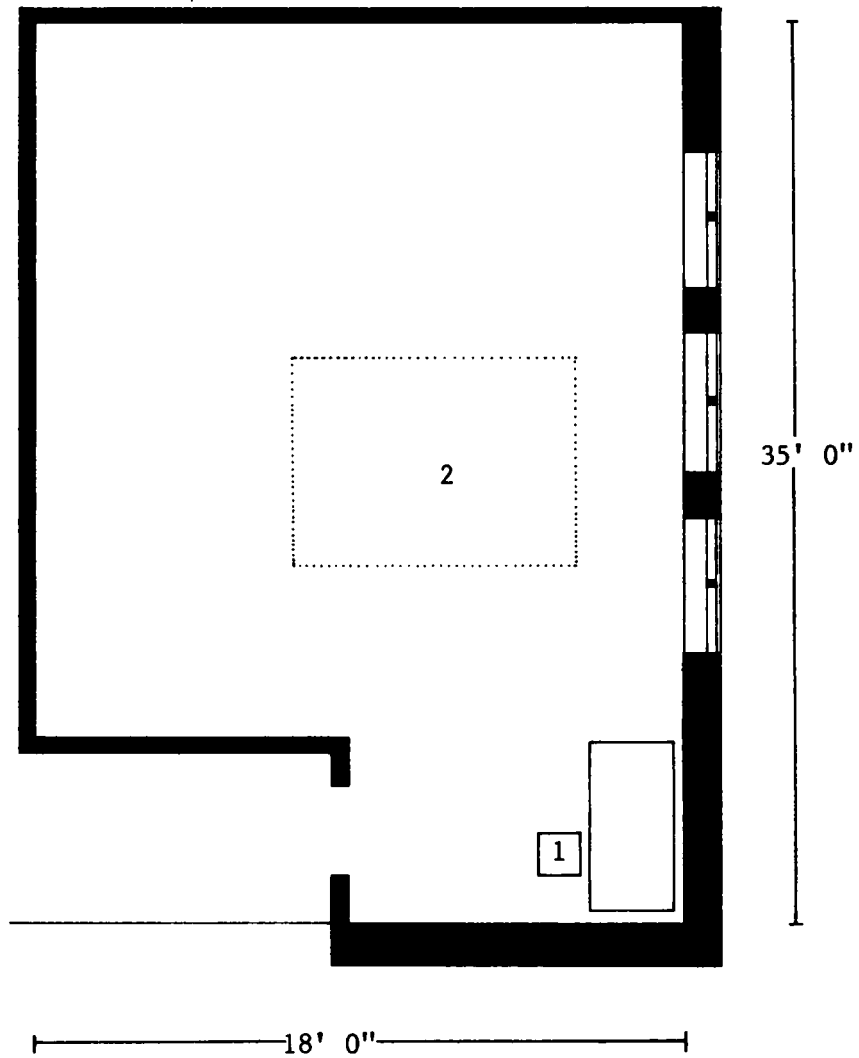
#### Site

Early in the investigation of a testing environment, it was suggested that the preschool laboratory at the Virginia Polytechnic Institute and State University located adjacent to the College of Home Economics be used. This setting was discounted after careful thought and consideration by the researcher due in part to the watchful monitoring of the children by instructors and students. For the purpose

of this study, a preschool in Blacksburg, Virginia served as the testing site.

The school, at the time of testing, had an enrollment of approximately 100 children ranging in ages from two and one-half years old to six years old with full day and part time programs. The children were primarily of the middle income/socioeconomic strata whose parents were diversely employed--from service workers to professionals. The program of learning was traditionally structured where the children received specific guidance, instruction, and interaction on both a group and an individual basis. There were provisions for free outdoor play on both portable and nonportable play facilities as well as a limited indoor space for the younger learners (four years and below). The majority of equipment within the school's perimeters were of the State I (static) classification as defined in this research although forms of State II (semiflexible) and State III (flexible) existed. This particular center was selected over others located within the Blacksburg area because of its pupil size, its instructional program, its available facilities to satisfy the desired testing environment parameters, its convenience of location, and its ease of accessibility to the researcher. Because of the diversity of learning programs within Blacksburg, the selection of a traditional learning system was randomly determined.

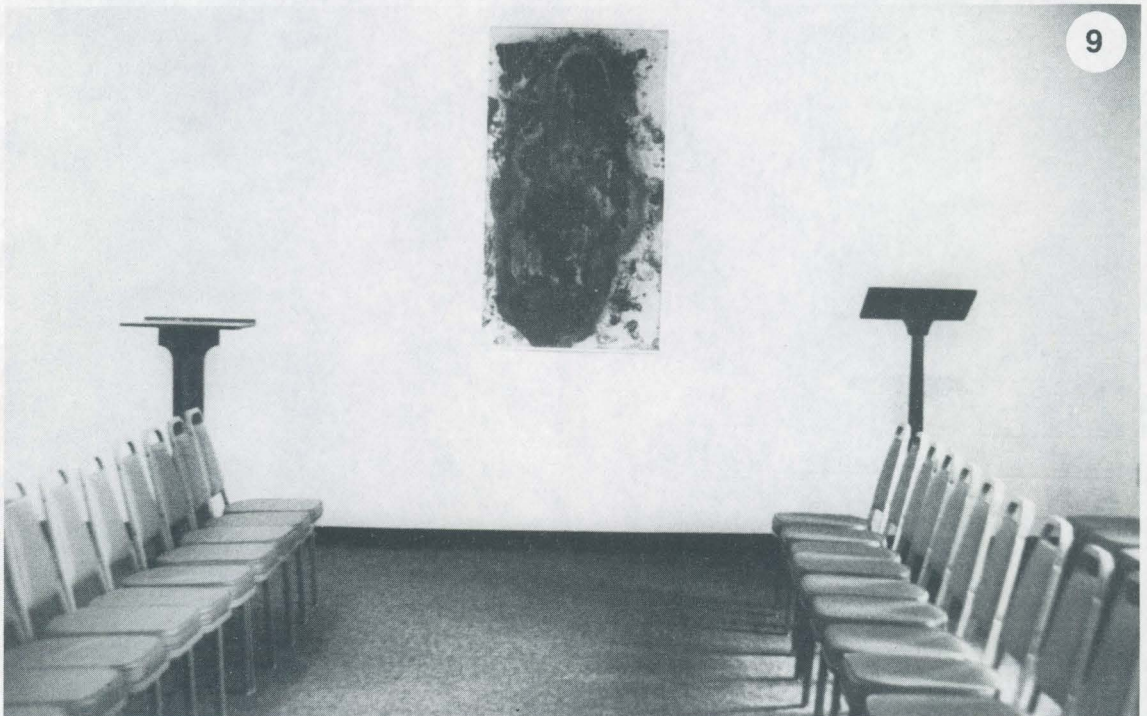
The actual testing environment was a room inside the school building (see Illustration 1 and Photographs 7, 8, and 9). The indoor



- 1 Position of Recorder
- 2 Position of Structural States I (Static), II (Semiflexible), and III (Flexible)

Illustration 1. Floor Plan of the Testing Environment Void of Original Furnishings.





Photograph 7. Photograph 8. Photograph 9.  
Test Environment: Original Arrangement.

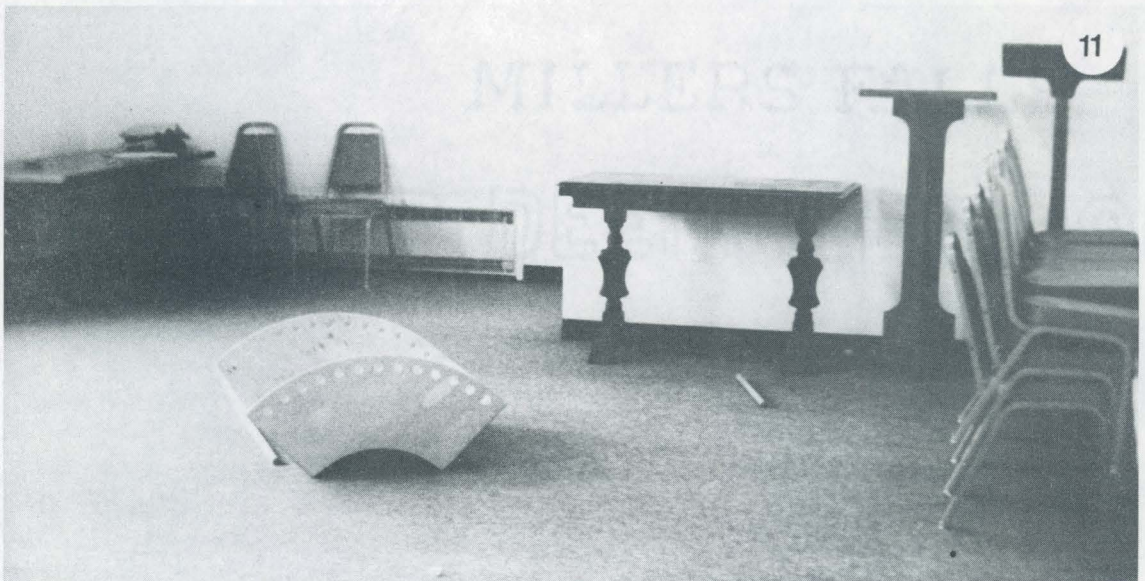
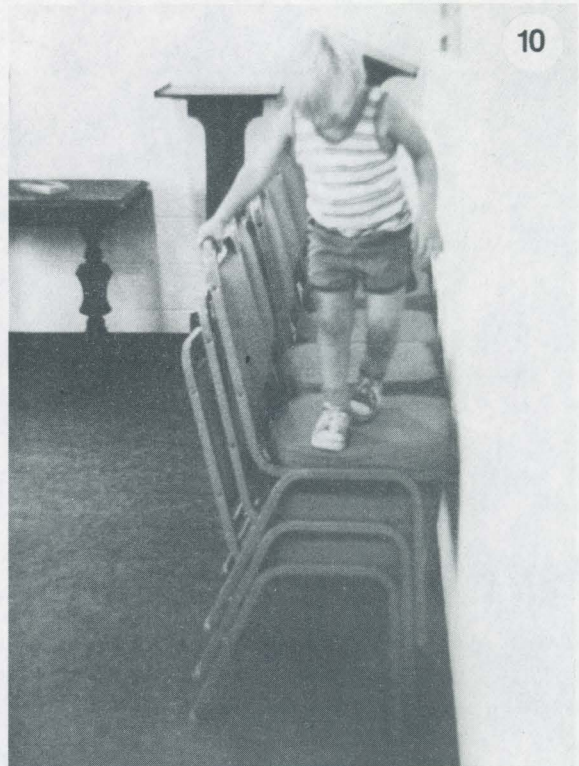
setting was arranged for testing so that it was void of other flexible play objects. Some furniture present from the original arrangement did remain stacked in a corner as much out of the children's immediate view as possible. As indicated in Photographs 10 and 11 though, the children utilized these objects to support their play activities as well; generally, they turned to these furniture pieces only when responses to the equipment were negative and aimless such as running, walking, and observing.

### Subjects

Because each preschool optionally selects the learning program for their enrollees, the school's educational concept may affect the children's play responses. For example, children highly accustomed to free expression might prefer State III--flexibility--whereas children instructed under a more traditional program might prefer State I--static manipulation. Due to the anticipated variation in collected data based on the educational direction of the selected school, the chosen subjects possessed present learning backgrounds from only one of the many possible disciplines.

The design of the play equipment developed and constructed for this research corresponded to the inherent abilities of three and five year olds. The skills of four year old children served merely as a medium between that of the three year olds and the five year olds. Three year old behaviors contrasted that of five year old abilities and provided a greater range of intellectual and dexterity skills to





Photograph 10. Children's Use of Furnishings Left in the Room in Test Arrangement to Facilitate Play.

Photograph 11. Furnishings Left in the Room in the Test Site.

examine. Thus, only three and five year old children were used as study subjects. It was not possible, due to the selected school's enrollment list at the time of testing, to observe an equal number of three year old and five year old students within each group. In addition, the selected school's enrollment did not permit the researcher to explore the response differences between males and females to the three structural systems.

For the three different groups organized for testing, three-three year olds and two-five year olds were selected. All children were full time students (students in school from approximately 8:00 A.M. until 5:00 P.M. two to three days a week). A total of 15 children were observed; individual data was collected on each.

To determine the environmental conditions that might influence the children's reactions and behaviors in the test site, questionnaires pertaining to the children's socioeconomic, cultural, play object, and activity preferences were filled out by the parents and teachers of the potential subjects. These questionnaires were not used as a guide in assigning the children to their respective groups but rather as evaluative information during the analysis of the data. Appendix A contains sample copies of the questionnaires used in this study and additional letters and pertinent writings provided as cover information to parents and teachers.

### Test Procedure

The actual testing dates were June 28, 29, and 30; July 5, 6, and 7; and July 12, 13, and 14. The chosen test dates influenced the sample size and participation as it was during most parent's summer vacation. Many potential participants were excluded from this study because one or more testing dates would be preconceivably missed.

In order for the subjects to feel comfortable and react naturally to the testing conditions and in its environment, the testing schedule needed to relate to the program schedule of the school. Thus, the actual time for testing was from 9:30 A.M. to 10:00 A.M. The morning time was selected because of the adaptability of this time to the daily program schedule of the children. In this fashion, the children were not obviously singled out from the rest of their class in a way that also might affect their behavior. Even children not scheduled for participation in this study were later permitted to play on the equipment following the completion of all testing. This eliminated any interpretation of favoritism among or act of punishment toward the children by the teacher. It also permitted the children participating in the study, with the suggestion and encouragement of their teacher, to "volunteer" to take part in the mornings' play.

Prior to the actual recording of data, all participating children drank sufficient water to exhaust their immediate thirsts and visited the bathroom before entering the testing environment. Because the children were highly active during their play sessions and because they tended to express their desires to change environments by using

these specific reasons, it was a necessary action in order to prevent a possible interruption in the recordings and in the occurring behaviors. These actions also served as an introduction for the children that a change in their previous activities was taking place and prepared them indirectly for the new event. During this preparatory time before data collection, the children were permitted to become familiar with any electronic and photographic equipment in the room. The children were in the environment acquainting themselves with its arrangement and encompassing articles for five minutes before the actual observations and recordings began. The children when first brought into the room were introduced to the researcher who was given the title of teacher and then told by the researcher to freely play as they wished while in this room; they were to remain with the researcher and in the testing room--not to run in the halls and disrupt the other classes--until they were permitted to leave.

The three groups were introduced to the structures on a schedule basis for a 30 minute freeplay session. Variation in learned responses from one system to another were tested by varying the order of introduction of the three systems to the three different groups. Table 1 represents the order of introducing the three states to the three different groups. It was anticipated and assumed that the order in which the different structures were presented to the subjects would affect ongoing responses. During the testing sessions, the children freely interacted with the play system and coplayers. Preplay on the

Table 1  
 Play/Group Pattern Matrix--Structure State  
 to Group Introduction Schedule

Structure State	Group Number/Order		
	Group I	Group II	Group III
Static (State I)	First	Third	Second
Semiflexible (State II)	Second	First	Third
Flexible (State III)	Third	Second	First

structures was not conducted. Hence, all children experienced equal novelty with the systems.

All five children on the testing site at one moment were observed one after another at 20 second intervals, with a ten second pause between each written observation. Each set of recordings represented a five minute time interval sequence. The order for observing the subjects was randomly assigned and maintained throughout the testing sessions during each of the state changes with that specific group. The 20 second/10 second time change for each observation was done with the assistance of a tape with recorded beeps. The tape was quietly played during the testing sessions with the assistance of an earphone so it would not distract or interfere with the children's ongoing activities. This interval pattern was selected for a number of reasons. Primarily, an attempt was made to include as much information about the observed subject's behavior and movements as possible. Because it was assumed that a young child attends to many stimuli within the environment causing rapid activity change, it was hoped that frequent recordings would reveal a more complete description of the resulting activities and provide a concise representation of the major behaviors during each of the 30 minute sessions. In addition, within the 20 second observation period, it was noted that the children changed behavior patterns approximately two to four times but not the particular object or direction of play; thus, each recording represented the specific actions displayed by the child being observed for



one play form such as observation, solitary, group, or parallel at that interval. Few recordings were made in which two different, unrelated forms of activity occurred during a 20 second observation. Furthermore, 30 minute testing sessions provided sufficient time for adequate behavior sampling of each child and yet it was not so long that the children tired or became disinterested in the entire surroundings.

#### Data Recording Method

The behavior responses in relation to the play systems were recorded through several electronic and manual methods. The primary recording system was immediate, on site, written observations made by the researcher manually. A number of coded play behavior categories were developed to facilitate the rapid recording that was required and fulfill the initial objectives stipulated in this research. The listing selection was based on readings on potential motor, physical, and mental dexterities of three and five year olds, on various known term classifications issued play behavior forms, and on personal observations performed on young children interacting during play. No available listing fully satisfied the criteria initially desired or hoped to obtain through observations; thus, the establishment of a listing specific to this research was required. Appendix B contains the specific listing, their code symbols, and a descriptive explanation of each term used.

In addition to written responses, video and still photographic images were employed to illustrate the general physical movements of

the children during each structural state arrangement. Initially, the presence of a camera and video equipment intrigued the children but soon lost favor to other ongoing play activities within the environment. At no time during any of the testing sessions was adult interaction or guidance initiated. The children were solely responsible for initiating adult recognition and maintaining this contact. Praise or disapproval of the children's activities was not permitted in any cases when adult contact occurred. Due to financial costs, the exploratory nature of this research, and the limited time of the photographer employed, these pictorial recordings were not continued during the latter two weeks of testing. Thus, only one group was exposed to this conditional state.

Once on site data were collected, the information was decoded and classified using a number of tables and charts in order to tabulate the number of times a specific response occurred per child, per group, and/or per structural state. Illustration 2 gives an example of the on site coded data and the format used in recording this data. Illustrations 3 and 4 give samples of the format used in decoding the data and actual data tabulations. Appendix D contains additional examples of the format used and recordings performed on the data collected.

Subject Time Frame--Min.		01 ⑤	02 10	03 15	04 20	⑤ 25	06 30																		
1	CL △ <sub>3</sub>							S3 S2 ① 1	2	3															
2	SI T ③										4	5	6												
3	WA ⊥													7	8	9									
4	DPE: Animal--"Cat"																①	2	3						
5	SO																			4	5	6			
6	RU ↻ CA △ <sub>3</sub>																						7	8	9
7	LI △ <sub>2</sub>																								
8								4	5	6															
9											7	8	9												
10														①	2	3									
11																	4	5	6						
12																				7	8	9			

COMMENTS:

Illustration 2. Example of On Site Coded Data and the Format Used in Recording this Data.

																		*Sx				Structural State Time (5 Min. Inter.) Group					
1			2			3			4			5			6												
1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3										
																		OB									
																		SO	Play								
																		GR	Form								
																		PA									
																		CH3	Contact								
																		CH5									
																		AD									
																		ST.									
																		R12									
																		R24									
																		R36									
																		C12	Structure								
																		C24	Contact								
																		C36									
																		L12									
																		L24									
																		L36									
																		Ⓜ									
																		ST									
																		SI									
																		LY									
																		LE									
																		CL									
																		JU									
																		HA									
																		SW									
																		RE									
																		RU									
																		WA									
																		KI	Body								
																		TU	Movement								
																		SL	and								
																		RO	Behavior								
																		PU									
																		PS									
																		TH									
																		LI									
																		RM									
																		DPE									
																		ACF									
																		BA									
																		CA									
																		BU									

\*Sx: S1: Static Structure State  
 S2: Semiflexible Structure State  
 S3: Flexible Structure State

Illustration 3. Sample Format Used in Decoding and Classifying Raw Data for the Groups Across Time with Regard to Their Response Differences to the Three Structural States of Static, Semiflexible, and Flexible.

												*Sx						Structural State					
																		Time (5 Min.					
																		Inter.) Group					
1			2			3			4			5			6								
1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3			
3	4	2	2	1	2	0	0	1	1	5	3	0	2	2	1	3	2	OB					
4	8	6	7	6	5	9	3	4	6	1	3	8	4	6	9	5	8	SO	Play				
1	0	4	2	3	6	1	5	5	0	5	4	3	3	5	1	2	2	GR	Form				
2	0	0	0	0	0	0	2	0	3	0	0	0	1	0	0	2	0	PA					
0	0	1	0	2	5	1	2	3	3	2	3	2	1	4	4	3	1	CH3	Contact				
1	0	4	3	2	4	1	4	4	1	4	2	3	0	4	1	1	2	CH5	Form				
0	0	1	0	4	1	0	0	1	0	3	1	0	2	1	1	0	1	AD					
8	9	10	8	5	9	10	5	8	9	5	5	10	7	5	10	6	9	ST.					
0	1	0	0	0	2	0	1	0	0	0	1	0	3	1	0	0	0	R12					
3	3	6	3	1	3	4	3	0	3	0	1	5	1	1	2	1	0	R24					
2	3	7	2	1	2	1	3	0	4	1	1	4	3	1	2	1	0	R36					
1	2	2	2	1	4	2	0	2	0	0	3	2	0	4	3	3	3	C12	Structure				
0	1	1	2	0	3	1	1	0	0	0	2	0	0	1	0	1	0	C.4	Contact				
1	1	5	2	2	0	2	1	3	4	4	2	2	2	1	3	2	3	C36					
0	1	0	0	1	2	0	0	0	0	0	1	0	0	1	0	0	2	L12					
2	4	2	3	2	3	5	2	4	7	0	1	8	5	1	8	1	3	L24					
0	0	3	0	2	3	1	1	3	0	1	1	1	0	1	0	3	2	L36					
0	0	0	1	0	3	1	0	4	0	0	1	0	0	1	2	0	0	(W)					
3	1	3	0	3	1	1	0	1	0	3	2	2	2	1	1	3	1	ST					
2	5	3	4	5	3	3	1	5	3	1	7	3	3	6	2	2	5	SI					
2	1	1	1	1	4	0	2	1	2	4	1	2	0	5	3	2	4	LY					
0	1	1	1	0	0	3	1	1	0	0	1	1	1	0	0	1	0	LE					
4	1	5	4	2	2	1	3	1	3	1	2	4	5	1	1	2	1	CL					
0	0	0	0	1	0	0	0	0	0	0	0	0	0	4	0	1	0	JU					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	HA					
0	1	0	0	3	4	0	0	2	0	0	2	1	0	0	2	2	0	SW					
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	RE					
1	1	2	0	4	1	0	8	4	0	1	1	0	1	1	0	1	4	RU					
2	1	2	2	1	1	1	3	1	0	3	2	1	4	3	2	3	3	WA					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	KI	Body				
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	TU	Movement				
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	SL	and				
0	0	1	1	0	0	0	0	0	0	1	1	0	0	1	0	0	1	RO	Behavior				
0	0	2	0	0	1	0	0	0	0	0	1	0	0	0	0	2	0	PU					
0	1	2	0	0	3	0	1	2	0	0	1	0	0	3	0	1	2	PS					
0	0	2	1	0	6	2	0	5	0	0	0	0	0	2	0	1	1	TH					
0	1	2	0	2	4	0	0	8	1	1	3	0	1	3	1	2	4	LI					
0	1	1	0	0	1	1	0	1	0	0	1	3	0	0	2	0	1	RM					
1	3	2	2	2	3	1	3	1	1	5	0	1	3	3	2	2	5	DPE					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	ACF					
0	0	2	0	1	1	2	0	1	0	0	1	0	0	0	1	1	1	BA					
0	2	2	1	1	1	2	0	0	1	0	0	4	3	1	6	2	3	CA					
0	2	3	0	1	2	2	1	1	4	1	0	3	0	0	1	0	1	BU					

\*Sx: S1: Static Structure State

Illustration 4. Example of an Actual Data Tabulation Translated from Raw Data for the Groups Across Time with Respect to Response Differences to the Static Structural State Arrangement.

## Chapter IV

### Arrangement/Style/Results: A Critical Analysis of Collected Data

#### Presentational Arrangement and Evaluative Style

Due to the nature of the collected data, statistical analysis was not a feasible method by which to interpret the data. Thus, two alternate methods were developed--one based on a collective or group behavioral reaction to the test setting; the other based on the individual and his/her behavioral responses to the environment. This chapter contains assumptive statements which were obtained by data analysis using these methods.

Each of the three groups in this study was composed of a total of five children. The order in which they were introduced to the three structural stages determined their differences. Table 1, on page 43, shows the specific introduction order for each group. The structural stages were classified as State I (static), State II (semiflexible), and State III (flexible). The individual pieces that formed the three structural states were linear (L), circular (C), or rectangular (R). Each category of the pieces contained three proportional sizes--small (12), medium (24), and large (36). Thus, this system was the basis for the structural piece symbols and abbreviations used in the following discussions. To further understand the terms, abbreviations, and symbols used in reporting the data, refer to Appendix B.

An Analysis of the Groups' ResponsesGroups' Play Form Preference, Object Contact Preference, and Behavioral Responses as Influenced by the Order of Introducing the Three Structural States

Solitary play was the main play form observed in all the structural conditions regardless of the order in which the arrangements were presented to each of the groups. Group and observation play also occurred. It appeared from Table 2 that flexibility encouraged more group play than static conditions. Table 3 shows the occurrence of group play when Group II was exposed initially to the semiflexible State II. On the second day though, Group II, interacting with Structural State III, engaged in observation and solitary play. Group III, on the other hand, showed group play on both the second and third days under Structural States I and II.

