

#### 14. RETHINKING PROTOCOL ANALYSIS FROM A CULTURAL PERSPECTIVE

Peter Smagorinsky

Some form of verbal report—that is, a research participant’s concurrent or retrospective verbal account of thought processes during problem-solving activities—has been used throughout this century as the data base from which psychologists have developed theories of human mentation. Newell and Simon (1972) and Ericsson and Simon (1980, 1993) have provided extensive justification for use of one such method, *protocol analysis*, to investigate cognition from an information processing (IP) perspective. They have characterized protocol analysis as a methodology capable of providing evidence of the cognitive processes used when people attend to information stored in short term memory (STM) in order to solve problems. Cultural-historical activity theory (CHAT), with its concern for the mediation of human development by culturally- and historically-grounded signs and tools based on the work of Vygotsky (1987), Leont’ev (1981), and others, suggests a different view of protocol analysis. In this chapter I outline a CHAT perspective that accounts for protocol analysis along three key dimensions: (a) the relationship between thinking and speech from a representational standpoint; (b) the social role of speech in research methodology; and (c) the influence of speech on thinking during data collection. The purpose of this discussion is to illustrate how use of verbal reports can be viewed through a CHAT lens and to identify alternative assumptions necessary to use it from a CHAT perspective.

---

When I was a graduate student in the 1980s, I undertook the study of writing processes that follow from different approaches to composition instruction (see Smagorinsky, 1989a, 1989b, 1991, 1992, 1994). The method of choice for studying thought processes at the time was *protocol analysis*. My work, like virtually all use of protocol analysis at the time, was grounded in information processing (IP) theory, particularly as outlined in Ericsson and Simon’s (1978, 1979, 1980, 1984/1993) extensive justification of using verbal reports to study

cognitive processes. Throughout their work, they provide a detailed and empirically-supported rationale for using both concurrent and retrospective protocols to build models of cognition, addressing and refuting challenges to both IP and protocol analysis that came from a variety of perspectives. Their account of protocol analysis provided the foundation for a whole field of study and established information processing as an important theoretical perspective for understanding how people think as they work.

Along with many others in the field of literacy studies, I experienced a shift during the 1990s from an emphasis on what happens within the head to an effort to understand the role of context in cognitive processes. The work of cultural psychologists and linguists such as Cole (see Newman, Griffin, & Cole, 1989), Hymes (1974), Moll (1990), Rogoff (1991), Wertsch (1985, 1991), and other modern interpreters of Vygotsky (1978, 1987) caused me to reconsider some aspects of information processing theory. In effect, these cultural psychologists shifted attention from internal cognitive processes to what IP theorists call the *task environment* of cognition and its influence on how cognitive frameworks develop. Using a framework variously known as cultural-historical, sociocultural, or sociocognitive, these theorists' view of the task environment was fundamentally historical, seeking to understand how cultures develop value-laden social practices, artifacts, and institutions that provide frameworks for thinking. The study of cognition, from this perspective, cannot be isolated from its social and cultural relationships. Rather, cognitive processes are viewed as a consequence of cultural practices which therefore vary according to the values and activities of different cultural groups. From this perspective, cognition is not something that is strictly internal, to be studied by efforts to disinter its functions from the confines of the skull.

I thus was faced with a dilemma. I continued to respect and draw on the work of IP theorists, including a number who used protocol analysis to study writing (e.g., Bracewell & Breuleux, 1994; Flower & Hayes, 1984) and reading (e.g., Pressley & Afflerbach, 1995). I felt that protocol analysis was well-justified within an IP perspective, particularly by Newell and Simon (1972) and Ericsson and Simon (1984/1993), and that it was a powerful tool for studying the kinds of composing processes I was interested in—not only those involved in writing (e.g., Smagorinsky, 1997), but those involved in artistic composing (see Smagorinsky & Coppock, 1994, 1995a, 1995b).

