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# Werner's Relevance for Contemporary Developmental Psychology

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Heinz Werner's contributions to contemporary developmental psychology are considered in terms of 3 major books that form the cornerstones of his enterprise. The fit or lack of it between Werner's theory and current practices of developmental psychologists is evaluated, and the tensions between his theory and those practices are identified. The core issue explored is the relation between what Werner identified as a developmental "topic" and the means by which topics are studied in practice. The mismatch between the Wernerian topic and the topics in the field is then used as a way of clarifying the relevance of Werner's theory to contemporary developmental issues and as a way of identifying some of the misinterpretations of his works.

When a field formally undertakes an examination of its past, it is often a way of finding its present. The search for history accomplishes, intentionally or not, two related goals. On the one hand, the past is constructed so as to legitimize the present by giving it a history, grounding some current practices and understandings in a tradition, leading from the past, that seems to point to the present. The present is then seen as an extension of the fundamental insights of that past. On the other hand, finding a history can be a way of relegating figures of potentially contemporary relevance to "history" and, hence, outside of the domain of current interests. In both of these senses, finding one's history is really a way of constructing oneself in the present. These processes are particularly apparent in the '80s and '90s, during which this process of selective construction is seen at an accelerated pace, with figures at temporal distance treated as contemporaries and some more historically proximal thinkers put in the past as historical relics.

At the outset then, I must confess a certain tension in presenting Heinz Werner as part of a historical series of articles. I am not sure that he belongs there. In many senses, although he is currently mostly forgotten, those of us who trained with him or who occupied the same departmental space cannot treat him as part of history. In some respects, Werner was a very modern thinker whose theoretical views were so at variance with normal professional practices that his message is yet to be heard.

Werner died in 1964, approximately 30 years after Vygotsky and 16 years before Piaget. If you attempt to judge Werner's impact on the field from the volume of citations in current references in journals, books, or book chapters, it would seem that his psychology has had little impact. In cases in which he is cited, it appears that his views have been transcended by better information or more modern conceptualizations. Many of the remaining citations of Werner put him even more firmly in the past by putting his work on the wrong side of areas of contemporary consensus, particularly with respect to what are presented as his views about psychological functioning in non-Western societies (e.g., LCHC [Laboratory of Comparative Human Cognition], 1983).

Particularly in comparison to his rough contemporaries, Vygotsky or Piaget, Werner seems to have precipitously faded from view. The volume of references to Vygotsky has been increasing, markedly it seems, in recent years. New volumes on Vygotsky continue to appear (Moll, 1990; Wertsch, 1985, among many others), and new translations of his works are forthcoming. Volume 1 of the Plenum Press translation of the Russian edition of Vygotsky's collected works appeared in 1987, with four more volumes forthcoming. Piaget is still an obligatory comparison point to frame, at the least, a systematic alternative to current positions. New volumes of Piaget's work have appeared in French as late as 1990—*Morphismes et categories: Comparer et transformer* [Morphisms and Categories: Comparison and Transformation] and as late as 1987 in English—*Possibility and Necessity: Vol. 2. The Role of Necessity in Cognitive Development.*

In contrast, Werner's last publication, *Symbol Formation,* coauthored with Bernard Kaplan, appeared in 1963. Werner is seldom cited in mainstream literature, and there is very little in the way of secondary scholarship devoted to working out, clarifying, or otherwise integrating his views within the context of contemporary debate. A chapter dedicated to Werner's theoretical ideas was dropped somewhere between the 3rd and 4th editions of the *Manual of Child Psychology.*

All of this could be understandable as the inevitable result of the passage of time since Werner's last publication. As publications become more and more historically remote, they come to be cited less and less. Interestingly, thanks to the historical factors and the vagaries of posthumous editing and translation, developmental psychology in the United States is, at this moment, currently witnessing a reversal of normal historical process. Some very old manuscripts are seeing the light of day for the first time and appearing with current publication dates. There are good reasons for this. Vygotsky, for example, had published in the (then) Soviet Union and was sufficiently controversial so that much of his writing did not go public, in English or in Russian. Therefore, discovery of Vygotsky is, in part, truly a contemporary discovery. But people are not simply

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discovering Vygotsky because he is there for the discovery; his discovery makes sense with respect to current interests and practices. I suspect that if there were to be found an undiscovered portion of Werner's work—unpublished manuscripts in great profusion—a discovery and secondary scholarship industry would not develop.

