Exploratory Behavior in Early Childhood.

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I. Introduction

Very young children spend many of their waking hours investigating, manipulating, mouthing, inspecting, examinating, playing, observing, and asking question about objects and events. Some theories suggest that these exploratory behaviors provide the foundations for more complex behaviors, such as reasoning, problem solving, and social competency. For example, developmental psychologists attribute great importance to the role of early play and exploration in promoting cognitive growth (Bruner, 1972; Piaget, 1952; White, 1959).

Since Small (1899) described the restlessness of infafant rats as "premonitions of curiosity", most of the earlier exploratory behavior studies have been conducted on animal species, expecially on rats (Barnett, 1958; Berlyne, 1950; Dember & Earl, 1957; Harlow, 1958; Montgomery & Monkman, 1955). From the early 1960s however, an increasing amount of research has been conducted on the exploratory behavior of human children (Bradbard & Endsley, 1980; Collard, 1971; Dansky, 1981; Eckerman & Rheingold, 1974; Fenson & Als, 1974; Fenson & Kagan, 1976; Gershaw & Schwarz, 1971; Minuchin, 1971; Passman & Weisberg, 1975; Vliestra, 1978).

As written above, there is no dearth of research, but despite the conceptual importance and the amount of research on exploration, the feeling exists that we have not really learned much about this behavior, especially with respect to human infants as summarized by Weisler & McCall (1976). This state of affairs derives of least in part from a lack of precise definitions of concepts and from a near total absence of comprehensive theory. Indeed, most of research begins with an apology for the inability to objectively define the concept of exploration. So the resulting body of research sometimes lacks form or direction.

In addition, most of the research has not attempted to integrate theory and research information on child's exploratory behavior for use by child development practitioners.

Therefore, this paper attempts to provide a clear understanding of the child's exploratory behavior and delineate some implications from the review of literature for further study and early childhood educational practice.

II. What Is Exploratory Behavior?

Attempts to define exploratory behavior have been troublesome and frustrating (Rheingold & Eckerman, 1969), some authors have continued research without precise operational definition or agreement on the nature of exploration. Especially there has been much conflict between exploratory behavior and play or curiosity.

1. Exploratory behavior and play

Berlyne (1960) has tried to distinguish between two kinds of exploration, specific and diversive exploration. Specific exploration consists of investigatory responses which occur in the presense of relatively novel or discrepant environmental stimuli. It is stimulus oriented, externally motivated, and shows a linear decrement with time, specific one, and often contrasts with the latter. Hutt (1966) insists that the emphasis in play changes from the question of "what does this object do?" to "what can I do with object?". While investigative exploration demonstrably results in the acquisition of information, in play such learning is largely incidential.

Thus Weisler & McCall (1976) define exploration as behavior that consists of a relatively stereotyped perceptual-motor examination of an object, situation, or event the function of which is to reduce subjective uncertainty (i.e. acquire information). On the other hand, play consists of behaviors and behavioral sequences that are organismdominated rather than stimulus-dominated behaviors that appear to be intrinsically motivated and apparently performed for "their own sake" and that are conducted with relative relaxation and positive affect.

In general, theories of exploration have assumed play, and theories of play have failed to take cognizance of exploratory behaviors. Why has play traditionally been regarded as an exploratory behavior? Hutt (1966) explains as follow: in infancy and early development, most of their environment is novel to children, who have also inadequate memory store aganist which to match new objects: thus in infancy, it is difficult to distinguish between investigatory responses and play responses. During ontogamy, however, these two behaviors diverge, and become more easily

separable, until in the adult there is a sharp distinction between investigatory activities on the one hand, and play activities on the other hand, which are often of an extremely ritualized kind. This specific or investigative exploration seeks to reduce uncertainty and hence arousal or activation produced by the novel or complex stimulation. Diversive exploration, on the other hand, is an effort to increase sensory input so as to avoid a state of bordome or high arousal. It tends to occur after information about the properties of an object is attained. It is more response oriented, more internally oriented, and increases over time (Hutt, 1966).