At the same time, I began to question a set of foundational assumptions made by IP theorists about the nature of speech and the nature of cognition. In my own work, I began to wonder if what I was studying was cognition as an isolated phenomenon, or cognition as socially-mediated by cultural tools, particularly speech. That is, I began to wonder if the participants, in rendering either a retrospective or concurrent protocol, were giving evidence of inner processes, as assumed by IP theory, or whether they were saying things to me that might be different from what they'd say to someone else. I began to think about my own

implication in the emergence of data, causing me to question whether I was studying cognition or interaction. Through my reflection on a series of studies conducted using some kind of protocol to study composing through either art or writing, I began to question and retheorize my assumptions about what happens during the collection and analysis of a verbal protocol. Ultimately, the question that I asked was: What do we study when we study what people say?

In this chapter I will give a brief account of some conclusions I have come to in response to this question. My views have not been received positively by key IP theorists; indeed, my original articulation of these issues (Smagorinsky, 1998) was met with a stern rebuke from Ericsson and Simon (1998). My goal with this rumination has never been to discredit their work, which I still consider to be a model of how to build a theory through empirical study. Rather, my goal is to consider how protocol analysis (or any other method of eliciting verbal data, including interviews, retrospective accounts, etc.) functions from a cultural perspective. The areas I wish to reconsider are (a) the relationship between thinking and speech from a representational standpoint; (b) the social role of speech in research methodology; and (c) the influence of speech on thinking during data collection.

### What Words Represent

A major assumption of IP theory is that the words uttered in a protocol serve as evidence from which to build models of cognition that in turn predict the unfolding of the verbal reports (Ericsson & Simon, 1980, 1993). The IP characterization of protocol analysis as a verbal *report* suggests that what is verbalized is a reasonably accurate account of something interior. Thinking aloud, argue Ericsson & Simon, “will not change the structure and course of the task processes, although it may slightly decrease the speed of task performance” (1980, p. 226).

From a cultural perspective a verbal protocol represents the speaker’s cultural conception of the word, which may or may not match the researcher’s interpretation of the protocol content. In Vygotsky’s (1987) view, the study of speech is the study of cultural history. Human consciousness is not the isolated functioning of a single mind. Rather, the mind is social; that is, the organization and process of thinking is a consequence of the ways in which a person has learned to use cultural tools, particularly speech. Words are both immediately social and historically cultural, says Vygotsky: “In consciousness, the word is what—in Feuerbach’s words—is absolutely impossible for one person but possible for two. The word is the most direct manifestation of the historical nature of human consciousness” (p. 285).

The two people described by Vygotsky do not live in isolation, but are products of culture. We can extrapolate, then, to say that the word is possible only because of the ways in which one’s predecessors have used it. Historical uses of

words, then, provide the context for the development of concepts by individual members of a culture. These concepts provide the groundwork for how to think and act in the world.

For individuals as well as cultures, word meaning reveals the conceptions that guide action. To Vygotsky (1987), words reveal the whole state of human consciousness. Word meaning is the appropriate unit of analysis for studying cognitive development because through the meanings that people attribute to words, psychologists can understand the degrees of abstraction that they have achieved in their thinking. Researchers, then, need to view artifacts, including words, as representative of cultural history and of the mediational means through which world views are represented and internalized.

Furthermore, words are fundamentally *communicative*, providing a meaning potential that is then interpreted by others according to their own culturally-learned conceptions. Understanding a protocol, then, involves understanding the web of meanings within which it is voiced and understanding the larger social goals that motivate its use. With the variance of cultural-historical traditions across both societies and idiocultures, any understanding of a verbal protocol must come through an understanding of the local social practices that mediate its production.

To achieve this understanding one needs to identify and account for the environmentally-channeled task and trajectory of an action. This premise implies that interpreting a protocol requires knowledge of the participant's cultural history, the researcher's goal-directed behavior within the conduct of the study, and the degree to which their congruence allows for words to be understood in the same way by both researcher and participant. Toward this end, Vygotsky (1987) viewed training sessions as among the most critical areas of study, for that is where researchers can "study how the subject uses the sign as a means of directing his intellectual operations. Depending on how the word is used, depending on its functional application, we are able to study how the process of concept formation proceeds and develops" (p. 128). The training period, then, is not practice, but rather provides an understanding of the participant's developing understanding of the researcher's expectations for the task.

