

Second Edition

Tools *of* the Mind

The Vygotskian Approach to Early Childhood Education



ELENA BODROVA • DEBORAH J. LEONG

Foreword by Michael Cole

Tools of the Mind

*The Vygotskian Approach
to Early Childhood Education*

Second Edition

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Foreword

Very few would disagree with the famous adage, variously attributed to William James and Kurt Lewin, that there is nothing as practical as a good theory. At the same time, it is very rare for practicing teachers to find anything useful to their everyday work in the theories of developmental and educational psychologists. A major exception to this dismal state of affairs is Elena Bodrova and Deborah Leong's outstanding introduction to Lev Vygotsky's theory, *Tools of the Mind*. In the first chapter of this fine book, written specifically for practitioners of early childhood education, Bodrova and Leong provide a lucid introduction to Vygotsky's ideas based on four key principles:

1. Children construct knowledge using cultural tools that become "tools of the mind."
2. Development must always be studied in its sociocultural context.
3. Learning can be organized in such a way that it promotes development.
4. The development of language is central to the intellectual development of the child.

These ideas are explained lucidly in a clear, accessible way, and relevant comparisons are made to the ideas of such major developmentalists as Montessori, Piaget, and those who favor the use of behavior modification techniques in the classroom. A variety of experimental examples are provided to make the basic concepts clear and then these examples are broadened to link them to a variety of classroom practices that teachers can implement themselves.

In this carefully revised edition of *Tools of the Mind*, Bodrova and Leong have retained all the outstanding features of the first edition and made several additions that will make the book even more useful for practicing teachers and teachers in training. In addition to a readable, understandable exposition of Vygotsky's theories, this new edition is chock full of practical examples that bring the theoretical ideas to life in ways that teachers can put to immediate use. There is also a timely discussion of children with special needs that will not only prove practical to teachers, but also will make clearer the deep connection that Vygotsky sees between the organization of the social environment of children in the classroom and the way that it is possible to create special zones of proximal development for such children by applying Vygotsky's ideas.

The first edition of *Tools of the Mind* was a major milestone in providing teachers with a really useful set of tools for their own work. This new edition will prove even more useful.

Michael Cole

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About the Authors

Elena Bodrova and Deborah J. Leong have co-authored numerous books and articles on the Vygotskian approach since they began writing together in 1995. They have written on play, self-regulation development, and early literacy development as well as articles on state standards and on early childhood assessment. With Oralie McAfee, they co-authored *Basics of Assessment: A Primer for Early Childhood Educators* published by the National Association for the Education of Young Children. They have a series of videos with Davidson Films: *Vygotsky's Developmental Theory: An Introduction*; *Play: A Vygotskian Approach*; *Scaffolding Self-Regulated Learning in the Primary Grades*; and *Building Literacy Competencies in Early Childhood*. Their work was featured in the video *Growing and Learning in Preschool* (National Institute for Early Education Research). Their early childhood program was named an exemplary program by the International Bureau of Education (UNESCO) in 2001.

Elena Bodrova is a senior researcher at Mid-continent Research for Education and Learning (McREL) in Denver, Colorado. Prior to her coming to the United States, she was a senior researcher at the Russian Center for Educational Innovations and the Russian Institute for Preschool Education. She received her Ph.D. from the Academy of Pedagogical Sciences, Moscow, Russia, and her M.A. from Moscow State University. In addition to her work with Dr. Leong, she co-authored the book *For the Love of Words: Vocabulary Instruction That Works, Grades K–6* (Jossey-Bass) with Diane E. Paynter and Jane K. Doty.

Deborah J. Leong is a professor of psychology and the director of the Center for Improving Early Learning (CIEL) at Metropolitan State College of Denver. She received her Ph.D. from Stanford University and her M.Ed. from Harvard University. In addition to her work with Dr. Bodrova, she is co-author with Oralie McAfee of *Assessing and Guiding Young Children's Development and Learning* (Allyn & Bacon) that is now in its fourth edition.

Preface

In the second edition of this book, we have attempted to stay true to our original purpose and to add new information that is currently available from the work of post-Vygotskians in Russia who have made great strides in the application of the theory in the classroom. Since the first edition there has been growing interest in Vygotsky and in the work that followed his death in which his colleagues and students went about applying the ideas in the classroom, developing classroom interventions, and verifying and extending his ideas as the work evolved. This has led to additions to the chapters on development and a new section on special education.

The title for this book, *Tools of the Mind*, reflects its purposes, which are to enable teachers to arm young children with the mental tools necessary for learning and to act as tools for teachers. Mental tools are ideas that we learn from others, modify, and then pass on. Vygotsky, his students, and his colleagues have given us wonderful mental tools that we in turn hope to pass on to our readers. This book and four related videos*—*Vygotsky's Developmental Theory: An Introduction*; *Play: A Vygotskian Approach*; *Scaffolding Self-Regulated Learning in the Primary Grades*; and *Building Literacy Competencies in Early Childhood*—will give teachers a strong foundation in Vygotsky's ideas.

The book is still organized as a set of concentric circles, or a spiral, in that the content becomes more and more tightly focused as the book progresses. Section I (Chapters 1 through 3) introduces the major ideas in the Vygotskian approach and compares and contrasts them with perspectives that will be familiar to early childhood teachers and psychology students. Chapter 2 contains a new section describing the Vygotskian approach to special education. Section II of the book (Chapters 4, 5, 6, and 7) revisits the points made in the first section and applies them to the learning/teaching process. Section II has been substantially reorganized and now describes general strategies for approaching learning/teaching and specific tactics that can be used for scaffolding this process. Section III (Chapters 8 through 14) is even more detailed, with specific applications provided. The second edition expands the first edition's coverage on the specific developmental features of children at specific ages: infants and toddlers, preschoolers and kindergarteners, and primary grade students. Separate chapters were added to specify the nature of learning and teaching that fosters development at different ages. Examples of Vygotsky-based classroom practices that were previously discussed in a single chapter are expanded in this edition and presented in three separate chapters according to the ages of children. The second edition ends with a special chapter on dynamic assessment.

*For further information, contact Davidson Films, Inc., 735 Tank Farm Road, Suite 110, San Luis Obispo, CA 93401. Phone: (805) 594-0422. FAX (805) 584-0532. Toll-free number: (888) 437-4200.

Examples and activities in this book are a product of 15 years of collaboration with preschool, kindergarten, and first- and second-grade teachers all over the United States. The programs ranged from Head Start to public school preschools, state-supported universal pre-K programs, private schools, child care, and federal Early Reading First and Reading First programs. The vast majority of the programs have been for at-risk children. The classrooms ranged from traditional to multiage groups (combining three- and four-year-olds, but also kindergarten, first grade, and second grade) and were philosophically diverse. For example, some employed traditional ways of teaching reading and others used the Whole Language approach. Some of the classrooms provided bilingual instruction.

One of the most exciting things we have found in our work with teachers is that the Vygotskian approach works in all of the classrooms we have described. Many of the concerns addressed in this book go beyond socioeconomic class or classroom philosophy. Vygotsky helps us examine our roles as the adults in the classroom in a different way, providing many more alternatives for action. He helps us see ourselves as partners with children in the great journey to learn, rather than as taskmasters or followers. Our work with teachers and children in these various classrooms has been a liberating, exhilarating, and exciting endeavor, reminding many of us why we became teachers in the first place!

Throughout the book, we have balanced the examples by using children of different ages, so that all of the early childhood period is presented. Because English lacks a gender-neutral pronoun for *child* and *teacher*, we alternate between using *he* and *she*.

Acknowledgments

We have many people to thank for their contributions to this book. In addition to the people who contributed to the first edition, we would like to thank the teachers, coaches, and administrators in the Vygotskian-based programs in New Jersey, Colorado, Oregon, Wyoming, Wisconsin, Iowa, Illinois, Missouri, California, and Arizona who have contributed to our work. The following people require special thanks: Sharon Saunders, Loretta Merritt, Laura Morana, Rita Mendez, Gisela Ferrer Bullard, Sally Millaway, Steffen Salfer, Lena Ko, Sandy Martin, Rebecca Fuerstein, Shawna Fagnant, Ann Lundt, Lynn Soat, JoAnn Christofferson, Laura Abruzzezze, Pat Chamberlain, Peggy Ondera, Louise Nelson, Tammy Upton, and Robin Bulterd.

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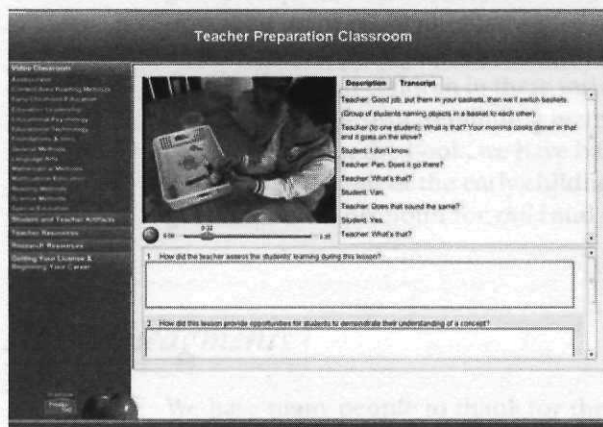
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The Vygotskian Framework: The Cultural-Historical Theory of Development

This section introduces the major principles in the Cultural-Historical Theory of development proposed by L. S. Vygotsky and implemented by scholars in Russia and the United States. In addition, it compares Vygotsky's perspective with other theories of child development. There are three chapters in this section:

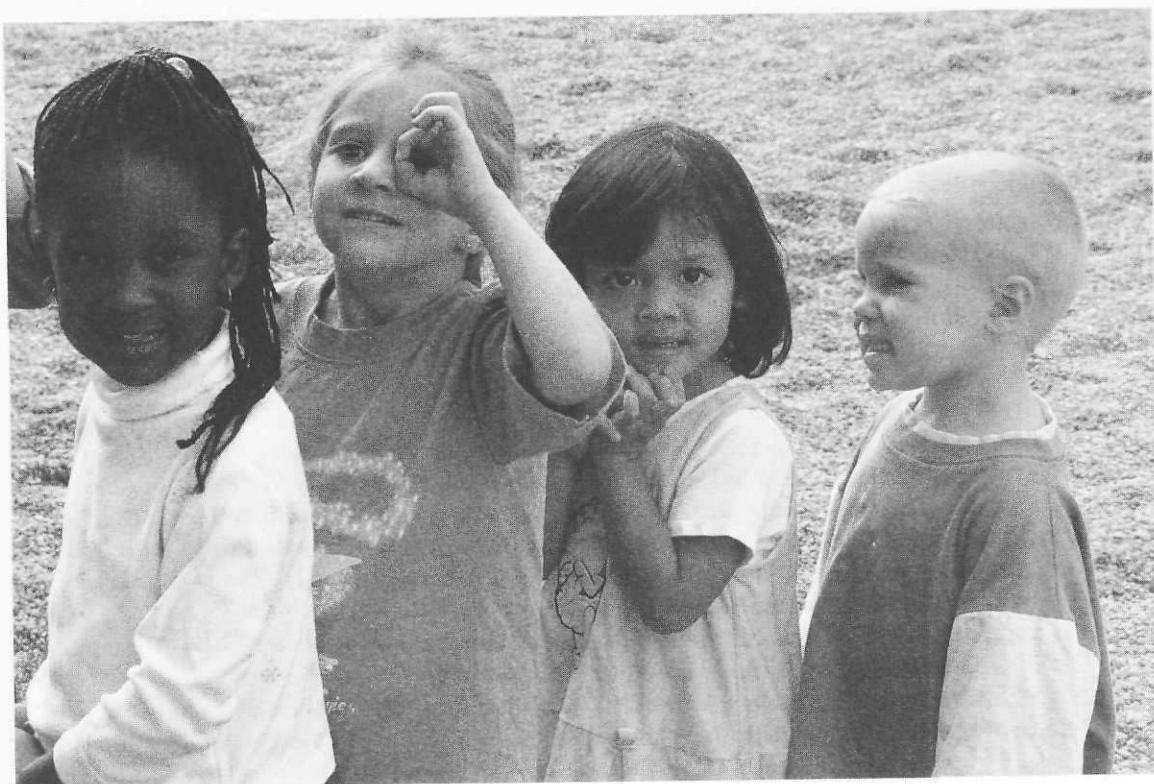
Chapter 1 Introduction to the Vygotskian Approach

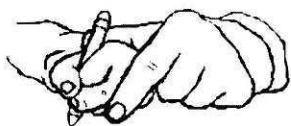
Chapter 2 Acquiring Mental Tools and Higher Mental Functions

Chapter 3 The Vygotskian Framework and Other Theories of Development and Learning

CHAPTER 1

Introduction to the Vygotskian Approach





Sun-mei, who is 4 years old, draws a picture of what she wants to do when she and Johan go to the dramatic play area to play spaceship. She draws a picture of herself and Johan with helmets. Next to them she draws some rocks. "We are going to make a space walk and look at moon rocks. We're scientists on the ship," she says when the teacher asks her what she is doing. When she goes to the play center, she and Johan play spaceship, starting out with moon rocks and then doing repairs on the ship. They stay involved for more than an hour and continue their play when they go outside.

Seven-year-old Juan has written his own version of a story he has read. The teacher asks him to "edit" his work by looking for spelling and capitalization errors. He puts on a pair of special glasses called "Editor's Eyes" to help him step out of his role of writer and into the role of editor. With the glasses on, he notices many more mistakes in his own writing.

Maura, a sixth grader, is a thoughtful, deliberate problem solver. When she has to answer a question, her answers seem intentional, and she thinks before she speaks. She ponders complex problems, planning her approach before she begins and looking over her work.

What do these three children have in common? Each is using "tools of the mind" to help them solve problems and remember. The idea of tools of the mind was developed by Lev Vygotsky, a Russian psychologist (1896–1934), to explain how children acquire increasingly advanced mental abilities.

Tools of the Mind

A tool is something that helps us solve problems, an instrument that facilitates performing an action. A lever helps us lift a rock that is too heavy to move with only our arms. A saw helps us cut wood that we cannot break with our hands. These physical tools extend our abilities, enabling us to do things beyond our natural capacities.

Just as we humans have invented physical tools, like hammers and forklifts, to increase our physical capacities, we have also created mental tools, or *tools of the mind*, to extend our mental abilities. These mental tools help us to attend, remember, and think better. For example, mental tools such as memory strategies enable us to double and triple the amount of information we recall. Mental tools, however, do more than extend our natural abilities. Vygotsky believed that they actually change the very way we attend, remember, and think.

Because Vygotskians believe that mental tools play a critical role in the development of the mind, they have explored ways in which children acquire these tools. They propose that these tools are learned from adults and suggest that the role of the teacher is to "arm children" with these tools. This sounds simple, but the process involves more than merely direct teaching of facts or skills. It involves enabling the child to use the tool independently and creatively. As children grow and develop, they become active tool users and tool makers; they become crafters. Eventually, they will be able to use mental tools appropriately and invent new tools when necessary (Paris & Winograd, 1990). The teacher's role is to provide the path to independence—a goal of all educators.

Why Mental Tools Are Important

When children lack mental tools, they don't know how to learn in a deliberate fashion. They are unable to focus their minds on purpose, and consequently their learning is less effective and efficient. As we will see, children develop the ability to use different mental tools at different ages. Their "tool chests" aren't filled all at once but gradually. Here are some examples of children who do not have mental tools.

Four-year-old Amanda is sitting in group time when the teacher asks the children to hold up their hand if they are wearing yellow. Amanda looks down at her dress and sees a gigantic brown kitty. She forgets all about "yellow," but she still holds up her hand.

Jane, who is 5, knows that she is supposed to hold up her hand when another child is talking and wait until the teacher calls on her. However, she can't seem to stop herself from talking out of turn. When you ask her, she can tell you the rule. In fact, she is always telling other children the rule, even as she is blurting out answers herself.

Second-grader Ben is working on his journal in a small group. He gets up to sharpen his pencil, but as he walks past the book section, he stops and looks at a book. Soon another book catches his eye. When it is time to change activities, he notices he is still holding a dull pencil, and he no longer has any time left to complete his work.

Eight-year-old Tony is solving a word problem: There are some birds sitting on a tree. Three flew away and seven are left. How many birds were there in the tree in the beginning? Tony keeps subtracting 3 from 7. Instead of adding, he subtracts because of the word "away." He doesn't self-regulate or check his thinking. Even though his teacher has just explained that estimating will help, he doesn't apply the strategy to this problem.

Young children *are* able to think, attend, and remember. The problem is that their thinking, attention, and memory are very reactive; what ends up holding their attention may or may not have anything to do with the task they are expected to perform. Think about how many things children learn by watching television, especially commercials. Very simply, television exploits reactive thinking, memory, and attention. Television is loud, has lots of movement, changes scenes every few seconds, and is colorful. This format is used to teach basic skills in many educational television programs and computer "teaching games," but many teachers complain that the fast-paced sensory bombardment makes it difficult to teach some children in other ways. In fact, many early childhood teachers complain that they have to "sing, dance, or act like Big Bird" in order to teach. Without the acquisition of mental tools, this attention-grabbing approach would be the only way for children to acquire information, because children could not direct and focus their attention, memory, and problem-solving skills on their own. It would take many more exposures to information to learn very simple information.

When children have mental tools, they are no longer reactive learners. They can take more responsibility for learning on their own because learning becomes a self-directed activity. The teacher no longer has to take total responsibility for every aspect of the learning process. Tools relieve teachers of this unnecessary burden, and more important, they can be applied across the curriculum, from reading to math or manipulatives to dramatic play.

One of the great strengths of the Vygotskian approach is that the mechanisms for teaching mental tools have been tried and tested. Instead of just expecting the tools to be learned and leaving children to struggle on their own, Vygotsky shows us ways to facilitate acquisition. Teachers in the United States and Russia who use these techniques report that they can see changes in the way that children think and learn (Cole, 1989; Davydov, 1991; Palincsar, Brown, & Campione, 1993).

The absence of mental tools has long-term consequences for learning because mental tools influence the level of abstract thinking a child can attain. To understand abstract concepts in science and math, children must have mental tools. Without them, children can recite many scientific facts, but they cannot apply the facts to abstract problems or problems that are slightly different from the ones presented in the original learning situation. Vygotskians trace this lack of transfer from one setting to the next to an absence of mental tools. Abstract problems are the concern of teachers in the upper elementary grades, therefore, tools learned during the early childhood period have a direct bearing on later abilities.

Logical, abstract thought is needed not just in school but in making informed decisions in many areas of adult life. How to buy a car, manage one's finances, decide how to vote, participate in a jury, and raise children all require mature thinking skills.

History of the Vygotskian Approach

The Life of Vygotsky

The Russian psychologist Lev Vygotsky lived from 1896 to 1934 and produced more than 180 articles, books, and research studies (see Figure 1.1). Vygotsky suffered from tuberculosis from a young age, and the disease eventually killed him at the age of 37. Throughout his life, he triumphed over difficulties. He faced difficulty getting an education. Born in the small town of Orshe near the city of Gomel (currently Republic of Belarus), Vygotsky was a Jew. In prerevolutionary Russia, strict limits were set on the number of Jews that could be educated at the university level, but Vygotsky won a place and became an exceptional student. As a psychologist, Vygotsky faced intense pressure to modify his theory to fit the prevailing political dogma. He did not succumb to the pressure. Several years after his death, however, his ideas were repudiated and expunged. The problem of political correctness also affected the work of his students, who courageously continued to expand and elaborate on his theory in spite of the risks. We have these scholars to thank for keeping Vygotsky's ideas alive. When the intellectual thaw of the late 1950s and early 1960s occurred, these scholars revived Vygotsky's ideas, applying them in many areas of education.

