Contemporary Implications of Vygotsky and Luria

Michael Cole and James V. Wertsch
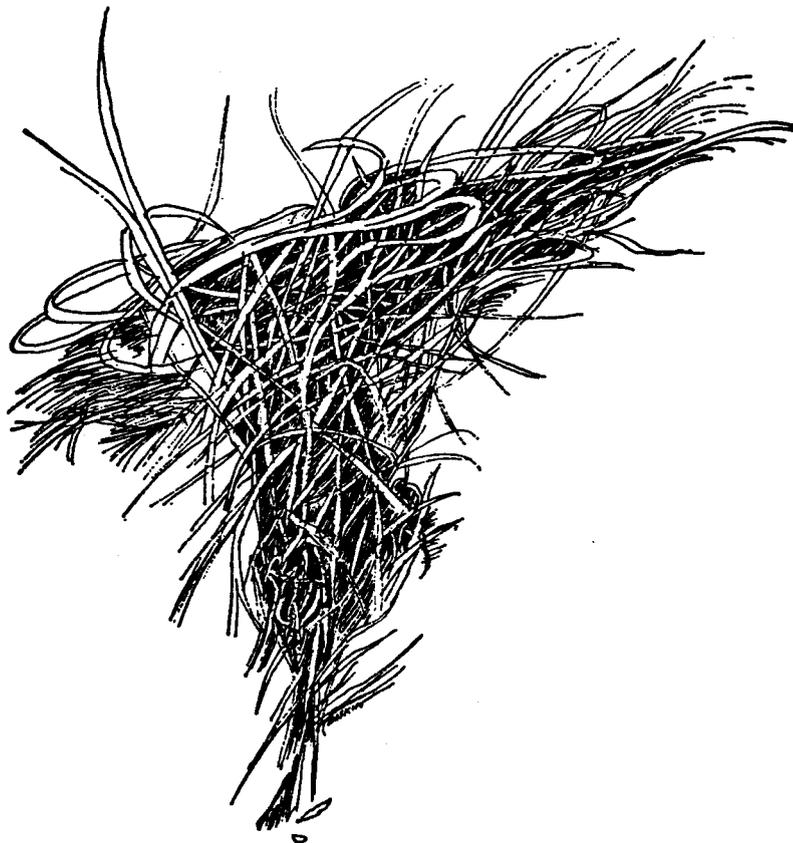
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THE HEINZ WERNER LECTURE SERIES

This is the twenty first of the Heinz Werner Lecture Series. This series is designed to provide a forum for outstanding scholars who are known for their contributions to the developmental analysis of biological, psychological and/or sociocultural phenomena. This series is sponsored by the Heinz Werner Institute for Developmental Analysis.

Heinz Werner (1890-1964) was one of the leading psychologists of the past half century. Deeply impressed by processes of organic formation and ordered change in various domains of the life sciences, he sought to apply developmental conceptualization and developmental analysis to all aspects of existence in which mentality is manifested. Convinced that developmental psychology is not merely a subject matter but is, rather, a manner of conceptualizing all psychological phenomena, Werner sought to encompass animal behavior, ontogenesis, pathological phenomena, products of collective activity, and behavior evoked in experimental situations, within a comprehensive system--a general psychology, grounded in the fundamental concept of development. In accord with Werner's philosophy, the Heinz Werner Institute is devoted to the application of developmental analysis to all psycho-biological and psycho-cultural phenomena. It seeks to fulfill Werner's vision by promoting research and teaching at graduate and post-graduate levels which will serve to integrate the various life sciences without collapsing their distinctiveness in method and subject matter.

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From Moscow To the Fifth Dimension:
An Exploration in Romantic Science
Michael Cole[1]

It is a special pleasure for me to be able to speak in this forum which is so evocative of the history of psychology in general and developmental psychology in particular. My assigned topic at this meeting is to talk about the work of Lev S. Vygotsky, a Russian psychologist who was Werner's contemporary. Like Joe Glick (1983, 1993), I believe that there are important convergences between the two thinkers that appear to involve their shared commitment to both organicism and development. I offer my remarks as a possible contribution to the task of finding points of synergism between Werner and Vygotsky that will enrich the current discussions between their students and admirers about the path to a more inclusive and powerful theory of development.

Departing, perhaps, from what my hosts anticipated, I will not spend much time directly discussing Vygotsky or Werner, although I will mention both. It is not indifference that motivates this choice. The fact of the matter is that I never had the opportunity to interact directly with either Vygotsky or Werner as a student or colleague. Instead it was Alexander Luria who provided the interpretive frame for understanding Vygotsky.

And it was primarily through Vygotsky that I came to appreciate Werner. So, in this chapter I will seek to make a virtue out of necessity, and use Luria's ideas as a prism through which to think about commonalities between the ideas of Vygotsky's cultural-historical school and those of Heinz Werner and his students. I begin by noting some key points of obvious commonality between the two. I then turn to the way in which Luria used these ideas in his research, particularly with respect to remediation of brain injuries. Toward the end of his life, Luria proposed the idea of a "romantic science" that was his resolution of the classic dualisms of idiographic-nomothetic, or natural-cultural. I will give an example of a methodology in the romantic science mode that, I will argue, provides an excellent medium for comparing different-but-similar theoretical claims. I called it a "mesogenetic" method.

Encountering Werner

I owe my introduction to Werner's ideas to Joe Glick who bears no responsibility for the unevenness with which I have assimilated what he has tried to teach me. As colleagues at Yale University , Joe and I participated in a project with Bill Kessen to evaluate the workings of "Man, a course of study" in live classrooms. As a side interest we conducted an experimental study of the development of concept discrimination. This work was done within an "experimental child development" methodological framework (Cole, Glick, Kessen, & Sharp, 1968).

At this same period I was just beginning my work in West Africa and it seemed to me obvious that to understand cultural differences in thinking one needed to adopt a developmental perspective and its methods. The ethos of the times strongly biased young academic psychologists to apply methods of study borrowed from the experimental study of learning on the model of the white rat/college sophomore. Choice of rat or sophomore was more or less irrelevant, although the work with rats generally had higher prestige. A similar, stimulus-response learning theory was believed to apply to representatives of both species, with suitable adjustment of parameters.

This milieu was not fertile ground for introducing a Wernerian organismic developmental perspective. However, Joe and I found common ground in our work in Liberia to which he brought a strong bias toward externalizing the process of change and appreciating the fact that qualitative differences between quantitatively similar performances offer privileged sites for learning something about development-as-process.

In general, at that period, I knew only Werner's (1957) *Comparative Psychology of Mental Development* which I assimilated to my distaste for those theories of culture and cognition that assume strong developmental parallels between cultural, cognitive, and historical change. To me such ideas looked suspiciously similar to 19th Century evolutionary anthropological theories. I did not like that kind of thinking in the work of the Russian cultural-historical psychologists, and I did not like it in its American, German, French, or English varieties any better. I saw in it a common grounding in early 20th Century cultural-historical theories, one prominent branch of which was German Romanticism.

Focusing on Genesis

My next encounter with Werner came via the Russians. In the chapter on problems of method reprinted in *Mind in Society*, Vygotsky (1978) identifies Werner as a thinker whose methodology is adequate to the study development-as-process because it provides "a dynamic display of the main points making up the processes' history " (p. 61). His characterization of microgenesis is pure Werner:

> Any psychological process, whether the development of thought or voluntary behavior, is a process undergoing changes right before one's eyes. The development in question can be limited to only a few seconds, or even fractions of seconds (as is the case with normal perception).

It can also (as in the case of complex mental processes) last many days and even weeks. Under certain conditions it becomes possible to trace this development. Werner's work furnishes one example of how a developmental viewpoint may be applied to experimental research (Vygotsky, 1978, p. 61).

The Method of Dual Stimulation

Vygotsky (1978) and his students applied this idea with particular success in their studies of the "method of dual stimulation." This method serves as one model of the basic unit of psychological analysis from the cultural-historical perspective promoted by Vygotsky and his students because it included the cultural mediation as a central focus and served as a juncture where natural and cultural processes are joined to create specifically human forms of action.

This juncture point is in the mediated act. Vygotsky (1929) wrote that the mediated act (A -X- B) consists of two simple reflexes, A-X and X-B. These elements are, he argued, entirely natural processes. The uniqueness of the mediated act is in the quality that emerges when they are combined. To capture this quality he depicted the familiar triangle:

$$X$$
$$/ \ $$
$$A\text{-------}B$$
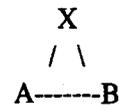
A is an action on B that incorporates X as its means. Mediated action mixes the natural and the artifactual; the relations of its parts are explainable in natural science terms, but the emergent property of their combination is not. It is a qualitatively unique form of thought and action, a hybrid of phylogeny and culture.

It is this line of reasoning that underpins the iconic Vygotskian experiment in which a child tries to get cookies that are out of her reach (this work was directly modeled on Köhler's research with chimpanzees). As described by R.E. Levina who carried out this research under Vygotsky's supervision, a young child is asked to achieve a goal (reach a piece of candy) that is beyond her reach on a cupboard (Levina, 1981). There is a stick hanging on the wall. At first the child attempts to reach the candy *directly* by climbing on a nearby couch and reaching. She next says that perhaps she should call for help from someone taller than herself, but then begins to use the stick, commenting all the while on her progress. Vygotsky (1978, p. 59) referred to this kind of mediated behavior in the memorable comment that human beings are able to "control their behavior from the outside." Another example is provided by Luria's (1929/1978) research on prewriting actions of preschool children. Luria observed that the sophistication of the written marks that children make on paper to help them remember a set of objects goes through a microgenetic sequence from iconic mimicry toward abstract summary even before the children know the conventions of written language.

The influence of the idea of microgenetic research is also illustrated in the later chapters of my work with Sylvia Scribner on Vai literacy and the subsequent research of her laboratory on cognition and adult work (Scribner & Cole, 1981; Scribner, 1984). More recently it can be seen in the work of Geoffrey Saxe (1994) who explains his approach to be a combination of ideas from Luria, Werner and Kaplan.

In this paper I describe my current approach to studying development as "a process undergoing changes right before one's eyes." However, I will not be focusing on the second by second or minute by minute processes of change. Rather, I will be considering change over an intermediate length of time measured in days, weeks, and even months. In order to motivate the empirical research to be described later in the talk, I need to take a small detour to explain the idea of romantic science and the way that Luria and others have implemented it. Then I will describe my own implementation of the idea.

