A Cognitive Process Theory of Writing

Linda Flower and John R. Hayes

There is a venerable tradition in rhetoric and composition which sees the composing process as a series of decisions and choices.[1] However, it is no longer easy simply to assert this position, unless you are prepared to answer a number of questions, the most pressing of which probably is: "What then are the criteria which govern that choice?" Or we could put it another way: "What guides the decisions writers make as they write?" In a recent survey of composition research, Odell, Cooper, and Courts noticed that some of the most thoughtful people in the field are giving us two reasonable but somewhat different answers:

> How do writers actually go about choosing diction, syntactic and organizational patterns, and content? Kinneavy claims that one's purpose—informing, persuading, expressing, or manipulating language for its own sake—guides these choices. Moffett and Gibson contend that these choices are determined by one's sense of the relation of speaker, subject, and audience. Is either of these two claims borne out by the actual practice of writers engaged in drafting or revising? Does either premise account adequately for the choices writers make?[2]

Rhetoricians such as Lloyd Bitzer and Richard Vatz have energetically debated this question in still other terms. Lloyd Bitzer argues that speech always occurs as a response to a rhetorical situation, which he succinctly defines as containing an exigency (which demands a response), an audience, and a set of constraints.[3] In response to this "situation-driven" view, Vatz claims that the speaker's response, and even the rhetorical situation itself, are determined by the imagination and art of the speaker.[4]

Finally, James Britton has asked the same question and offered a linguist's answer, namely, that syntactic and lexical choices guide the process.

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> It is tempting to think of writing as a process of making linguistic choices from one's repertoire of syntactic structures and lexical items. This would suggest that there is a meaning, or something to be expressed, in the writer's mind, and that he proceeds to choose, from the words and structures he has at his disposal, the ones that best match his meaning. But is that really how it happens?[5]

To most of us it may seem reasonable to suppose that all of these forces—"purposes," "relationships," "exigencies," "language"—have a hand in guiding the writer's process, but it is not at all clear how they do so or how they interact. Do they, for example, work in elegant and graceful coordination, or as competitive forces constantly vying for control? We think that the best way to answer these questions—to really understand the nature of rhetorical choices in good and poor writers—is to follow James Britton's lead and turn our attention to the writing process itself: to ask, "but is that really how it happens?"

This paper will introduce a theory of the cognitive processes involved in composing in an effort to lay groundwork for more detailed study of thinking processes in writing. This theory is based on our work with protocol analysis over the past five years and has, we feel, a good deal of evidence to support it. Nevertheless, it is for us a working hypothesis and springboard for further research, and we hope that insofar as it suggests testable hypotheses it will be the same for others. Our cognitive process theory rests on four key points, which this paper will develop:

1. The process of writing is best understood as a set of distinctive thinking processes which writers orchestrate or organize during the act of composing.
2. These processes have a hierarchical, highly embedded organization in which any given process can be embedded within any other.
3. The act of composing itself is a goal-directed thinking process, guided by the writer's own growing network of goals.
4. Writers create their own goals in two key ways: by generating both high-level goals and supporting sub-goals which embody the writer's developing sense of purpose, and then, at times, by changing major goals or even establishing entirely new ones based on what has been learned in the act of writing.

1. Writing is best understood as a set of distinctive thinking processes which writers orchestrate or organize during the act of composing.

To many this point may seem self-evident, and yet it is in marked contrast to our current paradigm for composing—the stage process model. This familiar metaphor or model describes the composing process as a linear series of

stages, separated in time, and characterized by the gradual development of the written product. The best examples of stage models are the Pre-Write/Write/Re-Write model of Gordon Rohman[6] and The Conception/Incubation/Production model of Britton *et al.*[7]

Stage Models of Writing

Without doubt, the wide acceptance of Pre-Writing has helped improve the teaching of composition by calling attention to planning and discovery as legitimate parts of the writing process. Yet many question whether this linear stage model is really an accurate or useful description of the composing process itself. The problem with stage descriptions of writing is that they model the growth of the written product, not the inner process of the person producing it. "Pre-Writing" is the stage before words emerge on paper; "Writing" is the stage in which a product is being produced; and "Re-Writing" is a final reworking of that product. Yet both common sense and research tell us that writers are constantly planning (pre-writing) and revising (re-writing) as they compose (write), not in clean-cut stages.[8] Furthermore, the sharp distinctions stage models make between the operations of planning, writing, and revising may seriously distort how these activities work. For example, Nancy Sommers has shown that revision, as it is carried out by skilled writers, is not an end-of-the-line repair process, but is a constant process of "re-vision" or re-seeing that goes on while they are composing.[9] A more accurate model of the composing process would need to recognize those basic thinking processes which unite planning and revision. Because stage models take the final product as their reference point, they offer an inadequate account of the more intimate, moment-by-moment intellectual process of composing. How, for example, is the output of one stage, such as pre-writing or incubation, transferred to the next? As every writer knows, having good ideas doesn't automatically produce good prose. Such models are typically silent on the inner processes of decision and choice.

A Cognitive Process Model

A cognitive process theory of writing, such as the one presented here, represents a major departure from the traditional paradigm of stages in this way: in a stage model the major units of analysis are *stages* of completion which reflect the growth of a written product, and these stages are organized in a *linear* sequence or structure. In a process model, the major units of analysis are elementary mental *processes*, such as the process of generating ideas. And these processes have a *hierarchical* structure (see p. 379, below) such that idea generation, for example, is a sub-process of Planning. Furthermore, each of these mental acts may occur at any time in the composing process. One major advantage of identifying these basic cognitive processes or thinking skills writers use is that we can then compare the composing

strategies of good and poor writers. And we can look at writing in a much more detailed way.

