Vygotsky as Precursor to Metacognitive Theory: II. Vygotsky as Metacognitivist

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ABSTRACT *In this article it is demonstrated that topics discussed in contemporary metacognitive research are integral parts of Vygotsky's (1978, 1986) theory of cognitive development. This conclusion is reached through a discussion of Vygotsky's views of self-regulation, the relationship between self-awareness and self-regulation, and the relationship between awareness/regulation on the one hand and cognitive process on the other. The uniqueness of a Vygotskian approach to metacognition is also specified. This uniqueness resides in Vygotsky's focus on the sign system of human language, on the linguistic tools of thought and the central role they play in mediating cognitive performance.*

INTRODUCTION

In the first article of this series (Bråten, 1991), the concept of metacognition was briefly discussed. It was ascertained that attempts to define this complex concept in contemporary literature involve a central distinction, namely between knowledge about cognition and control/regulation of cognition. It was recognized, moreover, that the concept's usage in referring to both these areas of research has generated a considerable amount of tension. It was also pointed out that controversy still remains over the conceptual issues of what is meta and what is cognitive, and over the transsituationality of metacognition.

Of the four historical roots of metacognition mentioned by Brown (1987), the issue of verbal reports as data was seen as referring to metacognitive knowledge; the issues of executive control, self-regulation, and transference from other-regulation to self-regulation were seen as referring to metacognitive control/regulation (cf. Bråten, 1991). According to Brown (1987), Vygotsky's (1978) influence on metacognitive theory has primarily been effected through his discussion of transference from other-regulation to self-regulation. As was indicated in the first article, however, Vygotsky seemingly discussed metacognitive-like topics in breadth as well as in depth, thereby integrating all the metacognitive themes mentioned by Brown. This second article will focus how Vygotsky (1978, 1986) dealt with central issues surrounding the metacognitive domain in contemporary theorizing, and, more

specifically, how a thorough study of his work may contribute to both clarification and unification of the metacognitive problem space. The uniqueness of a Vygotskian approach to metacognition will also be specified.

It goes without saying that space restrictions prevent the author from giving full coverage of Vygotsky's developmental theory. Concerning the passages in his work that may be regarded as being metacognitively hot, however, one will have to enter considerably into details. First and foremost, Vygotsky's views of self-regulated learning and problem-solving will need to be discussed.

VYGOTSKY ON SELF-REGULATION

It would probably not be exaggerating to state that the mastery of own cognitive processes (i.e. cognitive self-control) is one of the cornerstones, if not *the* cornerstone, of Vygotsky's entire theoretical system. As Rohrkemper (1989) has pointed out, this basic tenet of his was partly inspired by Marxist thinking. As a matter of fact, Marx had already defined consciousness as an active constructor of experience, that also organized and controlled the individual's own behaviour. For Marx, the ability to plan and direct one's activity was peculiar to humans (see Rohrkemper, 1989). Vygotsky for his part, tried to operationalize this principle in his analysis of developmental change. He thus tried to show that at each stage of development, children acquire the means by which they can competently affect themselves. As John-Steiner & Souberman (1978) have put it: "For Vygotsky, one of the essential aspects of development is the increasing ability of children to control and direct their own behavior, a mastery made possible by the development of new psychological forms and functions and by the use of signs and tools in this process" (p. 126). The second part of the above quote necessitates a closer look at the means by which children come to master themselves.

In Vygotsky's (1978) opinion, a fundamental distinction has to be made between elementary or natural forms of psychological processes and higher or cultural, that is, uniquely human, forms of psychological processes. While the first of these are held to be chiefly biologically determined, occurring in direct response to environmental stimulation, development extends the psychological processes of man beyond the biological dimensions of the nervous system, permitting them to incorporate artificial, or self-generated, stimulation. The change in the structure of psychological processes introduced by the use of self-generated stimulation, is also described as a transition from non-mediated to mediated activity. According to Vygotsky (1978), all higher psychological processes imply that a direct response to the task set before the organism, characteristic of elementary processes, has been substituted by a complex, mediated act, where "the direct impulse to react is inhibited, and an auxiliary stimulus that facilitates the completion of the operation by indirect means is incorporated" (p.40). Moreover, this incorporation of "a second order stimulus", serving as an intermediate link between environmental stimulation and responding, demands an active engagement on the part of the individual (ibid.).

In his attempt to specify the nature of these mediating stimuli, actively drawn

into psychological processing by the individual himself, Vygotsky (1978) likened them to material tools, mediating control of the external world. Quite unlike material tools, however, the artificially formed, self-generated stimuli ("psychological tools") involved in higher psychological processes are "means of internal activity aimed at mastering oneself" (ibid., p. 55). In other words, psychological tools are internally oriented; they operate on the individual and his cognition, not the environment.

