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ABSTRACT

This paper details Michael Lewis and Mark Starr's model of early child development known as the salient responses of the human organism. The model is described as a representation of the actions taken by humans in their qualitative attempts to move to more progressive states of development through interactions with the environment. The salient attributes of the responses include the quantity, quality, speed of acquisition, utilization, affective tone, generalizability, organizational properties, and intention in the use of information. The model allows a developmentally integrated view of children, especially infants, through an observational perspective which is not separated by arbitrarily established domains of development. The advantages of the model include its usefulness as: a foundation for assessing the developmental status of infants, a method of establishing developmentally appropriate intervention strategies, and a framework for the evaluation of child-centered early intervention program outcomes. Though use of the model in the 10 years since its development has been limited, it is recommended for utilization in early intervention programs to stimulate positive developmental change in infants. (JDD)

A PORTRAIT OF CHILDREN IN TRANSITION: UTILIZING THE SALIENT RESPONSES OF INFANTS AND TODDLERS TO EVALUATE SENSORIMOTOR CHANGE

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Abstract

This paper details Lewis's and Starr's (1979) model of early child development known as the salient responses of the human organism. The model is described in terms of particular traits exhibited by a child in its movement toward developmental sophistication. These traits can be seen in all children whether or not they happen to be developmentally disabled, especially infants who are the focus of this paper. Since the model forces a developmentally integrated view of children through an observational perspective which is not separated by arbitrarily established domains of development, it has major advantages for early intervention professionals who come from a number of related disciplines. The advantages of the model include its usefulness as a: foundation for assessing the developmental status of infants, method of establishing developmentally appropriate intervention strategies, and framework for the evaluation of child-centered early intervention program outcomes. In addition, the salient attribute of responses model lends itself to crossing the boundaries between discipline research, program evaluation research, and policy analysis because it provides a standard reference marker for considering a child's development.

Introduction

Crossing the boundaries between theory, research, and practice has been an infinitely difficult undertaking in human service disciplines. Pearl (1975), in a summary of a workgroup discussion at the Second Conference on Comparability in Research (sponsored by the United

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States Office of Child Development and called by the Social Research Group at The George Washington University), asked, "Can researchers themselves be expected to report their findings clearly, promptly, and effectively to the general public?" (p. 15). Seven years later, Bricker (1982) observed that although,

> many researchers seem to assume that information flows unilaterally from the laboratory to field applications for the eradication of social ills...some writers have questioned whether the unilateral flow from researcher to practitioner provides the greatest positive clinical impact, the most enlightened social policies, or the most effective governmental policies toward social issues (pp. 1-2).

In the arena of early intervention, Meisels (1985), Berkeley and Shapiro (1985), and Takanishi and Feshbach (1982) have noted the research to practice dilemma is greatly exacerbated. This problem occurs because the dialectic between program evaluation research, discipline research, and practice is strained since the theories of child development which serve as the foundation for early intervention are rarely, if ever, detailed in program designs. Moreover, it is assumed that program providers develop theoretically-correct interventions. This assumption is not always supported. Meisels (1985) reported,

> Far too often conclusions are drawn about efficacy without consideration first being given to internal consistency, within and between, of assumptions underlying these programs. Chief among these assumptions are the program's (a) implicit theory of human development, (b) conceptualization of specific interventions, (c) method of measuring developmental change, and (d) strategies for selecting participants (p. 2).

The intent of this paper is to introduce a model that is illustrative of the continuities in infant development so that early intervention professionals can assess the developmental

performance of a very young child, devise interventions utilizing multiple theoretical constructs (as is usually the case in programs employing professionals from several interrelated disciplines), and evaluate a program in such a way as to minimize methodological criticisms. At the same time, some statements might be made more reliably by early intervention personnel regarding the utility of the policy underlying such a program.

The rationale for this examination is grounded in Bronfenbrenner's (1974) claim that a relationship is needed between the competing methodological paradigms of program evaluation research, policy analysis, and discipline research.

> He suggested for early intervention that, an unusual converse proposition (exists) particularly in our field, science needs social policy -- needs it not to guide our organizational activities, but to provide us with two elements essential for any scientific endeavor -- vitality and validity (p. 1).