Luria's Conception of a Romantic Science

Luria (1979) begins his autobiography with a discussion

of the science of psychology he inherited in the second decade of the 20th century. His story begins in the latter part of the 19th Century when the "new psychology" came into being. Like many of his generation, Luria saw psychology as composed of two, apparently irreconcilable, ways of knowing. In Cahan and White's (1992) terms, the origins of the discipline of psychology really contained two psychologies. The First Psychology chose the path of experimentation and quantification in seeking explanatory laws of universal applicability. The Second psychology sought to understand human nature as a hybrid of organic and cultural features that had to be studied in the process of change, "genetically." The Second Psychology also privileged research that can be considered ecologically valid, that is, based upon forms of interactions that are not constructed primarily for purposes of psychological analysis. Luria characterized this way of doing science as "descriptive. "

Like many of his generation, Luria (1979) sought a resolution of the problem of two psychologies. Cultural-historical psychology is an effort to forge such a resolution in theory and methodology. Romantic Science seeks unity of the two sciences by resolving them in practice. In arguing for a resolution through practice, Luria was following in the footsteps of Vygotsky and Hugo Münsterberg (upon whom Vygotsky draws explicitly). However, he went a step further than either Münsterberg or Vygotsky. In his autobiography he focuses on another of the dichotomies that haunts discussions of the two psychologists, the dichotomy between an idiographic approach, that accounts for individual cases and a nomothetic approach based on aggregations of individuals. His way of synthesizing the two psychologies seeks to prove the utility of theoretical principles arrived at through the experimental study of groups of people by showing how they are relevant to *understanding and changing* the concrete life circumstances of an individual human being. It is this synthetic approach that he called romantic science.

Luria (1979) contrasted romantic science with what he called classical science:

> Classical scholars are those who look upon events in terms of their constituent parts. Step by step they single out important units and elements until they can formulate abstract, general laws. . . Romantics in science want neither to split living reality into its elementary components nor to represent the wealth of life's concrete events as abstract models that lose the properties of the phenomena themselves. (p. 174)

In writing about romantic science, Luria quoted a line from Goethe's (1988) *Faust* in which Mephistopheles tells an eager student, "Grey is every theory, ever green the tree of life," expressing his skepticism for the golden promises of theory and his desire to deal with the process of life itself. Elsewhere in the same scene, Mephistopheles advises the student on his future career, describing the consequences of following the path of science. The images he uses capture perfectly the difference between classical and romantic science.

The conversation begins with Mephistopheles admiring the work of weavers, who create patterns, a process in which "A single treadle governs many a thread, And at a stroke a thousand strands are wed." Quite different is the scientist's approach, and quite different the result. In light of my discussion to this point, it would not be amiss to think of the scientist as a psychologist who pursues the First psychology.

> And so philosophers step in
> To weave a proof that things begin,
> Past question, with an origin.
> With first and second well rehearsed,
> Our third and forth can be deduced.
> And if no second were or first,
> No third or fourth could be produced.
> As weavers though, they don't amount to much.
> To docket living things past any doubt

You cancel first the living spirit out;
The parts lie in the hollow of your hand,
You only lack the living link you banned.
(Goethe, 1988, p.95)

Luria illustrated his concept of romantic science in two longitudinal case studies involving people for whom ordinary ways of mediating action in the world are impossible (Luria, 1968, 1972). One was a man with a superb, but unusually organized memory. The other was a man who had suffered unusual disorganization of memory owing to massive destruction of the left-posterior part of his brain. In each case Luria combined information from experimental studies of large groups of subjects with the peculiarities of the individual case. His ideas about how the two kinds of knowledge, nomothetic and idiographic, should be combined was evaluated through the success or failure of the therapeutic regimes he prescribed.

In recent years the major champion of Romantic Science has been Oliver Sachs, whose deep involvement with his patients over a period of time is strongly reminiscent of Luria's approach and adds importantly to the range of abnormal brain-behavior relationships that can be used to develop a more powerful theory of mind and development (Sachs, 1987; 1995). According to Sachs, a central characteristic of Romantic Science is that it treats analytic science and synthetic biography of the individual case as essentially complementary, "the dream of a novelist and a scientist combined" (Sachs, 1987, p. xii). Equally important in my view is that both Luria and Sachs are therapists who engaged their patients as human beings and attempt to demonstrate through practical amelioration of suffering the truth of the basic premisses of their theories.

Alexander Romanovich and I never discussed his ideas about Romantic Science, which I encountered first in editing his autobiography, although he had apparently been thinking about the idea for some time (Sachs, 1987). Our mutual topic was culture in mind viewed in terms of a classical science approach using experimental methods to cross-cultural research. At the time of his death, I had only begun down the path that would lead me to the practice of Romantic Science.

I do not have the space here to recount the ensuing journey. Interested readers can find partial accounts in various publications (Cole, 1996; LCHC, 1982; Nicolopolou & Cole, 1993). In general terms, my research on culture and development since the early 1980's has involved constructing, analyzing, and seeking to sustain model activity systems. A key feature of this work has been the effort to implement a central idea of the cultural-historical approach to psychology proposed by Vygotsky, Luria, and Leontiev--the need for a multi-level analysis of developmental change that includes several genetic domains (for discussion of this issue, see Scribner (1985) and Wertsch (1985). Consequently, my version of romantic science goes beyond the study of individual adults to a form of research and theorizing which includes micro-analysis of change in adult-child interaction over periods ranging from minutes to weeks, analysis of ontogenetic change over periods ranging up to a few years, and the development of the system of activity which serves as the medium for the developments being analyzed. Because it serves as the general context for all of the work, I begin by describing the system of activity, which we call *The 5thDimension*.

The 5thDimension as a Medium for Romantic Science

The 5thD is designed to be run during afterschool hours in community institutions, such as the Y, Boys and Girls Clubs, churches, and libraries, which take responsibility for supervising children in the hours between the bureaucratized life of school and the family setting. The applied goal of the program is to increase children's involvement in activities that will promote cognitive and social development. The basic research goal is to elaborate and critically evaluate a cultural-historical theory of human development of the sort proposed by Vygotsky, Luria, and their colleagues.

Figure 1 provides a schematic overview of the 5thD in one of its institutional settings. The basic structure of these core elements has remained relatively constant across generations, so I will treat it as a generic case. The central coordinating artifact at the heart of the 5thD is a maze divided into twenty-one "rooms" each of which (symbolically) contains two activities.
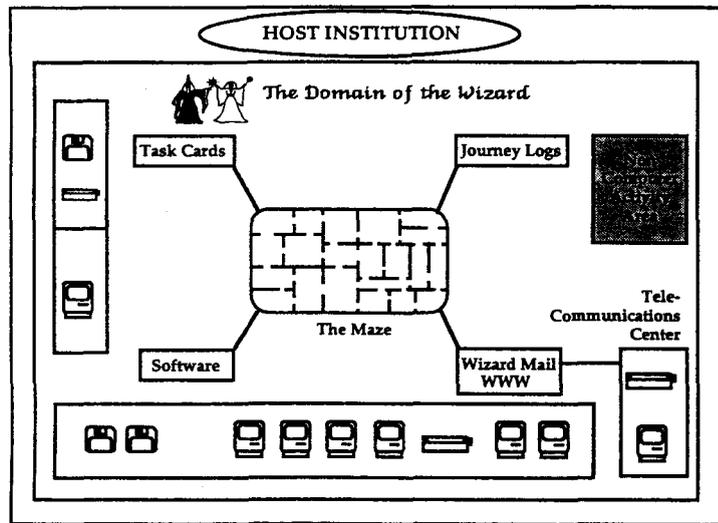

Figure 1. A schematic representation of the main elements of the 5thDimension activity system in its institutional setting.

The actual maze is usually constructed of cardboard and is about 1 square meter in width and 3 inches in height. Most, but not all, of the activities are instantiated on microcomputers as educational games; the remainder include arcade-style games, telecommunication activities (e.g., a treasure hunt on the World Wide Web); arts and crafts, and physical exercise.

The 5thD includes a variety of other standard artifacts in addition to computers and computer games. These include

- A constitution with all of the rules printed on it.
- A box containing record keeping folders for each child

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- At least one computer linked to a modem to enable children to communicate with distant places
- Task cards that specify what one has to do to pass various levels of the game and give hints about ways to proceed
- A consequence chart that specifies "next rooms" which children can enter when they complete an activity at a specified level of expertise
- Tokens called "cruddy creatures" with children's names attached which are moved from room to room to mark the children's progress
- A "hints book" where good tips and strategies about playing the games are stored for others to consult.
- A 20 sided die used to make decisions about what room to go to in some circumstances.
- An elusive Wizard/Wizardess available only through email and live chats on the computer.

These artifacts by themselves do not, of course, constitute the 5thD. Rather, they are resources that adults and children can draw upon in order to reconstitute the sociocultural system of the 5thD, which can be productively thought of as a collective process that must be performed by children and adults on each occasion of its coming into being.

According to the rules of the 5thD (contained in its constitution) the children make progress through the maze by completing the tasks associated with each game. In addition to the local goals of completing each task at one of its three levels, the 5thD provides for a variety of other goals, designed to appeal to a variety of children. For example, by traversing a path that takes them in one entrance and out another, they may "transform their cruddy creature" and obtain a more desirable figurine. They may choose to follow a path that will get them to a favorite game or allow them to play alongside a particular friend. Children who

display a high level of expertise by completing half the games at the excellent level and the other half at the good level are rewarded with a special t-shirt, often a party, and ascent to the status of Young Wizard's Assistant, which entails greater access to telecommunications and complex games as well as new duties and responsibilities for assisting novice members.

An important design feature of the 5thD is that undergraduates enrolled in a practicum class participate with the children as older, more knowledgeable peers. We refer to the undergraduates as "Wizard's Assistants" because of their proven educational achievement and greater general knowledge relevant to a lot of the games. This role assignment seems to work well and it is routine for friendships to develop between undergraduates and child members of the 5thD.

At UCSD, which divides its academic year into three 10-week quarters, the 5thDimension goes through three 8-week sessions which children attend from 1-4 days a week, depending upon local circumstances. Undergraduates are allowed to take the practicum course as many as three times and children are allowed to attend year after year. Graduate students, post-doctoral fellows, and project staff all participate from time to time in the 5thD. Consequently, at any given time, participants include a mix of child, undergraduate, graduate, and researcher "old timers" and "newcomers" with varying amounts of experience and knowledge about the activities.

