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5

Ecological Models of Human Development

URIE BRONFENBRENNER

Urie Bronfenbrenner argues that in order to understand human development, one must consider the entire ecological system in which growth occurs. This system is composed of five socially organized subsystems that help support and guide human growth. They range from the microsystem, which refers to the relationship between a developing person and the immediate environment, such as school and family, to the macrosystem, which refers to institutional patterns of culture, such as the economy, customs, and bodies of knowledge.

Ecological models encompass an evolving body of theory and research concerned with the processes and conditions that govern the lifelong course of human development in the actual environments in which human beings live. Although most of the systematic theory-building in this domain has been done by Bronfenbrenner, his work is based on an analysis and integration of results from empirical investigations conducted over many decades by researchers from diverse disciplines, beginning with a study carried out in Berlin in 1870 on the effects of neighborhood on the development of children's concepts (Schwabe and Bartholomai 1870). This entry consists of an exposition of Bronfenbrenner's theoretical system, which is also used as a framework for illustrating representative research findings.

1. THE EVOLUTION OF ECOLOGICAL MODELS

Bronfenbrenner's ecological paradigm, first introduced in the 1970s (Bronfenbrenner 1974, 1976, 1977, 1979), represented a reaction to the restricted

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scope of most research then being conducted by developmental psychologists. The nature of both the restriction and the reaction is conveyed by this oft-quoted description of the state of developmental science at that time: "It can be said that much of developmental psychology is the science of the strange behavior of children in strange situations with strange adults for the briefest possible periods of time" (Bronfenbrenner 1977, p. 513).

In the same article, Bronfenbrenner presented a conceptual and operational framework (supported by the comparatively small body of relevant research findings then available) that would usefully provide the basis and incentive for moving the field in the desired direction. During the same period, he also published two reports pointing to the challenging implications of an ecological approach for child and family policy (1974) and educational practice (1976).

Within a decade, investigations informed by an ecological perspective were no longer a rarity. By 1986, Bronfenbrenner was able to write:

> Studies of children and adults in real-life settings, with real-life implications, are now commonplace in the research literature on human development, both in the United States and, as this volume testifies, in Europe as well. This scientific development is taking place, I believe, not so much because of my writings, but rather because the notions I have been promulgating are ideas whose time has come. (1986b p. 287).

At the same time, Bronfenbrenner continued his work on the development of a theoretical paradigm. What follows is a synopsis of the general ecological model as delineated in its most recent reformulations (Bronfenbrenner 1989, 1990, Bronfenbrenner and Ceci 1993).

2. THE GENERAL ECOLOGICAL MODEL

Two propositions specifying the defining properties of the model are followed by research examples illustrating both.

Proposition 1 states that, especially in its early phases, and to a great extent throughout the life course, human development takes place through processes of progressively more complex reciprocal interaction between an active, evolving biopsychological human organism and the persons, objects, and symbols in its immediate environment. To be effective, the interaction must occur on a fairly regular basis over extended periods of time. Such enduring forms of interaction in the immediate environment are referred to as *proximal processes*. Examples of enduring patterns of proximal process are found in parent-child and child-child activities, group or solitary play, reading, learning new skills, studying, athletic activities, and performing complex tasks.

A second defining property identifies the threefold source of these dynamic forces. Proposition 2 states that the form, power, content, and direction of the proximal processes effecting development vary systematically as a joint function of the characteristics of the developing person; of the environment—both immediate and more remote—in which the processes are taking place; and the nature of the developmental outcomes under consideration.

Propositions 1 and 2 are theoretically interdependent and subject to empirical test. A research design that permits their simultaneous investigation is referred to as a process-person-context model. A first example illustrating the model is shown in Figure 1. The data are drawn from a classic longitudinal study by Drillien (1963) of factors affecting the development of children of low birth weight compared to those of normal weight. The figure depicts the impact of the quality of mother-infant interaction at age 4 on the number of observed problems at age 4 as a joint function of birth weight and social class. As can be seen, a proximal process, in this instance mother-infant interaction across time, emerges as the most powerful predictor of developmental outcome. In all instances, good maternal treatment appears to reduce substantially the degree of behavioral disturbance exhibited by the child. Furthermore, as stipulated in Proposition 2, the power of the process varies systematically as a function of the environmental context (in this instance, social class) and of the characteristics of the person (in this case, weight at birth). Note also that the proximal process has the general effect of reducing or buffering against environmental differences in developmental outcome; specifically, under high levels of mother-child interaction, social class differences in problem behavior become much smaller.