Although they were not seen as fully exhausting the concept of psychological tools, Vygotsky's (1978) further discussion centred upon the instruments of individual thought that were of a semiotic nature, that is, consisted of various sign systems (see also, Kozulin, 1986). Among these, the human language stood in a class by itself. Thus, it is mainly through the mediation by human language, with the various ways it is used and the various types of speech, that the higher psychological processes are formed and maintained. Accordingly, it is through this exceptional, most important form of sign-using activity that individuals come to control and direct their own cognition and, in turn, overt behaviour. Vygotsky (1978) claimed that, with the help of speech, individuals "acquire the capacity to be both the subjects and objects of their own behavior" (p. 26).

Much of Vygotsky's work focused on how children gradually gain active control over initially passive cognitive processes through the sign-using activity of human speech. Most notably, he discussed how speech becomes a pervasive and profound part of perception, attention, and memory, converting the non-mediated, basic forms of these processes into speech-mediated, higher forms.

Concerning perceptual development, for example, Vygotsky (1978) described the liberation from the stimulus-bound stage of natural perception made possible by speech-mediation. More specifically, verbal labelling enables even the young child to single out separate elements, "thereby overcoming the natural structure of the sensory field and forming new (artificially introduced and dynamic) structural centers" (ibid., p. 32). This implies that, before long, a "child begins to perceive the world not only through his eyes but also through his speech" (loc. cit.). Beyond verbal labelling, Vygotsky (1978) also mentioned more complex forms of verbalized perception, that is, where speech has acquired a synthesizing function as well. Finally, he ascertained the conceptual nature of higher forms of perception (ibid.).

To Vygotsky (1978), the ability to create new structural centres in the perceived situation, by means of the indicative function of words, also seemed to be the starting-point of the child's mastery of his own attention. However, in addition to reorganizing the present perceptual field the speaking child is capable of creating a "time field", which means that he "can view changes in his immediate situation from the point of view of past activities, and he can act in the present from the viewpoint of the future" (ibid., p. 36). Through this notion of a "time field", Vygotsky (1978) wanted to emphasize that an individual's attentional field comes to incorporate not only selected parts of his present perceptual field, but elements of past and potential (i.e. future) perceptual fields as well. In this sense, an individual's attentional field extends both backward and forward; an extension made possible through verbal representation of past and future situations and activities. Briefly

stated, this notion of mature attention as involving a whole series of successive (perceptual) structures, each created with the help of speech, seems to coincide with a conception of the individual as a single information-processing system, incorporating effective elements of the past, present, and future in successful problem-solving.

According to Vygotsky (1978), synthesizing elements of the past and the present into one attentional field demands a basic reconstruction of memory as well. Again, speech-mediated memory may be conceived of as the superstructure of a non-mediated form of processing, extending memory beyond the natural ability of the human brain. The fundamental distinction between primitive and more advanced forms of memory is contained in the following statement: "In the elementary form something is remembered; in the higher form humans remember something" (Vygotsky, 1978, p. 51). The fact that humans may actively employ "linguistic tools of thought" in the process of remembering, also led Vygotsky to conclude that, for the mature person, "to recall means to think"; his memory has become a "logical" or "logicalized" memory (loc. cit.). However, it should be mentioned that Vygotsky (1978), as regards memory, gave several examples of how individuals may actively remember something with the help of non-verbal signs. In everyday life this is clearly illustrated by simple operations such as the tying of knots as a reminder; in experimental settings by children's use of external stimuli such as coloured cards, pictures, and figures to mediate their memory instrumentally (ibid.).

In addition to the transformation of elementary perception, attention, and memory into complex, sign-mediated (i.e. higher) psychological processes, Vygotsky (1978) described how the incorporation of signs (speech) into various kinds of problem-solving may lead to their reorganization along entirely new lines. This applies to both problem-solving of a practical and of a more theoretical nature, the essential change being that impulsive and spontaneous solutions are replaced by solutions where linguistic reflection creates a cognitive barrier between the presentation of a task and the individual's final response.

A few words concerning Vygotsky's notion of functional learning systems are also appropriate in this context. In fact, he not only considered the transformation of elementary processes into higher-order processes by means of speech-mediation. Of even more importance was the integration of higher psychological processes into new combinations and complexes, thereby forming so-called functional systems. Hence, in addition to organizing separate psychological processes in the course of development, speech, in Vygotsky's opinion, acts to unify and integrate many disparate aspects of individuals' behaviour, such as perception, attention, memory, and problem-solving.

The details of Vygotsky's theory of the transformation of elementary psychological processes into higher psychological processes, and eventually functional systems, are not of great importance for our present purpose. It should be clear by now, however, that for Vygotsky cognitive development, more than anything else, involved development toward increasing control or mastery of own cognitive processes. Nor should there be any doubt that Vygotsky considered the sign-using activity of human speech to be the key mechanism whereby individuals achieve deliberate or voluntary control of their own cognition. Moreover, in a Vygotskian

perspective the stage of effective self-regulation is not reached until the individual is able to control his own cognition with the help of inner speech (cf. Zimmerman, 1989). Preceding this stage, however, is the stage of external speech control. In the following, the process of development of self-regulation in terms of internalization will be discussed.

