

Urie Bronfenbrenner's Theory of Human Development: Its Evolution From Ecology to Bioecology

By: Edinete Maria Rosa and [Jonathan Tudge](#)

This is the peer reviewed version of the following article:

Rosa, E. M., & Tudge, J. R. H. (2013). Urie Bronfenbrenner's theory of human development: Its evolution from ecology to bioecology. *Journal of Family Theory and Review*, 5(6), 243–258. DOI:10.1111/jftr.12022

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Abstract:

We describe the evolution, over three phases, of Bronfenbrenner's theory from an ecological to a bioecological theory. Phase 1 (1973–1979) culminated in the publication of *The Ecology of Human Development* (1979). Phase 2 (1980–1993) saw almost immediate modifications to the theory, with more attention paid to the role of the individual and greater concern with developmental processes. In Phase 3 (1993–2006), proximal processes were defined and placed at the heart of bioecological theory, and from 1998, the Process-Person-Context-Time (PPCT) model was described as the theory's appropriate research design. Given the extent of these changes, and to avoid theoretical incoherence, scholars should be cautious about stating that their research is based on Bronfenbrenner's theory without specifying which version they are using.

Keywords: bioecological theory | ecological theory | human development | PPCT model | Urie Bronfenbrenner

Article:

Urie Bronfenbrenner's theory of human development underwent considerable changes from the time it was first proposed in the 1970s until Bronfenbrenner's death in 2005. It is therefore unfortunate that too many scholars treat the theory as though it deals solely with the influence of context on children's or adolescents' development and take no account of what came to be the central aspect of the theory, namely proximal processes, and how person characteristics, context, and historical time mutually influence those processes (see Tudge, Mokrova, Hatfield, & Karnik, 2009). Moreover, although Bronfenbrenner described it as a theory of human development, from the start the developing individual was consistently viewed as influencing, and being influenced by, the environment. The family thus plays a key role: it does so as a microsystem context in which development occurs; it does so in terms of the personal characteristics of all individuals in

the family; and most important, it does so in terms of the interactions among family members as part of proximal processes.

It is also important to point out that although Bronfenbrenner may be best known as the developer of the theory that we describe in this article, he was also intensely interested in the family as an institution. During the years that he was developing his theory, he also wrote many papers on such topics as social-class influences on child rearing, the effects of maternal employment on children's development, the problems associated with treating some families as being at a "deficit," and family policies that are needed for families to grow healthily (for a review, see Tudge, 2013). Most relevant is the fact that there was cross-fertilization between his more family-oriented writings and those that have a more theoretical focus.

The bioecological theory of human development, initially termed an ecological model or approach, was originally proposed by Bronfenbrenner to explain how human development occurs, focusing largely on the impact of context. Nonetheless, as denoted by his use of the word *ecology*, Bronfenbrenner clearly viewed development as emerging from the interaction of individual and context. Subsequent reformulations of his original ideas resulted as he came to stress the role played by the individual; the impact of time; and most important of all, proximal processes.

Bioecological theory in its current or mature form specifies that researchers should study the settings in which a developing individual spends time and the relations with others in the same settings, the personal characteristics of the individual (and those with whom he or she typically interacts), both development over time and the historical time in which these individuals live, and the mechanisms that drive development (proximal processes).

From a methodological point of view, bioecological theory privileges the study of proximal processes that are likely to lead to healthy development, with the developing individuals of interest being distinguished in at least one relevant individual characteristic and studied in more than a single context (almost always the typical settings in which the individuals are to be found). The theory was formulated, as Bronfenbrenner expressed it, to examine not "the forces that have shaped human development in the past, but . . . those that may already be operating today to influence what human beings may become tomorrow" (Bronfenbrenner & Evans, 2000, p. 117).

Bronfenbrenner was a theorist who questioned his own propositions, and he himself drew attention to distinct phases in the development of his theory. These phases, however, are not quite the same as those that we have identified. Bronfenbrenner and Evans (2000) noted that the first theory-related publications were published from 1970 to 1979, marking the first phase in the theory's evolution. Bronfenbrenner and Evans wrote that in this first phase the theory concentrated primarily on a description of the characteristics and influences of different contexts (microsystem, mesosystem, exosystem, and macrosystem). According to Bronfenbrenner and Evans, the following two phases each began with publications in the major handbooks of the day (Bronfenbrenner & Crouter, 1983; Bronfenbrenner & Morris, 1998).

Our dating of the phases is necessarily somewhat imprecise, as we rely on date of publication rather than the date of writing and submission for publication. We have, for example, identified 1993 as both ending the second phase and starting the third phase. It is quite clear, however, that whereas the ideas in Bronfenbrenner's 1993 chapter fit with those expressed in his other publications from 1980 onwards, his coauthored paper of the same date (Bronfenbrenner & Ceci, 1993) marked a dramatic shift in thinking.

Regardless of the precise timing of these phases, what is absolutely clear is that the theory underwent significant changes between its inception and its final state. Unfortunately, as Tudge et al. (2009) pointed out, this fact has been ignored by many scholars. Tudge et al. analyzed 25 studies published between 2001 and 2008 (i.e., well after the beginning of the final stage in the theory's development), whose authors stated that their research was based on Bronfenbrenner's theory. Of those, only four were based on the most recent form of the theory, and most described the theory simply as one of contextual influences on development, completely ignoring the centerpiece of the theory in its final incarnation: proximal processes. As Tudge et al. argued, there is nothing wrong with deliberately basing one's research on an earlier version of the theory or even on a subset of its key concepts; however, for theoretical confusion to be avoided, one should be explicit about the specific theoretical basis for the study. Equally important, scholars should pay greater attention to the fact that while theorists are still alive and publishing, their theories are likely to develop.

