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Introduction

Comparing Piaget and Vygotsky

The issue of the relation between the theories of Vygotsky and Piaget is as relevant today as it was in the 1930's, when Vygotsky himself produced a critical analysis of Piaget's early work. As Vygotskian ideas gain increasing currency in the West, developmental psychologists are inevitably led to consider their compatibility with other perspectives, most significant among which is Piaget's. Moreover, since both Vygotsky and Piaget offer global explanatory theories of the relation between nature, the social world, and the developing individual, no attempt at explanation in one theory fails to find some counterpart in the other. Questions of compatibility and conflict are thus unavoidable.

The four articles in this issue seek to cast fresh light on the relation between the positions of these two thinkers. The papers result from a series of discussions prompted by a conference on Vygotsky's work sponsored by the Center for Psychosocial Studies in Chicago in 1986 and a symposium at the Jean Piaget Society's 18th Annual Meeting in June of this year. We offer them here in the hope that they will provoke further collaborative exploration of this important topic.

The four articles share a common message: contrary to common belief, Vygotsky's and Piaget's approaches are very similar. The authors discern this similarity not only in the overall theoretical framework of the two thinkers but also in the fine detail of their treatment of certain central psychological phenomena. Lucy in his discussion of the relation of thought and language argues that both thinkers offer theories of how "human intellectual development moves beyond biological determination to achieve more powerful and flexible forms of conceptual thought". In both accounts, he contends, language plays a significant role in the explanation of this development. The difference between the two approaches derives principally from the fact that where Piaget treats language as one among a number of significant representational systems, Vygotsky takes the appeal to language to be paradigmatic.

This similarity between the two perspectives suggests that, where differences are to be found, the positions of the two thinkers may be complementary, and the articles on creativity and play argue that aspects of each

theory can be invoked to strengthen the other. For example, Gaskins and Göncü argue that while Piaget's analysis of the symbolic function can help Vygotsky explain the origin of the unrealizable desires which generate play, Vygotsky's account of the separation of visual and mental fields in play assists in bridging the gap between the preoperational and operational stages in Piaget's theory.

Sharing his colleagues' general perspective, Terrance Brown focuses on a different question: If Piaget and Vygotsky are so similar, why are they often held to be so different? He argues that the common belief that Piaget's theory is distinguished from Vygotsky's by its failure to recognize the social foundation of development is a misconception, prompted by Vygotsky's misconstrual of Piaget's position, and perpetuated by modern scholars' propensity to accentuate the seemingly relativistic and hermeneutical aspects of Vygotsky's theory. Brown contends that, once we read Piaget's early writings correctly and incorporate the later works of Piaget and the Geneva school, we will find Piagetian resources to make excellent sense of the social. Only such a reading, he concludes, can form the basis of an authentic dialogue.

These articles raise important issues. Nonetheless, the degree to which they accentuate the similarity between these two perspectives is highly controversial. For example, there is little recognition that while Piaget views development as a consequence of a dialectic between phylogeny and ontogeny, Vygotsky and later exponents of the "cultural-historical school" insist that development emerges from the interaction of three fundamental contributing factors, phylogeny, ontogeny and history (given in the present in the form of culture).

This difference has several significant consequences. For example (and contra Brown's criticisms of Tudge and Rogoff), it follows that there is a radical difference in the role ascribed to the social by the two theories. For Brown, the social context of development provides a setting in which specific tasks are presented to the child, various tools offered to facilitate their solution, and various "non-rational" strategies of interaction enter the picture. As such, he contends, the social is a possible object of inquiry. For Vygotsky, in contrast, whether our theories emphasize the social can never be a matter of choice. The child is more than a biological-social entity, constructing its intellect through progressive adaptation to the external world; it is from the outset a participant in "culturally-mediated joint activity" in which the history of the community, and the child's own future, converge in the forms

of social interaction that structure the child's experience. Because, on this account, the basic unit of analysis is joint activity, a theory of the child's development must necessarily be a theory of the development of the interfunctional relations between adult and child in their co-constructive activity. Hence the "socio-cultural" becomes an irreducible component of the psychological.

Such considerations suggest that the congruence between the overall theoretical frameworks of Vygotsky and Piaget is considerably less than our authors contend. If so, the attempt to strengthen one theory by incorporating insights from the other is problematic. Moreover, since each part of a global explanatory theory derives its sense from its place within the whole, it is unclear how readily we can, say, translate the Piagetian concepts of assimilation and accommodation into the Vygotskian framework. If this unclarity is to be resolved, the issues raised by these four articles must be the topic of further sustained research.

D. B., M. C., D. M., A. N.

The Role of Language in the Development of Representation: A Comparison of the Views of Piaget and Vygotsky[1]

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The origin of the higher forms of thought has long been one of the central research concerns in the human sciences. One of the most lively disputes in this area has centered on the relationship between the acquisition of natural language and the emergence of conceptual thought and representation during development. One view, often attributed to Jean Piaget, holds that thought is a prerequisite to the development of language. Another view, often attributed to Lev Vygotsky, holds that language is a prerequisite to the development of thought. And these simple formulations are often used to characterize the principle contrast between the two developmental theo-

ries these men proposed. However, such characterizations reflect serious misunderstandings about both developmental theories and about the nature of development itself. A closer look at the two theories reveals similar overall theoretical goals and surprising agreement on the details of the emerging language-thought relationship, despite deep differences in fundamental assumptions about how to interpret the details so as to achieve those goals.

Language and Thought in Vygotsky's Theory

Vygotsky's (1978; 1987a, b)[2] central theoretical goal in his developmental work was to characterize *the uniquely human aspects of behavior*, that is, to characterize the psychological discontinuity between men and other species. In his view, human intellectual development moves from being essentially a biological or maturational process to being partly socio-historical. Since all genuine human social interaction necessarily involves communication with conventional signs, language stands at the center of his psychology as the mediational means by which these transformations occur.

Vygotsky believed that thinking and speaking begin as separate lines of development and that throughout life there are some forms of thinking and speech which remain independent of each other. There is a prespeech phase of thought, a form of practical intelligence which develops independently of speech. This early thought involves simple generalization, purposive activity, and tool use. However, this early thought is not representational in that it depends heavily on support of the immediate environment; it also remains highly individual in nature. There is also a preintellectual phase of speech wherein the child uses a variety of vocal and gestural means to express emotion and effect primitive social interchange. The child may even acquire some words, without, however, being aware of their conceptual potential.

In the second year of life, these two lines of development meet and join in the form of *word meaning* to initiate two new forms of behavior: *verbal thought* and *meaningful language*. The initially independent lines of development play a crucial preparatory role in the emergence of verbal thought because, on the one hand, speech cannot be discovered without thinking, and, on the other hand, there must be something there for thinking to discover. At this point in development, the child begins to use speech to achieve cognitive ends, that is, as a tool to express and to aid thought. Simultaneously, social interaction enters an intellectual phase and speech becomes language proper as the child begins to use generalized meanings to achieve

social ends. The two separate psychological functions—speech and thinking—have come into a new *interfunctional* relationship: thinking becomes verbal and speech intellectual. Both social interchange and practical intelligence are transformed by becoming united in word meaning. Both language and thought emerge from this interfunctional relationship. Vygotsky does not explain what factor leads to the convergence of these two lines of development, but he is absolutely explicit in his insistence that something new comes into being, a new unit that has properties not already present in the constituent elements and that provides the basis for the development of the characteristically human forms of conceptual thought.