One interesting feature of this arrangement is that cultural knowledge and age are not tightly linked: very often the children have more knowledge about the computers, games, and norms of the 5thDimension than the undergraduates. This situation creates enormous heterogeneity of knowledge and authority, which helps to re-order every day power relations with important consequences for the dynamics of the interactions that take place.

A second interesting outcome of these arrangements is variation in the timing of participation. Undergraduate participants move in and out of the system on a University schedule every 10 weeks, except for the summer time. Children move in and out of the system in many different time segments: they may come for only part of a session, or only part of a week, or once a week, or daily for a while after which they turn their attention to soccer or piano lessons. A few children attend the 5thD over a period of several years. This large number of different temporal patterns characterizing different participants makes for an unusual degree of heterochrony which amplifies the already considerable heterogeneity of synchronic activities.

These circumstances make the 5thD a rich medium for studying developmental change on several time scales simultaneously: the microgenesis of joint problem solving measured in several seconds or minutes, microgenesis that spans several days of work on a single complex task, the ontogenesis of the participants, and the cultural-historical genesis of the system of activity itself.

Evaluating learning and development in a 5thD activity system

Although my description has been brief in the extreme, I hope it is enough to allow you to picture an afterschool activity in a Boys and Girls club where 8-12 children, 5 or 6 undergraduates, and one or two researchers gather to participate in an activity system designed to mix play, education, peer interaction, and attachment. Central to this play-world is a system of rules which participants come to partially share, and modify, in the course of their participation. A typical session of the 5thD can be pretty confusing to a newcomer. Small clusters of children and undergraduates are grouped around computers, or drawing at a table, or examining a maze, or inspecting a log of recent achievements. There is a lot of cross talk, not a little arguing over strategies and obligations, and a good deal of coming and going for reasons that are hard to discern.

At first glance this sort of hurley burley might seem an unlikely place to be able to document processes of learning and development. By and large, the activity is *joint, collective* activity. This is how it should be according to a Vygotskian perspective; individual accomplishment is the precipitate of joint activity. But it poses severe problems for any psychologist who wishes to document learning and development as individual achievements.

In so far as one follows the path of the explanatory, nomothetic, First Psychology, the problems of evaluating learning and development in the Fifth Dimension seem insuperable. One such problem is that of attributing performance to individual children. After all, the rule of thumb in the Fifth Dimension requires the undergraduates to help out whenever they think it is necessary to provide the right sense of joint responsibility. The children know that they are college students, "big kids" who know a lot. Were the undergraduates to "hold out" on the children and display an interest in testing them, the dynamics of the joint activity would be destroyed. But how are we, as analysts, to parse any given performance by the child? How much of the product is really the responsibility of the child, and how much of the adult?

One seemingly simple way around this problem is to set up an experimental group of children that attend the Fifth Dimension and compare their performances on a set of criterion tasks with children who have not participated. There are two major problems with this straightforward approach.

First, the Fifth Dimension, by virtue of its fundamental organizing principles, is *voluntary* activity. The children not only self-select for participation in general, they self-select on a minute-by-minute basis. If they get bored, or frustrated, or have a soccer match to go to, or their best friend wants to play ping pong in another room, off they go.

Second, even if self selection was not a problem, and even if we could arrange for plausible control groups, and even

if we demonstrated that the Fifth Dimension produces measurable cognitive consequences "beyond the 5% level," we would face the inevitable question: what features of the Fifth Dimension are crucial to its effects?" Is it the participation in computer games? Is it interaction with the undergraduates? And so on. If we were to take such questions seriously, it would involve us in creating a variety of "almost Fifth Dimensions" with one or another hypothetically important feature removed to see if it made a difference. While this might seem like a feasible enterprise to some readers, my own experience with the vagaries of the Fifth Dimension renders me totally uninterested in such a snark hunt.

This is not to say that I have not worked at such evaluations and even scored some limited successes. Moreover, colleagues currently working with me in a multi-site implementation of the Fifth Dimension are engaged in just such analyses. However, I have become more interested in another possibility: that through a description of the interactions of children and undergraduates over time, it might be possible to document the process of change in such a way that the conclusion of cognitive benefits from participation in the Fifth Dimension can be firmly established.

Consequently, in my own work, and in the remainder of this paper, I concentrate on another possibility that implements an insight shared by Vygotsky, Luria, and Werner: it should be possible to evaluate the process of development with evidence about the genesis and transformation of problem solving abilities in the actual process of interactions among participants. Treat the process of developmental change as the product (Rogoff, 1995; Stone & Wertsch, 1984).

When Luria conducted research in the style he called romantic science, his data documenting the process of change consisted largely of clinical descriptions of what his subjects did and said, with a few more or less standardized test procedures included in order to gain deeper insight into specific processes.

Our data consist of a combination of detailed field notes written by undergraduates and other adults shortly after their participation in a 5thD session, unobtrusive tests that are embedded in the tasks that the children carry out as part of the games, and videotaped recordings. In the remainder of this article, I will concentrate my remarks on the description of change in the undergraduate field notes. These data are of particular interest to me because they both approximate most closely the main kind of evidence presented by Luria and provide a remarkable source of evidence about the process of microgenetic change, the level of development where the convergence between Werner and cultural-historical psychology is clearest.

Estimation Using Cartesian Coordinates.

My first example describes an occasion when Brian, ages nine, plays the game, *Shark*.[2] Shark was designed to provide children with deep experience in mediating their behavior through representations of the number line. According to the First Psychology, a well-developed representation of the number line is essential to the process called "long division," which is introduced to American children around the fourth grade. Children who have shaky knowledge of the number line experience inordinate difficulties in long division (Pettito, 1985). Consequently, evidence that the children who acquire a rich representation of the number line as a consequence of playing the Shark game often would be of both theoretical and practical interest. Figure 2 provides the display confronting children when they reach the third level of *Shark* (on the first level, only the abscissa, labeled "aim" is presented; on the second level, only the ordinate, labeled "distance" is presented). The field notes were written by Emily Rubin. Emily's description documents Brian's acquisition of knowledge about this important cultural tool.

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[2] This game was written by Jim Levin
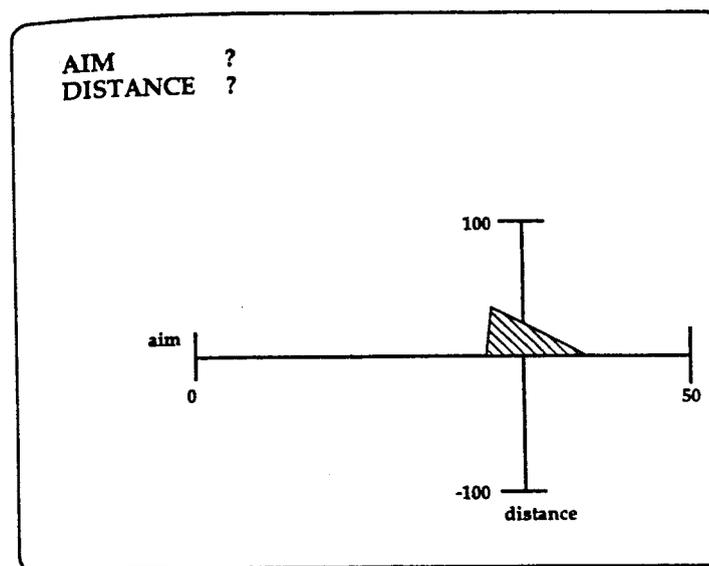
Figure 2. An example of a display of the Shark game, in which children must estimate the location of the shark on the horizontal and vertical number lines.

Emily writes:

I found the task card and joined Brian at the computer...I told him that I had only briefly played this game, so we should probably read the directions on the task card.

I read the description of the game from the task card. Before I had finished, he had begun the first level. For the first five levels or so, I used the task card to keep track of the guesses he made at harpooning the shark. He wasn't very aware that I was doing this until I told him that he had only made 2, 3, 2 and 1 misses and he was well on the way to becoming an expert at this game. He then began paying attention to what I was writing down. Every now and then he even asked me what his last guess had been.

During the first level of Shark, he was fumbling with the concept of the number line. He had not grasped the concepts of

"aim" and "distance" yet, rather he was just filling in the numbers which he felt corresponded to the lines on the screen. The first level was just an "aiming" level. He noted the numbers on either end of the number line and said, "This is huge!", referring to the distance between 0 and 50. He did much of his thinking out loud. "I'm gonna put..." he mumbled out loud, "I'll put 45". I would explain to him how his shot was too far to the right and he needed a lower number. He quickly shot the shark within two tries.

The second level was more difficult. It included distance as well as aim. He typed in a number for the first line and pushed return. He sat back in his chair expecting the harpoon to fly, but instead the computer read, "Type a number?". "Type a number!!!???", he read aloud. "I just did..." I told him that he would have to guess the distance as well. I motioned to the second number line on the screen. "You not only have to type where the shark is, but how high to shoot the harpoon," I said. He guessed the distance incorrectly. He was about to guess the second distance lower than the first when the shot had been too low. I remarked, "Remember last time? You guessed 33..." He quickly changed his input to 35 and harpooned the shark within three tries.

By the third level, he was prepared to enter both aim and distance. His first shot, which he made without my assistance, he exclaimed was "Too high!!!" (Referring to the distance number line). He began making the observations that I had previously made in the first two levels. On his next shot, he commented, "It was too high again! and too far that way!!" These directional comments were similar to the ones I had made on the previous levels.

As we made our way through the next few levels, he became more independent when making the decisions. For instance, when we were narrowing down a shot, I suggested that the aim should be 17, but he quickly responded by saying, "No,

I'll do something...(He was thinking of what to type)...I'll do 16" He was right on the dot with the aim, but the distance was still off. "So, I'll change the distance... " This was the first time I had heard him refer to the number line by saying "the distance," rather than pointing to the line and guessing.

Commentary on the Number Line Example.

Although I have truncated the exposition, this example provides an account of how the child comes to master the increasingly complex sub-tasks that the game sequence presents as part and parcel of his interactions with his undergraduate companion. (The fact that the child spontaneously talks aloud is an important resource for analysis of this example). Several moments stand out in this account:

- Initially the child takes no note of the adult keeping a record of progress, but then he starts to use the adult's contribution to mark his progress. Here we see the first of many examples of how new goals arise as the child comes to master new cognitive forms as a part of the joint activity with the undergraduate.

- As the game progresses, the child overtly appropriates the special pointers and adult verbal formulaic speech patterns, illustrating early stages in the acquisition of socio-cultural knowledge central to mastery of the number line and a Vygotskian account of development.