Vygotsky's interests ranged from cognitive and language development to literary analysis and special education. He taught literature in a secondary school and then went on to lecture at a teacher-training institute. He became very interested in psychology and gave a presentation in St. Petersburg on consciousness that brought him much acclaim. After moving his family to Moscow, he began a collaboration with Alexander Luria and Alexei Leont'ev that resulted in the rich theory and body of research that we have come to know as the Vygotskian approach.



Figure 1.1 Lev Vygotsky

If you are interested in learning more about Vygotsky and his colleagues and students, Van der Veer, Valsiner, and Kozulin give detailed accounts of Vygotsky's life and ideas both in and outside of Russia (Kozulin, 1990; Van der Veer & Valsiner, 1991). In addition, Alexander Luria's autobiography (1979) makes fascinating reading. Finally, memoirs written by Vygotsky's daughter, Gita Vygodskaya, provide unique personal "brush strokes to the portrait" (Vygodskaya, 1995, 1999).

Vygotsky's theory of development, which was unique and distinct from those of his contemporaries, is often called the *Cultural-Historical Theory*. Because his life was so short, his theory leaves many unanswered questions and is not always sufficiently supported by empirical data. Over the years, however, many of his concepts have been elaborated and studied by scholars in Russia and the West. Presently, his theory is changing the way psychologists think about development and the way educators work with young children.

In a strict sense, Vygotskian theory is really a framework for understanding learning and teaching. It gives the early childhood educator a new perspective and helpful insights about children's growth and development. Although it does not define a set of premises and present empirical studies that provide recipes for any classroom situation,

teachers can expect his ideas to inspire them to see children in a different way and consequently to modify the ways they interact with and teach them.

Vygotsky's Contemporaries

Among the major Western theorists that Vygotsky studied and reacted to were psychologists such as Piaget (constructivism), Watson (behaviorism), Freud (psychoanalysis), Kohler and Koffka (Gestalt psychology) as well as educators, anthropologists, and linguists. In his theoretical papers and empirical studies, Vygotsky proposed alternative explanations for several of Piaget's early works concerning the development of language in young children. Vygotsky frequently referred to Kohler's work on the use of tools by apes to discuss various similarities and differences in animal and human behavior. Vygotsky also commented on the work of Montessori. For a discussion of the similarities and differences between the Vygotskian framework and other developmental psychologists, see Chapter 3.

Post Vygotskians: Russian Colleagues and Students

Vygotsky collaborated with Alexander Luria (1902–1977) and Alexei Leont'ev (1903–1979) on many of his early experiments, and they contributed to the development of the framework. After Vygotsky's death, Luria, Leont'ev, and other Vygotskians faced increased pressure to cease their research. Many of them continued but did not openly acknowledge the tie to Vygotsky until the political winds changed. They elaborated on the major principles and applied them to various areas of psychology.

Luria, one of Vygotsky's most prolific colleagues, pioneered studies in such varied areas as cross-cultural psychology, neuropsychology, and psycholinguistics. He applied Vygotskian principles to the study of neuropsychology by looking at brain damage and possible ways of compensating for it (Luria, 1973). In cross-cultural psychology, Luria (1976) also studied how cultural influences shape cognition. Luria's psycholinguistic research probed the role of private speech in the regulation of motor actions and examined the ties between language and cognition from a developmental as well as clinical perspective. Vocate (1987) gives an excellent summary of Luria's work.

Leont'ev studied deliberate memory and attention, and developed his own theory of activity, which linked the social context or environment to developmental accomplishments through the child's own actions (Leont'ev, 1978). Leont'ev's theory is the basis of much current research in Russia, especially in the areas of play and learning. Some of these studies and their application to early childhood development will be discussed in detail in Chapters 10 and 12.

Piotr Gal'perin (1902–1988), Daniel Elkonin (1904–1985), and Alexander Zaporozhets (1905–1981), three of Vygotsky's students, focused on the structure and development of learning/teaching processes. Zaporozhets founded the Institute of Preschool Education where he and his students applied the Vygotskian approach to early childhood education.

Today, the Vygotskian tradition in educational and developmental psychology is being carried on in Russia by what can be called third- and fourth-generation Vygotskians (Karpov, 2005). The ranks of these neo-Vygotskians include, among others, such scholars as Vasili Davydov, Maya Lisina, Leonid Venger, Vitali Rubtsov, Galina Zuckerman, and Elena Kravtsova. Their elaborations of Vygotsky's original ideas have led to many of the innovations in teaching practices discussed in this book.

Research and Applications of Vygotsky's Theory in the West

Western psychologists first became interested in Vygotsky in the late 1960s following the translation of his *Thought and Language* (Vygotsky, 1962). Psychologists in Scandinavia, Germany, and Holland have addressed broad philosophical issues in this framework. American psychologists Michael Cole and Sylvia Scribner (1973), Jerome Bruner (1985), and Uri Bronfenbrenner (1977) first brought Vygotsky to the attention of psychologists and educators in the United States. From the 1970s to the 1990s, interest in the social-cognitive aspects of the Vygotskian framework was promoted by other researchers such as Wertsch (1991), Rogoff (1991), Tharp and Gallimore (1988), Cazden (1993), Campione and Brown (1990), and John-Steiner, Panofsky, and Blackwell (1990).

At first, American researchers were interested in the global aspects of Vygotsky's theory, but more recent research has been more specialized, studying how the framework applies in different areas of psychology and education. For example, several researchers have focused on a comparison of Vygotskian and non-Vygotskian approaches to play (Berk, 1994; Berk & Winster, 1995) or to joint problem solving (Newman, Griffin, & Cole, 1989). The Vygotskian framework has been used in a number of programs in the United States and in other countries outside of Russia. Most of the efforts have involved elementary, middle school, and high school students (Campione & Brown, 1990; Cole, 1989; Feuerstein & Feuerstein, 1991; Moll, 2001; Newman, Griffin, & Cole, 1989).

However, a few programs have used the Vygotskian approach with preschool and kindergarten children such as in the Reggio Emilia programs and our own work in the classroom in the *Tools of the Mind* (Bodrova & Leong, 2001) and *Scaffolding Early Literacy Programs* (Bodrova, Leong, Paynter, & Hensen, 2001; Bodrova, Leong, Paynter, & Hughes, 2001). Articles about the application of many of Vygotsky's ideas have been published widely, and the popularity of the approach has only grown in the last 15 years.

This book synthesizes Vygotskian works; the work of Vygotsky's colleagues; and contemporary research in Russia, the United States, and Europe to explain how the Vygotskian framework applies to the early childhood classroom. Vygotsky's ideas form a general approach that is helpful for examining developmental processes and for finding creative ways to enhance and further a child's development.

The Vygotskian Framework: Principles of Psychology and Education

The basic principles underlying the Vygotskian framework can be summarized as follows:

1. Children construct knowledge.
2. Development cannot be separated from its social context.
3. Learning can lead development.
4. Language plays a central role in mental development.

The Construction of Knowledge

Like Piaget, Vygotsky believed that children construct their own understandings and do not passively reproduce what is presented to them. However, for Piaget, cognitive construction occurs primarily in interaction with physical objects (Ginsberg & Oppen, 1998). People play an indirect role, for example, in planning the environment or creating cognitive dissonance. For Vygotsky, cognitive construction is always *socially mediated*; it is influenced by present and past social interactions (Karpov, 2005). The things that a teacher points out to her student will influence what that student “constructs.” If one teacher points out that the blocks are of distinct sizes, the student will construct a concept that is different from the one constructed by the student whose teacher points out the blocks' color. The teacher's ideas mediate what and how the child will learn; they act as a filter in a sense, determining which ideas the student will learn.

Vygotsky believed that both physical manipulation and social interaction are necessary for development. Trudy must touch, physically compare, arrange, and rearrange the blocks before she acquires the concept of “big and little” and incorporates it into her own cognitive repertoire. Without manipulation and hands-on experience, Trudy will not construct her own understanding. If she has only her teacher's ideas or words, chances are that Trudy will not be able to apply the concept to slightly different materials or to use it when the teacher is not present. On the other hand, without her teacher the child's learning would not be the same. Through social interaction Trudy learns which characteristics are most important and what to notice and act upon. The teacher has a direct influence on Trudy's learning through shared activity.

Because of the emphasis on the construction of knowledge, the Vygotskian approach stresses the importance of identifying what the child actually understands. Through sensitive and thoughtful exchanges with the child, the teacher discovers exactly what the child's concept is. In the Vygotskian tradition, it is common to think of learning as *appropriation* of knowledge, which underscores the active role that the learner plays in this process.

The Importance of Social Context

For Vygotsky, the *social context* influences more than attitudes and beliefs; it has a profound influence on how and what we think. The social context molds cognitive processes and is part of the developmental process. Social context means the entire social milieu; that is, everything in the child's environment that has been either directly or indirectly influenced by the culture (Bronfenbrenner, 1977). The social context should be considered at several levels:

1. The immediate interactive level, that is, the individual(s) the child is interacting with at the moment
2. The structural level, which includes the social structures that influence the child such as the family and school
3. The general cultural or social level, which includes features of society at large such as language, numerical systems, and the use of technology

All of these contexts influence the way a person thinks. For example, the child whose mother emphasizes learning the names of objects will think in a different way from the child whose mother issues terse commands and does not talk with her child. The first child will not only have a larger vocabulary but will also think in different categories and use language differently (Luria, 1979; Rogoff, Malkin, & Gilbride, 1984).

