8 In Search of Meaning: Readers and Expressive Language

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When people read they are searching for meaning. They generate ideas in response to books - ideas which depend on our experiences, expectations, and prior knowledge about the text and its subject. Put another way: people generalize from the information they get when they read books. One frustration we face as teachers is that students' generalizations are often quite different from either our own or from the generalizations of other students. Apart from those students who simply do not read the assignment we all have known students who honestly try to understand reading assignments but whose responses orally or in exams often seem idiosyncratic at best.

In a literature class, I try to be open-minded and allow for wide leeway in "interpretation" because I know that people come to fiction or poetry with different personalities and different backgrounds. I would be less likely to accept variants in the science or mathematics class-after all, here we are not supposed to be dealing with interpretation, but with fact. However, we learn largely by using language-by talking, listening, writing, and reading, and these language activities are uniquely interrelated in each individual, and socially interconnected among individuals through linguistic conventions and agreements. In other words, what we learn and what we know depends on the use and manipulation of both the private and public worlds of our language system.

Work in cognitive psychology suggests that learning proceeds in stages. We learn new concepts by assimilating them into what we already know. The first stage in learning a new concept is analogous to a "private" dialogue. We proceed as if we were talking to ourselves-attempting to fit new and unfamiliar information into the world view we already possess. For example, reading research demonstrates that students comprehend written material best when they explicitly make hypotheses in their own language about what they read in books. They then confirm or refute these hypotheses by reviewing or discussing the

text individually or in groups. Personal prediction and communal confirmation are at the heart of the learning process. One way to see this is to examine the way people read a technical text. Readers, like writers, proceed from a personal matrix of experiences, facts, social conventions, and conceptual and moral development towards creating meaning from a text. Kenneth Goodman puts it this way: "What message the reader produces is partly dependent on what the writer intended, but also *very much dependent on what the reader brings to the particular text.*[1] Whenever we use language as a learning tool we follow thinking processes which are mirrored in the processes of writing and reading.

An Experiment in the Reading Process

It is now standard practice to conceive of learning in "scientific" or "technical" subjects as different in nature from learning in the "humanities," We can see this difference in the common conception of the way we read and process "transactional" or technical writing compared to the way we process aesthetic or poetic writing. Anne Eisenberg's definition of scientific writing, from her text, *Reading Technical Books,* may be taken as representative: "language in science is special and particular. Each term has a very precise meaning. This is entirely different from the way language is used in everyday life."[2] That is, language in the sciences is referential (transactional) and meaning resides simply in a correct response by the reader to the text, while in everyday life, or in expressive and poetic writing, readers constantly make new meanings out of a conversation or a text based on personal associations.

I hope to show, first, that this concept of the processes involved in both "transactional" writing and "transactional" reading is too narrow; and second, that because of this fact, pedagogy in the sciences would benefit from using students' written responses to both texts and research data. This is demonstrated, in part, by the fact that readers of scientific prose in textbooks, scientific journals, or science magazines for popular consumption respond in ways remarkably similar to the ways readers respond to aesthetic works (poetry, in particular). Readers learn by transforming their own personal associative responses to a text into an objective form which they consider knowledge.

The following experiment in reader response helps to demonstrate these ideas. I asked a number of faculty members to respond to a three-paragraph section from an article in *Scientific American.* Each reader was instructed to write "what the passage means to you." The sample follows:

> Among the innovations that were once heavily supported and publicized but that have since fallen by the wayside one may remember fish-protein concentrates for human consumption and protein from single-cell algae grown on petroleum substrates. The proposals themselves are technically feasible, but they proved not to be economically viable and also resulted in food products people did not like. Opaque-2 maize (which has a high content of the essential amino acids lysine and tryptophan), antarctic krill and the wheat-rye hybrid triticale all seem to hold promise, but it is too early to predict their success. In short, it would be unwise to bank on technological breakthrough for the long-term solution to food shortages.
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> In retrospect one characteristic common to unsuccessful food innovations is that they were supported "from above" and had little relevance to the problems perceived by the people the innovations were supposed to help. A successful new technology has to fit the entire socioeconomic system in which it is to find a place. Security of crop yield, palatibility and costs are much more significant than the advocates of new technologies have recognized. For example, the better protein quality in tortillas made from opaque-2 maize is only a second order benefit to a poor family on the margin of subsistence if the new maize does not match the yields of older varieties or is more vulnerable to insects. There is optimism that new high-yielding varieties of opaque-2, with harder kernals to thwart insects, will be more widely accepted.
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> To such technical difficulties must be added a second set of complications: economic and political power relations strongly influence the outcome of those innovations that are put to use. In the Anglo-American tradition Schultz and most other economists stress private profitability as the key factor in guiding technical change. Actually profitability is neither a necessary nor a sufficient condition for a new technology to be adopted, let alone for it to benefit the poor.[3]

Readers' Responses

Now, consider the ways in which readers responded to the passage in terms of (1) the literal meanings they derived, (2) the various levels of abstraction in which they wrote their responses, and (3) the stylistic choices they made as they wrote. The readers in this case were faculty members in the Department of Humanities at Michigan Technological University.[4]

> *Ann:* The passage says . . . it would be unwise to bank on technological breakthrough for the long-term solution to food shortages because implementation of technological innovations is affected by the context within which they are to be implemented. Factors which complicate implementation include technical ones (security of crop yield, palatability, and costs) as well as economic and political ones.

Bob: Thesis: Uses of new technology in increasing food supplies have been frustrated by inadequate research, socioeconomic problems, and political difficulties.

Chris: Innovative food products, designed to reduce food shortages, have not been as successful as was hoped. . . though many . . . were technicaIly feasible. . . If we can learn to look at the entire socioeconomic picture we may yet find some success.

David: The writer argues that technological advances are not in themselves sufficient to insure the acceptance of new products. Examples . . . illustrate failure . . . due to . . . such factors as consumer tastes and perceptions, environmental constraints, and the socioeconomic power relationships in the marketplace.

Ellen: The author argues against the feasibility of purely technological solutions to food shortages and malnutrition.

Fred: The passage shows the failure of pure technology to solve the crisis of food production and protein production in the underdeveloped world. The passage means that technology must be tempered and/or supplemented by sociological and ecological concerns. . . . But who didn't know this that paid any attention to what was and is going on in the world. Political power doesn't shift when we have as a central interest avoiding "instability."

Glen: . . . technocrats tend to look at things from their own point of view [not from the view] of the people they are trying to help . . . [the passage is] an exercise in the nature of reading and says to me something about confidence in reading. The author throws around a lot of big words in the beginning, trying to convince you that you know nothing about what is to follow.

Harold: The writer is aware of the danger of applying technology blindly, without taking into account social or environmental conditions that may affect the success or failure of the new technology. The voice of the speaker . . . is muted by his/her easy adaptation of clichés-" technically feasible," "fallen by the wayside," "economically viable," etc. . . .I hear o1d voices from 1968 being resurrected-good voices-[but] I guess I'm a little tired of the message - I feel a sense of futility and frustration. I don't know what to make of the information.

Ingrid:

If you ain't got the do-re-me, boys
If you ain't got the do-re-me
Al1 the techno-inno won't do you no good
If you ain't got the do-re-me.

A Discussion of Readers' Responses

A single reading of these responses might suggest general agreement about one point: technological solution to the food shortage in underdeveloped countries has not succeeded as well as anticipated. However, I can say this only as a guess about the possible communal agreement which might be achieved by these readers. Clearly, they believe the passage says something about food and technology in the Third World - but even on this fundamental level there are a variety of readings. Their responses to the paragraphs show marked stylistic, syntactic, and semantic differences, which imply that readers of transactional texts affect the meaning of the text just as they would in response to other types of text. Readers will arrive at some core of agreed meaning-but they also show marked differences in word choice, in inference, in complexity of thought, and in personal involvement. In short, the readers have learned different things from the reading and have responded out of their private language systems. As will be shown, these can only be developed into shared meaning through group discussion. Without discussion of the responses readers will move farther apart as their original perspectives and hypotheses shape the meaning they would find in any extension of the text.