Hereafter, during the preschool years, it is not thought as such nor language as such that develops, but the interfunctional relationship of the two in the form of word meaning. Conceptual representation is a product of the evolving union of thought and language. Vygotsky traces the qualitative transformations in conceptual representation during this period—from congeries to complexes to pseudo-concepts. In addition to these structural transformations in word meaning, there are also functional transformations during the preschool years.[3] Speech moves from being largely social, that is, produced for others, to also being partly egocentric, that is, speech produced by the child for himself. The child speaks in conjunction with his action apparently as a means of helping to guide or regulate that action. This is part of a more general phenomenon, in Vygotsky's view, whereby forms of social interaction are appropriated to guide individual behavior. In essence, just as others have talked to the child and helped to guide his activities, he now talks to himself so as to guide his activity on his own. But as this inner speech becomes freed of direct links with vocal form, it is free to coalesce around and express more purely the meaning structure of the language so that inner speech becomes thinking in pure meanings. Thus hand in hand with the structural developments in word meaning comes a separation of those meanings from their original formal vehicle. Although any given thought still requires the word for its completion, the progressive isolation of the structures of conceptual thought from their spoken aspect constitutes a major developmental achievement.[4]

By school age the child has developed an array of conceptual representations which approximate adult forms in their outward aspect. But outward appearances are misleading and Vygotsky claims that a child of this age still lacks true or "scientific" concepts, that is, concepts which are subject to conscious awareness, are under voluntary control, and form part of an organized system. Acquiring

such control involves bringing the elements of the psychological function, in this case spontaneous (or pseudo) concepts, into a systematic hierarchical relationship with one another. By school age, the child has already done this for attention and memory, producing voluntary attention and logical memory, but he has not done it for the process of conceptual thought itself. In a sense, the child now has to engage in a highly reflexive activity, that is, to bring the process of conceptualization itself under voluntary conceptual control. Practically speaking, this involves placing his spontaneous concepts into a hierarchical system of relationships with other concepts.

But from his studies of the cognitive abilities of Russian peasants, Vygtosky had come to believe that true scientific concepts did not develop of their own accord but only under the influence of formal schooling. Scientific concepts are acquired ready-made in the school context as the child learns them by verbal definition and use. Thus these concepts are acquired with a pre-made systematic structure and within a context of conscious voluntary manipulation.

Once encountered, scientific concepts begin to interact with the child's own spontaneous concepts. Spontaneous concepts provide the concrete materials with which to enter into and comprehend the more abstract discourse of schooling; the scientific concepts encountered in the school context provide the framework for organizing and bringing under conscious voluntary control the existing spontaneous concepts. Scientific concepts grow downward to find concrete content; spontaneous concepts grow upward to find abstract, systematic form. The interaction between spontaneous and scientific concepts generates the final phase of development wherein the child gains consciousness control over his own concepts and thinking. Thus, this final phase of development depends for its emergence on the socially and historically specific institutional practices associated with formal schooling. In essence, a new functional demand from the social arena promotes a major structural reorganization of thought.

At all three periods in Vygotsky's theory, the initial linkage of language and thought at age two, the structural and functional transformations during the preschool years, and the final phases of development stimulated by schooling, he stresses that the development of the higher forms of human conceptual thought and representation are jointly sustained by our intelligence and our sociability in the form of word meaning and cannot be reduced to either component alone. Language, then, is not simply a prerequisite of conceptual thought, it codevelops with it.

Language and Thought in Piaget's Theory

In his book *Biology and Knowledge* (1967/1971) Piaget indicates that a central goal of his developmental work and the underlying rationale for the constructivist position is to describe how it is that man bursts the bounds of instinct in the course of his intellectual development, that is, how biological development becomes intellectual development. In Piaget's earliest psychological work, *The Language and Thought of the Child* (1923/1955), he argued that social factors, and language in particular, played a crucial role in such development. "Intelligence" he wrote "is enabled through the bond established by language between thoughts and words to make an increasing use of concepts" (1923/1955, p. 64). He was later to modify this view several times after his work on sensori-motor intelligence as he tried to account for the emergence of language itself as continuous with earlier developments. Yet even after publication of his first two books on the sensori-motor development of his children and with his studies on number and physical quantity under way, he continued to emphasize the importance of language in freeing the child from the immediate situation and in exposing the child to the world of social thought. Thanks to language, he wrote in 1940, the child becomes able

> to reconstitute his past actions . . . and to anticipate his future actions . . . . This . . . [creates] the possibility of verbal exchange with other persons, which heralds the onset of the *socialization of action* . . . [and] the internalization of words, i.e., the appearance of *thought itself,* supported by internal language and a system of signs . . . . (1940/1967, p.17, italics added)

He continued

> With the appearance of language, the young child must cope not only with the physical universe, as was the case earlier on, but also with two new and closely allied worlds: the social world and the world of inner representations. (1940/1967, p.18)

Thus, language opens up the sensorimotor intelligence to two new influences, inner representations and intersubjective communications, and a new series of equilibrations ensues to take account of these factors.

Only hinted at in this early work, but developed at some length in his book *Play, Dreams, and Imitation* (1946/1962), is the notion, borrowed from P. Guillaume, that a very general *symbolic function* underlies language, play, dreams, drawing, and deferred imitation. Language is still important in this model, but now the roots of

language itself are continuous with earlier forms of intelligence and, as a symbolic capacity, language shares the stage with other forms of behavior. The emphasis shifts towards seeing a main line of intellectual development in which language is made possible by and has some influences on thought, but in which its central transformative role is minimized.[5]

This formulation changed the focus of the analysis by downplaying social influences and emphasizing a spontaneous line of development. But Piaget now had to account for the development of the symbolic function itself. The crucial development, he argued, occurs during the sixth stage of the sensori-motor period when imitation is interiorized, as part of the general process of interiorization characteristic of this period, giving rise eventually to deferred imitation, the first form of representation (1946/1951, p. 62).[6] The function of freeing the mind from the here and now, which Piaget earlier had attributed to language, is now attributed to deferred imitation. Piaget argues that interiorized imitation and mental imagery generally do not depend on man's social life or language.[7]

However, in the course of his argument, Piaget makes it quite clear that mental images are not the same as thought proper, that is, *intelligence based on a system of concepts or abstract schemas.* He argues that both forms of representation—mental images and thought—emerge at the close of the sensorimotor period along with signs, that is, the conventional or socially determined signifiers of language. He argues that there is a certain parallelism in the emergence of these various forms of representation; but *so far as I can determine, his account of the origin of conceptual thought hinges at every point on its relationship to communication in general and language signs in particular.* Of the earliest verbal schemas he writes that they "involve the element of communication characteristic of the concept" (1946/1962, p. 220). Of the first preconcepts he writes

> Obviously, since conceptual schemas are related to the system of organised verbal signs, progress in conceptual representation will go hand in hand with that of language. (1946/1962, p. 221)

The end product of this conceptual development occurs when the child achieves true concepts, that is, concepts which achieve generality and individuality in a class inclusion relationship, that is to say, when the individual elements form a part of a true whole and relate to each other as part of that whole (1946/1962, pp. 226-27). With the true concept the child accommodates to all the relevant

data, including those outside the range of the immediate perceptual field and in the thought of others, and assimilates concepts into coherent systems and into the corresponding concepts of others (1946/1962, pp. 239-40).

The crucial role that language plays in this conceptual development, in his view, is to make possible a commentary upon ongoing action. With the acquisition of the child's ability to produce these verbal accounts, two changes arise: the child's thought is "objectivated" or socialized, and the child can use these accounts for metacommentary on his actions. It is these two features of conceptual development that Piaget never successfully accounts for by reference to factors other than language. In short, language plays the central role in the development of conceptual representation in Piaget's theory.[8]

However, judging from Piaget's own statements about this work (e.g., 1954/1967; 1975/1980), he believed he *had* established that the symbolic function is entirely continuous with developments within the sensori-motor period, that language is only part of the symbolic function, and, therefore, that language is essentially continuous with the developments of the sensori-motor period. A closer look shows that Piaget distinguished the mental image from conceptual thought. Only images emerge straightforwardly out of the sensori-motor period under his theory and there is no coherent argument as to how language or conceptual thought emerge from imagery. Language, as a form of social objectification and a vehicle for metacommentary, is fundamentally different from mental imagery and plays a crucial and unique role in the development of human conceptual thought and representation. Piaget himself acknowledges as much in several of his later works when he clearly distinguishes *images* as the signifiers of objects and *verbal signs* as the signifiers of concepts (Piaget & Inhelder 1966/1971, pp. 379-83) and when he speaks of a second level of the semiotic function which is apparently unique to the human species (Piaget 1970/1973, pp. 53-54). In his concern to develop the proposition that language alone is not enough to account for the semiotic function and intellectual development, he neglects to stress that images alone are not enough to account for the full power of the semiotic function or, more importantly, for the development of conceptual thought.[9] Conceptual thought is not simply a prerequisite of language, it depends on language in crucial ways for its own development.