Play, on the other hand, only occurs in a known environment, and when the animal or child feels he knowes the properties of the objects in that environment; this is apparent in the gradual relaxation of mood, or an element of pleasure in play, evidenced not only by changes in facial expression, but in greater diversity and variability of activities (Berlyne, 1960; Hutt, 1970). That is, play in its morphology, determinants and functions appears to be more similar to diversive exploration than to in order to have more clear understanding of the concept of exploration, it will be helpful to know the index of such behaviors employed by each researcher.

2. Index of exploratory behavior

In his comparative study of exploratory and play behavior of infants reared in an institution and in lower-and middle-class homes, Collard (1971) classified such behaviors as primarily looking at, extending, transferring, or turning (while looking), mouthing, fingering, poking or scratching the toy to exploratory responses; banging, waving, dropping and casting the toy, and rubbing it on the table to play responses; and handing toy to the experimenter, mother, or nurse, showing toy to them, or touching them with toy to social responses.

Hutt (1966) also distinguished investigative responses from play. He described investigative response as visual inspection, feeling, touching, or other manipulation accompanied by visual inspection, and play as repetitive motor movements, manipulation of long duration accompanied by visual inspection of other thing, that, is transposition of function.

Switzky et Als (1974) classified exploration as visual and tactual examinations of the object by visually scanning the contours of the objects as well as by moving his hands over it, and paly as sensorimotor play (rhythmic manipulation of object such as bouncing, bending, rolling on, jumping on and throwing it) and symbolic play.

In addition, Eckerman & Rheingold (1974) suggest another ideas that even looking and smiling at persons can serve an exploratory function similar to the touching and manipulating of inanimate objects.

In general however, many researchers do not distinguish exploratory behavior from play. For example, the latency and duration of subject's manual contact of the test object (Eckerman & Rheingold, 1974; Welker, 1956), local approach to the subject and frequency and duration of interaction with the object (Gershaw & Schwarz, 1971; Rheingold, 1969) were measured under the name of exploratory behaviors.

In addition to this unclear understanding of the relationship between exploration and play, there is another aspect to be considered in the study of exploration that is, the relationship between exploration and curiosity.

3. Exploration and curiosity

Curiosity defined as a primary emotion, consisting of a single impulse to know, instinctively governing and sustanining the attention, and evoking those bodily movements which enable us to gain a fuller acquaintance with its object (Berlyne, 1950).

If we compare these definitions or descriptions with the explanation of exploratory behavior, we may not find any difference between them. As expected, most of the researchers do not distingusih these two labels in their experiments and sometimes assert that those behaviors labeled "exploration", "curiosity", etc. belong to the general class of behavior labeled attention (Dember & Earl, 1957). And some investigators use the term, "exploratory drive" with the same meaning of curiosity (Berlyne, 1957; Montgomery, 1953).

The review of exploratory behavior, however, reveals that several different mechanisms, motives and adequate stimuli have been alleged by different writers to call forth exploratory behavior, and these alternative accounts are by no means necessarily incompatible. However, it is quite likely that superficially similar forms of exploratory behavior are derived from different sourses of stimulation. Thus curiosity is not the only source of exploration.

For example, an organism can and will learn particular investigatory response-sequences which satisfy particular homeostatistic motive, that is, hunger or some motives of detector searching systematically for clues. This kind of exploration may be termed instrumental exploration.

Some researchers labeled exploratory behavior motivated by homeostatistic status as an appetitive behavior and distinguished it from the usual exploratory behavior motivated by curiosity. However, it is even probable that exploratory habits found useful in one situation may generalize to a large variety of analogous situation (Berlyne, 1950).

Therefore, we may say that more curious child explores more, but exploratory behavior is not always the expression of curiosity.

4. Implication of the definition of exploratory behavior

It becomes clear that exploration is different from play and different from curiosity. In a narrow sense, exploratory behavior can be defined as investigatory responses evoked by novel or descrepant stimuli, not by an organism's homeostatic or productive need to know more about them. However, exploratory behavior evoked by an organism's homeostatistic or productive need is also one kind of exploration.