Ann quotes directly that it "would be unwise to bank on technological breakthrough." It may well be that the text says this, although the second paragraph also seems to imply that we may expect useful development. Bob argues that the uses of technology "have been frustrated" by various factors. I believe personal interests and experiences shaped these two opposing sentiments. Ann seems to feel that meaning here resides in as strict reliance on denotation as possible-the less paraphrase, the better. Bob, on the contrary, attempts a succinct paraphrase-which leaves out detail that Ann includes, However, if word count alone is considered, Bob's and Ann's responses show only minimal differences. Further reflection on the text in isolation will not provide a resolution to these differences since both responses seem justified (and their authors might well go to some length to demonstrate why).

Chris, David, and Ellen see less technological failure than Ann and Bob. Chris says that innovative food products "have not been as successfu1 as was hoped"; David says that such technologies "are not in themselves sufficient"; and Ellen says that solutions cannot be "purely" technological (but they can be partially so- a considerable contrast to Ann).

Even considering these differences, which are considerable and not trivial in terms of their implications for cost, political concerns, and

priorities for future development, the authors of these responses show a marked attempt to stick to denotative meaning. That is, the authors attempt to say what they "took away" from the reading and do not refer explicitly to what they brought to it. In a classroom, objective agreement will result only when students examine the reasons for these differences, reasons which I suspect reflect subjective responses of the authors to technology, to the style of the article (and their decision to mimic it), and to the issue of political problems in the Third World. These readers need to see how their view of language shapes the meaning they derive from the response. Does Bob, for example, think the nontechnological bias of native populaces influences what might otherwise be successful technology? Does David see hope in a proper combination of technology, ethnology, and politics? These questions shape the individual meaning each author derives from the text because they reflect unspoken experiences and affects. I, for example, would be interested in Ann's thoughts on computers.

Fred, Glen, Harold, and Ingrid move toward quite different reactions both to the text itself and to their understanding of the word *meaning* given in the instructions. Clearly, for these respondents the word suggests speculation, generalization, and inference. Their responses are both more obviously (that is, on the surface) personal and extend into areas of thought related only by the reader's associations. Fred comments on his frustration that this knowledge about technological limitations hasn't brought about change of some sort already. Indeed, the "frustration" which Bob mentioned is quite at odds with the "frustration" Fred and Harold feel. Perhaps, in discussion, Chris would join in making explicit his frustration that success was not what was hoped.

Glen sees the paragraphs separated from this context and as part of a larger concept- of the inevitable inertia to be overcome in all large scale change. Comments on style were offered verbally by a number of readers but they edited these comments out. They felt meaning and style had no interrelation-a concept which would need considerable discussion in light of the variety of styles these responses show. Indeed, I believe that Ingrid's response, in particular, is a conscious and aggressive attack on the style of the article. Of course, I cannot "know" this until I discuss the matter with the author.

Implications for Pedagogy

Apart from the interest of stylistic differences I consider two points about the responses significant: (1) their base in personal associations and language discussed above, and (2) their various levels of abstrac-

tion: Ann, Bob, Chris, Glen, and Ellen report on or summarize the material. Harold offers a generalization and narration of his experience while he read, Fred, Glen, and Ingrid, however, make generalizations and speculations about meanings inferred from the passage. These several levels of abstraction show great similarities to James Moffett's "levels of discourse."[5] At the same time the apparent expressive base of the writing mirrors James Britton's argument that the decision to write, to make meaning, to decide on significance is grounded in the experience of the writer. There is growing evidence which suggests that this expressive base of learning extends to readers and researchers. What are the pedagogical implications of the foregoing discussion? First, that a test or examination given to students who have not shared their responses to common reading may not test any individual student's ability to develop knowledge from a given textbook. Indeed, by examining students' responses we can demonstrate that the student will have developed knowledge- the problem is that even with technical and scientific reading it may not be the knowledge we expect. Our test then doesn't examine the student's knowledge; it doesn't tell us how intelligent this student is, nor does it show us whether or not this student has read the material. The test may tell us only that the student doesn't know what we know.