The thesis of this article is that Werner has faded from view in large part because his core message is perceived to be out of synch with the contemporary construction of the interests and, particularly, the practices of developmental psychologists. Indeed, in some areas, Werner's fading from view is related to his being too close to some contemporary concerns but seeming to be at too great a variance from contemporary consensus.

Because some of the judgment of the irrelevance of Werner to contemporary issues is based on a misunderstanding of his views, the body of this article restates some of the core elements of Werner's approach in a more contemporary idiom. It is my suspicion that this journey to the dustbin of history may well yield some precious finds that the field is at peril to ignore.

## Reference Points: Key Publications

Although Heinz Werner published profusely in areas as diverse as mental retardation (e.g., Werner, 1945; Werner & Strauss, 1942) and visual and auditory form perception (Werner, 1935, 1940), his core works are represented in three books, each of which represents a different body of work and scholarship, differing not only in topic but also in method. *Comparative Psychology of Mental Development* was initially published in German in 1926 and was continuously updated thereafter (the last edition was in 1957). This book is largely literature oriented, with numerous citations to other people's studies in psychology, biology, anthropology, and other related fields. Werner's contribution was an attempt to see large general themes that underlay an astoundingly diverse literature and to conceptualize all of these themes within a comprehensive developmental framework. This work is most often treated as representative of Werner's theoretical thinking, and it has drawn contemporary fire when cited at all. *Perceptual Development* (coauthored with Seymour Wapner) presents the results of extensive experimental work on perceptual processes, bundled under the general heading of sensori-tonic field theory (Wapner & Werner, 1957). *Symbol Formation* (coauthored with Bernard Kaplan) also presents extensive work, both experimental and descriptive, on language development and the relation of language activity to other developing functions (Werner & Kaplan, 1963).

Although seemingly diverse, these core publications relate to one another. Although researchers in the field seem to understand Werner in terms set out in *Comparative Psychology of Mental Development* (Werner, 1957), those who worked with him understood his work in terms of a larger enterprise, encompassed by the three key works.

## Background

In many respects, Werner was preoccupied with some of the same sorts of problems that preoccupied Piaget. His roots lay in a continental intellectual tradition heavily influenced by Kant and neo-Kantian philosophers such as Cassirer. Kant had identified a rich presuppositional structure of human thinking and experiences. These conditions of the possibility of thinking were posed as logically prior to experience, because they were the necessary forms within which experience took place. Hence they were posited as the a priori or necessary substrate of experience. Put succinctly, the Kantian assertion of the a priori seemed to leave no room for development. The problem that both Piaget and Werner attempted to solve was how to provide an account of development while at the same time recognizing the fundamental insight provided by Kant.

Werner's search was not unlike Piaget's in many respects. Both were concerned with the attempt to reconcile the fundamental insight of the Kantian position—that experience presupposed an underlying level that made for the conditions of the possibility of having that experience—with the need to account for developmental transformation without a simple appeal to biological preformation. Piaget's answer was to focus on the growth of logic and to develop a systematic alternative account, which saw the Kantian forms as resulting from a process of construction over the early years of life. Piaget's interest was in the constructive mechanisms, whether those be called assimilation, accommodation, organization or, later, equilibration and reflective abstraction, which could be used to account for the constructive moments in the development of cognitive functions.

Werner's most proximate influence was Gestalt psychology, not the Berlin School (Kohler, Koffka, or Goldstein) but the Leipsig gestalt group (e.g., Felix Sanders). The Berlin gestalt group followed an essentially Kantian quest, seeing a priori structures as the ground for perceptual organization. The gestalt laws posed by this group were timeless or autochthonous and hence were seen as a perceptual equivalent to Kantian categories. In contrast, the Leipsig gestalt school saw the laws of perceptual organization as stemming from a developmental process of formation. What to the Berlin gestalt group were such elementary forms as the segregation of a perceptual field into figure and ground were taken by the Leipsig gestalt group as results of a developmental process. In one of his most prescient studies, Werner (1935) anticipated the technique of backward masking by showing that the development of a contour (which separates a figure from a ground) took microdevelopmental time to be accomplished and that if the temporal process was interrupted, the contour would never be seen (and was therefore backwardly masked).

