# Creativity in the Making: Vygotsky's Contemporary Contribution to the Dialectic of Creativity & Development

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Vygotsky was a Russian Jew who worked as a literary critic and schoolteacher before turning to psychology. A brief overview of his life and work is included in the *Encyclopedia of Creativity* (Gajdamaschko, 1999) and in the first volume of his collected works (1987). Because of Vygotsky's early death at age 38 of tuberculosis, the stifling of his work in the Soviet Union under Stalin, and the cold war between the West and the USSR, Vygotsky's work was little known until the Cognitive Revolution got underway in the second half of the 20th century.

Since the 1960s and 1970s, when *Thought and Language,* followed by *Mind in Society,* were published in English, Lev Semenovich Vygotsky has been portrayed as a counterpoint to Jean Piaget in developmental psychology and education departments and journals. Whereas Piaget said that maturational development precedes learning and a child independently constructs his or her knowledge of the world, Vygotsky theorized that learning jumpstarted mental development and knowledge construction was a social, cooperative venture. Because of his notion of the zone of proximal development, through which a less capable person learns with the aid of a more capable person, and his extensive work on the role of language in mediating relationships, Vygotsky's strongest influence has been in teacher training and linguistics.

Less familiar is Vygotsky's work on the development and use of creativity, a topic Piaget barely touched upon (Gardner, 1994). Vygotsky gave two papers and a lecture focusing directly on the development of creative ability: *Imagination and Creativity in Childhood* in 1930*, Imagination and Creativity in the Adolescent* in 1931, and *Imagination and Its Development in Childhood* in 1932. Smolucha (1992) summarized this work, which asserted that creative imagination is a goal-directed, culturally mediated psychological system that emerges from the internalization of children's play and the functional interweaving of fantasy and thinking in concepts.

But Vygotsky's work on creativity does not end there. His career in psychology actually begins with a study of the aesthetic reaction to literary arts, *The Psychology of Art*, which was accepted as his dissertation in 1922 but was not published in his lifetime. Furthermore, a short paper a couple years before he died, *On the Problem of the Psychology of the Actor's Creative Work*, written in 1932 but also not published until after his death, revisited issues

of aesthetics, the connection between imaginary and real experience, and emotion that he had first touched upon in his dissertation.

Besides his ideas that specifically mention creativity or creative domains, Vygotsky wrote prolifically on other topics that bear on the understanding of his conception of creativity. These topics include the development of higher mental functions in general, how tools and signs develop and acquire meaning, the role of school and formal education in developing the imagination, the importance of culture and future outlook in psychological growth, and the connections among emotion, personal experience, consciousness and creativity. Vygotsky's work is particularly appropriate for this Counterpoints volume because his entire approach to psychology, development and creativity is based on dialectically raising and synthesizing contradictions and tensions of the human mind within social contexts.

**Why is Vygotsky's view important now?**

> *"One of the most important questions of child psychology and pedagogy is the question about creativity in children, its development and its significance for the general development of the child."*[1]

In today's information, technological and innovation driven society, creativity has become more of a necessity for psychological health and life success. It can no longer be viewed as a luxury or marginal to "the good life"; it is essential to society's ability to develop and work under conditions of fast-paced change. Societies have become more global and people must learn to interact with a diversity of others. Schools and other social institutions are having difficulty effectively educating and training people for a future that is ambiguous: how can teachers and leaders prepare children and workers for what they themselves cannot foresee? Vygotsky's notions of meaning-making, creativity development and the complementary development of cultures and individuals provide foundations for dealing with these growing issues. Vygotsky's dialectical and synthesizing methods become viable models for development and action. Creativity and development are both objective and subjective processes, involving not only shared, public meanings and objects, but also personal experiences and transformations.

This paper argues that Vygotsky's ideas regarding the development of the creative imagination, the impact creativity has on an individual's development over one's lifespan, the role of creativity in cultural development, how creativity works in expanding individual and cultural meaning, and the methodology for studying higher mental functions are timely to the current state of society and culture overall, and to creativity research specifically. Although 80 years old, Vygotsky's work is contemporary. Furthermore, this paper approaches Vygotskian and traditional Western theories dialectically, culminating in a synthesis that can serve as a springboard for future research. Vygotsky's work provides an opportunity to both expand and focus the scope of creativity research.

Each section begins with a direct quote from Vygotsky that captures the essence of his position regarding the particular topic, followed by explication of his ideas. We start with a description of his overall framework (cultural-historical theory), definitions of creativity and development, Vygotsky's methodology, and a brief comparison of his approach to those most prevalent in mainstream Western psychology. Next, we describe Vygotsky's theory of the development of creativity as a higher psychological system. These topics are derived directly from Vygotsky's writings. Then we turn to elaborations of Vygotsky's ideas regarding functional systems, cognitive pluralism, the role of historical time, person-environment interaction and adaptation, emotion and experience, personality development, mediation, and the development of meaning, and how they can enlighten us about how the creative imagination is implemented and used. Throughout, when possible, we show how Vygotsky's perspective can shed

new light on or reframe the findings of creativity researchers from other paradigms (psychometric, psychoanalytic, psychodynamic, cognitive, social constructivist, and historiometric). We conclude by evaluating Vygotsky's work on creativity and development from the perspective of the current status of creativity research, and outlining a synthetic approach to creativity based on the Vygotskian framework.

**What is cultural-historical theory?**

> *"Man's action arising in the process of cultural –historical development of behavior is free action, that is, action not dependent on directly acting need or a directly perceived situation, an action directed toward the future."*[2]

For Vygotsky, the key to understanding psychological phenomena was to study it historically, in the process of change over the course of a particular act, as part of an individual's lifespan, within an also changing social and cultural milieu over historical time. Nothing about the human mind's functioning did he consider to be static, neither within these particular timescales nor across them. He did not subscribe to the Cartesian dichotomous paradigm underlying most Western psychological research, which has focused more on psychological *objects*, such as traits or structures or mental products. Instead, Vygotsky focused on the *relationships* between phenomena and the *processes* by which those relationships changed over time. In short, his main interest lay in origins, turning points, syntheses/transformations and interactions of mental and, by extension, cultural phenomena. He particularly emphasized the social interaction and mutual influence of individuals both contemporaneously and generationally, which both propagate the development of the individual's mental systems and personality and the wider cultural repertoire of abilities, possibilities and processes through history.

All mental functions are first experienced socially, learned in interaction with others, then internalized to be conducted psychologically without the need for external object support. People can learn from each other, and so each does not have to reinvent cultural forms but can build, individually and historically, on the collective work of others. Once internalized, these mental functions interact with each other to form more flexible, complex functional systems. The contents and forms of these mental functions are constrained by the possibilities inherent in the particular social, cultural and historical symbolic capabilities and tools available.

A person comes to know about the world not through absorbing – but through *transforming* – the information received from others' speech and actions; s/he must reconstruct knowledge based on these experiences. Through the transformation of this social interaction and use of cultural tools and signs, a person can free himself or herself from the constraints of the present environment and take control of his or her own future. Past experience influences but

does not determine what a person does; s/he can reorganize the way s/he thinks in anticipation of future needs and goals. The emphasis is not on autonomy from others, but in the development of self mastery and a more flexible interaction with others.

**What is creativity?**

> *"Creativity exists not only where it creates great historical works, but also everywhere human imagination combines, changes, and creates anything new."*[3]

Like play does for children, creativity creates a lifelong zone of proximal development for adults to continually learn from and contribute to their cultures. It helps people actively adapt themselves to the environment and modify the environment to themselves: "The dialectical approach, while admitting the influence of nature on man, asserts that man, in turn, affects nature and creates through his changes in nature new natural conditions for his existence" (Vygotsky, 1978, p. ___). Through such interaction, creativity actualizes the inherent, latent possibilities of people and environments; it not only broadens what we singly and collectively have done, but also what we can and may do. It allows people to step out of the present moment, reflect on the past and plan future behavior; it connects us to what could be. Through the development of creativity, a person comes to be a flexible, intentional inventor of his or her personal future and a potential contributor to his or her cultural endowment.

Creativity is not an a priori stable property of only special people, but a positive, essential capability of all healthy-functioning individuals. It transforms both the creator through the personal experience of the process, and transforms other people via the creation of knowledge and innovative artifacts propagated through the culture to be appropriated by others. Creativity is both the goal and the means of personal and cultural development.

**What is development?**

> *"The development of the child can be understood only as a living process of development, a coming into being, a struggle."*[4]

Vygotsky was influenced by the theory of evolution (phylogenetic timescale) popular at the turn of the century. However, he focused on the functioning and interrelationships of the historical (culture), ontogenetic (individual life span), and, especially, psychological (internal functional systems) timescales. Within and between these timescales, development, like creativity, operates dialectically: it both brings into being contradictions and synthesizes these contradictions into a more complex functional whole. As a result, psychological functional systems, individuals, groups and cultures increasingly become interrelational, from which emerges new possibilities of development. The functioning of development is its own impetus; it self-propagates.

In addition, development includes both construction and destruction in this dialectic of becoming. New possibilities become actualized through creative efforts, then crystallized into personalities (internally) and creative products (externally) at the individual level, and, as expanded by Cole and Scribner (1974), into institutions at the cultural or social level. However, crystallization is not the end of development, because additional possibilities unfold that break down or tear apart these "fossilized" forms to provide materials for further development. As Vygotsky himself said: "Our concept of development implies a rejection of the frequently held view that cognitive development results from the gradual accumulation of separate changes. We believe that child development is a complex dialectical process characterized by periodicity, unevenness in the development of different functions, metamorphosis or qualitative transformation of one form into the other, intertwining of external and internal factors, and adaptive processes that overcome impediments that the child encounters" (Vygotsky, 1978, p. 73). Therefore, development is based on but not determined by the materials (social and physical) available at a particular point in time; but also there is no end to development: it is an open system.

Development is not a process undertaken alone: a person is an "aggregate of social relations, embodied in an individual" (Vygotsky, 1929, p. 60). "The dynamic of the personality is drama," or struggle and continuous change internally and in tandem with the environment, and the "stage" on which this "drama" unfolds is the individual mind within a cultural-historical context (Vygotsky, 1929, p. 67). Vygotsky theorized that a person appropriates the artifacts, tools, signs and meanings of his or her culture from others, and brings them under increasing self control. At first, the person needs external objects to help regulate his or her behavior, but later can do so using only internal operations (Vygotsky, 1978, p. 73). In this manner, a personality, or characteristic way of behaving, emerges that in

turn regulates further behavior. Creative behavior results in products that are externalized and made available for appropriation by others. Development is not an unfolding of maturational processes, but the continual reformation of complex connections and conflicts that arise in experience as a result of the interdependence among the individual and the social.