Social structures also influence a child's cognitive processes. Russian researchers found that children raised in orphanages did not have the same level of planning and self-regulatory skills as children raised in families (Sloutsky, 1991). American researchers found that schools, one of the many social structures outside of the family, directly impact the cognitive processes presumed to underpin IQ (Ceci, 1991).

The general features of the society also influence the way we think. Asian children who used an abacus had different concepts of number than children who did not (D'Ailly, Hsiao, 1992). These examples illustrate the pervasive influence of the social context on cognition.

The Characteristics of Cognition: Content and Processes. A number of theorists have discussed the idea that development requires the acquisition of culturally generated knowledge. Vygotsky extended this idea to include both the content and form of knowledge, the very nature of the mental processes. For example, children in Papua, New Guinea, will not only know different types of animals from children in the United States, but the strategies they use to remember these animals will also differ. Children who attend school and are taught scientific categories for classifying animals will actually group animals in a different way from children who do not attend school. Luria found that illiterate adults from a herding community in central Asia used situationally based

categories, and therefore placed hammer, saw, log, and hatchet in the same category because they are all needed for work (Luria, 1976, 1979). Adults with varying amounts of school experience grouped the objects into two categories, tools (hammer, saw, and hatchet) and objects to be worked on (log).

The idea that culture influences cognition is crucial because the child's entire social world shapes not just what he knows but how he thinks. The kind of logic we use and the methods we use to solve problems are influenced by our cultural experience. Unlike many Western theorists, Vygotsky did not believe that there are many logical processes that are universal or culture-free. A child does not just become a thinker and a problem solver; she becomes a special kind of thinker, rememberer, listener, and communicator, which is a reflection of the social context.

Social context is a historical concept. For Vygotsky, the human mind is the product of both human history, or *phylogeny*, and a person's individual history, or *ontogeny*. The modern human mind has evolved with the history of the human species. Each individual's mind is also a product of unique personal experiences. Therefore, Vygotsky's approach to development is often called the Cultural–Historical Theory.

Before they began producing tools and developing a social system for cooperation, human beings evolved in a way similar to other animals. When humans began to use language and to develop tools, *cultural evolution* became the mechanism that shaped further development. Through culture, one generation passes knowledge and skills on to the next. Each generation adds new things, and thus the cumulative experience and information of the culture are passed on to succeeding generations. Vygotsky assumed that children do not invent all of their knowledge and understanding but appropriate the rich body of knowledge accumulated in their culture. The developing child acquires this information and uses it in thinking. Thus the cultural history of our ancestors influences not just our knowledge, but our very thought processes.

Vygotsky believed that an individual's mind is also formed by individual history. Even though there are common aspects to mental processes, a child's mind is the result of his interactions with others within a specific social context. The child's attempts to learn and society's attempts to teach through parents, teachers, and peers all contribute to the way a child's mind works.

The Development of Mental Processes. Social context plays a central role in development, because it is critical for the acquisition of mental processes. Vygotsky's unique contribution was to see the possibility of the sharing of higher mental processes. Mental processes not only exist internally to the individual but can occur in an exchange among several people. Children learn or acquire a mental process by *sharing*, or using it when interacting with others. Only after this period of shared experience can the child internalize and use the mental process independently.

The idea of socially shared cognition is very different from the idea of cognition commonly accepted in Western psychology. Western tradition has viewed cognition as a set of internal mental processes accessible only to the individual. However, as researchers have studied the Vygotskian framework, a growing number have begun to examine the idea of cognition as a shared process and to recognize the importance of social context in the acquisition of these mental processes (Karasavvidis, 2002; Rogoff, Topping, Baker-Sennett, & Lacasa, 2002; Salomon, 1993).

To understand the idea of a shared mental process, let's look at Western and Vygotskian descriptions of how memory develops. In the Western tradition, we would attribute Ariel's ability to remember something to the fact that she possesses a set of memory strategies and that she encodes the information in memory. Memory is something that is internal. Because Ariel is 4 years old, she will probably not remember certain things because her strategies are immature. How will she acquire mature strategies? With age, her mind will mature and she will have them.

In contrast to seeing memory only as an internal process, Vygotsky believed that memory can be shared between two people. For example, Ariel and her teacher share memory; their interaction contains the mental process of memory. Ariel has forgotten the directions to playing a game. The information is stored somewhere in her memory, but she cannot retrieve it by herself. Her teacher, on the other hand, knows some strategies for recalling the information, but he doesn't know this particular game. Therefore, recalling the directions of the game requires both participants. The child cannot do it alone, but the teacher cannot either. It is through their social exchange, dialogue, or interaction that they can remember. The teacher says, "What do you do with the dice?" The child says, "You throw them and they tell you how many you can move." It is in the interchange that the memory exists for now. As Ariel grows she will appropriate the strategy that she currently shares. Soon she will ask herself questions about what the rules of the game might be. At this point in her development, however, she cannot generate the questions independently.

Andre, a first grader, is trying to read a particularly difficult passage in a book. He comes across a word that he can "read" but does not understand. His mother proposes two different reading strategies to help him figure out what the word means. He can guess at the meaning based on the meaning of the sentence or he can look the word up in the dictionary. Andre chooses one of these strategies and confirms his understanding of the sentence with his mother. Several days later, when Andre comes across an analogous situation, he thinks of the strategies that his mother told him. He uses both strategies independently.

Stephen, a second grader, is trying to solve a chess problem. His father identifies the problem and suggests several alternative moves. The child chooses a move and successfully captures the pawn. The problem is solved in a shared way with both participating. Playing chess several days later, Stephen uses his father's moves independently.

Natasha and Joseph are working on a project together. Neither of them remembers exactly what the teacher wants them to do. "I think he said we are supposed to look in the library first," Natasha says. "Right, but first we have to pick from one of these topics," contributes Joseph. Together they reconstruct the steps that they are supposed to follow to create the project.

Therefore, for Vygotsky, all mental processes exist first in a shared space, and then move to an individual plane. The social context is actually part of the developmental and learning process. Shared activity is the means that facilitates a child's internalization of mental processes. Vygotsky did not deny the role of maturation, but he emphasized the importance of shared experience for cognitive development.

The Relationship of Learning and Development

Learning and development are two different processes that are complexly related to each other. Unlike behaviorists who believe that learning and development are the

same thing (see e.g., Horowitz (1994)), Vygotsky argued that there are qualitative changes in thought that are not accounted for only by the accumulation of facts or skills. He believed that the child's thinking gradually becomes more structured and deliberate.

Although Vygotsky believed that there were maturational prerequisites for specific cognitive accomplishments, he did not believe that maturation totally determines development. Maturation influences whether the child can do certain things. For example, children could not learn logical thinking without having mastered language. However, theorists who stress maturation as the major developmental process believe that a specific level of development must exist *before* the child can learn new information (Thomas, 2000). For example, Piaget (1977) suggests that a child must attain the stage of concrete operations before she can think logically. In this view, the internal reorganization of thinking precedes the ability to learn new things. Thus, when information is presented at a higher level, the child cannot learn it until that developmental level has been attained.

In the Vygotskian framework, not only can development impact learning, but *learning can impact development*. There is a complex, nonlinear relationship between learning and development. Although Vygotsky did not question the existence of developmental prerequisites that limit a child's ability to learn new information at any time, he also believed that learning hastens and even causes development. For example, 3-year-old Cecily is classifying objects, but she cannot keep the categories straight. Her teacher gives her two boxes, each marked with a word and a picture. One box has the word *big* in large letters with a picture of a large teddy bear. The other has the word *little* in small print with a picture of a small teddy bear. The teacher helps Cecily learn by giving her the boxes to help her keep the categories straight. Soon Cecily is categorizing other objects without the benefit of the boxes. The learning of the words *big* and *little* in association with the images will hasten the development of categorical thinking.

Vygotsky insisted that we must consider the child's developmental level and also present information at a level that will lead the child into development. In some areas, a child must accumulate a great deal of learning before development or qualitative change occurs. In other areas, one step in learning can cause two steps in development. If we insist that development must come first, we reduce teaching to presenting material that the child already knows. As experienced teachers know, children quickly become bored when teachers review a skill that the children have already mastered. But if we completely ignore the child's developmental level, we would miss the moment when children are ready to learn and consequently present material that is frustratingly difficult. An example of this type of error would be introducing addition before a child can count accurately.

Vygotsky's ideas about the relationship between learning and development are also helpful in explaining why teaching is so difficult. We cannot make exact prescriptions that produce developmental changes for every child since individual differences are to be expected. We cannot say to a teacher, "If you do this six times, every child will develop a particular skill." The exact relationship between learning and development may be different for each child and for different areas of development. Teachers must constantly adjust their methods to accommodate the learning and teaching process for each child. This is a great challenge for all educators.

The Role of Language in Development

We tend to think that language's primary impact is on the content of a person's knowledge. What we think about and what we know are influenced by the symbols and concepts that we know. Vygotsky believed that language plays a greater role in cognition. Language is an actual mechanism for thinking, a mental tool. It is one of the processes through which external experience is converted into internal understandings. Language makes thinking more abstract, flexible, and independent from the immediate stimuli. Through language, memories and anticipations of the future are brought to bear on the new situation, thus influencing its outcome. When children use symbols and concepts to think, they no longer need to have an object present in order to think about it. Language allows the child to imagine, manipulate, create new ideas, and share those ideas with others. It is one of the ways we exchange social information with each other. Therefore language has two roles: it is instrumental in the development of cognition and it is also part of cognitive processing.