These exploratory behaviors can be detected by Various kinds of activities such as approaching toward, touching, inspection, experiment, manupulation stimuli as well as merely intensively looking or/and smiling them. Butler (1957) found that even auditory exploration can be a factor in the behavior of rhesus monkeys. However, to mention about auditory exploration in human children is seldom.

From the previous discussion, it is recommendable that we should pay attention to the manner in which exploration occurs as well as how much it occurs, and what shift occurs during the exploratory behaviors. And it is desirable for the researcher to indicate what kinds of activities were obserbed as exploratory behaviors, and to indicate under what situation of the organism that study

was conducted. These fundamental understanding will alow us some more detail discussion about exploration.

III. Why Do Children Explore?

1. The functions of Exploratory behavior

Mastery motivational theorists consider exploration to be one of several ways children can master their environment (White, 1959), In this context exploration is viewed as the core of early childhood experience. As children explore, they learn that they have some control over their environment and correspondingly begin to develop more positive self-concepts. Given a safe environment with many things to explore, children will explore in many ways because they derive positive reinforcement from the mastery, learning and feelings of competence which result from their exploration.

Ethologists view exploration as biologically adaptive behavior learned for survival (Barnett, 1958). That is, the genetic bias of the species leads infants, in time, to venture away from their mothers, thereby encouraging the acquisition of knowledge needed for survival (Rheingold & Eckermen, 1970). If organisms were not responsive to changes in the stimulus milieu and did not investigate new stimuli, they could risk greater danger from predators, fail to learn of the resources of their environment (Barnett, 1958), and probably seriously limit the likelihood or speed of modifying their behavior to accommodate to changes in vital aspects of the environment (e.g. location of food and water) (Weisler & McCall, 1976).

Another group of theorists (Berlyne, 1960) hypothesized that children explore stimuli containing new, surprising, incongruous, or complex properties to relieve perceptual conflict. The above dicussion about the relationship between exploration and play can be applied to this concept.

Some exploratory behavior, expecially that of children, however, is unrelated to any goal abject, and independent of any internal state other than that which brings about the exploratory behavior itself. So some researchers speak of an exploratory drive (Barnett, 1958; Montgomery, 1953). In this concept, exploratory behavior is not clearly distinguished from play. That means exploratory behavior itself can give some pleasure. And just a expbratory behavior can be performed without any goal, so apparently unmotivated learning takes place latent learnings as Barnett (1958) insisted, while it is being carried out. That is, exploratory behavior can bring latent learning as Barnett (1958) insisted. stress the role of learning on exploratory behavior and the importance of socialization agent on promoting children's exploratory behavior through modeling and providing external incentive such as praise and answers to question (Berlyne, 1960; Bijou, 1976).

2. The characteristics of exploratory behavior

~~The this exploratory behavior~~ has been claimed to have several characteristics as reviewed by Weisler & McCall (1976).

First, there seems to be considerable similarity-even stereotype-in the general form of this

behavior across situations (Berlyne, 1960; Hutt, 1970), For example, the sequence tends to be: (a) altering or the recruiting of attention to the new stimulus situation, (b) distance-receptor scanning or examination of the new situation, (c) motor aided peceptual examination of the new situation in which the organism may perambulate the environment or manipulate the object to explore it more completely, and (d) active physical interaction apparently for the purpose of discerning what will happen as a consequence of the organism's interactions with the object or situation. There is a tendency toward invariance in this sequence, though the length of time devoted to each phase may vary and components b and c may alternate. As an organism matures, phases in the above sequence may be reduced or eliminated and the nature of the physical exploration of a new situation becomes more immediately tailored to the particular stimulus entity.

Second, in the face of moderate amounts of subjective uncertainty, exploration can be a rather high-priority behavior (Berlyne, 1960). Frequently, the tendency to explore supersedes basic biological functions, such as eating, drinking, eliminating, and avoiding pain, even under circumstances (e.g., deprivation) that would otherwise make these incompatible behaviors paramount on the behavioral hierarchy.