**How did Vygotsky develop his ideas?**

> *"What must interest us is not the finished result, not the sum or product of development, but the very process of genesis or establishment of the higher form caught in a living aspect"*[5]

In creativity and developmental research, a significant tension exists between theoreticians who focus solely on the individual and theoreticians, such as Vygotsky, who consider the individual and the social as irreducible. Vygotsky did not emphasize separation, but rather connection. His methods followed his thinking in this manner. He wanted methods that focused on development as ongoing and rejected methods that portrayed a child or adolescent as "lacking" in light of a "finished" developmental process of the adult; and preferred historical dialectical methods to methods that separated the subject from the object, the person from the environment, the researcher from the subject in classic Cartesian dichotomies (Vygotsky, 1978, 1997a). He worked collectively, collaboratively, with researchers, including Luria, Leontiev, Levina and others, and with his subjects. The experimenter collaborated with the subject, was part of the experimental design. He did not try to "remove" the influence of the scientist because he thought it was an important part of the research; the scientist's interaction essential to the research process.

Methodology was a central concern of Vygotsky (1978): "The search for method becomes one of the most important problems of the entire enterprise of understanding the uniquely human forms of psychological activity. In this case, the method is simultaneously prerequisite and product, the tool and the result of the study" (p. 65). Rather than conduct tests, experiments or observations that only brought to light the "fossilized" products of a process that has already been completed, he felt researchers should create research designs that made visible the beginnings and turning points of experience and their effects on the development of a person's mental functions. He wanted a methodology that could study creativity and development in motion, in the making. In this way, a researcher could determine not just how the mind worked, but how its interconnected systems and its environment developed and influenced each other.

Particular to creativity, he said that a researcher cannot work back from the end product to the artistic process because the product has crystallized the process in such a way that obscures the process (Vygotsky, 1971). This idea is akin to James's (1890) notion of flights and perchings: one cannot look back from the end idea (perching) to view

the thinking process (flight) because the brightness of the idea makes the process invisible. However, his work is contradictory in this manner, because his dissertation, *The Psychology of Art*, follows just such a path: recreating what Shakespeare must have done to get the effect he did in *Hamlet*, for example (Vygotsky, 1971). In addition, Vygotsky never studied "creative people" in the sense of people who had made a transformative contribution to art, science or invention; he studied how "regular" people used the imaginative function that he saw as common to everyone.

Later he developed approaches to study higher, culturally mediated mental functions such as creativity by "converting thing into movement, fossil into process" (Vygotsky, 1997, vol. 4, p. 71). He wanted to study the phenomenon, preferably, in vivo: observing it in historical time and sociocultural setting rather than separated from life in an experimental laboratory. He believed that studies must be to collect rich data over a sufficient period of time in naturalistic settings to capture the full spectrum of the development of a function, then interpreted in terms of theory; facts do not speak for themselves. He was an interpretivist. For Vygotsky, then, "the aim of psychological analysis and its essential factors are as follows: (1) process analysis as opposed to object analysis; (2) analysis that reveals real, causal or dynamic relations as opposed to enumerations of a process's outer features, that is, explanatory, not descriptive, analysis; and (3) developmental analysis that returns to the source and reconstructs all the points in the development of a given structure" (Vygotsky, 1978, p. 65). More recent work that seems particularly in the spirit of Vygotskian methodology is the study of improvisational creativity in which the socially constructed creative process and creative product are one and the same. Sawyer's (1992) research on jazz musicians before their music is notated into formal compositions is a good example.

Although Vygotsky admitted he preferred observational studies to experimental designs, he did create his own double stimulation method of experimentation as a way to tease apart the developmental process, "to alter the automatic, mechanized, fossilized character of the higher forms of behavior and to turn it back to its source" (Vygotsky, 1978, p. 64). This method comprised presenting first a simple stimulus, then presenting a second stimulus whose role was to help the person organize his or her response. He used this method to see how a sign could organize behavior and how a word acquires meaning. He was interested in the first appearance of a behavior when its functional links were laid down (Vygotsky, 1978). In studies of the people in Uzbekistan and Kirghizia, Luria (1976) used this double-stimulation method to study problem-solving, self-awareness and reasoning, and attempted to use it to study imagination, although he did not quite succeed in providing a secondary stimulus for the

subjects to improve their imaginative abilities. However, Getzels & Csikszenthihalyi's (1976) study of art students by placing objects on a table for them to choose from, examine and organize their artwork seems to follow the principles of the double stimulation method.

The central thrust of Vygotsky's method was dialectical. He emphasized synthesis and qualitative transformation of contradictory elements into new coherent wholes (John-Steiner, 1997). He focused on relationships rather than objects, dynamics over stasis, holism vs. reductionism, emergence contrary to environmental determinism, and open-ended future orientation as opposed to a set developmental goal such as Piaget's Kantian categories of logical thought (Bidell, 1988). Subject and object codetermine each other; neither is primary. Imagination and logical thinking, form and content within an artwork, body and mind, cognition and emotion, nature and nurture, theory and practice, collaborators on a project – they are complementary to each other, in dialectical relationship such that both must be studied together to form a clear understanding of human mind and behavior.

**How does Vygotsky compare to mainstream 20th century creativity research?**

> *"[P]sychology has for a long time ascribed too great a significance to just such established stereotypic forms of development that were themselves the result of already developed and fixed processes of development, that is, processes that are concluded and are only repeated and reproduced."*[6]

On the surface, Vygotsky's dialectical approach to creativity and development may seem opposed to those of mainstream Western psychology in the last century. In fact, except for the Pragmatists, who were contemporaries of Vygotsky, a developmental, lifespan approach to creativity has been of relatively recent origin in mainstream psychology. Like Vygotsky, James, Dewey and Mead considered "creative intelligence" as fundamental to the effective, dialectical interaction of an individual with his or her environment and the intersubjective understandings among members of a community (Dewey, 1970; Mead, 1970).

However, most literature reviews of creativity research start with the post World War II psychometric approach, which conceived creativity as a set of traits of special individuals that could be measured on tests and cross-sectional experiments (Guilford, 1970; Runco, 1999; Terman, 1970; Torrance, 1988). Vygotsky would say these researchers were studying the "fossilization" of personality (characteristic ways of behaving), not creativity in vivo: they measured the supposed accumulation of past acts that have been practiced enough to stabilize, at least at the short timescale of the test or experiment, but could not provide information on how that particular fossilization arose. Psychometric findings did not reliably predict creative endeavors later in life. However, Terman's (1970)

longitudinal study did suggest the roles of time and place of birth, an encounter with an influential person, or a particular work experience played in the development of genius, which Vygotsky's theory would support.

An extension of the psychometric tradition is the historiometric approach, which uses aggregate data to determine which historical periods, geographical locations, and sociocultural circumstances have best nurtured creativity in Western civilization (Galton, 1978; Simonton, 1997). Often, creativity and eminence go hand in hand conceptually: the most successful are also seen as the most creative. Galton's findings were only predictive across two generations, which may support Vygotsky's social, rather than Galton's genetic, approach. From a Vygotskian lens, we might say the results of historiometric studies can be explained because the most eminent are those creators who best utilize the social and cultural tools and best "fit" with the social and cultural expectations of their time.

The psychoanalytical approach focused mostly on the biological underpinnings and subjective experience of creativity, and usually characterized it negatively in terms of madness and neuroticism (Arieti, 1976; Freud, 1958, 1970; Greenacre, 1957; Slochower, 1974). Vygotsky was aware of some of Freud's ideas and incorporated the unconscious and the role of experience into later works, but overall believed that creativity was a positive, primarily conscious mental faculty. Psychoanalytic ideas are still prevalent in the psychology of creativity, as seen in Russ's (1993) emotional model and Jamison's (1996), Rothenberg's (1990) and Steptoe's (1998) connection of creativity to madness and psychological instability.

The psychodynamic approach conceived of creativity as a lifelong process but relied on methodology that was cross-sectional, not developmental (Barron, 1970, 1988; Helson, 1990, 1999; MacKinnon, 1970; Taylor & Ellison, 1970). By studying members of certain professions in the arts, sciences, business, sports and engineering, these researchers found several personality characteristics common to creative individuals, many which parallel what Vygotsky theorized: personal mastery and discipline, independence and flexibility, sensitivity and resourcefulness regarding the environment. However, like the psychometricians, their findings were not predictive in the long term.

Currently, the cognitive approach, which is process oriented and in some cases does include developmental ideas, is in ascendance regarding creativity research (Arnheim, 1966; Boden, 1990; Bruner, 1983, 1986, 1990; Finke, Ward & Smith, 1992; Gardner, 1985, 1988, 1993, 1994; Gruber, 1989; Mumford et al., 1996, 1997; Perkins, 1981; Piaget, 1962, 1969). Creativity is a type of problem solving and symbolic representation, which can be taught and learned. Many of the earlier researchers (including Gestaltists) focused more on structure, whereas Vygotsky

emphasized function. However, Piaget's (1962, 1969) notions of assimilation, accommodation and equilibration complement Vygotsky's more process-oriented, developmental approach (Ayman-Nolley, 1999).

The current approach to creativity most in line with Vygotsky's general methodology is the idiographic case-study approach, which tries to recreate the process of creation over time through the close examination of highly creative people's lives, works, works-in-progress and journals (Gardner, 1993; Gruber, 1989; John-Steiner, 1997). For example, John Steinbeck's daily letters to his editor provide detailed data of the microgenesis of his novels (John-Steiner, 1997, p. 130). These case studies placed the individual's motivations, thoughts and actions within his or her specific cultural-historical milieu and often examined the influences of others, artifacts, symbols and tools on the creative person's developing ideas.

The social constructivist/social psychological approach also has many parallels to Vygotsky's work (Amabile, 1983; Csikszentmihalyi, 1990, 1993, 1996, 1998; Feldman, 1980, 1994; Fischer, 1993, 1995, 1996). They recognized the importance of multiple developmental pathways and analysis methods, as well as the person-in-context, the field and the culture as driving forces of development. They realized that creativity – both its generation and the aesthetic critique of it – derives from interaction with others. Csikszenmihalyi's (1990, 1993, 1996, 1998) system's perspective is a particularly fruitful parallel to Vygotsky's ideas: he reframed the question of creativity to be "where is creativity?" and posited that the answer lies in the interactions among the three nodes of individual, field and domain. In addition, his work on flow brought a subjective perspective to creativity research (Csikzentmihalyi, 1993). However, unlike Vygotsky, these more social-oriented researchers did not incorporate historical change into their models, although some do show that creations and fields have life cycles and can ebb and flow (Becker, 1982; Martindale, 1975). Some "factor out" the subjective individual, leaving only social forces, while others posit the creative individual and the conformity-driving society against each other, whereas Vygotsky viewed them as dialectically interwoven.

**How does creative imagination develop?**

> *"In this sense all that is the work of the human hand, the whole world of culture, is distinguished from the natural world because it is a product of human imagination and creativity based on imagination."* [7]

Smolucha (1992) outlined Vygotsky's basic ideas regarding the development of the creative function: children first learn to create and manipulate symbols and signs during play; children's pretend play and object substitution become internalized as fantasy or imagination; imagination becomes a consciously directed higher mental function as inner speech develops; in adolescence, creative imagination results when imagination and thinking in concepts

become conjoined, which, in adulthood, can mature into artistic and scientific creativity. Over the course of development, the creative faculty becomes more conscious, used with increasing goal-oriented awareness and intentional control. We describe this developmental trajectory in more detail and show parallels to more recent research.