It appeared from an examination of each five minute interval shown in Table 4 that Structural State III altered the children's preferred play form at an earlier recording time than the other two states. The highest initial display of different, observable play forms occurred at  $T_3$  and  $T_4$  for all structural states. All recordings at  $T_1$  showed preferences for solitary play; at  $T_5$  and  $T_6$ , this play form dominated only under States I and III. Hence, the semiflexible arrangement displayed more diverse play forms across time than the other states. In addition, States I and II indicated that the children maintained one behavior or activity pattern for approximately the first 15 minutes of recording before they changed their attention

Table 2

Specific Group Play Form Preference Responses to the  
Static, Semiflexible, and Flexible Structures

Structure State	Group Number/Play Form Preference		
	Group I	Group II	Group III
Static (State I)	Solitary	Solitary	Solitary Group
Semiflexible (State II)	Solitary	Solitary Group	Group Solitary
Flexible (State III)	Solitary	Solitary	Solitary



Table 3

Group Play Form Preference Responses to the Three Structural  
State Arrangements of Static, Semiflexible, and Flexible  
with Respect to a Day-By-Day Observation

Exposure Day	Group Number/Play Form Preference		
	Group I	Group II	Group III
Day 1	Solitary	Solitary Group	Solitary
Day 2	Solitary	Solitary Observation	Solitary Group
Day 3	Solitary	Solitary	Group Solitary

Table 4

Influence of Time on the Preferred Form of Play Based on Responses to the Three Structural States of Static, Semiflexible, and Flexible

		Time Frame (5 Min. Intervals)/Play Form Preference					
Structure State	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>	
Static (State I)	Solitary	Solitary	Solitary	Solitary Group Observation	Solitary	Solitary	Solitary
Semiflexible (State II)	Solitary	Solitary	Solitary Group	Group Solitary Observation	Solitary Group Observation	Observation Solitary Group	Observation Solitary Group
Flexible (State III)	Solitary	Solitary Group	Solitary Group	Observation Group	Solitary	Solitary	Solitary

and direction. This last observation paralleled literature readings and other child development research demonstrating the maximum attention span of young children to be 15 minutes for three year olds and somewhat longer for five year olds (Bridges, 1927; Van Alstyne, 1932; Rosenthal, 1973). The presence of fixed structures may have encouraged this prolonged span of attention to one object or activity.

More individual objects were handled under State III (flexible) across all groups than in either States I (static) or II (semiflexible). The linear pieces (L24 and L36) were the specific objects most under Group I's and Group II's clutches and control. Group III though preferred to handle the circular pieces (C12 and C36) under semiflexible and static conditions but chose the linear pieces (L36) under fully flexible conditions. Preference for the linear pieces may have been because of their greater quantity in the environment, their lightness, and their ease of moving and manipulating as contrasted to the other objects. In addition, its novelty of form as compared to other play pieces available to the children during regular learning sessions may have influenced their responses. The only similarity to other play equipment on the school's premise was in their jungle gym which was static and not manipulative by the children. Tables 5 and 6 demonstrate the object preference differences of each group in the three structural arrangements.

The highest number of different structural pieces contacted under State I occurred at  $T_1$  and  $T_2$ . At  $T_3$ , State II demonstrated a sharp decline in the number of structures touched, but generally,

Table 5

Group Object Piece Preference with Respect to the  
Static, Semiflexible, and Flexible  
Structural States

Structure State	Group Number/Object Piece Preference		
	Group I	Group II	Group III
Static (State I)	L24	L24	C12
Semiflexible (State II)	L24	L36	C36
Flexible (State III)	L24	L36	L36

L24: Medium Linear Piece

L36: Large Linear Piece

C12: Small Circular Piece

C36: Large Circular Piece

Table 6  
Group Object Piece Preference on a Day-By-Day Basis

Exposure Day	Group Number/Object Piece Preference		
	Group I	Group II	Group III
Day 1	L24	L36	L36
Day 2	L24	L36	C12
Day 3	L24	L24	C36

L24: Medium Linear Piece

L36: Large Linear Piece

C12: Small Circular Piece

C36: Large Circular Piece

showed a consistently high and diverse object contact response across time. State III displayed a decrease in the number of structures contacted beginning with T<sub>5</sub>. Table 7 illustrates the children's object preference responses to the structural conditions with regard to time. In many ways, these observations revealed that the greater the manipulateness of a play object, the more diverse and the larger the number of structural pieces contacted; the lower the attention span to a specific object and activity; and, the higher the level of activity.

During their first exposure to the test arrangements, Groups I and III primarily demonstrated passive behaviors such as sitting or lying. Group II, on the other hand, displayed more active behaviors such as building and lifting. Tables 8 and 9 illustrate the behavior responses of each of the groups upon exposure to the different structures. The need for children to adjust to unfamiliar surroundings before interacting physically and intellectually with environmental conditions may have caused this initial passiveness. On the other hand, these behaviors may have served as the children's cognitive way of gathering and collecting information before interacting. Physical tiredness, disinterest, or boredom with the events and the environment may also explain this phenomenon. The structural arrangements themselves may account for some of the differences in group responses. Despite the order in which Structural State I was introduced to each of the groups, sitting was the major response observed; climbing,

Table 7

Groups' Object Piece Preferences Across Time with Reference to Responses to the Three Structural States of Static, Semiflexible, and Flexible

Structure State	Time Frame (5 Min. Intervals)/ Object Piece Preference					
	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>
Static (State I)	R24	L24	L24	C36	L24	L24
	R36	C12	R24	L24		C12
	L24	R24		R36		C36
	C36	R36				
	C12	C24				
		L36				
	C36	Ⓜ				
Semiflexible (State II)	L24	L36	L24	L36	L24	L24
	L36	C36	R36	C36	C36	L36
	R36	L24		L24	L36	R24
	R24	C12		R36	R36	R36
	C36			L12		
	Ⓜ			Ⓜ		
Flexible (State III)	L36	C12	C36	C12	L36	L36
	L24	R12	C12	C36		L24
	C24	L36	L12	C24		
	C12	L24	C24	L24		
	Ⓜ	R36	R36	R36		
		C36	R12	R12		
		C24	L24			
	Ⓜ	R24				

Ⓜ: PVC Cap; L12: Small Linear Piece; L24: Medium Linear Piece; L36: Large Linear Piece; R12: Small Rectangular Piece; R24: Medium Rectangular Piece; R36: Large Rectangular Piece; C12: Small Circular Piece; C24: Medium Circular Piece; C36: Large Circular Piece.

Table 8

Specific Groups' Behavior Responses to the Three  
Structural State Arrangements of Static,  
Semiflexible, and Flexible on a  
Day-By-Day Basis

Exposure Day	Group Number/Behavior Expression		
	Group I	Group II	Group III
Day 1	Sit Climb	Lift Build Dramatic Play Sit	Sit Build Lift
Day 2	Stand Rhythmical Movements Build Climb Dramatic Play	Lift Carry Sit	Sit Lift
Day 3	Build Lift Sit	Sit Stand Walk	Sit



Table 9

Specific Group's Major Behavior Response to the  
Static, Semiflexible, and Flexible  
Structural Arrangements

Structure State	Group Number/Behavior Expression		
	Group I	Group II	Group III
Static (State I)	Sit	Sit	Sit
Semiflexible (State II)	Stand	Lift	Sit
Flexible (State III)	Build	Lift	Sit

standing, and lying were the minor responses. Group III, regardless of the structural state presented to them, mainly sat during their test play times. The dominance of sedentary behaviors across time seemed to indicate the children's tendencies to be less mobile during their play than was initially assumed. Table 10 shows the children's behavior responses to the three structural states across time.

Throughout all the tests, the children did not structurally copy the researcher's prearrangements. Rather, they utilized the construction techniques to build their own play structures. Repetitive behaviors such as putting linear pieces through holes, carrying these objects, and hammering occurred more with a flexible structure and diversity of behavior responses occurred more with a semiflexible structure. A fixed structure encouraged walking, sitting, climbing, and running. Possibly, children who engaged in diverse behaviors were testing and exploring internal hypotheses while children who engaged in repetitive behaviors were trying to strengthen and reinforce their newly acquired behavior responses. In addition, it was noted that children repeated their play forms and behaviors in other sessions. This finding may be explained by the fact that children may try a variety of behaviors until they discover those behaviors which satisfy their objectives, and then, they practice and repeat their discoveries in order to strengthen them. In general, the order of presenting the structures to the groups and the structural arrangements did not influence the type of repetitive and imitative constructions; but,

Table 10

Influence of Time on the Groups' Behavior Expressions  
in Response to the Three Structural States  
of Static, Semiflexible, and Flexible

Structure State	Time Frame (5 Min. Intervals)/Behavior Expression					
	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>
Static (State I)	Sit	Sit	Run	Sit	Sit	Carry
	Climb	Climb	Sit	Lie	Climb	Sit
	Walk	Swing	Lift		Carry	Dramatic
	Stand	Throw	Dramatic		Walk	Play
	Build	Dramatic	Play		Lie	Lift
	Dramatic	Play	Throw		Dramatic	Walk
	Play				Play	Lie
Semiflexible (State II)	Sit	Sit	Sit	Lift	Dramatic	Dramatic
	Lie	Climb	Climb	Sit	Play	Play
	Build	Lift	Lift	Stand	Sit	Climb
		Dramatic	Carry	Climb	Lift	Stand
		Play	Dramatic	Throw	Lie	Lift
		Carry	Play	Carry	Run	Build
			Stand	Dramatic	Stand	Sit
			Build	Play	Build	Throw
			Walk		Climb	Walk
			Rhythmical		Carry	Jump
			Movements			
Flexible (State III)	Build	Lift	Sit	Sit	Stand	Lift
	Sit	Sit	Dramatic		Sit	Sit
		Build	Play		Carry	Carry
			Stand		Lift	Build
			Lie		Build	
			Walk			
			Carry			
			Build			
		Lift				

they did influence the degree to which repetitive or varied behavior responses occurred.

It appeared from Table 11 that more dramatic play, rhythmical movements, and building occurred under the semiflexible state than under the other two. Tables 12 and 13 indicate that this state provided continuous stimulation to the children which resulted in a higher occurrence of the dramatic play behavior than in the fully static or fully flexible arrangements.

Behavioral Responses to the Three Structural State Conditions with Regard to Age Diversity

Regardless of age differences, the children engaged more in solitary play than other observable play forms. The outcome of this study contradicted findings of other researchers as to the major play form for children of three and five years of age. Other researchers (Bott, 1929; Parten, 1932) discovered that these children desired companionship over solitude. They were at a stage where conformity, cooperation, and group involvement were significant. Sharing of possessions occurred frequently in interaction. Perhaps the type of educational instruction supported by the test school encouraged greater solitary play than group play. In addition, the children's abilities to socialize and work cooperatively with others could influence the results. Often certain characteristics of an individual discouraged multiple person interactions.

Table 11

Overall Groups' Behavior Responses on a Day-To-Day Basis  
with Regard to the Structural Arrangements of Static,  
Semiflexible, and Flexible

Structure State	Exposure Day/Behavior Expression		
	Day 1	Day 2	Day 3
Static (State I)	Sit Climb	Sit Lift	Sit Stand Walk
Semiflexible (State II)	Lift Build Dramatic Play Sit	Stand Rhythmical Movement Climb Dramatic Play	Sit
Flexible (State III)	Sit Build Lift	Build Carry Sit	Build Lift Sit

Table 12

Group Behavior Responses to Dramatic Play with  
 Regard to the Three Structural Arrangements  
 of Static, Semiflexible, and Flexible

Group Number/# of Observed Responses of the Dramatic Play Enactment Behavior			
Structure State	Group I	Group II	Group III
Static (State I)	8	13	14
Semiflexible (State II)	12	21	18
Flexible (State III)	12	19	16

Table 13

Groups' Dramatic Play Behavior Responses on a Day-By-Day Basis  
to the Structural Arrangements of Static,  
Semiflexible, and Flexible

Structure State	Exposure Day/# of Observed Responses of the Dramatic Play		
	Day 1	Day 2	Day 3
Static (State I)	8	14	13
Semiflexible (State II)	21	12	18
Flexible (State III)	16	19	12

Behaviorally, three year olds preferred passive actions over the active patterns of five year olds. Sitting, lying, and climbing were major responses displayed by the three year olds while building, carrying, walking, and dramatic playing were behaviors performed by the five year olds. In agreement with existing literature discussing the behavior patterns of children (Hetzer, 1931; Buhler, 1933; Moyer, 1956; Margolin, 1961), three year olds tried to improve their dexterity and gross motor coordination in their play. On the other hand, five year olds were concerned with replicating realistic events or objects; they also demonstrated behaviors that would increase, support, and encourage small motor development, dramatization of events, and involvement with peers. The three year olds in the present study were not interested in altering and changing the structures as compared to the five year olds. Thus, it seemed that the three year olds were less inclined to exert and accept control over their play environments than the five year olds. Furthermore, the three year old participants demanded less flexibility than the five year olds in their play structures. As viewed in Table 14, the semiflexible structure provided the three year olds with the most stimulating and supportive conditions for their play activities.

The three year olds demonstrated a higher level of activity based on the quantity of body movements and structural objects contacted than the five year olds. This data supported other research findings which discussed the attention span and activity level of three year olds



Table 14

Influence of Age Differences on the Groups' Major Behavior  
Responses with Reference to the Three Structural  
Arrangements of Static, Semiflexible,  
and Flexible

Structure State	Age of Children/Major Behavior Expression	
	3 Year Olds	5 Year Olds
Static (State I)	Sit	Sit
Semiflexible (State II)	Lift Carry	Sit Walk Dramatic Play
Flexible (State III)	Sit	Sit Build Lift Dramatic Play Carry

versus that of five year olds (Bridges, 1929; Farwell, 1930; Van Alstyne, 1932). The present study found that three year old children maintained a shorter attention span to their objects and activities than did five year olds. Herring and Koch (1930) discovered that the activity level and interest span increased with an increase in age and maturation. Table 15 illustrates the specific play form, object contact, and manipulative preference of three year olds versus that of five year olds with respect to the structural state conditions and limitations.

#### An Analysis of Individual Responses

Of the 15 children observed during the three week testing period, data on two of these subjects were isolated for the purpose of examining individual responses to the environmental conditions. Using the responses of parents and teachers to questionnaires developed specifically for this study, a five year old passive and a five year old active child were selected. Both children were male. The terms passive and active denoted the children's general behavior in play, school, extracurricular activities, and social situations. Assumably, a passive child led himself in more solitary play, in a higher attentiveness to a single activity, in less physical aggression, in less verbalizations, and in a lower domineering position among his peers than an active child.

To demonstrate the type of analysis that could be executed for all the observed children for all variables and behaviors, the

Table 15

Play Form, Object Contact, and Manipulative Preference Responses of Three Year Old and Five Year Old Children with Regard to the Three Structural Arrangements of Static, Semiflexible, and Flexible

Variable Category	Age/Structure State/Preferred Responses					
	3 Years Old		5 Years Old			
	S1	S2	S3	S1	S2	S3
Play Form	Solitary	Solitary	Solitary	Solitary	Solitary	Solitary
Object Piece	L24	L24 L36	L24 L36	L24	L24	L36 C12
Desire to Change or Alter Prearrangements	No	Yes	Yes	Yes	Yes	Yes
Replication of Previous Behaviors	Neutral	Yes	Yes	Yes	Neutral	Yes
Replication of Structural Prearrangements	No	No	No	No	No	No

L24: Medium Linear Piece; L36: Large Linear Piece; C12: Small Circular Piece;  
 S1: Structural State I (Static); S2: Structural State II (Semiflexible);  
 S3: Structural State III (Flexible).

writer/researcher selected only the behavior of dramatic play. In evaluating the characteristic differences between the two children, attention span (length of time engaged in a specific activity), preferred play form, preferred play pieces, and preferred play behaviors were examined. Tables 16 and 17 contain the raw data that were collected and coded for the two chosen children. Table 18 summarizes the information received on these two children from the teachers and parents.

Responses of an Active and a Passive Child to the Varying Structural States

As illustrated in Table 19, the static condition produced the lowest level of responding for the active child; the semiflexible and flexible conditions encouraged his solitary play preference. In addition, completely flexible conditions forced the active child into high attention, concentration, possessiveness, and manipulation of one play equipment piece as demonstrated in Table 20. For the passive child, the semiflexible state prompted group involvement; the other two conditions distinctly encouraged solitary play. This group interaction by the passive five year old is further demonstrated in Table 21 where multiple person and object contact occurred under the semiflexible arrangement. The semiflexible arrangement also encouraged the greatest diversity in pieces handled by the passive child; consequentially, his attention span to any one object was far less than that of an active child. In addition, for both children, the





Table 18

Summation of Characteristics of a Five Year Old Active Child  
and a Five Year Old Passive Child Acquired From Parent  
and Teacher Responses to Questionnaires

Data Response Category	Characteristic of Child/Responses	
	Passive	Active
Child's Assigned Coded Number	12	08
Academic School Program	Full Day	Full Day
Age of Child	5 Years Old	5 Years Old
Sex of Child	Male	Male
Play Form Preference	Group (Small)	Group (Small)
Preferred Play Activities, Objects, and Behaviors	Blocks Rig-a-Jigs	Blocks Rig-a-Jigs Cars Guns Masks Planes Soldiers

**Group (Small):** Denotes two to three children engaging in the same activity at the same time and within close proximity to each other.

Table 19

Type of Play Form Preferred by a Five Year Old Active and a Five  
Year Old Passive Child with Regard to the Structural  
State Prearrangements of Static,  
Semiflexible, and Flexible

Structure State	Characteristic of Child/ Play Form Preferences	
	Passive	Active
Static (State I)	Solitary	Observation
Semiflexible (State II)	Group	Solitary
Flexible (State III)	Solitary	Solitary



Table 20

Preferred Object Piece Contact By a Five Year Old Active and  
a Five Year Old Passive Child with Respect to the  
Static, Semiflexible, and Flexible  
Structural States

Structure State	Characteristic of Child/ Object Piece Preference	
	Passive	Active
Static (State I)	L36 Ⓜ C36	L12 L24
Semiflexible (State II)	R24 R36 L24 L36 Ⓜ	L24 L36
Flexible (State III)	L36	L12

Ⓜ: PVC Cap

L12: Small Linear Piece

L24: Medium Linear Piece

L36: Large Linear Piece

R24: Medium Rectangular Piece

R36: Large Rectangular Piece

C36: Large Circular Piece

Table 21

Preference for Structural Contact Over Peer or Adult  
 Contact by a Five Year Old Active and a Five  
 Year Old Passive Child Based on Exposure  
 to the Structural Conditions  
 of Static, Semiflexible,  
 and Flexible

Structure State	Characteristic of Child/ Contact Preference	
	Passive	Active
Static (State I)	Structure	Structure
Semiflexible (State II)	Three Year Old Child Five Year Old Child Structure	Structure
Flexible (State III)	Structure	Structure

flexible state induced more handling of the linear pieces than of the other objects. The active child favored the smaller sized objects; the passive child preferred the larger sized objects. These diverse size preferences by the children may indicate their own perception of their abilities and relationships with their environment. The active child chose smaller forms which could be interpreted as his desire to authoritatively and aggressively dominate, control, and lead the activities in his surroundings. The passive child chose larger pieces which could be interpreted as his desire to secure support and cooperation from objects perceived as larger and more important than he. Hence, a fixed structure could provide a base and a sense of security upon which interactions could occur for both the active and passive child. Complete flexibility produced more occurrences of sitting for both children than the other two conditions. Table 22 shows this behavior and the others that resulted from exposure to the three structural states based on the characteristic differences of the children.

An examination of the dramatic play behavior expressed by an active and a passive child and how this behavior was affected by the structural arrangements was made by the researcher. Table 23 presents these data. For both the active and the passive child, the semi-flexible arrangement demonstrated the most constant occurrence of dramatic play across time. For the active five year old, the flexible state was the least interesting and behaviorally stimulating of

Table 22

Major Play Behavior Expressions of a Five Year Old Active and a Five Year Old Passive Child as They Were Exposed to the Three Structural Arrangements of Static, Semiflexible, and Flexible

Structure State	Characteristic of Child/ Behavior Expression	
	Passive	Active
Static (State I)	Run Walk Lift Throw	Dramatic Play Run
Semiflexible (State II)	Dramatic Play Walk	Dramatic Play Carry
Flexible (State III)	Sit Build Dramatic Play	Sit Carry

Table 23

Attention Span Level and Length of Time a Five Year Old Active and a Five Year Old Passive Child Engaged in the Dramatic Play Behavior with Reference to the Three Structural Arrangements of Static, Semiflexible, and Flexible

	Characteristic of Child/# of Dramatic Play Responses Observed											
	Passive						Active					
	Time Frame (5 Min. Interval)						Time Frame (5 Min. Interval)					
Structure State	1	2	3	4	5	6	1	2	3	4	5	6
Static (State I)	0	1	0	0	1	1	1	1	2	2	1	0
Semiflexible (State II)	2	2	1	2	1	0	1	2	0	2	2	2
Flexible (State III)	0	0	0	1	2	2	0	1	0	0	1	0

all three conditions. The static arrangement displayed a decrease in the occurrence of dramatic play toward the end of the session. For the passive five year old, complete flexibility initiated no occurrence of dramatic play; complete nonflexibility consistently displayed low dramatic play responses across time.

As the days passed, a decline in the occurrence of dramatic play resulted for the active child while an increase in this behavior was evident in the passive child. The active child, a member of Group II, experienced the semiflexible condition first and the static condition last; the passive child, a member of Group III, experienced the flexible state first and the semiflexible state last as shown in Table 24. Tables 25 and 26 further demonstrate the different responses of these children with regard to dramatic play. Educationally, the structural conditions could be employed as control behavior or stimuli behavior inducing instruments depending on the directives and desires of the children's parents or teachers.

#### Review of Observations, Numerical Recordings, and Discussed Results

The above concepts, thoughts, and statements attempted to demonstrate some ways the data could be evaluated. The significance of this study lies in its explorations and in its efforts to demonstrate the important need for further research on children's play desires and play equipment. In addition, this research hoped to unveil and present questions that would generate interest in the affects

Table 24  
 Specific Structural State Exposure of a Five Year Old  
 Active and a Five Year Old Passive Child with  
 Regard to a Day-By-Day Introduction

Exposure Day	Characteristic of Child/ Structure State	
	Passive	Active
Day 1	Flexible (State III)	Semiflexible (State II)
Day 2	Static (State I)	Flexible (State III)
Day 3	Semiflexible (State II)	Static (State I)

Table 25

Affect Order of Introduction Had on the Dramatic Play Responses  
of a Five Year Old Active and a Five Year Old Passive  
Child on a Day-By-Day Basis

Exposure Day	Characteristic of Child/# of Dramatic Play Responses Observed	
	Passive	Active
Day 1	5	9
Day 2	3	2
Day 3	8	0



Table 26

The Dramatic Play Responses of a Five Year Old Active  
and a Five Year Old Passive Child with Respect to  
the Static, Semiflexible, and Flexible  
Structural Arrangements

Structure State	Characteristic of Child/# of Dramatic Play Responses Observed	
	Passive	Active
Static (State I)	3	0
Semiflexible (State II)	8	9
Flexible (State III)	5	2

environments have upon behavior and activities; the need for or the absence of authoritative learning programs; and, the necessity to properly consider age differences in play equipment based on the individual's abilities and the use of these structures to influence, to increase, and to correct slow learning patterns.

The following statements based on the data and preceding analysis illustrate responses to a frequently changed play environment over a three day period. Three structural arrangements served as generators for response variations--a static structural state, a semi-flexible structural state, and a flexible structural state:

1. The order of introducing the structures to the different groups did not appear to influence resulting behaviors.

2. Solitary play headed the list of preferred play forms across all structural state conditions. Under some arrangements incorporating flexibility, group play occurred.

3. The degree to which manipulative conditions were present influenced, dictated, controlled, and suggested some of the behaviors that occurred. The children, too, influenced the events that took place--attempting in their own ways to restructure, to build, and to create a setting which would support their play. The degree to which the factor of the structure and its characteristics dominated over the factor of the children's manipulative attempts to modify their environment could not be determined from the conditions of this research.

4. The semiflexible state provided the most opportune conditions for the selection of objects, behavior expressions, and activities upon which to attend. This state displayed a high level of structure to group and structure to individual interaction, behavior diversity, attending, and interest. In addition, semiflexibility provided a foundation on which behavior could be based and could progress. The other arrangements created conditions in which this framework had to be built or in which a foundation was given that was difficult to alter to satisfy the specific activity needs. For the three year olds, the static structure stimulated people and object interaction; for the five year olds, manipulative structures encouraged this high level of interaction. Fixed structures for the active child provided more of a foundation for their activities than flexible arrangements; conditions of flexibility for the passive child were more stimulating. For the passive child, group interaction occurred in the semiflexible arrangement. Thus, the arrangements' differences were significant and important only in terms of the capabilities, needs, and interests of the age and behavior under observation.

5. Dramatic play was the most frequently recorded behavior in all the structural states. The static and flexible arrangements demonstrated a decrease in the occurrence of this behavior across time. The semiflexible arrangement, on the other hand, produced a steady continuous, high observation of this behavior.

## Chapter V

### Remarks/Concepts/Thoughts: Conclusionary

#### Statements of This Research

It was not possible to make definitive statements due to the exploratory nature of this study, the length of time in which recordings were made, the size of the sample, and the form and type of data collected. The analysis that was presented in the previous chapter could be performed for all observations. The comments that occur in this chapter attempt to summarize, clarify, and explain the reported results.

#### Evaluation of the Data Collecting Method

To maintain simplicity in the test environment, the researcher acted as the only recorder of data. Additional strangers other than the recorder would have disrupted and confused the children and made them more conscious of the recording instruments. Unnatural behavior responses might have resulted.