Conclusions

In review, both Piaget and Vygotsky strive to show how the course of human intellectual development moves beyond biological determination to achieve more powerful and flexible forms of conceptual thought. Both appeal to language to account for these conceptual developments. For Piaget this appeal is peripheral to his general account of development and he acknowledges the role of language only grudgingly; for Vygotsky the appeal to language is central. In both theories, language provides a mode of social objectification and representation. Vygotsky provides a clearer account of the social nature of language as a means of transforming individual behavior and he wants to use language as a paradigm for general arguments about the social nature of development. Piaget provides a clearer account of the relation of this mode of representation to other forms of representation and to the emergence of operational intelligence and he wants to minimize the significance of language in the overall course of development. Finally, both men agree that these transformations in conceptual development take time to emerge during the preschool years. Vygotsky provides a more detailed description of the changing interfunctional relationship between language and conceptual thought, whereas Piaget provides a more detailed account of the psychological mechanisms of transformation. Unfortunately, we still know surprisingly little about the changing interrelationship between language and thought during the preschool years, an interrelationship that both Piaget and Vygotsky recognized as crucial to the emergence of the higher forms of human thought.

Notes

[1]This paper grew out of a discussion group on Piaget and Vygotsky composed of scholars from several institutions in the Chicago area. At the invitation of the Jean Piaget Society, the group developed a symposium for the Society's annual meetings presenting brief reports on our current understandings. I thank the members of the working group for their encouragement and support in the preparation of the paper and Peggy Miller of the University of Chicago for a careful reading of the final draft. Hopefully, a fuller version providing more complete argumentation and detailed documentation can eventually be prepared.

[2]The discussion here is based primarily on English translations of Vygotsky's work *Myshlenie i rech* Two improved English translations of this work have recently appeared: *Thought and*

Language (1987b)—a somewhat compressed rendition based on the original 1934 Russian edition—and *Thinking and Speech* (1987a)—a more literal translation based on a somewhat different version used in the Soviet edition of Vygotsky's collected works. For a contemporary description and evaluation of Vygotsky's work, see Wertsch (1985).

[3]See Lucy and Wertsch (1987) for further discussion of Vygotsky's emphasis on the changing functions of speech.

[4]This achievement may account for the intuition speakers have that conceptual thought is logically prior to and independent of its specific linguistic embodiment. However, if the structures of conceptual thought retain traces of their linguistic origins, then these intuitions are misleading (cf. Lucy & Wertsch, 1987).

[5]Sinclair (1982) notes that this shift in Piaget's thinking formed part of his critique of empiricism in that he was opposing the position of the logical positivists who, in Piaget's view, reduced all logic and mental operations to language.

[6]At times, Piaget's arguments about this development are circular (or "dialectical"—see Sinclair, 1982, p. 171) in that the symbolic function makes representational thought possible and representational thought makes the symbolic function possible (e.g., 1954/1967, p. 91).

[7]Piaget (1946/1962, p. 69) makes reference to primate data to establish these points. In apparent contradiction to this position, Sinclair (1982, pp. 172-73) points out that at times Piaget regarded the intent to engage in communicative social interaction as the underlying motive for the young child to create his very earliest representations. These remarks, however, predate his discussions of the symbolic function by many years and do not seem to recur in his later work. But a similar appeal to social communicative factors *does* emerge in his account of the development of conceptual thought, as we have seen.

[8]Sinclair draws a similar conclusion: "At the deepest level, language is discussed in Piaget's work as a possible constructive factor in the development of thought" (1982, p. 167).

[9]In later years, Piaget (e.g., 1970/1971) sometimes invoked research on the deaf to establish the relative independence intellectual development from language. The reliability and validity of this research on the deaf cannot be taken up here, but it is important to note that without recourse to language, Piaget's own theory lacks a well-defined mechanism for generating conceptual representations (as opposed to images).

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Children's Play as Representation and Imagination: The Case of Piaget and Vygotsky

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Play, when transformed from an activity of children to a focus of study by psychologists, becomes something of an enigma, difficult to define and characterize. Two theorists who are often called upon by researchers to provide some basic characterization of children's symbolic play and its role in conceptual development are Piaget (1962) and Vygotsky (1967). Neither man's theory is focussed on, nor particularly dependent on, play as a concept. Each, however, has addressed the question of symbolic play from within his own theoretical framework. The issues they address, and their characterizations of children's play are quite distinct. We will nevertheless argue that their theories are essentially complementary and mutually informative, indicating which points in each theory we think are potentially most interesting for the other. However, although we feel that a comparison of these two theories which address play provides a useful point of departure, even together they do not offer a complete theory of play. To illustrate this, we will consider cultural variations in symbolic play and will discuss the limitations of each theory in explaining such differences.

To orient the comparison, we have developed a chart contrasting the two theorists' arguments about symbolic play in terms of three key issues. We should mention that the chart selects from and builds upon a previous comparison by Greta Fein (1979).

While it is possible to fill all the cells in this chart, we want to stress that these two theorists emphasize different issues. Piaget is most concerned with the origins of symbolic play—the step-by-step progression of the child's use of the ludic symbol and what place symbolic play holds in his structural system. Vygotsky, on the other hand, focuses on how the specific characteristics of play influence

the development of thought. We have drawn boxes around the relevant cells on the chart to indicates these emphases.

Issues	Piaget	Vygotsky
Origins of symbolic play	change to representational assim. because of dev. of symbolic function	need for imaginary situation because of new unrealizable tendencies + desires
Developmental outcomes of symbolic play	temporary mechanism for consolidation of schemas; action-based support for not-yet-independent mental representations	zone of proximal development; separates meaning from objects + actions
Functions of symbolic play	consolidation, but also pleasure of mastery, recapturing and reconstituting experience	generalized tension reduction + wish fulfillment

Figure 1.   Comparison of Piaget and Vygotsky on critical issues about symbolic play

We think that each of these more *developed* arguments offer something important to the other theory. Let us consider first how Piaget's elaborated ideas about the *origins* of symbolic play can inform Vygotsky's less detailed ones. Both theorists recognize a new ability in the child occurring around the time of onset of symbolic play which allows the child to separate his mental concepts from the context of the here and now, and they both agree that this ability is necessary in order for symbolic play to take place. Vygotsky believes that this separation of the fields of vision and meaning, as he puts it, is necessary but not sufficient for explaining symbolic play. He argues that every advance from one stage to another is connected with an abrupt change in motives and incentives to act. Symbolic play is invented only when certain unrealizable tendencies appear in development, while at the same time the tendency to want immediate fulfillment of desires is retained from the preceding stage. Play, then, for Vygotsky, is the imaginary, illusory realization of unrealizable desires. The child *must* create this imaginary situation in play, since his desires cannot be fulfilled in his real world. But Vygotsky offers no explanation of *why* the child develops new unrealizable tendencies and desires at this time.

Piaget's explication of the impact of the symbolic function on the child's mental life can be used to explain this affective change. For Piaget, the particular form of play called symbolic play is defined the same as practice

play which comes before it: they both reflect the predominance of assimilation over accommodation. But as a consequence of the development of the "symbolic function," that is, the capacity to manipulate images which are not in the immediate context, around the age of 18 months to 2 years, there can now be *representational* assimilation of reality to the ego, where before there was only *functional* assimilation. As a result, there is a general reorganization of the child's schemas. When the child has the ability to retain and manipulate mental images independent of objects and events in the actual context, the range of his capacity for wishes and desires increases, and the likelihood that they will be unrealizable also increases, since what he wants is not actually present. Vygotsky's affective changes therefore can perhaps be accounted for by the changes in schemas from sensori-motor to representational that Piaget describes as an result of the development of the symbolic function.