Childhood play

> *"By dragging a child into a topsy-turvy world, we help his intellect work, because the child becomes interested in creating such a topsy-turvy world for himself in order to become more effectively the master of the laws governing the real world."*[8]

Play is not just for fun; it is the work of childhood. Through play, children learn to give meaning to objects, to tease out relationships, to try on and practice different roles, to exercise their growing capabilities (Vygotsky, 1999). In short, "play is the best preparation for future life…play is self-education" (Vygotsky, 1998, p. 26 and 28). Nursery rhymes, fantasy role plays, outlandish stories, jokes and riddles bring relationships, which may be hidden "in reality," to the fore. Children learn about the real world via the absurd worlds of play (Smolucha & Smolucha, 1986). Yet, children do not confuse reality with such games and can move back and forth between the two frames.

As with other cultural behavior, pretend play starts with social interaction with adults. Somebody first shows a child how a banana can be a phone or a broom can be a dancing partner (Smolucha & Smolucha, 1986). At first, play is primarily imitative: the child copies what s/he has seen or heard or done before. The thinking and use of an object just barely strays from reality. However, play is more than transmission: "The child's play activity is not simply a recollection of past experience but a creative reworking that combines impressions and constructs from them new realities addressing the needs of the child" (Vygotsky quoted in Smolucha, 1992, p. 51). Over time and experience, the child becomes more adventurous in his or her object substitution, making believe objects function as something increasingly further from their "real world" functions and categories. As such, play helps the child develop symbolizing capacity. Furthermore, goals and rules become a focus of play as children enter school age, and play becomes an early mechanism for self-mastery: "A child's greatest self-control occurs in play" (Vygotsky, 1978, p. 99).

Vygotsky's conception of play parallels the age stages of Piaget's theory, although Vygotsky's theory is not stage oriented. In *Play, Dreams and Imitation*, Piaget (1962) wrote that "assimilation becomes creative imagination" whose origin is in symbolic play (Ayman-Nolley, 1999, p. 213). However, Piaget (1962) suggested that this symbolic ability spontaneously arises in playing alone, not with others (Smolucha & Smolucha, 1986). Smolucha

found some evidence to support both Vygotsky and Piaget: children do perform spontaneous object substitutions as early as 12 months but most occur during their second year in pretend play initiated by caregivers (Smolucha & Smolucha, 1986). Furthermore, Vygotsky criticized Piaget and Freud for asserting that play is externalized imagination rather than that imagination is internalized play. In addition, he disagreed with Freud's (1958) conception of play as unconscious wish fulfillment and uncontrollable primary process thinking; and, although he agreed with Freud's notion that play leads to later creativity, he disagreed with Freud's assertion that play and adult fantasy were the same.

Most recent studies that link play and creativity are correlational and cognitive, and usually do not have a developmental perspective. For example, they look at the co-occurrence of play and creativity only within a single age group. Singer & Singer's (1990) study found that play allows direct practice of divergent thinking skills and emotional associations. Berk and Winsler (1995) found that play helps children learn to delay gratification and live by social rules. Some researchers, however, have included time as a variable. Russ's (1993) model of affect and creativity holds that pretend play is important in developing creativity because of the many cognitive and affective processes involved. Russ, Robins, & Christiano (1999) did longitudinal follow-up of first-second graders and found that the children's quality of fantasy predicted their divergent thinking abilities through elementary school.

Make believe is the first venue in which children separate their thoughts from their actions and the objects around them. It is the first step in their behavior becoming more flexible in regards to the environment and also more self-regulated. During the school years, children no longer need the actual object or physical action to sustain their symbolic activities. Play has gone "inside" and become imagination: "Ideas surrounding the adolescent and present at the beginning of his maturation outside him become his internal property, an inalienable part of his personality" (Vygotsky, 1998, p. 163).

Childhood fantasy

> *"[I]magination is a transforming, creative activity directed from the concrete toward a new concrete…with the help of abstraction."*[9]

Fantasy, or imaginative activity without any environmental support, comes to the fore in early adolescence. Emotion-infused mental images and inner speech replace physical objects as the child's focus of attention (Smolucha & Smolucha, 1986; Vygotsky, 1971, 1998). In fact, based on studies of deaf kids and aphasics, Vygotsky considered the development of speech a milestone in both realistic and imaginative thinking: "Speech frees the child from the immediate impression of an object. It gives the child the power to represent and think about an object that

he has not seen" (Vygotsky, 1987, p. 346). More recent neuropsychological studies have shown that a child does not need to physically produce speech for this inner speech to arise, only that s/he be exposed to external speech (Baddeley, 1990). Fantasy brings a new relationship between visual and verbal, concrete and abstract thought. However, concrete thinking does not disappear, and fantasy is not exclusively visual but can incorporate all the senses (Vygotsky, 1998). This visual-verbal relationship bears out in experiments on imagery mnemonics; the two are dialectical not dichotomous (Baddeley, 1990).

Imagination is based in memory and is of two kinds: reproductive and creative. Reproductive imagination is the same process as real memory but has a different trigger. Whereas a real memory is elicited because of immediate external stimuli, a reproductive image is elicited without external stimuli; it is called to mind not by the environment but by some cause or need of the person, although it is still based on past environmental input (Vygotsky, 1987). Creative imagination, on the other hand, is "a special and unique form of memory activity" that does not require any direct input from the environment – past or present – to bring an image to mind (Vygotsky, 1987, p. 341). Creative images may be based on basic elements from past experience, but they are so transformed that the person could not pinpoint from where they came. Through such processes, imagination makes productive interaction between a person and his or her world possible: "No accurate cognition of reality is possible without a certain element of imagination, a certain flight from the immediate, concrete, solitary impressions in which this reality is presented in the elementary acts of consciousness" (Vygotsky, 1987, p. 349).

Recent empirical and theoretical work seems to follow this connection between imagination and memory as well as the "outside in" development pattern. Kosslyn (1983) found parallels in the mechanisms for perception and imagination, and that remembering and imagining seem to stimulate similar parts of the brain. He also found that adults no longer need imagery to solve problems but can answer verbally and logically, but may have to switch back to perception or memory in unfamiliar situations. Using a nonlinear dynamics model, Bar-Yam (1992) theorized that imaginings worked in the same way as memories but had "shallower" basins of attraction. In addition, much recent education research that focuses on scaffolding, contextualization, critical and creative thinking, learning jointly by active manipulation and through verbal concepts, group work, and student self-management and planning support Vygotsky's notions of schooling (Fischer et al., 1993, 1995; Gardner, 1991; Perkins, 1986, 1992).

At the start of imagination's development, the person "is able to imagine much less than the adult, but he trusts the products of his imagination more and has less control over them" (Vygotsky quoted in Smolucha, 1992, p. 54).

During adolescence, s/he will learn to be reflective and critical about his or her own imaginative products. Adolescent fantasy is of two kinds, both which are goal directed: subjective, which is emotional and oriented toward desire fulfillment and private inner life, and objective, which is used in understanding reality and later creating artistic and scientific works (Vygotsky, 1998). Objective fantasy focuses on external elements, subjective fantasy on emotional experience. Adolescence is the process of balancing these two processes in the service of self-mastery and, perhaps, mature creative production.

Subjective fantasy holds sway during early adolescence as the youth uses it to master his or her emotions. In fact, Vygotsky boldly asserted in an early work that emotion and fantasy are the same process, with "fantasy as the central expression of an emotional reaction" (Vygotsky, 1971, p. 210). Subjectively, fantasy is art for oneself. Although he criticized Freud's ideas on the relationship of wish fulfillment and creativity, Freud's influence on Vygotsky becomes apparent in the construct of subjective fantasy. According to Vygotsky, fantasy helps adolescents clarify their own emotions and impulses by embodying them in creative images, in a manner reminiscent of Karmiloff-Smith's (1994) representation redescription concept. Based on the drawings and problem solving of children, Karmiloff-Smith suggests that imagination catalyzes a person to put his or her experiences before self and others through extrinsification, such as writing or drawing. This extrinsification process increases both flexibility and control of meaning by making what was implicit explicit through several stages: from unreflective, procedural knowing through decreasing automaticity and increasing consciousness, to the final stage in which a person can reflect and verbally report on the experience.

Objective fantasy provides the means for the adolescent, and later the adult, to anticipate and plan his or her future behavior, helping to construct the culture of which s/he is a part (Vygotsky, 1998). Cultural products, such as art works, created during middle childhood and early adolescence are often syncretic, with different styles and techniques fused in a singular activity; only later do they include social-conventional representation or intentional stylistic elements (Carrothers & Gardner, 1979; Gardner et al., 1990; Smolucha, 1992; Vygotsky, 1987; Winner, 1982). Yet, as tension increases between emotionality and objective criticism during this so-called "literal stage" and beyond, many children stop creating (Smolucha, 1992; Winner, 1982). Social life requires individuals to subject their behavior to norms (Vygotsky, 1997b), but he hinted that these norms may differ by domains, which would parallel Gardner's (1983, 1993) domain specificity claims. Vygotsky said, "The average adolescent loses interest in

art and drawing….The most abstract art – music – is the greatest favorite of the adolescent" along with literary creativity as forms for subjective fantasy to become objective (Vygotsky, 1998, p. 44).

In short, Vygotsky anticipated later research finding a U-shape to creative development. Gardner (1994) and Winner (1982) found that a child may draw less because he or she, becoming more aware of objective cultural standards, is more critical of his or her own work. In fact, Gardner (1994) posits that the elementary school years may serve as a sensitive period for artistic development in which the child must build up skills and characteristics to buttress himself or herself from the heightened criticism that comes with adolescence's objective fantasy stage. Another possibility, however, is that art functions differently for children than for adults; for a child, art is related to play not creation (Vygotsky, 1971). When the child grows into the new function, it may not suit him or her and s/he moves on to other endeavors. In summary, adolescence is the age of mastering one's internal world and "the age of growing into culture" (Vygotsky, 1997b, p. 251).

Interfunctionality of imagination and thinking in concepts

> *"[F]antasy is not a primary, independent and leading function in the mental development of the adolescent; its development is the result of the function of forming concepts."*[10]

Eventually, fantasy separates from its concrete base and becomes infused with abstraction as imagination meets the ability to think logically, or in concepts (Vygotsky, 1998). The Gestalt psychologists paralleled Vygotsky's idea that true creative imagination is the result of both imagination and logic: "What we call creativity is a kind of reasoning, and that such reasoning can be either intellectual [abstract] or perceptual [concrete] – and, of course, is mostly a combination of both" (Arnheim, 1966, p. 287).

A concept is the "knowledge of the object in its relations, in its connections" (Vygotsky, 1997, p. 100). It is a web of meaning regarding a phenomenon that can be decontextualized and recontextualized based on the needs and goals of the individual. To hold a concept in mind means the person can "hold an idea long enough to shape its power" based on a world view, to make judgments that place an idea in proper relation to others for a given situation or to solve a specific problem (John-Steiner, 1997; Vygotsky, 1997). A concept develops over time and is only incompletely determined at a given point in history (John-Steiner, 1995).