As Kozulin (1986) has pointed out, human speech plays a double role in Vygotsky's developmental theory. On the one hand, it is a psychological tool that helps to organize other cognitive processes; on the other hand, it is one of these processes itself, undergoing the same kind of development. This means that the final stage in the development of cognitive processes, the "ingrowth" stage, where the entire operation of mediated activity takes place as a purely internal process, corresponds to a stage in speech development that is characterized by inner, soundless speech (Vygotsky, 1986). Concurrently, inner speech may be seen as the chief medium through which other cognitive processes reach the stage of internal mediation. The stage in cognitive development preceding the stage of internal mediation is, according to Vygotsky (1978, 1986), characterized by reliance upon external signs (i.e. external mediating operations). In speech development this stage is characterized by "egocentric" speech.

What Piaget had called "egocentric" speech, Vygotsky (1986) thus considered to play an important role in the child's regulation of his own cognition. Consisting of words spoken aloud in the presence of others, this kind of speech resembles social or communicative speech, but does not require a response or even the attention of a listener. In contrast to Piaget (1959, 1969), who had described egocentric speech as a useless accompaniment to the child's activity, Vygotsky (1986) maintained that, far from being a thing like that, egocentric speech "serves mental orientation, conscious understanding; it helps in overcoming difficulties; it is speech for oneself, intimately and usefully connected with the child's thinking" (p. 228). This conclusion was, in part, based on the observation that the relative amount of egocentric speech increased in relation to the difficulty of the problem a child was set to solve (ibid.). When preschool children were facing difficult and frustrating situations, the Vygotsky-group could actually demonstrate that the coefficient of egocentric speech almost doubled, that is, in comparison with Piaget's normal figure for the same age and also in comparison with their own figure for children not facing problems. This convinced Vygotsky (1986) that "the child would try to grasp and to remedy the situation in talking to himself" (p. 30) [1].

Among the self-regulatory functions ascribed to egocentric speech, Vygotsky and his collaborators seem to have concentrated especially on its role in *planning* the solution of a problem. It was thus demonstrated that at a certain stage in the child's development, his problem-solving becomes the carrying out of a verbal self-instruction (Levina, 1982). Verbal planning is now directing his problem-solving activities. According to Levina (1982), this line of research also explored stages of development preceding the stage of intelligent planning. This development was both studied in a situation where children should solve a practical problem with the help of (material) tools, and when they were working on a series of memory problems. It was shown that before taking on a directing, planning function, egocentric speech

plays a "gnostic" role in the child's problem-solving, permitting him to acquaint himself with, or gather information about, his environment (Levina, 1982). Immediately before verbal planning enters into the child's problem-solving, egocentric speech usually takes the form of concluding statements, that is, a sort of verbal reflection or summary of the activity carried out on a non-verbal plane. Levina (1982) ascertained that these 'concluding remarks' seldom reflect the details of the child's activity. Rather the essence, the abstract schema of the activity, is reflected in the child's speech. This occupation with the essential aspect of an operation is also present in the succeeding stage of verbal planning, stated Levina (1982), the only difference being that the basic structure of the operation is now identified in advance. Finally, Levina's (1982) account of these experiments, aimed at understanding the function of egocentric speech, certifies that the first and most frequent planning utterances appear in the more difficult problem situations. In such situations, the child's effort is characterized by a kind of two-phased structure, consisting of verbal planning and overt activity. This means that the child's problem-solving is no longer impulsive; it is prepared by means of verbal planning, putting a cognitive layer between the task stimulus and the child's response to it (cf. Levina, 1982). Not least important, with the appearance of verbal planning, children in these experiments succeeded in efficiently solving the tasks set before them (ibid.).

Vygotsky (1986) emphasized that egocentric speech, in taking on a directing, planning function, is "raising the child's acts to the level of purposeful behavior" (p. 31). On this level, the child is preoccupied with the nature of the solution of a task, strives to solve it, and is capable of breaking the operation into its separate parts, each of which becomes an independent problem that he formulates for himself with the help of speech (Vygotsky, 1978). Moreover, the verbalization of a purpose, implying intentionality on the part of the individual, makes it meaningful to describe his activity as deliberate or voluntary (see also, Levina, 1982). Voluntary activity, in Vygotsky's (1978) opinion, may well be the most unique feature of human psychology.

In brief, Vygotsky and his co-workers persistently claimed that egocentric speech soon becomes an instrument of thought in the proper sense. It not only involves the preplanning of problem-solving activity, but becomes an agent for planning-in-action as well (cf. Brown, 1987). Thus, during an ongoing attempt to solve a problem, the child continually directs, guides, and organizes his problem-solving activity with the help of egocentric speech, thereby submitting his own cognition to deliberate or voluntary control.