Conducting a conventional protocol collection and analysis can thus run the risk of assuming that the researcher's understanding of words is the true understanding, and that the participant's role is to gravitate toward the researcher's conceptions. A cultural psychologist might ask a different set of questions, centering on the participant's conception of the task and how the person's prior cultural experiences have mediated that conception. A cultural psychologist would be less interested in building a cognitive model, and more interested in understanding how a participant would come to attribute particular meanings and conceptions to words. In doing so, the goal would not be to build a general cognitive model. Instead, the goal would be to understand the particularity of

someone's conceptions and the cultural practices through which they have developed.

### The Social Role of Speech in Research

The factor of cultural mediation has immediate as well as historical implications for conducting protocol analysis. Researchers have long been concerned with the issue of *reactivity*, which is the way in which a method of investigation affects the phenomena being studied (see Rosenthal, 1966). Researchers, for instance, can help shape results by anticipating preferred outcomes and subtly providing conditions that favor their development. IP researchers recognize these interaction effects and try to neutralize them through controlling both the content of the instructions to participants, which does not cue specific thoughts or actions, and the physical presence of the researcher, who is positioned behind the participant (see Ericsson & Simon, 1993).

I would argue that it is possible to change but not reduce social factors in protocol-based research. Social factors are part of any environment, even when other people are not present, due to the artifactual nature of social settings. My view is based on my understanding of Bakhtin (1981, 1984, 1986), particularly as his work has been presented by Cole (1996), Holquist (1981), and Wertsch (1985, 1991). Bakhtin proposed the concept of *dialogism* to describe the way in which word meaning is fundamentally historical and cultural. All speech has a social basis and is uttered as part of an ongoing, linked set of utterances. Speech is thus inevitably conversational in a sense, deriving from prior utterance and contributing to what follows.

Bakhtin's (1986) notion of dialogism leads him to argue that "*addressivity*, the quality of turning to someone, is a constitutive feature of the utterance; without it the utterance does not and cannot exist. The various typical forms this addressivity assumes and the various concepts of the addressee are constitutive, definitive features of various speech genres" (p. 99; emphasis added). The addressee need not be immediately present but might be distant, and might further be an indefinite other rather than a specific person. Wertsch (1991) points out that:

Ultimately, an utterance reflects not only the voice producing it but also the voices to which it is addressed. In the formulation of an utterance a voice responds in some way to previous utterances and anticipates the responses of other, succeeding ones; when it is understood, an utterance comes into contact with the "counter word" of those who hear it. Bakhtin's concern with addressivity in the utterance thus involves both a concern with *who is doing the speaking*—the fact that "the utterance has ... an author" (1986, p. 95)—and a concern with *who is being addressed*. Because any utterance entails the idea of addressivity, utterances are inherently associated with at least two voices (p. 53, emphasis in original).

Bakhtin (1984) additionally argues that, because utterance is inherently social, speech can be part of “hidden dialogicality” (p. 197) in which the speaker anticipates a listener, even if that listener is not physically present.

The notions of addressivity and hidden dialogicality suggest that the speech elicited by a protocol can be viewed as a conversational turn. My reading of Bakhtin came serendipitously during my study of the writing of a high school senior named Doug (see Smagorinsky, 1997). The protocol collection was different from that of most studies in that Doug was issued a portable cassette recorder that he kept for four months, providing protocols *in situ*. Doug’s situated use of the protocol brought out its social nature and hidden dialogicality. Although he and I rarely had personal contact, he frequently addressed me as he talked into his tape recorder while writing or thinking about his writing. At one point, for instance, he said,

I would like to take the chance to thank you for letting me do this because it is kind of neat to get my thoughts out. ... It is kind of neat to have someone to talk to like this. And after I am done with the experiment, I will keep doing this, I will keep talking in the recorder. Leave some sort of physical memory behind of me, but other than that it helps to get my voice out. It is something that I can’t always talk about to other people (p. 92).

His transcript included a number of occasions where he made comments to me in this way, illustrating the communicative role that the protocol played in his reflection on his writing.