However, beyond the mere assertion that things take time to develop, Werner was early on struck by the directionality and ubiquity of developmental changes. Not only did things take time to develop—whether in phylogenesis, ontogenesis, or microgenesis—the direction of those changes displayed an orderly progression, unfolding a succession of organizational forms that succeeded one another in a lawlike fashion.

Although sharing with Piaget an interest in providing a developmental account of the a priori, Werner conceptualized the problem of development more radically. Whereas Piaget methodologically isolated a set of functions—the cognitive functions—and sought the principles of their development, Werner took as his unit of analysis the concept of development itself and

sought to trace developmental changes in a wider field and in broader terms.

This search led Werner in two directions, which seem, on the surface, to be contradictory. On the one hand, Werner adopted an *organismic* perspective, by which he sought answers to the problem of the development of the a priori in the way in which organismic functions related to one another. On the other hand, Werner adopted a *comparative* perspective, casting his search for developmental principles more widely into cultural areas.

In this regard, elements of Werner's project shared some features in common with Vygotsky's approach. Development does not proceed unaided or uncontexted. For Werner, it is half an answer to talk of the organismic without at the same time talking about the context within which the organism functions. And, because organisms grow in different cultures, some of the story of the development of the a priori had to be told by coreference to the story of cultural development. For this aspect of his approach, Werner borrowed heavily from the parallel work of Ernst Cassirer (1953, 1955, 1957) in philosophy.

However, Werner differed from Vygotsky, too. As much as it is half an answer to talk about the organismic without the cultural, so also is it half an answer to talk of the cultural without the organismic. The problem, as Werner posed it, was to find a way of talking about development within which these two perspectives could be seen in relation to each other.

## Core Themes

Werner's developmental psychology is not just older, it is fundamentally different from current conceptions of the problem of accounting for development. Indeed, some of the construction of Werner as relic involves a lack of understanding of some of his most basic ideas. This misunderstanding is itself understandable, because the words that Werner used seem to be familiar. However, as understood within Werner's enterprise, these familiar words referred to unfamiliar concepts, grounded in intellectual traditions that are outside of the traditions shared by most American developmental psychologists. Indeed, if the core messages were fully assimilated, Werner's developmental psychology would likely prove too radical for contemporary tastes.

Werner's conceptual system is distinguished by several sets of core ideas, each of which stands at some variance with current theory and practice. In this article, I focus on three of the core ideas that serve to most clearly distance Werner from contemporary conceptualizations within developmental psychology but that ironically serve to ally him quite closely with modern developments in other fields.

### *Development as Heuristic, Not as Phenomenon*

Perhaps the greatest mismatch between contemporary practice and the core of Werner's approach concerns the relation of the concept of "development" as defined by Werner to the topics studied by contemporary developmental psychologists and the way in which such knowledge with respect to a topic is constructed.

For Werner, development was not a substantive topic area. Rather, it was a way of studying things. Developmental theory was, from his perspective, not an explanation of changes that might be observed with age; it did not really have particularly much to do with age changes at all. It was rather a standpoint for interrogating phenomena. It was a set of questions that investigators posed to themselves about the nature of the phenomena they were studying.

This method was grounded in Werner's wide-ranging investigations of development presented in his synoptic book, *Comparative Psychology of Mental Development* (Werner, 1957), in which development was seen as a two-aspect process: differentiation of organismic functions from a primordial global and undifferentiated state to a state of hierarchic integration of the differentiated parts. This "orthogenetic" principle of development had radical implications that served to make Wernerian psychology fundamentally different from other developmental views. The most radical implication was that the topic of developmental study was by no means clear.

Werner's question was of the form, "given an organism and its development, how do the various functions of that organism's development emerge as studyable entities?" Thus, rather than being able to start with language, cognition, logic, or whatever, Werner started with the notion of an organism, which would eventually develop into an organism with differentiated functions, each of which could then be studied. The study of their development would necessarily, within this view, take account of the current level of differentiation of a specific function from the others. Development could then be seen, not as the historical story of a given function at different levels of organization, but rather as a set of qualitatively distinct states marked by varying levels of intrafunctional organization at varying levels of interfunctional organization.