The audio timer provided an effective method for judging the end of a subject observance period. It adequately provided a ten second pause to prepare for the next recording. A miniature tape player which could be located away from the children's view and thus minimize their curiosity would be recommended. Mechanical devices highly enticed and distracted the children from their other interests. Generally, the cameras, video recording systems, and other visual equipment within the

environment did not appear to alter behavior responses. The presence of a male assisting in the operation of this equipment developed negative responses in a few of the younger children. One child strongly refused to play when she suddenly became aware of the male photographer in the room. Apparently, from an explanation given later by her instructor, this was not a behavior caused by the equipment, as was initially evaluated and assumed by the recorder, but rather a reaction to the specific child's personal home life condition initiated by the presence of a male adult.

The use of a coded system assisted in the rapid recording of behaviors. Because only a single child was being watched at a time rather than a specific behavior, recordings were easily made within the 20 second period allowed. Full use of video taping would have allowed for a more precise evaluation of individual responses with respect to the group or the structures. For this research, with a single person recording information, only one segment of the entire setting and the factors that were influencing the observed child's behavior were revealed in the 20 second recordings. It was not feasible within the constraints of this study to review a 30 minute video tape in order to obtain the information that was desired; basically, the researcher was seeking general behavior responses encouraged by the different structures rather than the more specific environmental causes that may have been observed from the video tapes. With this recording device, the exactness, clarity, and field of viewing would be impaired and

limited to the angle and direction of the camera's aim. Thus, several video recording cameras would be required to reveal more detailed information. Hence, cost, evaluation time, and the specific variables to be studied should be determined before this system for recording is employed. Because this study was intended primarily to stimulate future work in the field, to present unanswered questions arising from this research, and to provide suggestions for evaluating, testing, and executing future work, the video taken for this research served only as visual support for the written recordings and analysis. The written recordings failed in many instances to reveal personal observations; thus, post evaluative loggings by the researcher were used to supplement the coded data. Appendix D contains an example of one of the researcher's loggings.

Initially, an exterior environment was sought for testing, but, an interior room in the school was used for the actual setting. For a number of reasons, this was a more successful site in terms of the play equipment design. For observation purposes, greater control over the children was possible, mainly in terms of restraining them from wandering away too far from the immediate environment. Additional assistance and time from the school personnel would have been required for proper outside supervision. In addition, weather conditions such as rain, excess wind, direct sunlight, and intense heat were not limitations. The indoor environment provided maximum control by the researcher in terms of the prearrangements. All other play equipment

pieces or furnishings could be removed from this site. In an already organized play space, this may not be possible.

For the objectives of this research and the conditions desired by the researcher, mainly that the environment permit free, unsupervised, and natural behaviors, the method of data collecting was adequate. This study attempted among many things to suggest the behaviors that could be further studied or that could be observed on the specific equipment tested and the specific prearrangements. Thus, an extensive list containing all possible major behaviors was developed. For future research and specific findings, this list should be reduced considerably.

Evaluation of and Discussion on the Subjects' Behavior Responses to the Three Structural States of Static, Semiflexible, and Flexible

The following discussion is divided into two areas, group reactions and individual responses, each with respect to the advantages, disadvantages, and differences between each of these structures. Specifically, group responses to the three structural arrangements were evaluated with reference to the order of introducing the different arrangements; to resulting behaviors; to age response differences; to type of preferred play forms such as solitary, group, parallel, and observation; and to span of attention, interest, and level of people and object interaction. In addition, an evaluation of an active child and a passive child, determined from parent and teacher responses to a questionnaire, were examined and compared with respect to their

reactions to the three arrangements in terms of the preferred object contact such as three year old, five year old, adult, and structure; the behavior activities such as dramatic play, hitting, and sitting; the preferred play form; the structural piece preferences; the span of attention, interest, and level of people and object interaction; and the specific reaction differences in their dramatic play.

Group Responses to the Three Structural  
State Arrangements of Static, Semiflexible,  
and Flexible

Regardless of the order to which the three different structures were introduced to the three different groups, the structures appeared to influence the children's activities. In many instances, arrangements were not duplicated exactly as they were originally displayed to the children, but rather, the techniques used to put these forms together were replicated such as placing PVC caps onto the linear pieces or disconnecting this joint system; putting linear pieces through holes in the other objects to form structures of their own; or lining the linear pieces in rows. Objects and conditions of violence were demonstrated and replicated in their dramatic play such as guns and swords; in their object contact such as swinging the linear pieces against other objects, persons, or surfaces in the room; and in their solitary or group play such as throwing the linear pieces into the air or throwing the PVC caps at each other. It appeared that the children's internal inhibitions, fantasies, and misunderstandings were visually and openly reenacted in their play.



This study did not permit adult initiated praise, supervision, or contact unless an emergency occurred (adult control was necessary only once during the three week study when the children were aimlessly tossing the linear pieces into the air and physical injury could have resulted). The children themselves verbally and physically demonstrated a sense and concern for safety when extreme situations of violence did occur.

Literature discussing the behavior characteristics and dexterity abilities of three year olds (Rogers, 1922; Herron and Sutton-Smith, 1971) revealed that the less structured the play equipment and play toys of three year olds, the more likely the occurrence of fantasy and manipulative actions. For this age group, blocks and simple form objects were suggested play toys. The present study found that semi-flexible conditions were more stimulating to the three year olds in encouraging structural changes than conditions of complete non-flexibility or complete flexibility. The five year olds in the present study expressed more manipulative behaviors under conditions of high flexibility than under conditions of fixed structuring. Related research revealed though that five year olds demanded predictability and order in their environments, definiteness in task requirements, and realistic models to serve as guides (Spencer, 1945; Piaget, 1962; Herron and Sutton-Smith, 1971).

Altering of the prearrangements during the testing sessions occurred in the forms of building, rebuilding, or dismantling. The

new structuring that resulted developed in a horizontal rather than a vertical direction. The children's perception and sense of safety may have influenced this pattern. According to Gump (1971), children's perceptions as to how stable a structure was influenced how high they climbed. During several recording sessions, dominance over the activities and the other children in the environment occurred by a few individuals who commanded the center of attention. In some manner, all children participated in the single event whether they were engaged in parallel, solitary, observation, or group play. It appeared from the written comments by the researcher after each day's session that the more active children assumed this leadership role. This observation of young children was also noted by other researchers (Pressman, 1975).

The following summarizes some of the behavior responses displayed by the children as a result of their exposure to the three structural conditions of static, semiflexible, and flexible:

1. The children physically and imaginatively expanded their play experiences by using equipment pieces and the environment to support such activities as war play, house play, fishing, and soldiering. They also imitated, reenacted, and replicated mother, father, and sibling roles in their play.

2. The children verbalized about their play, specifically describing their actions. They also talked about their experiences outside the immediate environment while engaged in play such as a

trip they took or would take, the purchase of a new article of clothing, a morning event, or a drawing they produced. Verbalizing about previously learned information, asking questions, and initiating discussions, they sought intellectual participation.

3. The children claimed territories and possessed objects in their grasp. Although they were aware of the need to share these items, they were selective as to whom they offered equal rights. A number of instances occurred where physical and argumentative battles resulted from an effort to gain possession of an object. The recorder's response in these instances when her assistance was sought was "Ask (child's name) politely for (the specific article, item, or desire)." The children, reacting positively to this, generally settled the confrontations themselves.

4. When initially exposed to the structures, the three year olds appeared to cling to each other and adults, perhaps indicating uncertainty and insecurity with the environment and the event. As they became familiar with the structures and the setting, this became less of an initial reaction.

5. The younger children tended to parrot and imitate others' word usages and behaviors more than the older children. Both age groups also sought adult approval, reassurance, support, encouragement, and suggestions. Many times the recorder was asked, "What do we do on it?" "What is this for?"

6. The five year olds attended to detail more than the three year olds. This first group would spend long periods constructing, reconstructing, and manipulating one or two play pieces. For example, one boy lodged the small rectangular piece (R12) into a small circular piece (C12), disconnected it, and repeated this behavior several times while telling a story about his actions.

7. Some of the children were aware of changes made in the environment; their perception of change influenced to some degree their initial reactions to the environment. For example, one five year old female asked in the beginning of her second day why the arrangement was different than the day before. Her first response was to "put the toys back the way they were." She said, "Why is it taken apart--why isn't it like yesterday? I must go fix it." The children also were aware of the absence or presence of other group members--when a child left the room or did not show for the day, the other children expressed concern and asked many questions about the absentee. This cognizance may have been due to the small size of the group.

8. The children showed concern for their own safety and for the care of their possessions. When disconnecting or taking structures apart, when hammering on objects, or when throwing linear pieces in the air, the children would remark, "It's getting damaged." "Stop that--you'll hurt someone." "Don't do that." "Stop it, Stop it."

9. There were occasions when rest, a pause in play, or isolation was desired. For example, the children would lie on their backs

in the circular units, or their stomach across an inclined rectangular piece, or sit in a circular unit away from other children and activities.

Individual Responses to the Three  
Structural State Arrangements of  
Static, Semiflexible, and Flexible

From an examination of an active and a passive child defined and selected on the basis of parent-teacher evaluations, it appeared the structures exerted and influenced some control over the children's behaviors. For the passive child, flexibility stimulated activity and interest while the active child preferred stationary conditions. In addition, the active child preferred to concentrate on one or a few activities where the passive child attended to numerous activities, play equipment pieces, and varying behavior actions.

The Benefits and Assets of the Three  
Structural State Arrangements of  
Static, Semiflexible, and Flexible

It appeared that each of the structural states demonstrated and displayed specific benefits for the education and socialization of children. The following points these out:

1. State I: static, nonmanipulative structure. This condition stimulated the occurrence of climbing, carrying, sitting, and standing. Attempts to alter, disconnect, or change were demonstrated by the children during exposure to this state. Only through successful dismantling or the shifting, moving, or lifting of the whole structure

did change or alteration occur. A static condition produced highly diverse behavioral expressions and disinterest in the play structures. Interest in other elements, objects, and people within the immediate environment were increased. Observational and solitary play occurred most often in this arrangement. For active children, an increase in their span of attention and concentration to one object or activity resulted. To a passive child though this state discouraged people and object interaction.

2. State II: semiflexible, partially manipulative structure. This state favored group interaction in a passive child. Although a brief pause in interacting with the semiflexible structure appeared halfway into the recording session, a more constant level of responding and a higher expression of interest in the structure occurred in the children. This arrangement provided some realistic models and a foundational framework for the children but also permitted them to exercise their own creativity and imagination. Diversity in the number of play forms, behaviors, and structural objects which were contacted across time was highest in State II. Thus, in educational environments where both individual and group activities must be fulfilled by a single adult instructor, this arrangement could provide a standard base for general learning programs. The three year olds were most stimulated to interact in State II than the other states. The semiflexible state encouraged involvement with a single object and with the whole arrangement.

### 3. State III: flexible, completely manipulative structure.

Like State I, confusion and disinterest were initial reactions to this state. This arrangement favored behaviors in which immediate, brief responses were desired. The search for a foundational framework occurred at a high level under completely flexible conditions. In addition, repetitive behavior expressions and a high attention to a specific object piece resulted. A high occurrence of aggressive behaviors was demonstrated under this conditional state. With regard to age diversity, the five year olds were more interested, attentive, and active in their play under State III. More emphasis on details occurred in a completely flexible arrangement while deemphasis on the relationship of the specific details to its greater environment resulted.

#### Summation of Remarks with Respect to the Objectives of this Research

Based on the preceding results and discussions, the following objectives were fulfilled according to the constraints, conditions, and scope of this research:

Objective I: To determine whether children exert and accept control over their play environments and endeavors or permit the existing surroundings to dictate and exert this control.

Response: It was discovered that both the structural conditions and the children influenced the resulting activities. Further research is necessary to determine which had the greater influence, the children or the play structures, in exerting control over resulting events.

Objective II: To determine to what degree the order of introducing static, semiflexible, and flexible play structures affect preschoolers' responses with regard to age differences, characteristic variations, span of attention and interest, play form preference, and behavioral responding on both an individual and group level.

Response: It appeared that variation in the order of introduction of the three different structure states did not influence responses. Rather, the specific structural condition influenced the resulting behaviors.

Objective III: To determine whether a static, semiflexible, or flexible play structure encourages greater individual to structure and/or group to structure interaction, span of attention, play form preference, behavioral responding, and structural alteration.

Response: It appeared that conditions which combined both manipulation by the children and fixed structuring were the most favored and acceptable in terms of the individual and the group interacting with the play structures, their span of attention, their play form preference, their behavior responses, and their alteration of the prearrangements.

Objective IV: To determine whether children replicate previous structural arrangements and the behaviors which result in physically similar settings.

Response: Behavioral actions were replicated based on each of the structural states; yet, exact duplication of the prearrangements



was not evident. Rather, the jointing and the concepts of the initial formations were repeated only as they supported the children's own structures and activities.

Objective V: To determine how age influences children's behaviors and capabilities under varying conditions of manipulation.

Response: Age influenced the children's responses to the three structural state conditions. The three year olds preferred conditions of flexibility while the five year olds responded more to fixed conditions. For both age groups though, the presence of a combination of both manipulation and nonmanipulation at the same time stimulated high interest, span of attention, and people and object interaction.

In many instances, these objectives lead to queries for future research and exploration. Following are many of those questions which developed:

1. Aggressive versus passive behavior: is violent behavior induced and perpetuated more in conditions of flexibility or in conditions of nonflexibility?

2. Sex: is one sex more behaviorally active on structures of flexibility or nonflexibility?

3. Construction behaviors: what stimulates the occurrence of horizontal building over vertical structuring by the children?

4. Play equipment construction materials such as wood, plastic, or foam: how will different materials of construction of the play systems developed in this research influence the children's behavior

responses to the conditions of flexibility and nonflexibility? Does textural differences (soft surfaces versus hard surfaces) influence the children's responses to flexible and nonflexible conditions?

5. Age: what diverse behavioral responses occur in a five year old child versus that of a child six years of age or older with regard to the preferences for flexibility over nonflexibility? How is age and the concepts of assimilation and accommodation discussed by Piaget influenced by the conditions of flexibility and nonmanipulation?

6. Cognitive education programs: how do the different instructional learning programs affect observed behaviors with respect to conditions of flexibility and nonflexibility?

7. Do the different structural concepts aid in teaching the relationship between individual parts and the relationship between the parts and the whole? Which structural condition--static, semi-flexible, or flexible--encourages the development of this behavior above others?

8. Prolonged time span interest and behavior responses: if a child is permitted to play on any one specific structural state for an extended period of time, do results occurring in this research reappear?

9. Disabilities and handicaps: how do handicaps of a mental, physical, psychological, and emotional nature affect response desires to the conditions of nonflexibility, semiflexibility, and flexibility?

10. Space and crowding: how does crowding created by excess play equipment, limited play space, or an overabundance of people affect children's desires to manipulate their environments to support their play?

11. Order and chaos: how does the initial organization and condition of the prearrangement to which the children are exposed affect their responses to manipulative and nonmanipulative desires? Which initial condition (scattered, indefinite prearrangements or an organized, distinct prearrangement of the structural states) stimulates greater interaction and interest?

12. Birth order: does a child's birth position within his/her family affect responses to the concepts of nonflexibility, semi-flexibility and flexibility?

Inherently, the objectives stipulated in this research should be explored further using a larger sample and a condensed list of behaviors.

## Chapter VI

### Literature/Data/Results/Discussion/Conclusions: A Post Evaluation, Analysis, and Review of this Research Finding with Reference to Former Explorations

The teacher needs to be objective in his approach to the child . . . he needs a completely unbiased attitude of seeing what an experience means to a child, not how it fits into or relates to other experiences, not what causes it, why it exists, or for what purpose . . . cherish the child as a person and permit opportunities for honest expression of feelings and expansion of self through meaningful, self chosen interests and activities. (Moustakas, 1966, p. 31)

The major emphasis of this research was an attempt to view the "honest expression of feelings" (Moustakas, 1966, p. 31) within children in play through a semicontrolled environment where responses to three play concepts were examined. Insights into teaching methods and techniques for helping individuals to adjust, adapt, and function in an everchanging environment were gathered.

As Holt (1972) stated, "Real learning comes when you get down to the child's present level of understanding and build a firm base from there" (p. 104). He established an environment that was absent of compulsion and one with belief in the inherent sociability of the child. The environment, he believed, was accepting and forgiving. In the present research, test conditions involving little or no supervision of the children were based on this same assumption and concept. In many instances, the static and semiflexible arrangements provided

an apparent foundation from which the children could develop and improve their basic skills. Some children expressed and displayed more intensive interaction on one structural condition than another. In other cases, complete lack of interest prevailed. The children, at different intellectual levels and abilities, appeared to need stimulating and diverse environments. Some arrangements appeared to provide either too low a base level upon which to interact or too high and definite a base level. Thus, age and the current learning level of the individual became significant in developing the most stimulating foundation.

It also became evident from this study that a relationship between the environment and its participants existed. In addition to the components in the environment, climatic factors such as hot and cold conditions and sensory stimulants which surrounded the environment externally such as noises from an adjoining room, smells from a hallway, and bright flashing lights from passing cars creating shadows affected behavioral responses. In conditions of noncontrol by adults and complete freedom by the children, the following occurred in the test environments: symbols of communication, both verbal and non-verbal; reenactments of troubled experiences; and fantasy and dramatic playing.

Space and its effects under conditions of crowding in play were not explored in this study. Yet, many other researchers indicated consequential reactions to crowding with regard to an individual's

personal needs (Hall, 1966; Gans, 1968; Proshansky, Ittleson, and Rivlin, 1970). It appeared from the discussion on the use of additional video equipment that crowded environments with respect to both people and equipment could significantly affect behaviors on the same play pieces. Because solitary play dominated over the other play forms, an increase in possessiveness, territoriality, and aggression could result in crowded play environments. From this study, it appeared that each child controlled a specific amount and area of space within the environment which no other child was allowed to enter uninvited. For the small room that was used to test behavior responses, the children maximally used the given space in their play. Thus, a number of questions arose with respect to crowding. What was the minimum and maximum space tolerated by children in their play before intensive negative behavior responses occurred that affected academic, physical, sociological, and psychological growth? Were responses to crowded conditions a determinant of the specific character of the child, of the child's age and maturation, or the child's self perception and needs?

Many of the theories and definitions expressed on play with respect to children appeared in the observations of this research. For example, the surplus energy theories were most evident in such behaviors as sitting, standing, lying, running, and walking expressed under conditions of complete manipulation and complete nonmanipulation. Through the dramatic play of adult roles and the physical structuring

of houses, boats, and guns, the children demonstrated their instinctive desires to prepare themselves for future endeavors stipulated by Groos (1976) and Hall (1938). The concepts of Froebel (1895), Freud (1949), and Piaget (1962), as well as many other dynamic play theorists occurred during the three week test period. Imitation, assimilation, and accommodation were seen in the children's dismantling, building, rebuilding, and people and object interactions. Lastly, the awareness by the post war theorists of the children's need for stimulation was also noted in the children's diverse responses to each of the three different structural state conditions.

## Chapter VII

### Statements/Parameters/Variables: An Overall

#### Summary of this Research

The initial years of a child's life before entering primary grade school implant many sociological, psychological, and physiological behaviors that outwardly reveal themselves in a child's interaction later in life. The environment and its encompassing stimuli influence the emergence or suppression of these innate behavioral characteristics in its participants. Play for children serves as their medium through which cognitive and physical growth, adaptation, socialization, and adjustment patterns develop. It is important that a child's environment support, encourage, and stimulate his play endeavors. Limited research presently exists that explored those factors and conditions most stimulating to children in their play for positive growth and development.

Fields of study such as child development, psychology, sociology, environmental design, and education provided basic information for the understanding of children's relationships with their environment and its encircling elements. Yet, these specific study areas have failed to examine the degree of unsupervised play children tolerate before disinterested behaviors occur. The present research concerned itself with specifically this question. More precisely, the following queries were examined: do children exert control within



their environment to assist in their play enactments or does the environment primarily influence and control the resulting behaviors; do children wish to manipulate their play equipment to support their behaviors; and, if changeability is desired in their play structures, what factors influence the degree to which their manipulation desires maintain a positive, stimulating, attentive, behaviorally responsive event. As a pilot study, this thesis developed speculative findings and generated many questions for future research.

### Sample

Fifteen children, three and five years of age, were selected from the enrollment list of children in a preschool in Blacksburg, Virginia. Composed of both male and female subjects, these children were divided into three groups each consisting of three-three year olds and two-five year olds. The grouping of the children explored the effect order of introducing three different play arrangements had on resulting observed behaviors. Because of the diversity in preschool education programs and because of the assumed influence this training difference would have on behavior, all the children came from a traditional learning program in which they were enrolled during the testing days. A traditional cognitive instruction denoted structured, strictly controlled, specifically goal-oriented, scheduled, daily activity sessions.

### Instruments

In order to determine the manipulative desires of these preschool children, a modular play system was constructed based on a three step progression from static to flexible (a static structure was one the children could not manipulate, change, or alter in any fashion by themselves; a flexible structure was one the children had complete control to alter or change). The same equipment pieces and the same number of forms were organized into three different arrangements. Thus, this eliminated the influence different colors, materials, shapes, forms, and dimensions might have had on the children's responses to the environments.

To record the behavior responses of the children on the three arrangements, a coded system was developed to observe: (1) preferred form of play such as observation, solitary, group, or parallel; (2) preferred object contact such as three year old, five year old, adult, or structure; and (3) preferred choice of behavior activity such as dramatic play, sitting, lifting, building, or rhythmical movements. The list of compiled activities resulted from a literature search that revealed a lack of such criteria for judging behavior responses pertinent to this study and its objectives. In addition, an attempt was made to report as complete a description of resulting activities and as concise a representation of the major behaviors displayed by the children during each 30 minute session as possible. Every set of recordings on one group of children represented five

minute intervals. The five children on the test site at one moment were observed one after another at 20 second intervals, with a 10 second pause between each written observation. An audio tape with recorded timed beeps assisted in the rapid observation changes.

The conditions that would least interrupt the children in their regular learning schedules and affect their responses on a psychological level were selected in arranging the environment and its observation time. Adult supervision was absent. Thus, with these two stipulations, the children interacted freely in the environment and influenced, demanded, and demonstrated only those behaviors generated from their own desires and needs rather than behaviors suggested from adult interaction, praise, or control.

#### Method of Analysis

Because of the nature and form of the data that was collected for this study, statistics and computers were not useful in analyzing responses. Several alternate methods were developed based on either a numerical or narrative discussion form. Specifically, the data was reported: (1) numerically, judging the observations to the different arrangements on an individual and group basis; (2) individually, narrating the behavioral responses of an active child compared to a passive child to the three structures; and, (3) collectively, reporting the reactions of the three different groups to the settings to which they were introduced. The sample size and the length of time in

which data was collected permitted only speculative statements. Thus, the need for further research on the concepts and objectives of this study alone are evident here.

### Data Findings

Using the preceding analytical methods, numerous concepts supporting and challenging previous research endeavors resulted. Both the characteristics of the environment and those of the children influenced the occurring activities and behaviors. The degree to which the factor of the environment and its components had a greater influence in exerting control over the factor of the children and their attempts to use the environment to support their behaviors was not determined in this study. In addition, the order in which the three different structures were introduced to the three different groups did not affect the behaviors that were observed in the children.

Of the behavioral responses and activities that were observed, the children repeated their actions throughout all the conditional states but did not replicate exactly the structural prearrangements. Rather, the concepts and methods behind the organization and jointing of these structures were duplicated as they supported the children's own created forms and desired activities. Perhaps, if these structures were a permanent part of their play equipment selection, a different observation would result. The semiflexible arrangement where both manipulation and nonmanipulation were possible by the children was most influential in terms of stimulating group

interaction, encouraging a high recurrence of dramatic play, suggesting change behaviors, and maintaining a steady interest in displayed activities. Age differences affected the children's degree of flexibility preferred. The three year olds were stimulated more by conditions where both manipulation and nonmanipulation were present. The five year olds, on the other hand, preferred structures which were primarily flexible. For the more passive child, the presence of flexibility induced higher activity response levels than nonflexibility. But, the more active child favored static forms which supported imitative, real model behaviors.

**CITED REFERENCES**

- Allen, Marjory (Lady Allen of Hurtwood), Planning for Play, Cambridge, Mass.: MIT Press, 1974.
- Angrus, Ruth, A Tentative Inventory of the Habits of Children from Two to Four Years of Age, Teacher's College, Columbia University, 1923, Published Doctoral Dissertation.
- Ankara, Inci Emine, The Philosophy and Design of an Outdoor Play Space for Pre-Elementary School Children, the Virginia Polytechnic Institute and State University, Blacksburg, Virginia, 1973, Unpublished Master's Thesis.
- Barker, Roger and Herbert F. Wright, Midwest and its Children, New York: Archon Books, Inc., 1971.
- Barker, Roger and Phil Schoggen, Qualities of Community Life, San Francisco, Calif.: Josey-Bass Publishing Co., Inc., 1973.
- Barnhardt, C. L., The American College Dictionary, Syracuse, New York: the L. W. Singer Company, 1967, p. 402.
- Blatz, W. E. and H. Bott, Parents and the Preschool Child, New York: William Morrow and Co., 1929, pp. 128-136.
- Bott, H., "Observations of Play Activities in a Nursery School," Gen. Psych. Monog., 1928, No. 4, pp. 44-48.
- Bridges, K. M. B., "Occupational Interests of Three Year Old Children," Ped. Sem. and J. Genet. Psych., 1927, Vol. 34, pp. 415-423.
- Bridges, K. M. B., "The Occupational Interests and Attention of Four Year Old Children," Ped. Sem. and J. of Genet. Psych., 1929, Vol. 36, pp. 551-570.
- Bronfenbrenner, Urie, "Developmental Research, Public Policy and the Ecology of Childhood," Child Development, Vol. 45, 1974, pp. 1-5.
- Bronfenbrenner, Urie, Experimental Human Ecology, a paper presented at the Division of Personality and Social Psychology at the 82nd Annual Conference of A.P.A., New Orleans, 1974.
- Bronfenbrenner, Urie, Two Worlds of Childhood: U.S.A. and U.S.S.R., New York: Pocket Books, Inc., 1973.
- Buhler, C., The First Year of Life, New York: The John Day Co., 1930, p. 281.

