Uses and misuses of Bronfenbrenner's bioecological theory of human development

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Abstract:

This paper evaluates the application of Bronfenbrenner's bioecological theory as it is represented in empirical work on families and their relationships. We describe the "mature" form of bioecological theory of the mid-1990s and beyond, with its focus on proximal processes at the center of the Process-Person-Context-Time model. We then examine 25 papers published since 2001, all explicitly described as being based on Bronfenbrenner's theory, and show that all but 4 rely on outmoded versions of the theory, resulting in conceptual confusion and inadequate testing of the theory.

Keywords: bioecological theory | Bronfenbrenner | ecological theory | PPCT Process–Person–Context–Time model | proximal processes

Article:

A number of scholars (see, e.g., Goldhaber, 2000; Guba & Lincoln, 1994; Richters, 1997; Tudge, 2008; Winegar, 1997) have argued convincingly that there should be a tight connection between one's theory, the methods that one uses, and one's analytic strategy. The meaning of theory in any scientific field is to provide a framework within which to explain connections among the phenomena under study and to provide insights leading to the discovery of new connections. Although we recognize that any theory is a representation of reality, among its purposes are those of providing researchers with a common scientific language and guiding empirical studies in such a way as to allow findings from different studies to be evaluated with a common rubric. The goal of much empirical work, on the other hand, besides acquiring new information, is to test the accuracy and goodness of fit of theories that aim to describe the phenomena under study. Some researchers argue that their initial work is deliberately atheoretical (as in the application of grounded theory methods) or purely inductive (descriptive studies). Many empirical studies, however, are guided by some theoretical framework from which the researcher operates,

consciously or not. In the latter case, for the clarity and integrity of scientific thought as well as for compatibility of findings, it is important to make explicit the theoretical framework on which the research is based.

Another benefit of making a theory explicit while conducting or reporting a study is in enhancing the understanding of a particular theory, either by providing supporting or nonsupporting evidence. An empirical study that does not properly represent a theory on which it is based, however, creates a twofold disservice. First, it misleads students and fellow researchers about the contents and propositions of the theory, thus providing a flawed heuristic tool. Second, it prevents a fair test of the theory, thus not allowing useful adjustments to be made.

The main goal of this paper is to present the essence of Urie Bronfenbrenner's bioecological theory in its "mature" form and examine the ways contemporary family and developmental scholars use and misuse it in empirical studies. After a brief overview of the origins and developments in bioecological theory, we present the key elements and propositions of the theory in greater detail. Then, we use a sample of 25 empirical studies, said to be explicitly based on Bronfenbrenner's theory, to examine the ways in which the theory was applied and to discuss the appropriateness of application. Finally, we consider a number of possible explanations for the misapplications that we identify.

Our goal in this paper is thus to evaluate the ways in which Bronfenbrenner's theory has been used in recently published research. Our intention is to assess the extent to which the theory was accurately represented and the research methods or analyses were linked to the theory. Initially, therefore, we will describe the theory as it developed into its mature form.

A Brief Overview of Bronfenbrenner's Theory

Bronfenbrenner's theory of human development is a theory that was, until Bronfenbrenner died in 2005, in a continual state of development. This is, of course, true of all theories; one cannot give an adequate account of Piaget's theory by describing only his earliest books. This point does not simply apply to theories that are developed over the course of a half century; Vygotsky, for example, was actively engaged in psychology for only a little more than a decade, but three distinct phases can be identified, and scholars need to distinguish among them when describing his theory (Tudge & Scrimsher, 2003). Bronfenbrenner, however, was a very self-reflective theorist and fairly frequently noted the changing nature of his theory. For example, he wrote: "I have been pursuing a hidden agenda: that of re-assessing, revising, and extending—as well as regretting and even renouncing—some of the conceptions set forth in my 1979 monograph" (Bronfenbrenner, 1989, p. 187). He was most explicit about this reassessment in his 1999 chapter, where 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" (p. 4). His earlier theorizing gave pride of place to aspects of the context (the famous concepts of microsystem, mesosystem, exosystem, and macrosystem), whereas he later engaged in self-criticism for discounting the role the person plays in his or her own development and for focusing too much on context (Bronfenbrenner, 1989). Interesting concepts such as molar activities, ecological

experiments, ecological validity, and ecological transitions, given an important role in his earliest work (Bronfenbrenner, 1977, 1979), virtually disappeared from his later writings.