Seen in this way, the problem of the study of development doubled. Traditional conceptualizations of the problem were well geared to examine intrafunctional developmental changes. Research designs or observational paradigms are, in fact, particularly well suited to look at various levels of a common target function. Where they run into difficulty is when the function that is methodologically segregated for study is not segregated within the organism. Werner always questioned the level of independence of a function as well as its history. And when this question is raised, the study of development becomes complex in ways that challenge available experimental techniques. Rather than looking, for example, at cognitive development in infants, one would look at infants with an eye toward whether there was such a thing as a separable and differentiated cognitive function within them.

This view of the problem makes the study of development far more complex than traditional approaches that take the entities to be studied for granted and trace their history. Although this aspect of Werner's thinking puts him at variance with ordinary practices within professionalized developmental psychology, it simultaneously allies him more closely with various postmodernist approaches in other disciplines. The postmodernist perspective sees the entities that are studied as products of particular practices that "form" them for study. It doubles the enquiry so that one must not only account for the laws of the entity as they are proposed within theories, but one must also account for the processes of "entification" that form the entities into the things that are then studied.

This fact alone makes Werner easily fated for extinction, because this way of theorizing, while perhaps suitable for philosophical and literary journals, is at variance with the normal practices of developmental psychologists. In normal practice, researchers address themselves to a literature by following some topic and then aligning various theories and research findings with respect to that topic. Theoretical ideas must be ideas of sufficient concreteness that they can themselves be treated as the kind of higher order topics that can allow a literature to be organized around them. For example, the *zone of proximal development* (Vygotsky, 1978) or *operations* (Piaget, 1983) are the kinds of topics around which one can organize one's thinking. When topics begin to exceed a searchable range of concreteness, they fall off into the unclassifiable, and hence they have their place only in books and articles devoted to "theories." Such is Werner's sometimes home now (Crain, 1992).

### *Processes Versus Achievements*

The interest in the entification processes of development and developmental analysis was coupled with an analytic stance that was typical of the Wernerian approach. There was a sharp distinction made between the surface structure of phenomena (the level at which one measures and identifies them) and the deep structure of phenomena, which was something that had to be unearthed by clever experimental means. This matter goes deeply to the heart of the methodological construction of developmental psychological practices.

To study the development of "an X" over some stretch of time, one has to take into account a prior operation that one can call the "construction of the X to be studied." To the extent that developmental analysis requires the repeated measurement of "an X" at various points in time, one must be confident that it is the same "X." Thus, if one wants to study the development of logic, one must be able to posit a class of measurements laid out over a time series as all being measures that somehow reflect the underlying topic, that is, logic. If this assumption of methodological continuity is questioned, then the possibility of developmental analysis is threatened.

The manner in which this methodological continuity is constructed and examined was of critical concern to Werner. In a ground-breaking article on "Process and Achievement" published in 1937, Werner demonstrated that underneath a supposedly continuous function such as brightness constancy, there were a succession of differential organizations of behavior that made the supposedly continuous phenomenon a product of a series of discontinuities that related to one another only on the plane of psychologists' measurements. However, these were not necessarily related in terms of a series of structures that build on one another. On one level, brightness constancy might be achieved by a reflexive organization at the pupillary level (where reflexive dilation and constriction of the pupil allowed for differential amounts of light to reach the retina), hence suggesting a sensorimotor form of constancy. This level of organization of the process might then be succeeded by other levels involving higher levels of processing that involve a computational relation between figure and ground to be calculated. Finally, there is a level of constancy that depended on a knowledge base that specified how the object was supposed to look (e.g., coal in bright light). Therefore, although a common set of measures (achievements) might be applied and data laid out in the form of connected points that traced the development of the constancy function, the underlying conception of process suggests that there is no warrant for connecting the points, because they represent very different behavioral organizations. Werner saw, presciently, that one of the greatest dangers for developmental analysis was the posing of false continuities that mask fundamental process discontinuities.

There are a number of modern echoes of this Wernerian insight, but characteristically, they are echoes without citation. For example, a series of studies by Sroufe and his colleagues (Sroufe, 1979) have been able to show that the standard practice of seeking cross-age correlations between behaviors that look alike often seeks measurement continuity at the wrong level. The correlations between look-alike behaviors are often low, whereas the correlations between behaviors that are dissimilar on the surface but that are similar on the process level were much stronger. Similarly, some fundamental insights of dynamical systems theory (Thelen, 1989) and the older levels-of-organization view of Schneirla (e.g., Schneirla, 1972) share a common stance with a Wernerian developmental perspective. All of these positions draw a sharp distinction between the way things look when they are the topic of psychological measurement and the way they are when analyzed at the level of process.