Because learning occurs in shared situations, language is an important tool for appropriating other mental tools. To share an activity, we must talk about that activity. Unless we talk, we will never be able to know each other's meanings. For example, Joshua and his teacher are working with Cuisenaire rods. Unless they talk about the relationships between the blocks, the teacher will not know if Joshua has built the quantity five out of the units because he understands the relationship between the small rods and the larger rods. Perhaps Joshua is focusing on the color of the smaller rods and doesn't even notice that five little ones make a rod the same size as the fives rod. Only by talking can the teacher distinguish relevant from irrelevant attributes. Only by talking can Joshua make known how he understands the activity. Only by talking can Joshua and the teacher share this activity.

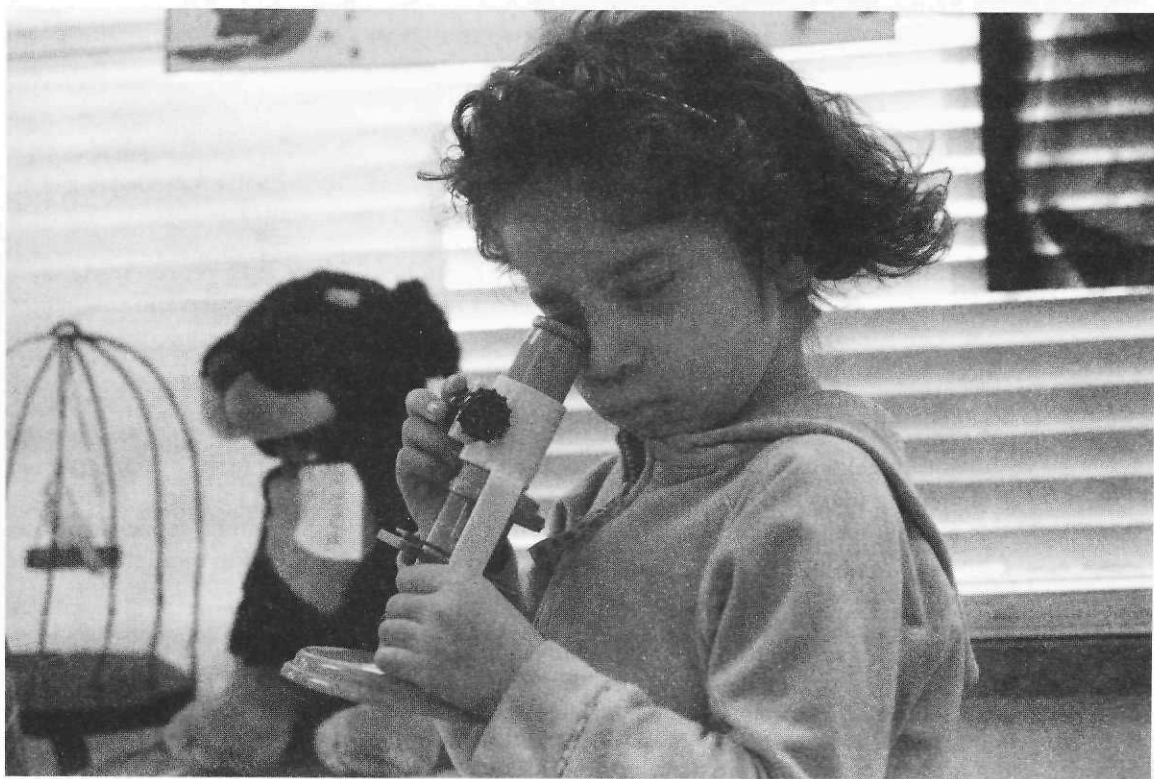
Language facilitates the shared experiences necessary for building cognitive processes. Six-year-old Lucy and her teacher are watching butterflies breaking out of their cocoons and drying their wings. Lucy says, "Look, they don't look bright to begin with." The teacher says, "When do they become bright? Look at that one that is just pulling itself out. Why would its wings be a different color compared with the wings of a butterfly that has been flying around for a while?" Lucy and the teacher discuss the butterflies they both see. Through many dialogues like these, Lucy will not only learn about butterflies and caterpillars, but will also acquire the cognitive processes involved in scientific discovery.

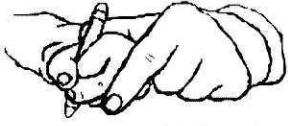
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CHAPTER 2

Acquiring Mental Tools and Higher Mental Functions





For Vygotsky, the purpose of learning, development, and teaching is more than acquiring and transmitting a body of knowledge; it involves the acquisition of tools. We teach to arm children with tools, and children appropriate these tools to master their own behavior, gain independence, and reach a higher developmental level. Vygotsky associated the higher developmental level with the use of mental tools and the emergence of higher mental functions.

The Purpose of Tools

Vygotsky believed that the difference between humans and lower animals is that humans possess tools. Humans use tools, make new tools, and teach others how to use them. These tools extend human abilities by enabling people to do things that they could not do without them. For example, although you can cut cloth to a certain extent with your teeth or hands, you can do it more easily and more precisely using scissors or a knife. Physical tools enable humans to survive in and to master a changing environment.

Humans, unlike all other animals including apes, invent both physical and mental tools. The whole history of human culture can be viewed as the development of increasingly complex mental tools:

[T]he use of notched sticks and knots, the beginnings of writing and simple memory aids all demonstrate that even at early stages of historical development humans went beyond the limits of the psychological functions given to them by nature and proceeded to a new culturally-elaborated organization of their behavior. (Vygotsky, 1978, p. 39)

Mental tools have evolved from the first scratches on cave walls representing numbers to the complex categories and concepts used in modern science and mathematics. The use of the mental tools in processes such as memory and problem solving has been transmitted from generation to generation.

Extending the Mind's Capacities

Vygotsky's extension of the idea of tools to the human mind is a novel and unique way of viewing mental development. Vygotsky proposed that mental tools are to the mind as mechanical tools are to the body. Mental tools extend the mind's capacity to allow humans to adapt to their environment, and thus have a function similar to that of mechanical tools:

[E]ven such comparatively simple operations as tying a knot or marking a stick as a reminder change the psychological structure of the memory process. They extend the operation of memory beyond the biological dimensions of the human nervous system and permit it to incorporate artificial, or self-generated, stimuli. (Vygotsky, 1978, p. 39)

Just like mechanical tools, mental tools can be used, invented, and taught to others. Unlike mechanical tools, however, mental tools have two forms. In the early stages of development (both phylogeny *and* ontogeny), mental tools have an external, concrete,

physical manifestation. At more advanced stages, these become internalized; that is, they exist in the mind without external support. An external manifestation of a mental tool is the use of a string around your finger to help you remember to buy apples at the grocery store. You would be using an internalized mental tool if you categorized groceries by the food groups or by the meals you plan to cook.

Mastering Behavior

Another difference between mental and mechanical tools is their purpose. Mental tools help humans to master their own behavior, not just the environment. According to Vygotsky, “humans master themselves from the outside—through psychological tools” (Vygotsky, 1981, p. 141). Without mental tools, humans would be limited to reacting to the environment as animals do. Mental tools enable humans to plan ahead, to create complex solutions to problems, and to work with others towards a common goal.

For example, the ability of humans to remember how to navigate long distances is limited compared with that of songbirds or other animals that use biologically programmed responses to outside stimuli, such as light patterns. Humans use mental tools to compensate for the lack of innate navigational abilities; they might leave a pile of stones to mark the way, make a scratch on a tree, or compose a song about the landmarks along the way. Maps and compasses are physical tools that reflect advanced mental processing about the problem of navigating long distances.

Mental tools help children master their own physical, cognitive, and emotional behaviors. With mental tools, children make their bodies react in a specific pattern, for example, to music or a verbal command. Planning, problem solving, and memory are not possible without tools. Tools also help children master emotions. Instead of hitting another person when angry, they learn ways of thinking, or strategies, to control their feelings. Counting to 10 and thinking of something else are tools to subdue anger.

Let’s look at how mental tools, such as language, help children to control their behavior. Toddlers are not able to resist touching objects with dials and knobs because they do not have control over their impulses. In Vygotsky’s words, children who lack this self-control have not yet “mastered their own behavior.” When children begin to acquire this mastery, they will issue commands to themselves to help them stop doing something. Two-and-a-half-year-old Thomas says “No, no” when coming near the stereo he knows he shouldn’t touch. Six months earlier, Thomas did not have this tool and would run to touch the stereo. Only his mother’s words and presence in front of the stereo would stop him. His actions were a reaction to the buttons and levers on the machine. When Thomas can stop himself by saying “No, no,” Vygotsky would say he has learned a mental tool and has become the master of his own behavior. Thomas’ speech is the mental tool that enables him to regulate his actions on his own.

Gaining Independence

Vygotsky believed that when children have acquired mental tools, they will use the tools in an independent manner. Children begin by sharing the process of using the tool with others; the process is *interpersonal* at this stage. In the Vygotskian framework, the words *shared*, *distributed*, and *interpersonal* all stand for the idea that mental processes exist between two or more people. As children incorporate the tool into their own thought

processes, a shift occurs and the tool becomes *intrapersonal*, or *individual*. Children no longer need to share the tool, because they can use the tool independently. Thus, gaining independence is associated with a child's moving from shared possession of tools to individual possession, where the tool is, in a sense, inside the child.

Nadia has a hard time concentrating during the morning group meeting. She lies down on other children, pokes them, and constantly talks, interrupting the teacher. The teacher has said "I like the way Mindy is paying attention" or "Pay attention" hundreds of times without the slightest impact on Nadia's behavior. The teacher realizes that Nadia does not possess the tools that will help her to concentrate on purpose. So she sits Nadia in the front of the meeting where she can put her hand on her shoulder. Then she gestures to the book and says "Nadia, listen." She gives her a picture of an ear to hold to help her remember to listen. At this point, attention still exists in a shared state, between Nadia and the teacher. After a number of group meetings, Nadia begins to concentrate on her own. Now attention is individual; Nadia is able to do it by herself.