Nonetheless, although Bronfenbrenner (1989, 1999) argued that the 1977 and 1979 versions of the theory had been altered, revised, and extended, his theory was always (and explicitly) ecological, stressing person-context interrelatedness (Tudge, Gray & Hogan, 1997). In none of his theory-related writings, even the earliest, did he focus exclusively on contextual factors. The single most important difference from his early writings is the later concern with *processes* of human development. In some of the chapters written in the 1980s (Bronfenbrenner, 1988; Bronfenbrenner & Crouter, 1983), he referred to "process" as that which could explain the connection between some aspect of the context (culture or social class, for example) or some aspect of the individual (e.g., gender) and an outcome of interest. It was only in the 1990s, however, that *proximal processes* were defined as the key factor in development (Bronfenbrenner, 1994, 1995, 1999; Bronfenbrenner & Ceci, 1994; Bronfenbrenner & Morris, 1998). It was also from this time onward that he discussed the Process-Person-Context-Time model (PPCT for short) that has become the essence of his theory (Bronfenbrenner, 2005; Bronfenbrenner & Evans, 2000; Bronfenbrenner & Morris, 2006).

Scholars may, of course, choose to use an earlier version of the theory as the foundation of their research; they may also choose to base their study on only some of the major concepts of the developed version. In either case, however, this needs to be stated explicitly; neither the field nor the theory is well served if the study's authors write that they are using "Bronfenbrenner's ecological theory" or "Bronfenbrenner's bioecological model" but instead use an earlier or partial version of the theory. Conceptual incoherence is likely to result when studies, written in the first decade of this century, are all described as being based on Bronfenbrenner's theory but some use ideas taken from the 1970s or 1980s and others from the 1990s. The full theory in its developed form deals with the interrelations among the following four PPCT concepts.

Process

Of these the first concept plays the crucial role (the "primary mechanisms") in development. Proximal processes feature in two central "propositions" that appear in several of Bronfenbrenner's later publications. The first states:

> [H]uman 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 external 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*. (Bronfenbrenner & Morris, 1998, p. 996, italics in the original)

The examples that he provided ("playing with a young child; child-child activities; group or solitary play, reading, learning new skills" and so on) are the types of things that regularly go on in the lives of developing individuals. They constitute the engines of development because it is by engaging in these activities and interactions that individuals come to make sense of their

world and understand their place in it, and both play their part in changing the prevailing order while fitting into the existing one.

As Bronfenbrenner made increasingly explicit, perhaps responding to the fact that he continued to be cited as a theorist of context, on the basis of his 1979 book, proximal processes are fundamental to the theory. The nature of proximal processes, however, varies according to aspects of the individual and of the context—both spatial and temporal (Bronfenbrenner, 1995, 1999, 2001/2005; Bronfenbrenner & Evans, 2000; Bronfenbrenner & Morris, 1998). As he explained in the second of the two central propositions:

> 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; the nature of the *developmental outcomes* under consideration; and the social continuities and changes occurring over *time* through the life course and the historical period during which the person has lived. (Bronfenbrenner & Morris, 1998, p. 996, italics in the original)

Bronfenbrenner stated that these two propositions "are theoretically interdependent and subject to empirical test. An operational research design that permits their simultaneous investigation is referred to as a *Process-Person-Context-Time model*" (Bronfenbrenner & Morris, 1998, p. 996). Thus, in order to implement a study that is guided by bioecological theory, all four elements of the model should be present. If a research design, for whatever reason, does not permit adequate assessment of one or more of the elements, this fact should be clearly acknowledged in order to preserve the integrity of the theory.

Person

Bronfenbrenner acknowledged the relevance of biological and genetic aspects of the person (Bronfenbrenner, 2001/2005; Bronfenbrenner & Ceci, 1994). He devoted more attention, however, to the personal characteristics that individuals bring with them into any social situation (Bronfenbrenner, 1993, 1995; Bronfenbrenner & Morris, 1998). He divided these characteristics into three types, which he termed *demand, resource*, and *force* characteristics. Demand characteristics are those to which he had referred in earlier writings as "personal stimulus" characteristics, those that act as an immediate stimulus to another person, such as age, gender, skin color, and physical appearance. These types of characteristics may influence initial interactions because of the expectations formed immediately. Resource characteristics, by contrast, are not immediately apparent, though sometimes they are induced, with differing degrees of accuracy, from the demand characteristics that are seen. These are characteristics that relate partly to mental and emotional resources such as past experiences, skills, and intelligence and also to social and material resources (access to good food, housing, caring parents, educational opportunities appropriate to the needs of the particular society, and so on). Finally, force characteristics are those that have to do with differences of temperament, motivation, persistence, and the like. According to Bronfenbrenner, two children may have equal resource characteristics, but their developmental trajectories will be quite different if one is motivated to succeed and persists in tasks and the other is not motivated and does not persist.