In psychology and linguistics, one traditional way of looking carefully at a process is to build a model of what you see. A model is a metaphor for a process: a way to describe something, such as the composing process, which refuses to sit still for a portrait. As a hypothesis about a dynamic system, it attempts to describe the parts of the system and how they work together. Modeling a process starts as a problem in design. For example, imagine that you have been asked to start from scratch and design an imaginary, working "Writer." In order to build a "Writer" or a theoretical system that would reflect the process of a real writer, you would want to do at least three things:

1. First, you would need to define the major elements or sub-processes that make up the larger process of writing. Such sub-processes would include planning, retrieving information from long-term memory, reviewing, and so on.
2. Second, you would want to show how these various elements of the process interact in the total process of writing. For example, how is "knowledge" about the audience actually integrated into the moment-to-moment act of composing?
3. And finally, since a model is primarily a tool for thinking with, you would want your model to speak to critical questions in the discipline. It should help you see things you didn't see before.

Obviously, the best way to model the writing process is to study a writer in action, and there are many ways to do this. However, people's after-the-fact, *introspective analysis* of what they did while writing is notoriously inaccurate and likely to be influenced by their notions of what they should have done. Therefore we turned to *protocol analysis*, which has been successfully used to study other cognitive processes.[10] Unlike introspective reports, thinking aloud protocols capture a detailed record of what is going on in the writer's mind during the act of composing itself. To collect a protocol, we give writers a problem, such as "Write an article on your job for the readers of *Seventeen* magazine," and then ask them to compose out loud near an unobtrusive tape recorder. We ask them to work on the task as they normally would—thinking, jotting notes, and writing—except that they must think out loud. They are asked to verbalize everything that goes through their minds as they write, including stray notions, false starts, and incomplete or fragmentary thought. The writers are *not* asked to engage in any kind of introspection or self-analysis while writing, but simply to think out loud while working like a person talking to herself.

The transcript of this session, which may amount to 20 pages for an hour session, is called a protocol. As a research tool, a protocol is extraordinarily rich in data and, together with the writer's notes and manuscript, it gives us a very detailed picture of the writer's composing process. It lets us see not only

the development of the written product but many of the intellectual processes which produced it. The model of the writing process presented in Figure 1 attempts to account for the major thinking processes and constraints we saw at work in these protocols. But note that it does *not* specify the order in which they are invoked.

The act of writing involves three major elements which are reflected in the three units of the model: **the task environment, the writer's long-term memory, and the writing processes**. The task environment includes all of those things outside the writer's skin, starting with the rhetorical problem or assignment and eventually including the growing text itself. The second element is the writer's long-term memory in which the writer has stored knowledge, not only of the topic, but of the audience and of various writing plans. The third element in our model contains writing processes themselves, specifically the basic processes of **Planning, Translating, and Reviewing,** which are under the control of a Monitor.

This model attempts to account for the processes we saw in the composing protocols. It is also a guide to research, which asks us to explore each of these elements and their interaction more fully. Since this model is described in detail elsewhere,[11] let us focus here on some ways each element contributes to the overall process.

Overview of The Model

The Rhetorical Problem

At the beginning of composing, the most important element is obviously **the rhetorical problem** itself. A school assignment is a simplified version of such a problem, describing the writer's topic, audience, and (implicitly) her role as student to teacher. Insofar as writing is a rhetorical act, not a mere artifact, writers attempt to "solve" or respond to this rhetorical problem by writing something.

In theory this problem is a very complex thing: it includes not only the rhetorical situation and audience which prompts one to write, it also includes the writer's own goals in writing.[12] A good writer is a person who can juggle all of these demands. But in practice we have observed, as did Britton,[13] that writers frequently reduce this large set of constraints to a radically simplified problem, such as "write another theme for English class." Redefining the problem in this way is obviously an economical strategy as long as the new representation fits reality. But when it doesn't, there is a catch: people only solve the problems they define for themselves. If a writer's representation of her rhetorical problem is inaccurate or simply underdeveloped, then she is unlikely to "solve" or attend to the missing aspects of the problem. To sum up, defining the rhetorical problem is a major, immutable part of the writing process. But the way in which people choose to define a rhetorical problem to themselves can vary greatly from writer to writer. An important goal for