That think-aloud protocols can potentially be influenced by the characteristics of a researcher is not a new observation. Rosenthal (1966) catalogued the seemingly endless number of interpersonal effects between researcher and participant that can affect the emergence of data, including effects based on gender, race, perceived ethnicity, researcher biases and hypotheses, and other factors. As noted, IP researchers try to neutralize these factors. From a Vygotskian perspective, it is impossible to neutralize the social context; rather, researchers can only ignore it.

Using protocol analysis from a cultural perspective, then, would require trying to understand the utterance in terms of its conversational nature. Doing so would involve an effort to understand which conversations the participant has engaged in prior to the protocol and how those conversations contribute to the kind of utterance produced in the protocol setting. Perhaps more critically, the analysis would attempt to understand the conversational partner envisioned by the participant and how the conception of that partner constrains and enables the participant to say particular things. Doug, for instance, told me in a subsequent interview that he said things during his protocol that were very personal, things he’d never say to his parents or to other teenaged boys. He viewed me as

somewhat of a confessor, a “third party” listener with whom he could share his thoughts. The content of his protocol, then, was a direct function of whom he believed himself to be addressing.

### **The Mediation of Thinking by Speech**

From an IP perspective the goal of protocol research is to use verbal reports to generate models of cognitive processes. If IP researchers are to achieve this goal, they must regard mediating influences as potential sources of contamination of the processes they are trying to infer and thus try to minimize interference and influence during data collection. These mediators include such material things as researchers and their prompts, which the researcher tries to contain through careful, theoretically-informed data collection procedures. The speech of the protocol is not viewed as having mediational potential, but rather is regarded as a representation of inner cognitive functions (also see Juffs and Gass chapters, this volume).

The goal of research from a Vygotskian perspective is quite different: to understand development as it is culturally mediated. If cultural psychologists are to achieve this goal, they must identify and understand the ways in which artifacts mediate cognitive change (Cole, 1996). Speech is the central cultural tool that serves this mediating function. The mediated nature of consciousness is an assumption from which a cultural psychologist’s work proceeds. The goal, then, is to understand the ways in which the tool of speech mediates the thinking that is studied through the collection of a protocol, and the ways in which uses of speech are mediated by other cultural means. Speech, then, is viewed in fundamentally different ways by cultural and IP researchers.

This view of speech emerges from what Wertsch (1985) identifies as the three bases for taking a Vygotskian perspective: a reliance on a genetic (i.e., developmental) method, the belief that higher mental processes are social in origin, and the claim that mental processes are mediated by tools and signs. The assumption behind this view is that psychological tools such as speech provide the means through which individuals internalize the higher mental processes central to social transactions within particular cultures. Furthermore, they provide the means through which they act on their environments. These tools not only mediate the development of higher mental processes, *they are themselves a fundamental part of those processes*. The mind, in this conception, “extends beyond the skin” (Wertsch, 1991, p. 14); that is, the mind is socially distributed and inextricably linked to the tools of mediation (Salomon, 1993). Thus the changes in consciousness that are usually the objects of psychological study are inseparable from the goal-directed, tool-mediated action through which the changes take place (Smagorinsky, 1995; Wertsch, 1985, 1991). To Vygotsky (1987), “thinking depends on speech, on the *means of thinking*, and on the child’s sociocultural experience. ... the development of the child’s thinking depends on his mastery of the social means of thinking, that is, on his mastery of speech” (p. 120).

Protocols, therefore, cannot be, to use a common metaphor, windows that allow researchers to peer into workings of the mind. Rather, they are part of the mediational process itself, and thus contribute to the process of articulation that produces the thinking that the protocols are designed to study.

Vygotsky (1987) describes the process through which inner speech is transformed to public speech:

Thought is not only mediated externally by signs. It is mediated internally by meanings. The crux of the matter is that the immediate communication of consciousness is impossible not only physically but psychologically. The communication of consciousness can be accomplished only indirectly, through a mediated path. This path consists in the internal mediation of thought first by meanings and then by words. Therefore, *thought is never the direct equivalent of word meanings. Meaning mediates thought in its path to verbal expression.* The path from thought to word is indirect and internally mediated. (p. 282; emphasis added)

He argues that *thinking achieves meaning on its way to articulation*:

Even at the outset, then, thought and word are not cut from a single mold. In a certain sense, one can say that we find more opposition than agreement between them. The structure of speech is not a simple mirror image of the structure of thought. It cannot, therefore, be placed on thought like clothes off a rack. Speech does not merely serve as the expression of developed thought. Thought is restructured as it is transformed into speech. It is not expressed but completed in the word. Therefore, precisely because of their contrasting directions of movement, the development of the internal and external aspects of speech form a true unity. (p. 251)

Through this process of articulation, inner speech is restructured, transformed from “a predicative, idiomatic speech into the syntax of a differentiated speech which is comprehensible to others” (p. 280). In Vygotsky’s view “*What is contained simultaneously in thought unfolds sequentially in speech.* Thought can be compared to a hovering cloud which gushes a shower of words” (p. 281; emphasis in original). Thinking only makes social sense after being transformed to the cultural artifact of the word, a process that reciprocally helps to produce the thoughts.

If a researcher adopts this assumption, collecting and analyzing protocols becomes highly problematic. If thinking becomes rearticulated through the process of speech, then the protocol is not simply representative of meaning. It is, rather, *an agent in the production of meaning.* What researchers study, to use Vygotsky’s (1987) metaphor, is the shower of words and not the storm cloud of thought.



While one generates the other, they are not the same. Both are dynamic, and both are continually in a process of “unfolding” (Vygotsky, 1987, p. 280).

The problem is much more complex when analyzing thinking and speech. Clouds, while having a history and existing within a context, do not have a consciousness or live within a culture; they have no memory, no volition, no tools, no motive. The problems of analyzing the artifact of speech, under the assumption that there is a dialectic relationship between thinking and speech, are virtually limitless given the range of variables potentially available to confound any interpretation.

Yet, from the perspective of cultural psychology, protocols can still be useful research tools. I think, however, that they would be used in service of different questions. In particular, the mediating role of speech itself could become an object of study. My studies of artistic composing, for instance, have consistently shown that when students interpret literature through drawing, dance, music, and drama, their processes of text production serve not only to represent their understanding of the literature, but to change their thinking about the literature’s meaning. In open-ended tasks such as this, protocol analysis could be used as a way to understand how the process of utterance mediates thinking. Viewed in this way, protocols ought not be controlled to reduce variables, but should be understood in terms of all of the variables that come into play. These include the transformational potential that Vygotsky and his adherents would argue is central to the act of speaking or engaging in other tool-mediated action.

### **Conclusion**

My effort to reconceive protocol analysis from a cultural perspective suggests that a protocol should be analyzed as a situated practice with antecedent cultural history. From a practical standpoint, this task is somewhat outlandish. There is, after all, a lot of history, and it would not be possible to say with certainty which historical actions are relevant to the study of a particular protocol. History can only be partially reconstructed, and so the cultural precedents for a protocol could only be sampled and inferred. A second, related problem concerns the perspective adopted to tell that history, which is inevitably subjective, biased, and selective, and thus open to fitting with the agendas of the researcher. Protocol analysis, then, is a research tool that must be employed with some care and theoretical consideration for what in fact is being studied.

My purpose here has been to outline what a method intimately connected to one research paradigm might look like when used from the perspective of another. My primary argument is that when tools cross paradigmatic boundaries, their use and potential must be reconceived in terms of different sets of research questions and qualifications. I see my effort not as a call to abandon information processing theory, but as an attempt to borrow one of its tools and use it quite differently. Viewed this way, protocol analysis can serve the interests of cultural

psychologists effectively and help make distinctive contributions to the understanding of human cognition.

### ANNOTATED BIBLIOGRAPHY

Cole, M. (1996). *Cultural psychology: A once and future discipline*. Cambridge, MA: Harvard University Press.

Michael Cole is among the key American thinkers in the Vygotskian tradition. Following the receipt of his doctorate, he studied with Vygotsky's student Luria in Moscow, after which he served as co-editor of *Mind in Society*, a collection of Vygotsky's major essays. In *Cultural Psychology: A Once and Future Discipline*, Cole outlines Cultural-Historical Activity Theory (CHAT), a strand of Vygotskian psychology generally attributed to Leont'ev. To do so Cole draws on his 30 years of studying the relationship between culture and psychology in diverse societies and settings to argue that engagement in cultural practice is the primary determinant of what we understand to be the human mind.