Although Bronfenbrenner, even in his earliest writings, was never a theorist simply dealing with contextual influences on development, as many authors imply, he, in his later writings, provided a clearer view of individuals' roles in changing their context. The change can be relatively passive (a person changes the environment simply by being in it, to the extent that others react to him or her differently on the basis of demand characteristics such as age, gender, and skin color), to more active (the ways in which the person changes the environment are linked to his or her resource characteristics, whether physical, mental, or emotional), to most active (the extent to which the person changes the environment is linked, in part, to the desire and drive to do so, or force characteristics).

Context

The environment, or context, involves four interrelated systems. The first is any environment, such as home, school, or peer group, in which the developing person spends a good deal of time engaging in activities and interactions (i.e., the microsystem). As people spend time in more than one microsystem, Bronfenbrenner wrote about the interrelations among them (i.e., the mesosystem). There are also important contexts in which the individuals whose development is being considered are not actually situated but which have important indirect influences on their development (i.e., the exosystem). An example of an exosystem effect is the following: A mother has been particularly stressed at work and, as a result, behaves more irritably than usual with her son when she gets home. The mother's work is an exosystem for the child because he spends no time there, but it has an indirect influence on him. Finally, Bronfenbrenner defined the macrosystem as a context encompassing any group ("culture, subculture, or other extended social structure") whose members share value or belief systems, "resources, hazards, lifestyles, opportunity structures, life course options and patterns of social interchange" (1993, p. 25). The macrosystem envelops the remaining systems, influencing (and being influenced by) all of them. A particular cultural group may share a set of values, but for any particular value system to have any influence on a developing person it has to be experienced within one or more of the microsystems in which that person is situated.

Time

The final element of the PPCT model is time. As befits any theory of human *development*, time plays a crucial role in the theory. In the same way that both context and individual factors are divided into subfactors, Bronfenbrenner and Morris (1998) wrote about time as constituting micro-time (what is occurring during the course of some specific activity or interaction), meso-time (the extent to which activities and interactions occur with some consistency in the developing person's environment), and macro-time (the chronosystem, to use the term that Bronfenbrenner had earlier used). The latter term refers to the fact that developmental processes are likely to vary according to the specific historical events that are occurring as the developing individuals are at one age or another. This latter sense is captured best in research such as that of Elder (1974, 1996), who was able to demonstrate significant variation in the developmental trajectories of people from two cohorts, born in the same geographical area but just 10 years apart. Each cohort experienced the effects of the Great Depression in the United States (and

subsequent historical events) completely differently because they experienced each of these events at a different point in the life course.

Time, as well as timing, is equally important because all aspects of the PPCT model can be thought of in terms of relative constancy and change. This is true whether one is thinking about developing individuals themselves, the types of activities and interactions in which they engage, or the various microsystems in which they are situated. Moreover, cultures also are continually undergoing change, although at some periods of historical time the rates of change are much faster than at others.

Research based on the mature version of Bronfenbrenner's theory should therefore include each of the elements of the PPCT model if it is to qualify as a complete test of the model. Partial tests are, of course, possible, but should be identified as such. It is impossible, however, to treat a study as being based on the mature version if its design does not involve a focus on the critical element of *Process* (proximal processes) or an assessment (observation or from interviews or questionnaires) of the types of typical activities and interactions believed to be relevant for the study participants' developmental outcomes of interest. To understand how *Person* characteristics influence those proximal processes, the minimum requirement would be to assess the ways in which a demand characteristic, such as age, appearance, or gender, altered these activities and interactions, although a richer design would examine the ways in which relevant resource or force characteristics of the study participants influenced the ways in which they acted and interacted. *Context*, too, influences proximal processes, and the minimum requirement would be to evaluate the differential influence of two microsystems (home and school, for example) or two macrosystems (middle- and working-class families or adolescents from different cultural groups) on the activities and interactions of interest. Finally, regarding *Time*, the study should be longitudinal (to evaluate the influence of proximal processes, as they are mutually influenced by person characteristics and context, on the developmental outcomes of interest) and should take into account what is occurring, in the group being studied, at the current point of historical time.