Concerning the fate of egocentric speech in the child's cognitive development, Vygotsky (1986) assumed that "the same mental operations that the preschooler carries out through voiced egocentric speech are already relegated to soundless inner speech in schoolchildren" (p. 30). While Piaget had claimed that egocentric speech dies off or atrophies, in Vygotsky's (1986) opinion, the quick drop in egocentric speech observed at the beginning of school age rather means that it "goes underground", that is, "turns into inner speech" (p. 33). Thus, egocentric speech is speech on its way inward, constituting the basis of inner speech. Already speech-for-

oneself, and playing a decisive role in the child's thinking, egocentric speech shares structural and functional features with inner speech. According to Vygotsky (1986), the structural and functional peculiarities of egocentric speech, distinguishing it from social or communicative speech (speech-for-others), become more marked as the child develops. Only its vocal aspect fades away:

> With the progressive isolation of speech for oneself, its vocalization becomes unnecessary and meaningless and, because of its growing structural peculiarities, also impossible. Speech for oneself cannot find expression in external speech. The more independent and autonomous egocentric speech becomes, the poorer it grows in its external manifestations (ibid., p. 230)

However, the downward curve of egocentric speech also indicates the progressive development of inner speech: "The decreasing vocalization of egocentric speech denotes a developing abstraction from sound, the child's new faculty to 'think words' instead of pronouncing them" (loc. cit.).

Inner speech, in contrast to the grammatically correct communicative speech, is more economical. Above all, it is governed by a predicative syntax, which means that the subject of a sentence and all words connected with it are omitted. Inner speech, according to Vygotsky (1986), "is speech almost without words" (p. 244). And: "Inner speech is to a large extent thinking in pure meanings" (ibid., p. 249). However, even on the semantic plane, inner speech has got its peculiarities. The first and basic one of these is the preponderance of the *sense* of a word over its *meaning*. While word meanings refer to 'literal' meanings or generalized concepts, "constituting significant *social* realities" and "serving as jointly endorsed 'standards of correctness' in everyday discourse" (Rommetveit, 1990, pp. 93–94), word senses depend on the contexts in which words appear. Thus, the sense of a word is a more personalized phenomenon than meaning, signifying "the sum of all the psychological events aroused in our consciousness by the word" (Vygotsky, 1986, p. 244). Other semantic peculiarities of inner speech concern word combination and the development of a kind of idiom, difficult to translate into the language of ordinary communicative speech (ibid.).

Speech-for-oneself in its full-fledged form still remains speech, that is, thought connected with words. Just the same, inner speech may be seen as the opposite of external speech. External speech involves the turning of thought into words, whereas inner speech involves the turning of words into thought (Vygotsky, 1986).

It is to be hoped that this discussion of self-regulation has clarified that the metacognitive issues considered by Brown (1987) under the headings of "executive control" and "self-regulation" have been thoroughly and coherently dealt with in Vygotsky's theory of cognitive development (see also, Bråten, 1991), and, moreover, that a Vygotskian perspective of these issues is distinguished by its emphasis on language, that is, individualized verbal thought, as a means of controlling and/or regulating one's own cognition. Eventually transferred to an inner plane of functioning, language still plays an important role in thinking, mediating and directing the individual's cognitive endeavours. However, another distinguishing feature of a

Vygotskian view of metacognitive control has not yet been discussed in this context. This is related to Vygotsky's emphasis on social interactions between adults and children as a vehicle for conveying and internalizing linguistic self-regulation. Hence, the time has come to elaborate the fourth metacognitive issue discussed by Brown (1987); "the transference from other-regulation to self-regulation".

THE SOCIOCULTURAL BASIS OF SELF-REGULATION

Vygotsky's theory acknowledges that the sign system of human language has a supraindividual or objective existence. It is a bearer of human culture, belonging to the cultural world, and evolving during the course of the cultural-historical development of society. As a tool of thought existing outside the individual, language is "created by society over the course of human history and changes with the form of society and the level of its cultural development" (Cole & Scribner, 1978, p. 7). However, this culturally produced sign system has an individual existence as well; it belongs to the mind of a particular person; it is responsible for his ability to mediate and regulate his own behaviour. The sign system of language is thus a means by which individual activity and individual consciousness are socially determined. Davydov & Zinchenko (1989) have stated that, in Vygotsky's theory, "the incorporation of signs into the structure of a mental function (mediation through signs) links that function to culture" (p. 33).