- Buhler, C., "The Imagination of the Child at Play," in The Mental Development of the Child, New York: Harcourt, Brace and Co., 1930, pp. 9-10 and 91-96.
- Buhler, C., "The Child and its Activity with Practical Material," British Journal Educational Psychology, 1933, Vol. 3, pp. 27-41.
- Dattner, Richard, Design for Play, New York: Van Nostrand Reinhold Co., 1969.
- Davison, Gerald C. and John M. Neale, Abnormal Psychology: An Experimental Clinical Approach, New York: John Wiley and Sons, Inc., 1974.
- Ellis, Michael J., Why People Play, Englewood Cliffs, New Jersey: Prentice Hall, 1973.
- Farwell, L., "Reactions to Kindergarten, First, and Second Grade Children to Constructive Play Materials," Gen. Psych. Monog., 1930, Vol. 8, No. 5 and No. 6.
- Ferguson, Charles Albert, Studies of Child Language Development, New York: Holt, Rinehart, and Winston, 1954.
- Fletcher, S. S. F., Frobel's Chief Writings on Education, London: Kegan Paul, 1928.
- Freud, Sigmund, A General Introduction to Psychoanalysis, New York: Garden City Publishing Co., 1949.
- Froebel, F., Pedagogics of the Kindergarten, London: D. Appleton, 1895, (Translated by J. Jarvis).
- Gans, J. J., People and Plans, New York, London: Basic Books, Inc., 1968.
- Gilmore, J. Barnard, "Play: A Special Behavior," in R. N. Haber (ed.), Current Research in Motivation, New York: Holt, Rinehart, and Winston, 1966, pp. 343-355.
- Griffiths, R., A Study of Imagination in Early Childhood, London: Kegan Paul, 1935.
- Groos, Karl, The Play of Man, New York: Arno Press, 1976.
- Groos, Karl, The Play of Animals, New York: D. Appleton and Co., 1898.



- Gump, Paul and Brian Sutton-Smith, "Activity-Setting and Social Interaction: A Field Study," in Herron and Sutton-Smith (ed.), Child's Play, New York: John Wiley and Sons, Inc., 1971.
- Hall, Calvin S. and Gardner Lindzey, Theories of Personality, New York: John Wiley and Sons, Inc., 1938.
- Hall, Edward T., The Hidden Dimension, Garden City, N.Y.: Doubleday and Co., Inc., 1966.
- Harmon, Darrell Boyd. The Coordinated Classroom, data from the Texas State Department of Health, 1945.
- Hart, Roger, "The Genesis of Landscaping: Two Years of Discovery in a Vermont Town," Landscape Architecture Quarterly, Vol. 65, No. 5, October, 1974.
- Havighurst, R. M. and Rhea R. Hilkevitch, "The Intelligence of Indian Children as Measured by a Performance Scale," the Journal of Abnormal Social Psychology, 1944, Vol. 39, pp. 413-433.
- Herring, A. and H. L. Koch, "A Study of Some Factors Influencing the Interest Span of Pre-School Children," Ped. Sem. and J. Genet. Psych., 1930, Vol. 38, pp. 249-279.
- Herron, R. E. and Brian Sutton-Smith, Child's Play, New York: John Wiley and Sons, Inc., 1971.
- Hetzer, H., "Kind and Schaffen: Experimente uber Konstruktive Betatigungen im Klein-Kindalters," Progressive Architecture, 1931, Vol. 7, pp. 108, (English translation).
- Hofstaetter, P. R., "The Changing Composition of Intelligence: A Study of T-techniques," the Journal of Genetical Psychology, 1954, Vol. 85, pp. 159-174.
- Holt, John, Freedom and Beyond, New York: E. P. Dutton and Co., Inc., 1972.
- Holt, John, How Children Fail, New York: Dell Publishing Co., Inc., 1964.
- Huizinga, Jan, Homo Ludens: A Study of the Play Element in Culture, London: Routledge and Kegan Paul, Ltd., 1949, (Translated by R. F. C. Hull).

- Isaacs, Susan, Social Development in Young Children, New York: Harcourt, Brace, 1933.
- Jersild, A., Frances Markey, and Catherine T. Jersild, "Children's Fears, Dreams, Wishes, Daydreams, Likes, Dislikes, Pleasant and Unpleasant Memories," Child Development Monographs, 1933, No. 12.
- Johnson, M. W., "Effects on Behavior of Variation in the Amount of Play Equipment," Child Development, Vol. 6, 1935.
- Kirkpatrick, E. A., Fundamental of Child Study, New York: The Macmillian Co., 1922, pp. 179-185.
- Kritchevsky, Sybil and Elizabeth Prescott, with Lee Walling, Planning Environments for Young Children, Washington, D.C.: National Association for the Education of Young Children, 1969.
- Lewin, Kurt, "Behavior and Development as a Function of the Total Situation," in Leonard Carmichael (ed.), Manual of Child Psychology, (2nd Edition), London: John Wiley and Sons, Inc., 1954.
- Lorenz, K., "Plays and Vacuum Activities," in L'instinct dans le Comportement des Animaux et de l'homme, Paris: Masson, 1956.
- Lowenfeld, Margaret, Play in Childhood, New York: John Wiley and Sons, Inc., 1967.
- Margolin, E. B. and D. A. Leton, "Interest of Kindergarten Pupils in Block Play," the Journal of Educational Research, 1961, Vol. 55, pp. 13-18.
- McLellan, Joyce, The Question of Play, New York, Great Britian: Pergamon Press, Ltd., 1970.
- Mitchell, E. D. and B. Mason, The Theory of Play, New York: A. S. Barnes and Co., 1948.
- Morris, Desmond, Primate Ethology, London: Weinenfeld and Nicholson, 1964.
- Moustakas, Clark, The Authentic Teacher, Sensitivity, and Awareness in the Classroom, Massachusetts: Howard A. Doyle Printing Co., 1966.
- Moyer, K. E. and B. H. VonGilmer, "Experimental Study of Children's Preferences and Use of Blocks in Play," the Journal of Genetical Psychology, 1956, Vol. 89, pp. 3-10.

- Neumann, Eva A., "The Elements of Play," University of Illinois, 1971, Unpublished Doctoral Dissertation.
- Nicholson, Simon, "How Not to Cheat Children: The Theory of Loose Parts," Landscape Architecture Quarterly, Vol. 62, No. 1, October 1970.
- Parten, M. B., "Social Participation Among Preschool Children," Journal of Abnormal and Social Psychology, 1932, Vol. 27, No. 3, pp. 243-269.
- Piaget, J., Play, Dreams, and Imitation in Childhood, New York: W. W. Norton and Co., 1962.
- Piers, Maria W. (ed.), Play and Development, New York: W. W. Norton and Co., Inc., 1972.
- Prescott, Elizabeth, "Who Thrives in Group Day Care?," Assessment of Child-Rearing Environments: An Ecological Approach, Part 2, Washington, D.C.: Office of Child Development, #R-219 (C6), 1973.
- Pressman, Gale A., "The Evolution of a Preschool Learning Environment," unpublished paper, the University of Virginia, Charlottesville, Virginia, 1975.
- Proshansky, H. M., William H. Ittelson, and Leanne G. Rivlin, (eds.), Environmental Psychology: Man and His Physical Setting, New York: Holt, Rinehard and Winston, Inc., 1970.
- Rogers, C. R., "Tentative Inventory of Habits of Children From Four to Six," Teachers College Bulletin, Fourteenth Series, No. 4, 1922.
- Rosenthal, Ronald H., Children's Responses to Environmental Spaces, A Student Originated Study, #GY9570, the National Science Fund Foundation, the Virginia Polytechnic Institute and State University, Blacksburg, Virginia, 1973.
- Rohe, William and Arthur H. Patterson, "The Effects of Varied Levels of Resources and Density on Behavior in a Daycare Center," in D. Carson (ed.), EDRA V, 1974.
- Schneekloth, Lynda H., Environmental Complexity and Behavior of Young Children: A Study in Person/Environment Relations, University of Wisconsin-Madison, Wisconsin, 1976, Master's Thesis.

- Spencer, M., Growth and Play, B. B. C. Publications, 1945.
- Spivak, Mayer, "Archetypal Place," Forum, October, 1973.
- Terman, L. M. and B. S. Burks, "The Gifted Child," in C. Murchison (ed.), A Handbook of Child Psychology, Worcester: Clark University Press, 1933, pp. 773-801.
- Van Alstyne, D., Play Behavior and Choice of Play Materials of Pre-School Children, Chicago, Ill.: University of Chicago Press, 1932.
- Waddle, C. W., An Introduction to Child Psychology, New York: Houghton Mifflin Co., 1918, Chapter VI.
- Westman, J. C., D. L. Rice, and E. Bermann, "Nursery School Behavior and Later School Adjustment," American Journal of Orthopsychiatry, 1967, Vol. 37, pp. 725-731.
- White House Conference on Children, Report to the President, Washington, D.C.: U.S. Government Printing Office, 1970.

## APPENDICES

APPENDIX A



COLLEGE OF HOME ECONOMICS

## VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Blacksburg, Virginia 24061

DEPARTMENT OF CLOTHING, TEXTILES AND RELATED ART

7 June 1977

Dear Parents or Guardian,

I am a graduate student working on a master's degree in the Department of Clothing, Textiles and Related Art in the College of Home Economics.

With the guidance of Mrs. Jeanne Dixon, Director of the Carousel School located at Church and Jackson Street in Blacksburg, Virginia, your child has been selected, based upon your written consent and approval, to partake in a research study for a period of three consecutive weeks beginning 28 June 1977 and ending 14 July 1977. This study is concerned with your child's responses to play facilities and equipment. It will attempt to determine to what extent children wish to change their play facilities. Your child will be introduced to and given the opportunity to freely play on small pieces of equipment built out of wood and safely finished for their use. Adults will be immediately nearby should your child need their assistance. In no way will the testing situation hurt your child's social or psychological growth.

If you are in agreement to the participation of your child in this research, please sign and fill in the enclosed permission form and questionnaire. When you have completed these, please return them to Mrs. Dixon at the Carousel School. You are cordially invited and highly welcomed to attend any of the testing dates and times to observe ongoing activities.

Should you have any further questions pertaining to this research, I will be pleased to answer them and share any results with you. I can be contacted in care of Mrs. Dixon at the Carousel School, Church and Jackson Street, Blacksburg, Virginia or by telephone at

I wish to extend my sincerest appreciation and thanks to you and your child for your cooperation, assistance, and efforts toward the fulfillment of this research endeavor.

Very sincerely,

Phyllis E. Hirschman  
Graduate Teaching Assistant  
Virginia Polytechnic Institute  
and State University

Dr. Lois M. Gurel  
Thesis Director  
Virginia Polytechnic Institute  
and State University

## PERMISSION FORM FOR PARTICIPATING CHILDREN

I give my permission and complete cooperation for my child,

\_\_\_\_\_, to participate in the  
(enter child's full name here)

research conducted at the Carousel School between Church and Jackson Street in Blacksburg, Virginia during the period of 28 June 1977 and 14 July 1977 by Phyllis E. Hirschman, a graduate student at the Virginia Polytechnic Institute and State University in Blacksburg, Virginia.

Tentatively, my child will not attend instructional sessions at the Carousel School on the following days (please check only those days and dates in which your child will be absent from school due to vacation plans, medical appointments, or other prearranged or pre-scheduled occurrences):

\_\_\_\_\_ Tuesday, 28 June 1977  
 \_\_\_\_\_ Wednesday, 29 June 1977  
 \_\_\_\_\_ Thursday, 30 June 1977  
 \_\_\_\_\_ Tuesday, 5 July 1977  
 \_\_\_\_\_ Wednesday, 6 July 1977

\_\_\_\_\_ Thursday, 7 July 1977  
 \_\_\_\_\_ Tuesday, 12 July 1977  
 \_\_\_\_\_ Wednesday, 13 July 1977  
 \_\_\_\_\_ Thursday, 14 July 1977

I will not hold the above researcher, the Carousel School, other researcher assistants, or the Virginia Polytechnic Institute and State University responsible for any injuries or other occurrences resulting from this study.

\_\_\_\_\_  
(Date)

\_\_\_\_\_  
Signature of Parent or Guardian



## QUESTIONNAIRE TO PARENTS OF PARTICIPATING CHILDREN

Please answer the following questions with reference to your child participating in this study. It is important that you respond to all of the following questions to the best of your knowledge. Your responses will be kept in the strictest of confidence and will be used only in the analysis of data for this research. Your full cooperation will be highly appreciated.

1. Age of child (check one):  3  5

2. Sex of child (check one):  Male  Female

3. Please check the total number of children in the family:

one  
 two  
 three  
 four  
 five

six  
 seven  
 eight  
 nine  
 ten or more

4. Please check the birth position of your child with relation to the other children in the family:

only child  
 youngest child  
 second from the youngest child  
 third from the youngest child  
 fourth from the youngest child  
 fifth from the youngest child  
 sixth from the youngest child  
 seventh from the youngest child  
 eighth from the youngest child  
 ninth from the youngest child  
 tenth from the youngest child or greater than tenth  
 other (please explain): \_\_\_\_\_

5. List some favorite toys or play equipment (5 or more if possible) your child likes to play with at home--both indoors and outdoors.

## QUESTIONNAIRE TO TEACHERS OF PARTICIPATING CHILDREN

Please answer the following questions with reference to the children you instruct that are participating in this study. It is important that you respond to all of the following questions to the best of your knowledge. Your responses will be kept in the strictest of confidence and will be used only in the analysis of data for this research. Your full cooperation will be highly appreciated.

1. Name of child: \_\_\_\_\_
2. Age of child (check one):    \_\_\_\_\_3        \_\_\_\_\_5
3. Sex of child (check one):    \_\_\_\_\_Male    \_\_\_\_\_Female
4. Learning program of child (check one):    \_\_\_\_\_1/2 Day    \_\_\_\_\_Full Day
5. Does the child have any learning physical or psychological disabilities that may impair his work, play, or affect his behavior in school?
6. Is the child generally noisy or quiet while in school?
7. Is the child generally active or sedentary while in school?
8. Does the child seem to mainly engage in group or solitary play?
9. What play activities does the child engage in while in school?  
What play equipment does the child enjoy working with while in school?
10. Other comments about the child's general behavior and play behavior while in school.

APPENDIX B

LIST OF CATEGORIES USED IN THE COLLECTING,  
TABULATING, AND CODING OF DATA

<u>Category</u>	<u>Symbol</u>
Structure State	S1, S2, S3
Day	D1, D2, D3
Time Interval	T <sub>1</sub> , T <sub>2</sub> , T <sub>3</sub> , T <sub>4</sub> , T <sub>5</sub> , T <sub>6</sub>
Play	OB, SO, GR, PA
Contact Form	CH3, CH5, AD, ST.
Structure Contact	Ⓜ, L12, L24, L36, R12, R24, R36, C12, C24, C36
Body Movement and Behavior	ST, SI, LY, LE, CL, JU, HA, SW, RE, RU, WA, KI, TU, SL, RO, PU, PS, TH, LI, RM, DPE, ACF, BA, CA, BU
Age	3 Year Old, 5 Year Old
Group	G1, G2, G3
Child	01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15

## LIST OF ABBREVIATIONS AND SYMBOLS USED IN THIS RESEARCH

<u>Symbol</u>	<u>Meaning</u>
S1	State I (Static)
S2	State II (Semiflexible)
S3	State III (Flexible)
D1	Day 1 (First Day of Exposure to the States)
D2	Day 2 (Second Day of Exposure to the States)
D3	Day 3 (Third Day of Exposure to the States)
T <sub>1</sub>	First Five Minute Interval of Recording
T <sub>2</sub>	Second Five Minute Interval of Recording
T <sub>3</sub>	Third Five Minute Interval of Recording
T <sub>4</sub>	Fourth Five Minute Interval of Recording
T <sub>5</sub>	Fifth Five Minute Interval of Recording
T <sub>6</sub>	Sixth Five Minute Interval of Recording
OB	Observation Play
SO	Solitary Play
GR	Group Play
PA	Parallel Play
CH3	3 Year Old Child
CH5	5 Year Old Child
AD	Adult
ST.	Structure (Object or Piece of the Structural State)

<u>Symbol</u>	<u>Meaning</u>
Ⓜ	PVC Cap
L12	Small Linear Piece
L24	Medium Linear Piece
L36	Large Linear Piece
R12	Small Rectangular Piece
R24	Medium Rectangular Piece
R36	Large Rectangular Piece
C12	Small Circular Piece
C24	Medium Circular Piece
C36	Large Circular Piece
ST	Stand
SI	Sit
LY	Lie
LE	Lean
CL	Climb
JU	Jump
HA	Hang
SW	Swing
RE	Reach
RU	Run
WA	Walk
KI	Kick
TU	Tumble

<u>Symbol</u>	<u>Meaning</u>
SL	Slide
RO	Rock
PU	Pull
PS	Push
TH	Throw
LI	Lift
RM	Rhythmical Movements
DPE	Dramatic Play Enactment
ACF	Academic Concept Formation
BA	Balance
CA	Carry
BU	Build
G1	Group 1 (Children 01 to 05)
G2	Group 2 (Children 06 to 10)
G3	Group 3 (Children 11 to 15)

DEFINITION OF TERMS USED IN THE RECORDING AND  
CODING OF DATA

## PLAY FORMS:

Observation play: any movement where the child fixes his/her focus for three seconds or more.

Solitary play: any behavior in which the child interacts independently of other individuals, persons, and children in the environment; structural contact may be made during this period.

Group play: any behavior in which two or more children act in a related manner toward a common goal or direction.

Parallel play: any behavior that is occurring adjacent to another individual but not similar to that of the other individual's behavior; the two activities are independent and nonsupportive of each other.

## FORM OF CONTACT:

Contact: any physical or verbal action with any part of the body, of the structures being tested, or of the structure of another element (object and/or person); any act or state of touching or meeting of two elements in immediate proximity or association.

Three year old child contact: any physical or verbal union, touch, or cooperation directed toward a three year old.

Five year old child contact: any physical or verbal union, touch, or cooperation directed toward a five year old.

Adult contact: any physical or verbal union, touch, or cooperation directed toward any individual other than a three or five year old.

Structure contact: any physical or verbal union, touch, or cooperation directed toward the play objects prepared for this study; this does not include other furnishings or objects present within the test environment.



**BODY MOVEMENTS AND BEHAVIORS:**

**Stand:** any vertical upright position in which both feet act as supports and are approximately a shoulder's length apart.

**Sit:** any position in which the trunk is lowered by hip and knee flexion and in which the body rests primarily on the buttocks; the legs may be horizontally extended or partially flexed; the feet may be dangling or parallel to the ground.

**Lie:** any horizontal position in which the trunk, back, legs, and head are parallel to the ground or in which they are tilted sideways or in such a manner that they replicate a reclining position; the knees and arms may be flexed, the head tilted, or the trunk twisted in any direction that maintains the body in a prone position.

**Lean:** any body position in which the trunk is flexed at the hips so that the upper torso is moved forward, backwards, or sideways requiring another element (object or person) to support the body upright.

**Climb:** any gross vertical body movement on an object or surface in which the limbs alternate extension and flexion; it denotes a transfer of body weight through pushing and/or pulling.

**Jump:** any movement in which the legs and feet are rapidly extended, launching the body into the air so that it lands vertically with two feet parallel to the ground or horizontally or diagonally with the limbs flexed; the arms may be held away from the body in a flexed position.

**Hang:** any movement in which the arms are extended above the head and clasping an element (object or person); the body itself is suspended above the ground; the elbow may be flexed or the entire arm straight, parallelling the body's direction.

**Swing:** any rotary or oscillating movement of an object generated from and engaged by the flexion of the forearm or full arm; this action may be patterned, rhythmic, circular, alternating, directionally shifted, or irregular.

- Reach:** a body movement in which the arm is horizontally extended and the fingers partially extended and separated with the palmar side down; this action is usually oriented toward a person or object followed by a grasping and picking up.
- Run:** a movement in which the body is thrust forward alternating legs during each stride in a manner that lifts both feet instantaneously off the ground during each stride; the trunk is upright and tilted forward; this may occur in one place without locomotion.
- Walk:** the body is propelled bipedally forward at a moderate rate alternating legs during each stride so that one foot is placed firmly on the ground before lifting the other; the trunk is upright.
- Kick:** the leg is flexed and then explosively extended at the knee and hip so that the foot moves forward toe first; this movement is usually oriented toward an object or person.
- Tumble (roll):** the back, trunk, head, and limbs are flexed; the chest and upper legs may be brought together so the head is close to the knees; this movement creates a shifting of weight along the body surface as it revolves or turns over and over like a wheel or ball.
- Slide:** any movement in conjunction with an object or person in which the body extended or flexed glides across a surface in a rapid sweeping motion.
- Rock:** the body trunk is moved backward-forward or sideways in a repetitive rhythmic movement; the body may be vertical, upright, and standing or flexed at its joints as in sitting; the movement may induce an extension-flexion or adduction-abduction at the hips.
- Pull:** the arms are flexed drawing an element (object and/or person) towards the body or the body toward the element; it is preceded by reaching and grasping.

- Pushing:** the arms are horizontally extended forward with wrists flexed and palms preceding; this action is generally oriented toward an element (object and/or person) thrusting this element away from the body or the body away from the element.
- Throw:** any movement which propels or casts an element by a sudden forward motion causing the extension or straightening of the arm and wrist; this motion creates a change of position in the element from its original source; it generally precedes a grasping and reaching.
- Lift:** raising of an element (object and/or person) off a ground or surface to suspend it to a higher position creating the flexion of the arm; this motion is usually preceded by grasping and reaching.
- Rhythmical movement:** any movement with a uniform, regular patterned occurrence of strong and weak melodic and harmonic beats or accents; the entire body may be engaged or only a segmentary part; the action may involve another element (object and/or person) to create or assist in creating the recurring pattern; it may be a physical or a verbal action.
- Dramatic play:** any gross body movement replicating a dialogue or pantomime of a story involving a conflict or contrast of character or portraying a realistic or fantasy event or incident.
- Academic concept formation:** any physical or verbal gross body movement involving the learning of liberal arts theories such as humanities, mathematics, and/or sciences.
- Balance:** any gross motor movement in which the body is upright, vertically extended, and in equilibrium with another element (object and/or person); the body may be raised above the ground on the element and in a state that maintains a harmonious condition with that element.
- Carry:** any movement in which the arm is flexed, transporting, and holding an element (object and/or person) raised above the ground; the body acts as a support to the moving element; generally this is preceded by reaching and grasping.

**Build:** any fine motor body movement replicating the assemblage and jointing of objects or construction of an idea, thought, or concept.

**MISCELLANEOUS TERMS:**

**Change:** any action in which the child alters in any fashion the original position or arrangement of the structural objects; obvious attempts to alter resulting in nonsuccess are additionally included.

**Replicate behavior:** any action in which the child repeats any movement, action, or activity that occurred prior to the response recording; this includes behaviors that resulted after a three second interruption to attend to another behavior or occurrence within the environment.

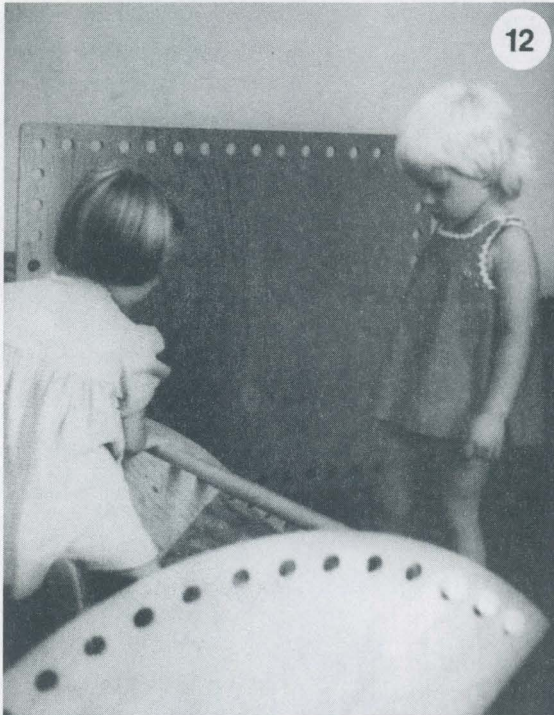
**Replicate structure:** any movement, action, or activity in which exact replication of the prearrangement or of its parts occur; use and awareness of the concepts and jointing conditions in which the parts are related to each other in a manner different from the prearrangements are not included.

**Behavioral response:** any actions, movements, or activities generated by an individual in response to an element (encounterment, person, or object) in a given condition or situation.