The focus of this paper is thus to evaluate the extent to which contemporary scholars are appropriately using Bronfenbrenner's theory in its developed form in the design of their studies. Obviously, papers written prior to the late 1990s could not be expected to discuss the theory in its mature form, and we therefore restricted our search to those papers published from 2001 to March 2008 whose authors stated explicitly that their research was based on Bronfenbrenner's theory. We excluded from consideration those papers in which authors specified that they were using an earlier version of his theory or that they were using a limited set of concepts from the theory. These are perfectly acceptable approaches, and these authors in no way imply that they are basing their research on the mature or complete version of the theory. Many other authors, however, stated explicitly that their work was based on Bronfenbrenner's theory but in fact only considered an earlier version of the theory or treated the theory as though it only related to person-environment relations. These papers, we believe, are unhelpful to the field, implying either that the theory has not developed since the 1970s or 1980s or that it can be reduced to something far more limited.

Method

To find studies for evaluation, we conducted an extensive search of PsycINFO, Education Index, EBSCOhost, ProQuest, Google, and Google Scholar, using the following keyword search: Bronfenbrenner, PPCT, ecological theory, ecological systems theory, bioecological theory, and process–person–context–time. Search options provided by some publishing houses (Sage, for example) were also used to search within specific journals. We do not claim to have located all articles published in English between 2001 and March 2008 in which the researchers stated that their study was based on Bronfenbrenner's theory; our search was extensive but not exhaustive. Nonetheless, we were able to locate 25 published studies that met our criteria.

Results, or Uses and Misuses of the Theory

Appropriate Uses of Bronfenbrenner's Theory

Of these 25 studies, we found only 4 in which the authors based their research on the mature form of Bronfenbrenner's theory, that is, by using at least three of the PPCT concepts, including proximal processes. Adamsons, O'Brien, and Pasley (2007), Campbell, Pungelo, and Miller-Johnson (2002), Riggins-Caspers, Cadoret, Knutson, and Langbehn (2003), and Tudge, Odero, Hogan, and Etz (2003) presented the theory in its mature form and tested theoretical assumptions through appropriate research designs.

Adamsons and her colleagues (2007) examined the differences in father involvement and quality of father-child interactions between biological father and stepfathers and did so by explicitly linking them to the four elements of the PPCT model. The secondary data analyses and cross-sectional nature of the study placed certain limitations on the authors' ability to implement fully the PPCT model, and we disagree with the authors' position that time was incorporated by simply considering how long the stepfather had been a part of the family. This variable does not represent the element of time as Bronfenbrenner conceived it. In the case of this study, it would have been sufficient to acknowledge that time was not measured because of the constraints of the research design and treat the lacuna as one of the limitations of the study.

Fathers were considered as the developing persons of interest because father involvement and quality of father interactions with his child were the outcomes being considered. Thus, the person element was assessed through fathers' position in the family (biological or stepfather), age, race, parenting beliefs, and fathers' levels of marital satisfaction. The authors also included child gender as a person characteristic of an individual (child) with whom the developing person of interest (the father) was interacting. Although Adamsons et al. (2007) state that the cross-sectional nature of the analyses did not permit the examination of development as process and that their conceptualization of process may differ from that of Bronfenbrenner, we find their assessment of quality of father-child engagement a reasonable representation of proximal process.

Overall, we felt that Adamsons and her colleagues (2007) adequately used the PPCT model in their research: The authors discussed all components of the theory, acknowledged the minor differences in conceptualization or absence of certain elements, considered their findings from Bronfenbrenner's theoretical perspective, and provided directions for future research that would

better and more fully incorporate bioecological theory in examining fathers' involvement with their children.

We also felt that the paper by Riggins-Caspers and her colleagues (2003) outlined nicely the key propositions of bioecological theory, drawing on Bronfenbrenner and Ceci (1994). The study's purpose was to assess biology-environment interactions through psychopathological contributions of biological and adoptive parents and their adopted adolescents' problem behavior as a result of harsh discipline. The authors explained clearly the links between variables in their study and all of the elements of Bronfenbrenner's model. Proximal processes were assessed through the children's adoptive parents' harsh disciplinary techniques, which were found to be influenced both by person characteristics of the children (their predisposition to problem behavior, as assessed by their biological parents' degree of psychopathology) and by the environment (low or moderate level of adoptive parents' psychopathology). Unfortunately, this measure of environment was inferred from person-related characteristics (drug and alcohol problems, legal difficulties, depression, anxiety, and other psychological problem) and not assessed directly as the theory requires. The outcome of interest was the children's current expression of problem behavior, which was found to be influenced both by childhood predispositions and by the level of their adoptive parents' psychopathology.