Of course, Vygotsky was not content to ascertain that the means of individual developmental change is rooted in society and culture. It was a challenge to his analytic intellect to explain *how* culture becomes a part of each person's nature; *how* culture invades the mind, as it were. In his approach, he tried "to link social, symbolic, and mental processes and to view the mind of the individual within the context of its dependence on the sociocultural environment" (Tulviste, 1989, p. 39). This was made possible by the fact that language, in addition to its existence as a social device, is a means of communication between people. Through his interpersonal communication with more mature individuals, the child gradually transfers social, collaborative forms of behaviour to the sphere of inner-personal psychic functions. First of all, this implies that actual relations between human individuals (joint activity) underlie the development of higher psychological processes, that is, development is a profoundly social process. Then, it implies that the social, collective activity of the child is individualized and internalized to the extent that this (joint) activity is mediated by human language. In other words, the development of higher psychological processes in the child is essentially an individualization and internalization of linguistically coded, social interaction. The means used and the solutions reached by the adult and the child in verbal cooperation gradually become an integral part of the child's own thinking. Vygotsky (1978) wrote that when socialized speech is turned inward, language "takes on an *intrapersonal function* in addition to its *interpersonal use*" (p. 27). He continued:

> When children develop a method of behavior for guiding themselves that had previously been used in relation to another person, when they organize

> their own activities according to a social form of behavior, they succeed in applying a social attitude to themselves. The history of the process of *the internalization of social speech* is also the history of the socialization of children's practical intellect. (loc. cit.)

It seems clear, then, that Vygotsky held the developmental sequence of the two functions of language, communication with others and self-regulation, to be from social or interpersonal to self-regulatory or intrapersonal. Logically, he classified egocentric speech as a link in the transition from an interpersonal to an intrapersonal use of language. Thus, with the emergence of egocentric speech

> ... the child starts conversing with himself as he has been doing with others. When circumstances force him to stop and think, he is likely to think aloud. Egocentric speech, splintered off from general social speech, in time leads to inner speech, ... (Vygotsky, 1986, p. 35)

This transition from interpersonal to intrapersonal communication was nicely illustrated in connection with the planning function of egocentric speech. According to Vygotsky (1978), when a child verbally appeals to another person for help during problem-solving, he indicates that he, in fact, has formulated a sort of plan to solve the task, but is unable to perform all the necessary operations. Such experiences may contribute to the independent formulation of more adequate plans (ibid.). At a later stage in the development of self-regulatory verbal planning, the child may turn to another person and explain what he intends to do before he actually performs the activity. In this way, planning-for-others precedes planning-for-oneself (cf. Levina, 1982). Eventually, when verbal planning loses its external manifestation, the transition from overt dialogue to internal dialogue is fulfilled (ibid.).

As Davydov & Zinchenko (1989) have pointed out, a Vygotskian perspective holds that "education and upbringing are means of organizing the process of man's assimilation of sociohistorically developed capacities, which are reproduced by the individual in the course of his mental development" (p. 32). Educational influence, then, is regarded as a necessary and universal aspect of individual development (cf. Vygotsky, 1978). Considering the great importance attached to social-linguistic interaction within Vygotsky's developmental theory at large, it stands to reason that he emphasized the dialogical character of effective instruction. As indicated in the previous paper of this series (Bråten, 1991), this is also the basic tenet of Vygotsky's notion of "the zone of proximal development". Initially, the learner may need assistance from his dialogue with the teacher to solve certain problems. This, in turn, will probably enable him to regulate this kind of problem-solving on his own, without need for any dialogical 'scaffolding'. In Vygotsky's (1978) words: "... what is in the zone of proximal development today will be the actual developmental level tomorrow—that is, what a child can do with assistance today she will be able to do by herself tomorrow" (p. 87).

Recently, Rohrkemper (1989) has summarized Vygotsky's so-called cultural-historical approach in the following way:

> ... Vygotsky went beyond the biological processes that he believed to

> dominate only at birth and examined the individual's mediation of experience, an experience that is at once cultural—in that it represents socially structured tasks and tools—and historical, in that it reflects the 'storehouse' of what we today call 'semantic knowledge' (language-based information), 'learning to learn' strategies and procedures (e.g., rehearsal, elaboration), and 'metacognitive awareness' (conscious monitoring of one's cognitive strategies). (Rohrkemper, 1989, p. 145)

Explicitly relating Vygotsky's approach to contemporary metacognitive notions, Rohrkemper (1989) also testifies to the extraordinary timeliness of his theory. On this point, she is in full agreement with the author of this article.

THE RELATIONSHIP BETWEEN AWARENESS AND CONTROL IN VYGOTSKY'S THEORY

Zimmerman (1989) has asserted that all models of self-regulated learning, including the Vygotskian one, assume that learners are aware of the potential usefulness of self-regulatory processes in enhancing their cognitive performance. Nevertheless, in his brief introduction to Vygotskian views of self-regulation, he has advanced the notion that Vygotsky himself devoted relatively little attention to self-awareness. He admits, however, that Vygotsky, in discussing the instrumental (i.e. self-regulatory) function of egocentric speech, maintained that "egocentric speech is a manifestation of the process of becoming aware" (ibid., p. 18).

Zimmerman's (1989) statement that Vygotsky did not have much to say about the role played by self-awareness in learning and problem-solving, may seem somewhat hasty. After all, one of Vygotsky's main projects during his short life in science was to restore the legitimacy of the concept of consciousness in human psychology (cf. Kozulin, 1986). It is difficult to see, moreover, how any close reading of Vygotsky's writings could possibly prove Zimmerman's (1989) assertion on this point. On the contrary, it will be argued in the following that Vygotsky gave considerable emphasis to the individual's conscious understanding of his own cognition, and that this kind of self-awareness was regarded as intimately connected with his self-regulatory activities.