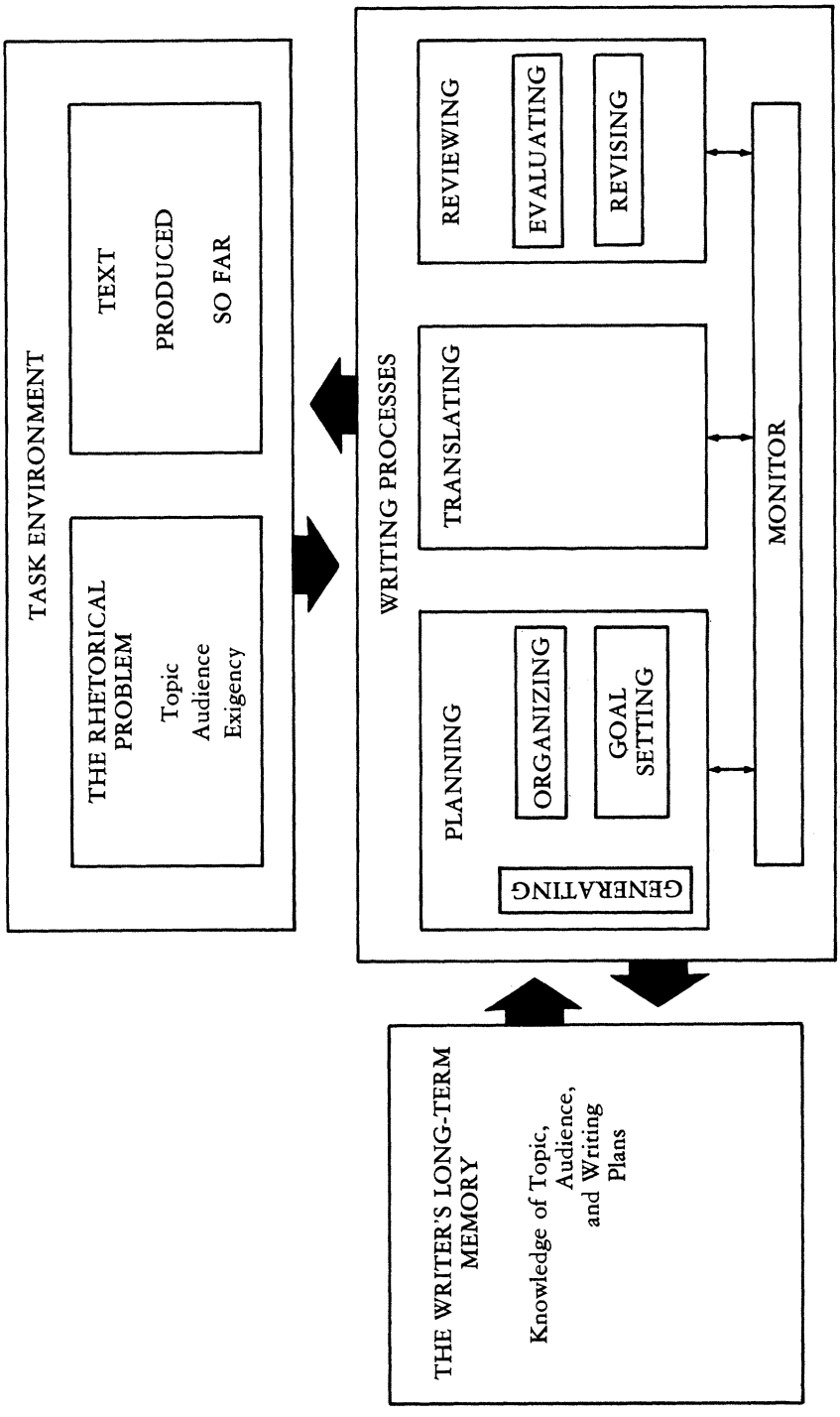

Figure 1. Structure of the writing model. (For an explanation of how to read a process model, please see Footnote 11, pages 386-387.)

research then will be to discover how this process of representing the problem works and how it affects the writer's performance.

The Written Text

As composing proceeds, a new element enters the task environment which places even more constraints upon what the writer can say. Just as a title constrains the content of a paper and a topic sentence shapes the options of a paragraph, each word in the growing text determines and limits the choices of what can come next. However, the influence that the growing text exerts on the composing process can vary greatly. When writing is incoherent, the text may have exerted too little influence; the writer may have failed to consolidate new ideas with earlier statements. On the other hand, one of the earmarks of a basic writer is a dogged concern with extending the previous sentence[14] and a reluctance to jump from local, text-bound planning to more global decisions, such as "what do I want to cover here?"

As we will see, the growing text makes large demands on the writer's time and attention during composing. But in doing so, it is competing with two other forces which could and also should direct the composing process; namely, the writer's knowledge stored in long-term memory and the writer's plans for dealing with the rhetorical problem. It is easy, for example, to imagine a conflict between what you know about a topic and what you might actually want to say to a given reader, or between a graceful phrase that completes a sentence and the more awkward point you actually wanted to make. Part of the drama of writing is seeing how writers juggle and integrate the multiple constraints of their knowledge, their plans, and their text into the production of each new sentence.[15]

The Long-Term Memory

The writer's long-term memory, which can exist in the mind as well as in outside resources such as books, is a storehouse of knowledge about the topic and audience, as well as knowledge of writing plans and problem representations. Sometimes a single cue in an assignment, such as "write a persuasive . . . ," can let a writer tap a stored representation of a problem and bring a whole raft of writing plans into play.

Unlike short-term memory, which is our active processing capacity or conscious attention, long-term memory is a relatively stable entity and has its own internal organization of information. The problem with long-term memory is, first of all, getting things out of it—that is, finding the cue that will let you retrieve a network of useful knowledge. The second problem for a writer is usually reorganizing or adapting that information to fit the demands of the rhetorical problem. The phenomena of "writer-based" prose nicely demonstrates the results of a writing strategy based solely on retrieval. The organization of a piece of writer-based prose faithfully reflects the writer's own

discovery process and the structure of the remembered information itself, but it often fails to transform or reorganize that knowledge to meet the different needs of a reader.[16]

Planning

People often think of planning as the act of figuring out how to get from here to there, i.e., making a detailed plan. But our model uses the term in its much broader sense. In the **planning** process writers form an internal *representation* of the knowledge that will be used in writing. This internal representation is likely to be more abstract than the writer's prose representation will eventually be. For example, a whole network of ideas might be represented by a single key word. Furthermore, this representation of one's knowledge will not necessarily be made in language, but could be held as a visual or perceptual code, e.g., as a fleeting image the writer must then capture in words.

Planning, or the act of building this internal representation, involves a number of sub-processes. The most obvious is the act of **generating ideas,** which includes retrieving relevant information from long-term memory. Sometimes this information is so well developed and organized *in memory* that the writer is essentially generating standard written English. At other times one may generate only fragmentary, unconnected, even contradictory thoughts, like the pieces of a poem that hasn't yet taken shape.