We believe that for our field to develop, research should be theoretically driven, with studies explicitly designed to test theory, calling into question its major concepts, supporting them, or expanding on them. But this can occur only if scholars base their work on an accurate reading of the theory as it currently exists or if they have explicitly tried to test an earlier version of the theory. Supporting or attacking a reduced, old, or simply incorrect version of the theory is neither helpful nor appropriate. Therefore, our goal here is to describe the three phases in the development of Bronfenbrenner's theory as it matured into its final form, analyzing the principle characteristics and reformulations of each phase. To attain this goal, we first identified all the published papers by Bronfenbrenner or with Bronfenbrenner as a first author that were related to the construction of his theory of human development. We were considerably aided in this task by the bibliographic chapter published by Lüscher and Jones (1995), which provides a fairly complete and accurate listing of all his scholarly work published until 1994. To avoid continual repetition of Bronfenbrenner's name, we cite his single-authored papers here by publication date only.

Phase 1 (1973–1979)

In Phase 1, Bronfenbrenner named his emerging theory either an ecological approach to human development (1974, 1975, 1977a) or an ecological model of human development (1976, 1978, 1979b), referring to it on occasion as a science (1977c) or a theoretical perspective (1979b). Interestingly, the roots of the theory can be seen as far back as a chapter published in the 1960s, in which Bronfenbrenner (1961) showed that adolescents' responsibility and leadership varied according to the parent–adolescent relationship, child gender, and the family's social-class background. Bronfenbrenner's publications during this period were characterized by analysis and

discussion of relevant research conducted by others in psychology and human development, most of which he used to demonstrate their methodological limitations.

Motives and Influences

Bronfenbrenner's main motive for starting this endeavor was based on two primary pillars: the limitations of much contemporary research in psychology, in particular studies conducted in laboratory settings (1973, 1974, 1975, 1976, 1977c, 1979a, 1979b), and the demands of politicians interested in social policies relevant to children, adolescents, and their families (1973, 1974, 1975, 1977a, 1979a, 1979b). He critiqued the artificial and limited ways in which research was conducted as being inadequate for the study of processes of development that occur in the settings that are most familiar to children (e.g., home, school, neighborhood) and with people with whom those children either live or are familiar (1973, 1977c, 1979b). Lab-based research, by contrast, is typically conducted in an unfamiliar setting by a researcher unknown to the child (1973, 1977a), something that Bronfenbrenner argued calls into question the validity of the results (1973, 1979b). Even when research was conducted in the settings in which children are situated, Bronfenbrenner noted that the researchers' focus was far more on the organism (the person) than on the setting (1975, 1977a, 1979b), the latter being described in terms of a static environment unrelated to any system of values (1976). Bronfenbrenner stressed the necessity to take into account more than two persons (the researcher and the subject) in the setting in which the child is situated and to focus on the developmental processes involved in attaining any developmental outcomes (1973, 1974, 1976, 1977a, 1977c, 1978, 1979a, 1979b). Finally, Bronfenbrenner argued that the absence of appropriate research was due to the lack of a theory that took seriously the contexts in which human beings live (1979a).

These research limitations meant that Bronfenbrenner was unable to find answers to the many questions asked by those with responsibility for social policies—questions primarily related to practical questions about the lives of children and their families (1974, 1977a). Bronfenbrenner argued that research should be informed by social policy, the opposite of what scholars typically think, which is that research should guide social policy (1974, 1975, 1977a, 1979b), and that researchers needed a better understanding of the implications of the profound changes in family configurations and relations that were occurring during the 1960s and 1970s in the United States (1975, 1976, 1979b). His analyses of these social changes and the negative impacts they had on the psychological development of children, adolescents, and their parents illustrated the importance of social class and race (1973, 1975, 1977a). His concern with these issues led Bronfenbrenner to conclude that “further advance in the scientific understanding of the basic intrapsychic and interpersonal processes of human development requires their investigation in [the] actual environment, both immediate and remote, in which the human beings live” (1979b, p. 12).

A number of scholars greatly influenced Bronfenbrenner's thinking during this first phase of the development of his theory. One was Kurt Lewin and his notion of the phenomenological field, expressed topologically, that constituted the person's ecological environment (1976, 1977b, 1977c, 1978, 1979b). Other important influences included the Soviet psychologists Luria, Leontiev, and Vygotsky and their idea of research that leads to social transformation (1977a, 1977c, 1978, 1979b); Bronfenbrenner's initial mentor, Dearborn, who noted that one had to

change something to understand it and discussed the importance of operationalizing research in context (1975, 1976, 1977a, 1977c, 1978); and the sociologists Thomas and Thomas, who held that it is not only the objective aspects of an environment that have a developmental effect, using the celebrated phrase: “Situations perceived as real are real in their consequences,” cited several times by Bronfenbrenner during this period (1976, p. 170; 1977c, p. 529; 1979b, p. 127).

Concepts and Definitions

What did Bronfenbrenner mean by the *ecology* of human development? This key concept, according to Bronfenbrenner (1977a), was first used in the realm of human development by Barker and Wright (1954) but had little effect in demonstrating “how environments change, and the implications of this change for the human beings who live and grow in these environments” (Bronfenbrenner, 1975, p. 439). Thus, Bronfenbrenner (1979b) argued, contemporary studies of human development were studies out-of-context rather than ecological studies that should examine the interrelations between the developing person and the changing micro and macro context (1977a). As he pointed out, “Ecology implies an adjustment between organism and environment” (1975, p. 439). Or, as he wrote in a more complete definition:

The ecology of human development involves the scientific study of the progressive, mutual accommodation between an active, growing human being and the changing properties of the immediate settings in which the developing person lives, as this process is affected by relations between these settings, and by the larger contexts within which the settings are embedded. (1979b, p. 21)

Bronfenbrenner conceived of the environment topologically as an arrangement of four interconnected structures, with those closer to the developing individual being enclosed within those further afield (1976, 1977b, 1977c, 1978, 1979b). He adapted Brim's (1975) terminology of microstructure, mesostructure, and macrostructure and provided the following names: *microsystem*, *mesosystem*, *exosystem*, and *macrosystem*. However, given that Bronfenbrenner viewed the environment as intrinsically connected to the individuals within it, he often used the qualifier *ecological* when referring to the environment. His focus, in other words, was not simply on the environment, or context, but on the ecological system that included the developing individual (1976).