In *Thought and Language* (1986), the issue of self-awareness in children's cognition enters Vygotsky's discourse in two different contexts. First, as has been noted by Zimmerman (1989), it is briefly mentioned in the context of Vygotsky's polemics with Piaget concerning egocentric speech. Secondly, it is more thoroughly discussed in the context of Vygotsky's studies of concept formation in children and adolescents.

As was mentioned earlier, Vygotsky's own observations indicated that children's egocentric speech increased when faced with difficulties. Vygotsky (1986) interpreted this as support for the premise that "an impediment or disturbance in an automatic activity makes the author aware of this activity" (p. 30). And: "... speech is an expression of that process of becoming aware" (loc. cit.). In accordance with this point of view, Vygotsky also stated that egocentric speech "serves conscious

understanding"; it increases when "consciousness and reflection" is demanded of the child (ibid., p. 228). These passages alone may indicate that Vygotsky stressed the importance of the individual's conscious understanding of a problem and the operations necessary to solve it, as well as the link between this understanding and the production of self-regulatory activity (e.g. egocentric speech).

In the context of his studies of concept formation, Vygotsky (1986) proceeded to describe how the psychological processes of memory and attention develop into voluntary or deliberate processes; that is, become higher psychological processes. He concluded:

> One may say that both attention and memory becomes 'logical' and voluntary, since the control of a function is a counterpart of one's consciousness of this function. Intellectualization of a function and voluntary control of it are just two moments of one and the same process of the formation of higher mental functions. (ibid., pp. 166–167)

Concerning concept formation, another speech-mediated, higher form of psychological activity, Vygotsky (1986) assumed the individual to become conscious of his own conceptual operations *and* to master (govern) them at a somewhat later stage in cognitive development. For example, in his account of the transitional character of adolescent thinking, Vygotsky (1986) argued that the individual's lack of stateable knowledge about his concepts coexists with problems of transfer. Thus, the adolescent encounters an obstacle "when he tries to apply a concept that he has formed in a specific situation to a new set of objects or circumstances" (ibid., p. 141). Even when the individual has become able to formulate his conceptual understanding in words, he may initially experience some problems in transferring conceptual operations to new concrete situations (ibid.).

As to the question of how the individual eventually reaches both reflective awareness and deliberate control of his own cognition, Vygotsky (1986) focused the schoolchild's transition to verbalized self-observation (introspection). This implies, according to Vygotsky (1986), that the child perceives his own cognitive processes as meaningful, that is, in a generalized fashion. Moreover: "The shift to a new type of inner perception means also a shift to a higher type of inner activity, since a new way of seeing things opens up new possibilities for handling them" (ibid., p. 170). The child is now able to abstract a certain process from the totality of cognitive activity, to focus it as such, and to use it in a new and more mature way. Thus, for Vygotsky (1986), the child's conscious awareness of a cognitive process, his ability to perceive it as a process of a certain kind, such as memory, also enables him to control or regulate this very process.

That Vygotsky posited a close connection between knowledge about cognition and control of cognition may further be evidenced by his study of "complex choice reactions", reported in *Mind in Society* (1978). Thus, it was suggested that children unable to control their own problem-solving effectively with the help of signs, did not know enough about their own capacities and limitations. Nor did they know enough about task variables: "They operate with complex tasks in the same way they operate with simple ones" (Vygotsky, 1978, p. 71). In this context, Vygotsky

(1978) ascribed children's lack of knowledge to insufficient experience with the task in question: "Just as naive physical knowledge is acquired as the child operates with objects, knowledge of psychological operations is acquired as the child strives to carry out the choice reaction task" (p. 71). This "knowledge of psychological operations" may, in turn, lead to an effective organization of his problem-solving activity (ibid.). Finally, on the basis of this study Vygotsky (1978) indicated that the child's understanding of external mediation may be seen as a prerequisite of his transition to the stage of internal mediation.

So far it has been indicated that Vygotsky held the individual's adoption of verbalized self-observation, as well as his experiences with systematic learning and problem-solving, to be important determinants of both reflective awareness and effective self-regulation. These determinants may, however, be seen as secondary to the effect of school instruction. School instruction, according to Vygotsky (1986), "induces the generalizing kind of perception and thus plays a decisive role in making the child conscious of his own mental processes" (p. 171). Moreover, the most important learning task introduced by the school in this respect, concerns the learning of "scientific concepts" (ibid.).