- There is an intimate link between the child's increasing ability to engage the game and the growth of excitement and satisfaction. In reality, if not in cognitive science, cognition and emotion are different aspects of a single process. As coparticipants in the joint activity, the undergraduates appear unable to give an account of learning and development in interaction except as they are fused with emotion.

Microgenesis Over Multiple Sessions

Although Vygotsky asserts that the process of microgenesis can take place over a number of days and even weeks, it is

primarily change within a single interactional session that has been analyzed in these terms. The 5thD, however, routinely provides evidence about the process of change over days and weeks, as the next example illustrates (See also Siegler & Crowley, 1991).

The set of field notes for this analysis was written by two UCSD undergraduate psychology students enrolled in the practicum course, Daisy, and Julie. Daisy's field notes cover 8 separate interactions over a one month period during which she worked with a 10 year-old girl named Vivian. Julie's notes are from one interaction with Vivian shortly after she had mastered the game she was playing with Daisy. The object they are working on is a computer game called *Island Survivors*.

Island Survivors is an ecology game that was intended as part of the *Voyage of the Mini* television project designed for educational purposes. The players are challenged to support an ecosystem by maintaining the life of all animal, plant and human inhabitants of the island over a period of many months. The core concept of the game is ecological balance which depends upon the construction and interaction of food chains. Activities on the island involve collecting firewood, building shelter for protection, and obtaining food by hunting, gathering and fishing. The human inhabitants, who are stranded for a year, can also suffer setbacks from sickness. Feedback on population size is given by graphs illustrating the status of each species for each month of the survival period (See Figure 3).

The basic cognitive challenges of the game include estimating and taking account of life cycles, food supply, weather, and health conditions The players must be able to interpret the graphs, work within time limits, and appreciate the factors that interact in the natural ecological system. It is also important that one be able to manipulate the keyboard effectively to move one of the survivors about the island to gather food. This aspect of the game is arcade-like; it requires practice and
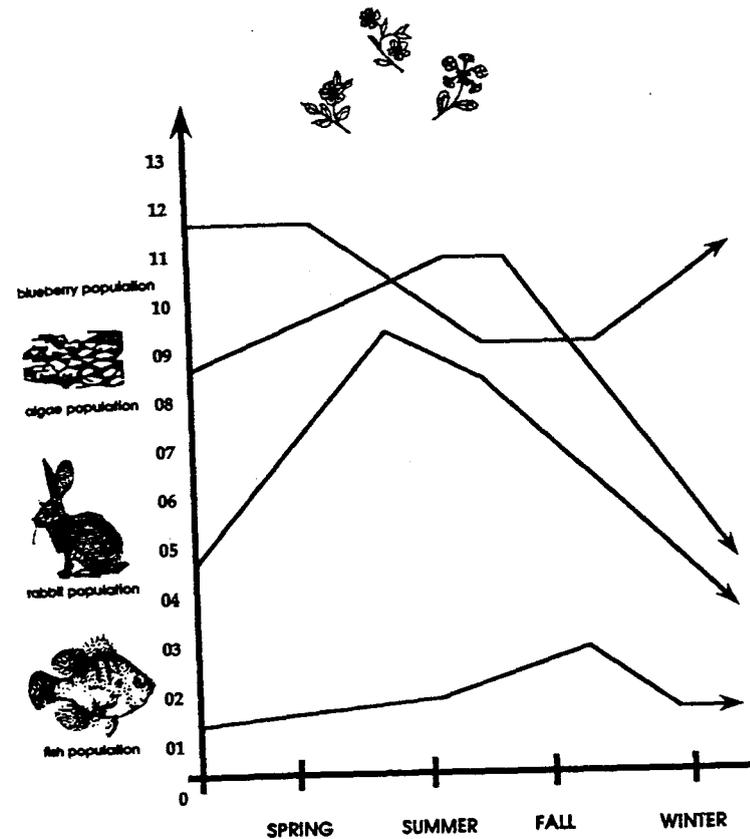

Figure 3. Sample screen from *Island Survivors* in which children must interpret graphic representation of population levels over time.

dexterity. If these activities are not carefully balanced or mastered, the human inhabitants risk starvation.

In our use of Island Survivors, the children initially play games that have been partially structured to insure that they

encounter interesting problems that will test and expand on their conceptual grasp of the underlying principles.[3]

Vivian's Development in Island Survivors

In the first field note example 10 year old Vivian has no experience with Island Survivors. To accommodate all the children who want to play in the 5thD that day, Vivian is paired with Anthony who is already playing, and has experience with the game. Daisy writes: (October 13, 1992)

"...I asked him if he would mind explaining this game to Vivian since she had never played before... While at first he didn't say anything, as soon as Vivian sat down next to him and began watching, Anthony looked at her and began explaining everything!!! It was totally cool watching them. Anthony explained the concept of the game, that they had to survive by hunting, fishing, etc., and as he played, he carefully went over his moves. Before long, they began playing together, Vivian helping Anthony catch food. Vivian would say, "There's one (referring to a rabbit)" and Anthony would answer back, "I see it!" As soon as he would catch it, they would both say things like, "Alright!"

Anthony was totally comfortable with us by now, and began taking time out to explain certain strategies he had picked up on. Because he was on the good level, he had mastered the tough times. He told Vivian and myself never to let our food level reach past the ½ marker or else we would lose our food. [This is due to spoilage] As they kept playing, Vivian would ask

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[3]Our partially "pre-cooked" games, designed by Peg Griffin, served this purpose.

him questions like, "Are all the food levels the same in every game?", and Anthony would answer all her questions. At one point Vivian explained to me that she was worried she wouldn't do so well because she wasn't a fast typist. Before I could reassure her that being a fast typist wasn't necessary to win these games, Anthony turned to her and said, "You don't have to be fast. Only when you are fishing you have to push the keys fast, but that's easy."

The next field note example is collected two weeks later, Daisy writes: (October 29, 1992)

" We read the instructions to Island Survivors, and then went ahead to play the game. Vivian basically knew how to play, but had an extremely difficult time using the space bar instead of the down arrow key, and using the IJKM to move in different directions... When we went hunting...the notice came that we had caught too much food, she automatically told me that we should keep the level of food at the half-way mark and no more. After starving because of problems using the keyboard, Vivian suggested we read the hints in the hints box to see what we should do next time. We read them, but basically couldn't use a lot of the suggestions since they were geared to the good and expert levels. I suggested we write a list of things we should do, or avoid, for guidance when we play again. On the list, Vivian wrote down, "go fishing and find plants a lot, do not get too much food. It spoils. Pick one person to build the shelter, the best person to build is the Wizard. "

Two days later Vivian begins her second day on the Beginner level of Island Survivors.

Well, we grabbed her folder and headed to an empty computer to play Island Survivors. We had starved to death on Tuesday, so we had to start at the beginner level again. Vivian is very goal-oriented, for she told me as we were booting the game up that she wants to race through the beginner level so that she can become an expert at this game. I said "All right! I like the way you think! Let's tackle this game and beat it!" Vivian said, "Yeah, and began waving her arm and yelling GO! GO! GO!" We were definitely psyched up!

When we went fishing, Vivian began catching all the fish, but half way through, she said "that's all." I asked her why she was stopping and she said that she didn't want the food level to pass the halfway mark, so she was going to throw back everything else from then on. I was glad she remembered that, and felt sure we were going to pass the beginner level. One time our food level got low, so Vivian said we'd better go fishing. To her, fishing is the easiest way to catch food, and when the level would get too high, she'd just throw everything back. It got to be sort of a habit where she would go fishing, catch all that she could, then stop at the halfway point, throwing things back, then catching some, then throwing things back, then catching some... It was like, hit the space bar twice, return key once, space bar twice, return key once... She wouldn't even look at the screen sometimes. Finally we made it through November, and were past the beginner level. It was time to fill out her task card, and she answered the questions herself, without any help

from me. When it asked her to write what you need to do to survive, she wrote "go fishing." When it asked her for hints, she explained about keeping the food at the midmark. She was on the ball!! "

Over the course of the next few days, Vivian moves on to the Good level of the game. This level has been set in such a way that there the fish population has been decimated by a mischievous character. Now Vivian's strategy of fishing to survive, which was the easiest way to deal with the challenges of the beginner level, is no longer adequate so she is forced to gather plants and animals for food. Because the animals move every few seconds when you are hunting and one has to collect a lot of plants to survive, Vivian must now confront her limited keyboard dexterity. As Vivian hunts, she exhibits a classical Vygotskian phenomenon: she says the name of each key aloud to increase her motor control. Unfortunately she panics and is unsuccessful in her attempts and the humans starve.

During the next 5th Dimension session Vivian continues on the Good Level of Island Survivors. There is evidence in the notes that she finally begins to master the keyboard and she completes this level.

The next note about Vivian attempting the Expert level is of particular interest because it shows that Vivian, in creating her own island, has acquired conceptual understanding of how the food chain works.

Daisy continues: (November 3, 1992):
" We started the next game, and this time it had us pick our own land animals and pond species for the island. Vivian didn't want to choose too quickly, so she said we should read up on all the animals first. When it came down to deciding the ones we wanted to keep, Vivian picked the turkey and rabbit. She decided that the deer were too

big and were too much food, and that the turkey and rabbit were the best choices since they were edible and the right size. Then she chose leaves and blueberries because humans could eat them as well as the turkeys and rabbits. I didn't help her at all in deciding, so it was neat to see her reading the facts and deciding which animals and plants would be most beneficial to the survival of the humans. Then it was time to pick our pond species. This was a tougher decision for Vivian. She couldn't decide on what to choose because most of the species didn't seem to be good food for humans. Whereas before she chose her animals mainly on the basis that they would feed her survivors, now she had all these species that weren't meant for eating. She wanted to fish since she likes to go fishing, so she picked the bass and crayfish. She was kind of worried though, because the bass, in order to survive, eat the crayfish. She didn't want her fish population to go down because the bass were eating them up. She then picked two types of plants that the bass also ate, hoping they would eat that instead of her fish...pretty clever, eh,...? "

The next session Daisy and Vivian play Island Survivors again. Daisy comments that the game was "more like a ritual than playing a game. Vivian knew exactly what to do, first gather firewood, then build a shelter, and then go fishing to build up our supply of food." At this point in their interactions, Daisy and Vivian are less directed at the game and more directed at getting to know one another. Daisy writes, "For the most part, I just sat back, watched her, and enjoyed talking to her. In fact the only thing I said which related to the game after that was, "hit return." Because Vivian was always talking to me , she

would forget to pay attention to what was happening, and the screen would never change."