Ericsson, K. A., & Simon, H. A. (1993). *Protocol analysis: Verbal reports as data*, 2nd edition. Cambridge, MA: MIT Press.

Ericsson and Simon are the primary architects of the research method *protocol analysis*. *Protocol Analysis: Verbal Reports as Data* is the most astute and comprehensive rationale for using protocol analysis to study human cognition from an information processing perspective. The authors detail hundreds of studies from diverse fields that have employed protocol analysis and address criticisms from those who argue against introspective research methods. Their book explains the theoretical underpinnings of information processing theory and how protocol analysis, when conducted according to the principles they outline, yields valid information about cognitive processes and structures.

Vygotsky, L. S. (1987). Thinking and speech. In L. S. Vygotsky, *Collected works* (vol. 1, pp. 39–285) (R. Rieber & A. Carton, Eds; N. Minick, Trans.). New York: Plenum.

Vygotsky's *Myshlenie i Rech': Psikhologicheskie Issledovaniya*, published in 1934 around the time of his death, has been translated three times, the first two as *Thought and Language* and finally as *Thinking and Speech*, a title that more accurately suggests Vygotsky's more dynamic conception of both thinking and its primary mediational tool, speech. Many of Vygotsky's key constructs are outlined here, including his distinction between complexes and concepts, his distinction between spontaneous and

scientific concepts, his semiotic view of language as a cultural artifact, his view of speech as a mediational tool, his view of word meaning as the basic unit of analysis for studying human consciousness, and his conception of inner speech as internalized egocentric speech. His view of psychology as a function of cultural practice emerges from these constructs.

Wertsch, J. V. (1991). *Voices of the mind: A sociocultural approach to mediated action*. Cambridge, MA: Harvard University Press.

Wertsch outlines a cultural theory of mind derived from a synthesis of Vygotsky, Bakhtin, others. A key contribution is his introduction of “multivoicedness” of human mind due to social action that engages and internalizes the voices of others that then echo through any new discourses. Wertsch further departs from Vygotsky by arguing that speech is but one of many mediational tools through which people both shape and are shaped by culture. He argues that a larger “tool kit” of mediational means is more theoretically appropriate to account of the diverse ways in which people act cognitively, and appropriate and echo the voices or other cultural means of expression produced by members of social groups.

#### UNANNOTATED BIBLIOGRAPHY

- Bakhtin, M. M. (1981). *The dialogic imagination: Four essays by M. M. Bakhtin*. (M. Holquist, Ed.; C. Emerson & M. Holquist, Trans.). Austin, TX: University of Texas Press.
- Bakhtin, M. M. (1984). *Problems of Dostoevsky's poetics* (C. Emerson, Ed. & Trans.). Minneapolis: University of Minnesota Press.
- Bakhtin, M. M. (1986). *Speech genres and other late essays* (C. Emerson & M. Holquist, Ed.; V. W. McGee, Trans.). Austin, TX: University of Texas Press.
- Bracewell, R. J., & Breuleux, A. (1994). Substance and romance in analyzing think-aloud protocols. In P. Smagorinsky (Ed.), *Speaking about writing: Reflections on research methodology* (pp. 55–88). Thousand Oaks, CA: Sage.
- Ericsson, K. A., & Simon, H. A. (1978). Retrospective verbal reports as data. (C.I.P. Working Paper No. 388.) Pittsburgh, PA: Carnegie-Mellon University, Center for Information Processing.
- Ericsson, K. A., & Simon, H. A. (1979). Thinking-aloud as data: Effects of verbalization. (C.I.P. Working Paper No. 397.) Pittsburgh, PA: Carnegie-Mellon University, Center for Information Processing.
- Ericsson, K. A., & Simon, H. A. (1980). Verbal reports as data. *Psychological Review*, 87, 215–253.