Let us next turn to how Vygotsky's arguments about the role of play in development could supplement Piaget's. Vygotsky spends most of his effort at exploring the developmental outcomes of play and argues that play is the leading edge of development. He argues that in play the child learns to act in a cognitive, rather than an externally visible realm, relying on internal tendencies and motives and not on incentives supplied by external things. He cannot yet accomplish this in his everyday behavior, and thus, Vygotsky says play creates a "zone of proximal development."

In his work with older children, Vygotsky argues that instruction, the interaction between teacher and pupil, operates as a "zone of proximal development," allowing the child to do more than he can do by himself. Because of this, it has sometimes been assumed that when he *also* calls play the zone of proximal development for the younger child, he is referring to some interpersonal dimension of symbolic play, for example, one child leading another in social play. But we believe that he intends only a more general level of comparison, that the child achieves more within this context of behavior than he can outside of it. He is not referring primarily to interpersonal interaction in play as being the zone of proximal development—though of course the instruction relationship could also occur between two children of differing abilities. Rather, he is referring to the demands on the child in order to create and sustain the imaginary situation itself. There are two mechanisms, according to Vygotsky, by which play operates as the leading edge of development.

Vygotsky's first mechanism is a general one: in order for imaginary play to be sustained, the child becomes conscious of and must abide by rules about objects and actions that in everyday behavior he takes for granted. For instance, in order to *play* at being a sister, a child must *create* "sister-like behavior" that reflects the prototypical attributes of sisterhood, such as feelings of similarity or solidarity. This does not happen when she is *being* a sister, interacting with her siblings in a real situation. Normally, such a preschool child behaves without conscious awareness of rules, nor does she control her behavior to abide by them. But in imaginary play, the role the child fulfills and her relationship to the objects used will always stem from rules. The child thus achieves in play what she will later achieve in her everyday behavior.

Vygotsky's second mechanism is more particular. He argues that in the very young child, there is a fusion between objects and actions, and their meanings. Play serves to separate thought from objects and allow action to arise from ideas rather than from things. It does so by having one object or action stand for another. When a stick stands for a horse, it becomes an interim pivot for severing the meaning of horse from the object horse itself, by allowing the meaning to be attached to something besides the original object. Likewise, meaning is severed from action by means of another action serving as pivot. But in real action with real objects, it is not yet severed. Play serves, then, again, as a transition between the purely situational constraints of early childhood and internalized thought which is free of real situations.

With these two mechanisms, Vygotsky explicates how he thinks play creates a zone of proximal development with important developmental outcomes. It is, of course, impossible to transpose his argument about play as the zone of proximal development intact to Piaget, for Piaget has his own theory of how a child moves from one stage of development to another. But the mechanisms described by Vygotsky, it seems to us, capture something about the nature of *play* in particular that is missing in Piaget's account. The separation between the visual and mental fields that Vygotsky says happens first in play is exactly what the preoperational child must achieve in his everyday behaviors in order to become concrete operational, suggesting that the *particular* nature of symbolic play could be important for sustaining Piaget's global argument. We feel that these mechanisms deserve to be explored within a Piagetian framework.

We have suggested ways in which each theorist may have something to offer the other by considering the areas in which each focussed their work. We want next to touch only briefly on the notion of affect in play. To do so properly, of course, we would have to complicate our comparison considerably by introducing the psychoanalytic perspective, which time here does not allow. Neither Piaget nor Vygotsky emphasizes the role of affect in their theories. But it *does* appear in several places. We feel a more expanded role of affect can be achieved in each theory by considering the arguments of the other.

First, Vygotsky attributes the *origins* of play to newly developed and unrealizable tendencies and desires in the child, while Piaget minimizes the importance of affect in the origins of symbolic play. Including an affective component in the origins of play offers a potential of breadth that is missing in Piaget's theory by suggesting that the domination of assimilation during this period may in general reflect a child's affective needs as well as a structural instability in adaptation.

Both theories also discuss affect in terms of functions of play. For Piaget, in addition to its primary function as assimilative consolidation, play serves as a means of recapturing and reconstituting experience for the child, of compensating, realizing unsatisfied desires, or of resolving conflicts. He also mentions the pleasure of mastery and power to be in control as motivating factors. Piaget recognizes that in service of all these functions, the content of play is strongly influenced by the specifics of the child's natural and social environment.

Vygotsky by contrast argues that play functions primarily as generalized tension reduction or wish fulfillment and is not tied to specific tendencies and desires, taken directly from the child's environment. If Piaget's content argument were incorporated into Vygotsky's tension reduction theory, it would have important implications for Vygotsky's argument that play, in its role as a zone of proximal development, leads the child to gain an awareness of the rules that he already unconsciously follows in daily life. For if the themes of play are more directly influenced by particular experiences, then play adaptively allows the child to be most competent and most aware in exactly those areas of his life with which he is most concerned, in addition to playing the general structural role of expanding the child's control over concepts.

We have argued so far that Piaget's analysis of the *origins* of symbolic play and Vygotsky's analysis of the

developmental *outcomes* of symbolic play are complementary and mutually informative. Further, the role of affect can profitably be expanded in both theories through a consideration of the other. We do not mean to make the extreme claim that a single, unified theory of play can easily be created by cutting and pasting. The differences of emphasis we have discussed here stem from fundamental disagreements about the role of biological and natural autoregulative forces vs. social and historically specific ones in a child's development. But because of the relative rich detail of the analyses in different areas, we do believe that, considered together, the theories provide a stronger and more comprehensive view of play than either taken alone.

Nevertheless, we find one characteristic of *both* theories limiting in our own research. We each have been exploring the development of play in non-Western cultures (Gaskins, 1987; Göncü et. al., in preparation), and find that the richness of symbolic play that we see in our own culture does not exist everywhere. Several observers of non-Western cultures or Western sub-cultures have reported that symbolic play does not exist at all in the cultures they have studied or that it exists only in very stereotypic forms (e.g., cowboys and Indians) and represents a much smaller proportion of children's activity (Smilansky, 1968; Feitelson, 1977; Smith, 1977; Ariel & Sever,1980; LeVine & LeVine, 1963). Neither Piaget or Vygotsky offers much insight into the causes or consequences of such cultural variation (or, for that matter, of within-culture individual variation). Systematic variation in either the quantity or quality of play poses serious questions for these developmental theories.

First, what would be the origins of significant variation in play? Piaget would predict that symbolic play would emerge in all children as a result of the development of the symbolic function, and since he offers no motivation for play beyond the general disequilibrium between assimilation and accommodation, he has *no* interpretation about why some children might play significantly more or less than others. Vygotsky comes closer to acknowledging the possibility of variation when he argues that if there is no development of unrealized needs, there will be no play. In fact, he claims that there is arrested development of play in intellectually under-developed children or affectively immature ones. But he presumes a deficit on the part of individual children who show variation in their play, which is not particularly helpful in explaining group variation among normal children. His general argument

about the origins of play, however, would lead us to predict that in those groups or individuals where play is not particularly elaborate or frequent, one should also find less evidence of frustration in the toddler—which is an interesting and testable hypothesis.

Second, what would be the implications of variation in play on developmental outcomes? Piaget does not assign play any important developmental role, so variation is not particularily troublesome for his theory here. But Vygotsky gives play a crucial and distinct role in development, and a cultural variation raises important questions for his theory. In Vygotsky's theory, it is not clear how much play—in terms of either amount or variety—is sufficient to support normal development. Is occasional play enough to serve as a pivot between objects or actions and their meanings, or to give the child the opportunity to operate by rules in order to gain conscious awareness and control over roles of people and objects? One might suspect that these developments occur only through varied and sustained play. Presuming that Vygotsky is correct about the child's need to operate first in a non-reality situation, one might explore to see if behaviors other than play (for example, teasing or ritual drama) might serve the same role in other groups that play serves for our children. If no equivalents are found, then either the accuracy or the generality of his account must be seriously questioned.