Introduction to the Model

Lewis's and Starr's (1979) salient responses model is a little known, barely used, yet well-articulated representation of the actions taken by the human organism in its qualitative attempts to move to more progressive states of development through interactions with the environment, or ecology of development (Bronfenbrenner, 1979). The model is based upon a widely accepted history of theoretical assertions regarding developmental continuity (Berkeley and Ludlow, 1989), as well as some empirical data which supports its validity (Lewis and Cherry, 1977). It is especially applicable to infants and toddlers (the focus of this paper) from birth to two years of age.

Lewis's and Starr's paradigm offers four principal benefits to early intervention professionals: 1) it is relevant to the major linear, stage, or circular theoretical constructs of

human development (e.g., maturational to constructivist to information-processing to behavioral) since its primary attributes are experienced by all children; 2) it assumes that developmental continuities and discontinuities exist, but the discontinuities exist to assist in reorganizing behavior and bringing about developmental change, especially qualitative change; 3) it can be used singularly or as part of a broader protocol for child assessment, as a framework for designing child-centered interventions, and as a frame of reference for evaluating program outcomes (without being a victim of the "teaching to the test" criticism applicable to curriculum-based assessment schemes); and, 4) it can be applied to children at all levels of development: typically developing, atypically developing, or at-risk, or to infants and toddlers who are hearing-impaired.

The salient responses model consists of a set of variables that represent the transitions a child passes through in its continuous process of attaining mastery of conceptual information across all of the arbitrarily established separations, or domains of development (e.g., cognition, communication, social-emotional, and motor). Lewis and Starr (1979) noted that the salient attributes of responses include the "quantity, quality, speed of acquisition, utilization, affective tone, generalizability, organizational properties, and intention in the use of information". (p. 657) They contend,

> A response is an experimenter-defined unit of behavior measured along some dimension. The response selected and measure employed in a given instance is, of course, fairly arbitrary... we consider briefly possible dimensions or attributes of a response. By considering that a particular response may have a variety of attributes, we may question the relation of these attributes over time. It may be the case that stability over time for a particular response is dependent on the attributes of the response measured (p. 657).

They define the variables in the following terms:

> Quantity refers to the gross frequency and/or duration with which the behavior is expressed in a given unit of time. In the case of language, for example, this is how much a person speaks. Quality refers to the extent the response is effective, efficient, or elaborately differentiated. For example, we can ask whether an infant uses syntactically,

> correct language in a situtation. Speed of acquisition refers to how quickly a response is acquired. Utilization refers to the circumstances in which the behavior is displayed. The affective tone refers to the degree of affect associated with use. Generalizability refers to the use of the target behavior in the place of other responses, while organizational properties refers to the relationship of the particular response to others in the individual's repertoire. Intention refers to the infant's control of the response and awareness of that control (p. 657).

To add further understanding about the model, Berkeley and Ludlow (1989) noted, "The salient responses of the child can best be seen in the examination of the play of infants...As the child develops, play changes with respect to the salient response attributes: the amount of time the child spends engaged in play (quantity); the differentiation of actions the child uses to play with different objects (quality); the length of time it takes the child to learn new play skills (speed of acquisition); the occasions and settings in which the child chooses to play (utilization); the affect displayed by the child during play (affective tone); the inclination of the child to use a play skill in novel settings or with new objects (generalization); the relationship of play behaviors to other responses demonstrated by the child (organization); and, the purpose and meaning the child attaches to play (intention)" (p. 16).

While the foregoing discussion defines the model, several questions emerge that if answered might increase the likely utility of the model in the future: What is the theoretical foundation for a salient response attribute? What conditions have caused the limited utility of the model in the ten-year period since its initial description in the literature? Are there new claims which can be made to assist in understanding the model?

Theoretical Conceptualizations of the Model

The salient attributes of response are traits of development. Lewis (1987) has suggested that attributes parallel the concept of traits whereby a child is inclined to develop in a particular way through its interactions with the environment and that changes in development

are ongoing. Mischel (1968) reported that environmental determinants of behavior are traits, they impact upon the child's development, and the environment must be considered if exceptional outcomes of development exist, similar to, for example, a psychopathology. Sameroff and Chandler (1975) specified in their transactional model that the environment is "plastic" (p. 235) and adds flexibility to the child's ability to respond and react to its surroundings. Thus, the traits of development are flexibile and the "constants in development are...the processes by which these traits are maintained in the transactions between organism and environment" (p. 235).