In contrast to "spontaneous concepts", rooted in, and spontaneously formed on the basis of, the child's concrete experience of everyday life, Vygotsky (1986) held "scientific concepts" to be products of systematically organized learning in an educational setting. Tulviste (1989) has pointed out that "a scientific concept", in Vygotsky's thought, "means not simply a higher level in the development of the units of verbal thinking, but a unit that is functionally intended for use in the intellectual operations specific to science" (p. 43). In any case, Vygotsky (1986) assumed that scientific concepts, "evolving under the conditions of systematic cooperation between the child and the teacher", involve a higher level of conscious understanding, as well as an ability to use concepts "freely and voluntarily" (p. 148). Such (metacognitive) competence is, in turn, supposedly transferred to operations with spontaneous concepts, and to other areas of cognition (ibid.).

Tulviste (1989) has linked Vygotsky's notion of scientific concepts to the concept of decontextualization. Essentially, scientific concepts are verbal signs that are freed from concrete objective contexts, that is, "they are freed so that they may enter into the new contexts and operations of thought that are characteristic of science" (pp. 40–41). Hence, the learning of scientific concepts may be seen as introducing the child to verbal instruments appropriate for the mediation and regulation of own cognitive processes across situations and problem types. Indeed, this notion of decontextualization of verbal mediators corresponds with Vygotsky's (1986) assertion that the cognitive prerequisites for instruction in different school subjects are to a large extent the same. He stated: "... the main psychic functions involved in studying various subjects are interdependent—their common bases are consciousness and deliberate mastery, the principal contributions of the school years" (p. 186). As the last part of this quote indicates, Vygotsky not only regarded transsituational knowledge and skills as prerequisites for learning in school; they were the products of learning any school subject as well. This view is in accordance

with his basic conception of a dialectical relationship existing between development (maturation) and learning of higher psychological processes.

A few words are in order here concerning Vygotsky's views of so-called automatic self-regulation. In the context of memory development, for instance, Vygotsky (1978) repeatedly stated that late stages of memorizing, characterized by internal mediation, indeed may seem identical with early stages, characterized by an unmediated (direct) process. However, as development proceeds "not in a circle but in a spiral", this identity "is only illusory" (ibid., p. 56). In the advanced stages of memory development, then, the memory process is still regarded as mediated; the main difference being that a new and higher level of sign-using activity is involved. Moreover, in her report on the planning function of speech, Levina (1982) pointed out that when a child eventually has internalized his verbal mediators, stimulating the use of external mediation may actually impede his problem-solving.

The issue of automatic self-regulation is also inherent in Vygotsky's (1978) discussion of the problem of "fossilized behavior". According to Vygotsky (1978), higher psychological processes that have eventually become automated or mechanized, create great difficulties for psychological analysis. These difficulties are related to the above mentioned outer (phenotypic) similarity with the first or primitive stages of the same processes. Thus, the only way to study the highest stage in the development of cognitive processes is to focus "the very *process* by which higher forms are established" (ibid., p. 64). For example, "the researcher is often forced to alter the automatic, mechanized, fossilized character of the higher form of behavior and to turn it back to its source through the experiment" (loc. cit.).

In short, it seems clear that Vygotsky acknowledged a stage in development where the individual's regulation of his own cognition is carried out on an automatic level. This highest stage is reached when the self-regulatory mechanisms used by the individual have been fully internalized, and it should not be mistaken for the early stages of non-mediated activity, that is, where the individual's learning and problem-solving are confined exclusively to the plane of action. Thus, within a Vygotskian perspective, self-regulation-like phenomena occurring before the individual's cognitive activity has been reconstructed on the basis of sign operations, should definitely not be regarded as higher forms of psychological activity. Today, it may seem equally misleading to conceive of them as part of the metacognitive domain.

VYGOTSKY ON THE RELATIONSHIP BETWEEN COGNITION AND METACOGNITION

In Vygotsky's (1986) opinion, awareness and deliberate control of a cognitive process appear only during an advanced stage in the development of that process, after it has been used and practised unconsciously and spontaneously for a long time. He thus stated that "in order to subject a function to intellectual and volitional control, we must first possess it" (ibid., p. 168).

At school start, for example, the child possesses the processes of attention and memory in a fairly mature form. These processes he will next learn to subject to

conscious control. Indeed, the schoolchild is "growing steadily in awareness and mastery of such functions as memory and attention" (ibid., p. 167).

This situation is not limited to the development of memory and attention, however. Rather, it is the general law of development, the rule in the cognitive development of the child, that consciousness takes possession of cognitive processes, but does not create them (ibid.). According to Vygotsky (1986), this developmental course is obvious in the case of conceptual thinking: "Thus, the child begins to operate with concepts, to practice conceptual thinking, before he is clearly aware of the nature of these operations. The concept-in-itself and the concept-for-others are developed in the child earlier than the concept-for-myself" (p. 124).

Vygotsky (1986) also maintained that genuine concepts are formed relatively late in the child's cognitive development. This, in turn, enabled him to explain why the child cannot define his concepts in words or operate with them at will, although cognitive processes such as perception, attention, and memory have long been the objects of conscious understanding. If the child were able to become conscious of and to control his conceptual operations parallel to his formation of the same concepts, "it would indeed be a miracle" (Vygotsky, 1986, p. 169).