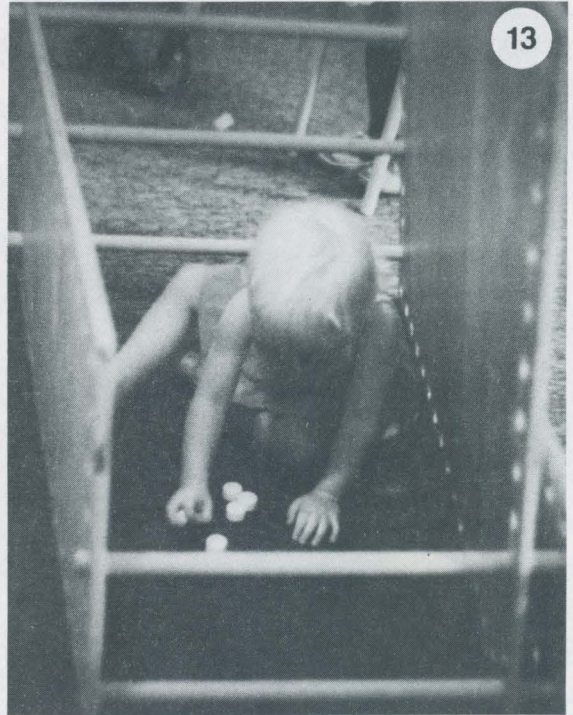
**Body movement:** any action, motion, alteration, or change in the position, direction, gesture, or stance of the physical structure or any of the parts of the structure of an organism.

PHOTOGRAPHIC EXAMPLES OF THE BEHAVIORAL RESPONSES DEFINED AND OBSERVED IN THIS RESEARCH WITH RESPECT TO THE THREE STRUCTURAL STAGES OF STATIC, SEMIFLEXIBLE, AND FLEXIBLE

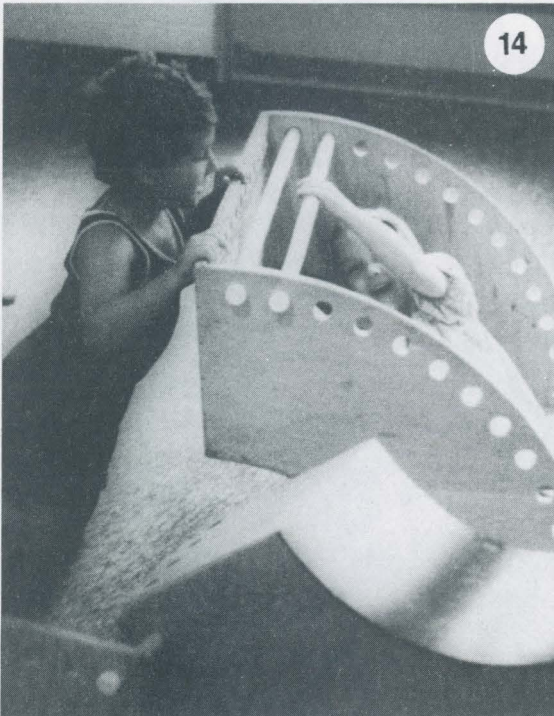
The following pages represent photographic examples of previously defined play forms, forms of contact, and body movements and behaviors observed during the data collection period.



12



13



14



15

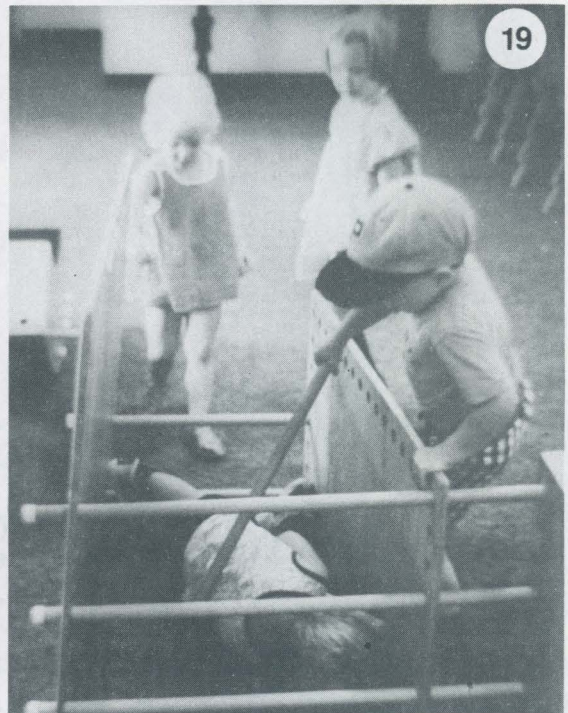
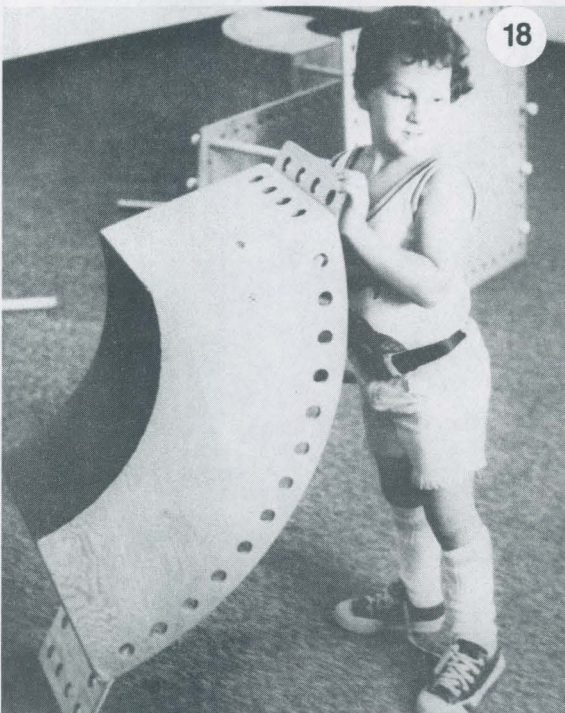
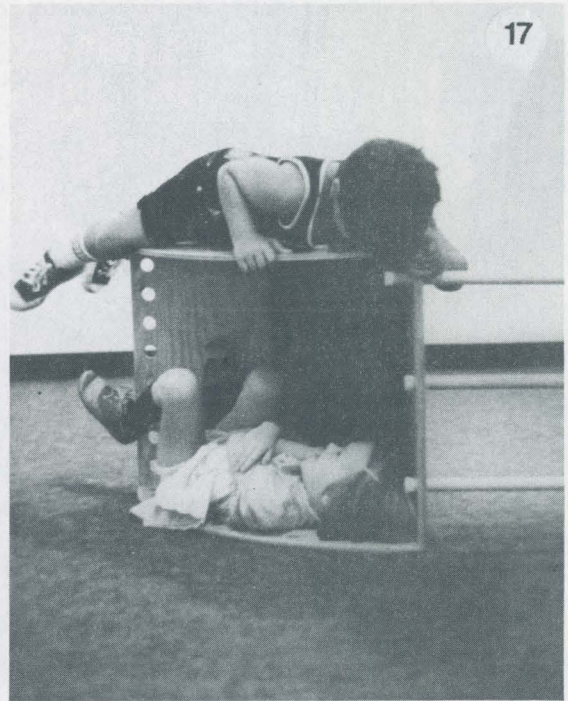
Photograph 12. Play Form: Observation.

Photograph 13. Play Form: Solitary.

Photograph 14. Play Form: Group.

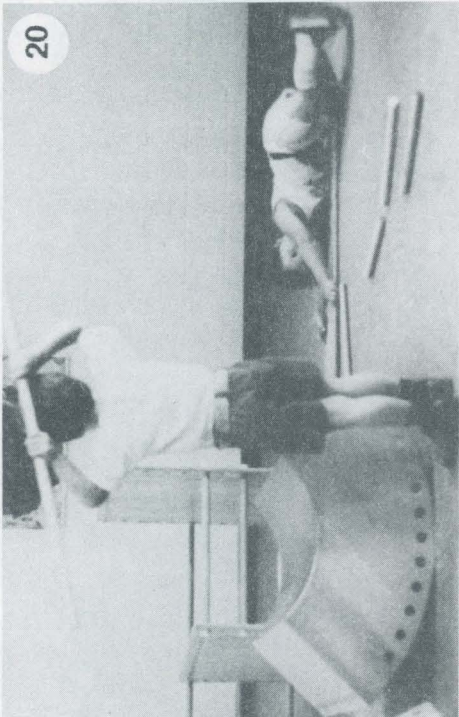
Photograph 15. Play Form: Parallel.





Photograph 16. Contact Form: Adult.  
 Photograph 17. Contact Form: Five Year Old Child.  
 Photograph 18. Contact Form: Structure.  
 Photograph 19. Contact Form: Three Year Old Child.

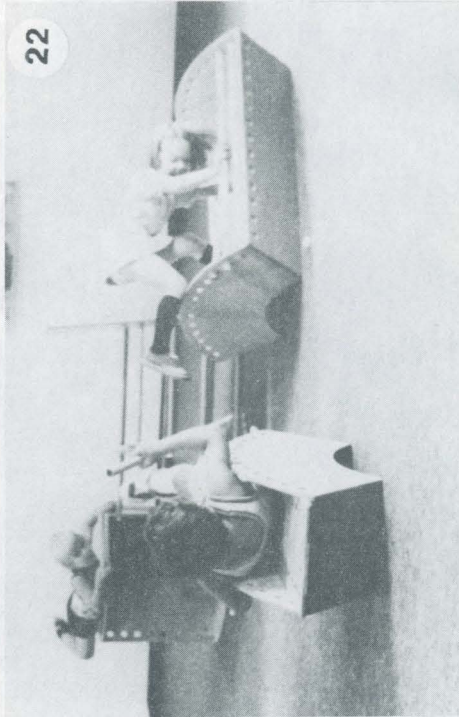




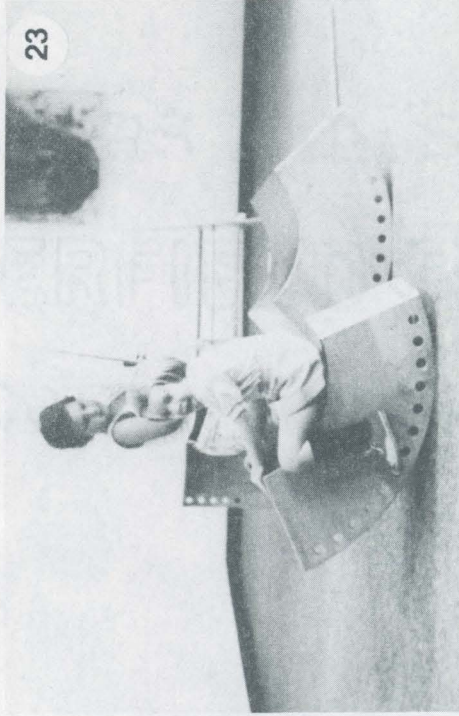
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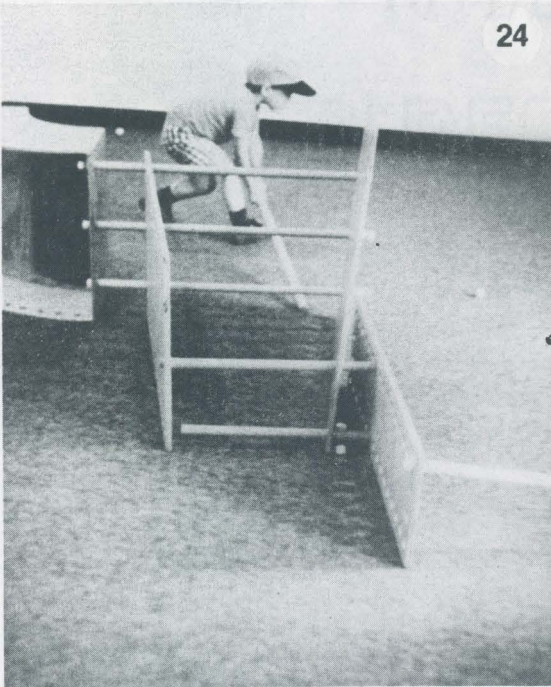
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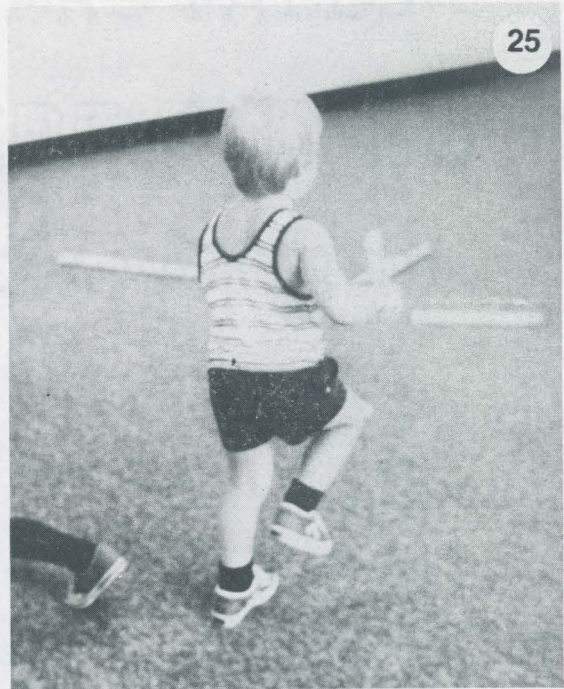
23

Photograph 20. Behavior Expression: Stand.  
 Photograph 21. Behavior Expression: Walk.  
 Photograph 22. Behavior Expression: Lie.  
 Photograph 23. Behavior Expression: Rock.





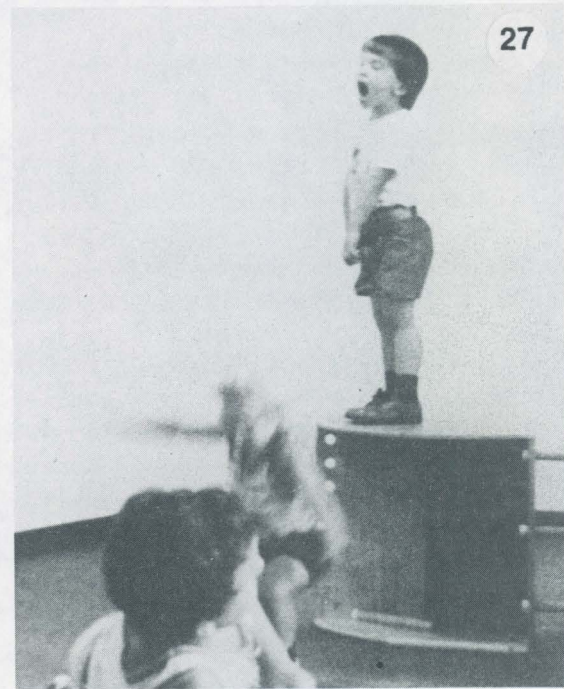
24



25



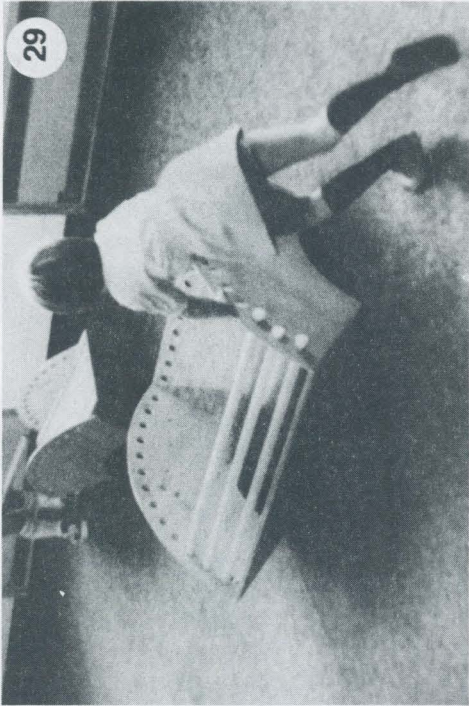
26



27

- Photograph 24. Behavior Expression: Run.  
 Photograph 25. Behavior Expression: Carry.  
 Photograph 26. Behavior Expression: Sit.  
 Photograph 27. Behavior Expression: Rhythmical Movement.

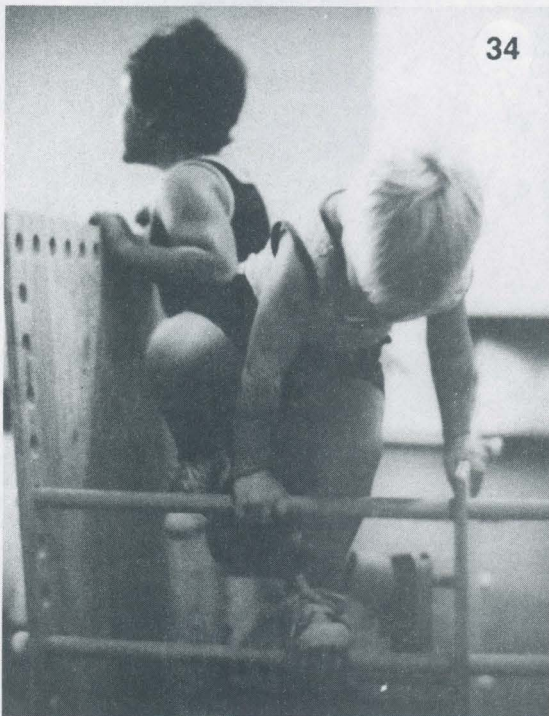
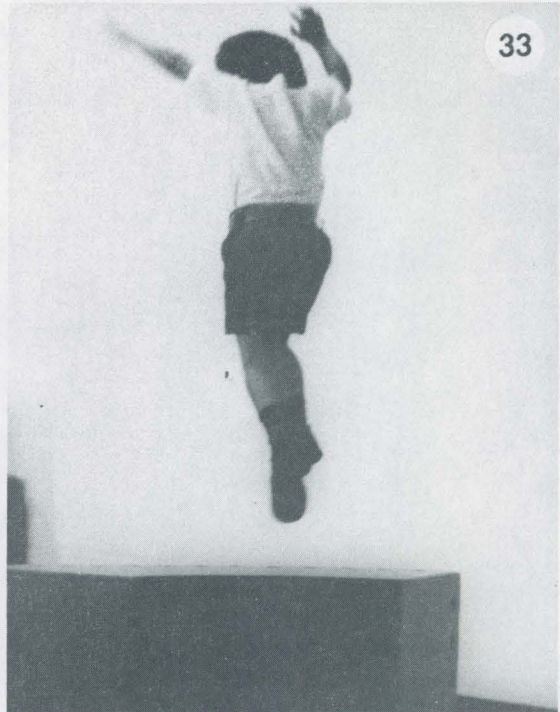
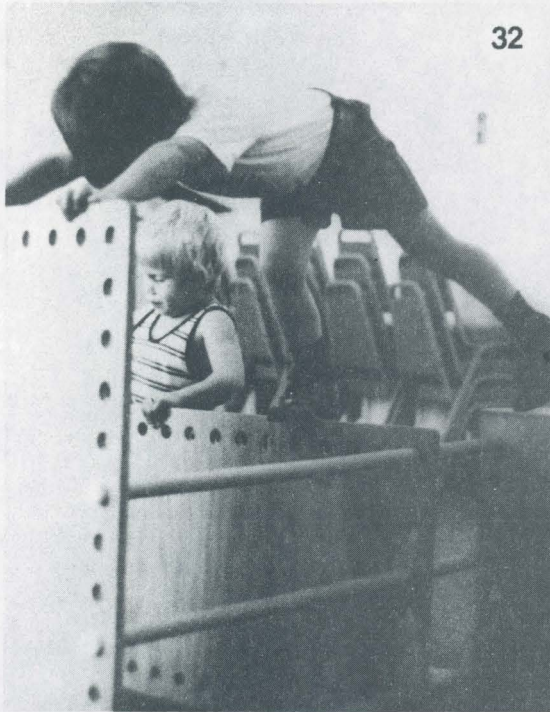




Photograph 28. Behavior Expression:  
 Photograph 29. Behavior Expression: Push.  
 Photograph 30. Behavior Expression: Tumble (Roll).  
 Photograph 31. Behavior Expression: Dramatic Play Enactment.

OLD DEERFIELD BOND  
 50% COTTON CONTENT





- Photograph 32. Behavior Expression: Reach (Balance).  
 Photograph 33. Behavior Expression: Jump.  
 Photograph 34. Behavior Expression: Climb.  
 Photograph 35. Behavior Expression: Lean.

APPENDIX C

## DEFINITION OF STRUCTURAL OBJECT PIECES

PVC Caps: 1 1/8" diameter polyvinyl chloride (PVC) circular caps which act as fasteners to hold the fixed parts of each of the arrangements established for this research.

Linear forms: L12 (1" diameter, 12" long), L24 (1" diameter, 24" long), L36 (1" diameter, 36" long); circular poles constant in depth and width dimensions but diverse in length; their ends are flat; their construction material is fir with a polyurethane finish.

Rectangular forms: R12 (12" x 42" x 3/4"), R24 (24" x 42" x 3/4"), R36 (36" x 42" x 3/4"); each unit contains 1" diameter holes along all four edges; they are constant in their length and depth but vary in their width; they are constructed from plywood and finished with polyurethane.

Circular forms: C12 (24" diameter, 12" wide, 12" long), C24 (24" diameter, 12" wide, 24" long), C36 (24" diameter, 12" wide, 36" long); three dimensional circular "wedges" with 1" holes lining their borders; they have the capacity to rock, stand upright, or lie horizontally up or down; they are constant in their length and width dimensions but vary in their depth; their construction materials are 1/2" plywood, 3/4" plywood, and 1/8" masonite with a polyurethane finish.

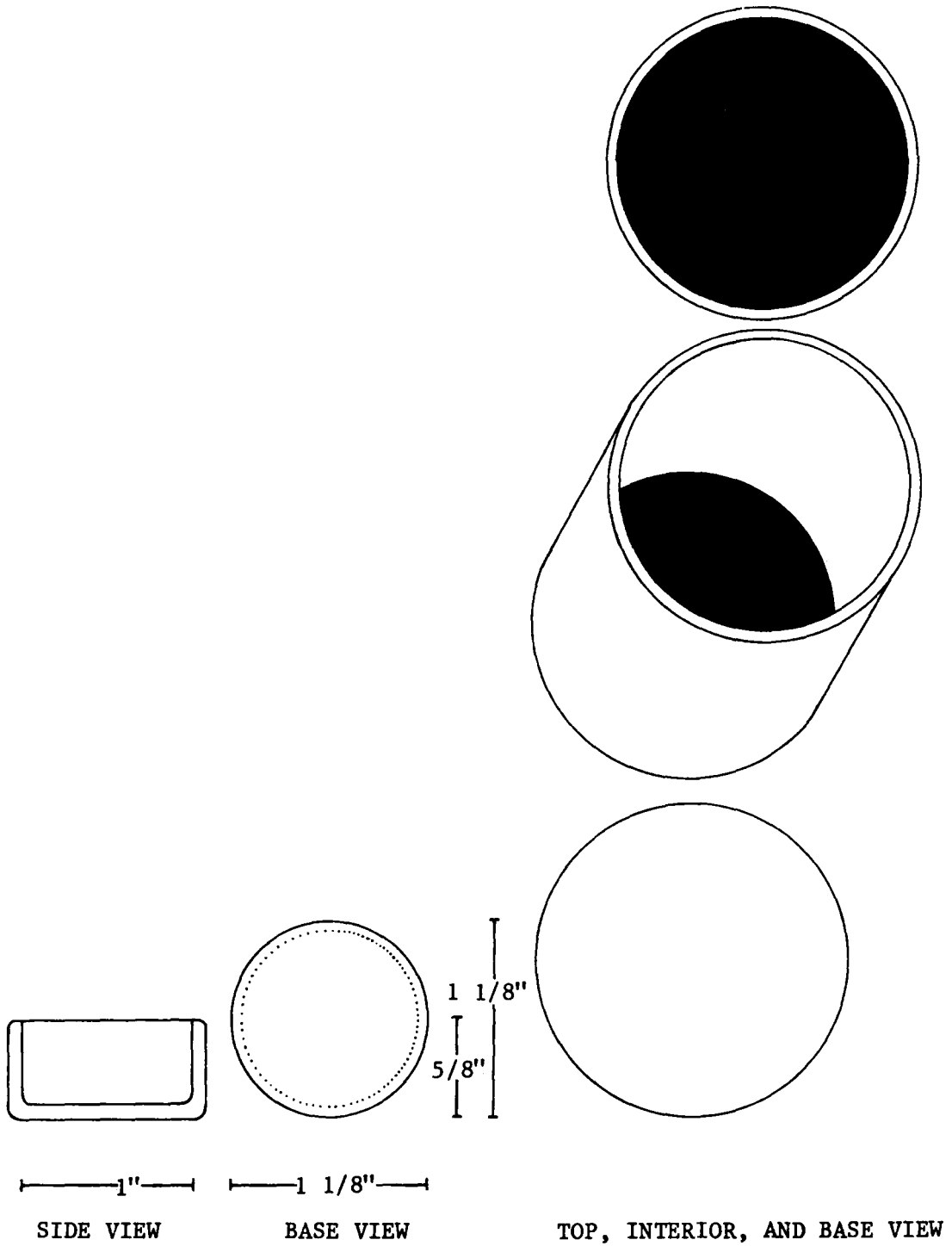
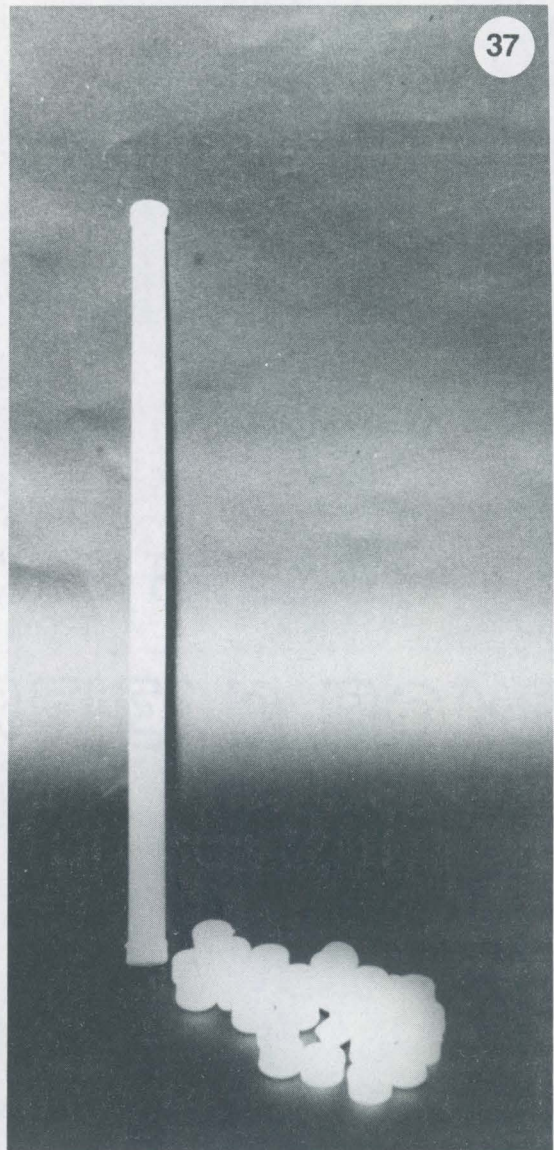
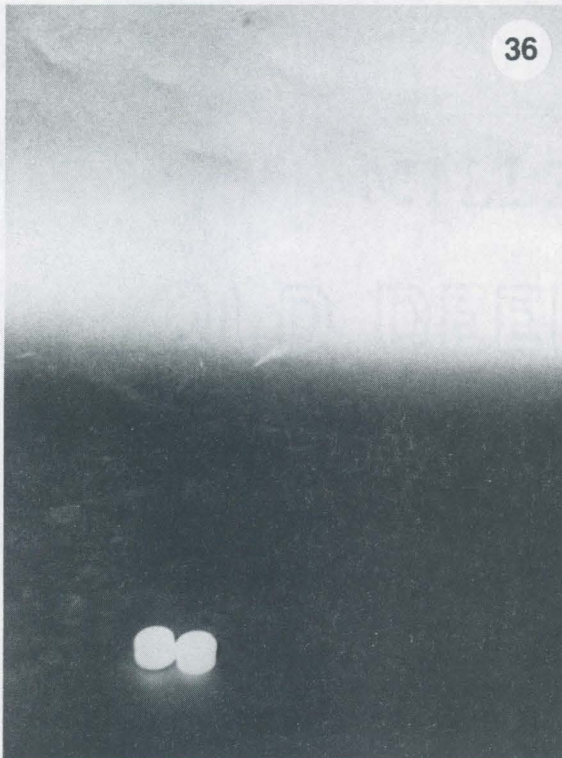


Illustration 5. Object Piece: Structural Details of the PVC Caps.