The use of the word "ritual" indicates that the task has become routine, and interest shifts to interpersonal interaction involving content beyond the game. At the same time it is evidence that Vivian has learned the skills and concepts of Island Survivors so well that she can run, so to speak, on automatic pilot. As part of the task for achieving the expert level of the game the player is supposed to write an entry for the "Hints & Strategies Folder." This is the same folder Vivian used as a tool when she experienced difficulty in her first attempts to play Island Survivors. Daisy writes, "The taskcard told us we had to write to the hints box, and Vivian wanted to write a good one since the others in the book (for Island Survivors) weren't that helpful to her."

*HINTS TO ISLAND SURVIVORS, by VIVIAN
Don't get a lot of food -- make sure the level is at or below the middle Go fishing. While the fish aren't in danger it is the quickest and fastest way to catch food. Get a deer because it gives enough food (if you are desperate for food) Don't look at how much time you have left because it makes you NERVOUS! IF THE WIZ-ARD DOESN'T CHANGE THE LENGTH OF TIME YOU NEED TO SURVIVE, WRITE A LETTER AND COMPLAIN. "*

In the final field note observation, Julie, another undergraduate, asks Vivian to help explain Island Survivors to another child, Michael, who has never played before. Julie writes (November 10, 1992):

" I elicited Vivian who was on expert level on this game to come explain the object and proce-dures of the game. Vivian was most helpful. She took on the role of a teacher and led us step by step through the procedures of the game. She

started by having us boot the game. Michael listened diligently to what she said and followed her procedures. When the computer asked who should do different chores, Vivian had a special form. She said that the Wizard should build shelter because he is really good at it. Ann should go fishing and Joe should hunt. I asked her if the Wizard was better at building the shelter than the others and she answered "yes, because he is the Wizard." She said you need to find the winning combination when giving out jobs. She made it seem like some of the survivors were better at doing certain things than others.

Michael followed Vivian's instructions precisely. Vivian led us through the game step by step. First she showed us how to fish. She said that to pick up the fish to press return and to let them go to press space bar. Vivian included not to catch too many fish because they will rot. She said keep your food at about half full. Michael lived by this rule throughout the rest of the game.

In hunting, Vivian commented that you must pick up the black dots. I asked her to be more explicit. How do you pick them up? She said that first you must put them in your box and then press return. She added that we must watch the graphs for the increase and decrease of certain species and keep this in account when we hunt or fish. Vivian made a wonderful teacher. She explained everything in such a manner that fascinated learning. Both Michael and I listened attentively and questioned her on the things we did not understand.

Comments on Vivian's Development

I find this example particularly interesting within two different frameworks. First, it provides relatively convincing evidence about what an individual child learned as a consequence of engaging in extended interaction using an educational game even though there was constant interaction between the child and a cooperative adult. This possibility was created not through the deliberate constraints imposed by the researcher but as a consequence of the constraints/affordances of the cultural conventions of the culture of the 5thDimension. The convention that people are supposed to help newcomers and newcomers are welcome to ask for help provides the baseline condition: Vivian's initial ignorance concerning both specifics of *Island Survivors* and how to think about interacting elements in an ecological system. This same convention provides evidence of the developmental changes that occurred during her work with Daisy because Vivian is asked to conform to the same convention by two other novices. There is no question that Vivian has mastered many important principles as well as the sensorimotor skills needed to realize them in the specific environment of *Island Survivors*. Given the difficulties of conducting controlled experiments to evaluate participation in the 5thDimension, this result is particularly gratifying.

Because success at *Island Survivors* requires a complex blend of conceptual knowledge and motor skills as well as a clear and understandable goal, it also provides an especially rich context within which to study the process of microgenetic change *in situ*. Many of the phenomena in this example are well known to Wernerian psychologists as well as those influenced by the cultural-historical tradition. The following points stand out.

- When Anthony and Vivian begin to interact, they immediately establish a division of labor that is not totally one sided (e.g., "Expert teaches, novice observes." Rather, Vivian makes both cognitive contribu

tions (pointing to a rabbit) and motivational contributions ("Alright!").

- Their contributions are asymmetrical, to be sure. But the nature of this asymmetry bespeaks the spontaneous formation of a zone of proximal development.

- Once Vivian begins to play on her own, sensori-motor constraints emerge as important goals that reorganize her behavior, beginning a cycle of shifts between cognitive forms and functions that is a hallmark of Wernerian developmental analysis. For example, Vivian long avoids the goal of hunting and the need to develop skills adequate to it. But when her successes bring her to the second level of the game, where the fish population is depleted, the new goals of going hunting and gathering arise naturally, accompanied by intense practice with new behavioral forms needed to achieve them. Once she has mastered the new behavioral forms, game play becomes a ritual and a new set of goals (exchange of personal information with the undergraduate) and new means (conversation) come to the fore.

- There is also closely related evidence of the process by which actions become converted into operations as Vivian gains mastery over the game and turns her attention to her social relationship to Daisy.

There seems no escaping the conclusion that these sorts of psychological analysis do not depend upon the use of highly constrained experiments. The "natural" cultural constraints of the 5thDimension are sufficient.

Evidence Concerning Other Genetic Domains

Space limitations do not permit me to illustrate fully all of the genetic domains which our research in the 5thD encompasses (See Nicolopolou & Cole, 1993 or Cole, 1996 for more extensive treatments). However, I can at least indicate the sorts of analyses that are possible.

Ontogenesis

We are currently in the process of analyzing a series of case studies of children who have participated in the 5thD over a period of years. One child, Chuck, began participating at the age of 7 years. Our notes on Chuck for the first two or three years emphasize his great difficulties in dealing with 5thD tasks, his susceptibility to being teased by other children, and include information that led us to think that he is mildly retarded. However, over time the notes suggest a transformation in Chuck's participation and his evaluation by his undergraduate partners (Since there are three "generations" of undergraduates every calendar year, none of whom have read accounts of earlier years, these accounts cannot be contaminated by prior expectations). Chuck came to be treated as a master member of the 5thD, a Wizard's Assistant to whom the uninitiated can turn for help whether it concerns strategies to use in a particular game or problems booting up a computer. He was polite, cheerful, and helpful, a set of characteristics that won him admiration from the undergraduates many of whom are scared of computers and ignorant of the games.

This transformation is largely restricted to the 5thD however; in his everyday life, Chuck, now a teenager, is struggling in school and has a negative image of himself. Inadvertently, through a chat that he had with his buddy, the Wizard, we learned that Chuck even formed a dual personality: nice guy Chuck in the 5thD wars with his alter ego, CHHHUUUUUCK, who says nasty things to the Wizard and feels bad about himself. CHHHHUUUUCK is Chuck's outside-the-5thD personality.

Enculturation

Another kind of genesis we are interested in is the process of becoming a competent members of the 5thD culture. Again, our basic evidence comes from the undergraduate field notes.

As pointed out several decades ago by Rose and Felton (1955) when any group of people come together around a common task, they quickly begin to invent, borrow, and repeat new ways of doing things, e.g, to create culture. This process at work in the 5thDimension is apparent to anyone who walks into the room while the activity is in progress: at first it seems sort of chaotic and formless: there are children and adults engaged in a wide variety of tasks; they move around in hard-to-understand patterns, they say odd things ("Wildcat is down!", "Right 45 degrees", "Kathmandu", "I hate the Wizard," and so on).

This casual observer's sense of crossing a cultural border when entering the 5thD is routinely captured by the difference between the way that (enculturated) old-timers and (unenculturated) newcomers experience the 5thDimension. Routinely the initial field notes written by the undergraduates express their conviction that they are entering a system of shared understandings that is mysterious to them, a condition that generally evokes anxiety and an expressed desire to figure out what it takes to become a member:

> As I looked into that room through the windows I had many questions running through my head. How does this program work? What am I supposed to do here? How can I possibly be a leader here when I don't know the first thing about computer games?

Similar evidence is found in retrospective reports about their experience in the 5thDimension that the undergraduates write at the end of each quarter. Many such accounts begin as does the following one:

> On that first day in the Fifth Dimension site I was totally lost. Everything was foreign to me, and everyone in the room was strangers. In the first week of the class Professor Cole did not clearly explain what we were supposed to do at site, and even if he did, I did not understand the things he was saying.

With equal frequency, undergraduates report that their understandings undergo a marked change after a few sessions at the 5thDimension.

> I got to know everyone at the site very well. We were almost like a little family, because we helped each other and shared ideas about the children. I never would have expected this type of bonding

A second, slightly more subtle, indicator of the process of enculturation can be found in a shift in the way in which the artifacts of the 5thDimension mediate the activities of undergraduates once they become familiar with the system. Participants frequently reference fundamental artifacts like the wizard, maze, constitution, and task cards in their daily field notes describing their interactions as they learn to become functioning citizens. Analysis of the field notes reveals the presence of three modes of interacting with these artifacts. The first mode might be called "orientational," in which the person treats the artifacts as "things in themselves." The second mode might be called "instrumental" because the artifact is incorporated in some kind of goal directed action as a mediator. The third mode might be called "reflective" because it indicates a particular form of mindfulness in working with the artifacts of the 5thD. What makes this distinction particularly interesting in the present circumstances is that there is a shift in the relative use of orientational, instrument\ mediational, and reflective patterns as participants become familiar with the cultural system. At first, field note references to 5thDimension artifacts are primarily oriented toward interpreting and understanding one's role in the 5thDimension. Then the artifacts are incorporated as tools into well articulated goals. Finally, the artifacts are the subject of critical reflection.

Cultural-historical Change

The final level of genesis that we study in the 5thD is the genesis of the activity systems themselves. Over the past 10 years more than a dozen 5thD have been born into a variety of

institutional settings in three countries. Each of them has been characterized by a unique idioculture despite great similarities in many of their elements. Some of them died after a period of several months or several years (Cole, 1996; Nicolopolou & Cole, 1993). At this scale of time, our method is comparative and historical; we study the specific qualities and conditions of development of each system, seeking to understand both the circumstances that enable their continued development in conjunction with the development of the children within them.

Some Concluding Remarks

I hope that even this brutally brief account of the 5thDimension is sufficient to illustrate a few key points.

1. As others have noted before me, there are important points of contact between Vygotskian and Wernerian approaches to the study of development. These include a focus on the changing relations between cognitive forms and cognitive functions in the process of children's development, studied both at the microgenetic and ontogenetic levels.