*Development of a process analysis.* Although the distinction between process and achievement that Werner posed may seem noncontroversial in a seemingly postbehaviorist world of practice, the somewhat radical methodological and theoretical implications of that view are neither easily grasped nor easily practiced. For Werner, as well as for those who follow in his footsteps, the production of a process description is not something that is easily achieved, because a somewhat atypical stance toward the study of phenomena is demanded. From the Wernerian point of view, the process will not simply reveal itself either by close examination or by a sensitive approach to data analysis. The process can only be revealed by a planned structure of investigatory activity that constantly seeks to find differentiating measurement operations that can expose to view process differences that might otherwise be hidden. The organization of data and evidence in terms of achievements is almost second nature to normal practitioners of normal developmental science, who organize data topically, and the topics are provided by the achievement level of organization. The "titling" practices stress an achievement continuity. A title such as "Logical Thinking in 6-, 8-, and 11-Year-Olds" posits an underlying entity—logic—which is then measured at different points on a time–age continuum.

Yet, if the implied continuity is or may be somehow "illusory," the question remains whether it is a real continuity or only a measurement continuity. Because the practice of the field predisposes it to seek continuities, the burden of proof lies on those who would question that seemingly self-evident continuity. Such is the burden of all levels-of-organization points of view, which seek differential organizations underlying a supposedly continuous function.

Werner's fundamental insight was that an alternative practice was necessary, one that was guided by a strong theory of development that would exert theoretical pressure on normal mea-

surement and titling practices. Werner pursued a solution to this problem along three different dimensions.

First, to look for possible differential underlying organizations, one must find a theoretical guidepost that tells one where to look and how to look for it. Second, one needs to identify an interactive plane within which the proposed process phenomena occur and in terms of which relations between successive organizations can be found. Third, one needs to find a sufficiently enriched description of both phenomena and influences on phenomena so that variables can be identified, the manipulation of which will be instructive to process-oriented experiments.

*Theoretical guideposts to a process analysis.* Although Werner's theory is talked about as if it were "a theory"—as an interrelated set of propositions about development—it was either a theory of such general scope so as to be not usable or it was not a theory at all. If Werner's theory is to be thought of as a theory, it must be understood as a theory on the "grand scale," as a theory about organisms and their development that did not hinge on or come to rest on a delimited set of phenomena. Such grand theories are currently out of fashion, perhaps justifiably. The test of theories is whether they help to produce phenomena that are interesting and studyable (the heuristic value of theory) as well as to simultaneously provide an explanation of those phenomena. An additional modern demand is that the theory have pragmatic value, that is, that it relates to practice in identifiable ways.

Although Werner's theory has great heuristic value, it does not really provide explanations that count as explanations, and although it has pragmatic and practical implications, those are not its focus. I have found it useful to think of Werner's theory as a methodological guidepost telling one where to look to identify the operations that serve to distinguish levels of functioning and, hence, to allow for layered process descriptions.

The fundamental theoretical–methodological stance is that processes are likely to be organized at one of three different levels: the sensorimotor, the perceptual, or the symbolic. These different levels of organization will be reflected in methodological terms by different classes of stimulus variation influencing variation of functioning within the organizational level. One must, then, painstakingly examine the level of structural–functional organization by being sensitive to the various classes of variation that might apply. The work of Lewkowitz and Turkewitz (1980) with infants or the work of Pollack (1983) on the influence of lower level stimulus features determining processing that is often taken as indicative of higher level functioning are cases in point of the use of these methodological tactics to illuminate a field of inquiry by differentiating various levels of organization of processes.

The methodological constraint of finding classes of variation that will serve to differentiate similar-looking achievements leads inevitably in another direction as well. There is a commitment to an enriched representation of the kinds of stimulus fields that are the actual surround of a behavior in question. Within a Wernerian worldview, the stimulus world as defined and definable by an experimenter involves both a specific point of focus and a specific point of blindness to things that might have been focused on but were not.