Photograph 36: Object Piece: PVC Caps

Photograph 37. Object Piece: PVC Caps with Linear Piece (L24).

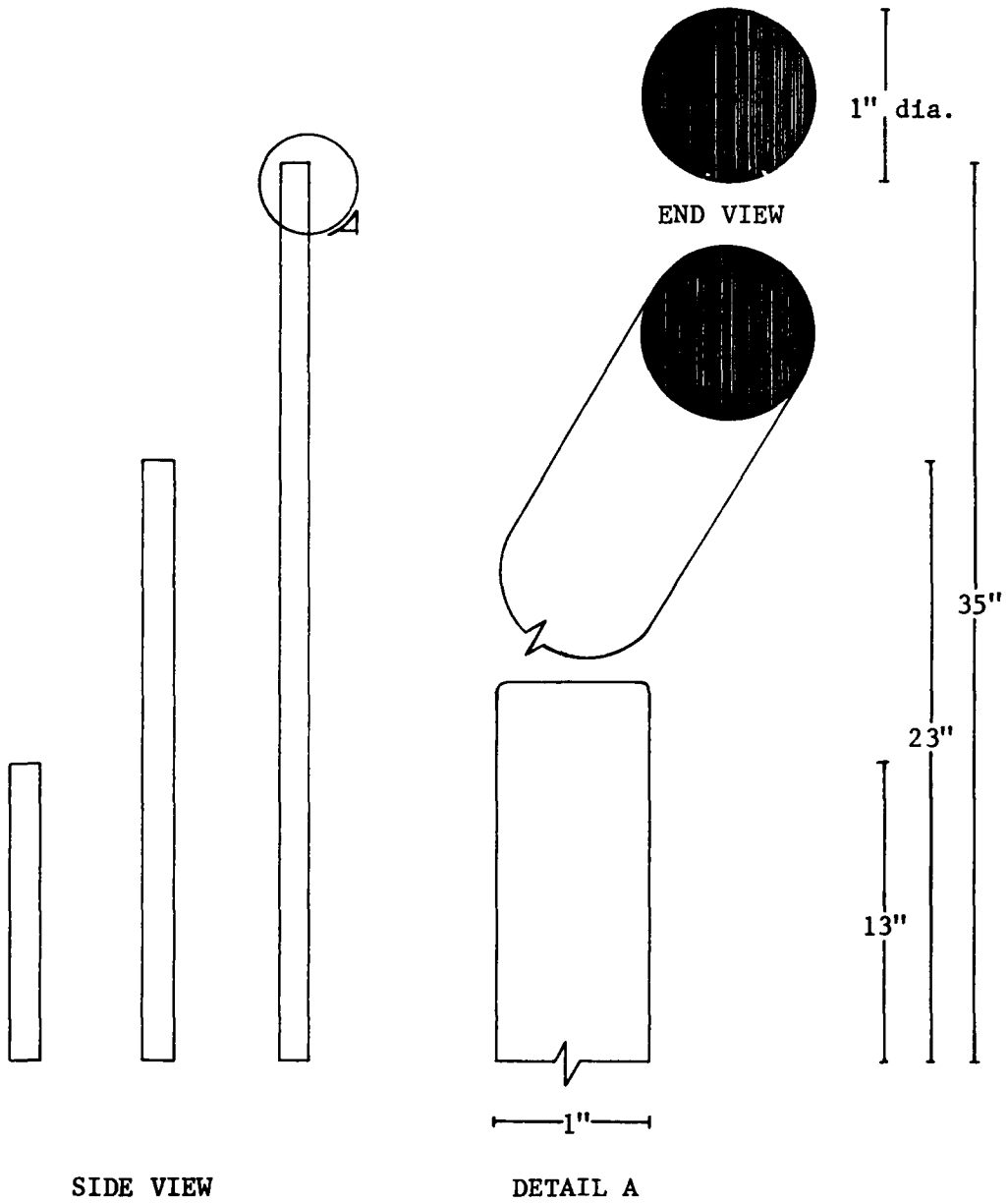
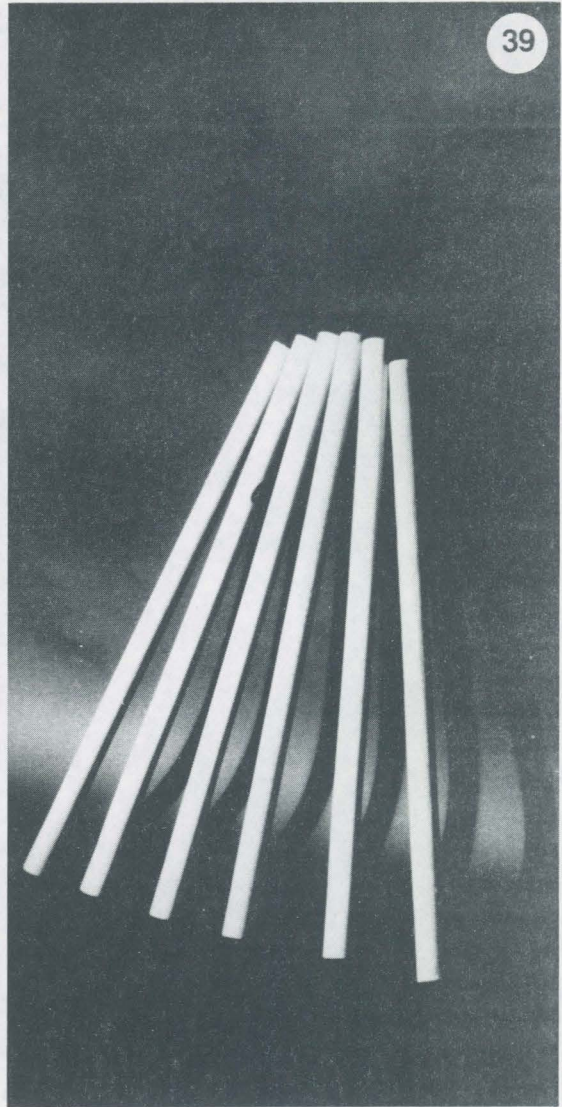
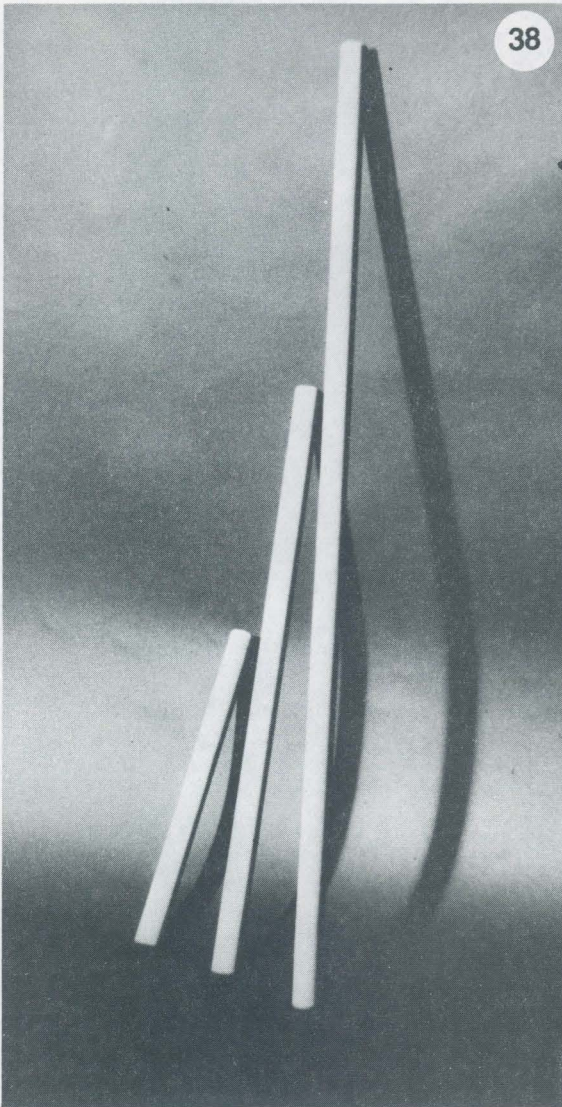


Illustration 6. Object Piece: The Linear Pieces and Structural Details of the Linear Pieces.

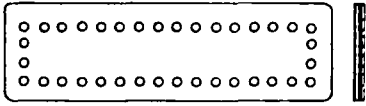




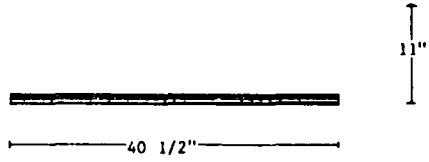
Photograph 38. Object Piece: One Set of Linear Pieces (L24). Each Set Consists of Six Objects.

Photograph 39. Object Piece: Proportional Relationship of the Linear Pieces to Each Other.

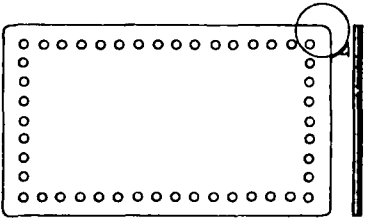
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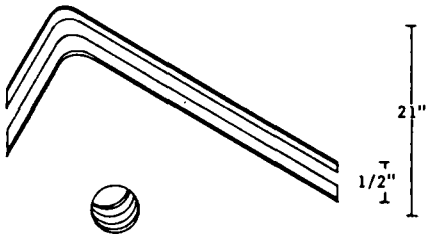
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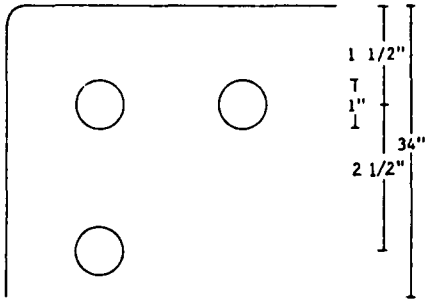
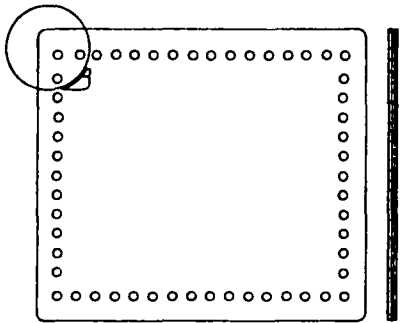


SIDE VIEW



DETAIL A

9



40 1/2"

2" 2 1/2"

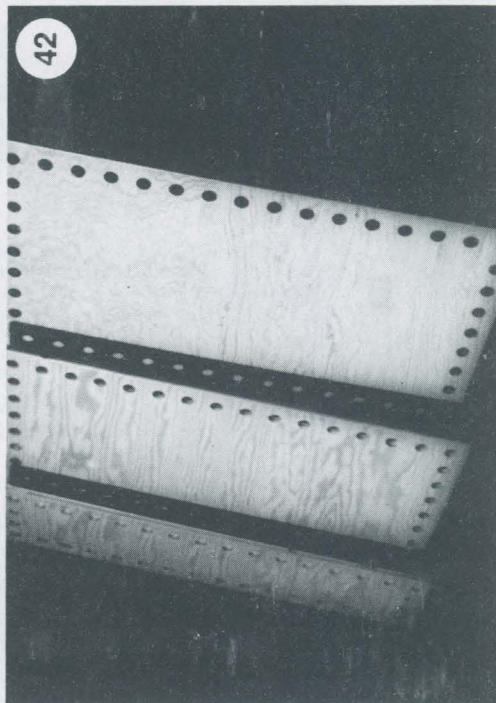
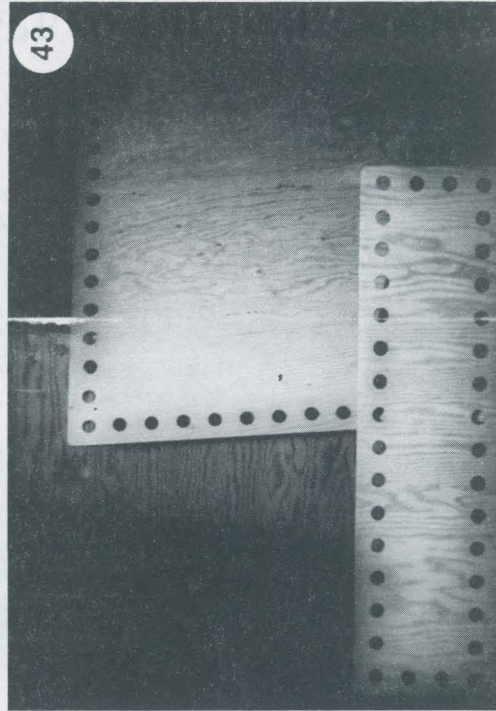
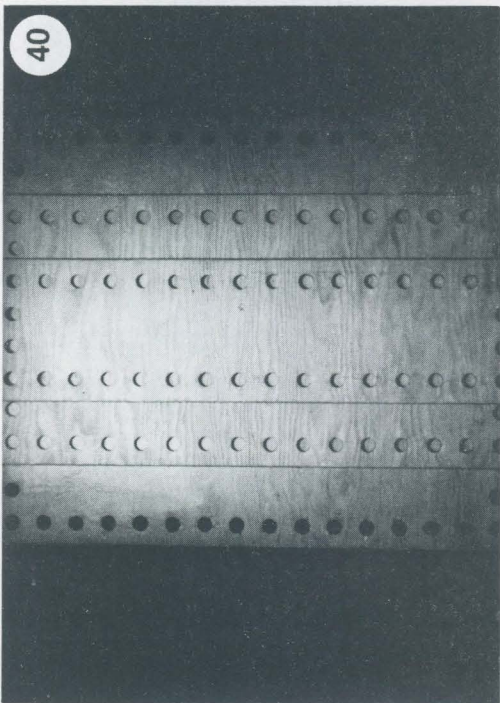
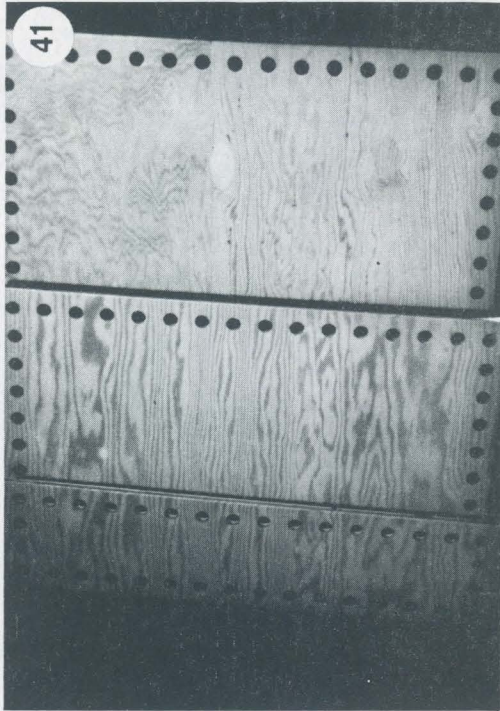
FRONT AND BACK VIEW

SIDE VIEW

DETAIL B

- Illustration 7. Object Piece: R12 (Small Rectangular Piece).
- Illustration 8. Object Piece: R24 (Medium Rectangular Piece).
- Illustration 9. Object Piece: R36 (Large Rectangular Piece).
- Illustration 10. Object Piece: Structural Details of the Rectangular Pieces.



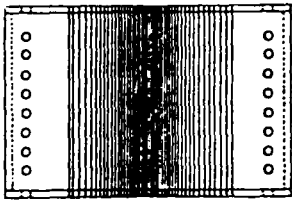


Photograph 40. Photograph 41. Photograph 42. Photograph 43. Proportional Relationship of the Rectangular Pieces to Each Other.

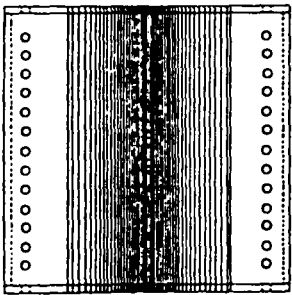
11



12

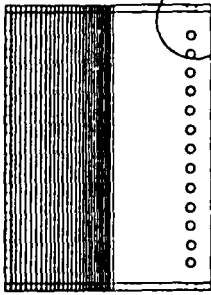
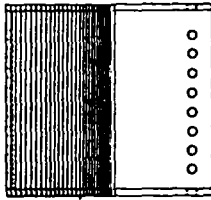


13



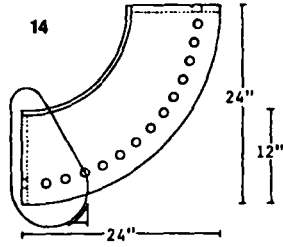
17"

BACK VIEW

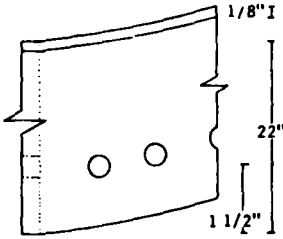


12"

SIDE VIEW

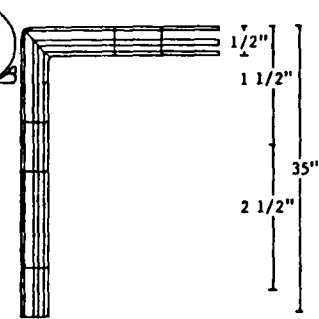


TOP VIEW



$\pm 2 \frac{1}{2}'' \pm 2 \frac{1}{2}''$

DETAIL A



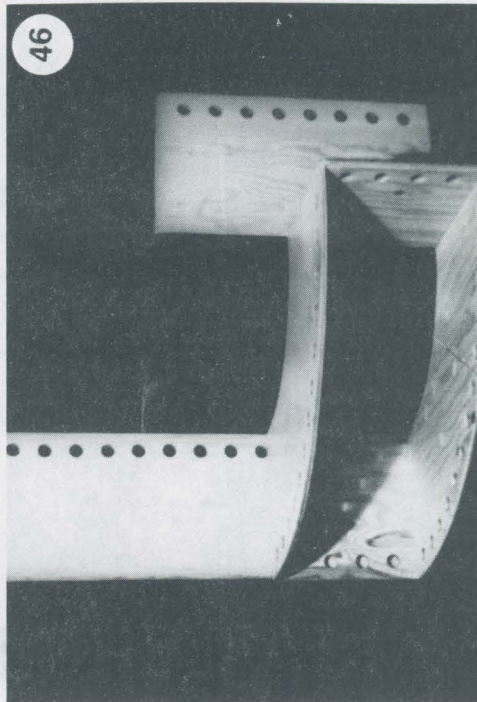
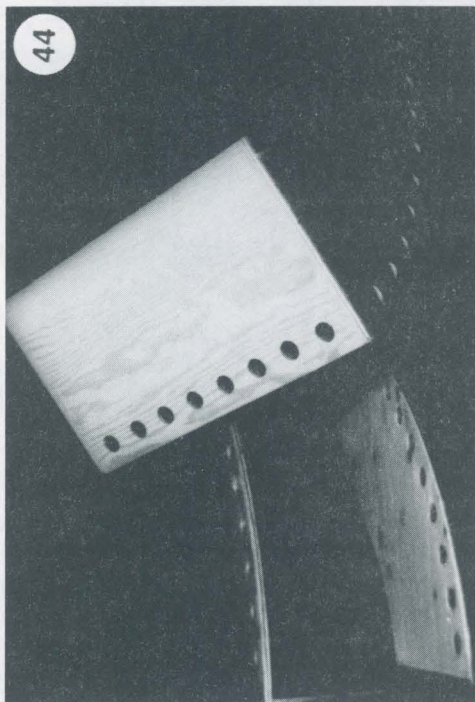
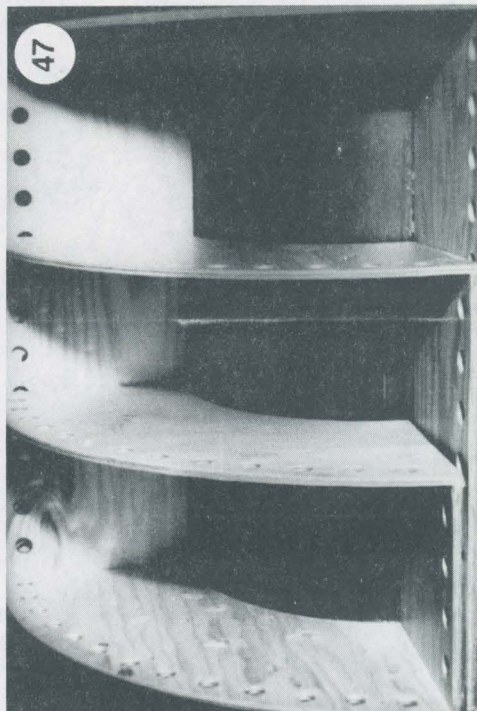
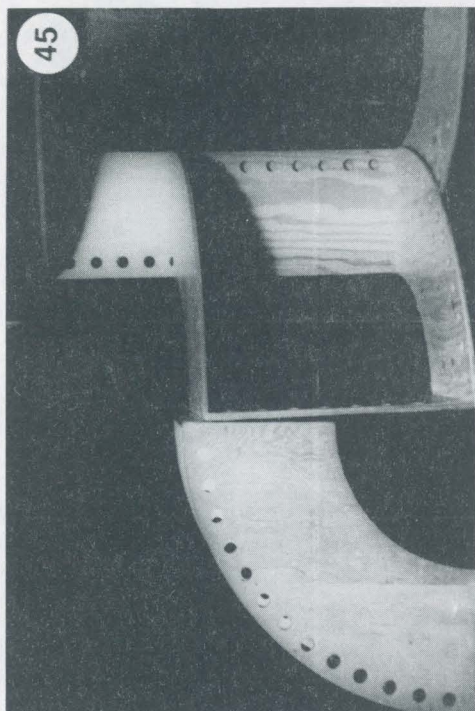
$\pm \frac{3}{4}''$

2 1/2"

DETAIL B

- Illustration 11. Object Piece: C12 (Small Circular Piece).
- Illustration 12. Object Piece: C24 (Medium Circular Piece).
- Illustration 13. Object Piece: C36 (Large Circular Piece).
- Illustration 14. Object Piece: Structural Details of the Circular Pieces.