- Ericsson, K. A., & Simon, H. A. (1984). *Protocol analysis: Verbal reports as data*. Cambridge, MA: MIT Press.
- Ericsson, K. A., & Simon, H. A. (1998). How to study thinking in everyday life: Contrasting think-aloud protocols with descriptions and explanations of thinking. *Mind, Culture, and Activity*, 5, 178–186.
- Flower, L. S., & Hayes, J. R. (1984). The representation of meaning in writing. *Written Communication*, 1, 120–160.
- Gass, S. M. (this volume). Innovations in second language research methods.
- Holquist, M. (1981). Glossary. In M. Holquist (Ed.), *The dialogic imagination: Four essays by M. M. Bakhtin* (C. Emerson & M. Holquist, Trans.) (pp. 423–434). Austin, TX: University of Texas Press.
- Hymes, D. (1974). *Foundations in sociolinguistics*. Philadelphia, PA: University of Pennsylvania Press.
- Juffs, A. (this volume). Psycholinguistically oriented second language research.
- Moll, L. C. (Ed.). (1990). *Vygotsky and education: Instructional implications and applications of sociohistorical psychology*. New York: Cambridge University Press.
- Newell, A., & Simon, H. A. (1972). *Human problem solving*. Englewood Cliffs, NJ: Prentice-Hall.
- Newman, D., Griffin, P., & Cole, M. (1989). *The construction zone: Working for cognitive change in school*. New York: Cambridge University Press.
- Pressley, M., & Afflerbach, P. (1995). *Verbal protocols of reading: The nature of constructively responsive reading*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context*. New York: Oxford University Press.
- Rosenthal, R. (1966). *Experimenter effects in behavioral research*. New York: Appleton-Century-Crofts.
- Salomon, G. (Ed.) (1993). *Distributed cognitions: Psychological and educational considerations*. New York: Cambridge University Press.
- Smagorinsky, P. (1989a). The effects of different types of knowledge on the writing process: A protocol analysis. Unpublished doctoral dissertation, University of Chicago.
- Smagorinsky, P. (1989b). The reliability and validity of protocol analysis. *Written Communication*, 6, 463–479.
- Smagorinsky, P. (1991). The writer's knowledge and the writing process: A protocol analysis. *Research in the Teaching of English*, 25, 339–364.
- Smagorinsky, P. (1992). How reading model essays affects writers. In J. W. Irwin & M. A. Doyle (Eds.), *Reading/writing connections: Learning from research* (pp. 160–176). Newark, DE: International Reading Association.
- Smagorinsky, P. (1994). Think-aloud protocol analysis: Beyond the black box. In P. Smagorinsky (Ed.), *Speaking about writing: Reflections on research methodology* (pp. 3–19). Thousand Oaks, CA: Sage Publications.
- Smagorinsky, P. (1995). The social construction of data: Methodological problems of investigating learning in the zone of proximal development. *Review of Educational Research*, 65, 191–212.

- Smagorinsky, P. (1997). Personal growth in social context: A high school senior's search for meaning in and through writing. *Written Communication, 14*, 63-105.
- Smagorinsky, P. (1998). Thinking and speech and protocol analysis. *Mind, Culture, and Activity, 5*, 157-177.
- Smagorinsky, P., & Coppock, J. (1994). Cultural tools and the classroom context: An exploration of an alternative response to literature. *Written Communication, 11*, 283-310.
- Smagorinsky, P., & Coppock, J. (1995a). The reader, the text, the context: An exploration of a choreographed response to literature. *Journal of Reading Behavior, 27*, 271-298.
- Smagorinsky, P., & Coppock, J. (1995b). Reading through the lines: An exploration of drama as a response to literature. *Reading & Writing Quarterly, 11*, 369-391.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes* (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds.). Cambridge, MA: Harvard University Press.
- Wertsch, J. V. (1985). *Vygotsky and the social formation of mind*. Cambridge, MA: Harvard University Press.
- Wertsch, J. V. (1991). *Voices of the mind: A sociocultural approach to mediated action*. Cambridge, MA: Harvard University Press.
- Wertsch, J. V. (2000). Vygotsky's two minds on the nature of meaning. In C. D. Lee & P. Smagorinsky (Eds.), *Vygotskian perspectives on literacy research: Constructing meaning through collaborative inquiry* (pp. 19-30). New York: Cambridge University Press.