Although this is a recognized feature of any treatment of method taken at some level of analytic depth, it is a centrally constitutive feature of the Wernerian approach. The evaluation of the looked-at against the backdrop of the not-looked-at was a matter of central theoretical concern. Moreover, and more deeply, the evaluation of how the looked-at was looked at was also at the core of the issue. In this respect, Wernerian psychology shared some deep assumptions with Vygotskian thinking. Both schools drew a sharp distinction between *fossilized* behaviors and *nascent* behaviors in which development could be more clearly seen. It became a matter of concern for both schools to peel away the fossilized levels in order to make development seeable. In Vygotsky's work this tactical move led to the use of a method of double stimulation, in which normal access routes to functioning were systematically deprived and alternative means offered in their place. In Werner's work on language development, presented in *Symbol Formation* (Werner & Kaplan, 1963), similar techniques were used. A variety of alternative media for expression—for example, line drawings or gestures—were used in order to experimentally primitivize language use so that more dynamic, nascent, and unfossilized features of language use could be observed.

The upshot of many of these experiments was an attempt to show that the development of word meaning was not simply a matter of the extension of reference; rather the language function was seen as undergoing a differentiation process from deeper sensorimotor roots. It was not until later stages of development and in fossilized usages that language could be seen to function as an autonomous medium.

*Search for a process language.* One of the characteristic features of a Wernerian view of process was that a means must be found to represent processes and the relation among functions in a set of terms that could allow for an understanding of how seemingly different functions could interrelate. In this sense Werner demanded an organismic theory that could account for the way in which the psychological functions could interact with one another at various levels of differentiation.

Wapner and Werner's *Perceptual Development,* published in 1957, summarized nearly a decade of experimental work devoted to working out elements of such an organismic theory, called sensori-tonic field theory. The original formulations of sensori-tonic field theory were in reaction to many of the "new look" studies in perception that demonstrated the interrelation among affective, cognitive, and perceptual functions. For Werner it was not enough to assert, or even to experimentally demonstrate, that knowledge states or affective states were variables that influenced such seemingly remote processes as perceptual recognition. Rather, Werner took it as incumbent on those who would talk of these interrelations to develop notions of organismic representation of process that could account for how the effects could be achieved.

This way of dealing with the problem has a somewhat modern ring to it, because problems of representation have taken on an increasingly central role in attempts to describe processes (Mandler, 1983). However, whereas modern attempts to deal with representational structure focus on the organization of functioning within a domain, Werner was seeking the kind of representation that could be understood as applying to organisms and, in particular, that would allow for a representation suitable for interfunctional relations. Werner's notion of an or-

ganismic representational system, pursued in the context of perceptual work and through the study of language development, was not fully worked out at the time of his death. However, it was sufficiently different in kind from current notions of representation so as to be scarcely recognizable to them.

The reason for this is clear and characteristic. Many attempts at developing a representational language do so within the segregated domain of an area of functioning. Some function is isolated, some problem within that area of function is defined, and possible psychological representations are fitted with and tested against the performance of various age groups. However, for Werner, the topic was the organism and the way in which the various functions within the organism relate to one another. Therefore, his basic intuition was that a fundamentally organismic form of representation was needed, one that did not necessarily link an organism's function to a problem structure but that linked an organism's functions to each other.

For this purpose Werner pursued the usefulness of a vectorial or dynamic treatment of organismic representation. The basic idea was that although each of the separate functions may use its own representations, the possibility of their interrelation presupposed a more basic level of representation that could provide a common language by means of which the various functions could communicate. Thus, in perceptual studies, Werner (Wapner & Werner, 1957) pursued the usefulness of a theoretical language that could describe intersensory relations in terms of dynamic tendencies, counteractive forces, and the like.

Similarly, in their language studies, Werner and Kaplan (1963) pursued an analytic attempt to decompose word meanings into a dynamic-vectorial language that could be used to account for the connotational structure of concepts and relations between concepts as they are represented in language. Their basic position was that although one could attempt to represent the denotational structure of concepts by traditional (componential) means, one could not understand language use, which is in essence connotational, without recourse to deeper levels of representation.

### *Organism and Environment as Multiple Moments*

Both Piaget's and Vygotsky's theories are taken as dealing with an understanding of the relation between a developing organism and its environment. For Piaget the standpoint of analysis was, at least in part, an issue of the transactional cycles that link behavior to the environment, considered largely as a physical environment. For Vygotsky, the issue was, at least in part, the relation between developing organisms and their socio-historical environment. Thus, both of these theories have profound educational implications and accord well with a field of developmental psychology that fundamentally looks for the mechanisms by which capacities come into the competence of organisms as they develop. These conceptualizations leave room for environmental input and point toward the kinds of things that interest and that can allow developmentalists to talk to various constituencies that may be looking for help (e.g., parents, teachers, or educational systems).