Bronfenbrenner defined the microsystem as the most proximal setting, with particular physical characteristics, in which a person is situated, such as the home, child care, playground, and place of work, and in which the developing person can interact in a face-to-face way with others (1974, 1979b). The setting is one in which activities and interpersonal roles and relations engaged in over time are the constitutive elements (1976, 1977c, 1978, 1979b).

He defined the mesosystem as the relations among two or more microsystems in which the developing person actively participates (1977c, 1978, 1979b). In other words, “the mesosystem is a system of microsystems” (1976, p. 163; 1977b, p. 46; 1978, p. 6; 1979b, p. 25). It is formed, or widened, each time an individual enters a new setting (1979b), and it is diminished when the opposite happens. The developmental characteristics of the mesosystem are similar to those of the microsystem, the main difference being that rather than the activities and interpersonal roles

and relations occurring within a single microsystem, they occur across settings (1979b). Given the contemporary propensity to study development in a single context, Bronfenbrenner presented a large number of testable hypotheses related to the ways in which the mesosystem might influence human development, as a way to encourage scholars to study development across settings (1979b).

Bronfenbrenner defined the exosystem as the “third circle of the ecological model” (1977c, p. 526), being an ecological setting in which the developing person of interest is not situated, and thus does not participate actively within it, but nonetheless experiences its influence (1977b, 1979b), and at times can also influence it (1979b), whether formally or informally (1976, 1977c, 1978). This effect is indirect, such as when what occurs in a parent's workplace has a follow-on effect within the home (assuming that the child is the developing person of interest) (1974, 1978). The exosystem has an important role in this first phase of the theory because politicians develop a given society's social policies within it. Bronfenbrenner (1974) had in mind programs such as those that facilitate young children's attending a child-care center and policy decisions about the type of care and education that children receive there.

The macrosystem differs fundamentally from the other levels of context, embracing the institutional systems of a culture or subculture, such as the economic, social, education, legal, and political systems (1976, 1978). Bronfenbrenner stated that the influence of the macrosystem on the other ecological settings is reflected in how the lower systems (e.g., family, school) function (1977b). The hallmark of the macrosystem is its overarching belief system or ideology (1979b). As a result, the daily experiences of children in any given societal, socioeconomic, ethnic, or religious group tend to be similar (1977b, 1979b). Macrosystem studies are those that compare systems with different basic patterns of social organization or those that deal with changes that fundamentally alter the characteristics of a given society (1977c).

During this phase Bronfenbrenner paid particular attention to the normative changes in roles and environments that occur in people's lives, terming this phenomenon an *ecological transition* (1976, 1977b, 1977c, 1978, 1979b). An ecological transition is a typical example of a mutual accommodation between an organism and its setting—in other words, the essence of what he conceptualized as the ecology of human development. In several of his papers, Bronfenbrenner placed the phenomenon at the level of the mesosystem (1977c, 1978), such as when a child goes from home to a child-care center or a young adult leaves school for the world of work. However, taking a broader perspective, he stated that it could occur in any of the four levels of the ecological environment across the entire life course (1979b). Thus, an ecological transition can occur given biological changes related to physical maturation or how individuals deal with those changes (1976, 1977c, 1978, 1979b), changes in the environment (1977b, 1977c, 1978, 1979b), or a combination of these factors (1979b). Its occurrence can be either a consequence or a motive for a developmental process (1979b) and exerts its impact not only on the developing person but also on the system of which that individual is a part, such as the family, a group of friends, and colleagues at work (1977c, 1978).

The operationalization of an ecological-transition study requires a “pre–post” design (1977b, 1977c, 1978, 1979b) with real situations and in natural settings (1978, 1979b), involving the same person in different activities and roles and almost always in more than one ecological

environment (1978). Bronfenbrenner pointed out three essential characteristics of ecological environments. First, they must be understood systemically or interdependently (1977c, 1978). Thus, what happens or fails to happen in any given environment depends to a large extent on events and relationships in other related environments (1976). The consequences for ecological research is that researchers must consider the interaction of systems in which people participate, not only the influence of (and their influence on) the immediate setting in which the developing individuals of interest are situated (1976, 1977b, 1977c, 1978).

Second, in ecological environments development occurs via processes, understood as modes of interaction among people (1973, 1977c), maintained in the course of reciprocal relations between them and with their environment (1973, 1976, 1977a, 1977b, 1977c, 1978). Bronfenbrenner therefore argued that researchers conducting ecological research must consider more than one person in the setting, including the researcher's own influence on the subject (1977a, 1977c, 1978). He termed *second-order effects* the effective participation of a third person ($N + 2$) in a developing person's life (1974, 1976, 1977a, 1977c, 1978, 1979a, 1979b), and *third-order effects* (1976) or *higher-order effects* (1976, 1978) those situations in which more people are involved.

Third, ecological environments are constituted in a phenomenological field that orients the developing person's actions and interactions (1976, 1978). The environment should thus be considered as it is perceived and understood by the person, meaning that it is partly constituted of the world of imagination, fantasy, and unreality (1977b). From a methodological perspective, a phenomenological analysis is the analysis of how each participant perceives the setting and the various elements contained within it (1976, 1977a, 1977c).

Bronfenbrenner stressed that human development involves both continuity and change. There is a progressive change in the person's characteristics over time and space (1975, 1978, 1979b), which signifies continuity both in the person and in the environment (1975), as well as changes by virtue of the dynamic relations among the person, the environment, and the other people within that environment, all engaged in reciprocal activities that (in other words, foreshadowing proximal processes) become progressively more complex (1973, 1977a, 1979a) in an enduring pattern of activities (1973, 1975, 1979a). "The growing person acquires a more extended, differentiated, and valid conception of the ecological environment, and becomes motivated and able to engage in activities that reveal the properties of, sustain, or restructure that environment at levels of similar or greater complexity in form and content" (1979b, p. 27). The child's development will be more successful if the relationships established in ecological environments are with people with whom the child has established a positive emotional attachment that is both mutual and permanent (1973, 1979a), if those environments provide the opportunity for the observing of and engaging in activities with the assistance of people who have better understanding and skill, and if they encourage the performance of skills acquired with help in other settings and in other relationships (1979a).