2. Microgenesis, usually thought of as, and studied as, an individual achievement that occurs within a single session of interaction, can be seen as a process distributed among people and over a timespan of many days and weeks.

3. It is possible to study the process of microgenetic change as changing qualities of co-constructive interaction between children and more capable others in the spirit of Vygotsky and Luria. At the same time, it is possible to arrive at valid conclusions about the extent to which the joint accomplishment of partners can later appear as a differently mediated process on the individual plane. The shifting nature of socially organized joint activity is a resource for this kind of analysis.

4. Similarly, Luria's idea of a *Romantic Science* can be generalized to the study of children's development in complex, multi-person activity systems. As in Luria's famous case studies, the strategy of the 5thD deliberately mixes the properties of the "two psychologies": principles and problem solving tasks

derived from the nomothetic (classical) approach can be used as tools with which to intervene in the lives of children, considered as individuals, in a practical manner.

5. Detailed narrative descriptions of adult-child interactions such as those contained in the field notes used as data in this work operate like the clinical protocols and interviews used by Luria. Although it goes beyond the purview of this paper, I believe that the undergraduate notes, by virtue of the fact that they play a central role in constituting the behaviors they document, provide a privileged perspective on the processes of problem solving and development;

6. When participants describe the process of co-constructing "next steps" in problem solving and development, their accounts reflect learning, development, and emotion as all being co-present in the process of change. As Weavers, participants in the 5thDimension do amount to much; enabling detailed analysis of processes of developmental change at many interwoven levels of analysis.

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Vygotsky: The Ambivalent Enlightenment Rationalist
James V. Wertsch[1]

Vygotsky and Werner: Intended and Unintended Links

There are many reasons that make it appropriate to examine the ideas of Lev Semenovich Vygotsky in a setting associated with Heinz Werner. Vygotsky's contribution to developmental psychology and related disciplines is by itself sufficient, but there are some other points that are worth mentioning in this regard as well.

The first of these is that Vygotsky explicitly recognized the influence of Werner on his own thinking. As far as I can tell, this influence was exercised primarily through Werner's *Comparative Psychology of Mental Development* (1948), originally published in German in 1925. Vygotsky mentioned this volume and several of its ideas at several points in his writings. Among other things, it seems that Vygotsky borrowed the notions of "complexes" and "complexive thinking" from Werner, and Vygotsky was clearly indebted to Werner when it came to formulating relationships among various "genetic domains" (Wertsch, 1985) such as phylogenesis, sociocultural history, and ontogenesis.

It is interesting to speculate about whether there was any influence in the reverse direction as well. The possibilities for this were lessened by the fact that Werner did not read Russian

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and hence had access to only a few of Vygotsky's writings (e.g., Vygotsky, 1929, 1934) during the latter's lifetime. This of course changed in 1962 with the publication of an abridged version of Vygotsky's 1934 classic *Myshlenie i Rech'*, and the ensuing influence on Werner and Kaplan (1963) reveals that there would have been much for Vygotsky and Werner to discuss had they had the opportunity to meet.

Another possible means through which Vygotsky and Werner may have had contact was in the figure of Kurt Koffka. Koffka visited Moscow and participated in one of the Luria-Vygotsky expeditions to Central Asia in 1932 (van der Veer and Valsiner, 1991). However, there is no evidence that I know of to suggest Koffka as a major channel by which Vygotsky might have influenced Werner or vice versa.

Perhaps the most intriguing, but unfortunate way in which Vygotsky and Werner were linked was in connection with the political attacks against Vygotsky and his colleagues that began in 1932. Van der Veer and Valsiner (1991) have provided their usual careful and insightful account of this link. Specifically, they outline an incident in which two Soviet authors writing in the journal *Pedologiya*, R. Abel'skaya and O. Neopikhonova (1932), criticized Werner (1926) for his analysis of development. Among other things, Abel'skaya and Neopikhonova argued that Werner's search for formal similarities among various genetic domains reflected a misguided universalizing tendency. In their view, this constituted a fundamental error because it did not take into account historically specific Marxist categories such as the means of production.

Although the article by Abel'skaya and Neopikhonova was devoted primarily to the "shortcomings" of Werner, it also served as a forum for identifying and attacking similar ideas in the writings of scholars in Soviet pedology and psychology, especially Vygotsky and Luria (van der Veer and Valsiner, 1991). In the highly charged political atmosphere that was beginning to emerge in Soviet intellectual life at that time such

claims could have serious consequences, and in the years that followed these consequences did a great deal of damage to Soviet psychology. Hence in this strange, and subsequently tragic way the names of Vygotsky and Werner were linked in more ways than they might have liked.

The Problem of Telos in Vygotsky's Developmental Approach

With these ties between Vygotsky and Werner as background, I turn to an issue that arises in both figures' writings but is approached in somewhat different ways. This is the issue of the "telos" of human development. In what follows, I shall focus in particular on Vygotsky's position on this issue. An extended discussion of how it fits into Werner's theoretical system can be found in Kaplan (1967).

Central to any account of development, and serving to distinguish it from both chance and variation, is the notion of the intrinsic directionality of the developmental process. When, for example, we find comparative evaluations of development (levels, trajectories) meaningful in a given domain, the *de facto* implication is that we have posited a preferred direction which is pertinent to that domain. The simplest observation of the occurrence of development (in what would otherwise be a welter of undifferentiated Now) is fundamentally an act of meaning-making predicated upon *a priori* claims--explicit or implicit, well- or badly-articulated--of the forms, norms, directions, or goals of development. In short, one cannot coherently speak of development without positing an ideal end point, or telos.

As Kaplan (1983) has pointed out, the recognition that development involves preferred directionality means that it "is a value, policy or normative notion" (p.59). Hence to posit a telos--something that is part of any developmental theory--is to nominate a "virtue" or set of virtues in the sense outlined by figures such as MacIntyre (1981) and Taylor (1989); it is to identify the good. For this reason, a telos of development can be understood in terms of what Kaplan terms a "mythos, dogma,

theory, perspective, etc., that we use to evaluate, assess, and seek to regulate human actions and transactions, including those we call inquiry" (p.59). Depending on the assumptions one makes in this connection, a developmental theory necessarily takes a stance with regard to what Kaplan terms "perfection-development" (p.59). Such stances about teloi may be "dimly held or vaguely apprehended" (p.59), but they nonetheless provide the grounds on which to "advocate different forms of education, different forms of therapeutic intervention, different forms of inquiry, different forms of governance, etc." (p.59).

Like any other developmental theorist, Vygotsky took a position on what constitutes "perfection-development." Before going into the details of this, it is worth making two general points about his position on this topic. The first concerns what Vygotsky would take perfection-development is perfection-development *of*. Are we dealing with the perfection of the individual, society, or some other entity? In accordance with an interpretation of Vygotsky that sees his basic unit of analysis as some form of instrumental action (Wertsch, 1985, 1991; Zinchenko, 1985), I shall argue that what develops or is perfected in his formulation is *mediated action*. Hence I will be talking about the tendency of mediated action to approach a posited telos rather than the tendency of an individual or some other entity to do so.

A second, related point is that if mediated action is the basic unit of analysis, then serious consideration must be given to the mediational means, or cultural tools involved. As with many other aspects of his line of reasoning, a key to understanding Vygotsky's position on the telos of development in my view is his assumption about what might be termed the "affordances" (Gibson, 1979; Still and Costall, 1989) of the cultural tools employed. Given his overriding focus on language as a cultural tool, this means examining the "semiotic potentials" (Wertsch, 1985) inherent in this medium. Thus, I shall argue that Vygotsky's position on the teloi of human development reflects

an underlying set of assumptions about the complexities and multiple functions of human language.

In particular, two semiotic potentials played a central role in Vygotsky's reasoning: a potential for decontextualization and a potential for a kind of linguistic contextualization, or recontextualization. The first is tied to his account of abstract word meaning and concepts, and the second is tied to his account of inner speech. Vygotsky made a set of claims about the semiotic potential for decontextualization that have fairly straightforward implications for a telos, namely a telos of abstract rationality. However, much of the power and generativity that flow from Vygotsky's writings derive from the fact that he seemed to be ambivalent about positing abstract rationality as the sole telos of human development. Instead, he posited at least one other form of perfection-development as well, and part of my task will be to outline this alternative. In the case of neither of these teloi did Vygotsky leave us an explicit formulation, so my major task is to reconstruct the assumptions and implicit commitments that underlay his arguments.

The Telos of Abstract Rationality

As dedicated participants in the effort to carry out the first grand socialist experiment in the form of the Soviet Union, Vygotsky and his students and colleagues in the 1920s and 30s were committed to formulating a psychology grounded in Marxism. As already noted, sharp differences emerged over the years among the various parties involved in this effort (see Zinchenko, 1995 for more on this). However, the fundamental tenets accepted by all included a belief in some form of universal human rationality and a belief in the evolution, or progress toward such rationality. The rationality involved was viewed as being accessible to all humans, though some groups and individuals were interpreted as lagging behind others in their mastery of it.

Based on this assumption Vygotsky and his colleagues made several distinctions within the genetic domains of sociocultural history and ontogenesis between "higher" and "lower" forms of mental functioning. For example, with regard to sociocultural history, Vygotsky and Luria argued in *Studies on the History of Behavior: Ape, Primitive, and Child* (1993) that "cultural" peoples are distinct from "primitive" peoples in the forms of language and thinking they employ. Specifically, "primitives" were viewed as not having the requisite "psychological tools" and associated forms of mediated action for higher mental functioning.

> The primitive man does not have concepts;
> abstract, generic names are completely alien to
> him. He uses the word differently than we
> do....All the characteristics of primitive thinking
> can be reduced to this main fact, that is, to the
> fact that instead of [conceptual] notions, it
> operates with complexes....The main progress in
> thought development affects a shift from the first
> mode of using a word as a proper name to the
> second mode, where the word is a sign of a
> complex, and finally to the third mode, where a
> word is a tool or means for developing the
> concept....[T]he cultural development of think-
> ing is found to have [a] close connection with
> the history of the development of human
> language. (pp.118-121)

In making such claims about thinking and language, Vygotsky was making strong assumptions about universal human rationality and progress toward one kind of telos. "Primitive thinking" in general differs from modern forms in that the former does not rely on abstract concepts. Abstract concepts are viewed as emerging at a later historical point. One of the results of this formulation is that what we would today call cross-cultural differences were for Vygotsky and his colleagues "cross-historical" in nature (Wertsch, 1985).