Concepts that still confront a deficit of conscious and volitional control, may, however, find this control in the zone of proximal development, that is, in the child's cooperation with adults (ibid.).

Concerning the issue raised in this section, Vygotsky's discussion may well be considered somewhat beside the question of what is meta and what is cognition, repeatedly asked in contemporary metacognitive literature (cf. Bråten, 1991). His views may, however, be seen as corresponding with the notion that metacognitive competence actually presupposes the existence of specific, task-relevant cognitions in the individual's repertoire (cf. Bråten, 1990). In terms of training, moreover, Vygotsky's theorizing may be interpreted as support for the notion that teaching metacognition is more or less wasted, unless more specific cognitive processes (strategies) are already available to the individual. Alternatively, metacognitive components should be taught in conjunction with these processes.

CONCLUSION

As the preceding discussion has shown, Vygotsky's developmental theory is highly relevant to issues raised in contemporary metacognitive research (cf. Bråten, 1991). Not least does this apply to his treatment of self-regulated learning and problem-solving. Vygotsky thus described how the individual comes to control his own cognition, conferring special status to planning through the organization of an integral activity. Moreover, Vygotsky specified how self-regulatory activities are rooted in a cultural-historical process and transferred to the individual through his social interactions. The glue in this theory of self-regulation, as it were, is definitely the sign system of human language. In the process of development, this cultural-historical product is eventually remodelled into the self-regulatory mechanism of inner speech. Necessary connecting links in this remodelling are held to be

interpersonal communication (verbal cooperation) and overt verbal self-regulation (i.e. egocentric speech).

It may seem clear, then, that the topics discussed by Brown (1987) under the headings of executive control, self-regulation, and other-regulation, all pertaining to metacognitive control (cf. Bråten, 1991), are integral parts of Vygotsky's developmental theory. As has been shown, this integrity is reached through Vygotsky's preoccupation with the multiple functions of human language. At the same time, his focus on the linguistic tools of thought results in a rather unique solution to the problem of metacognitive control. The following quote Zimmerman (1989): "... Vygotsky's theory is distinctive from other views of self-regulation ... by its emphasis on linguistically mediated social agents in children's development and in the functional role of inner speech" (p. 17).

Enduring questions concerning the status of verbal reports as data may, according to Brown (1987), be seen as pertaining to the issue of knowledge about cognition in contemporary metacognitive literature (see also, Bråten, 1991). It has been demonstrated here, however, that even this piece of the metacognitive problem space may be traced back to Vygotsky's theory of cognitive development. Thus, in Vygotsky's work, emphasis is given to the individual's conscious understanding of his own capacities and limitations, task variables, and specific cognitive processes. But even more important is Vygotsky's conception of the relationship between this kind of self-awareness and self-regulatory activity. The prevailing view in contemporary metacognitive literature is that of a distinction between knowledge about cognition and control of cognition (cf. Bråten, 1991). Clearly, this dominant view is challenged by Vygotsky's assertion that the two phenomena are inseparable aspects of higher forms of cognitive functioning. It may be argued, moreover, that the unity missing in modern metacognitive theorizing, is present in Vygotsky's theory just because of his concentration on the central role played by language in mediating cognitive performance. Thus, if an individual plans, directs, and organizes his learning and problem-solving with the help of word meanings, reflective access to his cognitive resources may indeed seem to be an integral part of the process. In the light of this, nor would it be feasible within a Vygotskian perspective to distinguish between the two aspects of metacognition as regards their transsituational or context-free character (Campione, 1987). There seems to be no doubt, however, that the conception of metacognition as a relatively transsituational (decontextualized) form of competence may find support in Vygotskian theory (cf. Bråten, 1991).

Finally, it bears repeating that a Vygotskian perspective of self-regulated learning and problem-solving does not deny that self-regulatory activities may be carried out automatically. To the extent that these self-regulatory activities are late versions of conscious and purposeful forms of self-regulation, they may still be considered part of the metacognitive domain. As they are not readily available to verbalized self-observation, attempts to study such activities may well lead metacognitive researchers to the somewhat simplistic conclusion that control of cognition is generally less stateable than is knowledge about cognition (cf. Bråten, 1991).

NOTE

[1] It should be added that Piaget, in his comments supplementing the first English edition of *Thought and Language* (Cambridge, MA, MIT Press, 1962), found himself in agreement with most of Vygotsky's hypotheses concerning egocentric speech. According to Piaget, his own interest in the phenomenon had been limited to the aspect of cognitive egocentrism, that is, the inability to shift cognitive perspective and cooperate with others on the cognitive plane. As Vygotsky and Piaget originally viewed the phenomenon from quite different theoretical perspectives, Vygotsky's (1986) polemics with Piaget concerning egocentric speech may seem to be rooted in some kind of pseudo-disagreement.

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