Illustrations and photographs are incorporated to elucidate the various ideas, such as Piaget's views on the ways in which children understand the conservation of number and quantity.

Third, at the end of each chapter, Crain establishes connections beyond the field of educational psychology. In the section describing Ainsworth's patterns of attachment, for example, Crain postulates how her studies have implications for child-rearing, specifically the effects of separation from parents and of day care. Crain goes on to explain how Vygotsky's insights into the self-regulatory functions of speech are being used by clinical psychologists working with people suffering from neurological disorders. The author then shows how the new theory complements or contradicts previous positions and presents a synthesis of opinions commonly held about the theorist's ideas. Finally, Crain evaluates the theory as to its significance in helping us understand the human condition. He calls for educators interested in developmental traditions to join forces, exchange insights and compare practices, in an effort to learn even more about "children's spontaneous development and methods of fostering it" (p. 330).

In any book presenting an overview of various theories, there is always the tendency to abbreviate the information to such an extent as to lose the substance or the full implications of the theorist's ideas. This does not seem to be the case in *Theories of Development: Concepts and applications*. Crain's discussions are clear, direct, lucid, and free from ponderous jargon. His purpose to introduce students to a number of different theorists has been achieved. The background information and applications to education and other fields are well presented. The name and subject indexes are useful and complete. The only serious complaint that can be made about *Theories of Development: Concepts and applications* is that it would have been better, in a work like this, to have references presented at the end of each chapter, rather than only at the end of the book, thus facilitating the student's ability to track down additional information about a selected theory.

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Jay L. Lemke.
TALKING SCIENCE:
LANGUAGE, LEARNING, AND VALUES.
Norwood, NJ: Ablex Publishing Corp., 1990.
261 pp. $24.95.

The title of *Talking Science* is deceptive. In the introduction Lemke states: "Talking Science does not simply mean talking about science. . . it is teaching students how to do science" (p. xi). This, and other statements, give

the reader the idea that scientific ideas and processes will be examined through the language of science. But that view is quickly dispelled as semantics takes over. As "a case study in communication" (p. xi) classroom teaching is analyzed through the semantics of science. Moreover, since teaching and learning science is a social process, the author also introduces the theory of social semiotics (in the final chapter) as a way of looking at education in general – not science in particular. So what about *Talking Science*?

In the first four chapters Lemke examines basic teaching strategies and outlines how patterns of social interaction take over classroom teaching and learning situations. By referring to brief extracts from British secondary school science lessons, Lemke analyzes and reanalyzes the Triadic Dialogue. He compares this strategy with other teaching/learning behaviours such as teacher-student arguments, controlling student behaviour, student-student dialogue. The various types of activities (described fully in Appendix A) are described as normally found in science classes, however, they are not specific to science and may be evident in other classes, such as: history, social studies, mathematics, or English.

Lemke focuses on linguistic terms and theory to argue that the linguistic differences identified in Thematic Pattern Diagrams illustrate how the students' misunderstanding may develop because they do not understand the genres specific to science. He makes his point this way: "Language (semantics, thematics, structures) may not be the whole of the means by which we do science, but it is the most important, the best understood, and the model for understanding the rest" (p. 124). As "the most important" it becomes the essence of the beginning chapters and is interposed strongly in subsequent chapters.

In chapter 5, Lemke considers the mystique of science and students' alienation from pursuing the subject. He attributes this alienation to "the language of the science classroom" (p. 129) and argues that the difference between scientific language and usual (everyday or colloquial) language is due to its "style" – the choice of words, grammar, how idioms and metaphors are used. Lemke lists nine stylistic rules which are held by teachers to be the norm for teaching science. For example: "Be verbally explicit and universal," "use technical terms," "avoid personification," "avoid metaphoric language" (p. 133). These rules, Lemke argues, "are a recipe for dull alienating language" (p. 134) in that they establish a "contrast between the language of human experience and the language of science" (p. 134). This contrast, associated with the perceived "objectivity" of science vs. the "subjectivity" of experience, leaves students with a misleading view that science is a specialized study, outside of human experience, and a goal only for bright students. Lemke refers to dialogue from science lessons to illustrate how such misrepresentations could (and should) be avoided by "making the language of the lessons more interesting, more familiar, and more human" (p. 136).

In chapter 6 Lemke examines the difference between science and other school disciplines. Although there are fundamental similarities among subjects, he contends that the difference in science is due mainly to "the topical content of its thematics and the formats of its longer, more complex and specialized genres" (p. 154). Moreover, other academic subjects do not include as many "unfamiliar and specialized non-verbal activities" (p. 154).

Lemke devotes chapter 7 to providing suggestions on how to change teaching strategies so that students can learn not only the scientific concepts but how to **talk** science. In fact, Lemke believes that science teaching should include "the parts, order, and meaning relations among parts of the major and minor genres of science" (p. 171) as well as the principles of grammar and argumentation inherent in scientific language. Thus, chapters 5, 6, and 7 do consider the teaching and learning of science and how the language used in the classroom can misrepresent the scientific enterprise. The heavy focus, however, the vocabulary of semantics, could discourage the reader who is unfamiliar with linguistic theory.

As a contrast to Lemke's book, readers interested in learning how language is used in secondary school science classes will find *Science** by Clive Carré, published in Great Britain in 1981, a far more useful read. The book, and the series of which it is a part, tries to document rather than philosophize and theorize. Semantics is not the focus but Carré draws heavily from the work of Douglas Barnes and James Britton, both language theorists. Lesson discourse, and laboratory notes and reports are analyzed to show how the philosophy and theory of language and learning is applied to and evident in all types of classroom communication. Carré's work is not just fascinating and understandable, it is a practical examination of the **real** world of teaching science. Unfortunately, the book may be out of print, although it should be available in a library or from the publisher or the University of Exeter (where Carré is a senior lecturer). This small volume is well worth the search.

* This book is one of a series titled *Language, Teaching and Learning* edited by Mike Torbe and published by Ward Lock Educational, 47 Marylebone Lane, London, W1M 6AX.

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REFERENCE

Carré, C. (1981). *Science*. London: Ward Lock Educational.