This ability does not spring fully formed into an adolescent's mind, but develops (Vygotsky, 1987). Whereas Piaget (1969) based concept formation on direct sensorimotor interaction with objects, for Vygotsky, the key to concept formation was "the functional use of the sign or words to master one's own mental operations" (Vygotsky, 1987, p. 131). On their own, children first form groupings based on trial and error, subjective criteria or proximity,

then later form categories based on sensory connections. They also can develop pseudoconcepts that appear the same from the outside as real concepts, but are given to them "ready made" by adults. Children, then, can know the word and how to properly use it socially before they completely know its meaning or have made the concept "their own." Only after adolescents have built a concept in all its relations is it a true concept. And, although s/he can now use the concept pragmatically, only in late adolescence and early adulthood can the person objectify and reflect on the concept (Vygotsky, 1987, p. 161).

Concepts can also be taught in a systemic fashion, derived from verbal definition; Vygotsky differentiated these concepts as scientific concepts, as opposed to the everyday concepts youth constructed through personal experience (Vygotsky, 1987). Everyday and scientific concepts work in tandem, sometimes in parallel and sometimes in opposition. Vygotsky said that a scientific concept forms a zone of proximal development for everyday concepts and, once a scientific concept is mastered, it transforms a person's everyday concept. However, recent work at Harvard's Project Zero found the opposite: that in some domains, such as science, everyday or common-sense conceptions of phenomena can inhibit the learning of scientific concepts (Grotzer, 1999).

Of interest methodologically, John-Steiner, Meehan and Mahn (1998) and Cole and Scribner (1974) elaborated on Vygotsky's functional systems approach regarding concept formation by children in different contexts. These researchers noticed that the complexity of the children's learning processes would have gone unrecognized if the standard dichotomy of visual vs. verbal thought, rather than dynamic functional systems, had been the framework for their studies. In Cole's (1996) words, cultural-historical researchers reject "cause-effect, stimulus-response, explanatory science in favor of a science that emphasizes the emergent nature of mind in activity."

Adolescence, in Vygotskian terms, was a pivotal time for the development of creativity. He considered it crucial for the development of the underlying complex psychological systems on which creativity depended, the inner life/subject/identity of the person, and the interests on which intrinsic motivation and possible life-work is based. As a result, his work can be tied to Erikson's and Csikszentmihalyi's work. Erikson (1980) thought that, through playful experimentation with potential occupations, roles and philosophies of life, the adolescent forms her first creation: her own identity. Later, s/he brings to life children or professional works as contributions to society. As such, creativity for Erikson, like for Vygotsky, was both personal and cultural. Recent cross-cultural empirical work suggests that the self, like other creations, is based on the raw materials of the culture: Markus and Kitayama (1991) showed that a particular society's mechanisms for self-development shaped each person's self. For example, among

their subjects, Japanese people conceive of a more socially distributed self, while Americans have an individualistic self. Csikszentmihalyi's studies of adolescents found one of the primary goals of social leaders, including schools, is to help adolescents develop interests in culturally and socially productive roles. Similarly, Vygotsky (1998) wrote, "the problem of education and training at the transitional age [adolescence] is a problem of proper building of interests," or purposeful strivings, because educators cannot establish in advance all of the future behaviors of a person, only driving forces for those potential behaviors (p. 24).

Imagination and school

*"Education is the artificial mastery of natural processes of development."*[11]

School was a key venue for Vygotsky's theory of creative development in two ways: first, it was where children could learn to better use and control their imaginations; and second, it was the primary place for acquiring scientific concepts and culturally organized information. Therefore, schooling impacted both strands of creative imagination: fantasy and thinking in concepts.

School could train children to imagine before they acted, to develop "the potential and capacity to consciously surrender oneself to a certain intellectual construction independent of its function in realistic thinking" (Vygotsky, 1987, vol. 1, p. 346). It could provide social and physical materials for students to play with and internalize the signs, tools, meanings and artifacts of the culture in a systematic ways. By increasing children's creative capacity, an educator could increase their ability to cope with, interact with and master reality in the present and the future. Perkin's (1981) work has shown how people can be trained to better use their creative and critical thinking abilities through domain-specific heuristics.

Contrary to recent studies (Getzels & Jackson, 1970; Torrance, 1988) that suggest school does not welcome the imagination, Vygotsky suggested that school is beneficial to the development of creativity: "Here the child can meditate on some imagined form before he acts on it. This is why it is during the school age that we find the first forms of true daydreaming, the potential and capacity to consciously surrender oneself to a certain intellectual construction independent of its function in realistic thinking" (Vygotsky, 1987, p. 346). Therefore, schooling contributes to mastery not only of logical thinking but imaginative thinking as well. However, he did note that "in the process of an adolescent's development, at its most critical stage, there is usually a decline in school progress, a weakening of formerly established habits, particularly when productive work of a creative nature unfolds before the

child." As old ways of thinking succumb to new ways of thinking, adolescents may narrow their areas of interest (Vygotsky, 1998).

Once the imagination begins to operate in concepts and becomes trained toward positive interests, a transformation of the adolescent's thinking has occurred: "In creative imagination, the emotional and intellectual aspects of the adolescent's behavior find complex synthesis" (Vygotsky, 1998, p. 166). The person now has all the resources of emotion and cognition, of imagination and logic, at his or her disposal for learning from and contributing to the culture. The next developmental milestone is control over these processes.

Lifelong self mastery

> *"[T]he functional use of the sign or word [is] the means through which the adolescent masters and subordinates his own mental operations and directs their activity in the resolution of the tasks which face him."*[12]

Although Vygotsky did not empirically study adults, he surmised that the main accomplishment after adolescence, in terms of creativity, was in increasing conscious control of the concept-driven creative imagination. What was previously partially subconscious is now fully capable of awareness; Vygotsky (1997a) referred to creativity as the "conscious illusion of adults." An adult has more years of experience, more pattern recognitions, and more formal systems of concepts to draw from and transform into creative, cultural products within a chosen domain. The more s/he creates, the more creativity becomes a part of his or her personality. The structures of imagination or logical thinking do not change, but their functional relationships do, as the person improves his or her control over these processes. Mental flexibility is not the result of increased autonomy but of increased interconnectedness.

According to Vygotsky, the emphasis of development is on increasing flexibility and self-mastery through the interdependence of functional, psychological systems. External stimuli, such as objects and other people are first used to control behavior; but over time, control is shifted internally. A person comes to mediate his or her own behavior by internalizing and using signs and psychological tools, especially inner speech. Increasing control allows for better resource allocation toward goals, decision making, and self-reflection: "Intention is a type of process of controlling one's own behavior by creating appropriate situations and connections" (Vygotsky, 1997b, p. 211). Those elements of mental operation that are within one's conscious control become part of one's personality, which "encompasses unity of behavior that is marked by the trait of mastery" (Vygotsky, 1997b, p. 242).

Transformation

*"The individual becomes for himself what he is in himself through what he manifests for others."*[13]

Self-mastery also has a more subjective component: transformation. For Vygotsky, creativity not only transforms objective materials into creative products, it also transforms the creator: "In fulfilling the activity, the subjects also change and develop themselves. The transforming and purposeful character of activity allows the subject to step beyond the frames of a given situation and to see it in a wider historical and societal context. It makes it possible for the subject to find means that go beyond the possibilities given" (Engestrom, 1999, p. 39). The person learns and creates artifacts, imbues them with meaning, and through this process, comes to have mastery over himself or herself. Creativity is a lifelong process that transforms the person to ever new vistas of insight (Van der Veer & Valsiner, 1991). In fact, Vygotsky goes so far as to suggest that personal transformation is perhaps an end goal of objective creativity: "It is for oneself, in the mind, that poems and novels are produced, dramas and tragedies are acted out, and elegies and sonnets are composed" (Vygotsky, 1998, p. 165). In other words, subjective and objective creativity are dialectic, not separate, with each of them more prominent at certain developmental periods (such as the heightened role of subjective creativity in adolescence).

In a seeming contradiction that Vygotsky synthesizes through creative development, a person becomes more social – and more capable within society – through becoming more thoroughly individual. The more differentiated his personality becomes, the better able he may be to contribute and possibly transform his or her culture. Social homogeneity or entropy has no part in Vygotsky's conception. Furthermore, neither development nor creativity stop with physical maturation. They are lifelong endeavors. In fact, creativity is a resource for sustained lifetime development; it makes development open-ended by forming a self-propelled zone of proximal development for the person. Vygotsky's lifespan perspective parallels that of several contemporary Western researchers. Barron (1970) focused on the creative life more than the single creative act: what a creative genius may be remembered for historically is only a small subset of the many ideas he produces in his lifetime. Helson's (1990, 1999) longitudinal study of women found that personality development and creative achievement interact dynamically. Wallace and Gruber (1989) and Gardner (1993) both take lifelong perspectives in their studies of creative individuals, and Csikszentmihalyi et al. (1993, 1996) has studied creative work at various stages of the lifespan. Gruber succinctly summarizes the dialectic of creativity and transformation: "How can I express this peculiar idea that such an

[creative] individual must be a self-generating system?…The system regulates the activity and the creative acts regenerate the system" (quoted in John-Steiner, 1997, p. 78).

In addition to the attributes of novelty and value, Gruber gave creativity two more dimensions: intent and time. Creativity was purposeful and took a lifetime to manifest. These ideas reinforce Vygotsky's thinking that creativity was conscious and goal driven, and dynamically unfolds through time. Time is a key ingredient for both development and creativity: neither is a priori or universal, and both link the past, present and future. They follow a path that is both common to all and unique to each, based on the particular materials available in the culture and the social and emotional experiences of the individual within that culture. Rogers (1970) concurs: "My definition, then, of the creative process is that it is the emergence in action of a novel relational product, growing out of the uniqueness of the individual on the one hand, and the materials, events, people, or circumstances of his life on the other" (p. 139). At the creative act, lifetime and historical timescales, the change of materials and thinking through time is crucial to creativity and development; they are not instantaneous.

It might be noted that perhaps this developmental pattern – play to fantasy to imagination and logic intertwined to mastery – may occur not only ontogenetically but on a smaller scale as well. Based on Gardner's (1983) and John-Steiner's (1997) ideas of domain specificity, perhaps an individual – even an adult – must go through this same developmental sequence when entering a new domain. An adult changing careers or learning a new hobby may first talk to others more knowledgeable and physically "play around" with tools, signs and materials of the new domain, then internalize the processes to be able to plan his or her actions, then increasingly incorporate the systematic concepts from the field, and finally become an expert through self-mastery. Such a perspective sheds light on Gardner's (1993) assertion that it takes about 10 years for a person to master a domain, on Fischer & Granott's (1995) findings of "dips" in developmental pathways when context is changed, and on Newell's and Simon's differentiation between weak (more imaginary and heuristic) and strong (algorithmic) problem solving strategies depending on whether the problem and context were ill or well defined (Kaufmann, 1996).

**What is creativity for?**

> *"A true understanding of reality is not possible without a certain element of imagination, without a departure from reality, from those immediate concrete holistic impressions by means of which reality is represented in the elementary acts of our consciousness."*[14]

Creative imagination introduces something new – ideas not directly from past experience – into the stream of consciousness through transformed impressions (Vygotsky, 1987). It is a common – and commonly used – faculty,

not something set aside for special people or circumstances: "…when in the process of understanding, or in the process of practical activity, something new is necessary, perhaps a concrete construction or a new image of reality or the creation of a new idea, then fantasy appears" (Vygotsky quoted in Smolucha, 1992, p. 62).