Phase 2 (1980–1993)

Motives and Influences

Bronfenbrenner's main goal in this period was to show the ways in which the environment was conceptualized, either theoretically or empirically, in contemporary research in human development and deal with a lacuna identified in his Phase 1 writings—the lack of any explanation of the role played by person characteristics in the course of development. These objectives were attained in various papers (1983, 1986a, 1986b, 1988, 1989; Bronfenbrenner & Crouter, 1983) in which he not only identified the different paradigms existing in the literature but also presented his own, ecological, paradigm (1993). As Bronfenbrenner himself affirmed, “from the scientist's perspective, perhaps the most important function of a review of existing knowledge in a particular area is to identify promising directions for future investigation” (1986a, p. 734).

However, he also identified a need to reassess, extend, and even renounce (1989) some aspects of what he had written in his 1979 volume. Specifically, in addition to paying greater attention to the role played by the individual in his or her own development, he attended more to processes of development and focused explicit attention on the passage of time. He also revised his concepts of development and of ecological environments (particularly the microsystem and macrosystem) and formulated a new research paradigm for the study of human development—a model first termed the Person-Process-Context model (1986a, 1986b; Bronfenbrenner & Crouter, 1983) and then the Process-Person-Context model (1988, 1989). This model would be revised and broadened in the next and final phase of the theory's development.

Among the authors who influenced Bronfenbrenner during this phase, several names stand out including several who had been influential in his Phase 1 thinking: Kurt Lewin, who was no longer cited for his topological notions of the environment but who provided the basic conceptualization from which came Bronfenbrenner's new definition of human development (1988, 1989, 1993); Lev Vygotsky and Alexander Luria, who strengthened Bronfenbrenner's perception of human development as a process varying as a function of the cultural context in which people are situated (1983, 1989, 1993); Glen Elder, who illustrated the chronosystem in his research; Cecil Mary Drillien, a doctor and professor of children's health and welfare, who provided data that proved highly relevant for the Process-Person-Context model (1989); and Anne Crouter, who coauthored the influential 1983 *Handbook* chapter.

Concepts and Definitions

Several of Bronfenbrenner's papers during Phase 2 focused on the different types of research models that had been used in contemporary studies of human development. He and Crouter defined a research model as “the conceptualization of the environment, and its role in development, that is explicit in the operational definitions employed by the investigator” (Bronfenbrenner & Crouter, 1983, p. 359). Bronfenbrenner used this conceptualization as he sought to trace the evolution of such models used in research in this area.

Social-address models are those that are based on the geographic or social locale in which people live. “The design involves nothing more than comparison of the psychological characteristics of children or adults living in different social environments (e.g., class, nationality, family structure, etc.)” (1986b, p. 289). The model's main limitation is that human development is treated as though it were solely dependent on environmental factors (1989), and it reveals neither the

processes by which the environment influences the developing individual nor the person characteristics implicated in that process (1983, 1986a, 1988; Bronfenbrenner & Crouter, 1983). As a result, Bronfenbrenner argued, studies using this model do not provide any data capable of guiding future interventions on structure or process that could affect the course of development (1986a, 1986b). Moreover, proponents of this model assume that all individuals living in the same environment are equally affected by it, regardless of their biological or psychological characteristics (1988).

Person-context models move beyond social-address models in that they include participants' person characteristics (e.g., sex, biological condition) of the different groups under consideration. This allows a variety of combinations of person characteristics and contexts in the analysis of development (1988, 1989). However, this model still is limited in its ability to describe development because it is unable to explain the process by which it occurs (1988).

Process-context models allow the evaluation of the influence of some external setting on a specific developmental feature, such as the impact of parents' workplace experiences on the dynamics and functioning of the family (1986a). In this model, the processes that translate the contextual experiences into development are explicated, including not only the objective behaviors occurring in any given interaction but also the relevant subjective psychological states, such as beliefs and opinions of the interacting individuals (1988).

Person-process-context models are those in which the developmental outcomes are viewed as stemming from interactions of the person and the context (1986b, 1988; Bronfenbrenner & Crouter, 1983), thereby emphasizing the process whereby the developmental outcome was attained (1989). Bronfenbrenner cited Drillien's research with premature and full-term babies as one example of evidence of the interaction between biological and environmental forces acting in conjunction and leading the person (the baby) to developmentally appropriate outcomes. In this model "the term synergism is used to describe a phenomena ... in which the joint operation of two or more forces produces an effect that is greater than the sum of the individual effects" (Bronfenbrenner, 1989, p. 199).

Despite the major advance of this model in comparison to the others, Bronfenbrenner alerted readers to its limitations, referring specifically to the fact that scholars did not refer to characteristics of all of the individuals involved in any given interaction (1986a). For example, Bronfenbrenner (1989) examined the ways in which Drillien's study was conducted to assess the developmental outcomes relating to mothers' interactions with their babies. In this study, the outcomes were analyzed taking into account the interactions and processes mediated by maternal responsiveness to their baby's solicitations as a function of both the environment (family socioeconomic status and neighborhood) and person characteristics (the baby's birth weight). However, the responsiveness of the babies toward their mothers was not considered. In other words, the relation was examined only in a unidirectional, not bidirectional, fashion.

Another problem that was generally noted in this and the other models was the absence of any consideration of time as an important component of the research. This meant, Bronfenbrenner argued, that researchers generally did not take into account development as a process of

continuity and change (1988). Those who did take it into account were using, he suggested, a chronosystem model.

Chronosystem models are those in which time is treated as being as important as the environment for human development (1986a, 1986b, 1988, 1989). Researchers using this model take into account changes that occur over the individual's lifetime caused by events or experiences (1989). These experiences may stem from the external environment (e.g., a sibling's birth, going to school, parents separating) or within the developing individual's own organism (e.g., entering puberty, becoming ill) (1988, 1989). Such changes can either be normative, when the change is expected, such as school entry, or nonnormative, when the occurrence is unexpected, such as the sudden death or serious illness of a family member (1986b, 1988). The main characteristic of these experiences or events is that “they alter the existing relation between person and environment, thus creating a dynamic that may instigate developmental change” (Bronfenbrenner, 1989, p. 201). Bronfenbrenner (1989) stressed that research using this model should accompany the developing individuals of choice before and after the events assumed to influence development have happened. One study that Bronfenbrenner often discussed to exemplify this model was Elder's research about the impact of the Great Depression on the lives of American children, adolescents, and adults (1986b, 1989, 1993).