Reaching the Highest Level of Development

The highest level of development is associated with the ability to perform and self-regulate complex cognitive operations. Children cannot reach this level through maturation or the accumulation of experiences with objects alone. The emergence of this higher level of cognitive development depends on the appropriation of tools through formal and informal instruction.

Language: The Universal Tool

Language is a universal tool that has been developed in all human cultures. It is a cultural tool because it is created and shared by all members of a specific culture. It is also a mental tool because each member of the culture uses language to think.

Language is a primary mental tool because it facilitates the acquisition of other tools and is used for many mental functions. Tools are appropriated or learned through shared experience, which exists, in part, because we talk to each other. Two-year-old Frank and his teacher are putting together a puzzle. They share the experience through their physical interaction over the puzzle. However, the learning that Frank will take away from the experience depends on the language that he and his teacher share. The teacher says, "Look for a piece that has blue, because the piece next to this one is blue." Frank says, "Dis?" The teacher says, "Yes, that is blue. It matches this spot here. Keep turning it until it fits." The dialogue elevates Frank's learning to a higher level, arming him with strategies for other puzzles. Without language, Frank would not even know that there are strategies!

Language can be used to create strategies for the mastery of many mental functions, such as attention, memory, feelings, and problem solving. Saying to yourself "Only color matters" will focus your attention to the color of an object and help you ignore the other attributes. Language plays a large role in what we remember and how we remember. Because of its application to so many mental functions, we devote all of Chapter 6 to the discussion of the various aspects of language in the Vygotskian framework.

The Concept of Higher Mental Functions

Like many of his contemporaries, Vygotsky divided mental processes into lower mental functions and higher mental functions. However, unlike his contemporaries, Vygotsky did not consider lower and higher mental functions to be completely independent of each other but instead proposed a theory of how these two sets of functions interact.

Characteristics of Lower Mental Functions

Lower mental functions are common to both higher animals and human beings. Lower mental functions are innate and depend primarily on maturation to develop. Examples of lower mental functions are cognitive processes such as sensation, reactive attention, spontaneous memory, and sensorimotor intelligence. Sensation refers to using any of the five senses in mental processing and is determined by the anatomy and physiology of a particular sensory system. For example, different animals are capable of discrimination between different number of colors—from almost color-blind marine mammals to birds and fish who can discriminate between more shades of color than humans do. Reactive attention refers to attention that is dominated by strong environmental stimuli, as when a dog suddenly reacts to the sound of a car coming up the driveway. The dog’s attention is drawn by the noise. Spontaneous memory, or associative memory, is the ability to remember something after two stimuli are presented together many, many times, such as associating a tune from a commercial with a company logo or a dog that salivates when it associates a bell with being fed. Sensorimotor intelligence in the Vygotskian framework describes problem solving in situations that involve physical or motor manipulations and trial and error. Table 2.1 provides some examples of lower and higher mental functions.

Characteristics of Higher Mental Functions

Unique to humans, *higher mental functions* are cognitive processes acquired through learning and teaching. The main difference between lower and higher mental functions is that the latter involve the use of mental tools.

The central characteristic of elementary functions is that they are totally and directly determined by stimulation from the environment. For higher functions, the central

Table 2.1 Lower and higher mental functions

Lower Mental Functions	Higher Mental Functions
<i>humans and higher animals</i>	<i>humans only</i>
Sensation	Mediated perception
Reactive attention	Focused attention
Spontaneous or associative memory	Deliberate memory
Sensorimotor intelligence	Logical thinking

feature is self generated stimulation, that is, the creation and use of artificial stimuli which become the immediate causes of behavior. (Vygotsky, 1978, p. 39)

Higher mental functions are *deliberate, mediated, internalized* behaviors. When humans acquired higher mental functions, thinking became qualitatively different from that of the higher animals and evolved with the development of civilization. Higher mental functions include mediated perception, focused attention, deliberate memory, and logical thinking. When we distinguish between different colors, placing sky blue in a different category from turquoise blue, we are using mediated perception. Focused attention describes the ability to concentrate on *any* stimulus, whether or not it is exceptionally salient or striking. Deliberate memory refers to the use of memory strategies to remember something. Logical thinking involves the ability to solve problems mentally using logic and other strategies. All these higher mental functions are built upon lower mental functions in a culturally specific way. In current cognitive theories, many of the mental processes described by Vygotsky as higher mental functions are commonly referred to as *metacognitive*.

Higher mental functions are *deliberate* in that they are controlled by the person, and their use is based on thought and choice; they are used on purpose. The behaviors can be directed or focused on specific aspects of the environment, such as ideas, perceptions, and images, while ignoring other inputs. Young children lacking deliberateness react to the loudest noise or the most colorful picture. When children acquire higher mental functions, they direct their behavior to the aspects of the environment most pertinent to solving a problem. These aspects may not necessarily be the most perceptually obvious or noticeable (see Table 2.2).

Mediation is the use of certain signs or symbols to represent behavior or objects in the environment. These signs and symbols may be external as well as internal (see Table 2.3). Vygotsky considered mediation an essential characteristic of higher mental functions. "All higher mental functions are mediated processes. A central and basic aspect of their structure is the use of the sign as a means of directing and mastering mental processes" (Vygotsky, 1987, p. 126). The signs or symbols can be universal, specific to a small group such as a family or classroom, or specific to a particular person. For

Table 2.2 Examples of nondeliberate and deliberate mental behaviors

Nondeliberate Behavior	Deliberate Behavior
Cannot find a hidden figure in a picture because she searches in an unsystematic way or is distracted by other figures	Searches for hidden figure in a systematic and deliberate way, ignoring other distracting figures
Cannot listen to the teacher when other children are talking	Listens to the teacher and blocks out distracting noises
Begins building with blocks that are nearest at hand and keeps stacking them on top of each other with no idea what the structure is going to be	Begins building with blocks using a mental plan, so blocks that will be best for the future structure are chosen

Table 2.3 Examples of nonmediated and mediated behaviors

Nonmediated Behavior	Mediated Behavior
Trying to remember a complicated dance pattern you have just watched	Saying the names of the steps to yourself, such as “two right, three left, kick, kick”
Trying to visually estimate the number of items	Counting the items
Blurting out your comment after the teacher’s question	Holding up your hand as a sign that you are ready to answer the question

example, a stop sign or red light is a universal sign for stopping forward motion and is understood the world around. On the other hand, when a teacher places a red dot next to a student’s name, it can mean different things depending on the particular classroom. In one classroom it might mean that all children with red dots will go to the blocks area while all children with green dots will do an art project. However, in a different classroom it might mean that a child who received a red dot just got his last warning and if he continues to misbehave he will be sent to a time-out. Sometimes a sign has meaning only for the individual who uses it and is meaningless for everybody else. For example, a circled date on a calendar may be a very important reminder for the person who circled it, but it can mean anything to a stranger—from an anniversary to a dental appointment.

Internalized behaviors exist in a person’s mind and may not be observable. Internalization happens when external behaviors “grow into the mind,” maintaining the same structure, focus, and function as their external manifestations (Vygotsky & Luria, 1993). Adding a group of numbers using your fingers is an external behavior. Adding the numbers in your head is basically the same behavior, but it is internal.

In young children, most behaviors are external and visible. When young children are beginning the process of internalization, we can see the roots of higher mental functions in their overt actions, such as attempts to control memory by chanting or singing something repeatedly to themselves. Older children possessing deliberate memory may not show any overt strategies.

The Development of Higher Mental Functions

Vygotsky believed that higher mental functions develop in a specific way:

1. They are dependent on lower mental functions.
2. They are determined by the cultural context.
3. They develop from a shared function to an individual function.
4. They involve internalization of a tool.

Building on Lower Mental Functions

Higher mental functions are built upon lower mental functions that have developed to a specific level. Two-year-old Elena cannot remember all the words to “Itsy Bitsy Spider” because her spontaneous memory has not sufficiently developed. Presently, her ability to remember deliberately is limited primarily by the immaturity of the underlying lower mental functions, not by the absence of specific strategies.

When higher mental functions develop, a fundamental reorganization of lower mental functions occurs (Vygotsky, 1994). It means that as children start utilizing higher mental functions more frequently, their lower mental functions do not disappear completely but are used less and less often. For example, as children acquire language, they continue to use their associative memory, but now they depend less and less on their ability to recollect things spontaneously and more and more on the use of various memory strategies.

The Influence of Cultural Context

Culture affects both the essence of the higher mental functions and the way mental functions are acquired. A classic example of this is found in Luria’s studies of classification in the 1930s. Luria found that the classification system used by people who do not have formal schooling is quite different from those who do. People without formal schooling use an experience-based system of classification that depends on where they have encountered the objects. When asked which object does not belong—apples, watermelon, pears, or plate—they are likely to say all of the objects go together. Since people with formal schooling develop more abstract ways of categorizing, such as fruit and nonfruit, they are likely to exclude plates from the group. Luria’s findings have been confirmed in several cross-cultural studies (Ceci, 1991).

The acquisition of higher mental functions also depends on the cultural context. Abstract thinking, such as using numbers, is learned differently depending on cultural background. In some African cultures children use their hands in a specific rhythm to help them add, in parts of Asia they use an abacus, and in some North American classrooms, children count using Cuisinaire rods. The children in all three cultures learn the same mental skills but in different ways. Individuals may have the same higher mental functions, but the paths to their development may be different.

Moving from Shared to Individual Functions

Higher mental functions first exist in shared activity between two or more people and only later become *internalized* by an individual. Vygotsky called this transition from shared to individual *the general law of cultural development*, emphasizing that in the course of development of higher mental functions, “social relations, real relations of people, stand behind all the higher mental functions and their relations” (Vygotsky, 1997, p. 106).