What techniques can we use to develop a body of knowledge understood in common by members of our classes? One successful method used in literature classes depends on making connections among the thinking processes involved in writing and reading and on the need for students to make explicit both their predictions and confirmations about their reading. Reading any text is, as we have seen, a matter of predicting, confirming, and composing meaning. But I believe that only when students weave their personal knowledge of texts and experience into a pattern through writing and discussion as a group can they say, "We know."

A Pedagogical Model

David Bleich, in his book *Subjective Criticism,* argues that knowledge about anything depends on language and its primary role in symbolizing experience.[6] Bleich considers it pedagogically imperative that students analyze both books and their written responses to the books. I have used Bleich's theory successfully in several literature classes by asking students to respond to novels first in writing. If you consider the following example from one of my classes, you can see that the student's response is expressive- Martha is working out her associations to a passage from D. H. Lawrence's novel, *Sons and Lovers,* in terms of her past personal experience:

> The beginning of the passage evokes memories of the typical motherly response I was used to when growing up. There is instinctive psychology put to use when Mrs. Radford allows Paul to make his own choice about whether or not to go to bed, but (she points out), it is late. . . . " Do what you want, but don't forget what I believe is right." . . . It is a soft weapon.
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> It reminds me of a summer evening at the dinner table when I was told that I must eat a carrot . . . I thought they were vile tasting things and that I was being tortured. . . . As the family left the table one by one to go out in the back yard there was finally myself and my mother who firmly coaxed me to eat my carrot. She finally left for the yard, as I gazed with disappointment at that object of distaste. She thought she could get me to finish it off, just as Mrs. Radford really believed that Paul was going to bed to sleep, but of course I took my golden opportunity and promptly disposed of the carrot. Dear Mom thought I had eaten it.
>
> I also related to Paul's apology for his cold fingers which also bothered me the first time I danced with some boys in a ballroom dancing class in junior high. Would some boy drop my fingers as he would ice cubes?

One of the most important aspects of sharing these types of responses in class is the student's recognition of the varied sources of their associations. As lecturers, teachers will too often assume that their emotional responses and their students' develop in wholly analogous ways. On the contrary, although the feelings evoked may be common to both student and teacher those feelings usually emerged from a variety of sources. For the student above it is important to see that her reaction to being forced by her mother to eat a carrot was similar to Paul and Clara's reaction to Mrs. Radford's machinations; but it is more important for her to see the variety of events which sparked similar feelings in her peers, for by doing that she and her classmates create a meaning in common for the experiences of the reading which did not exist before their discussion.

I ask students to consciously use their immediate responses to their readings to help them create knowledge about the text. I find that a fruitful study of literature arises from the students' personal working out of meaning through his or her responses followed by group discussion during which the class lists and compares their responses. In this way we collectively make or compose meanings as a group. Students do not feel that meaning is something they must discover in the words of the text. Rather, they begin to see that interpretation is primarily a communal activity. Bleich points out that this communal or collaborative act "is validated by the ordinary fact that when each person says what he sees, each statement will be substantially different. The response must therefore be the starting point for the study of aesthetic experience."[7]

The experiment in reader response which began this chapter suggests that the responses of students also should be a focus for study in scientific fields as well. The variety of responses to an "objective" group of paragraphs shows that students need to think about why they responded as they did- not that they responded "incorrectly." Of course, the responses are useful to the teacher as well. By examining the style and order of ideas in the responses, the teacher can tell which students' language is closest in structure to that of the passage. There are trivial and inappropriate responses-there are responses which show clear problems of comprehension or difficulty in identifying significant information. The teacher also can identify those students whose style of response is so different from the original text that the response seems simply idiosyncratic- consider Ingrid's response to the piece from *Scientific American.* The way people derive meaning from a text is closely related to the way they structure the text in their own words. A response statement can also reveal similarities and differences between the structure of the student's language and the structure of the text.[8]