Finally, for both Piaget and Vygotsky, the importance of the functions of play, as wish fulfillment, consolidation, or affective expression, are called into question by variation. If a child only plays in one or two stereotypic imaginary situations, will that play still serve to reduce tension or reconstitute experience? How else might the child accomplish these same functions and what would be the consequences if he did not?

Cultural and individual variations in quantity and quality of symbolic play raise questions about the origins, developmental outcomes, and functions of play. These questions serve to illustrate that both Piaget's and Vygotsky's generalizations about play (and development in general) were based only on the children around them. Neither theory accounts for the role of the environment in producing variation—either at the individual or cultural level. For those of us interested in that question, we must first develop reliable and culturally sensitive descriptions of play elsewhere, and then explore the developmental implications of that variation, so that we can begin to answer some of the questions we have raised here.

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Piaget and Vygotsky on Creativity

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Piaget and Vygotsky have each made important contributions to the understanding of creativity within the framework of two diverse and wide ranging theoretical

perspectives. The complexity and multidimensionality of the concept of creativity makes a full discussion of this phenomenon in the context of these two extensive theories nearly impossible. Therefore, this paper will only explore and compare the explanatory power of these theories in addressing some of the major issues in the field of creativity.

Given the developmental nature of the theories of Piaget and Vygotsky, the following questions will be the focus of this discussion. In what way do these theories expand our understanding of the development of creative thought? In their developmental explanation of creativity, how do they resolve the following issues: 1) Who is more creative, children or adults? 2) Is creativity a primary component of all other aspects of thought or is it a higher mental process that can only be realized after the development of other primary aspects of thought? 3) What are the differences between artistic and scientific creative processes? 4) What is the role of society in the development and expression of creative thought?

Vygotsky with his literary background and interest in artistic thought, has given special attention throughout his work to issues related (directly or indirectly) to creativity and imagination. Piaget, contrary to the popular view, has also provided a clear framework for explaining creativity and its development (Ayman-Nolley, 1985). Although in the historical development of American psychology, the influence of Vygotsky's work follows that of Piaget, in relation to creativity, Vygotsky's most important work was done prior to that of Piaget. This historical note is especially important because of Vygotsky's specific criticisms of Piaget on the subject of creativity. Vygotsky's major works on creative imagination were written in 1930-32, while Piaget's work on *Play, Dreams and Imitation in Childhood*, containing the kernel of his thought on creativity, was not published in French until 1945. For this reason we are setting aside Vygotsky's own early characterization of Piaget's explanation.

In contrast to the static explanations of psychoanalytic and psychometric theories that deal with creativity at one point in time, both Piaget and Vygotsky have provided a dynamic and developmental perspective on creativity. The advantage of this developmental approach is that it explains creative thought as it evolves and changes from its inception in early childhood years through adulthood. The theories of Vygotsky and Piaget on the development of creativity converge and compliment each other in several ways. Piaget provides the mechanisms of the processes involved in the development of creative imagi-

nation and Vygotsky gives the general structure of the changes and evolution in the content and function of creative imagination.

Piaget and Vygotsky argue that the beginning of creative imagination lies in the early manifestations of play. They see this initial occurrence as not fully creative (constructive) but having that special element of distancing from reality. Neither of them sees creative imagination replacing play but they observe that creative imagination is an aspect of thought that first appears in early examples of play. They explain that this original manifestation of imagination goes through a process of integration and evolution after the development of concepts and reasoning and develops into a mature creative imagination. This mature creative imagination, though integrated with the concepts of reality, still keeps its original quality of being removed from the immediate reality. Creative imagination through this integration, has become richer and more meaningful but not fundamentally changed.

Although Piaget and Vygotsky converge on the generalities of the path of this development their elaborations are complimentary to each other. Through the dual processes of assimilation and accommodation, Piaget provides a mechanism to explain this development. Piaget explains that symbolic assimilation is the source of creative imagination but that this higher form (creative imagination) can only be achieved if symbolic assimilation is reintegrated with other aspects of thought (i.e. representational construction and conceptualization) (1962). In this way the development of creativity starts with the primacy of assimilation and an egocentric distortion of reality. Through its integration with accommodating thoughts and development of conceptualization it becomes less egocentric but continues to be removed from concrete reality (Ayman-Nolley, 1987a).

Following a similar pattern, Vygotsky gives a very extensive and elaborate description of when and how this integration occurs. He believed that imagination as manifested in child's play is primarily reproductive imagination, closely connected to the concrete reality but separate from reasoning. Vygotsky developed an extensive explanation of the evolution of imagination during adolescence (1931). He explained that the development of abstract thinking and the integration of imagination with this level of reasoning will produce creative imagination that can bring forth new concepts from old concepts. He believed that in adolescence, emotional impulses and needs integrate with the intellectual side of abstract and concrete thinking only in the realm of creative imagination. In this

way during adolescence both the subjective creativity (fulfillment of emotional needs) and objective creativity (creation of new concepts) develop and although they remain separate they have a complex interlocking relationship. In this relationship the two aspects of the adolescent's psychology, affect and intellect assist each other in the further maturation of both. Subjective activity is only possible with abstract thinking and rich understanding of concrete reality while objective creativity is motivated by affective needs (1931/1984).

On the basis of this brief explanation of the development of creative thought, we can address the other questions at hand. Regarding the relationship between creativity in children and adults, Piaget and Vygotsky, as we have seen, take essentially the same position. Both agree that although remoteness from reality and egocentric distortion of reality is stronger in childhood, that true creative imagination only occurs after adolescence when imagination is integrated with abstract reasoning and conceptualization. Piaget explains that

> although this reintegration of symbolic play in intelligence restricts the extension of the distorting aspect of the symbol, it in no way reduces its creative activity. Creative imagination, which is the assimilating activity in a stage of spontaneity, does not diminish with age, but, as a result of the correlative progress of accommodation, is gradually rein tegrated in intelligence, which is thereby correspondingly broadened (1962, p.289).

Piaget explains that throughout development as accommodation expands and improves, assimilation becomes enriched and that this progress is a life-long process (Ayman-Nolley, 1987b). Vygotsky gives an even more explicit comparison of childhood and adult creativity. He explains that the child is able to imagine less than the adult, but he trusts the products of his imagination more and has less control over them (1930/1967, p.29). In another place he explains that the material for imagination comes from the individual's experiences and therefore the richer the experiences the richer the imagination. Poverty of creative imagination in children then is partially due to poverty of their experience (1930/1967, p.10). Vygotsky explains that the impression of richness observed in children's fantasy is due to the great excitability of this affect, the intensiveness of this experience and the uncritical judgement of children. He explains that the creative imagination of adolescents is more creative than children and less productive than adults (1931/1984, p.214). Therefore, according to Vygotsky the creative imagination evolves both qualitatively and quantitatively through the life cycle.

The dynamic nature of this development continues throughout adulthood. Vygotsky's explanation shows that the question is not whether children or adults are more creative, but rather how is creativity different in childhood and adulthood in different individuals. In fact Piaget offers a very insightful example to challenge the usefulness of the child/adult distinction by comparing Mozart who was creative from early in childhood with Kant who did not produce his original works until much later in life (1972, p.222).

A more challenging question is the role of creative imagination in the general development of thought. Is creative imagination the basis of all thought or is it the end point of the development of certain primary aspects of thought? This issue is not very clearly explained by either Piaget or Vygotsky. Both make it clear that there are prerequisites to creative imagination and therefore it is a process that comes later in childhood and does not really appear until adolescence. On the other hand both Vygotsky and Piaget see the origins of creative imagination in early play and give importance to its role in the development of all aspects of thought. Vygotsky claims creative imagination to be the distinguishing feature between the world of culture and that of the nature (1930/1967, p.5). It is what separates man from animal, the basis of all mature mental activity. Piaget refers to creative imagination as "the motor of all future thought and even of reason" (1962, p.162). It is clear that this essential component of creativity plays an important role from the beginning in all functions of thought. This role becomes more expanded and critical as imagination matures and becomes what both Piaget and Vygotsky called creative imagination. It then becomes what Vygotsky calls the source of all man's constructions, new constructions. In a sense then creative imagination becomes an important pillar for the development and advancement of all other higher mental processes.