Like the Pragmatic conception (Dewey, 1970), then, Vygotsky thought this creative imagination system develops to help the person adapt to reality (Vygotsky, 1987). It serves an ecological function, although Vygotsky did not use ecological terminology. As a person's mental functions grow dialectically, the person can take a freer perspective on and be less determined by his or her environment. Piaget's (1969) development theory also emphasized adaptation through assimilation and accommodation but did not deal as directly with the role of creativity. Bronfenbrenner (1979), who did not directly study creativity, said imagination allows for a person's perceptions to be constructive not just reflective, and shows the highest expression of development by allowing the person to remold reality in accordance with his or her wishes. Hatch and Gardner (1993) developed an ecological model of cognition that parallels Bronfenbrenner's while also paralleling Vygotsky's emphasis on social interaction and tools. Sternberg's (1988) triarchic theory of creativity also emphasizes how creativity and experience mediate between the person's internal world and the environment. Simonton (1999) makes a more direct case for reciprocal interaction between environment and creative person: not only does the environment affect the child during development, but the child's potential may also pressure the environment (school, parent, etc.) to conform more closely to supporting those latent or expressed talents.

One key adaptive ability tied to creativity – the ability to and process of being sensitive to problems or gaps in the environment, also called problem-finding – has been particularly explored by the Gestalt psychologists, Getzels and Csikszentmihalyi (1976), Gardner (1993, 1994b) and Sternberg (1988). Wertheimer (1954) explained that a perceived gap in the environment starts the creative process of perceptual reorganizations. Getzels and Csikszentmihalyi's study of art students found that the more creative students were those who spent the most time discovering and examining problems before starting on solutions, which has also been built into Gardner's and Sternberg's theories of creativity. Vygotsky himself recognized this important ability: in "The Crisis in Psychology", Vygotsky (1997a) used the domain of psychology to show that "a correct statement of a question is no less a matter of scientific creativity and investigation than a correct answer – and it is much more crucial" (p. 258).

So creativity is in service to adaptation; it is not a pathway to pathology, as Freud (1958, 1970) and many recent books (Jamison, 1996; Rothenberg, 1990) and special issues of *Creativity Research Journal* (vol. 11 (2), 1998)

claim. In fact, Vygotsky asserted, creative imagination and madness have an inverse, not a direct relationship. In other words, mental malfunctioning is the result of *less* creativity because people with less creative imagination cannot remove themselves from the immediate stimuli of the environment. In his works on defectology, Vygotsky (1993) wrote, "We saw that the zero point of imagination...appears in the following way - the individual is in a state where he is unable to abstract himself from a concrete situation, unable to change it creatively, to regroup signs to free one's self from under its influence." Creative people are more adept at manipulating signs and psychological tools and, therefore, at adapting to their environments than are people who use their creative imagination less often (Vygotsky, 1997b).

Creative imagination is necessary to healthy development and is, in fact, a necessary part of development. Often creative products are not planned in advance, but emerge through the interaction of the person with materials in the environment, as Arnheim's (1980) study of Picasso revealed. This development proceeds along two levels: a macrolevel that deals with the interaction of the individual with others and the development of culture, and a microlevel that focuses on the development within the individual himself. First, we will address how Vygotsky explained the macrolevel in the next section, since he considered social interaction the source of development. In the following sections, we will present ideas based on Vygotsky's works that show how the microlevel might work through meaning-making and personal experience.

**How are individual and culture connected through creativity?**

> *"In this sense all that is the work of the human hand, the whole world of culture, is distinguished from the natural world because it is a product of human imagination and creativity based on imagination."* [15]

All higher psychological systems, including creativity, start as social functions mediated by cultural tools, the most important being language (Vygotsky, 1978, 1998). Internalization and externalization are the dialectical mechanisms that allow an individual to construct higher psychological structures. Internalization is not just copying but rather a transformation or reorganization of incoming information and mental structures based on the individual's characteristics and existing knowledge; internalization reflects not "content" poured into a person's psychological structure, it is how that structure is formed. Externalization is demonstrated when the individual explains the new skill or concept in his or her own words or way. This dialectical process also leads to the production of new tools. Based on Vygotsky's cultural-historical theory, and Vygotsky's collaborator, Leontiev's, activity theory, Engestrom's (1987, 1996) expansive cycle explains the developmental process as a cycle of internalization of cultural practices and the creation of novel artifacts. As an activity becomes increasingly

disruptive and internal contradictions cannot be ignored, internalization turns into critical self-reflection and externalization, and the search for novel solutions, increases. Externalization is first a "violation" of cultural norms for the activity, then reaches its apex when a new way of conducting the activity is implemented. Participants then switch back to internalization as the main form of learning (Cole & Engestrom, 1993). Gardner's (1993) notion of fruitful asynchrony among Csikszentmihalyi's (1996) three-node system parallels Engestrom's violation notion. Feldman's (1980, 1994) continuum of domain development parallels Engestrom's externalization/internalization cycle: Feldman shows how a new idea or "variation" starts first as idiosyncratic and, as it becomes perceived as useful and significant by more people, undergoes several reorganizations and is accepted by ever larger groups, societies and cultures until it is deemed universal, or something everyone in the next generation should know and internalize.

"Every inventor, even a genius, is always the outgrowth of his time and environment. His creativity stems from those needs that were created before him, and rests upon those possibilities that, again, exist outside of him… Creativity is an historically continuous process in which every next form is determined by its preceding ones" (Vygotsky quoted in Van der Veer and Valsiner, 1991, p. xi). Historical conditions dynamically create new contexts and opportunities for development and creativity. Martindale's (1975) and Simonton's (1997, 2000) work on change over time within domains and across Western history support this notion. Martindale showed how each poet works within a culturally-defined aesthetic tradition, but can only gain prestige by breaking from that tradition. This continued pressure to be more original eventually destroys the style, requiring new conventions. Simonton (1997, 1999, 2000) found that "the coming and going of great creative genius in various times and places can be better attributed to changes in the cultural, social, political, and economic circumstances that determine the extent to which the resulting milieu nurtures the development of creative potential and the expression of that developed potential" (p. 3). One of Simonton's (1997) most intriguing assertions is that the zeitgeist, or "spirit of the times" is influential toward, perhaps even deterministic of, creativity. Perhaps individual greatness goes to those who best fulfill the expectations of their age. Getzels and Csikszentmihalyi's (1976) study came to a similar conclusion: the most successful painters 10 years after art school were those whose methods corresponded to the institutionally valued styles of the time. Current creativity researchers have also implicitly used this idea of "creator is of his time" in how they designed studies. Many researchers (Barron, 1963, 1970, 1988; Hennessey & Amabile, 1988; MacKinnon,

1970) use nominations from supervisors, colleagues or other social gatekeepers to determine who is most creative in a field and which works are most creative: who is deemed most creative is dependent on the norms of the time.

Many current researchers agree with this basic model. Cultural psychology has built on this theoretical foundation, positing that people are intentional beings motivated to build intentional worlds from the meanings and resources they gather from their sociocultural environments (Shweder, 1990). Since historical context is always changing, there can be no universal representation of internal and external development dynamics (John-Steiner & Mahn, 1996). In addition, Wertsch (1991) has elaborated on the mechanisms of mediation that make this possible, and Rogoff (1990) has examined apprenticeships as vehicles for this individual-culture exchange. Gardner (1991) recognizes that culture was pervasive in development, including creativity, and that, in fact, we would be hard pressed to understand development without taking culture into account. Wells (2000) asserts cultures provide overlapping activity systems in which each individual engages in only a subset. Cole (1998) concurs: "culture is exteriorized mind; mind is interiorized culture" (p. 292). In fact, Cole and Scribner have expanded Vygotsky's basic culture-mind model to include intermediate levels: Cole emphasizing mesogenetic-level institutions and Scribner calling for a level of individual societies (Scribner, 1985).

Tools and signs

> *"[A]n essential mechanism of the reconstructive processes that take place during a child's development is the creation and use of a number of artificial stimuli. These play an auxiliary role that permits human beings to master their own behavior, at first by external means and later by more complex inner operations."*[16]

Creativity involves anticipating what could be and putting that vision into a symbolic form that can be shared so as to affect the present and the future of others (Vygotsky, 1999). It is an organizing capacity that is inherently social, which is why creative products are not only novel but must also be appropriate to the cultural context (Gardner, 1993, 1994b). Creativity brings more of the vast human potential into actuality. Although not based on Vygotsky but on the Gestalt psychologists' (Wertheimer, 1954) and Wittgenstein's (1953) notions that sense perceptions are ambiguous and that meaning is derived from the functional use of a sign, Kaufmann (1996) suggest a mechanism for this possibility-into-actuality process. It is based on the fact that perceptual content includes dormant interpretations, interpretations beyond what is required in the particular situation in, or reference frame through, which something is perceived.

Signs, psychological tools and artifacts are the media through which mind and culture communicate. Already existing tools and symbols are the embodied thought and ideas of people who have come before us in history. When

our current tools and symbols do not serve our current needs, we can develop new ones: such "created stimuli" help us to make decisions (Vygotsky, 1997b). We are all connected through the creation and propagation of these aids over time. Eventually, through the mastery of tools and signs, we come to recognize ourselves – the "'I' of personality" (Vygotsky, 1997b, p. 242).

"The sign and methods of its use are the functional, determining whole or focus of the whole process" of creativity and other higher psychological systems (Vygotsky, 1997b, p. 84). For example, art assign or transform basic sensory processes (sight, movement, etc.) into symbolic meaning; it makes them significant. This significance is first idiosyncratic, then it becomes more common as it is shared (see also Feldman, 1980, 1994). Artifacts crystallize subjective experience for others to experience. These products – physical or mental – extend what we can know: "The application of psychological tools enhances and immensely extends the possibilities of behavior by making the results of the work of geniuses available to everyone" (Vygotsky, 1997a, p. 87). A recent study by Hatano and Osawa (1983) gives a concrete example of this: Japanese abacus experts can do calculations based on an image representation of the abacus; they have internalized computation based on the social tool available to them. In addition, John-Steiner (2000) notes how certain innovations within a domain, such as music, cannot occur until the tools (in this case, instruments) are available to allow it, and how changes in tools can dramatically alter how a domain progresses.

**How might domain-transforming creativity operate?**

> *"[N]ew systems are not just linked with social signs but also with ideology and the meanings which some function acquires in the consciousness of people."*[17]

A society at a given historical period includes concepts that coordinate how members of that society understand their world, how they make meaning of their experience. These concepts incorporate a certain fuzziness that allows "wiggle room" for people to "make them their own": as Vygotsky (1997a) put it, "new forms of behavior develop from the new content picked up by the person from the ideology of the surrounding environment" (p. 98). Mental life is polysemous and requires interpretation; understanding is "the clarification of meanings and the establishment of values" (Vygotsky, 1997a, p. 111). In other words, cultural and idiosyncratic meanings are not static but develop to allow for both stability and variability in the culture and the individual's mind (Van der Veer & Valsiner, 1991).