Responses may be obtained through several kinds of questions. One is simply to ask students for a paraphrase of a text. The response should be written without the text available. Or students may be asked to say what a chapter, or problem means. In this case the text should be made available since the student will often use interpretation to answer the question. Whatever method is used to generate responses the class must share them in groups. The students themselves will identify trivial responses (and the teacher can find ways to guide a discussion which seems to get off track). In classes which deal with formal symbolic systems-mathematics, for example- it is often useful to have students reformulate equations and concepts verbally. Teachers might use short (five minute) journal writes such as "Discuss the statement, 'Factoring and finding a product are reverse processes.' " A more complex question would also provide material for extended class discussion in an algebra class: "Think of an analogy in the nonmathematical world describing the relationship between a perfect square trinomial and its binomial square."[9]

Writing and Reading: The "Expressive" Connection

I have spoken already about connections among the various aspects of language use and their interconnections in learning. Reading, listening,' speaking, and writing share an expressive or personal base which I believe constitutes the heart of the learning process in any discipline which depends on language or symbolic forms in its teaching and

practice. James Britton in *The Development of Writing Abilities (11-18)* outlines a theory of writing development grounded on what he calls "expressive" writing.[10] Britton defines expressive writing as writing done for the self with the purpose of using language to follow "the unfolding of experiences and thoughts in the head, close to their emergence and close to the contours of thinking."[11] Writing, Britton argues, is grounded in the immediate, personal life of the writer. This does not mean, of course, that writing does not move into other less obviously personal modes; but it does mean that writing begins in the self and that the composing process is, in part, a search for appropriate modes of approach to an audience. The writer relates his work to his own experience; he must develop his thought on the basis of what he knows. "Whatever it is that provokes the decision to write . . . it soon comes to be seen in relation to all the writer's relevant previous experience. His conception, the way he explains to himself what he must do, is influenced by his involvement or lack of it."[12]

Because most writing implies, eventually, some audience, it is good practice for teachers to combine writing and speaking in the classroom: this provides an immediate audience. Talking about writing is valuable because talk is more expressive than writing and because, in Britton's words, "talk relies on an immediate link with listeners; . . . the rapid exchanges of conversation allow many things to go on at once -exploration, clarification, shared interpretation, insight into differences of opinion, illustration and anecdote, explanation of gesture, expression of doubt. . . ."[13] Britton's colleagues, in their research on writing across the curriculum extend this connection between writing and speech to encompass associations among writing, speech, listening, reading. "One of the major uses of language that concerns teachers is its use for learning: for trying to put new ideas into words. For testing out one's thinking on other people, for fitting together new ideas with old ones which will need to be done to bring about new understanding. These functions suggest active uses of language by the pupil, as opposed to passive reception. . . . 'Language' is the sum total of talking, listening, reading and writing. No one of these four modes is more important than the others, and all should be developed equally."[14]

Consider, in this context, the responses to the piece of writing on food production. If we remember that the respondents arrived at various interpretations of both the material and the instructions, we can see the immediate pedagogical value of analyzing the various responses in a group. Now the respondents can test their own hypotheses of the passage's meaning against both the text and against the collective experiences and hypotheses of other readers. The personal nature of the responses does not intrude on the development of learn-

ing; rather, it enhances it by showing the personal bases from which to begin learning. The teacher's role is to assist students in making logical connections, to keep students returning to the text to confirm their own hypothesis, and to help the students codify their developing knowledge. The teacher encourages the process of thought by progressing from expressive language in journals, diaries, first drafts, and response notebooks to discussion of that language and then to more formal uses such as essays, argumentation, research papers, and final drafts.