Werner's focus on the organism seems to leave the organism cut off from the environment in a way that could lead one to believe that his theory had little relation to environments considered either physically or socio-historically. Such is not the case, and it is the conceptualized relation between organism and environment that has led to the deepest misconstruals of the Wernerian enterprise.

We have already seen how the topics that developmentalists study and the theoretical apparatus of Wernerian developmental psychology are somewhat mismatched. This mismatch has been pursued so far in the context of the conception of topic. The mismatch is deeper than that.

For Werner, the analysis of development required an understanding of a system that necessarily included a designation of the interrelation of organismic functions (process analysis) but that also included an environment with respect to which and within which these functions were organized. Psychological functions were seen as being organized within such moments of functioning, in which a given level of interfunctional organization was mobilized with respect to an environment.

Perhaps this mode of thinking is best exemplified by the work pursued by Werner and Kaplan (1963) with respect to the relation of linguistic organization to various mediational forms. Their work focused, in particular, on the way in which concept and medium shaped each other. The basic theoretical idea was that language use involves a process of dual schematization. On the one hand, a concept was underpinned by a particular connotational structure that led to a particular "shaping" of a symbolic vehicle (e.g., the intonation of speech or the way in which one could represent the concept by a line drawing). At the same time, the nature of the symbolic medium itself could be seen as supporting a particular means of expression (e.g., a concept could take on a different connotational structure depending on the available means for its expression). This principle underlay the analysis of symbol development. Thus, Werner and Kaplan were talking neither about symbolic development in children of different ages nor about the nature of symbolic media. They were talking about the meeting point, or moment of interaction, between a symbolic medium and an organism. The result of these two inputs would yield a particular level of developmental organization of the symbolic function. The process of "double schematization" described earlier was considered to be illustrative of the general problem of development.

Development was seen as a series of such moments linking an organism at a given level of development with a medium within which that development would be expressed. The resultant development level would be a joint function of the two sets of determinants. In this way Werner reconciled his organismic and comparative viewpoints.

If one pursues the line of thinking opened up by the dual schematization notion, there are a number of radical consequences for understanding the relation between Wernerian thinking and the normal interests of developmental psychologists. Some of the more obvious consequences are highlighted here.

*Reconceptualization of the unit of analysis.* The most obvious consequence of this analytic approach is to break up one of the most fundamental units that child psychologists use. If the notion of developmental analysis is defined by moments of linkage between organismic functions and environments that sup-

port or call out different levels of functioning (dual schematization), the fundamental analytic unit cannot be conceptualized in terms of age or even function at an age (e.g., concrete operations in 5-, 7-, and 9-year-olds) terms. The fundamental unit becomes the moment that is codefined by an existing organismic level of interfunctional development and by an environmental medium within which, and with respect to which, the organism is organized.

The immediate consequence is to regard the child as being composed of multiple and nonfixed functional systems. The multiplicity of functional systems stems from the notion that behavior is always organized with respect to some environment that is itself organized. Variation can stem from either source. Because variation can stem from either source, it is quite possible to change the measured level of performance by changing the environmental organization within which that performance is called on.

Within this conceptual framework, people would be seen to be at simultaneously multiple developmental levels. The matter of which level is expressed is a matter of the way in which the moment of measurement was constructed. Thus, Wernerian developmental theory is not a theory about people either at various ages or in various cultures. It is rather a theory about "moments" of people by environment interactions. This point is critical for an understanding of the enterprise.

Werner has often been construed as talking about developmental issues at the level of "people." Thus, his identifications of certain phenomena within certain non-Western groups have been called into question. He is criticized as failing to understand that the non-Western people he described are not primitive and that they are fully capable of developing more advanced functions and that certain of their practices are, in fact, more advanced than Werner described. Indeed, casual reading of some of Werner's (and Cassirer's) descriptions of anthropological evidence supports this discomfort. It is, however, a reading without a context. Concepts such as "primitivity" are, in context, concepts that apply on the level of moments of organization and not on the level of people. Werner did not have a primitive in mind (if that primitive is taken to be a person), rather, he had a picture of development in mind, in which some levels of organization were more primitive than others (Werner & Kaplan, 1956).