Late in his career, Vygotsky switched his emphasis from sign mediation to meaning making. Meaning is the socially agreed-upon definition of something – the dictionary definition for a word, for example. It is "generalized reality" (Vygotsky, 1997a) and often considered a property of the object or sign. Sense incorporates the variations of

possible meanings that surround meaning; it can differ by person, time period and situation. It is related to and sometimes even incorporated into meaning, but is not usually considered a property of the object or sign itself.

The intersection of the macrolevel and microlevel of adaptation, development and creativity – which includes the intersection of big-C and little-c creativity – seems to center on Vygotsky's notion of meaning-making. Most of Vygotsky's work has emphasized the little-c, common creativity, because he was not interested in "crystallized" products, on which most big-C creative determinations are made. In other words, because Vygotsky was interested in the creative process as it occurred, and since a product (and, therefore, the person who made it) is not deemed domain-transformative until after the product is done. Vygotsky's conception of how creativity operates through meaning and sense, however, creates methodological problems for researchers. If data is collected only through retrospective verbal report and interviews, much of the process of transforming sense into meaning may be missed since sense is primarily nonverbal.

Still, that is what many current creativity researchers (Csikszentmihalyi, 1996; Gardner, 1993; Wallace & Gruber, 1989) have done to focus on big-C creativity that transforms domains, as described in the section above. Although artists, scientists and inventors have many tools and symbols at their disposal, when they are being historically, big "C" creative, they are operating at the edge of their domain. There is no longer a system of scientific concepts to guide them on their journey toward new ideas. There are no socially agreed-upon terms or definitions for what they are working on. They are walking an ideational tightrope without a cultural web of meaning to support them. As Gardner (1993) described, "These are the times that try the mettle of the creator. No longer do the conventional symbol systems suffice; the creator must begin, at first largely in isolation, to work out a new, more adequate form of symbolic expression…" (p. 34). In Vygotskian terms, the potential big-C creator has internalized all that the domain has to offer at the particular historical moment and must now try to make socially acceptable meaning out of vague sense of what s/he anticipates could be.

In *Thinking and Speech*, Vygotsky (1987) outlines how a person comes to understand literal meaning: an external word is internalized in inner speech and its meaning and sense are broken down and combined with the hearer's or reader's subjective emotion, motivation and volition. From this process, we can surmise that it may work in reverse as meaning making via creativity: for example, an artist's subjective experience can be combined with different senses of his or her medium and symbol system and externalized as an artifact, whose social meaning is intersubjectively negotiated (see also Saavedra & Van Dyne, 1999). Creative thought starts as an imaginary "sense"

of how things might be, which is transformed into meaning and externally expressed in an ongoing dialectic between the general and the specific (Prawat, 1999). Meaning and sense are both tied to emotional experience (Vygotsky, 1997a). Through their work and subjective experience, creative people expand the senses of an object, word or symbol; or bring a new sense into the phenomenon's social meaning; or create new relationships between the phenomenon's meaning and sense. Guilford's (1970) divergent thinking is the stretching of sense. The final stage of Wallas's (1926) creative process – verification – could be conceived as turning the idea's sense into socially acceptable meaning. From a computational, information-processing approach, Boden (1990) indirectly supports the meaning-sense operation of creativity by describing creativity as a process of searching through a state space of possibilities and ultimately finding the best solution by expanding the state space itself.

As with his other work, Vygotsky's writings on meaning focused on language, heralding inner speech as the lynchpin of this process. John-Steiner (1995) quoted, "Inner speech is to a large extent thinking in pure meanings. It is a dynamic, shifting, unstable thing" (p. 7). Inner speech and inner speech writing, such as found in Virginia Woolf's journals or Darwin's diagrams, are cryptic forms of thoughts that help creative people plan, reflect and transform their ideas (Gruber, 1989; John-Steiner, 1997); creativity involves the interaction between this condensed, generative form of thought and the expanded, shared thinking of external speech or artifact creation (John-Steiner, 1995, 1997). "Creative thinking is that search for meaning which encompasses rapid bursts of ideas embedded in the sustained thought activities of the thinker. There is a continuing interaction between generative thought, which is often condensed, fluctuating, and unstable, and communicated thought, which is expanded and organized for maximum impact" (John-Steiner, 1997, p. 218). By studying the notebooks and works-in-progress of creators, this transformation of inner to external speech can be discerned.

New discoveries and inventions are made at the fuzzy boundary of domains between the meaning and sense of concepts and images (John-Steiner, 1995). One key mechanism for this process, which Vygotsky did not directly study but which many current researchers (Lakoff & Johnson, 1980; Schank & John-Steiner, 2001; Winner, 1988) have explored, is metaphors. By "anchoring" innovative knowledge, ideas or artifacts to what is already known, metaphors bridge the gap of meaning and sense and helps bring fuzzy sense into socially accepted meaning. Metaphors can help reveal complex processes and patterns, and make implicit imaginal processes more explicit through social interaction (Schank & John-Steiner, 2001). Metaphors can be an effective mechanism for the co-construction and expansion of culture. In addition, Lakoff and Johnson's (1980) work has shown how even

metaphorical categories are based in experience and culture, as Vygotsky would agree. Getz and Lubart's (1998) emotional resonance model functionally specifies how metaphor provides a way for creative people to access and associate concepts. Language, including metaphorical language, is one of the most researched and perhaps easiest to comprehend arenas in which meaning and sense operate, perhaps because it has become crystallized in an agreed-upon notational form (Goodman, 1976). However, language is by no means the only symbol system to which this process applies. The transformation of sense into meaning could be extended based on cognitive pluralism.

Cognitive pluralism

> *"[I]f L.N. Tolstoy, the genius novelist, might want to work on mathematics, might want to take up medicine or even chess, there would probably be an enormous discrepancy between his abilities as a novelist and his potential for mathematics and chess."*[18]

Vygotsky was well aware that many domains of knowledge, many different symbol systems are available to developing individuals. Unlike Piaget (1969), who thought language was a particular manifestation of a general semiotic function, Vygotsky saw the potential for domain specific symbol systems and multiple mental faculties. In "The Instrumental Method of Psychology," which was not published in his lifetime, Vygotsky (1997a) stated: "The following may serve as examples of psychological tools and their complex systems: language, different forms of numeration and counting, mnemotechnic techniques, algebraic symbolism, works of art, writing, schemes, diagrams, maps, blueprints, all sorts of conventional signs, etc." (p. 85). Geertz's (1973) ethnographic work supported this notion of multiple means of symbolization and outside-the-head thinking. John-Steiner (1995) termed this array of psychological tools "cognitive pluralism." Gardner's (1983, 1993) theory of multiple intelligences and his notion of domain specificity in creativity parallel these ideas.

Societies and individuals choose to deploy particular intelligences – for example, linguistic, spatial and musical – in aesthetic ways (Gardner, 1993). Particular types of thought develop depending on what activities a person participates in, how s/he represents experiences, which situations s/he prefers (John-Steiner, 1997). Therefore, an adult's creative imagination could be deployed in many different ways, depending on what the culture has available to match his or her talents and goals; and there are usually many thinking styles present in a given culture (Wertsch, 1991). However, it should be noted that domains and intelligences or thought processes are not synonymous: different kinds of intelligences or psychological systems can be used in a variety of domains. As John-Steiner (1997) and Gardner (1993) pointed out, a dancer could be primarily a musical or a geometric thinker, a scientist could be strong in either mathematical or spatial thinking or both.

In summary, creativity operates through the person appropriating, making sense and meaning from, and externalizing tools, signs and artifacts. Underpinning this dialectical process is conscious awareness of one's own and others' subjective, emotional experiences in interaction with the world. Creativity is, as Feldman (1980) puts it, a "transformational imperative" of everyone. Most who engage in it do not make a major impact on cultural domains; they go unrecognized in the dialectic of creativity. "Turning our attention to the collective creativity, which unites all these insignificant fragments, comes the realization of what a great part belongs to the collective creative work or unknown inventors" (Vygotsky quoted in Smolucha, 1992, p. 53). For Vygotsky, there is neither such a thing as a truly independent creator nor any basic difference in creative process between the "primitive story reteller" and "famous creator" (Vygotsky, 1971). Both rework the materials that are culturally available to them.

**What is the relationship of emotion to creativity?**

> *"Art is the social technique of emotion, a tool of society which brings the most intimate and personal aspects of our being into the circle of social life."*[19]

Now we turn our attention to the microlevel of creativity (which is not separate but in continuous dialectic with the macrolevel), further exploring the inner manifestations and transformations that occur within a person as s/he engaged in creative activity. Vygotsky's work on cognition is well known, but he also included emotion as a key component of development and creativity. As a brief example, Vygotsky (1999) wrote a short essay at the end of his life on the psychological "paradox of the actor" (p. 244). The actor embodies feelings that become what the entire audience feels. But these embodied feelings are not the actor's real feelings; the actor does not "live through" or subjectively experience the emotions s/he conveys. Still, they are interpreted as real by the audience. How does this occur? Vygotsky surmised that understanding of this phenomenon lies in the intersection of the qualities of the actor and the general psychological and ideological patterns prevalent in the specific culture at the specific historical period. The actor draws from "idealized passions" that are similar to the conventional literary or artistic forms on which novelists and sculptors draw. The "art" of the actor is the crystallization of these social passions in dialectic with the audience. Therefore, through art, emotions can be objective as well as subjective. In this section, we look at the subjective role of emotions in creativity and in the next section we broaden the discussion to look at the objective, social role of emotions specific to art.

Perezhivanija: what a person "lives through"

> *"[T]he essential factors which explain the influence of environment on the psychological development of children, and on the development of their conscious personalities, are made up of their emotional experiences [perezhivanija]."*[20]

Perezhivanija – Russian for "living through" – is the term Vygotsky used as the connector of subject and object. It basically refers to subjective experience, which Vygotsky puts as the foundation for the development of fantasy, meaning making, and aesthetic response. Experience is the basic unit of development: how a person interprets and relates to an object, other person, or event determines what s/he finds emotionally real and meaningful (Van der Veer & Valsiner, 1994). Even though fantasy does not have an external object, Vygotsky (1971) asserted that emotions attached to it are experientially real, even in children: "Perhaps the pronounced and real emotional roots of the child's imagination are as strong as in the adult." (Vygotsky quoted in Smolucha, 1992, p. 54; Vygotsky, 1987). As Vygotsky put it, "The essential factors which explain the influence of environment on the psychological development of children, and on the development of their conscious personalities, are made up of their emotional experiences [perezhivanija]." (quoted in Van der Veer & Valsiner, 1994, p. 339).

Csikszentmihalyi's (1993, 1996) studies of creativity in adolescence and adulthood had a similar aim to describe creativity from the subjective point-of-view of the creator, which culminated in his well-known theory of flow. Furthermore, Csikszentmihalyi's later work with Sawyer (1995) supports Vygotsky's ideas about the role of emotional experience personally and socially in creativity: "When we look at the complete 'life span' of a creative insight in our subjects' experience, the moment of insight appears as but one short flash in a complex, time-consuming, fundamentally social process" (p. 331).