Comprehension of complex texts is a process calling for the use of higher mental functions. As primary students are learning strategies such as asking questions or making predictions, there is a time when the entire process is distributed between the teacher and the group of students. At this stage, it is mostly the teacher who models both how to apply a specific strategy and how to know which strategy works for which kind of text. Later, students take over some parts of this process with one child asking

a question about the text, the second one answering the question, and the third one checking if the answer is correct. Finally, each student is able to carry out all of these processes independently, as everyone has mastered the use of comprehension strategies. At this point, what was previously shared becomes individual. To apply the earlier Vygotskian quote, relationships between the teacher and students, in the context of text comprehension, were transformed into the relationships between specific comprehension strategies that each student is now able to apply independently. We will discuss this process in more detail in Chapter 7.

To acquire higher mental functions, the child must have already learned the basic mental tools of her culture. Children use mental tools to modify and restructure lower mental functions into higher mental functions. Mental tools such as language will reorganize the child's lower mental functions. We will discuss several tools and their relationship to higher mental functions in the chapters that follow.

Individual Differences in the Development of Mental Functions

Lower Mental Functions

Vygotsky proposed that lower mental functions were culture-free, or independent of any cultural context. They seem to be part of our biological heritage. All people can solve sensorimotor problems regardless of whether they live in Papua, New Guinea, or the United States. Lower mental functions depend primarily on maturation and growth, and not on any particular type of instruction. However, all people do not develop the same level of lower mental functions. The problem may be organic and due to the underdevelopment of, or damage to, a particular area of the brain. Children with certain learning disabilities lack some aspects of lower mental functions, such as being able to discriminate between some visual or auditory stimuli or to hold a specific amount of information in their memory. Sensorimotor stimulation, the opportunity to manipulate objects and explore the environment, also affects lower mental functions. Extreme deprivation can lead to individual differences, especially in the first years of life when lower mental functions are developing.

Higher Mental Functions

Individual differences in higher mental functions may be influenced by factors described previously, but there are other contributing factors. One is the quality of language environment. Opportunities to hear and practice language will directly influence the future development of higher mental functions.

Another factor is social context. Some social contexts are more conducive to the development of higher mental functions. Vygotsky insisted that formal schooling was one of the most beneficial social contexts. Some aspects of higher mental functions can be learned only by going to school. The development of taxonomic categories (mammal, carnivore) is an example of "schooled" behavior. However, a child's informal experiences may be very different from those taught at school, especially when the child's culture is different from the mainstream culture. Most likely, white, middle-class children will have an informal context that is quite similar to that found in most schools in

the United States. For them, the process of developing higher mental functions builds upon their previous accomplishments. Children from other cultural backgrounds have varying degrees of similarity between school and their other social contexts. The degree of dissimilarity will influence how much mental restructuring must occur before the child can acquire the higher mental function presented in school. This is an important point for parents and educators to understand. This mental restructuring will require special support. It cannot happen by just dropping the child into that setting.

Compensating for the Deficits in the Development of Higher and Lower Mental Functions: Vygotskian Approach to Special Education

Abnormal psychology and special education for Vygotsky were more than simply the applications of his general ideas on learning and development. In fact, Vygotsky was able to formulate or refine some of his major theoretical principles while studying the development of children and adults with disabilities. Vygotsky's view of disabilities is consistent with his major principle of social determination of the human mind: for him a disability is a sociocultural and developmental phenomenon and not a biological one.

Social and Cultural Nature of Disabilities

Vygotsky strongly opposed views that were dominant in special education during his time where the focus of diagnosis and intervention was on the handicap itself. He argued that these views reflect a simplistic—he called it “arithmetic”—view of a human as a “sum of its parts.” From this perspective, a child with an auditory or visual impairment is considered to be no different than a normally developing child—“minus the disability.” In contrast, for Vygotsky, the development of children with sensory, cognitive, or speech impairments takes a completely different course from the development of their healthy peers. To emphasize the complex and systemic nature of this development, Vygotsky used the term “disontogenesis” or “distorted development.”

The major components that determine the course of this developmental path include the primary disability (e.g., visual impairment or restricted movements) and the social context in which the child develops. This social context would determine the extent to which this child would be considered (and will consider himself) “disabled.” According to Vygotsky, “For the daughter of an American farmer, for the son of a Ukrainian landowner, for a German duchess, for a Russian peasant or a Swedish proletarian, blindness represents absolutely different psychological factors” (Vygotsky, 1993, p. 82). Another way to illustrate this principle is to compare children experiencing similar problems in coordinating movements of their eyes while focusing on near objects. For a child living in a Western industrialized country, this problem will interfere with his ability to track print when reading. On the other hand, a child living in a herding community might not even have a need for tracking small objects since most of his daily tasks involve looking at larger objects at a distance. Evidently, the same visual “deficit” may go virtually unnoticed in a society that does not rely on written texts for carrying out essential tasks. But it might put another child at risk for developing a reading disability and even for

academic failure associated with the possibility of subsequent social and emotional complications.

As a result of the interaction between the primary disability and the social context, a secondary disability can develop. While the child's primary disabilities affect primarily lower mental functions, secondary disabilities are the distortions of higher mental functions. Secondary disabilities develop because primary disabilities often prevent a child from mastering cultural tools that are critical for engaging in social interactions. In turn, limited social interactions prevent the child from acquiring even more cultural tools, which eventually leads to systemic distortions in the child's mental functioning. On the other hand, if the social context provides this child with an opportunity to learn an alternative set of cultural tools, the child may be able to participate in a wide range of social interactions and, as a result, develop higher mental functions.

In his own writings, Vygotsky frequently used examples of children who were deaf or blind (primary disability) and who did or did not develop secondary disabilities depending on whether or not they were able to master alternative tools, such as sign language instead of oral language and Braille instead of written language. Today, with an ever-increasing number of assisting devices, the mastery of cultural tools is becoming possible for children with various primary disabilities.

Remediation as a Means of Remediation

Vygotsky's approach to remediation differs greatly from the approaches of his contemporaries, as well as many of today's educators. The proponents of the "arithmetic" approach to disabilities believed that remediation is possible at the level of an isolated function—the one affected by the primary disability. The way to "fix" this isolated function was to provide training to overcome the deficit (e.g., doing numerous exercises in blending isolated sounds into syllables and then into words to compensate for an auditory processing deficit) or to train an alternative function to take over for the one that is not working (e.g., training a blind person to develop more acute hearing or more differentiated tactile perception).

For Vygotsky, however, the primary disability should not be the main focus of the remediation efforts. He argued that, contrary to common wisdom, the primary disability is the hardest one to remediate because it affects lower mental functions. As we discussed earlier in this chapter, lower mental functions are biologically determined (in today's language, we would call them "hardwired"). It is exactly because of their biological nature that they cannot be changed by any means other than radical medical intervention such as inserting a hearing implant to improve hearing. On the other hand, higher mental functions are culturally and socially determined and as such can be successfully remediated in the course of specifically designed educational interventions. Vygotsky advocates focusing on higher rather than lower mental functions in remediation contending that "the developmental limitations in higher knowledge go beyond sensorimotor training which is possible in the elementary processes. Thought is the highest form of compensation for the insufficiencies of visual perception" (Vygotsky, 1993, p. 204).

For Vygotsky and his students, the way to engage higher mental functions to compensate for the deficiencies in lower mental functions is to use mental tools such as language. In a series of studies focusing on the self-regulatory role of speech in motor

behaviors, Vygotsky's colleague Alexander Luria observed changes in behaviors of extremely impulsive children after they were taught to verbalize their actions while carrying them out (Luria, 1979). At the beginning of the study, these children had a hard time following an experimenter's directions to press a rubber bulb when a green light came on and not to press it when a red light came on. Instead, they pressed the bulb every time they saw the light—any light—or did not press it at all. After being taught to say “press” in response to the green light and “no” or “do not press” in response to the red light, these children were able to gain control over their reactions and began to respond according to the directions. In essence, Luria had re-built the behavior that was lacking internal regulatory mechanisms by replacing the mechanisms with the children's own self-directed speech. This speech mediated the children's responses to external stimuli; therefore their new, more self-regulated behavior was not simply the result of remediation but also the result of re-mediation (Cole, 1989).

Application of Vygotsky's Theory to Special Education

Vygotsky's ideas had a profound impact on the field of special education in Russia and are gaining popularity in the West (Gindis, 2003). We will not be able to describe the specific intervention strategies or particular programs that have been developed, but we will summarize two major ways Vygotsky's approach is being currently applied to special education.

Differential Diagnosis of Impairment of Higher and Lower Mental Functions. In extreme cases of severe visual or hearing impairment, it is clear which of the lower mental functions is affected. However in most early childhood classrooms, we are dealing with a system of interactions between a primary disability and subsequent deficiencies in social interactions and the acquisition of mental tools. Often children with neurological or sensory conditions exhibit symptoms similar to those of children with no such conditions who have been subject to cultural deprivation or educational neglect. Differentiated diagnoses of these cases is critical for planning successful instructional interventions. In his work with special needs children, Vygotsky pioneered a new type of assessment that allows for such a differentiated diagnosis. Based on the idea of Zone of Proximal Development (see Chapter 4), this assessment provides information not only about children's current mastery of certain content and skills but also about their responsiveness to adult assistance and their amenability to instruction in general (Gindis, 2003). In contemporary literature, this type of assessment is called Dynamic Assessment (see Chapter 14). A special type of dynamic assessment has been developed for cases in which a child's low performance is thought to be fully or partially due to the gaps in the child's acquisition of certain mental tools. Some examples of such cases—studied at the time by Vygotsky himself and now studied by R. Feuerstein and his associates (Feuerstein, Rand, & Hoffman, 1979; Kozulin, 1999)—include children brought up in poverty or displaced as a result of war. Other cases include children who have been institutionalized and/or adopted internationally (Gindis, 2005).