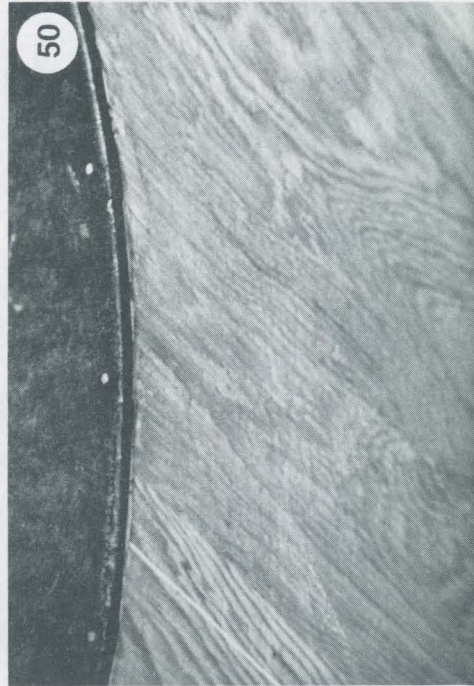
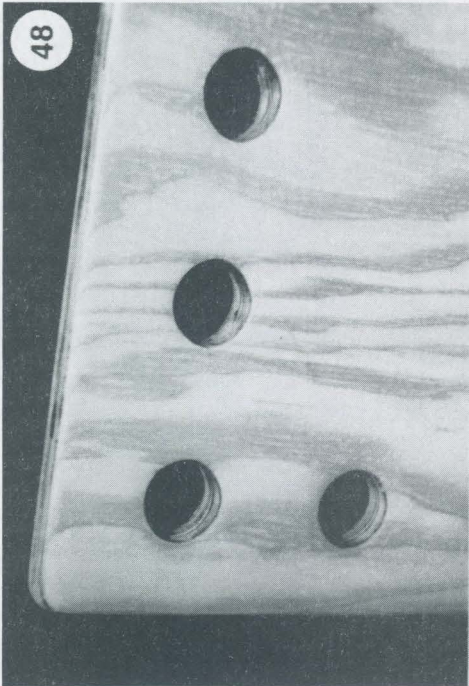
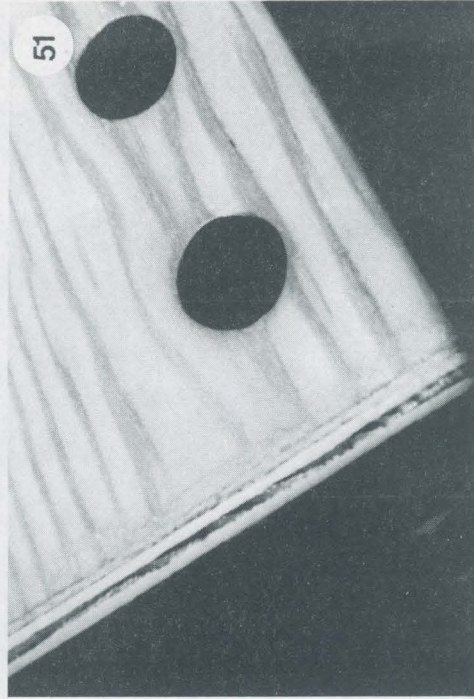
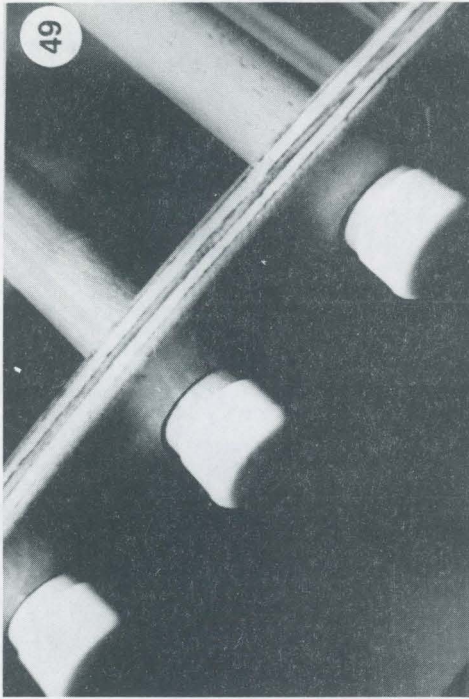


Photograph 44. Photograph 45. Photograph 46. Photograph 47.  
Proportional Relationship of the Circular Pieces to Each Other.

OLD DEERFIELD BOND

W. W. BROWN & CO. CHICAGO, ILL.





Photograph 48. Photograph 49. Photograph 50. Photograph 51.  
Construction and Jointing System Details of the Object Pieces.

MILLERS FALLS  
OLD DEERFIELD BOND  
50% COTTON CONTENT

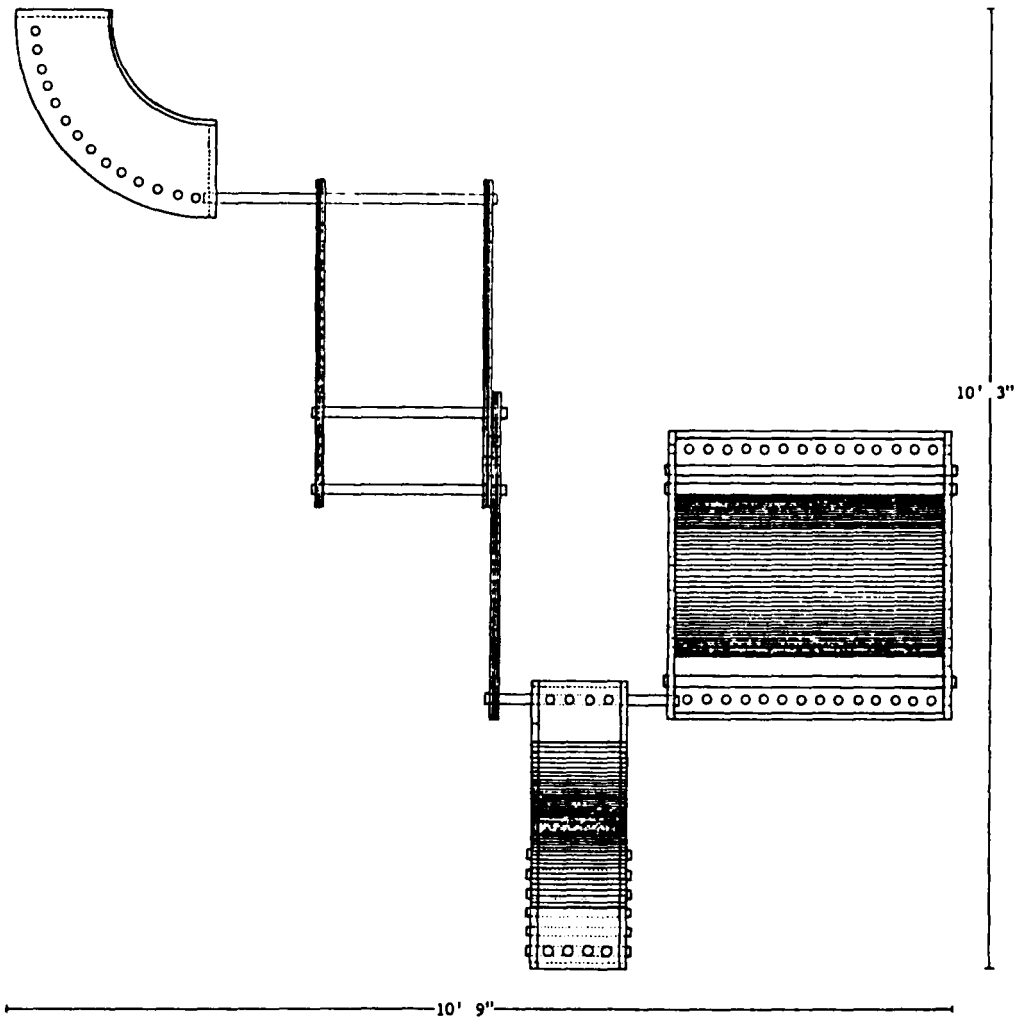


Illustration 15. Structural State I: Static

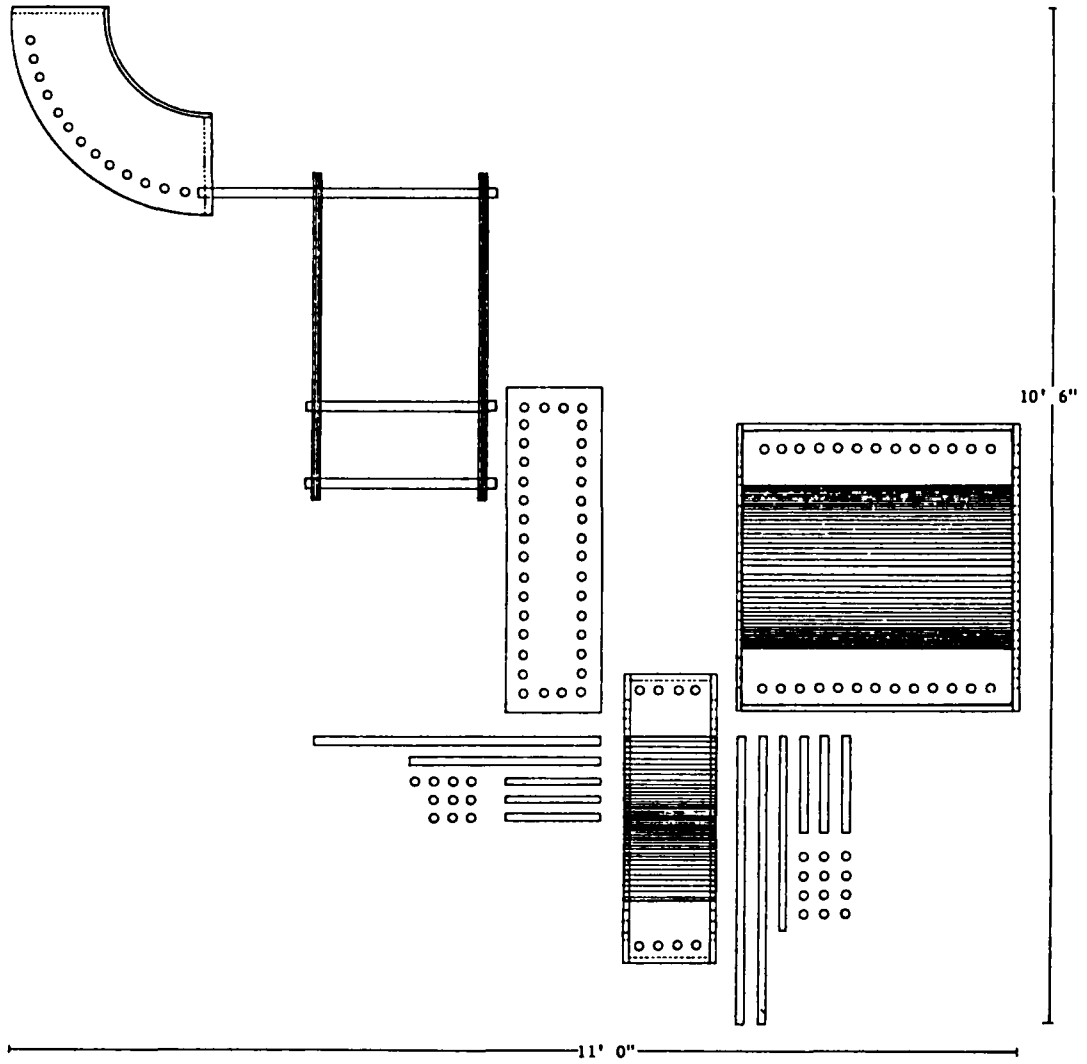


Illustration 16. Structural State II: Semiflexible.



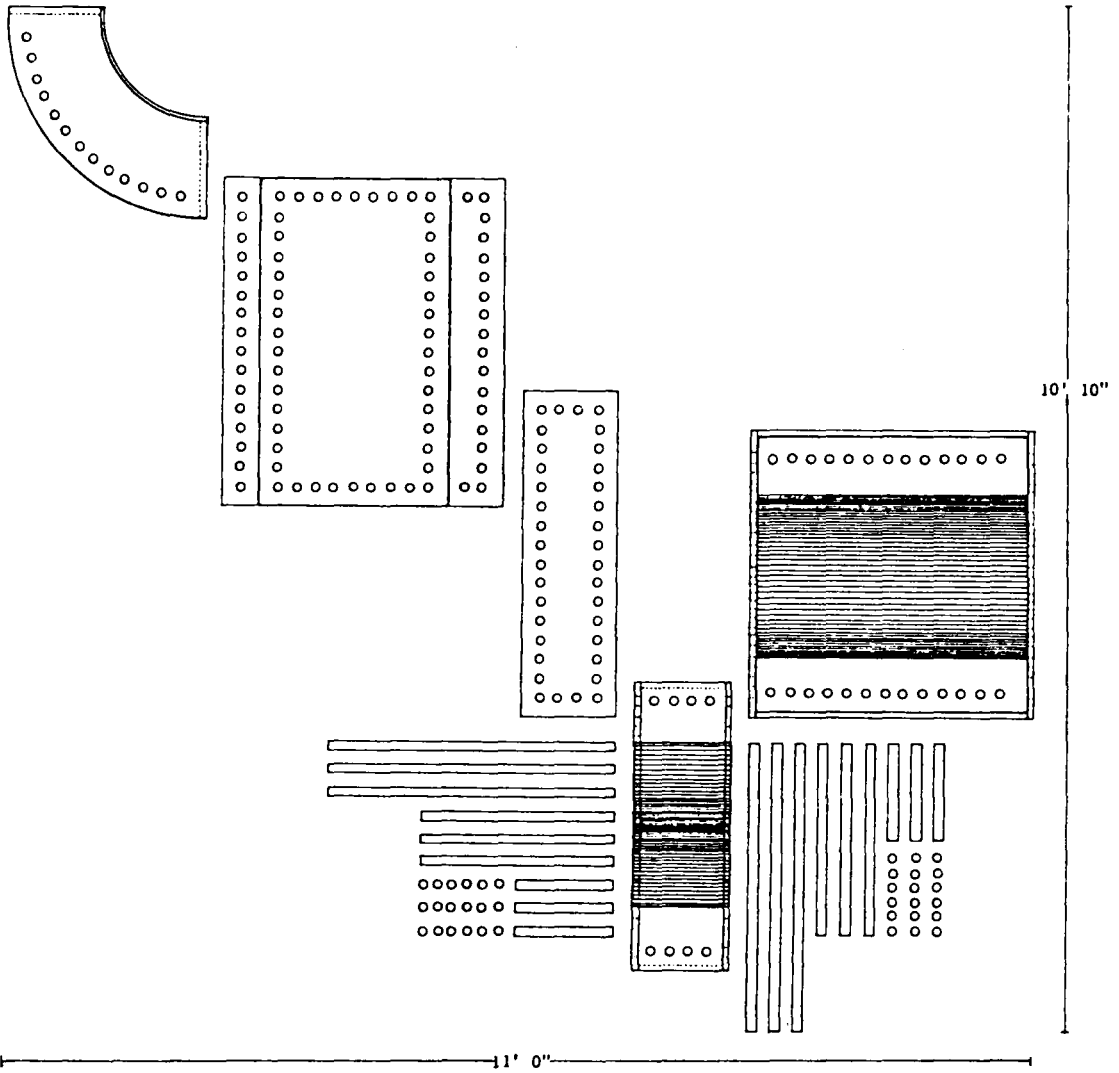
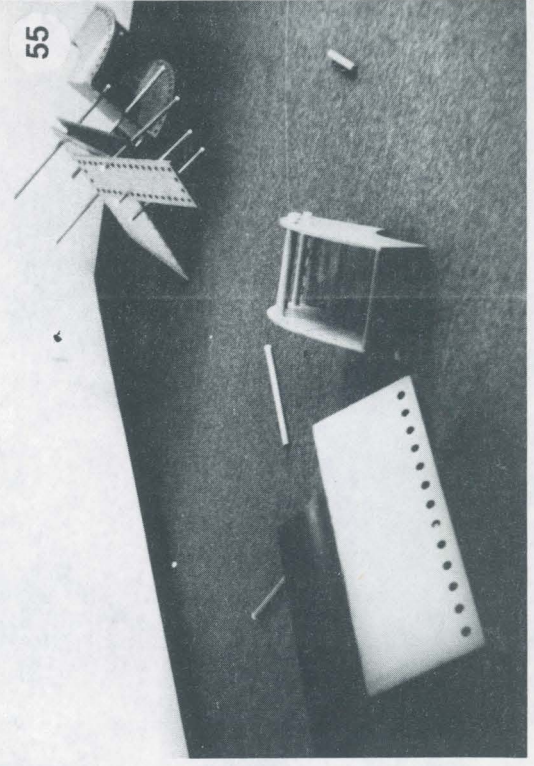
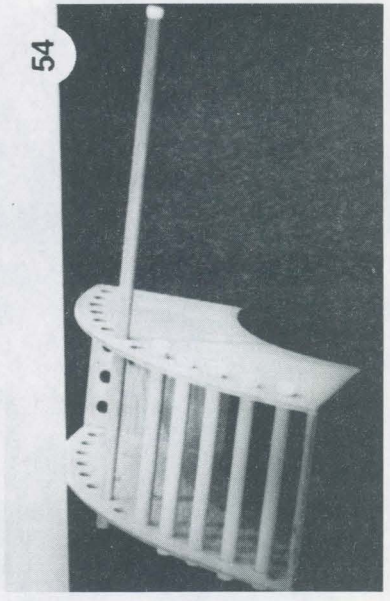
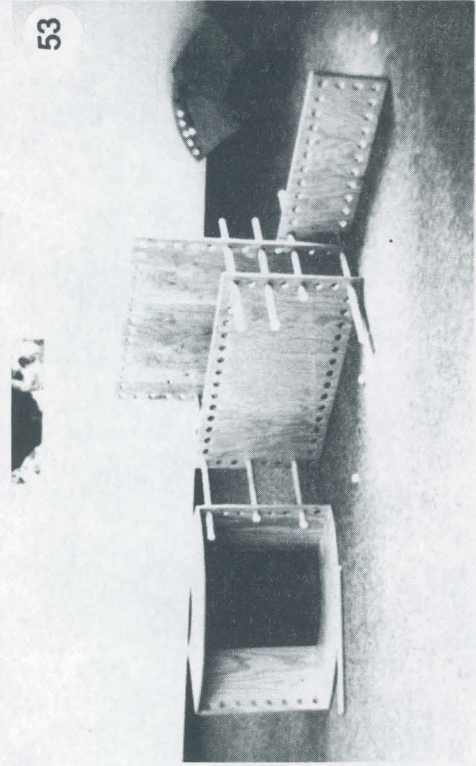
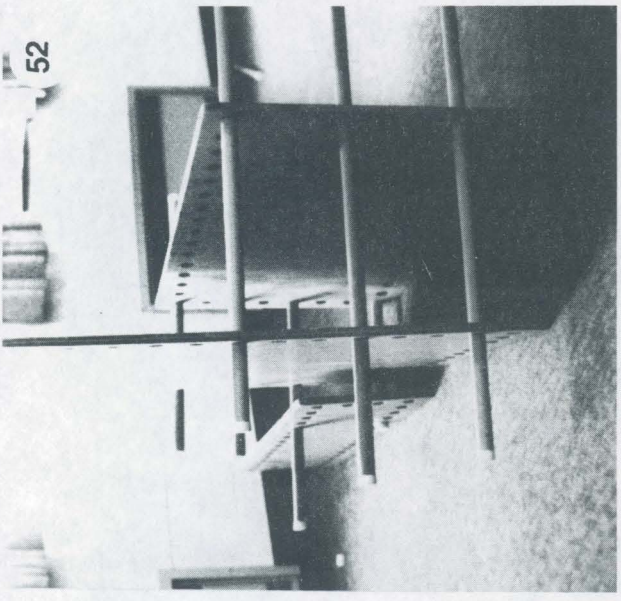
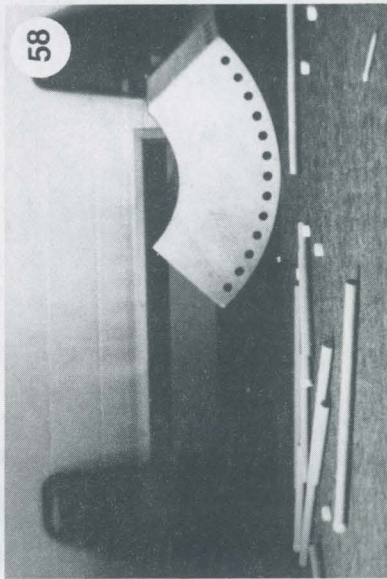
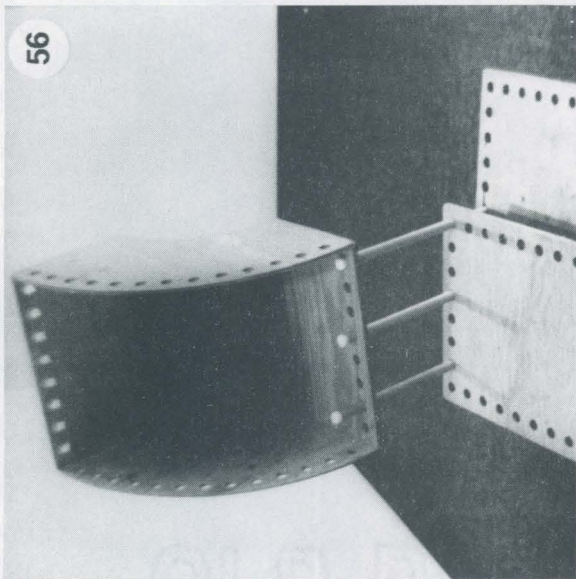
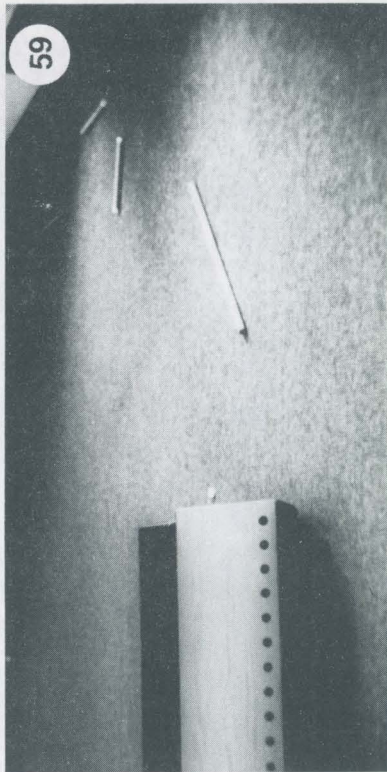
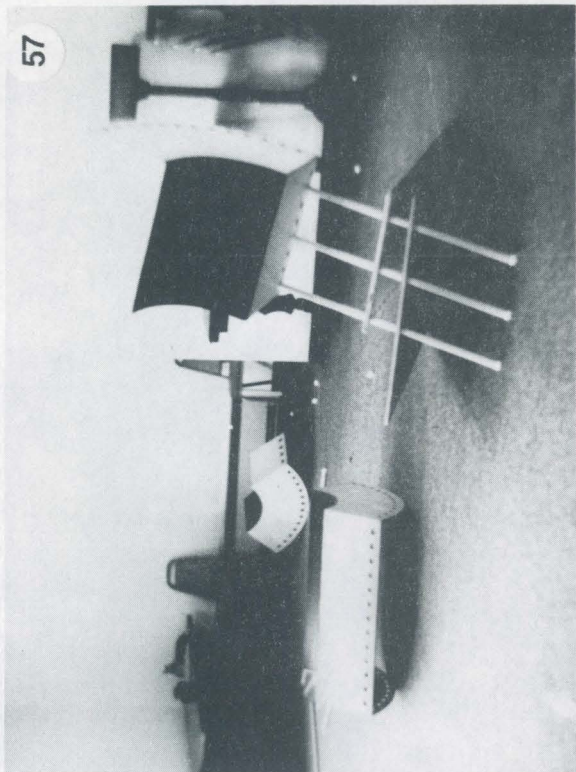


Illustration 17. Structural State III: Flexible.



Photograph 52. Photograph 53. Photograph 54. Photograph 55.  
Post Arrangement of Structural State I: Static.