Expressive Language and Thinking Complexity

James Moffett's work in discourse theory suggests a similar need for teachers to follow a logical progression in language development based on cognitive theory.[15] Moffett argues that students learn best by moving in a logical and orderly progression through levels of abstraction (report, narration, generalization, and speculation) and levels of audience distance (reflection, conversation, correspondence, and publication). The ability to make higher level abstractions comes, Moffett argues, from "letting students try to symbolize raw phenomena of all kinds at all levels of abstraction. . . ."[16] Moffett's suggestions for a curriculum mean students must each struggle with data on a personal level; they do not "know" in any but a trivial way when they receive "knowledge" as empirical fact to be memorized from a teacher, and, more significantly, they do not develop an ability to make the abstractions which the teacher (or someone) had to make to decide on the importance of any discrete piece of data in the first place.

Consider again the responses to the *Scientific American* article. They are, as we have seen, expressive writing, but they are written on several different levels of abstraction. We need to remember that expressive writing does not represent simplistic thought. Indeed, the various levels of thought discussed by Moffett each may appear in expressive writing. An expressive response to language, to a laboratory experiment, or to raw data may describe, narrate, generalize, or speculate. The move toward transactional or poetic writing is not necessarily a movement into more complex or abstract thought patterns; it is primarily a movement toward a different audience.

Our language becomes less and less personal as we move outward from the expressive base- first we think to ourselves, then we speak to others whom we know about our ideas ("What do you think of this?"), then we may move toward an audience from whom we receive less immediate feedback (as we would write a letter to a friend, or editor), and finally we may produce a finished product on the assump-

tion that we will get little or no feedback. Britton suggests that this process (perhaps internalized in experienced writers) occurs whenever we write. What is significant for my purpose here is that the process is the same for both literary and technical language.

This outline of an audience's distance from a writer deals only with the function which the writing serves and the relation between the reader and writer. Another aspect of language, perhaps even more important, concerns levels of thought complexity. Moffett classifies language use into four major categories of abstraction: Tautologic (or speculation); Analogic (or generalization); Narration; Report.[17]

It is important to remember that any of these levels of abstraction can apply to language used for either a poetic or transactional function; that is, we may communicate on any level of abstraction while our language serves any function. A poem, for example, may be written about as a report (paraphrase), as a narration of the reader's experience as he or she read the poem, as a generalization about the poem's connotative meanings, or as speculation about the relation of the meaning to events in the future. A diary may be as speculative as a formal scientific paper, a letter may narrate or generalize, and the proceedings of a professional organization may be reported on or described. By asking students to use expressive writing or to share their expressive responses to a mathematics text or problem, for example, we are not asking for less complex thought. On the contrary, we hope for a greater range of speculation because the student is not being graded or evaluated on a journal or rough draft. What we are asking for is the student's personal commitment to and responsibility for his evolving language system. The use of expressive writing or of reader responses is predicated on the common sense belief that language is the developmental, personal, and psychological foundation of learning in the individual. Research in both cognitive and psychoanalytic psychology appears to affirm this judgment.[18]

A Diagrammatic Model

I suggest that the reading process has direct connections to Britton's and Moffett's concepts of the process of writing. Figure 1 shows the theoretical matrix of expressive language and its relationship to both the function and uses of language. The diagram shows the relationships between expressive language- language close to our feelings, associations, and prior knowledge- and more formal uses of language, the transactional and poetic. The diagram also suggests that this matrix of personal language is central to learning because it forms the base for our thinking when we either produce or process language and

thought. That is, we all begin thinking about new information through the resources of our past knowledge and associations. One of our jobs as teachers is to assist students in moving beyond personal knowledge to knowledge shared by a community, one shaped by cultural values and traditions. That is, we attempt to promote both individual learning and shared learning. Learning and the development of knowledge are, after all, social. Subjective thought, expressive language, becomes collective knowledge through communal agreement. Learning depends on shared knowledge.

But, it may be objected, science is a business of facts, mathematics a business of figures. Some people will argue that science is fundamentally different from literature. We have already examined one aspect of this argument when we studied the responses made to a "scientific" text. In addition, we may examine the definition of science offered by scientists themselves.