Traits, then, can be observed to change over time from an initial observation to succeeding observations. Thus, this point allows the model to be used as a framework for the assessment of infants and as a new frame of reference for curriculum design and program evaluation research, especially by early intervention professionals who usually bring several theoretical approaches to their work with young children and who represent a number of different disciplines (e.g., occupational therapy, physical therapy, speech therapy, clinical and developmental psychology, medicine, social work, and special education).

Lewis and Starr represent change in development along the following mathematical parameter:

t=birth or time of initial observation

+x=later time intervals

d=development

d=t or development at birth or time of initial observation

d=t+x or development at birth plus one time interval of observation

d=t+x+x....or development at birth plus each consecutive time interval of observation

The application of this formula to an assessment and intervention system could suggest the progress or lack of progress each child makes developmentally. This need for specificity is crucial since teachers and other child development specialists often complain about the lack of detail on developmental status and performance of children enrolled in early intervention programs. Moreover, each child could be viewed in a standard manner through the description of each child in terms of salient responses.

The value of using such a standard terminology for describing developmental performance rests on Lewis's and Starr's assumption that the study of development is a study of change in the human organism. Moreover, how changes occur and determining "order" (p. 653) in those changes is part of the ontological pathway upon which development rests. Flavell's (1971) notion of development as progressive steps "leads logically to the paradoxical conclusion that the individual spends virtually all his childhood years 'being' rather than 'becoming'" (p. 426).

Lewis and Starr, as well as Flavell, were not the first to posit that development, especially cognitive growth, needed to be viewed outside of its traditional universalistic realm---that of isolated though highly detailed stages but with quite limited explanations of the catalysts that cause a shift from one point in time to another point in time and from one stage to another stage; or, outside of a rigid stimulus-response model where the stimulus causes a reaction that sets the individual on its developmental journey. Each of these universal approaches offer a necessary overarching framework to the study of development; but they do not take into account the variety of atypicality that exists in the development of the individual (Feldman, 1980).

Vygotsky (1934, 1986) according to Bruner (1983), "rebelled at the 'quietism' of stage theories, quietism in the sense that stages were something a child lived through until he had

enough @aliment to progress to the next one." (p. 143) Bruner and his colleagues developed a theoretical construct of cognition called "modes of representation" whereby,

> growing human beings represent their experience of the world; and how they organize for future use what they have encountered. There are striking changes in emphasis that occur with the development of representation. At first the child's world is known to him principally by the habitual actions he uses for coping with it. In time there is added a technique of representation through imagery that is relatively free of action. Gradually there is added a new and powerful method of translating action and image into language, providing still a third system of representation. Each of these modes of representation enactive, ikonic, and symbolic---has its unique way of representing events. Each places a powerful impress on the mental life of human beings at different ages, and their interplay persists as one of the major features of adult intellectual life (p. 1).

Bruner and Vygotsky were not just interested in the mechanisms and structural representations of development. Rather, it seems, they felt it necessary to include other influences on the life of the developing individual. Fortuitously, they considered culture and all of its complexities to be crucial to their theoretical dispositions, just as they understood that the evolutionary heritage of the species left a startling imprint upon human movement toward greater levels of understanding of all that can be encountered. This need to view development outside of traditional universalistic boundaries, especially on Bruner's (@983) part, resulted because of a belief that Piaget, as well as other clinical and developmental theorists, believed in development as "singular systems of thought" (p. 8).

Pervin (@984) reported a controversy about trait theory, especially as it related to personality development. He noted, "Trait theory was criticized for its assumption that personality is made-up of stable and enduring predispositions that exert fairly generalized effects on behavior." (p. 10) However, Lewis and Starr went to great lengths to prove that (salient attributes of response) traits can represent developmental change. Throughout their presentation of the model in the first edition of Osofsky's Handbook of Infant Development. they were most specific that their construct was about developmental continuity, and the model

reflected their belief that development and change were interchangeable. Moreover, their philosophical belief that development does mean change was reflected in their portrayal of an adult as the more completed embodiment of the child at the beginning and the end of their presentation of the model.

Nevertheless, there are a number of reasons why the salient responses model has not been used by program providers in the design and implementation of early intervention efforts. And these reasons reflect, perhaps, on the state-of-affairs of early intervention as an emerging discipline more than on structural problems with the model.