Unfortunately, from the perspective of an ecological model the greater developmental impact of proximal processes in poorer environments is to be expected only for indices of developmental dysfunction, primarily during childhood. For outcomes reflecting developmental competence (e.g., mental ability, academic achievement, social skills) proximal processes are posited as having greater impact in more advantaged and stable environments throughout the life course. An example of this contrasting pattern is shown in Figure 2, which depicts the differential effects of parental monitoring on school

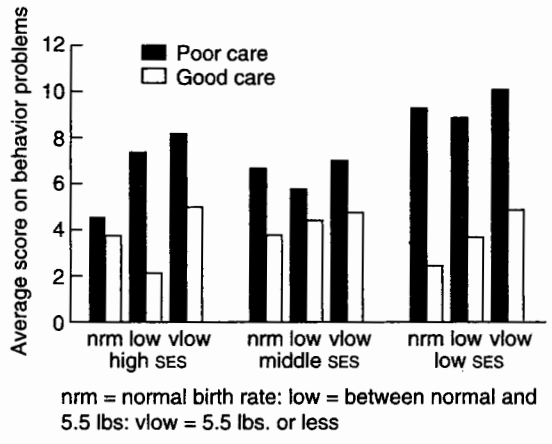

FIGURE 1 Problem behavior at age 4 (by birth weight, mother's care, and social class).

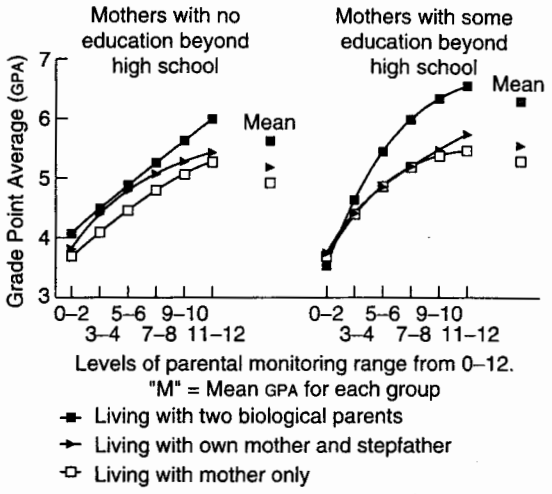

FIGURE 2 Effect of parental monitoring on grades in high school by family structure and mother's level of education.

achievement for high school students living in the three most common family structures found in the total sample of over 4,000 cases. The sample is further stratified by two levels of mother's education, with completion of high school as the dividing point. Parental monitoring refers to the effort by parents to keep informed about, and set limits on, their children's activities outside the home. In the present analysis, it was assessed by a series of items in a questionnaire administered to adolescents in their school classes.

Once again, the results reveal that the effects of proximal processes are more powerful than those of the environmental contexts in which they occur. In this instance, however, the impact of the proximal process is greatest in what emerges as the most advantaged ecological niche, that is, families with two biological parents in which the mother has had some education beyond high school. The typically declining slope of the curve reflects the fact that higher levels of outcome are more difficult to achieve so that at each successive step, the same degree of active effort yields a somewhat smaller result.

3. ENVIRONMENTS AS CONTEXTS OF DEVELOPMENT

The foregoing example provides an appropriate introduction to another distinctive feature of the ecological model, its highly differentiated reconceptualization of the environment from the perspective of the developing person. Based on Lewin's theory of psychological fields (Bronfenbrenner 1977; Lewin 1917, 1931, 1935), the ecological environment is conceived as a set of nested structures, each inside the other like a set of Russian dolls. Moving from the innermost level to the outside, these structures are defined as described below.