Given the divergence of approaches between Piaget and Vygotsky in relation to arts and sciences, it is interesting to compare and contrast how they might have conceptualized the processes of creative thought in these two fields. It is clear from the point of view of both theories that the creative imagination, which Piaget refers to as the outcome of symbolic assimilation, is not only the source of artistic expressions but also scientific inventions. On the other hand, in Piaget's discussions of creative imagination, his examples are mostly drawn from the arts. It is primarily in the arts that Piaget sees the outcome of play and the primacy of assimilation. He sees arts to be the "full flowering of spontaneous creation" (1962, p.152). He

does not deny the necessity of symbolic assimilation in scientific inventions but he does not specifically discuss creative imagination in relation to scientific thought. In several cases he made a distinctive clarification that the state of equilibrium that is the required end point for logical, rational and scientific thought, is not necessary for all aspects of thought. For example, he sees no necessity for equilibrium between assimilation and accommodation in the case of the arts. These statements imply that although both scientific and artistic thought require the dual processes of assimilation and accommodation, the balance between the two can differ. Artistic thought gives primacy to assimilation over accommodation while scientific thought requires a greater degree of equilibrium as explained by Piaget. Of course the issue is more complex. In a 1972 lecture at John Hopkins University, Piaget refers to a distinction made by a physicist between creative physicists and run-of-the-mill physicists. He states that the "creative physicist, in spite of his knowledge, succeeds in staying in part a child, with the curiosity and the candor of invention that characterize most children" (1972, p.229).

Vygotsky also focuses on artistic creativity. He sees artistic thought as the continuation of childhood play. In *The Psychology of Art* (1925/1971) for example, he puts more effort toward understanding artistic experiences than scientific inventions and discoveries. Vygotsky makes a distinction between artistic and scientific thought based upon the method of experiencing and perceiving rather than outcomes. In summary, while their discussions of the development of creative imagination clearly have implications for understanding the processes of scientific thought, neither Piaget nor Vygotsky have elaborated on the role of creative imagination in scientific inventions.

When discussing creativity, the role of society has always been unclear. In this area Vygotsky provides a very useful and important complementary prospective to Piaget. Piaget has assigned an important role to the socialization process and social interaction in the development of concepts and therefore mature forms of creative imagination. In reflecting on his own creative work, Piaget gives three conditions for the formation of creative ideas: 1) "To work alone, to ignore everybody else, and to mistrust every influence from the outside." 2) "To read a great deal in other disciplines, not in one's own discipline." 3) "To have an adversary, a school of thought whose ideas one considers to be wrong...so one's own ideas are always as a contrast" (1972, p. 222). Piaget seems to have concentrated mostly upon the intrapsychological aspects of these conditions and did not explore the social influences implied in especially the last two conditions. Vygotsky on

the other hand primarily elaborates the interpsychological processes which Piaget only hinted at in the second and third conditions. Vygotsky elaborates this process very thoroughly and carefully in relation to the arts, explaining that understanding creativity comes from understanding the creator, the product, the viewer and their interrelationships (1925/1971). He then proceeds to explain that a work of art entails a connection between the creator and the viewer and only in careful analysis of it can we fully understand the interrelationship of individual and society in the process of creativity. His sense of the magnitude of the influence of these relationships was such that at least in the case of literary arts, Vygotsky believed that the product is not solely the work of an individual creator. Most of Vygotsky's work in this area of the interpsychological aspects of creativity focuses on the effects of a work of art on the viewer. He claims that through analysis of the indirect qualities of art, the metaphoric and analogical aspects, we can determine their relationship to both the creator and the viewer. This knowledge then will help clarify the connections between the creator and the viewer themselves and how the very existence of the viewer affects creative imagination to start with. Vygotsky has also emphasized the role of historical tradition in the creative process. In essence then, Vygotsky by careful analysis of the creative product in its historical and cultural milieu is providing a system to explain how reading in surrounding fields and choosing an adversary, as well as what Piaget calls accommodation (learning the rules of the medium to use), are crucial in the development of creative thought.

Although we can see considerable convergence in Piaget's and Vygotsky's theories in addressing these major controversial issues, they do differ in their explanations of the roles of language and unconscious thought in creative imagination. A full discussion of these differences is beyond the scope of this paper but it is important to mention the general nature of these differences. In an overall sense Vygotsky takes the position that language has a strong role in the development of imagination to its maturity as evidenced by creating new concepts and engaging in abstract thought. He also sees this as a conscious process that is interconnected to realistic thinking. He criticizes the idea put forth by Freud and others that creative imagination is primarily the product of the unconscious. Piaget on the other hand tends to assign lesser significance to language and speaks of unconscious processes involved in creative thought. However, a more careful study of the two theories raises a more thorny problem. It is not clear that Piaget and Vygotsky are addressing the same concepts when referring to language

and the unconscious. For example, when Vygotsky talks about the role of language in the creative imagination he is primarily considering verbal thought, which seems to be very different conceptually from Piaget's references to language in this context. Similarly Piaget's reference to the role of the unconscious is mostly in relation to egocentric assimilation in the earlier stages of play. In fact, one of the steps in the development of creative imagination in Piaget's theory is the reintegration of play into general intelligence, whereby it becomes a conscious process. He makes a clear distinction between dreams which are unconscious versus play and art which he describes as deliberate and conscious illusions. There are seeming contradictions within both theories in relation to the unconsciousness of creativity. Piaget's dual processes of assimilation and accommodation may hold the key to resolving the matter. While both processes are present in creative thought, it would appear that it is only the primary nonintegrated assimilating aspects of creative thought that are unconscious.

As we can see, these theories have gone a long way toward the explanation of the development of creative imagination from childhood to adulthood and address some of the key issues in understanding creativity. On the other hand, both theories are also limited in their power to explain the specific processes, especially in relation to scientific creativity. The comparative study of Piagetian and Vygotskian perspectives on creativity is a productive way to enhance our understanding of the developmental aspects of the creative process. Further study of these explanatory mechanisms may enable us to elaborate and explain other unclear aspects of the complex and subtle processes of creative thought.

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Why Vygotsky?
The Role of Social Interaction in Constructing Knowledge

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In the first volume of the *Études d'Épistémologie Génétique*, Piaget explains how he believes the psychological development of the child and the sociogenesis of scientific knowledge are related. He begins by defining epistemology as the empirical and theoretical study of the

successive states a science traverses as it develops. He then argues that all sciences have epistemological, psychological, and sociological aspects and that rational analysis of any science requires consideration of all three. Since the epistemological aspect constitutes the phenomenon to be explained, it must be delineated first. That done, the psychological and social aspects can be studied in order to provide an explanation. The latter study, however, leads the epistemologist beyond the realm of scientific knowledge. "In attempting to lay bare the sociogenetic or psychogenetic roots of any variety of knowledge, [the investigator] will be forced to push the analysis of formative mechanisms onto the prescientific or infrascientific terrain of common knowledge, whether this be in the history of societies (for example, the history of techniques), in child development, or even in the frontier region of the elementary mental mechanisms and physiological processes underlying knowledge acquisition . . . " (Beth, Mays, & Piaget, 1957, pp. 2-3). Understanding the growth of knowledge depends, therefore, on understanding how the psychosocial development of individuals starting from biological beginnings makes possible their participation in the complex institutions and activities that comprise a science.

There can be little doubt that Piaget's was a powerful conception. Although epistemological in purpose, his studies of the prescientific development of ideas in children inspired and shaped developmental psychology as we know it. His questions are still asked; his experimental method is still employed; his explanatory principles are still invoked. Even so, significant dissatisfactions have arisen. Some of these relate to the incompleteness of the theory. For example, psychologists interested in motivation, performance, therapy, social interaction, or instruction find that Piaget speaks to their concerns indirectly and in fragmentary ways. To build on Piaget, they must take up threads at the edges of his theory and weave patterns of their own. But there are dissatisfactions of another sort relating to beliefs about the origins of knowledge. Workers suspicious of ideas of progress, cognitive universals, natural logic, and "hard" science in general and committed to notions of cultural relativity, nonrational thought, and hermeneutic "authenticity" as a substitute for truth seek a prophet other than Piaget. They want a Moses who will lead them out of the land of reason and into the realms of motivation, social practice, meaning, and intention. It is in this context that interest in Vygotsky has arisen.