In their discussion and conclusion, Riggins-Caspers et al. (2003) evaluated their results through the lens of bioecological theory, addressing the limitations of their study in a theoretically appropriate way (particularly that their approach to time had relied on a retrospective, rather than prospective longitudinal, approach) and stating directions for future research from the theoretical as well as empirical standpoint. Beside the inferred nature of the context variable, this study serves as a good example of an empirical test of the PPCT model.

The final two papers that we thought not only well described and used Bronfenbrenner's theory in its mature form but also were able to include time in their use of the PPCT model were those of Campbell et al. (2002) and Tudge and his colleagues (2003). Campbell and her colleagues stated that they were basing their research “on Bronfenbrenner's (Bronfenbrenner & Morris, 1998) ecological model in which interactions among personal characteristics, proximal processes, contexts, and time combine to affect developmental outcomes” (p. 278). The measures of proximal processes that the authors used included early educational interventions and the quality of family functioning, as assessed by the HOME scale, when the children were young. Early achievement scores were used as the main measure of person characteristics. All children were from low-income African American families, which meant that it was impossible to assess the ways in which proximal processes differentially operated in two different macrosystems (see Bronfenbrenner, 1993), but the study, being longitudinal, could examine the interrelated impact of each process, person, and context over time. Campbell and her colleagues returned in the paper's conclusion to the theory to point out that the model was supported in assessing the development of adolescents' feelings of self-worth.

In the research conducted by Tudge and his colleagues (2003), proximal processes were assessed via children's typically occurring interactions with objects, materials, and people within their most common microsystems (home and child-care setting). This was accomplished by observing each child in the study for a total of 20 hours. Person characteristics, specifically

developmentally instigative characteristics, were also assessed in parents and children. For example, the authors measured parents' beliefs about childrearing and the children's motivation in choosing and sustaining activities. As for context, two macrosystems were assessed—middle-class and working-class families from a single city in the southeastern United States. Finally, time was included in the study as the assessed child outcomes at three ages—the observations of everyday activities and interactions were conducted when the children were 3 years old, and their teachers' perception of their academic competence was assessed at the end of the children's first and second years of school. This study, we felt, did a good job of applying Bronfenbrenner's theory in a systematic fashion.

Misuses of Bronfenbrenner's Theory

The remaining papers fall into three main groups. In each group, authors stated explicitly that they were using "Bronfenbrenner's theory," "Bronfenbrenner's bioecological model," or a synonym. Those in the first group, however, used primarily Bronfenbrenner's writings from the 1970s, those in the second group included references from the 1980s, and the final group drew explicitly on Bronfenbrenner's work from the 1990s but without paying attention to what lies at the heart of the mature theory—proximal processes. Even in the 1970s the theory was not about contextual influences on development but on context-individual interactions, and from 1994 the theory was quite explicit that proximal processes were the "engines of development" and that they were modified by both the context and the individuals engaged in those proximal processes. As noted above, authors wishing to test an earlier version of the theory may, of course, do so, but in that case they must make explicit their intention. Failure to do that, and ignoring the major changes to the theory, constitutes a misrepresentation of the theory.

In the first group, the authors treated the theory as though it either dealt solely with contextual influences on development or on contextual and individual characteristics, but without any attention paid to proximal processes. Three of the papers (those by Weigel, Martin, & Bennett, 2005; Ying & Han, 2006; Yu & Stiffman, 2007) focused attention exclusively on one or more of the contextual "systems" on which Bronfenbrenner concentrated in his 1979 book. Many of the other authors in this group (Atzaba-Poria, Pike, & Deater-Deckard, 2004; Drake, Jonson-Reid, & Sapokaite, 2006; Kulik & Rayyan, 2006; Schwebel & Brezausek, 2007) focused primarily on contextual influences on development, although they also discussed individual influences. Two sets of authors (Atzaba-Poria & Pike, 2008; Stewart, 2007) took seriously the interactional nature of the theory as it existed in the late 1970s; an ecological position is one that focuses on individual-environment interrelations. Stewart sought to "determine the ecological factors (i.e., characteristics of the person and of the environment) that contribute to the academic achievement of African American adolescents" (p. 17), and Atzaba-Poria and Pike proposed that "parents' behavior is influenced by child characteristics … the proximal social context … and the more distal social context" (p. 18). In none of these cases, however, was there any mention of proximal processes, let alone an attempt to measure them.