Third, exploratory behavior may be accompanied by neutral or even mild negative affect. Although organisms will seek out stimulus variation and uncertainty (Berlyne, 1960), it is not obvious that the act of exploring organisms may be somewhat tense (e.g., with intense, nervous, or strained rather than smiling or laughing facial expressions; Hutt, 1970), businesslike, and task oriented. Although these affective characteristics have been claimed frequently, the empirical basis for them is less secure than for other proposed attributes of exploration.

3. Implication

Theoretical orientations assume that exploratory behavior is important for learning, mastery, reasoning, as well as biological adaptation. Thus exploratory behavior should be encouraged, expecially in early childhood.

It can be deduced that the characteristics of children's immediate environment, in other words, new, surprising, incongruous, or complex environment as one of the most important factors for eliciting exploratory behaviors, and the role of socialization agents can be also highly evaluated as a model and provider of external incentives.

In addition, considerable similarity in the general form of exploratory behavior and invariance in its sequence suggest that exploratory behavior may have Some relationship with the cognitive developmental stage or age of children. If it is true, we will be required to employ a proper method for encouraging exploratory behavior according to the developmental stage of each child.

Therefore, there still remains so much cloudy area in exploratory behavior research, especially the motivation and function of exploratory behavior in infant in relation with play, the possibility of increasing exploration by training or any other methods, and the developmental characteristics of this behavior.

In order to promote further research and children's exploration, it is needed to know more about what kinds of variables, and how they affect the exploration.

IV. How Are The Exploratory Behaviors Influenced By Variations In Situations And Setting?

Subjective uncertainty-and thus exploratory behavior is an organismic variable dependent on the level of certain physical attributes of a stimulus and the organism's experience with, and ability to process the information they embody (Weisler & McCall, 1976).

1. Exploratory behavoir and stimulus properties

All recent studies reinforce the conclusion that variation in the stimulus situation is important. Novelty, ambiguity, incongruity, surprises, and complexity are stimulus characteristics that elicit exploratory behavior (Berlyne, 1960; Hutt, 1966). Familiarity, clarity, simplicity, and congruity, on the other hand, are believed to be stimulus characteristics that elicit play behavior (Piaget, 1951; Smilansky, 1968; Sutton-Smith, 1968).

(a) Novelty

An active striving to encounter new experiences, and to assimilate and understand them when encountered, underlies a huge variety of activities highly esteemed by society 'The instinct of curiosity,' says McDougall 'is at the base of many man's most splendid achievements, far rooted in it are his speculative and scientific tendencies' (Berlyne, 1950. P. 68)

Novelty figures prominently among the qualities that can give stimuli the power to attract attention. So most researcher concluded that novel situations and objects elicit exploratory behavior (Berlyne, 1950; Montgomery, 1953; Welker, 1956). The degree of novelty can be produced by varying the organism's familiarity with a stimulus. Other things being equal; exploration increases linearly with the amount of novelty for a wide variety of organisms and stimuli.

The role of novelty however, presents a difficult problem. What quality is there that characterizes novel stimuli? How is the difference between the familiar and unfamiliar communicated to the nervous system?

To this problem, there would appear to be two possible solutions: (a) it may be that not all novel stimuli are effective, but only these which are familiar in some respects and novel in others-i.e., stimuli responsible for "surprise" or curiosity. This presumably means that the familiar aspects set up some sort of expectations with which the perception of the model feature conflicts. Such discrepancy elicits a surprise-exploration (Dember & Earl, 1959). (2) to human infant, however, very little is familiar. If the adequate stimulus for exploration is not novelty alone, but a combination of novelty and familiarity, it is difficult to see how the intensive investigatory activity of early years which familiarize the child with his surrounding could occur. The reaction may be one that all stimuli originally evoke but which disappears as the organism becomes familiar with them. That is, the novel stimuli have not had time to lost their curiosity, therefore, investigation can be initiated by novelty pure and simple (Berlyne, 1950).