When the structure of ideas already in the writer's memory is not adequately adapted to the current rhetorical task, the sub-process of **organizing** takes on the job of helping the writer make meaning, that is, give a meaningful structure to his or her ideas. The process of **organizing** appears to play an important part in creative thinking and discovery since it is capable of grouping ideas and forming new concepts. More specifically, the organizing process allows the writer to identify categories, to search for subordinate ideas which develop a current topic, and to search for superordinate ideas which include or subsume the current topic. At another level the process of organizing also attends to more strictly textual decisions about the presentation and ordering of the text. That is, writers identify first or last topics, important ideas, and presentation patterns. However, organizing is much more than merely ordering points. And it seems clear that all rhetorical decisions and plans for reaching the audience affect the process of organizing ideas at all levels, because it is often guided by major goals established during the powerful process of **goal-setting.**

Goal-setting is indeed a third, little-studied but major, aspect of the **planning** process. The goals writers give themselves are both procedural (e.g., "Now let's see—a—I want to start out with "energy") and substantive, often both at the same time (e.g., "I have to relate this [engineering project] to the economics [of energy] to show why I'm improving it and why the

steam turbine needs to be more efficient" or "I want to suggest that—that—um—the reader should sort of—what—what should one say—the reader should look at what she is interested in and look at the things that give her pleasure . . .").

The most important thing about writing goals is the fact that they are *created* by the writer. Although some well-learned plans and goals may be drawn intact from long-term memory, most of the writer's goals are generated, developed, and revised by the same processes that generate and organize new ideas. And this process goes on throughout composing. Just as goals lead a writer to generate ideas, those ideas lead to new, more complex goals which can then integrate content and purpose.

Our own studies on goal setting to date suggest that the act of defining one's own rhetorical problem and setting goals is an important part of "being creative" and can account for some important differences between good and poor writers.[17] As we will argue in the final section of this paper, the act of developing and refining one's own goals is not limited to a "pre-writing stage" in the composing process, but is intimately bound up with the ongoing, moment-to-moment process of composing.

Translating

This is essentially the process of putting ideas into visible language. We have chosen the term **translate** for this process over other terms such as "transcribe" or "write" in order to emphasize the peculiar qualities of the task. The information generated in **planning** may be represented in a variety of symbol systems other than language, such as imagery or kinetic sensations. Trying to capture the movement of a deer on ice in language is clearly a kind of translation. Even when the **planning** process represents one's thought in words, that representation is unlikely to be in the elaborate syntax of written English. So the writer's task is to translate a meaning, which may be embodied in key words (what Vygotsky calls words "saturated with sense") and organized in a complex network of relationships, into a linear piece of written English.

The process of **translating** requires the writer to juggle all the special demands of written English, which Ellen Nold has described as lying on a spectrum from generic and formal demands through syntactic and lexical ones down to the motor tasks of forming letters. For children and inexperienced writers, this extra burden may overwhelm the limited capacity of short-term memory.[18] If the writer must devote conscious attention to demands such as spelling and grammar, the task of translating can interfere with the more global process of planning what one wants to say. Or one can simply ignore some of the constraints of written English. One path produces poor or local planning, the other produces errors, and both, as Mina Shaughnessy showed, lead to frustration for the writer.[19]

In some of the most exciting and extensive research in this area, Marlene Scardamalia and Carl Bereiter have looked at the ways children cope with the cognitive demands of writing. Well-learned skills, such as sentence construction, tend to become automatic and lost to consciousness. Because so little of the writing process is automatic for children, they must devote conscious attention to a variety of individual thinking tasks which adults perform quickly and automatically. Such studies, which trace the development of a given skill over several age groups, can show us the hidden components of an adult process as well as show us how children learn. For example, these studies have been able to distinguish children's ability to handle idea complexity from their ability to handle syntactic complexity; that is, they demonstrate the difference between seeing complex relationships and translating them into appropriate language. In another series of studies Bereiter and Scardamalia showed how children learn to handle the translation process by adapting, then eventually abandoning, the discourse conventions of conversation.[20]

Reviewing

As you can see in Figure 1, **reviewing** depends on two sub-processes: **evaluating** and **revising**. Reviewing, itself, may be a conscious process in which writers choose to read what they have written either as a springboard to further translating or with an eye to systematically evaluating and/or revising the text. These periods of planned reviewing frequently lead to new cycles of planning and translating. However, the reviewing process can also occur as an unplanned action triggered by an evaluation of either the text or one's own planning (that is, people revise written as well as unwritten thoughts or statements). The sub-processes of revising and evaluating, along with generating, share the special distinction of being able to interrupt any other process and occur at any time in the act of writing.

The Monitor

As writers compose, they also monitor their current process and progress. The **monitor** functions as a writing strategist which determines when the writer moves from one process to the next. For example, it determines how long a writer will continue generating ideas before attempting to write prose. Our observations suggest that this choice is determined both by the writer's goals and by individual writing habits or styles. As an example of varied composing styles, writers appear to range from people who try to move to polished prose as quickly as possible to people who choose to plan the entire discourse in detail before writing a word. Bereiter and Scardamalia have shown that much of a child's difficulty and lack of fluency lies in their lack of an "executive routine" which would promote switching between processes or encourage the sustained generation of ideas.[21] Children for example, possess

the skills necessary to generate ideas, but lack the kind of monitor which tells them to "keep using" that skill and generate a little more.

Implications of a Cognitive Process Model

A model such as the one presented here is first and foremost a tool for researchers to think with. By giving a testable shape and definition to our observations, we have tried to pose new questions to be answered. For example, the model identifies three major processes (**plan, translate, and review**) and a number of sub-processes available to the writer. And yet the first assertion of this cognitive process theory is that people do not march through these processes in a simple 1, 2, 3 order. Although writers may spend more time in planning at the beginning of a composing session, planning is not a unitary stage, but a distinctive thinking process which writers use over and over during composing. Furthermore, it is used at all levels, whether the writer is making a global plan for the whole text or a local representation of the meaning of the next sentence. This then raises a question: if the process of writing is not a sequence of stages but a set of optional actions, how are these thinking processes in our repertory actually orchestrated or organized as we write? The second point of our cognitive process theory offers one answer to this question.