Limited Use of the Model

In the ten year period since the salient responses model first appeared in the literature, the use of the construct has been virtually non-existent. There are no known reports about the model's implementation, and few have attempted to demonstrate how the model can be used (Berkeley and Parkhurst, 1988). Moreover, there are only two sites where the model has been partially adopted for use. In one site, an early intervention program in the South, the model has been used by some staff as a framework for qualitative assessment and for progress observations of babies enrolled in the program. At that site, center-based and home-based early intervention teachers use the model. In the other site, an infant development center in New England, a home-based interventionist and an occupational therapist have been using the model to assist the parents of some of the children enrolled in the program to manage the behavior of their toddlers whose disabilities severely restrict their ability to adapt to the ordinary demands of the environment. In this case, the two staff members developed specific intervention activities based upon the salient responses, and then they observed the progress of the toddlers by using the model, as well as another standard developmental construct, namely Piaget's theory

of intellectual functioning, to gather data regarding the developmental performance of those children.

Why, then, has the model's use been so limited? At least four reasons explain why. First, The Handbook of Infant Development has a limited circulation, limited in the sense that the primary audience for the book seems to be child development researchers, not program providers or even university faculty. Also, there are few conclusions made about the applicability of the reviewed research to early intervention programming.

Second, in the case of the chapter offered by Lewis and Starr entitled "Developmental Continuity", the authors stated in their concluding section, "Consistency and continuity of development remain issues of importance for theories of development. We began with the question 'Does childhood show the man?' Our answer will provide little satisfaction for those of a pragmatic bent..." (p. 668) Thus, it seems necessary for infant specialists to attend, as Meisels contended, to the theoretical underpinnings of their work, to the application of developmental models to assessment and observation schemes, and to the reliability of standardized instruments in terms of the model of development upon which an instrument is premised. Thus, the authors were not particularly helpful in offering the model in a way that eased the translation of the model into practice.

Third, the use of the model is labor-intensive. It requires a considerable investment in terms of time, program reconceptualization, and staff retraining for successful adaptation of the model. Reverting back to Meisels' (1985) admonition on the need for asking why early intervention efficacy is still being questioned, it is hardly surprising that early intervention providers are not necessarily willing to change a model, especially if their funding remains stable and if the parents of the children enrolled in their programs are not criticizing the program or

the staff. In addition, implementing qualitative child assessment techniques requires considerable effort in arriving at a design of a standard (e.g., not standardized) format for conducting those assessments, as well as a protocol that can be reliably used by all staff.

A fourth reason is that the research-to-practice dilemma has had its impact upon university faculty who may be more interested in teaching intervention prescriptions that in presenting the underlying theoretical foundations for developing those strategies because of the limited time students spend in professional courses. As a result, the university students enrolled in the courses taught by those faculty are not always exposed to the full knowledge base available to the field.

Even though these reasons exist, the question remains about whether there is anew evidence to suggest that the salient responses model has a bright future for early intervention providers. A conceptualization of child development is advanced in this paper that could bring about the use of the model.

Integrated Modeling: Human Development as Set Theory

The salient responses of the child can be seen best in the examination of the play of infants since play according to Rogers (1982) "is an all encompassing activity...that virtually all areas of...development -- cognitive, motor, social emotional, language -- can be observed in a child's play" (p. 11). Therefore, play mirrors the integrated quality of a child's development.

In this view, play is similar to set theory. A set, according to Breuer (1958), is "a collection of distinct objects of our perception or of our thought, which are called elements of the set" (p. 4). That is to say, play is a complete set, and the domains of development (i.e., cognition, motor functioning, social-emotional functioning, and communications) are individual elements comprising the complete set. The elements of the set are united, and an integrated

conceptualization of development exists (See Figure 1[2]). Thus, there is no need to arbitrarily separate development into domains. In point of fact, using play as the mirror of development, every aspect of development can be seen in a child's play, especially the play of infants who are in the midst of the sensorimotor stage from a constructivist point of view which is an integrated phase of development.

In and of itself, the sensorimotor period, though the initial phase in Piaget's cognitive scheme, is not just a unidimensional developmental construct. Rather, the sensorimotor stage represents cognitive motor functioning, social-emotional functioning, and communications. Moreover, considering development in any terms other than that of an integrated model seems to limit the understanding of a child's full range of developmental abilities and characteristics. Thus, descriptions of development in domain-specific terms suggests that children function intellectually separate from their motor functioning, social-emotional functioning, and communications functioning. However, this separation is simply not the case.