3.1 Microsystems

A microsystem is a pattern of activities, social roles, and interpersonal relations experienced by the developing person in a given face-to-face setting with particular physical, social, and symbolic features that invite, permit, or inhibit engagement in sustained, progressively more complex interaction with, and activity in, the immediate environment. Examples include such settings as family, school, peer group, and workplace.

It is within the immediate environment of the microsystem that proximal processes operate to produce and sustain development, but as the above definition indicates, their power to do so depends on the content and structure of the microsystem. Specific hypotheses regarding the nature of this content and structure, and the as yet limited research evidence on which they are based are documented in the work of Bronfenbrenner (1986a, 1986b, 1988, 1989, 1993). Most of the relevant studies of proximal processes have focused on the family, with all too few dealing

with other key developmental settings, such as classrooms and schools. A notable exception in this regard is the work of Stevenson and his colleagues (Stevenson and Stigler 1992, see also Ceci 1990).

3.2 Mesosystems

The mesosystem comprises the linkages and processes taking place between two or more settings containing the developing person (e.g., the relations between home and school, school and workplace, etc.). In other words, a mesosystem is a system of microsystems.

An example in this domain is the work of Epstein (1983a, 1983b) on the developmental impact of two-way communication and participation in decision-making by parents and teachers. Elementary school pupils from classrooms in which such joint involvement was high not only exhibited greater initiative and independence after entering high school, but also received higher grades. The effects of family and school processes were greater than those attributable to socioeconomic status or race.

3.3 Exosystems

The exosystem comprises the linkages and processes taking place between two or more settings, at least one of which does not contain the developing person, but in which events occur that indirectly influence processes within the immediate setting in which the developing person lives (e.g., for a child, the relation between the home and the parent's workplace; for a parent, the relation between the school and the neighborhood peer group).

Especially since the early 1980s, research has focused on three exosystems that are especially likely to affect the development of children and youth indirectly through their influence on the family, the school, and the peer group. These are the parents' workplace (e.g., Eckenrode and Gore 1990), family social networks (e.g., Cochran et al. 1990), and neighborhood-community contexts (e.g., Pence 1988).

3.4 Macrosystems

The macrosystem consists of the overarching pattern of micro-, meso-, and exosystems characteristic of a given culture or subculture, with particular reference to the belief systems, bodies of knowledge, material resources, customs, life-styles, opportunity structures, hazards, and life course options that are embedded in each of these broader systems. The macrosystem may be thought of as a societal blueprint for a particular culture or subculture.

This formulation points to the necessity of going beyond the simple labels of class and culture to identify more specific social and psychological features at the macrosystem level that ultimately affect the particular conditions and processes occurring in the microsystem (see Bronfenbrenner 1986a, 1986b, 1988, 1989, 1993).

3.5 Chronosystems

A final systems parameter extends the environment into a third dimension. Traditionally in the study of human development, the passage of time was treated as synonymous with chronological age. Since the early 1970s, however, an increasing number of investigators have employed research designs in which time appears not merely as an attribute of the growing human being, but also as a property of the surrounding environment not only over the life course, but across historical time (Baltes and Schaie 1973, Clausen 1986, Elder 1974, Elder et al. 1993).

A chronosystem encompasses change or consistency over time not only in the characteristics of the person but also of the environment in which that person lives (e.g., changes over the life course in family structure, socioeconomic status, employment, place of residence, or the degree of hecticness and ability in everyday life).

An excellent example of a chronosystem design is found in Elder's classic study *Children of the Great Depression* (1974). The investigation involved a comparison of two otherwise comparable groups of families differentiated on the basis of whether the loss of income as a result of the Great Depression of the 1930s exceeded or fell short of 35 percent. The availability of longitudinal data made it possible to assess developmental outcomes through childhood, adolescence, and adulthood. Also, the fact that children in one sample were born eight years earlier than those in the other permitted a comparison of the effects of the Depression on youngsters who were adolescents when their families became economically deprived with the effects of those who were still young children at the time.