The ecological paradigm. At the end of his discussion of the various paradigms found in contemporary research on human development, Bronfenbrenner (1993) presented the ecological paradigm as that in which development is viewed as a function that involves interactions over time between a person and those individuals with whom he or she has face-to-face interactions in the immediate settings in which the person is situated. He then described the characteristics that should be part of any ecological study, including those both of the individuals concerned and of the environments. He paid particular attention to what he referred to as a person's “instigative characteristics,” namely those that invited or discouraged reactions from the environment, either promoting or disrupting psychological growth (e.g., calm or fussy babies) and qualities that involve an active orientation or interaction with the environment, such as a child's initiative to initiate or maintain reciprocal interactions with parents or other caregivers (1989, 1993). “Both types of developmentally instigative characteristics, when manifested over time in particular settings, tend to evoke complementary patterns of continuing environmental feedback, thus creating progressively more complex developmental trajectories that exhibit continuity through time” (1989, p. 219). In the subsequent, and final, phase of the theory's development, Bronfenbrenner would describe in more detail these person characteristics and their active influence on developmental processes.

In similar fashion, Bronfenbrenner noted instigative characteristics of the environment—those that could serve in a constructive or destructive way. In the first case are objects and places that invite manipulation and exploration and thus promote developmental processes; in the second are those environments characterized by instability, unpredictability, and the absence of any clear structure, characteristics that are prejudicial to development (1993).

During this phase, some changes were also introduced in the concepts of the microsystem and macrosystem, in particular the emphasis given to the processes that occur in each of these contexts. At the microsystem level Bronfenbrenner stressed the psychological characteristics of

all the individuals present in the immediate setting in which interpersonal interactions occur. The microsystem was thus defined as a pattern of interpersonal relations experienced face-to-face in a given environment “containing other persons with distinctive characteristics of temperament, personality, and systems of belief” (1989, p. 227). These relations, which influence the distinctive patterns of psychological functioning, are altered as a function of the setting in which the developing person is situated (1993).

To understand the influence of culture, developed over historical time, on developing individuals, Bronfenbrenner relied, in part, on Vygotsky's and Luria's ideas. He thus redefined the concept of the macrosystem as “the overarching pattern of micro-, meso-, and exosystems characteristic of a given culture, subculture, or other extended social structure” (1993, p. 25). This extended structure refers to a pattern of “similar belief system, social and economic resources, hazards, life-styles, etc. [such as] social classes, ethnic or religious groups” (1989, p. 229). He continued as follows:

To the extent that it is practically possible, every study of development in context should include a contrast between at least two macrosystems. In terms of research design, this means that, whatever questions or hypotheses are under investigation, the analysis is conducted separately for each macro-domain, thus making it possible to determine the extent to which the hypothesized processes operate in the same way in different macrosystems. (1989, p. 231)

His 1993 paper included the same requirement, but he did not mention it in any of his subsequent Phase 3 publications.

Revising his earlier notion of the individual, Bronfenbrenner (1993) emphasized the nature of the person as a “highly complex biopsychological organism—characterized by a distinctive complex of evolving interrelated, dynamic capacities for thought, feeling, and action” (p. 7), from which one can deduce his concern to make more explicit the participation of the person in his or her own development. Continuing to cite Vygotsky and Luria, Bronfenbrenner emphasized the interaction of biological factors and the contexts in which people develop:

It is true that individuals can and often do modify, select, reconstruct, and even create their environments. But this capacity emerges only to the extent that the person has been enabled to engage in self-directed action as a joint function not only of his biological endowment but also of the environment in which he or she developed. There is not one without the other. (1989, pp. 223–224)

Bronfenbrenner, in this second phase, thus started to deal explicitly with the lacuna many identified in his writings up to and including 1979—the absence of a clear presentation of characteristics of the person and how they contribute to developmental processes. However, the challenge of constructing a framework for considering person characteristics, similar to that of context, was met only in the third and final phase of his writings.

Phase 3 (1993–2006)

Motives and Influences

The primary objective of this phase of the development of the theory was to show how individual characteristics, in conjunction with aspects of the context, both spatial and temporal, influence what Bronfenbrenner now called proximal processes—the “engines of development” (Bronfenbrenner & Evans, 2000, p. 118). In this final version of his theory, named both the bioecological theory and the bioecological model of human development, Bronfenbrenner gave pride of place to proximal processes (1994, 1995b, 1999, 2000, 2001; Bronfenbrenner & Ceci, 1993, 1994; Bronfenbrenner & Morris, 1998, 2006) and included the Process-Person-Context-Time (PPCT) model of how to conduct bioecological research (1995b, 1999, 2000, 2001; Bronfenbrenner & Morris, 1998, 2006).

To show how the PPCT model operated, Bronfenbrenner relied heavily on others' research—from Drillien's work published in the 1960s through Elder's study of the Great Depression to Steinberg and colleagues' research into the effects of different parenting practices on adolescent outcomes. The results, and even more evidently the methods, of Drillien's research provided clear support for Bronfenbrenner's position that proximal processes were the most powerful predictor of human development (1994, 1999, 2000; Bronfenbrenner & Ceci, 1993, 1994; Bronfenbrenner & Morris, 1998, 2006). Elder's research also contributed greatly, as it showed the clear impact of historical time on development (1994, 1999, 2001; Bronfenbrenner & Ceci, 1994; Bronfenbrenner & Evans, 2000; Bronfenbrenner & Morris, 1998, 2006). However, it is also worth noting that Lewin's influence can still be seen in Bronfenbrenner's view that ecological environments should be understood as involving the phenomenological field of a developing person, formed by a set of nested structures (1994, 1995a). During this phase, Bronfenbrenner continued his development of a theory that could lead, via public policy, to improving the living conditions for children, adolescents, and their families by optimizing developmental outcomes (1994, 1995b, 2000, 2001; Bronfenbrenner & Ceci, 1994; Bronfenbrenner & Evans, 2000; Bronfenbrenner & Morris, 1998, 2006).