The tendency to view history as universal human progress reflects what Shweder (1991) terms "evolutionism," a view in which "diverse beliefs and understandings" are taken to be "steps on an ideational Jacob's ladder moving progressively in the direction of the normative endpoint" (pp.117-118). Such a critique of evolutionism is at the foundation of much of the thinking in contemporary cultural anthropology and cultural psychology. In contrast to grounding cultural and psychological analyses in assumptions about "psychic unity" (Jahoda, 1993) and the evolution thereof, figures such as Boas (1911, 1920) focused on the qualitative differences among cultures and argued that each has its own historical, psychological, and social configuration and must be understood in its own terms (see Lucy and Wertsch, 1987). This critique and the ensuing theoretical framework outlined by Boas and his students such as Sapir (1931) and Whorf (1956) are what provide the basic framework for much of today's cultural anthropology in the West.

In addition to playing a role in his account of socio-cultural history, Vygotsky's evolutionism appears at several points in his writings about other genetic domains. In particular, it plays an important role in his account of the ontogenesis of concepts. Chapters five and six of *Thinking and Speech* (1987) are very instructive in this regard and hence bear close analysis. Chapter five is titled "An Experimental Study of Concept Development" and is primarily concerned with the transitions Vygotsky saw from "heaps" to "complexes" to "pseudoconcepts" to "true concepts" as manifested in subjects' performances in a task involving what came to be known as "Vygotsky blocks." This chapter, which was probably written sometime during the early 1930s, is based on research Vygotsky conducted with Sakharov (1930) in the late 1920s.

Chapter 6, "The Development of Scientific Concepts in Childhood," was written somewhat later. Specifically, it was written for *Thinking and Speech*, which was published in 1934, the year of Vygotsky's death. In this chapter, Vygotsky focused on "scientific" concepts and contrasted them with "everyday" or "spontaneous" concepts. The Russian adjective used here-- "nauchnyi"--has usually been translated as "scientific." However, it can also be translated as "academic" or "scholarly," reflecting the fact that Vygotsky saw scientific concepts ("nauchnye ponyatiya") as being tied to the discourse of formal instruction. Indeed, at one point he went so far as to write that "the basic characteristic of [the] development [of scientific concepts] is that they have their source in school instruction" (1987, p.214).

As I have noted elsewhere (Wertsch, 1985), there are some important differences between Vygotsky's notions of true, or genuine concepts, on the one hand, and scientific concepts, on the other. For my present purposes, however, I shall focus on an underlying similarity in outlook which characterizes his account of both types of concepts. Specifically, I want to examine how he viewed them as reflecting a telos of abstract rationality.

When outlining his notions of complexes and concepts in chapter 5, Vygotsky wrote:

> The foundation of the complex lies in empirical connections that emerge in the individual's immediate experience. A complex is first and foremost a concrete unification of a group of objects based on the empirical similarity of separate objects to one another...The most important characteristic of complexive thinking is that it occurs on the plane of concrete-empirical thinking rather than on the plane of abstract-logical thinking.... (1987, pp.137)

In chapter 6, a similar orientation is reflected in connection with scientific concepts.

> As part of an organized system [of scientific concepts], this verbal definition descends to the concrete; it descends to the phenomena which the concept represents. In contrast, the everyday concept tends to develop outside any definitional system; it tends to move upwards toward abstraction and generalization. (1987, p.168)

The nature of everyday and scientific concepts was envisioned by Vygotsky in terms of one of the semiotic potentials of human language, namely for decontextualization. The potential for decontextualization, which is inherent in any human language, is the potential to consider words in terms of sign-types and to formulate what Vygotsky termed *meaning* ("znachenie"), as opposed to *sense* ("smysl"), in terms of relationships among sign-types.

In addition to similarities between Vygotsky's account of true and scientific concepts, on the one hand, as opposed to complexes and everyday concepts, on the other, there are important parallels in how he viewed the relationship between the two contrasting elements in the each case. In accordance with his assumptions about abstract rationality as a telos, he viewed true concepts as being more developed than complexes and scientific concepts as being more developed than everyday concepts.

At several points in his writings, Vygotsky took this line of reasoning one step further and argued that mastery of the more highly evolved forms of concepts results in a transformation of the less developed forms. This emerges in particular in chapter 6 of *Thinking and Speech* where he argued:

> The possibility that the mastery of scientific concepts influences this development in the child's spontaneous concepts is obvious. Everyday concepts are restructured under the influence of the child's mastery of scientific con-

cepts...when the child masters the structure that is associated with conscious awareness and mastery in one domain of concepts [i.e., scientific concepts], his efforts will not have to be carried out anew with each of the spontaneous concepts that were formed prior to the development of this structure. Rather, in accordance with basic structural laws, the structure is transferred to the concepts which developed earlier. (1987, pp.216-217)

In this view, there is a strong homogenizing force in concept development with the resulting picture of perfection-development being one in which *all* concepts taking the form of scientific concepts.

The key to understanding the homogenizing forces Vygotsky saw as being set in motion with the appearance of scientific concepts has to do with the "mastery" associated with "conscious awareness," "intellectualization," and "volition." Everyday concepts are defined by the fact "that they lack conscious awareness" (1987, p.191), whereas a hallmark of scientific concepts is precisely such awareness. Furthermore, Vygotsky saw the key to the conscious awareness, intellectualization, and volition associated with scientific concepts as being their organization into a system.

> *Only within a system can the concept acquire consciousness awareness and a voluntary nature. Conscious awareness and the presence of a system are synonyms when we are speaking of concepts, just as spontaneity, lack of conscious awareness, and the absence of a system are three different words for designating the nature of the child's concept.* (1987, pp.191-192)

Carried to its logical extreme, this principle of systematicity suggests that mathematics would provide an ideal case, and indeed Vygotsky did turn to mathematics in the course of

making his argument. He did so in the context of a discussion of the claim that "by its very nature, each concept presupposes the presence of a certain system of concepts. Outside such a system, it cannot exist" (1987, p.224). One of the implications of this systematic property is that concepts can be defined in accordance with "the law of concept equivalence" (1987, p.226), which, in principle, means that "*any concept can be represented through other concepts in an infinite number of ways*" (1987, p.226). In applying this to numbers as concepts, Vygotsky wrote:

> Thus, the number one can be expressed as 1,000,000 minus 999,999 or, more generally, as the difference between any two adjacent numbers. It can also be expressed as any number divided by itself or in an infinite number of other ways. This is a pure example of the law of concept equivalence. (1987, p.227)

This example of arithmetic provides what is perhaps the closest approximation possible to abstract rationality as a telos of development. By taking maximal advantage of the semiotic potential of decontextualization, it is possible to operate strictly within an abstract system, with all the attributes of mastery, conscious awareness, intellectualization, and volition that Vygotsky associated with scientific concepts. Furthermore, the decontextualizaton and abstraction involved strongly suggest that the kind of rationality at issue is universal. It is a kind of rationality accessible to all individuals and groups.

To say that the systematization and conscious awareness associated with scientific concepts reflects a semiotic potential is of course not to say that this potential is always fulfilled. Indeed, the studies that Luria and Vygotsky conducted in Central Asia in the 1930s (Luria, 1976) concerned cases in which this potential for the decontextualization of mediational means was not attained. A further question that arises here is whether scientific concepts and other forms of rationality are invoked in all

contexts by individuals or groups who have demonstrated a capacity for using them in at least one context. That is, can one assume a kind of homogeneity of the rational mind across contexts?

At several points in his writings about concept development Vygotsky indicated that he did not assume such homogeneity of abstract rationality. His doubts on this score seemed to stem from two basic sources. First, he argued that even though humans may have access to highly evolved and hence more powerful forms of conceptual functioning they sometimes fail to use them. Almost all of his comments on this issue can be found in chapter 5 of *Thinking and Speech*, comments such as:

> Although adult thinking has achieved the forma-
> tion of concepts and generally operates on that
> foundation, not all the adult's thinking is based
> on these operations. In dreams, for example, one
> can observe the ancient primitive mechanism of
> complexive thinking, the concrete fusion, con-
> densation, and shifting of images...In our [i.e.,
> adults'] everyday lives, our thinking frequently
> occurs in pseudoconcepts. From the perspective
> of dialectical logic, the concepts that we find in
> our living speech are not concepts in the true
> sense of the word. They are actually general
> representations of things. There is no doubt,
> however, that these representations are a transi-
> tional stage between complexes or pseudo-
> concepts and true concepts. (1987, p.155)

When writing about these issues in the context of the development of concepts, Vygotsky made it clear that he interpreted different forms of conceptual functioning (i.e., complexes versus true concepts) in terms of different levels in an evolutionary hierarchy approximating perfection-development.

> *The various genetic forms co-exist*, just as strata
> representing different geological epochs coexist

in the earth's crust. This is more the rule than the exception for the development of behavior more generally. Human behavior is not consistently characterized by a single higher level of development. Forms of behavior that have emerged very recently in human history dwell alongside the most ancient...The adult's thinking is often carried out at the level of complexes, and sometimes sinks to even more primitive levels. (1987, p.160)

All these comments from chapter 5 of *Thinking and Speech* indicate that Vygotsky did not assume that human mental functioning can always be characterized in some homogeneous way, specifically in terms of abstract rationality. Instead, he saw clear evidence for a kind of "heterogeneity" (Tulviste, 1991; Wertsch, 1991) of mental functioning. Specifically, his comments in this chapter comprise a statement about "heterogeneity as genetic hierarchy" (Wertsch, 1991). As characterized by Tulviste (1986), this view asserts that "having attained higher stages in the development of thinking, humans sometimes nonetheless drop to lower levels, to already completed stages of ontogenesis or sociogenesis [i.e., sociocultural history]...It is held that the completed stages in the development of thinking are not lost without a trace, but are preserved, and the return to them is viewed as regression" (p.19).

Heterogeneity as genetic hierarchy has played a role in the ideas of several major developmental psychologists. For example, it was much in evidence in the reasoning of Werner (1948) who wrote that "the normal adult, even at our own cultural level, does not always act on the higher levels of behavior. His mental structure is marked by not one but many functional patterns, one lying above the other. Because of this the isolated individual, genetically considered, must occasionally exhibit in his varying behavior different phases of development" (p.38).