Preventing “Secondary Disabilities” by Promoting the Development of Higher Mental Functions. According to Vygotsky, the major efforts of special education should focus on creating alternative pathways of development for children with special needs. These pathways involve introducing special mental tools geared toward the unique needs of

children with different kinds of disabilities and designing strategies to facilitate their acquisition. An example of this approach can be found in the work of the Russian Institute of Corrective Pedagogy—the Institute that emerged from the laboratory of abnormal developmental psychology founded by Vygotsky. Methods of corrective pedagogy developed by the researchers working in this institute included an innovative approach to teaching 2- and 3-year-old children who are deaf to read in order to equip them with a tool alternative to oral language early enough to participate in a wider variety of social interactions (Kukushkina, 2002).

Probably the most impressive example of the implementation of Vygotsky's ideas in special education is the unique system of educating children who are born blind and deaf. Developed by Luria's student, Alexander Meshcheryakov, this approach builds on the intact lower mental functions of these children, such as their sense of touch or muscle memory, to develop complex higher mental functions (Meshcheryakov, 1979). Teachers in the school for children who are blind and deaf founded by Meshcheryakov help their students engage in a series of joint activities focused first mainly on their self-help routines. Gradually, movements used by children in performing these routines (e.g., pulling on pants or holding a dish) develop into symbolic gestures used to communicate to adults and other children. For example, holding a dish acquires a generalized meaning of "eating" and the gesture imitating pulling on pants would mean "going outside." After children develop simple gestures that serve as "symbolic equivalents" for the words, they proceed to learning special (dactylic) language based on different combinations of hand and finger movements. This allows children to develop progressively more abstract concepts. A graduate of Meshcheryakov's program who himself became a psychologist and who researches the development of children who are deaf and blind says, "Gesture equivalents become a kind of prism through which the child sees the real world" (Sirotkin, 1979, p. 58). At this point, children have developed higher mental functions using alternative but essentially equivalent pathways to cultural development that Vygotsky placed in the center of remediation efforts.

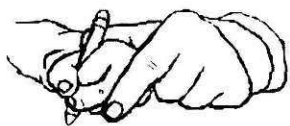
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CHAPTER 3

The Vygotskian Framework and Other Theories of Development and Learning





In this chapter, we will first compare Vygotsky's theory with other theories of child development and then give a general critique of the Vygotskian approach. These comparisons focus on the major principles of his Cultural-Historical Theory described in Chapter 1. More detailed comparisons of specific concepts appear in later chapters as each Vygotskian concept is introduced.

Vygotsky studied and commented on the work of constructivists (Piaget), behaviorists (Watson), Gestalt psychologists (Koffka), and psychoanalysts (Freud), as well as the work of educators (Montessori). Vygotskian theory also complements many of the ideas in information processing theory, which was developed after his death.

Piaget's Constructivist Approach

Vygotsky was familiar with the early works of Jean Piaget such as *The Language and Thought of the Child* (Piaget, 1926). In his book *Thought and Language* (Vygotsky, 1962), Vygotsky criticized the Piagetian perspective on the relationship between thought and language, and proposed his own approach. Piaget accepted some of Vygotsky's criticisms and modified some of his later ideas, but this did not happen during Vygotsky's lifetime (Tryphon & Vonèche, 1996). The works of some of Vygotsky's students (e.g., Leont'ev) have more in common with Piaget than the works of Vygotsky himself. These similarities have caused many psychologists to erroneously consider the Vygotskian framework as part of Piaget's constructivist tradition.

Similarities

Both Piaget's and Vygotsky's theories are best known for their insights into the development of thought processes. Piaget placed thinking at the center of child development (Beilin, 1994; DeVries, 1997). Although the bulk of Vygotsky's work was concerned with the development of thinking, Vygotsky had planned to study other areas of development that he considered equally important (such as emotions), but his early death did not allow him to complete this work.

Piaget and Vygotsky agree that a child's development is a series of qualitative changes that cannot be viewed as merely an expanding repertoire of skills and ideas. For Piaget, these changes occur in distinct stages (Ginsberg & Oppen, 1988). Vygotsky, however, proposed a set of less well-defined periods. He wrote primarily about the restructuring of the child's mind that takes place during the periods of transition from one stage to another and placed less emphasis on each stage's characteristics (Karpov, 2005).

Both Piaget and Vygotsky believed that children are active in their acquisition of knowledge. This belief differentiates them from the proponents of behaviorism, who view learning as determined primarily by external (environmental) variables. Instead of seeing the child as a passive participant, a vessel waiting to be filled with knowledge, both Vygotsky and Piaget stress the active intellectual efforts that children make in order to learn (Cole & Wertsch, 2002).

Both theories describe the construction of knowledge in the mind. Piaget believed that young children's thinking is different from that of adults and that the knowledge

children possess is not *just* an incomplete copy of what adults have. Vygotsky and Piaget agree that children construct their own understandings and that with age and experience these understandings are restructured.

In his later writings, Piaget acknowledges the role of social transmission in development (Beilin, 1994). Social transmission is the passing of the accumulated wisdom of the culture from one generation to the next. Vygotsky also believed in the importance of culture in transmitting knowledge. Piaget, however, believed that social transmission influences primarily the content of knowledge. For Vygotsky social transmission plays a much greater role; it influences not only content but the very nature and essence of the thinking process.

Finally, for both theorists the elements of mature thought are quite similar. Piaget describes formal operational thinking as abstract, logical, reflective, and hypothetical-deductive. Vygotsky's higher mental functions involve logic, abstract thinking, and self-reflection.

The emphasis on abstract, logical thinking has led some psychologists to criticize Piaget and Vygotsky for being Eurocentric because they place a higher value on the mental processes that are more prevalent in Western, technologically advanced societies (Ginsberg & Oppen, 1988; Matusov & Hayes, 2000; Wertsch & Tulviste, 1994). Although Vygotsky did place more emphasis on logical thought, he believed that, given exposure, all humans are capable of developing it, and that the lack of development of logic in a particular culture was due to the fact that it was not "useful" in that culture.

Differences

Initially for Piaget, intellectual development has a universal nature independent of the child's cultural context. Thus, all children reach the stage of formal operations at about the age of 14. For Vygotsky, the cultural context determines the very type of cognitive processes that emerge. Cultures that do not employ formal reasoning extensively would not foster the development of formal operations in their young. Vygotsky's ideas have been supported by the data obtained in cross-cultural studies of societies where children do not develop formal operations (Bruner, 1973; Jahoda, 1980; Laboratory of Comparative Human Cognition, 1983; Scribner, 1977). The research of some of Piaget's students (Perret-Clermont, Perret, & Bell, 1991) has led to a greater stress on the contribution of the cultural context.

While Piaget emphasizes the role of the child's interactions with physical objects in developing mature forms of thinking (Beilin, 1994), Vygotsky focuses on the child's interactions with people. For Piaget, people are of secondary importance, and the objects and the child's actions on objects are of primary importance. Peers may create cognitive dissonance, but they are not an integral part of the learning process. For Vygotsky, a child's actions on objects are beneficial for development only as long as they are included in a social context and mediated by communication with others.

For Piaget, language is more a by-product of intellectual development than one of its roots (Beilin, 1994). Language can increase the "power of thought in range and rapidity" by representing actions, liberating thought from space and time, or organizing actions (Piaget & Inhelder, 1969). However, the way a child talks merely reflects the present stage of the child's cognition; it has no impact on the progression from one stage to another. For Vygotsky, language plays a major role in cognitive development and forms the very core of the child's mental functions.

Piaget views the child as an “independent discoverer” who learns about the world by creating his own construction of it on his own. (DeVries, 2000 Wadsworth 2004). Vygotsky argues that there is no such thing as completely independent discovery for children who grow up in human society. Instead, a child’s learning takes place in a cultural context, and both the things to be discovered and the means of discovery are products of human history and culture.

Piaget believed that only the discoveries children make independently reflect their current intellectual status. Knowledge of how children acquire or apply knowledge that is transmitted by adults is not relevant in determining a child’s developmental level. Vygotsky, in contrast, believed that appropriation of cultural knowledge is key to a child’s cognitive development. Therefore, a child’s shared performance is as valuable as her independent performance for determining her intellectual status (Obukhova, 1996).

The effect of learning on development is viewed differently by Piaget and Vygotsky. For Piaget, a child’s current developmental status determines his ability to learn. Accordingly, all teaching should be adjusted to the existing cognitive abilities of a child. For Vygotsky, the relationship between learning and development is more complex. For certain knowledge or content and for certain ages, one step in learning may mean two steps in development. In other cases, learning and development proceed at a more even pace. However, teaching should always be aimed at the child’s emerging skills, not at the existing ones.

Behaviorist Theories

In Russia during the 1920s and 1930s, when Vygotsky did most of his writing, behaviorism in its various forms was one of the most influential psychological theories. Vygotsky lived in the epoch of early behaviorism represented by John B. Watson (Watson, 1970) and was not familiar with later developments within this framework. Although Vygotsky disagreed strongly with behaviorists, the influence of this theory is evident in his language.

Similarities

Like the behaviorists, Vygotsky favored the use of objective methods in psychology. His approach was not purely speculative but was based on observations, measurements, and experiments. Vygotsky criticized the use of introspection as an experimental method, as did the behaviorists.

Although Vygotsky stressed unique features of the human mind, he also recognized that humans and animals have certain common behaviors. Like the behaviorists, Vygotsky believed that animals and humans are part of the same evolutionary continuum, not completely different forms.

Another similarity of the behaviorists and Vygotsky is their mutual interest in learning. Behaviorism and the Vygotskian framework both focus on the learning process, although they approach it from different directions.

Differences

Unlike early behaviorists, Vygotsky was not satisfied with measuring only overt behaviors. Vygotsky did not believe that thinking could be understood by considering only