The second group consists of seven papers (Chenoweth & Galliher, 2004; Dalla, 2004; Grogan-Kaylor & Otis, 2007; Johnston, Swim, Saltsman, Deater-Deckard, & Petrill, 2007; Jones, Forehand, Brody, & Amistead, 2003; Singal, 2006; Voydanoff, 2005) whose authors relied primarily on Bronfenbrenner's ideas from the 1980s. Each set of authors focused their main

attention on contextual factors, although they all noted the importance of individual factors. Chenoweth and Galliher stated that ecological systems theory served as the theoretical basis for their study of students' college aspirations, but cited two sources (Bronfenbrenner, 1977, 1986), neither of which explicitly referred to ecological systems theory. Furthermore, they stated: "Bronfenbrenner proposed that human development should be studied using a contextual approach, taking into account the many possible influences of the environment upon a child" (p. 1), treating the theory as one simply dealing with contextual influences. Similarly, Singal wrote about adopting Bronfenbrenner's "eco-systemic framework" but referred only to ideas from 1979 and the 1992 reprint of the 1989 chapter. Moreover, she conceptualized the framework in the following terms: "Providing an imagery of the nested set of Russian dolls, Bronfenbrenner argues that various immediate and distant forces affect an individual's development" (p. 240). Not surprisingly, given this conceptualization of the theory, Singal placed exclusive attention to the various contextual systems. Voydanoff also wrote that she was using Bronfenbrenner's "ecological systems approach as a framework" (p. 667), citing Bronfenbrenner (1989), but although her data on work-family linkages could have been analyzed in the type of systemic way that Bronfenbrenner was advocating at that time, Voydanoff treated the theory as though it dealt exclusively with microsystem and mesosystem influences on development. Nonetheless, none of these studies involved the type of systemic person-process-context analysis for which Bronfenbrenner had argued from 1983 to 1989, let alone any consideration of the mature form of the theory.

Jones et al. (2003) argued that they were "extrapolating" from Bronfenbrenner's (1979, 1989) position that "multiple environments … in which families live cannot be viewed as mutually exclusive but rather as 'systems' that jointly influence familial behavior" (p. 437). To be fair, Jones and her colleagues included in their study of parental monitoring both "structural variables" (e.g., characteristics of the family and the neighborhood) and "psychological variables" (maternal depression, child problem behavior, and coparenting conflict) that may influence parental monitoring. They failed, however, to acknowledge or examine the person-context interactional aspects of the 1970s and 1980s versions of Bronfenbrenner's theory. Grogan-Kaylor and Otis (2007) did better in this regard, although they relied on the 1979 book and one paper from the 1980s, as did Dalla (2004), who relied on the 1989 chapter. In both papers development was assumed to be a joint function of the person and the environment, and person characteristics were included as an important component of development. Dalla also mentioned components of the chronosystem, building on Bronfenbrenner's position that historical events and situations impact development. Johnston et al. (2007) cited Bronfenbrenner (1986) as well as the 1979 book and argued that they were using a person–process–context design, first discussed in Bronfenbrenner and Crouter (1983). Unfortunately, from the point of view of application of the mature form of the theory, "process" at this time was not yet conceptualized as proximal processes and had yet to be placed at the forefront of the theory. Moreover, there is little evidence, at least from this paper, that Johnston and her colleagues considered processes in the way that Bronfenbrenner, in the mature form of the theory, stipulated, although they had data that could have been used for this purpose. For example, they were interested in "the extent to which mothers engaged in racial, ethnic, and cultural socialization practices; and the relation between racial, ethnic, and cultural socialization and child adjustment" (p. 398). Their measure of cultural socialization practices asked mothers the extent to which they engaged in various practices, with possible responses ranging from *several*

times a week to *never*. Furthermore, the authors also took into account both the adopted children's age and their country of birth (Korea or China). In principle, therefore, it would have been possible to analyze these data using the PPCT model.