Although Werner himself never developed an experimental approach to the issue, the approach embedded in the concept of the moment (a term, by the way, which Werner never used) is quite in sympathy with Vygotsky's notions of the mediation of psychological functions, in particular with respect to the possibility of extending the range of an organism's functioning by providing appropriate mediational tools (the "zone of proximal development"). Whether the external mediator was another person or a different symbolic medium was not a key issue for Werner, nor, in retrospect does it seem a key issue for Vygotsky. The key issue for both of them was that a given, measured level of functioning was not fully determined by in-the-person factors, rather the analytic unit must take into account the mediational surround.

*Conceptualization of processes of development.* A second main consequence of the analysis by moment was to broaden the range of phenomena to which the concept of development could be applied. Werner's notions extended the concept of development to apply to *microgenesis,* or the time that it takes to assemble a functional system at the moment of its being called into play. Thus, development not only extended laterally —across ages, across functions, and across environments—it applied vertically as well. This thoroughly developmental view followed directly on his notion of the moment of functioning. If one is not dealing with fixed patterns within organisms, then it follows that each occasion of behaving would require some "assembly time" and, hence, would undergo some period of formation that could be analyzed in terms of developmental theory.

Werner devised several means for seeing these microdevelopmental phenomena and describing them. Although I do not dwell on the results of the microgenetic studies, it is important to show how they serve to further complicate the developmentalist's task. If a thoroughly developmental approach requires the consideration of assembly time, then it becomes critical to determine the point in the assembly process when a measurement has been taken. Any given measure would therefore have a different significance for indicating developmental level, depending on the point in an assembly process that the measure tapped in to.

As much as this concept adds to the difficulty, it also offers promise for some new directions for study. If measured functions have undergone a period of assembly through a microdevelopmental process, one might expect that some portion of the lower levels are brought along to the higher levels. Thus, a presumably autonomous function would be expected to have, as part of its connotational structure, some elements that bind it, potentially, to other functions. This notion opens the way for not only studying the display of higher level functions but also of finding a way of locating them in broader areas of the personality.

## Radical Challenges of Wernerian Theory

Far from comfortably fitting within current developmental conceptualizations, Werner's concept of development poses a number of radical challenges to them. Therefore it is not surprising that Werner has somehow faded from view. Moreover, it should not be particularly surprising to search in vain for Werner's legacy in terms of his student's contributions to the developmental psychology literature. Although some important figures in the field have emerged from Werner's school (e.g., John Flavell or Eugene Gollin), they typically identify themselves outside of the domain of Wernerian psychology.

The thesis of this review of Werner's thinking is that his conceptualization of the problem of development is so radically at odds with the ordinary practices by means of which developmental psychologists practice their craft that the discipline of developmental psychology and its current close ties with child psychology make the field seem alien and unreceptive.

Werner's psychology, at its deepest levels, challenges the ordinary topics that developmentalists address. In place of functions, in which development can be studied, there are levels of organization, which bear a variable and somewhat uncertain relation to the functions that are topicalized for study. In place

of an ability to address a literature in terms of statements about the state of a function at a given age or developmental era, there are statements that talk of the moment of functional organization as it is expressed in a particular environment and at a particular level of functional assembly. In place of a representational language that can link elements of problems to elements of psychological functions, there is a representational language whose main purpose is to recompose these representations to deeper dynamic levels.

Indeed, as I have argued elsewhere (Glick, 1983), Werner suffers from the fact that he does not have a topic that accords well with the topical organization of the field. Yet, his theoretical apparatus is one that could break down some of the artificial separations (e.g., between affect and cognition) that are produced, in part, because of the current topicalization practices.

Werner's theory is perhaps best understood outside the domain of developmental psychology as developmentalists know it. His was one of the earliest attempts at a critical theory of development. It is a critical theory that comes from a completely unexpected place—not from an attempt to question the reifications of some social or economic system but rather from an attempt to find universal laws of development and to relate those laws to the lives of organisms and to the environments within which those lives are lived and, from that perspective, to challenge the research practices of developmental psychologists.

Werner's historic position has suffered from this. Perhaps an article such as this one may serve to relink Werner's thinking to the field. His thinking has much to teach us yet, and although his theoretical ideas are linked to emerging ideas in a somewhat subterranean way, a more careful conceptualization of his contemporary relevance may open up some issues that have remained buried under decades of disciplinary practice.

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