On the other hand, some have claimed that extreme novelty leads to less exploration and even fear(Hebb, 1949). Young or inexperienced organisms are especially cautious and reticent

to explore stimuli events that are extreme in this regard (Hutt, & McGraw, 1969; Switzky, Haywood, & Isett, 1974). So Weisler & McCall conclude that the organism explores when confronted by a moderate amount of uncertainty, and at the same time, sheer novelty alone is not likely to inhibit exploration by mature organisms (Hutt, 1970; Nunnally & Lemond, 1973).

In addition, it seems interesting that there is a difference between the determinants of exploration in children and in lower mammals, chiefly wild rodents. Rodents will explore a new environment but not a new object in a familiar setting on their own but children will explore a new object if placed in a relatively familiar environment. This difference may represent a shift biological emphasis from prey to predator (Hutt, 1966).

(b) Complexity

Nunnaly (1971) has proposed that the amount of exploratory behavior is directly related to the amount of time required to resolve the information conflict inherent in tthe stimulus situation. Switzky et Als. (1974) find that investigatory behaviors increase as a linear function of the level of stimulus complexity in older children (4-7 years) and curvilinear function in younger children. They also observed that play time was a decreasing linear function of the level of stimulus complexity for younger children and the older boys.

In contrast, several theorists (Dember & Earl, 1957; Walker, 1964) have predicted that the amount of exploratory behavior elicited by stimulus complexity should be a nonlinear (presumably quadratic) function of the level of stimulus complexity. Especially, Dember & Earl (1957) insist that we further complicate the issues, and get closer to reality by making attention a function not only of stimulus complexity but also of the individual's complexity-which itself changes with experience. However, Switzky et. Als. (1974) argue that above Dember & Earl's theory hold for only very young children and the change in function relation amount of exploration and the level of stimulus complexity may occur between the second and fourth years.

Hunt (1961, 1964, 1965) has written on the "match problem," that is the problem of arranging a proper relationship between the environmental circumstance a child encounters and the schemata that he has already assimilated. Small discrepancies are important so that the child exhibits curiosity behavior and the possibility of promoting and accomodative modification in the structure of schemata for intellectual grow. Hunt(1964) gave Montessori credit for being that first educator to solve this problem on a practical level through giving the child freedom of choice on selecting from a wide variety of materials graded in difficulty and complexity.

In addition to these two properties of the stimulus, novelty and complexity, spaciousness was also mentioned in the experiment of Y-mazes of rats (Berlyne & Slater, 1957). They found evidence that all these help to evoke exploration. It was suggested that the effect of spaciousness reflects a tendency on the part of the rat to "escape" from exploration (Berlyne, 1950). But unfortunately it is seldom to mention about the role of spaciousness in human infant's exploration study.

2. Exploratory behavior and time

Exploratory behaviors evoked by the novel and complex stimuli show a decrease with

continued exposure (Berlyne, 1950; Glazer, 1961; Welker, 1956) and a recovery after a period of non-exposure (Berlyne, 1955; Montgomery, 1950; Welker, 1956). This habituation of exploratory behavior has interpreted in terms of Hullian principle of reactive and condition inhibition by Berlyne(1950); in terms of Pavlovian theory inhibition by Danziger & Mainland (1954); in terms of stimulus satiation by Glanzer (1958); in terms of weakening of the exploratory derive elicited by novel stimuli by Montgomery (1953).

Kagan (1971) suggested that preference for rapid visual event may be related to fast play tempo in that tempo variable may influence behavior in both situations. And for female both fixation and habituation rate predicted rate of satiation in play with a familiar toy and relative degree of preference for novel toys (Fenson et Als., 1974). Therefore, it is important to say in what manner, not how much an activity is performed (Hutt, 1970).

3. Exploratory behavior and age

There is a little information on the developmental changes that may occur in exploratory behavior with age.