As noted by Tulviste (1986) and Wertsch (1991) perhaps the most problematic aspect of claims about heterogeneity as genetic hierarchy is why lower forms of functioning would continue to exist and be used when forms presumed to be higher, and hence more powerful are available. It is a problem that Vygotsky himself did not address. Indeed, certain passages from his later writings suggest that, if anything, he was moving toward a position that strongly posited homogeneity. As noted earlier for example, he argued in chapter 6 of *Thinking and Speech* that the mastery of scientific concepts results in the transformation of everyday concepts into a like form. The key to this transformation is the systemic organization of scientific concepts outlined earlier: "*it is this new system that transforms the child's everyday concepts*" (1987, p.223). Even in chapter 6, however, Vygotsky gave at least some indication that heterogeneity was still a possibility. For example, he noted in passing that "scientific concepts are as inadequate in some contexts as everyday concepts are in scientific contexts" (1987, p.222), a comment which suggests that he did not envision a telos in which all mental representation was of one homogeneous sort having to do with abstract rationality.

Harmony of the Imagination as Telos

Just as the telos of abstract rationality reflects one of the major influences on Vygotsky's life--the Soviet effort to build a rationally organized society--the other telos I shall outline reveals another. Specifically, I have in mind Vygotsky's life long interest in literature, poetry, and drama (Kozulin, 1990; van der Veer and Valsiner, 1991). Vygotsky's implicit nomination of a second telos surfaces at several points in his writings and can be viewed as reflecting the view that two general forms of perfection-development can be posited when outlining an account of human mediated action. As already noted, Vygotsky never explicitly addressed the issue of teloi in general, and he certainly did not explicate the relationship between the two that I am positing. However, his comments about various forms of

mediated action and the cultural tools they employ are quite instructive in this connection.

In contrast to those sections of his writings which focussed on concepts and on the abstract rationality associated with them, Vygotsky posited another telos when dealing with other forms of semiotic organization. In this connection, consider Vygotsky's discussion of the "aesthetic reaction" that is at the core of his study of *The Psychology of Art* (1971). In the context of analyzing the function of texts in producing aesthetic reactions, he made a foray into issues raised by the Russian Formalists such as the relationship between story and plot, or "fabula" and "syuzhet" (Wertsch, 1985). In doing so, Vygotsky was examining issues that fall under the heading of what we would generally call narrative today. It is telling that Vygotsky examined narrative only in the context of dealing with the aesthetic reaction and never in his discussions of abstract rationality. This is one illustration of how particular mediational means are tied to particular forms of action, and by implication to particular teloi in his account.

Another version of this connection between mediational means and telos can be found in Vygotsky's later writings, especially in chapter 7 of *Thinking and Speech* (1987). This chapter, which he dictated in the final months of his life raises a host of issues that provide a striking contrast with those addressed in the previous two chapters of that volume, chapters devoted to the abstract rationality as manifested in conceptual thinking. It is not so much that he abandoned a position which implies a telos of abstract rationality as it is that he situated this position in a larger framework where another telos is implied as well.

Chapter 7 of *Thinking and Speech* is devoted to "Thought and Word" and deals with the complex dynamic that Vygotsky saw as characterizing the relationship between these two phenomena. In actuality, in this chapter the terms "thought"

and "word" reflect a more general opposition between two semiotic potentials. "Thought" can be taken as a sort of cover term for the potential that language has for maximally abbreviated and contextualized meaning and form, and "Word" can be taken as a cover term for the potential that language has for maximally explicit, expanded, systemic, and decontextualized meaning and form.

Throughout this chapter Vygotsky lays out this basic opposition. For example, he spends some time developing the distinction between the "internal" and "external" form of the word, a distinction that is prefigured in the writings and lectures of one of his teachers, Gustav Shpet (1927). This distinction, which again involves a dynamic tension between two poles, is also manifested in the distinctions Vygotsky drew between social and inner speech (with egocentric speech serving as an intermediary), between written speech and inner speech, and between sense and meaning.

In all these cases Vygotsky stressed that the functional, as well as the derivative formal properties of the two members of the opposition were quite distinct. In general, "language" (when contrasted with "thought"), "social speech," "written speech," the "phonetic" or "auditory" aspect of speech, the "grammatical" categories of subject and predicate, and "meaning" were all viewed as being associated with explicit, systemically organized, and expanded form, whereas "thought," "inner speech," the "semantic" aspect of speech, the "psychological" categories of subject and predicate, and "sense" were viewed as being characterized by implicit, condensed, abbreviated form.

In Vygotsky's view the externality of the first set of terms is tied to the fact that they are associated with the social, and hence public world, whereas the internality of the second set of terms is tied to the fact that they are associated with a private, psychological world. The kind of distinction between public and private I have in mind has been outlined by Smolka, De Goes, and Pino (1995) and is quite consistent with what Vygotsky

seemed to have in mind when he made statements such as "Inner speech is for oneself. External speech is speech for others" (1987, p.257).

Some of Vygotsky's most interesting comments on the basic opposition I have been explicating emerge in his discussion of the properties of external and inner speech. In outlining these properties he relied on the distinction between "meaning" (znachenie) and "sense" (smysl) to develop his claims about its "semantic" properties.

> The sense of a word...is the aggregate of all the psychological facts emerging in our consciousness because of this word. Therefore, the sense of a word always turns out to be a dynamic, flowing, complex formation which has several zones of differential stability....As we know, a word readily changes its sense in various contexts. Conversely, its meaning is that fixed, unchanging point which remains stable during all the changes of sense in various contexts....The real meaning [i.e., sense] of a word is not constant. In one operation a word emerges in one meaning and in another it takes on another meaning. (1934, p.305)

As Vygotsky outlined such contrasts in chapter 7 of *Thinking and Speech* his point was not to say that one member of the opposition reflects reality and the other reflects a mere figment of analysts' imaginations or that we should pay attention to one member and ignore the other. Instead, his point was that the members of these oppositions both play a role in human action and mental life and hence deserve serious analytic attention. His position on this issue was quite similar to that of Cassirer (1946) in the latter's analysis of "theoretical" and "mythical" thinking. Furthermore, Vygotsky's point was that the members of these oppositions exist in a kind of dynamic tension

and that this tension is extraordinarily productive in shaping human thought, speech, and other forms of action. The "word" generally, and "written speech" in particular, with their explicit, expanded, public form provide a necessary foil for the kinds of implicit, condensed, abbreviated, and private forms of "inner speech" and "thought" that struggle with them. It is only out of this dynamic that meaning, thought, and action emerge in Vygotsky's view.

Vygotsky wrote about the kind of dynamic tension he envisioned on this score in passages from chapter 7 such as:

> Only in mathematics do we find a complete elimination of incongruities in the use of common and unquestionable correct expressions. It appears that it was Descartes who first saw in mathematics a form of thinking that has its origins in language but has nonetheless surpassed it. We can only say one thing: In its oscillation and in the incongruity of the grammatical and the psychological our normal conversational language is in a state of dynamic equilibrium between the ideals of mathematics and the harmony of imagination. It is in the state of continuous movement that we call evolution. (pp. 252-253)

Of course the fact that the "harmony of imagination" is grounded in private semiotic processes meant that Vygotsky was less able to document and explicate it than the public semiotic processes which he examined in his analysis of concept development. His analytic strategy, therefore, shifted from focusing on relatively standard psychological studies to focusing on reports provided by authors of literary and dramatic texts. Hence his reliance on the abbreviated discussion between Kitty and Levin in *Anna Karenina* and the discussion of a group of inebriated men in Dostoyevsky's *Diary of a Writer*.

Teloi in Tension

This brief comparison between what Vygotsky had to say in chapters 5 and 6 of *Thinking and Speech*, on the one hand, and what he had to say in chapter 7, on the other, suggests several things. First, it is striking that in discussing the processes involved in "aesthetic reactions" or the "harmony of imagination" Vygotsky nowhere suggested that these were somehow less developed forms of human action. This at least appears to stand in contrast to his comments in chapter 5 and 6 of *Thinking and Speech* suggesting that there is one telos, that of abstract rationality, and other forms of human mediated action are hence somehow less well developed. His analyses of thought and of the abbreviation, sense, and other properties associated with inner speech in chapter 7 clearly were not intended to constitute an analysis of processes that occur through "primitivization" (Werner, 1948). Instead, he was taking these phenomena as representing some of the highest forms of human mental functioning and action.

So what are we to make of Vygotsky's strong claims in chapters 5 and 6 concerning the tendency of scientific and genuine concepts to absorb more primitive forms of thinking and to result in a homogeneous form of mental functioning? What are we to make of what appear to be strong tendencies toward evolutionism in Vygotsky's writings? It seems to me that the only answer to this is to understand Vygotsky as an ambivalent Enlightenment rationalist. There seems to be a side to him that was committed to the standard account of the Enlightenment (Toulmin, 1992) which viewed abstract rationality as superseding irrational dogmatism and other pitfalls associated with pre-Enlightenment times. This was a side that would have been well suited to participate in some of the discussions of Soviet Marxism going on during Vygotsky's professional lifetime.

At the same time, however, there seems to be side of Vygotsky that recognized the powers of human thinking and

action grounded in the harmony of the imagination, aesthetic reactions, and other phenomena that do not fit neatly into standard accounts of the Enlightenment and its descendants. In this latter connection it is important to remember that Vygotsky did not associate these phenomena with irrationality, primitive forms of thinking and action, or other such labels.

In a sense we should not be surprised about Vygotsky's ambivalence on these issues since serious students of the Enlightenment such as Gay (1966) have argued that it can be adequately understood only in terms of an ongoing struggle between various forms of mentality and that there have been no final, transcendent victories in this process. Vygotsky was not content, however, to let the various human mentalities he identified exist side by side in some kind of static heterogeneity. Instead, he devoted chapter 7 of *Thinking and Speech* to understanding how two general semiotic potentials and two corresponding forms of mental action exist in dynamic tension. Indeed, human mental life as we know it would not be possible if they were *not* in this dynamic in Vygotsky's view.

This leaves us with a complex, if not muddled picture of what constitutes the telos or teloi of human action for Vygotsky. At some points he seems to have been quite clear about the telos of abstract rationality. Indeed, his most extended statements that bear on a telos can be found in the sections of writings that deal with concepts, decontextualization, and related issues. On the other hand, he seems to have recognized other forms of human mental life that simply do not fit into these categories--either as primitive versions of perfection-development or otherwise. The resulting picture is one that is less neat than someone committed in a single minded fashion to abstract rationality might prefer, but it is probably the picture that we will be left to struggle with for some time to come.

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