2. The processes of writing are hierarchically organized, with component processes embedded within other components.

A hierarchical system is one in which a large working system such as composing can subsume other less inclusive systems, such as generating ideas, which in turn contain still other systems, and so on. Unlike those in a linear organization, the events in a hierarchical process are not fixed in a rigid order. A given process may be called upon at any time and embedded within another process or even within another instance of itself, in much the same way we embed a subject clause within a larger clause or a picture within a picture.

For instance, a writer trying to construct a sentence (that is, a writer in the act of **translating**) may run into a problem and call in a condensed version of the entire writing process to help her out (e.g., she might generate and organize a new set of ideas, express them in standard writing English, and review this new alternative, all in order to further her current goal of translating. This particular kind of embedding, in which an entire process is embedded within a larger instance of itself, is known technically in linguistics as recursion. However, it is much more common for writers to simply embed individual processes as needed—to call upon them as sub-routines to help carry out the task at hand.

Writing processes may be viewed as the writer's tool kit. In using the tools, the writer is not constrained to use them in a fixed order or in stages. And using any tool may create the need to use another. Generating ideas may require evaluation, as may writing sentences. And evaluation may force the writer to think up new ideas.

Figure 2 demonstrates the embedded processes of a writer trying to compose (translate) the first sentence of a paper. After producing and reviewing two trial versions of the sentence, he invokes a brief sequence of planning, translating, and reviewing—all in the service of that vexing sentence. In our example the writer is trying to translate some sketchily represented meaning about "the first day of class" into prose, and a hierarchical process allows him to embed a variety of processes as sub-routines within his overall attempt to translate.

(Plan) Ok, first day of class. . . . . just jot down a possibility.

(Translate) *Can you imagine what your first day of a college English class will be like?*

(Review) I don't like that sentence, it's lousy—sounds like theme talk.

(Review) Oh Lord—I get closer to it and I get closer—

(Plan) Could play up the sex thing a little bit

(Translate) *When you walk into an English class the first day you'll be interested, you'll be thinking about boys, tasks, and professor—*

(Review) That's banal — that's awful.

Figure 2. An Example of Embedding

A process that is hierarchical and admits many embedded sub-processes is powerful because it is flexible: it lets a writer do a great deal with only a few relatively simple processes—the basic ones being **plan, translate,** and **review**. This means, for instance, that we do not need to define "revision" as a unique stage in composing, but as a thinking process that can occur at any time a writer chooses to evaluate or revise his text or his plans. As an important part of writing, it constantly leads to new planning or a "re-vision" of what one wanted to say.

Embedding is a basic, omni-present feature of the writing process even though we may not be fully conscious of doing it. However, a theory of composing that only recognized embedding wouldn't describe the real com-

plexity of writing. It wouldn't explain *why* writers choose to invoke the processes they do or how they know when they've done enough. To return to Iee Odell's question, what guides the writers' decisions and choices and gives an overall purposeful structure to composing? The third point of the theory is an attempt to answer this question.

3. Writing is a goal-directed process. In the act of composing, writers create a hierarchical network of goals and these in turn guide the writing process.

This proposition is the keystone of the cognitive process theory we are proposing—and yet it may also seem somewhat counter-intuitive According to many writers, including our subjects, writing often seems a serendipitous experience, an act of discovery. People start out writing without knowing exactly where they will end up; yet they agree that writing is a purposeful act. For example, our subjects often report that their writing process seemed quite disorganized, even chaotic, as they worked, and yet their protocols reveal a coherent underlying structure. How, then, does the writing process manage to seem so unstructured, open-minded, and exploratory ("I don't know what I mean until I see what I say") and at the same time possess its own underlying coherence, direction, or purpose?

One answer to this question lies in the fact that people rapidly forget many of their own local working goals once those goals have been satisfied. This is why thinking aloud protocols tell us things retrospection doesn't.[22] A second answer lies in the nature of the goals themselves, which fall into two distinctive categories: process goals and content goals. Process goals are essentially the instructions people give themselves about how to carry out the process of writing (e.g., "Let's doodle a little bit." "So . . . , write an introduction." "I'll go back to that later."). Good writers often give themselves many such instructions and seem to have greater conscious control over their own process than the poorer writers we have studied. Content goals and plans, on the other hand, specify all things the writer wants to say or to do to an audience. Some goals, usually ones having to do with organization, can specify both content and process, as in, "I want to open with a statement about political views." In this discussion we will focus primarily on the writer's content goals.

The most striking thing about a writer's content goals is that they grow into an increasingly elaborate network of goals and sub-goals as the writer composes. Figure 3 (page 378) shows the network one writer had created during four minutes of composing. Notice how the writer moves from a very abstract goal of "appealing to a broad range in intellect" to a more operational definition of that goal, i.e., "explain things simply." The eventual plan to "write an introduction" is a reasonable, if conventional, response to all

three top-level goals. And it too is developed with a set of alternative subgoals. Notice also how this network is hierarchical in the sense that new goals operate as a functional part of the more inclusive goals above them.

These networks have three important features:

1. They are created as people compose, throughout the entire process. This means that they do not emerge full-blown as the result of "pre-writing." Rather, as we will show, they are created in close interaction with ongoing exploration and the growing text.

2. The goal-directed thinking that produces these networks takes many forms. That is, goal-setting is not simply the act of stating a well-defined end point such as "I want to write a two-page essay." Goal-directed thinking often involves describing one's starting point ("They're not going to be disposed to hear what I'm saying"), or laying out a plan for reaching a goal ("I'd better explain things simply"), or evaluating one's success ("That's banal—that's awful"). Such statements are often setting implicit goals, e.g., "Don't be banal." In order to understand a writer's goals, then, we must be sensitive to the broad range of plans, goals, and criteria that grow out of goal-directed thinking.