Hunt (1961) implied that the function relating amount of exploration to stimulus complexity does not change as a result of age. Nunnally & Lemond (1973) on the other hand, implied that it does change with the age of the child. Young children, because they have developed fower perceptual cognitive schemata, may not be able to perceive as much information conflict in relatively complex stimulus as do older children. This position leads to the expectation that older children are more curious than younger children because older children probably have more information conflict to resovle than do younger children. Switzky et Als (1974) found that investigatory behavior increased as a linear function of stimulus complixity in older children and that older children (4-7 years) showed more investigatory exploration than younger children (2 years) did. They recommended that the precise measures of specific curiosity used must be considered in the study of the relation between exploration and age.

Several theorists (Erikson, 1952; Piaget, 1952; Switzky et Als., 1974; Vliestra, 1978), however, have suggested that younger children should be more curious (i.e., explore more) than older children. Most adults in a particular culture have had more time and opportunity to become familiar with a wider range of stimuli than have younger children. Due to this longer and broader familiarization history, adults, in most moderately novel situations, should spend less time in specific exploration and more time in diversive activity. A few experiments (Hutt & McGraw, 1969; Pielstick & Woodruff, 1965, 1968; Vliestra, 1978) have showen that younger children manifest more curiosity than do older children.

On the other hand, some experimenters (Kaess & Weir, 1968; Thomas, 1966) have failed to find significant differences in curiosity as a function of age.

Other researcher seem to prefer to describe the feature of exploratory behavior in relation with the age. Wright & Vliestra (1975) have described a developmental change in attention in which short-sequenced, stimulus-oriented attentional behavior on younger children are placed in older children and adults by more goal-oriented, longer, sequenced patterns of search.

Vliestra (1978) found that preschool children engaged in a greater number of different activities and changed activities more frequently than did adults. She also found that the children apparently were more interested in looking, while the adults were more interested in doing. This result needs more supportive data by other research.

Fenson & als. (1976) in their developmental progression of manipulative play study, observe that 13-month-olds showed more interest in physical and functional relation among dimensions of toys, a trend discernible at 9 months. The emergence during the last quarter of the first year, of the ability to relate 2 objects signals an importance advance in cognitive functioning. Relational play precedes symbolic play developmentally.

4. Exploratory behavior and emotional and cognitive growth

Adults often assume that children who are more curious are also more intelligent, perhaps because curious children are often more motivated to achieve and are more alert, attentive, and interested in the things that are going around them. However, many researchers tell us not to be quick to assume that more curious children are also more intelligent children (Bradbard & Endley, 1980). But "developmentally high risk" group within the disadvantaged preschool population showed limited exploratory behavior (Minuchin, 1971).

Minuchin (1971) found that children who are more exploratory tended also toward a more differentiated self-image, stronger expectation of support, coherence, and facilitation from the environment and greater conceptual mastery. Consistent with his findings, investigators working with both preschool and elementary school children have shown that more exploratory children also have the most positive-self concepts (Maw & Maw, 1970).

In a recent study, Dansky (1980) found that play training to economically disadvantaged preschoolers enhanced: (a) sociodramatic activitiy: (b) imaginativeness: and (c) comprehension and production of sequentially organized information. Subjects trained in exploration gave more accurate and detailed descriptions of concrete stimuli, both as they examined them and from memory. Free-play opportunities however, did not enhance performance on any of the 21 dependent measures employed.

5. Exploratory behavior and individual differences

Just as children vary physically and intellectually, they also vary in the amount of exploration as Bradbard & Endsley (1980) summarized. For example, a number of studies show considerable variability among ten-month-old infants both in their exploratory behavior and in their reactions to novel stimuli (Corter Rheingold, 1974). In addition, studies of preschool children's question-asking behaviors indicate that some children rarely ask questions about novel objects presented them while others ask questions almost continuously (Endsley & Clarey, 1975).