The irony is that Piaget and Vygotsky are very similar. Both were concerned with the growth of knowledge (albeit knowledge of different sorts), both agreed that knowledge is a form of adaptation, and both placed the origins of knowledge in biological evolution. For both thinkers, certain phylogenetically-created forms of knowledge are present at birth and provide the basis upon which an individual's higher mental functions were constructed. Moreover, for both thinkers all higher mental functions employ semiotic instruments and social factors are crucial. Wherein, therefore, did they differ?

The Role of Social Interaction in the Development of Knowledge

Much of Vygotsky's current appeal stems from the idea that Piaget ignored or seriously deemphasized the role that social factors play in the development of knowledge while Vygotsky made social interaction crucial. This view was held by Vygotsky himself (1986, p. 52; 1987, p. 88) who wrote that the central point of Piaget's theory was to derive logical thinking purely from the play of consciousness without regard to practical activity or social practice. And it is echoed by modern workers such as Shweder (Shweder & Levine, 1984) who argues that in Piaget's theory knowledge is *self-* rather than *other-*constructed or Tudge and Rogoff (in press, p. 4) who argue that "the bulk of Piaget's epistemology concerned the ways in which individuals come to understand physical principles of the world while acting on it as individuals." There is, however, good reason to believe that this proposition is erroneous.

Vygotsky

Vygotsky (1987) arrived at this conclusion through analyzing the relationship Piaget held to exist between biological and social factors in development. Oddly enough, he had to construct his argument in such a way as to negate Piaget's repeated assertion that "the thinking of the child cannot be derived only from innate psychobiological factors or from the influence of the physical environment [but] must also be understood . . . as a function of those relationships which are established between the child and the social environment that surrounds him" (p. 82). To do this, he focused on another of Piaget's assertions to the effect that although both biological and social aspects must be constantly kept in mind, "in order to make a beginning, [one] must choose one language at the expense of the others," and that he, Piaget, has chosen the language of sociology even though the language of biology might also have been chosen (p. 81). To Vygotsky, this meant that Piaget believed "that a description that is given in the language of sociology in one situation may with equal success be reduced in another to the language

of biology" (p. 81). Together with a misconstrual of Piaget's opposition between egocentric and decentered as an opposition between biological and social, this led Vygotsky (pp. 82-84) to conclude "that we are dealing . . . with a purely biological conception of the child, a conception that attempts to derive characteristics of the child's thinking from his biological nature" (p. 83).

Even granting that Vygotsky's death put him at a disadvantage in evaluating Piaget's ideas, there is no escaping that this analysis is faulty. To say that two factors or two viewpoints are necessary for complete understanding but that one must be chosen in order to get started in no way implies that complete description from either point of view is possible or that the social may be reduced to the biological. In fact, Piaget states quite clearly that to ignore either is to miss half the picture, and Vygotsky's arguments about egocentrism, cooperation, and coercion provide no grounds for assuming that Piaget meant something other than what he said. The simple fact is that the opposition between the biological and the social that Vygotsky attributes to Piaget is spurious. From the very excerpts that Vygotsky quotes, and certainly from the vantage point of 1988, it is clear that Piaget did not think that biological and social factors could be isolated from one another, nor did he invoke a single factor to explain them. In *Les opérations logiques et la vie sociale* (1967), in *La pensée psychologique, la pensée sociologique, et la logique* (1950) and in several other places (1970, 1980; Piaget & Garcia, 1983; Piaget & Inhelder, 1969), Piaget made clear that he considered individual and social factors to be inextricably intertwined. Moreover, in his famous "circle of the sciences" (Piaget, 1973, p. 42), he traced all forms of knowledge to the interactive cycle linking the epistemic subject with the "object" of his knowledge and argued that from that point of view, psychology and sociology, as complementary approaches to the single reality of human conduct, are empirically grounded in biology while at the same time providing an explanatory basis for the normative activities of the subject. If invariance of adaptive functioning between biological and social domains is denied, there is no way to explain the social. At the same time, because biological and social mechanisms and the structures they produce are not identical, there is no biological reduction. In short, Vygotsky's argument is not tenable.

Modern Scholars

The strange thing is that modern scholars, to whom Piaget's mature work is available, often come to similar conclusions. Sometimes ideology drives the discussion more than reason. For example, although he makes no reference to Vygotsky, the cognitive anthropologist Shweder agrees with his contention that Piaget holds knowledge to be self-constructed. Shweder bases this contention on a single quotation: "What we want to know about is individual invention" (p. 117). This remark comes from an analysis Piaget made of the way Lévi-Strauss interpreted his discovery that kinship systems are algebraic structures (Piaget, 1970, pp. 106-119). In that discussion, Piaget is at pains to reject Lévi-Strauss' notion of an unchanging human mind consisting of permanent schemes prior to and necessary for the construction of social systems. For that reason, he is interested in how individuals come to understand the logic of this kinship system rather than the kinship system itself, admittedly logical in its completed state. The thrust of Piaget's argument is that a principle of equilibration must be invoked to explain both individual and social systems and that "From this perspective, there is no longer any need to choose between the primacy of the social or that of the intellect; the collective intellect is the social equilibrium resulting from the interplay of the operations that enter into all cooperation" (p. 114). Thus, Shweder's notion that Piaget believed in self-constructed rather than other-constructed knowledge may be traced to a statement taken out of context in which Piaget was actually arguing that social and individual factors go hand-in-hand.

In a more thoughtful paper comparing Piaget and Vygotsky directly, Tudge and Rogoff (in press) assess the relative weights given to social phenomena by these thinkers. Although they eventually conclude that differences between them derive more from differences in what they attempt to explain than from differences in the explanatory principles they invoke, they nevertheless believe that the two theories handle the issue of social influence in opposite ways. From the premises (1) that Piaget's interest in such phenomena was limited to his early theorizing, (2) that his focus was on interactions between the child and his physical environment rather than on interpersonal interactions, (3) that his mature theory emphasized the role played by equilibration at the expense of maturation, experience, and social interaction, (4) that he restricted the influence of the social environment to accelerating or retarding the age at which children pass through the stages of development, (5) that he placed cognitive conflict above social conflict as the motor of development, (6) that he held young children to be relatively impervious to logical argumentation, and (7) that he believed that logical construction is better aided by interactions with peers than with adults, they conclude that for Piaget development moves from the individual to the

social. By contrast, they argue that for Vygotsky it moves in the opposite direction.

To my mind, there are several problems with this thesis. In a general way, the distinction Tudge and Rogoff arrive at seems to derive from not distinguishing adequately between intrapsychological and interpsychological factors in child development and in the historical development of scientific knowledge and from comparing phenomena of different levels. Taking their premises individually and keeping these distinctions straight, I believe the correct conclusion vis-a-vis Piaget is that he believed that development, either ontogenetic or historical, is simultaneously individual and social. If he differed from Vygotsky at all in this respect, it would be because, accepting Tudge and Rogoff's exposition, Vygotsky believed that individual and social factors could be separated and made social factors primary.

Specifically, the fact that Piaget did many studies on how physical concepts are constructed by having children work on physical materials (*premise 2*) says nothing either way about social influences on development. In fact, Tudge and Rogoff's argument conflates a specific knowledge content with the processes of its construction. In all of Piaget's experiments, an investigator set up the situation, chose the materials, motivated the child, drew the child's attention to salient aspects of the objects and procedures, and provided knowledge, hypotheses, and contradictions. It is just as possible to study these aspects of constructing physical understanding as it is to study the physical data that were ascertained and how they were logically coordinated. Likewise, one might study either set of factors in situations where the child is constructing social knowledge. With respect to the historical construction of ideas, the situation is even clearer since Piaget considered all sciences to be social institutions. All, therefore, that might reasonably be granted is that, in his studies of the ontogenetic construction of physical knowledge, Piaget did not focus on social factors.[1] One cannot agree that he saw development as moving from the individual to the social.