Goal directed thinking is intimately connected with discovery. Consider for example, the discovery process of two famous explorers—Cortez, silent

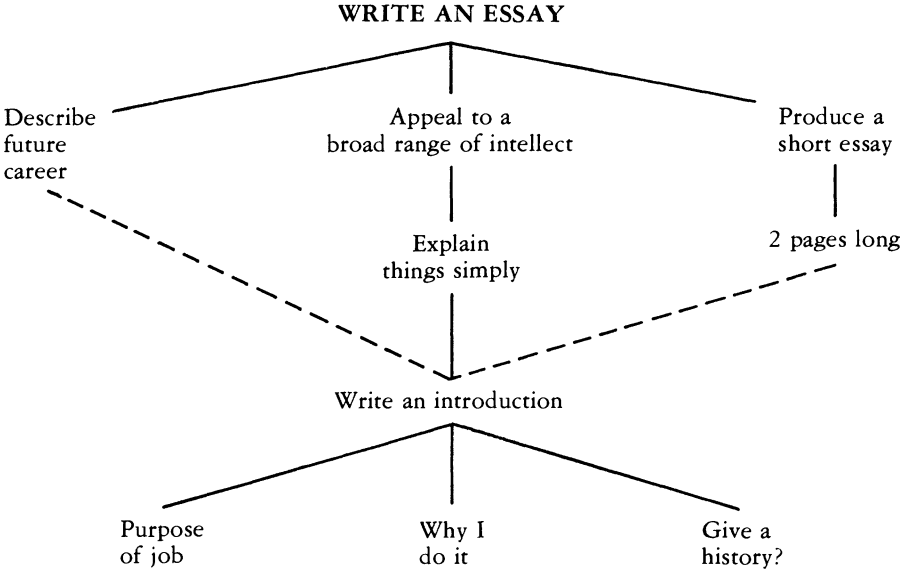

Figure 3. Beginning of a Network of Goals

on his peak in Darien, and that bear who went over the mountain. Both, indeed, discovered the unexpected. However, we should note that both chose to climb a long hill to do so. And it is this sort of goal-directed search for the unexpected that we often see in writers as they attempt to explore and consolidate their knowledge. Furthermore, this search for insight leads to new, more adequate goals, which in turn guide further writing.

The beginning of an answer to Odell's question, "What guides composing?" lies here. The writer's own set of self-made goals guide composing, but these goals can be inclusive and exploratory or narrow, sensitive to the audience or chained to the topic, based on rhetorical savvy or focused on producing correct prose. All those forces which might "guide" composing, such as the rhetorical situation, one's knowledge, the genre, etc., are mediated through the goals, plans, and criteria for evaluation of discourse actually set up by the writer.

This does not mean that a writer's goals are necessarily elaborate, logical, or conscious. For example, a simple-minded goal such as "Write down what I can remember" may be perfectly adequate for writing a list. And experienced writers, such as journalists, can often draw on elaborate networks of goals which are so well learned as to be automatic. Or the rules of a genre, such as those of the limerick, may be so specific as to leave little room or necessity for elaborate rhetorical planning. Nevertheless, whether one's goals are abstract or detailed, simple or sophisticated, they provide the "logic" that moves the composing process forward.

3. Finally, writers not only create a hierarchical network of guiding goals, but, as they compose, they continually return or "pop" back up to their higher-level goals. And these higher-level goals give direction and coherence to their next move. Our understanding of this network and how writers use it is still quite limited, but we can make a prediction about an important difference one might find between good and poor writers. Poor writers will frequently depend on very abstract, undeveloped top-level goals, such as "appeal to a broad range of intellect," even though such goals are much harder to work with than a more operational goal such as "give a brief history of my job." Sondra Perl has seen this phenomenon in the basic writers who kept returning to reread the assignment, searching, it would seem, for ready-made goals, instead of forming their own. Alternatively, poor writers will depend on only very low-level goals, such as finishing a sentence or correctly spelling a word. They will be, as Nancy Sommers student revisers were, locked in by the myopia in their own goals and criteria.

Therefore, one might predict that an important difference between good and poor writers will be in both the quantity and quality of the middle range of goals they create. These middle-range goals, which lie between intention and actual prose (cf., "give a brief history" in Figure 3), give substance and direction to more abstract goals (such as "appealing to the audience") and they give breadth and coherence to local decisions about what to say next.

Goals, Topic, and Text

We have been suggesting that the logic which moves composing forward grows out of the goals which writers create as they compose. However, common sense and the folklore of writing offer an alternative explanation which we should consider, namely, that one's own knowledge of the topic (memories, associations, etc.) or the text itself can take control of this process as frequently as one's goals do. One could easily imagine these three forces constituting a sort of eternal triangle in which the writer's goals, knowledge, and current text struggle for influence. For example, the writer's initial planning for a given paragraph might have set up a goal or abstract representation of a paragraph that would discuss three equally important, parallel points on the topic of climate. However, in trying to write, the writer finds that some of his knowledge about climate is really organized around a strong cause-and-effect relationship between points 1 and 2, while he has almost nothing to say about point 3. Or perhaps the text itself attempts to take control, e.g., for the sake of a dramatic opening, the writer's first sentence sets up a vivid example of an effect produced by climate. The syntactic and semantic structure of that sentence now demand that a cause be stated in the next, although this would violate the writer's initial (and still appropriate) plan for a three-point paragraph.