Some theorists have hypothesized that same-aged children often vary considerably in the ways they express their curiosity, particularly as they approach the elementary school years and develop more sophisticated information-seeking and problem-solving strategies (Henderson & More, 1979; Nunnally & Lemond, 1973). Children who frequently ask questions have more overt information-

seeking styles while other children have a more internalized, covert style of obtaining information and try to work out solutions to games and problems in their own, or seek informanion from books (Day & Berlyne, 1971).

Further, although the results are inconsistent, investigators have suggested that there may be sex differences in the ways that same-aged children express their curiosity. A few studies have shown that preschool boys are generally less reluctant to leave their mothers and explore objects and toys than are poreschool girls (Maccoby & Jacklin, 1974). However, it has been suggested that the nature of the objects that boys and girls prefer to explore might account for this difference. There is evidence that girls prefer to explore toys with faces or objects that are more social while boys prefer to explore novel fixtures and nonsocial toys and abjects (Maccoby & Jacklin, 1974).

Sex differences among same-aged elementary school children's exploratory behavior might also result from restrictions that adults impose on exploration. For instance, one investigator (Coie, 1974) found that boys explore more than girls when permission to explore was not explicitly given by an adult; whereas boys and girls explored equally when permission to explore was made explicit by the adult.

6. Exploratory behavior and family environment

Provence and Lipton (1962) showed clearly the effect of the severe deprivation of appropriate early maternal and sensory experience on child's soical retardation. Collard (1971) also found that institutional babies were found to explore less and to show fewer schemata and less social play than did home-reared babies. The babies from lower-class homes, explored as much as those from middle-class homes, but middle-class home babies showed more schemata and more soical play than did the former. However, Weisler & McCall (1976) advise that many data are supportive the above results, but not inclusive, and some results depend on the sex of the subject. Therefore, from the social learning point of view, it must be stressed on the role of learning on increasing exploratory motive and the importance of socialization agents of children in shaping their exploratory behaviors.

7. Exploratory behavior and secure bases

Many researchers show that in normal setting the young of many mamalian species explore and play more and show less distress in the presence of secure bases which provide clinging or contact-seeking behaviors. Of course, this base may be a biological mother or surrogater (Ainsworth & Bell, 1976; Cox & Cambell, 1968; Gershaw & Schwarz, 1971; Rheingold, 1967; Passman & Weisberg, 1975), but it may also be a familiar nonsocial object (Harlow, 1958; Passman & Weisberg, 1975). However, if human infants are stressed, nonsocial objects do not promoted exploration or lessened distress (Gershaw & Schwartz, 1971; Rheingold, 1969).

8. Implication of the situations and setting factors on exploratory behaviors

These above data tend to support the proposition that exploratory behavior varies as a function

of subjective uncertainty, which is a product of the relationship between the informational potential of the stimuli, its degree of unfamiliarity, its magnitude of discrepancy, and its complexity, and the experience, age, and mental growth of organism. We know that optimum incongruity is important, that is, providing a proper balance between novelty and familiarity can optimize chuldren's exploraroty behavior.

We come to understand that it is possible to facilitate the exploratory behavior by training or incouragement. This can be done by making classrooms or environment interesting places to spend the day, by providing many opportunities for children to explore and inquire about the aspects of their world, by giving positive reinforcement to their exploratory behavior, or by being a secure attachment figure to children.

At the same time, we know that decreased exploratory behavior by continued exposure to the same stimuli can be recovered after a period of non-exposure. So we can use this principle in planning materials or environment for children.

We also should keep in mind that there are individual differences in the method, attention dimension, the amount, duration, motivation, and speed of exploratory behavior according to the children's age, sex, rearing background, and developmental stage. Highly exploratory children are not necessary more intelligent, but they are more secure about and interested in their environment and have a better selfimage, greater conceptual mastery. These attributes are also generally associated with a broader concept of social and intellectual competence in children (White, 1959).

V. Conclusion

Every researcher, studying animals and/or humans, has the same opinion; that is, exploration is of the greatest importance in the process by which an individual adapts itself to its own particular environment. As the child manipulates objects, creates change, and asks questions, she adapts action and ideas to her accumulating experience. As infants develop memory from the results of some of their behavior patterns, they begin to combine schemas into means-end relationships, the ability which Piaget calls the begining of "true intelligence".