Physicist and mathematician, Jacob Bronowski shows that the same symbolic need which underlies all language underlies science; in fact, he claims science itself is a type of language- and it is a language which obeys a general law governing all language: ". . . consciousness depends wholly on our seeing the outside world in [terms of outside things]. And the problems of consciousness arise from putting reconstitution beside internalization, from our also being able to see ourselves as if we were objects in the outside world. That is the very nature of language; it is impossible to have a symbolic system without it."[19] Bronowski makes connections between poetry and science, and points

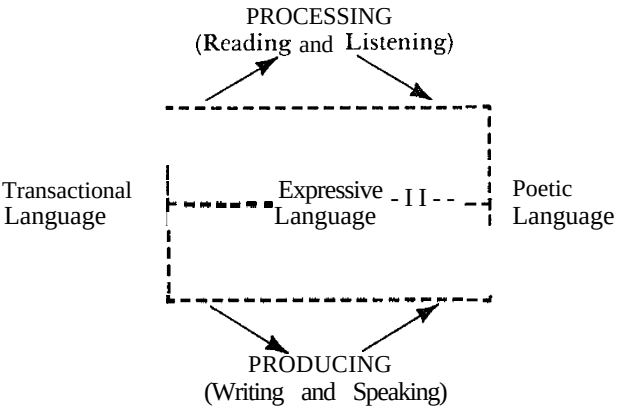

Figure 1.

out that what makes us human is our ability to work with symbolic images: the gift of imagination is not just a literary gift, "it is . . . characteristically human."[20] Bronowski shows that the "book of facts" image of science is wrong.

> [S]cience is not a collection of facts; it is the organization of the facts under general laws, and the laws in turn are held together by such concepts, such creations of the human mind, as gravitation. The facts are endless chaos . . . science is the human activity of finding an order in nature by organizing the scattered meaningless facts under universal concepts.[21]

If we think of Bronowski's statement in terms of Moffett's and Britton's concept of language and of the connections to learning we have now made among listening, writing, reading, speaking, then we see that our task as teachers is to assist the student in developing increased capacity to organize facts. We need to assist in the expansion of our students' ability to make abstractions and to express those abstractions.

But is this the common conception of learning in the sciences? Is it how students in our classes conceive of science as they sweat over the names of species and genus, the equations of inertia and rotational force, or the differential calculus? Students do need to know these things, but will they also learn the structure of their discipline, of its values beyond measurement and classification? More important in a practical sense is the question of whether more than a few students develop the abilities, founded in language, which Bronowski, for one, considers essential for scientists. That is, will students gain a passion for learning, the capacity for inference and speculation, an appreciation of originality, independence of thought, a regard for truth, tolerance of difference in opinion and thought, and an appreciation of dissent?[22] In order to accomplish these ends, we need to encourage students to examine the relationships between their own expressive words and the body of previously established knowledge in a discipline, that is, the connections between the student's language and the language of, for example, entymology, algebra, or physics.

It is not enough to ask questions which call for answers previously established; it is not enough to ask students to memorize algorithmic formulas. When teaching is carried on in this manner, students themselves do not learn to form the essential questions of their readings; they seldom respond to readings expressively; they do not easily use induction or speculation; nor do they often examine the growth and change taking place in their own language as a result of their experience with new bodies of knowledge.

I have suggested here one method which can assist students in the effort to relate their personal language to the language and structure of the books and writers they study. Using students' responses to their texts, encouraging students to share those responses, and analyzing the style and content of their responses will assist learners to integrate what they know with what they need to know. At the same time this method will develop new information, and new perspectives, on information we teach. Perhaps most significant, writing out and discussing responses will encourage students to examine the role that language plays in their learning in all courses.

Notes

1. P. David Allen and Dorothy J. Watson, eds., *Findings of Research in Miscue Analysis: Classroom Implications* (Urbana, Ill.: ERIC/NCTE, 1976), p. 58.