The consideration of human development as an integrated set is new only because developmental theory is not usually thought of in such terms. However, support for this shift in paradigms does exist and is much more seminal than one might expect. For instance, Bringuier (B) (1980) had the following conversation with Piaget (P) illustrating this point:

B: There's a little of everything in here -- insects in glass cases on the wall and plants at the windows. At what level of life does psychology begin, do you think?

P: I am convinced there is no sort of boundary between the living and the mental or between the biological and the psychological. From the moment an organism takes account of a previous experience and adapts to a new situation, that very much resembles psychology.

B: For instance, when sunflowers turn toward the sun, that's psychology?

[2] The figure is placed at the end of the article before references.

P: I think, in fact, it is behavior.

B: Isn't there any boundary between sunflowers and us?

P: No. That is the central argument of my book Biology and Knowledge, in which I try to show the isomorphisms...

B: The analogies?

P: Yes -- between organic relations and cognitive processes, the processes of knowledge. The[illegible]are structures of organisms and structures of intelligence. I try to show that the latter spring from the former and that logic, for example, originates in the general coordination of actions and that the general coordination of actions is based on coordinations of the nervous system, themselves supported by organic coordinations (pp. 2-3).

This disclosure by Piaget seems to overrule a previous account he made about the development of separate skills that join together once there is a greater level of sophistication in the infant's ontological system. It is not surprising that Piaget would alter his thinking if there existed a powerful enough view to cause such a shift. Returning to his conversation with Bringuier (1980), Piaget said, "The history of experimental sciences abounds in examples that are instructive in this regard. When one theory succeeds another, the initial impression that the new one contradicts the old and eliminates it, whereas subsequent research leads to retaining more of it than was foreseen. My secret ambition is that the hypotheses one could oppose to my own will finally be seen not to contradict them but to result from a normal process of differentiation" (p. 143). Rose and Ruff (1987) noted, "Piaget (1952; Piaget and Inhelder, 1956)...states that the child constructs separate action schemata for seeing, touching, and hearing, and only later coordinates them in a way that allows for intermodal correspondences. The lawful nature of these coordinations is thought to lead to reciprocal assimilation in which, for example, distinct visual sensations are associated with distinct tactual sensations" (p. 320).

Bruner's (1966) contention that development can be thought of through three modes of representation -- enactive, ikonic, and symbolic -- is an understanding that development is integrated because the modes are discussed not just in terms of a mix of culture and genetic heritage, but also in terms of cognition and language. Further, language requires motoric activity in order to have successful communication of thought. Moreover, it is universally understood and accepted (except by behavioral developmental theorists) that every cognitive act has a social-emotional response. Thus, development from a linear, rather than just a constructivist, viewpoint can be seen as being integrative.

Finally, Rose and Ruff (1987) offered an integrated system of development they call "cross-modal transfer" and "cross-matching" (p. 318). To begin, Rose and Ruff noted, "The acquisition of knowledge about the world requires that information about the environment and about the self in the environment be picked up by the various perceptual systems" (p. 318). rose and Ruff went on to explain,

> Adult humans, for example, readily recognize many objects whether they are only touching them, listening to them, or looking at them; in some cases, they can identify objects by one perceptual system even though their previous experience of those objects has been limited to one of the others. This ability is referred to as cross-modal transfer. When an adult recognizes that two objects simultaneously experienced are the same even though each is perceived with a different system, the ability is referred to as cross-modal matching (p. 318).

Rose and Ruff used another example in this regard and discussed the integrated developmental functioning of blind persons who use their tactile senses to provide order and understanding of objects these persons touch and know. In addition, they suggested that some evidence exists that understanding an object through atypical means (e.g., a blind person using touch as a form of visualization) is, in fact, a "translation of information from the code of one system into that of another" (p. 319). Finally, they offered evidence that cross-modal activity does occur in

infants of just several weeks o age. Here, Rose and Ruff noted, "While the basis of these responses may be more primitive than sometimes supposed, and although the basis is no doubt altered by experience, the ability to respond equivalently to information from different modalities is certainly present early on " (p. 341).