Research consistently points to the gaps in our knowledge and the need for more extensive program of research: for example, the relationship between exploratory behavior and play, confusion between exploration and curiosity, the motive or status of the organism for exploration, various patterns of exploratory behavior in accordance with varying situation, the degree and characteristics of stimulies novelty, complexity, and spaciousness, the relationship between exploration and age, sex, or congitive developmental stage, and individual differences in exploratory behavior.

We know little about the generalizability of the existing research, for most of the research on exploretory behavior has been conducted in the laboratory rather than in the natural setting. Also the earlier part of exploration research has carried out in the animal laboratory under simple S-R theory.

It also may be overly simplistic for researcher to label children's exploratory behavior based on "one shot" observations of behavior because it is more likely that a typical child will ask questions in some situations, and express little or no curiosity in still other situations (Bradbard & Endsley, 1980). It is clear, too that no one theory can explain the function and characteristics of exploratory behavior. We may borrow ideas from various theoretical orientions to understand the exploratory behavior of our children.

In further research it may be more useful to examine different motives, patterns, and functions of exploration that individual children develop in speicfic situations, and it may be desirable to conduct our research with such variables or condition of organism as well as that of stimuli including spaciousness. Another powerful research field in children's exploratory behavior can be derived from the relation of exploration to mental development or to peer social development (Weisler & McCall, 1976) and the relation of exploration training to developmental progress (Dansky, 1980).

The studies reported in this paper should pave the way for further research on the exploratory behavior in young children. Fortunately, many researchers are looking at exploratory behavior and curiosity development, and we anticipate that the next decade of exploration research will be even more relevant for the practitioner.

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〈국문요약〉

아동의 탐색활동

서 영 숙

본 연구는 아동의 탐색활동에 관한 연구에 지침이 되고 자극을 주고자, 또한 아동의 실제 지도에 있어 시사점을 발견하고자 이 분야에 관한 주요연구문헌을 고찰하였다. 그리하여 탐색활동을 놀이와 호기심과 비교하여 그 정의를 내리고 탐색활동의 기능과 특징, 그리고 이 활동에 영향을 주는 제 요인을 살펴보았다.

그 결과 아동의 탐색활동에 관한 연구자간의 의견차이를 보이는 것이나 연구공백이 있는 것이 여러부분이 됨이 드러났다. 즉 놀이와 탐색활동과의 구별, 탐색활동과 호기심과의 관계, 탐색활동의 동기, 상황에 따른 탐색활동의 유형변화, 탐색활동을 유발시키는 자극물의 특성—특히 공간적 특성, 탐색활동과 아동의 년령, 성별, 인지적 발달단계와의 관계, 그리고 탐색활동에 있어서의 개인차 등에 관해 더 많은 연구가 요구됨을 알 수 있었다.

특히, 아동의 탐색활동과 지적발달 또는 사회성 발달과의 관계나 아동의 발달과정에 따른 훈련이나 교육을 통한 탐색활동의 증진방안 등은 시사성 있는 중요한 연구테마로 보여진다.

또한 이 탐색활동에 관한 연구에서도 실험실에서 이루어진 연구가 자연적인 상황에 얼마나 일반화 될 수 있는지, 한 번의 관찰이나 실험이 계속적인 의미를 지닐 수 있는지에 대해 연구자들이 더욱 신중해야 할 필요성이 있음이 드러났다.

물론, 한 가지 이론이나 연구로서 탐색활동의 전부를 설명할 수는 없다. 유아교육자들이나 아동학자들은 아동이 그 자신의 환경에 적응하고, 사회적 유능성을 함양시키고, 진정한 의미에서의 지능발달에 중요한 것으로 드러난 이 아동의 탐색활동에 관해 더욱 관심을 가지고 여러 가지 이론과 연구를 빌어 연구나 실제 지도에 필요한 아이디어를 삼아야 할 것이다.