Definitions and Concepts

If in the first phase it was necessary to explain Bronfenbrenner's conception of an ecology of human development, in this third and final phase it is necessary to describe what he meant by the bioecology of human development. Bronfenbrenner defined the bioecological model as “an evolving theoretical system for the scientific study of human development over time” (2001, pp. 6963–6964; Bronfenbrenner & Morris, 2006, p. 793). This system presupposes that the four elements of which it is formed (process, person, context, time) simultaneously influence human beings' developmental outcomes; their effects are not merely additive (1999).

Proximal processes. Describing the change from an ecological to a bioecological model, Bronfenbrenner emphasized the role played by the person in his or her own development by means of a mechanism termed proximal processes. Proximal processes are the center of bioecological theory and are viewed as the driving forces of human development (1999, 2000, 2001; Bronfenbrenner & Evans, 2000; Bronfenbrenner & Morris, 1998, 2006). Two propositions, provided in each of his publications during this phase, lay out the properties of proximal processes and the manner in which they operate:

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 henceforth as proximal processes. . . . Proposition 2 [states that] the form, power, content, and direction of the proximal processes that affect development vary systematically as a joint function of the characteristics of the developing person and the environment (both immediate and more remote) in which the processes are taking place and the nature of the developmental outcomes under consideration. (Bronfenbrenner & Ceci, 1993, p. 317)

Almost identical wording, with the addition of phrasing that included time from 1995 onward, can be found in any of his most recent papers (1994, p. 1644; 1995b, pp. 620–621; 1999, p. 5; 2000, p. 130; 2001, pp. 6964–6965; Bronfenbrenner & Ceci, 1994, p. 572; Bronfenbrenner & Evans, 2000, pp. 117–118; Bronfenbrenner & Morris, 1998, p. 996; 2006, pp. 797–798).

The analyses conducted by Bronfenbrenner regarding proximal process indicated that he considered them as almost always acting in a positive way on developmental outcomes, whether by promoting outcomes of competence or by diminishing the possibility of dysfunctional outcomes (1994; Bronfenbrenner & Ceci, 1993, 1994; Bronfenbrenner & Morris, 1998, 2006). The first, and probably unique, consideration of the possibility that proximal processes could promote dysfunctional outcomes can be found in his paper coauthored with Evans (2000). Drawing on Bronfenbrenner and Morris (1998), Bronfenbrenner and Evans defined competence as the “demonstrated acquisition and further development of knowledge, skill, or ability to conduct and direct one's own behavior across situations and developmental domains” (p. 118). They defined dysfunction as “the recurrent manifestation of difficulties in maintaining control and integration of behavior across situations and different domains of development” (p. 118). Bronfenbrenner and Evans then went on to ask the crucial question, although they left the answer unstated: “If proximal processes are indeed the ‘engines of development,’ what are the differences between those that produce dysfunction vs. competence?” (p. 118).

An important function of proximal processes is their potential to transform genotypic characteristics into phenotypes, actualizing genetic potential and thus improving “effective developmental functioning” (Bronfenbrenner & Ceci, 1994). To explain this, the coauthors discussed three hypotheses, namely: (a) “heritability (h^2) will be higher when proximal processes are strong and lower when such processes are weak” (p. 572); (b) “proximal processes actualize genetic potentials both for enhancing functional competence and for reducing degrees of dysfunction” (p. 578); and (c) “the power of proximal processes to actualize genetic potentials for developmental competence . . . will be greater in advantaged and stable environments than in those that are disadvantaged and disorganized” (p. 578).

On the basis of many nontheoretical papers that he wrote, discussing others' research into the conditions under which children and families would thrive, Bronfenbrenner concluded that proximal processes would have greater chance of promoting outcomes of developmental

competence in more stable and advantageous environments. By contrast, in settings that are unstable and disadvantageous, proximal processes would function by avoiding or slowing outcomes of developmental dysfunction (1994, 2000, 2001; Bronfenbrenner & Ceci, 1994; Bronfenbrenner & Morris, 1998, 2006). These hypotheses are clearly related to the conviction that public policy, if planned on the basis of bioecological theory, could improve the ecological environments in which human beings live and thus lead to developmental outcomes of competence (1999; Bronfenbrenner & Ceci, 1994). He also argued that the developmental power of proximal processes would also be increased if they occurred among people who developed a strong emotional relationship (2000, 2001; Bronfenbrenner & Evans, 2000; Bronfenbrenner & Morris, 1998, 2006).

Proximal processes involve not only relationships among people but also relations between people and the objects and symbols with which they come into contact; however, Bronfenbrenner paid little attention to relations with objects and symbols, with the exception of a single page in his chapters published with Morris (1998, 2006) and a paragraph in his 1999 chapter. When engaging in solo activities, only with objects and/or symbols, a person's "own disposition and resources would play a far stronger role in affecting the direction and power of the proximal process than in the case of interpersonal interaction" (Bronfenbrenner & Morris, 2006, p. 814), just as characteristics of the setting also become more relevant (Bronfenbrenner & Morris, 1998, 2006).

Person characteristics. Bronfenbrenner described three types of person characteristics as part of the second *P* of PPCT. The characteristic of force (or "disposition"; 1995b) is considered the most likely to influence a person's developmental outcomes, whether in a generative or disruptive manner. Generative force characteristics are those that initiate or sustain proximal processes, whereas those that are disruptive can impede or interrupt them (Bronfenbrenner & Morris, 1998, 2006). Generative force characteristics "involve such active orientations as curiosity, tendency to initiate and engage in activity alone or with others, responsiveness to initiatives by others, and readiness to defer immediate gratification to pursue long-term goals" (Bronfenbrenner & Morris, 1998, p. 1009; 2006, p. 810). By contrast, individuals with disruptive force characteristics tend toward "impulsiveness, explosiveness, distractibility, inability to defer gratification, or, in a more extreme form, [readily] resort to aggression and violence" (Bronfenbrenner & Morris, 1998, p. 1009; 2006, p. 810).