Another flaw in Tudge and Rogoff's thesis has to do with the way in which they interpret Piaget's emphasis on equilibration (*premise 3*). While it may be true that of the four factors Piaget invoked to explain development, i.e., biological factors, physical experience, social experience, and equilibration, physical experience and equilibration received more attention, that does not lead to the conclusion that development moves from the individual to the social. In ontogenetic equilibrations, as Tudge and Rogoff

appreciate (pp. 24-25), social contradictions as well as physical contradictions in the form of disconfirmed predictions play an important role. Similarly, in the historical evolution of scientific knowledge, the fact that logical organization of experience can only be explained by a theory of equilibration says nothing about individual versus social mechanisms in producing equilibrium. In fact, consonant with his belief that all construction is simultaneously individual and social, Piaget held that equilibration, as the means by which rational structures are constructed, involves both individual and social factors (Piaget & Garcia, 1983; Garcia, 1980a, 1983).

The problem here (as well as with *premise 5*) appears to arise through conflating the individual and social aspects of equilibration with Piaget's and Vygotsky's explanatory principles, i.e., with equilibration and dialectics. I say this because of a personal communication from Tudge and Rogoff. I had asserted that, while everyone agrees that children are more apt to learn gravitational theory in school than sitting under an apple tree, that in no way suggests that the original construction of gravitational theory can be reduced to purely social factors and that, moreover, Vygotsky does not himself explain interpsychological or social construction. In response, Tudge and Rogoff pointed out that "Vygotsky's is [an essentially dialectical theory] of both ontogenesis and phylogenesis, based on Marxism, [in which] the development of knowledge must be considered at the level of cultural history." Not only does this mean that the adequacy of Vygotsky's theory depends on the adequacy of Marxist epistemology but it also means that, in order to maintain their thesis, Tudge and Rogoff are forced to pit Marxist dialectics, conceived as social constructivist in nature, against equilibrational theories conceived as biological. Since Piaget (1970, p. 114; 1980) wrote repeatedly that to explain knowledge required both dialectical and equilibratory perspectives and that neither was purely biological, that thesis is highly questionable. In *Les Formes élémentaires de la Dialectique* (1980, pp. 9-10), he posits that whenever it becomes necessary to construct new forms, dialectical processes come into play at every level of thought and action. But he also argues, and perhaps this is a real difference with Vygotsky, that thought is not initially and always dialectical. Between phases of dialectical construction there are phases of equilibrium during which simple discursive logic suffices to explain activity. Dialectics, therefore, constitutes the inferential aspect of every equilibrational process whereas logical deduction constitutes the inferential aspect of equilibrated systems. Far, then, from equilibratory processes opposing dialectical ones, in Piaget's theory they fit together in a specific way.

Tudge and Rogoff's *premise 4*, i.e., that Piaget restricted the influence of the social environment to accelerating or retarding the age at which children pass through the stages of development, is untrue and, moreover, is contradicted by data that they cite. True, in the passage referenced, Piaget cites such acceleration or retardation as evidence of the almost total control social factors have over the development of mental structures but he in no way suggests that these are the only effects the social environment exerts. Moreover, Tudge and Rogoff's admission that interpersonal contradictions promote equilibration, a proposition ubiquitous in Piaget's writings including his posthumous works (cf. *Psychogénese et Histoire des Sciences*), contradicts this premise. What Piaget would not do, however, is grant the social environment complete control. While it is critical in determining whether a structure is constructed and plays an important role in the dynamics of construction, the final product, at least as far as elementary logical operations are concerned, is much the same from one culture to another.

Again, with regard to *premise 6*, the fact that young children are relatively impervious to logical argumentation does not entail the conclusion that development moves from the individual to the social. Rather, it indicates that it moves from the prelogical to the logical. In truth, little of human action or interaction at any level is highly rational. Myriad nonrational interactive strategies are used to influence, educate, and control the child long before any sort of logic is constructed, and these strategies are arguably more important throughout the lifecycle than is human reason. To say, therefore, that the young child is impervious to logical interaction is not to maintain that they are impervious to other forms of social interaction that influence knowledge construction. For his part, Piaget did not deny that these other forms of interaction are important. He only held that they could not, by themselves, insure operational constructions.

Similarly, in their discussion of the relative effects of peer-peer and novice-expert interactions (*premise 7*), Tudge and Rogoff fail to differentiate nonrational from rational strategies of interaction. In this regard, it must be noted that in Piaget's theory as he left it, a distinction is made between procedural and epistemic structures (Brown, 1988; Cellérier, 1979a, b) and that the invention of procedures or strategies proceeded on pragmatic, not logical, grounds. In fact, in the pragmatic transformation, i.e., using existing knowledge to create adapted action, a system of evaluative heuristics, largely affective (Blanchet, 1986; Brown & Weiss, 1987; Brown, in press), is used to find possible but not necessarily unique solutions

to a problem while in the epistemic transformation, i.e., using adapted action to create operational knowledge, only values of truth and logical necessity may guide construction. From this point of view, it is understandable why unequal power relationships are more useful in inventing procedures than in creating operational structures. In the first situation, coercion or persuasion can orient the child in the right direction and direct search without seeking or producing understanding. In the second, the raucous voices of rhetoric and emotion drown out the feeble murmurings of coherence, correspondence, and non-contradiction and foil the child's efforts at logical construction.

In sum, despite their careful scholarship and even-handedness, I do not believe that the contrast that Tudge and Rogoff draw between Vygotsky and Piaget is accurate. Piaget believed that knowledge construction was simultaneously social and individual and that these factors or aspects could not be separated and one made prior. If Tudge and Rogoff's presentation of Vygotsky's ideas is correct, Piaget differed from Vygotsky in that Vygotsky believed such separation was possible and made the social primary. They also may have differed with respect to what part of knowledge acquisition they held to be dialectical in nature. But all in all, they were very similar.

Conclusion

While there is no doubt that, as it stands, the sociological aspects of Piaget's theory are underspecified, they are both much more developed and much more open to development than the majority of Piaget's critics are willing to admit. In future, comparisons of Piaget and Vygotsky should leave off repeating Vygotsky's tired arguments about the biological and the social and explore the social aspects of Piaget's theory. In future, such comparisons should forget *The Language and Thought of the Child* (Piaget, 1969) and Vygotsky's (1987) misconceived critique of it. Instead, they should concentrate on the third volume of Piaget's (1973) great epistemological treatise, on the work on dialectics (Piaget, 1980), and on the book comparing ontogenesis and the history of science (Piaget & Garcia, 1983). Moreover, they should review Mays's (1982) exposition of Piaget's sociological theory, they should consider the interchange between Apostel (1986), Furth (1986), and Mays (1986) relative to Piaget's social thinking, and, most importantly, they should take into account what Garcia (1980a, b; 1983) and Cellérier (1979a, b; 1982) have to say. If that were done, we might enjoy an interesting discussion of the parallels Garcia sees between Piaget and Lenin or how activity theory (Kozu-

lin, 1986; Wertsch, 1984) and Cellérier's pragmatic transformation come together. We might also begin to glimpse how Vygotsky's interest in affectivity touches on the evaluations central to procedures (Blanchet, 1986; Brown & Weiss, 1987; Brown, in press). If that is not done and if the debate continues as it is presently conducted, we stand to lose all that Piaget has taught us about how scientific concepts are developed and be left with vague and questionably consistent social theories that, to date, have proved largely barren with respect to how knowledge is constructed.

Note

¹Piaget's experiments on the development of logical concepts also used physical objects, of course, although actions not objects were the source of knowledge. Although I have neglected logico-mathematical knowledge in this discussion in order to simplify the exposition, the same arguments apply.

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