Emotions

> *"The motive gives birth to thought, to the formation of thought itself, to its mediation in the internal word to the meanings of external words, and finally, to words themselves."*[21]

Emotions, therefore, are the bedrock of creativity: "All psychological systems which attempt to explain art are nothing but various combinations of the theories of imagination and emotion." (Vygotsky, 1971, p. 200). More specifically, creative imagination is the dialectic synthesis of emotion and intellect (Vygotsky, 1998). Thought and feeling are not opposites and one cannot be reduced to the other; rather they are two processes that develop and intertwine (Vygotsky, 1999). Reason and imagination are both based on emotions; emotions provide the "why" of development as well as creative and productive action (Mahn & John-Steiner, in press; Smolucha, 1992; Vygotsky, 1987). Russ's (1993, 1998) studies support this dialectic: specific affective processes facilitate creative cognition, which, in turn, influences personality and further affect. However, creativity need not be determined by emotion:

"the form of imagination that is associated with invention and other forms of action on reality, we find that imagination is not subordinated to the subjective caprice of emotional logic" (Vygotsky, 1987, p. 348).

Vygotsky's ideas parallel about emotions parallel many current streams of research. Most of these more recent studies emphasize how emotions are adaptively advantageous because they focus the person on what is most subjectively relevant in the environment and they help organize his or her behavior. The Gestalt psychologists thought cognition and emotion were both organizers of experience, including creative experience. Amabile's (1983) work on intrinsic and extrinsic motivation also follows this theme (see also Hennessey, 1998). Fischer and colleagues theorized that emotions are relational, adaptive reactions: "Emotions play a basic, adaptive part in human functioning by organizing action tendencies that mold, constrain, or structure human activity and thought" (Fischer & Tangney, 1995, p. 6; Fischer, Shaver and Carnochan, 1990). Damasio's (1994) neuroscientific theory asserts that emotions bridge rational and nonrational parts of a person; they forge creative linkages and expand cognition; and they communicate meaning to self and others. The subjective experience of emotion provides increased flexibility and speed of response, which becomes more of a conscious choice than instinctual reaction.

In contrast to the mainstream creativity researchers' emphasis on cognition and emotion, cultural psychologists and Western cultural-historical theorists focused more on the dialectic of emotion and culture. Based on Vygotsky and cultural anthropologists, these theorists considered our categories of thought, feeling, communication and experience as determined and mediated by our culture via interactions with caregivers and others (Bruner, 1986; Lyon, 1995). Emotion results from an individual's socialization and his continuing experience in a particular sociocultural context (Lyon, 1995). Kitayama, Markus and Matsumoto (1995) asserted that, once an individual experiences a certain emotion, he automatically recognizes the characteristic social orientation this emotion entails and anticipates the likely state of relationship between himself and the other person. Vygotsky goes a step further to include time: "complex emotions emerge only historically. They are combinations of relationships that develop under the conditions of historical life" (Vygotsky, 1997a, p. 103). For example, the 20th century has been dubbed the age of anxiety as our ability to be aware of events worldwide that have no clear-cut objective lead us to have a more generalized fear response.

Emotion may start out as simply bodily sensation; but it takes on new, productive functions in the context of cultural mediation (Vygotsky, 1987). Artistic emotions, in particular, are intelligent, cerebral, released through complex fantasy images (Vygotsky, 1971). Like Vygotsky, Arnheim (1966) suggested that there is an emotion

specific to and impetus for creativity: citing the art critic Bell, he discussed an "aesthetic emotion" as the start of any aesthetic production or consumption. Fischer's (1998) skill theory supports this higher level of emotional complexity: basic emotions are mostly universal, whereas more complex emotions can differ across cultures and historical periods. Within creativity, creativity researchers have place emotion in numerous roles as well: as a discipliner for staying on task, a rewarder for completion, and a recognizer of the "right" solution (Russ, 1993), as an early distant warning system of problems (Csikszentmihalyi, 1996), as positive reinforcement for engaging in the creative process (Csikszentmihalyi's flow, 1996), and perhaps even as a bridge between cognitive faculties in generating metaphors and concepts (Lubart & Getz, 1997).

Empirical work has shown that emotions – both positive and negative – seem to affect creativity. Isen's (1998) extensive experimental work found that positive affect was associated with greater cognitive flexibility and improved creative problem solving across many settings and with different types of samples. Dovidio, Gaertner, Isen and Lowrance (1995) found that induced positive affect enables people to classify more flexibly and see commonalities more readily. However, Runco (1994, 1998), emphasized the role in creative thought of tension and negative affect caused by cultural and professional marginality, broken homes and emotional dissatisfaction. Similarly, Rothenberg (1990), through his interviews with hundreds of creative people, found that they are driven to create, and what drives them is the attempt to work through sources of destructive feelings. From a Vygotskian perspective, then, how a person emotionally, not just cognitively, perceives his or her place within the social environment has a tremendous impact on his or her ability to flexibly – and perhaps creatively – respond to the possibilities inherent in that environment.

**How do subject and object interact in art?**

> *"Art is the supreme center of biological and social individual processes in society, that it is a method for finding an equilibrium between man and his world, in the most critical stages of his life."*[22]

For Vygotsky, art was a particularly interesting "stage" for the dialectic of subject (creator) and object (social and material world). Through the crystallization or embodiment of creative process and subjective experience into objective form and meaning, art makes the private emotions of the artist public in a systematic way, and it achieved an aesthetic effect from the tensions between form and meaning. Because art draws on and gives back to the tools and signs of the culture, "art is the social within us and even if its action is performed by a single individual it does not mean its essence is individual" (Vygotsky, 1971, p. 249). Society uses art as a means to bring intimacy into the social realm.

Gardner's (1994) early studies of art also found that art encompasses the social realm: "Every art form involves communications on the part of one person to create by means of a symbolic object that the first subject has created, and that the second is able in some way to understand, react to or appreciate" (p. 30). Art is an exchange of meaning between creator, performer, viewer and critic. Through a Vygotskian lens, this exchange could be a resonance among each of these individual's meaning and sense understandings of the artwork. Through imagination, meaning is infused into the object and separated from the object by each participant in the aesthetic encounter. Leontiev (1990) followed up on this idea by asserting that imagination "colors" objects with personal meaning, and art reflects this subjective transformation.

Vygotsky's (1971) first book-length work, *The Psychology of Art*, addressed art as a venue for the dialectical intertwining of individual and social, form and content. In his analysis of *Hamlet*, for example, Vygotsky looked at why Shakespeare structured the play in a way that at first seems contradictory: why does Shakespeare make Hamlet delay his slaying of the king? First, he realized that some of Shakespeare's choices were based on the stage conventions of Elizabethan England, so the distortion of timing was partially attributable to sociohistorical conditions. Second, he determined that Shakespeare purposefully deviates the action of the play from the actual plot of the saga of Hamlet, grouping and regrouping plot elements for particular psychological effects among audience members. In other words, he "teased the emotions" of the audience by how he formed the story. In fact, Shakespeare actually builds into his play increasing contradictions among plot, story and characters to heighten its emotional and aesthetic impact by making the audience see the dramatic events through not only their own eyes, but Hamlet's eyes as well. Yet these contradictions do not fall apart, they stay in dialectical tension within the protagonist: "the new

contribution of the protagonist is that at any moment, he unifies both contradictory planes and is the supreme and ever-present embodiment of the contradiction inherent in the tragedy."

By creating an "interpretational curve of the tragedy" rather than having just a straight-line plot, Shakespeare increased the emotional significance of the story. The meaning does not grow from the characters' motivations or emotions directly. Neither is the meaning is just in the retelling of the facts of Hamlet's life. Rather, the meaning results from the dialectic of form and content, from the combination of ideas inherent in those characters and facts. Creative process makes possible intersubjective interaction; art connects people at multiple levels or perspectives. It brings to light hidden potentials of raw materials and symbol systems (words, colors, clay) and allows them to be shared socially.

**Can Vygotsky's approach be applied beyond individuals?**

*"[E]very symbolic activity … was at one time a social form of cooperation."*[23]

Even though Vygotsky emphasized the role of social interaction in development and creativity, he did not actually study groups; he was a psychologist that researched the effects of social interaction on individuals. In addition, although Vygotsky developed his ideas in a collaborative fashion, he did not directly address, in his writings, collaboration among equally "experienced thinkers" (John-Steiner, 1997); however, he did open the door to collaboration as a key part of knowledge construction and creativity through his notion of the zone of proximal development (Vygotsky, 1978). The zone of proximal development is not solely dyadic and can also apply to learning and participative communities.

Although some recent studies by organization theorists (Abra & Abra, 1999; Paulus, 1999), claim to study collaboration, they are not addressing the same phenomenon as we are here. Some of these studies say collaboration helps spur creativity; others say it hinders creative production. Yet, these experiments often throw strangers together to perform a short-term task, which does not allow time for trust and complementarity to emerge. They do not take the developmental perspective that Vygotsky asserts is crucial to creative development and production. Brainstorming and other similar group processes do not represent the prototypic character of collaboration, which is long-term, voluntary, trusting, negotiated, and appropriate for the projects to be shared.

Gruber (quoted in Schrage, 1990, p. 44) recognized the active role that collaboration takes in creative endeavors: "Creative people must use their skills to devise environments that foster their work…they invent new peer groups appropriate to their projects…. Each creator therefore invents new forms of collaboration." Collaboration may be a particularly fruitful social venue for people on the edge of transforming their domains by providing scaffolding to expand social meaning within those domains. As Schrage (1990) put it, collaboration is shared creation and discovery in which "two or more individuals with complementary skills interacting to create a shared understanding that none had previously possessed or could have known on their own" (p. 40).

One of the most extensive applications of the zone of proximal development to adults was done by John-Steiner (2000) in her recent study of creative collaborations, through which "generative ideas emerge from joint thinking, from significant conversations, and from sustained, shared struggles to achieve new insights by partners in thought." Using case-study and cultural-historical approaches, John-Steiner (2000) studied historical and contemporary dyads and groups to extract how creative work in the arts, sciences and social sciences is accomplished in collaboration.

Shared vision and purpose, talents, and perseverance can build on each other over time within collaboration, enhancing their impact on the creative work. Collaboration is not just an intellectual endeavor; it is like an "affair of the mind" in which emotions can transform the participants and the work itself in interesting, supportive and sometimes painful ways. Because the participants are so closely tied to each other, the emotional intensity of collaboration is quite high.

John-Steiner found that creative collaborations fall loosely into four categories: distributed, complementary, family and integrated. A given dyad or group can stay within one of these categories or can move among the categories as the collaboration develops over time and interactions among members can form new rhythms. In Vygotskian terms, the collaborators can form new functional interrelationships that allow for new possibilities to emerge.

Distributed collaborations are the most loosely connected form of collaboration. The participants' level of involvement, commitment to and ownership of the project may vary considerably. There is an exchange of information, but values may go only so far as similar interests. Current examples of such collaborations are casual conversations, listservs and chat rooms on the Internet or a research institute in which each scientist, for the most part, is independently using the shared facilities.

Complementary collaborations are characteristic of most scientific partnerships. They have clear divisions of labor, discipline, and complementary training, skills and temperaments. This complementarity draws on the dialectical logic Vygotsky used: each partner can only be wholely creative in relationship with the other partner, and the contradictions that arise in creative process are to be cherished not removed. The Curies are an example. Marie's background was in chemistry while Pierre's was in physics. Marie was an organizer, a doer, while Pierre was a conceptualizer, a dreamer. Marie was determined and social, while Pierre was more private and cautious. Their complementarity eventually led to them winning the Nobel Prize and many other honors.