Viewed this way, the writer's abstract plan (representation) of his goals, his knowledge of the topic, and his current text are all actively competing for the writer's attention. Each wants to govern the choices and decisions made next. This competitive model certainly captures that experience of seeing the text run away with you, or the feeling of being led by the nose by an idea. How then do these experiences occur within a "goal-driven process"? First, as our model of the writing process describes, the processes of **generate** and **evaluate** appear to have the power to interrupt the writer's process at any point—and they frequently do. This means that new knowledge and/or some feature of the current text can interrupt the process at any time through the processes of **generate** and **evaluate**. This allows a flexible collaboration among goals, knowledge, and text. Yet this collaboration often culminates in a revision of previous goals. The persistence and functional importance of initally established goals is reflected by a number of signs: the frequency with which writers refer back to their goals; the fact that writers behave consistently with goals they have already stated; and the fact that they evaluate text in response to the criteria specified in their goals.

Second, some kinds of goals steer the writing process in yet another basic way. In the writers we have studied, the overall composing process is clearly under the direction of global and local *process* goals. Behind the most free-wheeling act of "discovery" is a writer who has recognized the heuristic value of free exploration or "just writing it out" and has chosen to do so. Process goals such as these, or "I'll edit it later," are the earmarks of sophisticated writers with a repertory of flexible process goals which let them use writing

for discovery. But what about poorer writers who seem simply to free associate on paper or to be obsessed with perfecting the current text? We would argue that often they too are working under a set of implicit process goals which say "write it as it comes," or "make everything perfect and correct as you go." The problem then is not that knowledge or the text have taken over, so much as that the writer's own goals and/or images of the composing process put these strategies in control.[23]

To sum up, the third point of our theory—focused on the role of the writer's own goals—helps us account for purposefulness in writing. But can we account for the dynamics of discovery? Richard Young, Janet Emig, and others argue that writing is uniquely adapted to the task of fostering insight and developing new knowledge.[24] But how does this happen in a goal-directed process?

We think that the remarkable combination of purposefulness and openness which writing offers is based in part on a beautifully simple, but extremely powerful principle, which is this: *In the act of writing, people regenerate or recreate their own goals in the light of what they learn.* This principle then creates the fourth point of our cognitive process theory.

4. Writers create their own goals in two key ways: by generating goals and supporting sub-goals which embody a purpose; and, at times, by changing or regenerating their own top-level goals in light of what they have learned by writing.

We are used, of course, to thinking of writing as a process in which our *knowledge* develops as we write. The structure of knowledge for some topic becomes more conscious and assertive as we keep tapping memory for related ideas. That structure, or "schema," may even grow and change as a result of library research or the addition of our own fresh inferences. However, writers must also generate (i.e., create or retrieve) the unique goals which guide their process.

In this paper we focus on the goals writers create for a particular paper, but we should not forget that many writing goals are well-learned, standard ones stored in memory. For example, we would expect many writers to draw automatically on those goals associated with writing in general, such as, "interest the reader," or "start with an introduction," or on goals associated with a given genre, such as making a jingle rhyme. These goals will often be so basic that they won't even be consciously considered or expressed. And the more experienced the writer the greater this repertory of semi-automatic plans and goals will be.

Writers also develop an elaborate network of working "sub-goals" as they compose. As we have seen, these sub-goals give concrete meaning and direction to their more abstract top-level goals, such as "interest the reader," or "describe my job." And then on occasion writers show a remarkable ability to

regenerate or change the very goals which had been directing their writing and planning: that is, they replace or revise major goals in light of what they learned through writing. It is these two creative processes we wish to consider now.

We can see these two basic processes—creating sub-goals and regenerating goals—at work in the following protocol, which has been broken down into episodes. As you will see, writers organize these two basic processes in different ways. We will look here at three typical patterns of goals which we have labeled **"Explore and Consolidate," "State and Develop," "Write and Regenerate."**

Explore and Consolidate

This pattern often occurs at the beginning of a composing session, but it could appear anywhere. The writers frequently appear to be working under a high-level goal or plan to explore: that is, to think the topic over, to jot ideas down, or just start writing to see what they have to say. At other times the plan to explore is subordinate to a very specific goal, such as to find out "what on earth can I say that would make a 15-year-old girl interested in my job?" Under such a plan, the writer might explore her own knowledge, following out associations or using more structured discovery procedures such as tagmemics or the classical topics. But however the writer chooses to explore, the next step is the critical one. The writer pops back up to her top-level goal and from that vantage point reviews the information she has generated. She then consolidates it, producing a more complex idea than she began with by drawing inferences and creating new concepts.

Even the poor writers we have studied often seem adept at the exploration part of this process, even to the point of generating long narrative trains of association—sometimes on paper as a final draft. The distinctive thing about good writers is their tendency to return to that higher-level goal and to review and consolidate what has just been learned through exploring. In the act of consolidating, the writer sets up a *new goal* which replaces the goal of explore and directs the subsequent episode in composing. If the writer's topic is unfamiliar or the task demands creative thinking, the writer's ability to explore, to consolidate the results, and to regenerate his or her goals will be a critical skill.

The following protocol excerpt, which is divided into episodes and subepisodes, illustrates this pattern of **explore and consolidate.**

Episode 1 a, b

In the first episode, the writer merely reviews the assignment and plays with some associations as he attempts to define his rhetorical situation. It ends with a simple process goal—"On to the task at hand"—and a reiteration of the assignment.

(1a) Okay - Um . . . Open the envelope - just like a quiz show on TV - My job for a young thirteen to fourteen teenage female audience - Magazine - *Seventeen*. My job for a young teenage female audience - Magazine - *Seventeen*. I never have read *Seventeen*, but I've referred to it in class and other students have. (1b) This is like being thrown the topic in a situation - you know - in an expository writing class and asked to write on it on the board and I've done that and had a lot of fun with it - so on to the task at hand. My job for a young teenage female audience - Magazine - *Seventeen*.