Resource characteristics are those that influence a person's ability to engage effectively in proximal processes (Bronfenbrenner & Morris, 1998, 2006). Those that activate development include "ability, knowledge, skill, and experience," whereas resources that limit or disrupt proximal processes "include genetic defects, low birthweight, physical handicaps, severe and persistent illness, or damage to brain function" (Bronfenbrenner & Morris, 2006, p. 812).

Demand characteristics are those easily noted qualities of the developing person that can invite or discourage reactions from the social environment, influencing the way in which proximal processes are established. Bronfenbrenner and Morris (2006) provided examples of demand characteristics as an agitated or calm temperament, attractive versus unattractive appearance, and hyperactivity and passivity. They also mentioned other characteristics that could be immediately

seen, such as age, gender, and skin color, all of which can affect the establishment of proximal processes.

Finally, emphasizing the role of person characteristics in his new bioecological model, Bronfenbrenner highlighted the fact that they appear twice in this new conceptualization of human development. They first appear as one of the components of the model and therefore as an influence on development and, at the same time, as a developmental outcome (1995a, 1995b, 2000; Bronfenbrenner & Morris, 1998, 2006).

Context. Context, about which so much was written in earlier phases of the theory, received much less attention in this third and final phase. Without further modifications to those that had been developed in the first two phases, Bronfenbrenner (1994, 1999) restricted himself to providing definitions of the four “systems” of context. Bronfenbrenner and Morris (1998, 2006) made clear that proximal processes, whether involving solitary interaction with objects or symbols or interaction with one or more other social partners, occur within microsystems, but that the other systems of context are also influential. However, it is particularly striking that the macrosystem, to which particular attention had been paid in 1979, 1989, and 1993, is only briefly discussed once (1994) in this entire phase. Bronfenbrenner and Morris (1998, 2006) discussed Steinberg, Darling, and Fletcher's (1995) research on adolescents from groups that are distinguished by ethnicity (which had been considered “subcultural” aspects of the macrosystem in the previous phase) as though it were related to the mesosystem and exosystem rather than to the macrosystem.

Time. Finally, time is included in the model, building on what Bronfenbrenner had earlier termed the *chronosystem* (1988). In the bioecological model, however, the concept of time was broadened to include what happens over the course of both ontogenetic and historical time. Inspired by Elder's (1974) research, Bronfenbrenner stated, “The individual's own developmental life course is seen as embedded in and powerfully shaped by conditions and events occurring during the historical period through which the person lives” (1995b, p. 641; 1999, p. 20).

In his publications of 1998 and 2006, in collaboration with Morris, Bronfenbrenner called further attention to the importance of time, in different senses. They described it as having three levels: microtime, mesotime, and macrotime. Microtime refers to “continuity versus discontinuity in ongoing episodes of proximal process,” mesotime has to do with how often these episodes occur over days and weeks, and macrotime “focuses on the changing expectations and events in the larger society, both within and across generations” (2006, p. 796). Integrating each of these aspects into the bioecological model, Bronfenbrenner and Morris defined human development as “the phenomenon of continuity and change in the biopsychological characteristics of human beings, both as individuals and as groups ... over the life course, across successive generations, and through historical time, both past and future” (2006, p. 793).

As Bronfenbrenner had already shown in his ecological theory, in the bioecological model the notion of stability and change occurs within a phenomenological perspective. Such a perspective considers not only the objective properties of the setting in which the person is acting and interacting but also the subjective properties, as experienced by the person (2001; Bronfenbrenner & Evans, 2000; Bronfenbrenner & Morris, 1998, 2006).

Operationally, the bioecological model proposes methods for evaluating developmental outcomes that emerge as a result of the active participation of the four components of the PPCT model: process, person, context, and time. Bronfenbrenner also was convinced that the ideal method of study using his model was one of the “discovery” type, namely a method that includes all of the elements of the model, revealing their interdependence, given the available data, and that allows the elaboration of successive studies that are progressively more complex (1995a, 2000, 2001; Bronfenbrenner & Morris, 1998, 2006).

Discussion

Bronfenbrenner's theory-related publications from 1973 to 2006 reveal clearly the extent to which the theory evolved. The first phase was characterized by a description of ecological contexts, making clear the social nature of the process of human development. In this phase one can find the fullest description of the different levels of the ecological environment in which human beings develop. Human beings are described as not only the product but also the producer of their own development, but little explicit attention was paid to the role of the individual in this phase.

The importance of the second phase is in Bronfenbrenner's discussion of the evolution of various research paradigms, with particular attention paid to the distinction between paradigms that either do or do not permit researchers an assessment of processes that might explain how development occurs. In this phase, Bronfenbrenner also made the first major modifications to the theory, in particularly paying more explicit attention to the role played by the person in development, to processes of development, to culture and subculture as important parts of the macrosystem, and to the chronosystem.

The third phase constitutes the mature form of the theory, in which proximal processes are considered the primary driving force of development and the role of person characteristics is given far more weight as one of the two main factors (the other being the environment) that influence the functioning of proximal processes. Although Bronfenbrenner himself marked the beginning of the final version of the theory from 1998 (Bronfenbrenner & Evans, 2000), in fact, the change was first signaled in a paper coauthored with Ceci (1993), in which the authors for the first time referred to the theory as a bioecological theory, placed proximal processes as the driving force for development, and included the two central propositions describing proximal processes and how they are influenced. Although Bronfenbrenner and Morris's (1998) chapter included many more examples of research that supported the model, the only substantive change was to refer to the model with which the theory could be tested as a PPCT model (in Bronfenbrenner's 1994 paper he still referred to it as a PPC model and included time as the chronosystem, the temporal equivalent of the spatial context).