With the family style of collaboration, common values become more important, roles become less rigidly defined and more fluid, and the security of the group depends on all members pulling together. Expertise is integrated, rather than divided as in complementary collaborations. Often, the members' interaction goes beyond the work to include personal companionship and friendship. The participants are more integrated and synthesized, even though the retain their unique individuality. Theater troupes, such as the Group Theater of the 1930s, can turn into such family collaborations. From its informal beginnings as a loose collection of performers, these creative

individuals came to create a complex "artistic organism" of playwrights, actors, directors and financial supporters. Leadership, for the most part, was egalitarian and democratic. Everyone had to come together to solve problems as they arose.

Integrated collaborations, the most intensive form, are long-term, dyadic, intimate partnerships in which participants have strong shared ideologies and a drive and vision to transform their particular domains. In the process, not only is a domain or discipline transformed, but so too are the collaborators – after the experience, they will never be the same again. As a result, integrative collaborations are the pinnacle examples of Vygotsky's theory of creativity. The most well-known of these collaborations are in the arts: the Impressionists followed by the Cubists in painting. Because of these two transformative movements, art has never been the same since.

Methodologically, studying creative collaborations follows Vygotsky's call to research the process "online" as it happens; collaborative activity aids in discovering the processes of microdevelopment because internal processes are expressed and verbalized. Engestrom (1987) concurred: "One of the most persistent methodological difficulties of studying thinking has to do with access to online data from thought processes. When thinking is defined as a private, individual phenomenon only indirect data is accessible. Thinking embedded in collaborative practical activity must to a significant degree take the form of talk, gesture, use of artifacts, or some other publicly accessible mediational instrumentality; otherwise mutual formation of ideas would be rendered impossible. Collaborative thinking opens up access to direct data on thought processes" (p. 45). Granott (1998) has also supported changing the unit of analysis for psychological phenomena from an individual to an ensemble to better account for the complex dynamics of psychological systems.

Another interesting tie between Vygotskian theory and collaborations is that many tensions within creativity and development are present within these long-term partnerships: the dialectics of subject and object, meaning and sense, personal and cultural, emotion and cognition. Collaborations provide a microcosm for the study of creativity and development. And adult collaborations, particularly, allow for the "effective surprise" (Bruner, 1986) of creativity to arise. In teacher-learner and other unbalanced zones of proximal development between a more competent and less competent individual, a problem solution or creative product that is at the edge of accepted social meaning would more likely be labeled as "error" and the thinking and behavior of the less competent individual would be corrected. But in zones of proximal development between relatively equal co-learners or co-creators, the solution or product might be labeled "creative": novel yet appropriate to the particular situation, and potentially

useful to the larger society. Through collaboration, individuals can form thought communities and mutual zones of proximal development in which to continue their own and each others' creative development. Most of these collaborations are domain specific, following the lines of Vygotsky's cognitively plural perspective.

**How might we build on Vygotsky's ideas today?**

> *"Any psychological process, whether the development of thought or voluntary behavior, is a process undergoing change right before one's eyes."*[24]

Vygotsky's dialectical methodology, notion of zone of proximal development, emphasis on social interaction and cultural mediation in the development of higher psychological systems, cognitive pluralism, and dialectical conceptions of subject and object, individual and culture, imagination and logical thinking, and meaning and sense create a new foundation for thinking about creative thinking. The expansion of Vygotsky's theory of the development and functioning of creativity provides an opportunity for the process of creativity research to change.

Most of the mid-century Western approaches to creativity have featured an entity – person or product – that was assumed to be relatively static, at least for the duration of the study. In the 1960s, the psychodynamicists and some cognitivists began to take a more developmental and lifespan perspective. In fact, one of the great contributions of creativity research to the developmental literature has been to show that development continues beyond physical maturation. In addition, "systems" and "dynamics" became key terms in the study of creative people and process (Csikszentmihalyi, 1996; Gruber, 1989).

Another way to look at this research field is on a continuum: at one end is psychometric testing and laboratory experiments, which focused on the isolated individual at one point in time; at the other end is cultural-historical theorists and, more recently, systems and dynamics theorists, which present a complex picture of individual, other people, tools, artifacts, socioeconomic forces and historical time all in motion. It used to be believed that having such a high number of variables in motion simultaneously could only be studied qualitatively or narratively; as a result, case studies were an often used method. However, newer time series and nonlinear dynamics methods are providing possible avenues to capture and explain the complexity quantitatively. Van Geert (1994), for example, has presented a mathematical model for how Vygotsky's zone of proximal historically through time corresponds to complexity theory approaches.

Dynamic systems theory (or complexity theory or nonlinear systems theory) has barely knocked on the door of creativity research. The complex adaptive systems paradigm, which parallels many of Vygotsky's ideas, argues that the whole is more than the sum of its parts and is irreducible. It emphasizes *becoming* over *being*, interaction with

the environment, and emergence or self-organization. A system can radically change in a qualitative way when certain quantitative thresholds are reached (Berman, 1996). However, they are difficult to study as everything remains in motion: because the researcher cannot pinpoint exactly which elements of the system will be relevant over time, all elements are relevant. A dynamical perspective examines change on many timescales (as Vygotsky attempted to do), as change at one scale interacts with and co-determines changes at other scales. As a result, a complex adaptive system cannot be studied retrospectively, as many creativity researchers have approached creativity in the past.

A few developmental and creativity researchers have ventured to use complexity theory and nonlinear mathematics to explain creativity, usually in a metaphorical way. Abraham (1996) provides a speculative tour of how Csikzentmihalyi's, Gruber's, Feldman's and Gardner's approaches could be reconceptualized as dynamical systems. For example, Gardner's concept of fruitful asynchrony can be reconceived in terms of chaos within and between nodes. Csikszentmihalyi et al. (1993) draws on the ideas of self-organization and open systems that "defy" the law of entropy to explain how creative talent arises. Goertzel (1997) provides an extensive dynamics-based theory of how the mind mutates and combines ideas and spreads them analogically. Guastello (1998) dynamically analyzed the discussion threads of an Internet-based problem-solving conference, and found oscillations in convergent and divergent thinking (Guilford, 1970) and chaos as the number of discussion threads rose too high.

**Never-ending possibilities…**

> *"Realized behavior is an insignificant part of all possible behavior. Man is every minute full of unrealized possibilities."*[25]

In addition to tying in with these new dynamics concepts and tools, Vygotsky's ideas also provide a bedrock for a more "synthesize and build" approach, as opposed to the Cartesian-inspired "divide and conquer" approach of positivist science. Although not drawing directly on Vygotsky, Mace's (1997) study of visual artists considers the person, process, product and environmental variables of creativity concurrently. She determined that artworks are not isolated but part of a larger ongoing art making process, themes arise from multiple sources, problem finding and solving are not distinct stages but are cyclic throughout production process, and the nature of the artist's medium influences her art making processes. Mace incorporates dialectical ideas about subject and object, individual and culture, problem finding and solving.

Vygotsky's conception of creativity, and our expansion of his ideas, also incorporates all four of the traditional Western elements of creativity – person, process, product and place – into nonreducible dialectical relationships.

The person, via products such as tools, signs and artifacts, internalizes the materials and ideas of his or her historical and cultural place and, in turn, fashions new products that propagate the culture historically. This process incorporates several dialectical subprocesses: internalization and externalization, personal transformation/self-mastery and social interaction, personal and cultural transformation via subjective experience, expansion and focusing of meaning and sense. As such, creativity is a universal human potential that manifests in specific contexts by specific people resulting in specific products, all simultaneously in motion.

In addition, Vygotsky's approach welcomes and makes use of contradictions, which creativity appears full of, rather than trying to explain them away. They can be beneficial, a mechanism and driver for synthesizing growth. His own work is full of them, as, in the process of his own creativity, he picks up and occasionally discards different ideas, such as his move from studying signs to studying meaning, and his changing methodology from studying creative end product to studying processes in vivo. In addition, although his theory focuses on the importance of social interaction, he often falls back on only describing the impact on personal experience not the interaction itself. He understood the methodological and conceptual difficulties of researching creativity formatively, and it may be because of these challenges that many contemporary cultural-historical researchers did not follow his footsteps in studying this phenomenon.

By focusing more on stable elements than dynamic relationships, mainstream Western creativity research, in some ways, has had a long history – psychologists have studied it for a long time – but a short growth rate, as conceptual and methodological progress has been slow. Perhaps, with the new dynamic tools and computing power available and Vygotsky's ideas as a framework, now is the time to study these elements and processes in relationship, not in isolation. Many contemporary theorists have said that no one element is sufficient to explain creativity. Vygotsky would agree, and add that it is the changing functional relationships among them that may be the key to creativity. As creative collaborations show, each of these elements has their time and place in the overall cycles and rhythms of creativity; creativity is a complex, open system.

Vygotsky left much work to be done; he primarily mapped the terrain and left others to the empirical exploration. As we have shown, his work is not separate from, but supports and is supported by much creativity research completed after his death. Our synthesis of cultural-historical, ecological, systems and dynamic approaches is appropriate to open up additional avenues for creativity researchers to explore – especially to go beyond the study of crystallized or fossilized or culturally standardized processes and products to focus on what actually happens as

the process and product form. These new avenues could include the mechanisms of making meaning and sense, subject-object ecology, and, especially, how to apply his ideas to domains other than language, to go beyond words. Contemporary creativity researchers have done an admirable job understanding the "fossilized" cognitive and personality traits associated with creativity; now it is time to study how those traits come to be, how they develop ecologically and dialectically in specific contexts. The key is to capture creativity *in the making*, to focus on where turning points are most likely to occur, and to take into consideration emotional experience and emic meanings.

Studying the complexities of creativity will require the dialectical synthesis of formerly separately methods and lines of research: the method used by Getzels & Csikszentmihalyi (1976) that parallels Vygotsky's double-stimulation method; the case studies of Gruber (1989), Gardner (1993) and John-Steiner (1997); the further examination of collaborations in action that make personal thoughts social (John-Steiner, 2000; Rogoff, 1990); clinical interviewing that can show how creative people define and think about what they do, what creative people know before a creative act and, after the creative act, how they subjectively experienced the situation; the observation of creators at work (Sawyer, 1992) and the examination of successive "drafts" of a creative work (Gruber, 1989) to provide sufficiently rich data to conduct time series and dynamic analyses; microanalyses of a person and field in the throes of accepting a creative product, transforming the domain (Becker, 1982; Martindale, 1975); and the study of the effects of crystallized creative process (artifacts) on successive generations – which is usually categorized as "learning" studies – in terms of creativity.

Such an approach will be demanding and complex, and require scholars themselves to collaborate in new ways. But as Csikszentmihalyi (1993) observed: "The desire to achieve complexity will have limited value as long as it is held by separate individuals, each nursing it in the privacy of his or her own consciousness. It must be shared to become effective." From the new possibilities that arise in the development of creativity research as a domain, we need to cultivate, not reduce, contradictions: to hold and move among different perspectives, to bring to light and synthesize tensions, to make anew.

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