Finally, a further five sets of authors (Butera, 2005; Hossain, 2001; Jordan, 2005; McDougall, DeWit, King, Miller, & Killip, 2004; Warren, 2005) at least cited work from the 1990s in which the mature form of the theory could be found. Unfortunately, this did not prevent the authors of three of these papers from treating the theory as though it were simply a theory of contextual influences on developing individuals. For example, Jordan stated that she was using ecological systems theory to study media use in the home and school. She wrote, however; "The research is framed by Bronfenbrenner and Morris's (1998) conceptualization that children grow up in a series of nested environments" (p. 525). In his study of young children's television viewing, Warren wrote explicitly about trying to "test Bronfenbrenner's theory" (p. 850) by establishing a "hypothesized set of relationships [that] closely parallels Bronfenbrenner's (1979, 2001) ecological theory of child development" (p. 849). Hossain studied the division of household labor and household functioning among Navajo families not living on reservations and argued that the findings "lend support to the use of the human ecology model in understanding the cultural context of family roles and functioning (Bronfenbrenner & Morris, 1998)" (pp. 258–259). It was thus surprising to see no mention of the PPCT model, and no attempt to assess proximal processes, in either study. Instead, Warren focused solely on the four contextual systems of development, from micro to macro, and Hossain also treated the theory as though it simply dealt with the impact of context, stating; "Such environmental factors as one's family, cultural values, economic practices, and historical events have important bearing on the making and shaping of gender roles in a particular cultural setting" (p. 256).

Butera (2005) also cited the 1998 paper but argued that this perspective "can be used to examine the systems that surround children and their families and deepen our understanding of the effects of contextual variables on collaboration and special education" (p. 107). Perhaps not surprisingly, the remaining citations are almost exclusively to Bronfenbrenner's 1979 book. However, although Butera had nothing to say about the PPCT model, she acknowledged clearly the transactional nature of even the early form of the theory and stated that "individual characteristics make a considerable contribution to outcomes" (p. 114).

Finally, McDougall et al. (2004) also drew on several of Bronfenbrenner's papers from the 1990s to describe his bioecological perspective as one involving the interplay of person characteristics, contextual factors, and proximal processes. The authors found clear relations between person characteristics (age, sex, and academic achievement) and contextual factors (including socioeconomic status, ethnicity, and the school culture) but explicitly treated peer and student-teacher interactions as an aspect of their primary contextual factor (school culture) rather than as proximal processes. McDougall and her colleagues also ignored the fourth aspect of the PPCT model and, although they noted the problem of conducting a purely cross-sectional study, did not describe this as a theoretical limitation.

Discussion

If, as we argued at the start of this paper, theory has an important role to play in developmental and family studies, it is surely necessary to apply it correctly in research. Failure to do so means that it has not been tested appropriately; data apparently supporting the theory do no such thing if the theory has been incorrectly described, and, by the same token, a misrepresented theory is impervious to attack from nonsupportive data.

What can explain the fact that, of these 25 papers published between 2001 and 2008, only 4 used the mature form of the theory and appeared to have used it appropriately in their research? One possible reason is that some scholars merely want to provide some general theoretical support for their view that the contexts in which developing individuals exist have an influence on their development or that both contexts and the individuals themselves are influential. This truism hardly needs to be supported theoretically, and these authors could have contented themselves simply by citing Bronfenbrenner; they stated, however, that their research was based on or informed by his theory, or model, or framework.

Could it be the case that some scholars who state that they are drawing on his theory are unaware of the changes in Bronfenbrenner's theory? There is perhaps some justification for researchers to be unaware of some book chapters (e.g., Bronfenbrenner, 1993, 1994, 1995, 1999) because they may not be as easily accessible as articles published in peer-reviewed journals. Bronfenbrenner's book (1979), in which he laid out an early version of his theory, may be so widely known as to overshadow completely some chapters that appeared later. One can hardly argue, however, that a chapter from the 1998 *Handbook of Child Development* is hard to find. There seems little justification to state that one is relying on a theory whose own author noted the extent to which it had changed (see Bronfenbrenner, 1989, 1999) and use material only or primarily from the 1970s, as was the case with the authors of no fewer than nine of these papers. Worse, these authors treated the theory as though it was purely a theory about the various systems of context and their influences on development, thereby missing the ecological nature of the theory even in its earliest form.