The results for the two groups presented a dramatic contrast. Paradoxically, for youngsters who were teenagers during the Depression years, the families' economic deprivation appeared to have a salutary effect on their subsequent development, especially in the middle class. As compared with the nondeprived who were matched on pre-Depression socioeconomic status, deprived boys displayed a

greater desire to achieve and a firmer sense of career goals. Boys and girls from deprived homes attained greater satisfaction in life, both by their own and by societal standards. Though more pronounced for adolescents from middle-class backgrounds, these favorable outcomes were evident among their lower-class counterparts as well. Analysis of interview and observation protocols enabled Elder to identify what he regarded as a critical factor in investigating this favorable developmental trajectory: the loss of economic security forced the family to mobilize its own human resources, including its teenagers, who had to take on new roles and responsibilities both within and outside the home and to work together toward the common goal of getting and keeping the family on its feet. This experience provided effective training in initiative, responsibility, and cooperation.

4. GENETIC INHERITANCE IN ECOLOGICAL PERSPECTIVE

The most recent extension of the ecological paradigm involves a reconceptualization of the role of genetics in human development (Bronfenbrenner and Ceci 1993). The new formulation calls into question and replaces some of the key assumptions underlying the established "percentage-of-variance" model employed in behavior genetics. Specifically, in addition to incorporating explicit measures of the environment conceptualized in systems terms, and allowing for nonadditive, synergistic effects in genetics-environment interaction, the proposed "bioecological" model posits proximal processes as the empirically assessable mechanisms through which genotypes are transformed into phenotypes. It is further argued, both on theoretical and empirical grounds, that heritability, defined by behavioral geneticists as "the proportion of the total phenotypic variance that is due to additive genetic variation" (Cavalli-Storza and Bodmer 1971 p. 536), is in fact highly influenced by events and conditions in the environment. Specifically, it is proposed that heritability can be shown to vary substantially as a direct function of the magnitude of proximal processes and the quality of the environments in which they occur, potentially yielding values of heritability that, at their extremes, are both appreciably higher and lower than those hitherto reported in the research literature.

If this bioecological model sustains empirical testing, this would imply that many human beings may possess genetic potentials for development significantly beyond those that they are presently manifesting, and that such unrealized potentials might be actualized through social policies and programs that enhance exposure to proximal processes in environmental settings providing the stability and resources that enable such processes to be maximally effective.

Certainly, thus far it has by no means been demonstrated that this latest extension of the ecological paradigm has any validity. Nor is the validation of hypotheses the principal goal that ecological models are designed to achieve. Indeed, their purpose may be better served if the hypotheses that they generate are found wanting, for the primary scientific aim of the ecological approach is not to claim answers, but to provide a theoretical framework that, through its application, will lead to further progress in discovering the processes and conditions that shape the course of human development.

However, beyond this scientific aim lies a broader human hope. That hope was expressed in the first systematic exposition of the ecological paradigm:

> Species *Homo sapiens* appears to be unique in its capacity to adapt to, tolerate, and especially to create the ecologies in which it lives and grows. Seen in different contexts, human nature, which I had once thought of as a singular noun, turns out to be plural and pluralistic; for different environments produce discernible differences, not only across but within societies, in talent, temperament, human relations, and particularly in the ways in which each culture and subculture brings up the next generation. The process and product of making human beings human clearly varies by place and time. Viewed in historical as well as cross-cultural perspective, this diversity suggests the possibility of ecologies as yet untried that hold a potential for human natures yet unseen, perhaps possessed of a wiser blend of power and compassion than has thus far been manifested. (Bronfenbrenner 1979 p. xiii)

Questions

1. What are the five subsystems of the ecological context that Bronfenbrenner discusses? Think of a particular process of psychological development and try to describe it from the perspective of each of these subsystems.
2. What information about human development will an ecological systems approach add to the field of developmental psychology?
3. In theory, the ecological systems approach is rich in the amount of new information it can provide about human development. But is it a practical or feasible approach? Which aspects of this approach lend themselves to study and which do not?

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