In the earlier versions of the theory, Bronfenbrenner had represented the person, topologically, in the center of various circles, organized in levels from the most proximal to the most distal from the person, representing the various contexts (micro to macro) in which he or she was situated. That idea of enveloping circles, represented as the nested “matrioshka” (Russian dolls) continued to be used in the latest versions: “Today, as then, ‘the ecological environment is conceived as a

set of nested structures, each inside the other like a set of Russian dolls' (Bronfenbrenner, 1979b, p. 3)" (Bronfenbrenner & Morris, 2006, p. 814). In our opinion, however, this metaphor does not do adequate justice to Bronfenbrenner's position that each of the systems is interrelated. Moreover, the mesosystem is not a layer outside the microsystem but a relationship between or among microsystems.

It is interesting to note that as Bronfenbrenner paid more attention to proximal processes and the ways in which they were influenced by both characteristics of the people involved in those processes and the contexts (microsystems) in which the processes occur, he largely ignored the macrosystem. Cultural and subcultural sets of values and practices, and the ways in which they influence processes of development, about which he had written at some length during the second phase of the theory's development, were left unmentioned in the third and final phase, even when citing at length Steinberg et al.'s (1995) research dealing with different ethnic groups in the United States.

Nonetheless, despite the fact that Bronfenbrenner had paid more attention to the contexts in which development occurs during the first two phases, it is important to note that he never considered context as separate from the person, as should have been clear from his consistent use of the word *ecology* to signify the interplay between the environment and the individuals who are active within their environments. The change from *ecology* to *bioecology* in the theory's name was a result, no doubt, of a strategy to make yet more explicit the participation of the person in his or her own development. The fact that his colleague and subsequent collaborator had used the term in a book title (Ceci, 1990) also was a likely influence.

Despite the fact that even during the first decade of this century many scholars continued to treat Bronfenbrenner's theory as one of contextual influences on human development (Tudge et al., 2009), it was always far more subtle, even from the start. Perhaps because the theory was so consistently referred to as a theory of context (usually with reference to the set of circles representing the levels of environment), Bronfenbrenner was forced to be clearer, in the second and third phases, about how person characteristics (in conjunction with the environment) influenced people's own development.

It is easy to argue that persons and environments are mutually implicated in human development, but it is more difficult to explain how that functions. This issue clearly occupied Bronfenbrenner's thinking from the second phase onward. First, he introduced an adaptation of Lewin's formula—namely, that development is a function of the interaction between person and environment—and then tried to show, in different ways, how that function operated. Initially, he considered this in terms of process, making the argument that field-theoretical studies (as opposed to class-theoretical studies) included methods designed to show *how* one or more aspects of the environment, for example, actually influenced human development. In other words, Bronfenbrenner's notion of process, during the second phase, was as an explanatory mechanism.

In the third and final phase he became far more explicit about the mechanism, now viewed as the engine or driving force of development and termed proximal processes. As he laid out in the first of the two crucial propositions relating to proximal processes, these are the types of everyday

activities and interactions (with objects, symbols, and other persons) in which individuals are actively and consistently engaged. In the second proposition he argued that these proximal processes are mutually influenced by person characteristics and by the environment and, explicitly from 1998 onward, by what has happened and is currently happening in historical time.

The growing attention to time is another clear change in the evolution of the theory. Despite the fact that Bronfenbrenner and Morris wrote, “The 1979 volume scarcely mentions the term [time] whereas in the current formulation, it has a prominent place” (1998, p. 995), Elder’s (1974) work on the life course as affected by historical time had been covered extensively in the 1979 book, and the theory, from its inception, was a theory of human development, with a clear focus on continuity and change. Time, and timing, was therefore necessarily implicated. Nonetheless (and again no doubt because the theory was so consistently, and erroneously, viewed as a theory of context), Bronfenbrenner found it necessary, in the second and third phases of the theory’s development, to call increasing attention to the role of time.

The changes can be seen not simply in Bronfenbrenner’s use of the term *chronosystem* (from 1986 to 2006) to stress historical time, but even in the changes to Lewin’s formula. Thus, in 1988 the formula appeared simply as $D = f(PE)$, but in 1989 it became $D_t = f_{(t-p)}(PE)_{(t-p)}$, with t representing time at which an outcome is observed and $t-p$ representing the period during which the person and environment were jointly operating to produce that developmental outcome. In effect nothing has been added to the formula except the explicit acknowledgment that processes of development involving an interplay of person and environment necessarily takes some degree of time. This formula no longer appears in the third phase of the theory’s evolution, but time has become part of the PPCT model itself, and just as person characteristics were clearly distinguished in this phase, the impact of time was not only covered in terms of developmental outcomes but also broken apart into three (micro, exo, and macro time).

As Tudge et al. (2009) pointed out, all theories undergo evolution. That is true whether one considers a theorist such as Vygotsky, who was actively involved in theory construction for little more than a dozen years, or for theorists such as Piaget or Bandura, who were theorizing for decades. The changes in Bronfenbrenner’s theory are easier to see than most, because he often reflected on his own process of “re-assessing, revising, and extending—and even renouncing—some of the conceptions set forth in [the] 1979 monograph” (Bronfenbrenner, 1989, p. 187). A decade later he stated that “it is useful to distinguish two periods: the first ending with the publication of the *Ecology of Human Development* (Bronfenbrenner, 1979) and the second characterized by a series of papers that call the original model into question” (1999, p. 4). Thus there really is no reason for continuing to treat Bronfenbrenner’s theory as one of contextual influences on development, or for ignoring the focus, during the third and final phase, on proximal processes and the use of the PPCT model as a guide for research using the bioecological theory. To the extent to which one goal of research is to test theory and support, modify, or discard it, a valid test can only be one that is actually based on the theory’s main tenets. As we mentioned earlier, scholars may choose to base their research on an earlier version of the theory—but then they should be explicit about that. Otherwise theoretical incoherence will result from the label “Bronfenbrenner’s theory” being used to describe versions that are quite different from one another. We hope that this article will contribute to a more effective use and

testing of Bronfenbrenner's theory in its mature form, the fruit of an entire lifetime of theory development.

Note

We acknowledge the generous support of Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) for the postdoctoral scholarship provided to the first author to study at the University of North Carolina, Greensboro (UNCG), and for the scholarship to support the second author's visiting professorship at the Federal University of Rio Grande do Sul. The second author is also grateful to UNCG for the provision of a research leave that facilitated the completion of this article.

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