Other scholars at least used a more up-to-date version of the theory, from the 1980s, when Bronfenbrenner described the importance of process as something that linked person and context. Even then, however, despite stating correctly that he termed his theory “ecological systems theory” (Bronfenbrenner, 1989), these authors did not actually apply the systems part of the theory in their research, despite writing that their research was based on it. At best, some of the authors acknowledged the fact that one had to examine the interdependent roles of the developing individuals and the contexts in which they were situated, though others from this second group continued to write as though Bronfenbrenner was simply a theorist interested in contextual influences on development.

Furthermore, it was not necessarily the case that citing the theory in its mature form (Bronfenbrenner, 1994, 1995, 2001/2005; Bronfenbrenner & Ceci, 1994; Bronfenbrenner & Morris, 1998) was sufficient to ensure that the theory was applied correctly in research. Of the nine papers whose authors drew on Bronfenbrenner's work from the 1990s, no fewer than four still treated the theory as though it were primarily a theory of contextual influences or of person-context interaction without any consideration of the core feature of the theory—proximal processes. The authors of only four of these papers actually wrote about the process–person–

context–time model and tried to apply it in their research. Innumerable authors include in their research some contextual variable (social class, for example) and an individual characteristic, such as gender, and may test for class-gender interactions in their outcomes of interest. The research may well be interesting, but it would not constitute a test of Bronfenbrenner's theory.

We do not believe that researchers who base their work on a specific theory have to use the latest version of that theory or the theory in its entirety. Researchers can obviously choose to draw on specific concepts from the theory or on an older version. But in this case, surely this more limited goal needs to be clearly specified or one can be accused of a lack of conceptual or theoretical clarity. We do not think that researchers would be taken seriously if their research was said to be a test of Piaget's theory but took no account of any of his thinking from the 1960s onward (when he moved from writing primarily about stages of development, or structural aspects, to a greater focus on mechanisms of change). Similarly, one would not consider research to be an adequate test of Bandura's social cognitive theory if the scholar only cited Bandura's early work on social learning theory. It is thus unfortunate, to say the least, that so many scholars (and the reviewers of their scholarship) seem to be able to treat Bronfenbrenner's theory as though it was simply a theory of microsystem or macrosystem influences on development.

The final reason for scholars not treating seriously the mature form of Bronfenbrenner's theory may be that it is viewed as simply too difficult to translate effectively into research. Bronfenbrenner himself did not make these connections as clear as he might have; in none of his writings did he provide a clear methodological guide to help in the application of the theory. Nor did he write about any of his own research as a way of showing how he applied an appropriate method, preferring instead to comment on others' research, none of which was designed specifically as a test of the theory. Moreover, if one considers designing a study that includes each and every aspect of the theory, the research would indeed be a large and complex study. Consider, for example, all that he wrote about the different types of important person characteristics—demand, force, and resource—as well as genetic attributes, the four different contextual systems, and the three aspects of time (micro, meso, and macro), that include both collecting data over time and situating the research into its historical time. In addition, to study proximal processes, the most important part of the mature theory, requires collecting data about regularly occurring interactions and activities with the important people, symbols, and objects in the developing individuals' lives.

However, Bronfenbrenner never implied (let alone stated outright) that every aspect had to be included within any study. His position was rather straightforward: A study involving the PPCT model should focus on proximal processes, showing how they are influenced both by characteristics of the developing individual and by the context in which they occur and showing how they are implicated in relevant developmental outcomes. The simplest research application could examine, for example, the ways in which regularly occurring parent-child interactions vary by an important characteristic of the child (gender would be the easiest, though not necessarily the best) and by some relevant aspect of the context (perhaps different ethnic/racial or social-class groups), with data collected over at least two points in time, choosing some outcome viewed as being relevant to parent-child interaction. Methods for collecting the parent-child interaction data vary but would need to be adequate to assess interactional patterns that occur

regularly. Even so, a study of this type does not seem so difficult to carry out effectively and would serve as an adequate application of Bronfenbrenner's theory.

In conclusion, we think that scholars are doing the field of human development and family studies a disservice by stating that they are basing their research on a theoretical foundation but neither taking that theory seriously enough to consider its development nor attempting to use methods that are theoretically relevant. Unlike theories such as those of Piaget or Vygotsky, Bronfenbrenner's theory is eminently accessible to English-speaking scholars. To consider his ideas as simply relating to contextual influences on development or even as a plea to examine person-environment interrelations is to do his theory a gross disservice. This theory has a great potential to allow us insight and understanding of the processes of human development and deserves to be tested appropriately.

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