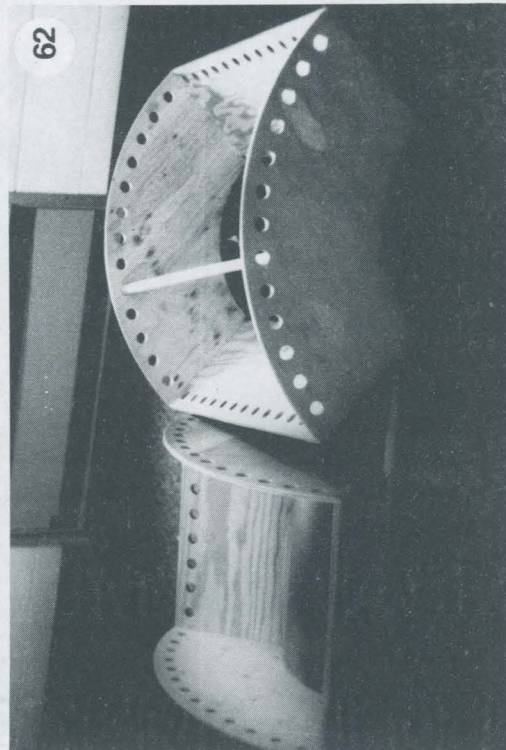
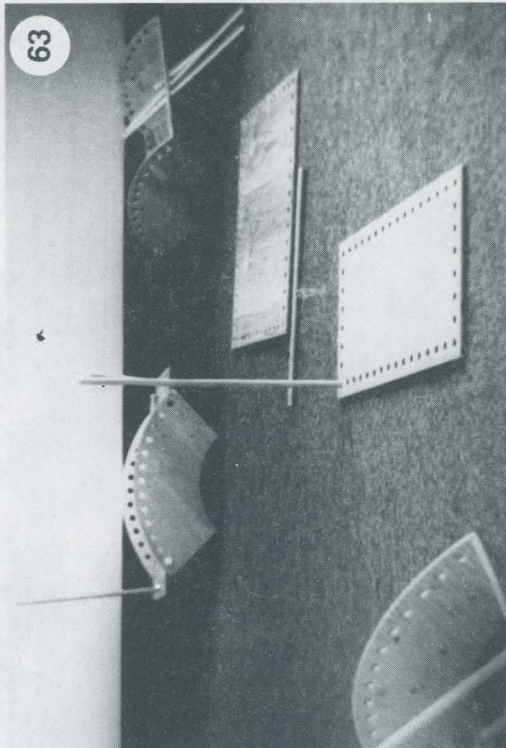
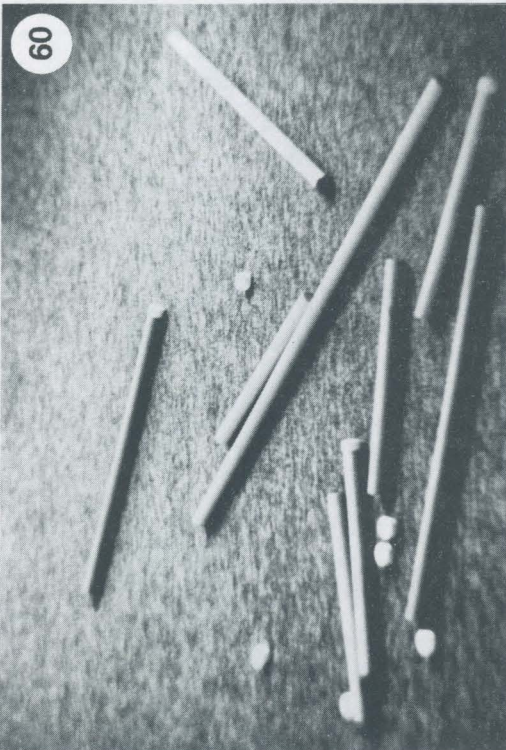
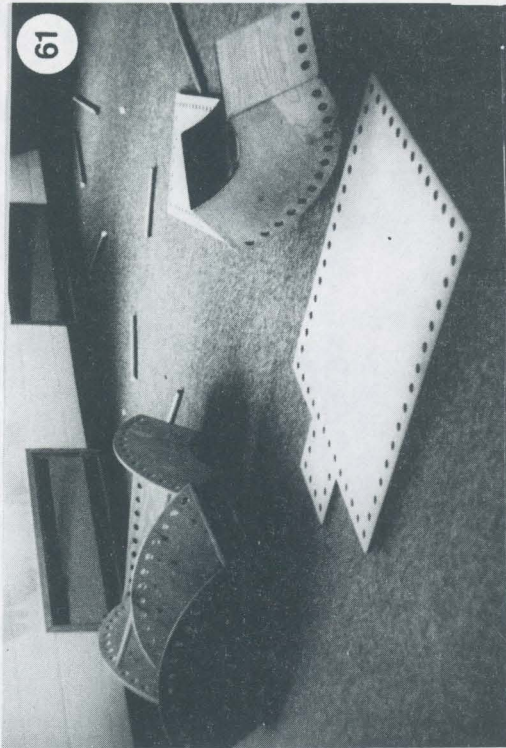


Photograph 56. Photograph 57. Photograph 58. Photograph 59.  
Post Arrangement of Structural State II: Semiflexible.

OLD DISCOVERED BOND

50% COTTON CONTENT





Photograph 60. Photograph 61. Photograph 62. Photograph 63. Photograph 63.  
Post Arrangement of Structural State III: Flexible.

APPENDIX D

GROUP TOTAL	*D <sub>x</sub>															DAY GROUP				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15					
7	13	17	0	2	2	1	2	2	1	4	6	0	9	2	6	0	0	0	B	
43	30	31	9	9	10	7	8	8	8	5	5	4	5	8	5	4	9	6	0	PLAY FORM
8	25	16	2	1	0	3	2	4	5	4	4	8	1	3	1	7	4	4	4	R
5	2	5	1	1	0	1	2	0	0	2	0	0	0	1	1	2	1	1	1	PA
10	11	10	3	1	2	3	1	3	1	2	3	2	1	3	0	3	3	0	1	CB
10	10	16	3	1	1	4	1	1	2	3	1	3	2	3	3	6	2	4	5	CONTACT FORM
1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	AD
55	58	56	12	10	11	10	12	12	11	11	12	12	9	12	11	12	12	12	12	ST.
0	6	2	0	0	0	0	0	1	2	0	0	3	0	0	0	1	1	1	1	R
20	13	5	5	4	2	2	7	1	2	2	0	8	0	1	0	3	1	1	1	R
15	18	5	2	3	3	2	5	3	4	2	0	9	0	1	0	2	2	2	2	R
10	5	15	0	1	4	2	3	0	2	0	2	1	3	4	3	3	2	2	2	C
4	7	16	1	0	0	2	1	3	3	0	0	1	1	4	2	7	2	2	2	C
16	18	14	6	3	4	2	1	2	4	5	5	2	2	0	7	3	3	3	3	C
0	7	14	0	0	0	0	0	0	2	0	0	5	0	4	2	3	1	2	1	L
38	17	15	7	9	3	8	6	4	2	6	1	4	2	1	2	4	6	1	2	L
3	24	18	1	0	1	0	16	2	2	8	6	1	5	3	5	4	1	3	6	L
4	17	9	1	1	2	0	0	5	4	1	1	6	3	1	1	1	3	1	1	W
7	14	10	1	2	1	1	2	2	2	2	4	4	3	3	2	1	1	1	1	ST
17	19	26	4	2	4	5	2	4	5	4	6	6	5	11	2	2	2	2	2	S
10	9	6	4	1	2	3	2	3	2	1	1	1	2	3	1	1	1	1	1	LY
5	4	11	1	1	2	1	1	1	1	2	1	3	1	1	5	1	1	1	1	LE
17	17	8	1	6	3	2	5	4	2	2	2	7	2	1	1	1	3	1	1	CL
1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	JU
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	HA
3	0	9	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	GA
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	RE
1	7	9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	RU
8	10	13	3	1	3	1	1	3	2	3	1	5	2	1	2	3	1	2	3	WA
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	KI
0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	TU
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	SL
1	2	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	RO
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	PU
0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	PS
3	10	13	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	TH
2	23	21	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	LI
6	0	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	RM
8	21	16	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	DPE
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	ACF
3	2	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	BA
15	13	18	6	1	2	4	2	2	2	2	2	2	2	2	2	2	2	2	2	CA
10	22	25	3	2	2	2	1	5	5	2	2	8	3	5	3	8	6	6	6	BU

\*D<sub>x</sub>: DAY 1 (ABOVE DATA)  
 DAY 2  
 DAY 3

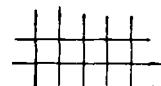


Illustration 18. Example of Data Tabulation: Group and Individual Responses with Respect to the Specific Exposure Day.

GROUP TOTAL	*S <sub>x</sub>															STRUCTURAL STATE GROUP		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
715	12	0	2	2	1	2	5	4	0	6	0	6	2	0	3	1	0	B
482730	99	10	7	8	9	2	7	3	6	4	7	7	4	8	5	0	5	PLAY
81726	21	0	3	2	1	6	5	2	4	5	5	6	6	4	4	0	0	FORM
550	1	1	0	1	2	0	0	0	3	2	0	0	0	0	0	0	0	PA
10116	3	1	2	3	1	0	3	3	3	2	5	2	0	7	2	0	0	CB
101120	3	1	1	4	1	1	1	3	1	5	4	3	7	3	3	0	0	CHS
19600	0	1	0	4	2	2	0	1	1	1	2	0	2	0	2	0	0	AD
555744	12	10	11	10	12	9	8	10	5	5	7	11	8	6	12	5	0	ST
05400	0	0	0	1	0	0	4	0	1	0	0	0	3	0	0	0	0	R12
2099	5	4	2	2	7	2	2	2	0	3	1	1	1	1	5	0	0	R24
15139	2	3	3	2	5	4	2	2	2	3	1	2	0	1	5	0	0	R06
10618	0	1	4	2	3	2	1	2	0	1	1	4	4	5	4	0	0	C12
44710	0	2	1	2	1	1	0	0	2	0	0	1	4	0	1	4	0	C24
16124	6	3	4	2	1	1	5	4	0	2	4	2	4	2	2	0	0	CB0
02600	0	0	0	0	0	0	0	2	0	0	0	1	2	0	3	0	0	L12
381413	7	9	3	8	6	3	2	3	4	2	2	2	2	1	6	0	0	L24
3713	1	0	1	0	1	3	2	0	0	2	0	3	1	2	7	0	0	L36
41911	2	0	0	1	0	0	0	0	0	1	3	2	0	3	0	0	0	④
7157	1	2	1	1	2	3	3	4	2	3	2	1	3	1	5	0	0	ST
171929	4	2	4	5	2	5	5	2	4	3	6	2	10	6	5	0	0	SI
101016	4	1	2	3	3	4	3	4	3	3	2	4	0	0	0	0	0	LY
58211	2	1	1	4	1	2	1	1	1	1	1	1	1	1	1	1	1	LE
171211	6	3	2	5	2	1	2	3	4	2	2	1	1	5	0	0	0	CL
140	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	JU
020	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	HA
348	2	1	1	1	1	1	1	2	2	2	1	3	2	2	1	0	0	SW
051	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	RE
11313	1	1	5	2	2	2	2	3	4	1	1	4	0	0	0	0	0	RU
8413	3	1	3	1	3	4	0	1	3	4	1	2	3	4	0	0	0	WA
000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	KI
001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	TU
011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	SL
114	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	RO
124	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	PU
0213	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	PS
3216	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	TH
2724	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	LI
6841	1	1	2	2	7	1	2	2	2	2	2	2	2	2	2	2	2	RM
81313	2	2	2	3	4	0	2	3	4	4	4	4	4	4	4	4	4	DPE
010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	ACF
335	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	BA
1595	6	1	2	4	2	2	2	4	1	1	1	1	3	0	0	0	0	CA
1057	3	2	2	1	2	2	1	1	2	3	2	2	2	2	2	2	2	BU

\*S<sub>x</sub>: S1: STATIC STRUCTURE STATE (ABOVE DATA)  
 S2: SEMIFLEXIBLE STRUCTURE STATE  
 S3: FLEXIBLE STRUCTURE STATE

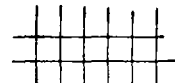


Illustration 19. Example of Data Tabulation: Group and Individual Responses with Respect to the Specific Structural State Under Observation.

AGE	*S†												STRUCTURE STATE				
	TOTAL	3			4			5			AGE						
515	2	3	5	6	9	10	11	13	15	1	4	7	8	12	14	CHILD	
24	10	2	2	2	5	6	0	6	0	1	0	1	4	0	2	3	0 B
44	36	9	10	8	9	3	6	4	7	8	9	7	2	7	7	4	SO PLAY
25	27	1	0	2	1	2	4	5	6	4	2	3	6	5	5	6	GR FORM
8	2	1	0	2	0	3	2	0	0	0	1	1	0	0	0	0	PA
16	21	1	2	1	0	3	2	5	0	2	3	3	3	3	2	7	GH 3
24	17	1	1	1	1	1	5	4	7	3	3	4	1	3	3	3	CH 5 CONTACT
10	6	0	0	0	4	0	1	1	2	2	0	1	2	2	1	0	AD FORM
79	57	10	11	12	9	5	5	7	8	12	12	10	8	10	11	6	ST 6
9	0	0	0	1	4	0	1	0	3	0	0	0	0	0	0	0	RR 2
25	13	4	2	7	2	0	3	1	1	5	5	2	2	2	1	1	RR 24
26	11	3	3	5	4	2	3	1	0	5	2	2	2	2	1	1	RR 6
20	14	1	4	3	2	0	1	1	4	4	0	2	1	2	4	5	C 12 STRUCTURE
9	6	0	0	1	2	0	0	2	0	4	1	2	1	1	0	1	C 24 CONTACT
21	21	3	4	1	1	0	2	4	4	2	6	2	5	4	2	2	C 26
5	3	0	0	0	0	0	0	0	2	3	0	0	0	2	1	0	L 12
57	23	9	3	6	3	4	2	2	2	6	7	8	2	3	1	1	L 24
15	8	0	1	1	3	0	2	0	1	7	1	0	2	0	3	2	L 26
10	4	1	2	0	1	0	0	1	2	3	1	0	0	0	3	0	(D)
17	12	2	1	2	3	2	3	2	1	1	1	1	3	4	3	3	ST
41	24	2	4	2	5	4	3	6	10	5	4	5	5	2	2	6	SI
18	18	1	3	3	4	3	4	4	2	3	4	3	2	3	2	1	LY
8	7	1	2	1	1	2	1	1	1	1	1	1	1	1	1	1	LE
91	9	6	3	5	2	3	4	2	1	5	1	2	1	2	2	1	CL
3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	JU
0	2																HA
13	2		2	1	1	1	2	2	1	3							SW
1	5																RE
18	9		1	5	2	2	3	1	4								RU
22	13	3	1	1	3	6	1	3	1	3	3	4	4	2	1	1	HA
0	0																KI BODY
0	1																TU MOVEMENT
1	1																SL AND
5	1																RO BEHAVIOR
2	5																PU
8	7																PG
10	11																TH
28	10																LI
6	12																RM
20	14																DPE
0	1																ACE
9	2																BA
11	18																CA
11	11																BU

\*S†: S1: STATIC STRUCTURE STATE (ABOVE DATA)  
 S2: SEMIFLEXIBLE STRUCTURE STATE  
 S3: FLEXIBLE STRUCTURE STATE

Illustration 20. Example of Data Tabulation: Responses Based on Age Differences with Regard to the Three Structural States of Static, Semiflexible, and Flexible.



TIME	TYP						TYP						STRUCTURAL STATE				
	1	2	3	4	5	6	7	8	9	10	11	12		13	14	15	
0.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
0.1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
0.2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2
0.3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3
0.4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4
0.5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5
0.6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6
0.7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7
0.8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8
0.9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9
1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.0
1.1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1
1.2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2
1.3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.3
1.4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.4
1.5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.5
1.6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.6
1.7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7
1.8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.8
1.9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.9
2.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.0

T<sub>1</sub> FIRST 5 MINUTE RESPONSES  
 T<sub>2</sub> SECOND 5 MINUTE RESPONSES  
 T<sub>3</sub> THIRD 5 MINUTE RESPONSES  
 T<sub>4</sub> FOURTH 5 MINUTE RESPONSES  
 T<sub>5</sub> FIFTH 5 MINUTE RESPONSES  
 T<sub>6</sub> SIXTH 5 MINUTE RESPONSES

Illustration 21. Example of Data Tabulation: Individual Responses to the Three Structural States of Static, Semi-flexible, and Flexible.

51			52			53			STRUCTURE STATE		
1	2	3	1	2	3	1	2	3	GROUP		
85	55	55	55	55	55	55	55	55	AGE		
61	11	47	39	78	512	456	1212	152	00		
27	16	18	91	112	217	1313	911	416	1119	1250	PLAY
35	71	15	116	116	914	4710	1266	10	4R	FORM	
32	50	00	50	02	103	001	23	PA			
46	56	79	101	83	111	5512	746	CH	3		
37	44	63	135	1312	586	079	CH	3	CONTACT		
01	54	51	43	00	405	012	10	AD	FORM		
55	218	18	2717	19	2336	2225	423	2436	2432	34	ST.
00	50	40	010	42	404	128	211	R	12		
13	75	47	210	39	462	123	014	R	24		
11	49	46	311	412	652	0413	523	R	36		
82	33	99	083	216	211	858	7C	12	STRUCTURE		
13	22	61	904	361	915	8511	C	24	CONTACT		
88	39	10	439	9916	475	464	3C	26			
00	02	51	107	060	22	411	3L	12			
18	15	95	103	1717	988	4712	810	5L	24		
21	52	85	9820	446	4916	7810	L	26			
31	10	63	8212	533	8421	72	Ⓢ				
52	87	43	107	104	338	613	664	ST			
89	12	72	184	710	917	9810	2011	19	751		
46	37	11	503	4510	142	594	2L	Y			
41	35	11	313	1012	264	56	LE				
43	93	83	1211	348	422	526	2CL				
10	22	00	300	242	200	100	JU				
00	02	00	100	000	010	100	HA				
30	40	62	500	061	372	163	SW				
00	00	51	000	000	000	000	RE				
10	94	85	100	528	371	105	4RU				
53	10	47	653	355	942	105	94	HA			
00	00	00	000	000	011	100	00	KI			
00	00	00	120	001	200	001	1TU	MOVEMENT			
00	00	11	000	010	000	000	0SL	AND			
10	00	14	002	203	122	436	1RO	BEHAVIOR			
01	11	13	021	010	021	001	PU				
00	11	76	032	144	102	203	PG				
12	11	88	128	285	416	285	TH				
11	61	16	877	203	989	920	712	9LI			
33	17	22	115	004	230	101	1RM				
44	10	36	775	118	104	815	442	0PE			
00	01	00	000	100	001	100	0ACF				
30	21	41	301	113	101	031	DA				
510	363	326	576	465	841	112	6CA				
55	32	34	311	570	188	102	124	5BU			

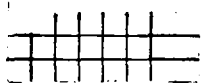


Illustration 22. Example of Data Tabulation: Behavioral Responses of Three Year Olds and Five Year Olds Regarding the Specific Structural State Arrangement Under Consideration.

		1		2		3		4		5		6		TIME (5 MIN. INTER.)	
1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	STRUCTURE STATE
9	8	7	5	8	5	1	7	9	9	10	14	8	7	6	OB
16	17	15	18	17	15	18	15	16	10	10	6	18	15	17	SO
2	2	5	0	1	1	2	1	0	3	1	1	9	0	2	GR
2	5	4	11	8	11	11	9	12	9	13	11	11	10	5	PA
1	4	4	7	9	7	6	4	7	8	9	8	7	6	7	CB
5	4	4	9	1	5	9	6	7	7	8	9	7	10	4	CB
1	1	3	5	2	1	1	2	0	4	1	0	3	2	3	AD
25	25	27	22	23	23	23	22	28	19	24	26	22	19	27	ST
1	4	7	2	1	8	1	3	5	1	3	4	4	4	3	R
10	6	3	7	3	0	7	7	3	4	3	1	7	5	2	R
10	8	0	5	2	6	4	8	6	6	8	4	8	6	4	R
5	4	8	7	6	10	4	2	8	3	2	9	6	3	5	C
3	3	11	5	4	5	3	6	6	2	3	6	1	2	4	C
7	5	7	4	11	8	6	7	8	10	9	9	5	9	8	C
1	2	3	3	2	3	0	2	6	1	5	3	1	3	2	L
8	10	10	9	7	6	12	14	4	8	3	5	14	11	8	L
4	10	13	5	11	9	5	6	2	2	9	2	2	7	15	L
0	8	8	4	3	5	3	1	1	4	1	1	5	2	2	Ⓢ
7	6	7	4	2	5	2	7	8	5	7	5	5	8	12	ST
10	12	15	12	10	10	9	9	11	12	10	17	12	10	12	SI
4	2	2	6	4	5	3	2	8	7	2	4	7	5	6	LY
1	0	4	1	0	6	5	1	4	1	3	3	2	4	6	LE
9	3	4	9	8	2	5	7	4	6	6	0	10	5	1	CL
0	2	0	1	1	0	0	0	1	0	1	0	4	2	2	JU
0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	WA
1	2	3	7	2	3	2	1	4	2	1	2	1	1	4	SW
0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	RE
4	3	1	5	4	0	11	5	1	2	3	3	2	5	5	RU
6	6	7	4	3	6	5	6	7	5	4	5	8	3	5	WA
0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	KI
1	0	0	0	0	0	1	0	0	1	0	0	3	0	0	TU
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	BL
1	2	2	1	1	1	0	1	3	2	0	3	1	0	5	RO
2	1	0	1	1	1	1	0	0	1	0	1	0	2	2	PU
3	0	0	3	4	3	4	3	1	1	2	2	3	1	0	PS
2	2	2	7	3	5	7	1	4	0	6	3	1	3	4	TH
3	9	13	6	9	14	8	8	6	5	11	6	4	7	11	LI
1	3	1	1	4	0	2	5	1	1	4	1	3	1	2	RM
5	6	4	7	6	8	7	5	9	6	10	8	7	10	10	DPE
0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	ACE
2	1	0	2	0	0	3	1	1	0	0	3	1	1	2	BA
2	4	7	3	5	8	2	5	7	1	11	8	9	5	12	CA
5	8	9	3	4	11	4	7	6	5	5	6	3	6	7	BU

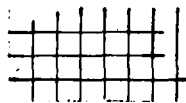


Illustration 23. Example of Data Tabulation: General Responses to the Three Structural States of Static, Semiflexible, and Flexible Across Time.

GROUP II  
DAY 3  
STATE I: STATIC

The children immediately ran to the structure and attempted and/or made actual changes in the structures. The three year olds seemed less enthused about playing today because all the other three year olds were going to the park. They were told they would be able to go to the park after they finished playing in the room. Often they asked the recorder if they could leave or if it was time to go to the park. After the first ten minutes of this questioning, they became more involved, excited, and content in playing on the equipment.

Of all the children, 07 seemed the quietest. During the week, his play behavior was more lying, observation, or sitting--no really intense, active movements. 08 seemed the most physically dexterous. He seemed to be able to manipulate the structures much more easier than the others and seemed the most active and involved. 10 was the most domineering and bossy during the play sessions; she seemed to control the activities that were occurring during the testing session. Her influence was much stronger the first day than successive days. The children played well together as a group. This group seemed to want to communicate with adults more than the last group or at least talk to them and ask questions of them during play.

This group also restructured in the very beginning the entire environment to satisfy their play. Their building and manipulation was

much more sophisticated than the last group. They used the structures more to represent their dramatic play such as they changed it around to represent a house.

The weather was humid all week and seemed to affect the children's play particularly the second and third days. Although they stayed 50 minutes all the test days, their interest in and attention to the structure state was limited. The children seemed to cling to the recorder or around her more than to the structures--at least the younger ones did more than the older ones.

The younger children tended to need more adult attention than the older ones. Sometimes, the younger children ran out of the room during the recording session; the older children did not and continued their play despite the brief absence of the others.

PERSONAL DATA ON EACH CHILD BASED ON PARENT  
AND TEACHER RESPONSES TO QUESTIONNAIRES

Group	Subject	Age	Sex	Characteristic of Child	Preferred Play Form	Preferred Play Equipment and Activities
I	01	5	Male	Active	Group (small)	Trees Blocks
I	02	3	Female	Passive	Solitary	Small Toys Cutting Dolls Mini Wheels Swings Hippity Hop
I	03	3	Male	Active	Group	Big Wheel Sandbox Jungle Gym Buckets Dramatic Play Big Activities
I	04	5	Female	Active	Group (small)	Tricycle Music (dancing) Dolls Typewriter Cash Register Dramatic Play Jungle Gym Swings Cut and Color
I	05	3	Male	Active	Group (small)	Wheel Toys
II	06	3	Female	Active	Group (small)	Swings Slides Sandbox Pull Toys Stuffed Animals Puzzles Coloring Small Wheel Toys Dramatic Play

Group	Subject	Age	Sex	Characteristic of Child	Preferred Play Form	Preferred Play Equipment and Activities
II	07	5	Male	Passive	Group (small)	Odds and Ends (form own play items) Books Puzzles Balls Fishing Rods Blocks Building Items Crayons Swings Bicycle Model Cars Stuffed Animals
II	08	5	Male	Active	Group (small)	Blocks Rig-a-Jigs Dramatic Play Cars Guns Masks Planes Soldiers
II	09	3	Male	Active	Solitary	Firetrucks Balls Books Riding Vehicles Telephones Keys Tunnels Pushing Wheel Toys
II	10	5	Female	Active	Group (small)	Swings Art (crayons, paints) Dolls Mini Wheels Books Building Blocks
III	11	3	Female	Active	Solitary	Books
III	12	5	Male	Passive	Solitary	Blocks Rig-a-Jigs

Group	Subject	Age	Sex	Characteristic of Child	Preferred Play Form	Preferred Play Equipment and Activities
III	13	3	Female	Active	Group (small)	Tricycle Art Cutting Stuffed Animals Swings Jungle Gym Puzzles Crayons Building Blocks Digging Utensils Water Toys
III	14	5	Male	Passive	Group (small)	Fire Hat Big Wheel Milk Bottles Chalkboard Coloring and Drawing
III	15	3	Male	Active	Group (small)	Bat and Ball Small Trucks/Cars Blocks Play Dough Toy Guns Wheel Toys Climbing Equipment

NOTE: Group (small)--denotes two to three children engaging in the same activity at the same time and within close proximity to each other.



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THE BEHAVIORAL RESPONSES OF PRESCHOOL CHILDREN  
(THREE AND FIVE YEARS OF AGE) TO STRUCTURALLY  
MODIFIED SELF-MANIPULATING PLAY SYSTEMS

by

Phyllis Elaine Hirschman

(ABSTRACT)

Exploratory in nature, this research investigated children's responses to a modular play system in which three stages from static (the children could not manipulate the forms themselves) to flexible (the children could completely alter the prearrangement) were introduced. The degree to which the children wished to manipulate their play environments to support their activities was explored. Three, sexually mixed groups each consisting of three-three year olds and two-five year olds were selected from a traditional learning program. The collected data, numerically and narratively reported, evaluated individual responses and group reactions to the three arrangements. Both the children and the structures to which they were exposed influenced resulting activities. The conditions with both manipulative and non-manipulative forms displayed the highest occurrence of dramatic play, stimulated group play, encouraged structural changes which largely supported play activities, and maintained a more constant level of interaction and interest in activities than the two conditions alone. The children's differing ages and characteristics affected the degree

of manipulation preferred. Five year olds appeared to need more flexibility in their play equipment than three year olds. Passive children also preferred flexible structures; active children preferred static, fixed structures. The order of introducing the structures to the groups did not influence responses. The children repeated activities from one testing arrangement to another but did not replicate the exact structural prearrangements. Rather, they duplicated the concepts and connecting systems of these structures to support their own behaviors and activities.