2. Anne Eisenberg, *Reading Technical Books* (Englewood Cliffs, N.J.: Prentice-Hall, 1978), p. 3.

3. Nevin S. Scrimshaw and Lance Taylor, "Food," *Scientific American 243* (September 1980): 86-87.

4. The responses have been edited because of space limitations. Full text of responses may be obtained from Language Skills Laboratory, Department of Humanities, Michigan Technological University.

5. James Moffett, *Teaching the Universe of Discourse* (Boston: Houghton-Mifflin, 1968). Moffett describes four levels of discourse which he relates to cognitive levels: report, narration, analogic or generalization, and tautologic or speculation.

6. David Bleich, *Subjective Criticism* (Baltimore: The Johns Hopkins Press, 1978), pp. 38-67.

7. Bleich, p. 98.

8. For an introduction to top-level structure in reading see: Bonnie J. F. Meyer, David M. Brandt, and George J. Bluth, "Use of Top-level Structure in Text: Key for Reading Comprehension of Ninth-grade Students," *Reading Research Quarterly* 16, no. 1 (1980): 72-103.

9. I am indebted for these questions to Cynthia Nahrgang. She has developed techniques for using writing to teach mathematics in two courses in Algebra and Trigonometry at Michigan Technological University. Descriptions of the courses will be made available upon request.

10. James Britton, Tony Burgess, Nancy Martin, Alex McLeod, and Harold Rosen, *The Development of Writing Abilities (11-18)* (London: Macmillan Education, 1975). See, in addition, Randall Freisinger's article in the present volume.

11. Britton, p. 144. In the context of this paper consider also Britton's further comment: "Behind expressive writing lie the resources of speech and the ongoing accomplishment of spontaneous talk, which occupies much of the

lives of most of us and arguably informs more centrally than any other use of language our pupil's encounters with, and versions of, experience. . . . Expressive writing may operate as the matrix from which differentiated forms of mature writing are developed."

12. Britton, p. 23.

13. Britton, p. 29.

14. Mike Torbe, *Language across the Curriculum Guidelines for Schools* (1976; reprint ed., London: Ward Bond Educational, 1979), p. 7.

15. Moffett, *Teaching the Universe of Discourse.*

16. Moffett, p. 9.

17. Moffett, passim.

18. See, in particular: David Bleich, "The Motivational Character of Language and Symbol Formation," and "Epistemological Assumptions in the Study of Response," in *Subjective Criticism,* pp. 38-67, 97-133; John B. Carroll, "Words, Meaning, and Concepts," *Harvard Educational Review 34* (Spring 1964): 178-202; Nan Elsasser and Vera P. John-Steiner, "An Interactionalist Approach to Advancing Literacy," *Harvard Educational Review* 47 (August 1977): 355-369; Paulo Freire, "The Adult Literacy Process as Cultural Action for Freedom," *Harvard Educational Review 40* (May 1970): 205-225; Jurgen Habermas, *Knowledge and Human Interests,* tr. Jeremy J. Shapiro (1965; rpt. Boston: Beacon Press, 1972); Pinchas Noy, "The Psychoanalytic Theory of Cognitive Development," *The Psychoanalytic Study of the Child, vol. 34 (New* Haven: Yale University Press, 1979): 169-216; William Labov, *Language in the Inner-City: Studies in the Black English Vernacular* (Philadelphia: University of Pennsylvania Press, 1972); Jean Piaget, *Knowledge and Epistemology: Towards a Theory of Knowledge,* tr. Arnold Rosin (New York: Viking Press, 1971); *The Child and Reality: Problems of Genetic Psychology,* tr. Arnold Rosin (1972; reprint ed., Harmondsworth, England: Penguin, 1976); and Roger Poole, *Towards Deep Subjectivity (*New York: Harper and Row, 1972).

19. Jacob Bronowski, *The Origins of Knowledge and Imagination* (New Haven: Yale University Press, 1977), p. 38.

20. Jacob Bronowski, *A Sense of the Future* (Cambridge, Mass.: The MIT Press, 1977), p. 25.

21. Bronowski, *A Sense of the Future,* p. 255.

22. Bronowski, *A Sense of the Future,* pp. 214-220.