This evidence about the salient responses model, especially the integrated understanding of development it provokes, as well as its generative quality of being amenable to the multiple theoretical approaches to development that happen to be used by early intervention professionals, suggests that the model has much more pragmatic utility than Lewis and Starr initially thought. It is just as significant to note that each child regardless of age does: 1) acquire developmental concepts with a certain speed and quality, in varying degrees of quantity, with a specific sense of organization, generalizability, and intention, and with an individualistic affective tone, and, 2) exhibit these salient responses in the presence or absence of a developmental delay or at-risk condition.

Conclusion

The intent of this paper is to offer evidence that a previously conceptualized model of human development can be utilized by early intervention professionals in their work with infants who are enrolled in programs whose general goal is to stimulate positive developmental change. Further, the intent is to demonstrate that the mode is viable as a foundation for the assessment of infants, the design of intervention activities, and as a framework for the evaluation of early intervention program outcomes.

The salient responses model posited by Lewis and Starr approximately ten years ago offers early intervention professionals the capability of expanding their capacity to discuss all of their efforts to policy makers, parents, and themselves by describing the developmental performance through a more standard approach and in a much more compelling manner. Further, it is significant that a model of development exists whereby the traditional divisions of development or domains can be considered in a unitary conceptual framework. That is, it is important that children, especially infants whose proportion of development increases at an incredible rate of speed daily, can be thought of in complete, rather than in separate developmental terms. The observation of a child's development through the salient responses model offers a positive success-oriented view of a child, rather than a deficit-oriented or pathological perspective that is unidimensional in scope.

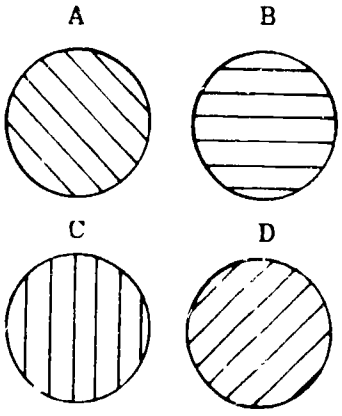
Now, a final note. There has been very little specific discussion of the salient responses model in terms of infants who are deaf or hearing-impaired. It has not been the intent here to overlook the importance of children who happen to exhibit characteristics that represent deafness or hearing impairment. And, it has not been the intent here to show disregard for the cultural richness of those individuals who happen to be deaf or hearing-impaired. Rather, it is

of the utmost importance for early intervention professionals who work with those children who are referred to their programs for screening and assessment, or who are enrolled in their programs, to include those characteristics and an understanding of that cultural richness in their descriptions of and programming for these children, using the salient attributes of response. It will be at that moment in time when early intervention professionals incorporate this understanding about child development into their programs that the notion of "disability" as a "pathology" of children will disappear, and differences among children will become truly valued.

Figure 1

Child Development as Set Theory

Set Theory Notation:



A= Cognition

B= Motor Functioning

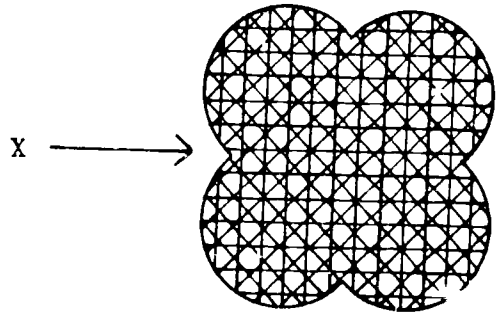
C= Communications & Language

D= Social/Emotional Functioning

A, B, C, D= Set Elements

U= Union of the Elements

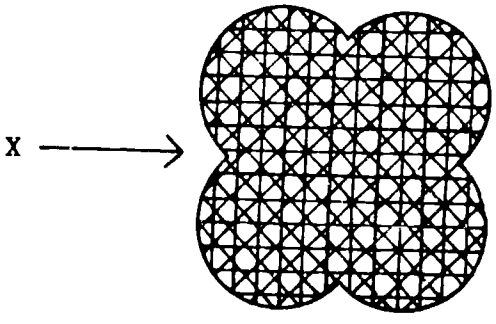
Play as Set Theory: An Integrated Notion of Development



X= Play

X= A U B U C U D

Development as Set Theory: An Integrated Notion of Development



X= Development

X= A U B U C U D

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