Episode 2 a, b, c, d

The writer starts with a plan to explore his own "job," which he initially defines as being a teacher and not a professor. In the process of exploring he develops a variety of sub-goals which include plans to: make new meaning by exploring a contrast; present himself or his persona as a teacher; and affect his audience by making them reconsider one of their previous notions. The extended audience analysis of teen-age girls (sub-episode 2c) is in response to his goal of affecting them.

At the end of episode 2c, the writer reaches tentative closure with the statement, "By God, I can change that notion for them." There are significantly long pauses on both sides of this statement, which appears to consolidate much of the writer's previous exploration. In doing this, he dramatically extends his earlier, rather vague plan to merely "compare teachers and professors"—he has regenerated and elaborated his top-level goals. This consolidation leaves the writer with a new, relatively complex, rhetorically sophisticated working goal, one which encompasses plans for a topic, a persona, and the audience. In essence the writer is learning through planning and his goals are the creative bridge between his exploration and the prose he will write.

Perhaps the writer thought his early closure at this point was too good to be true, so he returns at 2d to his initial top-level or most inclusive goal (write about my job) and explores alternative definitions of his job. The episode ends with the reaffirmation of his topic, his persona, and, by implication, the consolidated goal established in Episode 2c.

(2a) Okay lets see - lets doodle a little bit - Job - English teacher rather than professor - I'm doodling this on a scratch sheet as I say it. -ah- (2b) In fact that might be a useful thing to focus on - how a professor differs from - how a teacher differs from a professor and I see myself as a teacher - that might help them - my audience to reconsider their notion of what an English teacher does. (2c) -ah- English teacher - young teen-age female audience - they will all have had English - audience - they're in school - they're taking English - for many of them English may be a favorite subject - doodling still - under audience, but for the wrong reasons - some of them will have wrong reasons in that English is good because its tidy - can be a neat tidy little girl - others turned off of it because it seems too prim. By God I can change that notion for them. (2d) My job for a young teenage female audience - Magazine - *Seventeen*. -ah- Job - English teacher

- guess that's what I'll have to go - yeah - hell - go with that - that's a challenge - rather than - riding a bicycle across England that's too easy and not on the topic - right, or would work in a garden or something like that - none of those are really my jobs - as a profession - My job for a young teenage female audience - Magazine - *Seventeen*. All right - I'm an English teacher.

State and Develop

This second pattern accounts for much of the straightforward work of composing, and is well illustrated in our protocol. In it the writer begins with a relatively general high-level goal which he then proceeds to develop or flesh out with sub-goals. As his goals become more fully specified, they form a bridge from his inital rather fuzzy intentions to actual text. Figure 4 is a schematic representation of the goals and sub-goals which the writer eventually creates.

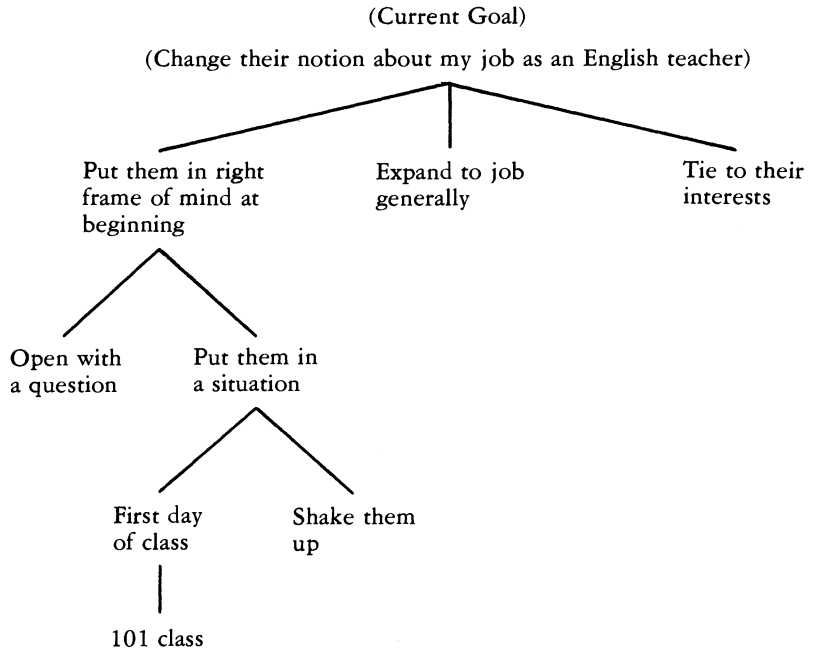

Figure 4. Writer Developing a Set of Sub-Goals

Episode 3 a, b, c

The episode starts with a sub-goal directly subordinate to the goal established in Episode 2 (change their notion of English teachers). It takes the

pattern of a search in which the writer tries to find ways to carry out his current goal of "get [the audience?] at the beginning." In the process he generates yet another level of sub-goals (i.e., open with a question and draw them into a familiar situation). (A note on our terminology: in order to focus on the overall structure of goals and sub-goals in a writer's thinking, we have treated the writer's plans and strategies all as sub-goals or operational definitions of the larger goal.)

Notice how the content or ideas of the essay are still relatively unspecified. The relationship between creating goals and finding ideas is clearly reciprocal: it was an initial exploration of the writer's ideas which produced these goals. But the writing process was then moved forward by his attempt to flesh out a network of goals and sub-goals, not just by a mere "pre-writing" survey of what he knew about the topic. Episode 3c ends in an effort to test one of his new goals against his own experience with students.

> (3a) All right - I'm an English teacher. I want to get at the beginning - I know that they're not going to be disposed - to hear what I'm saying - partly for that reason and partly to put them in the right, the kind of frame of mind I want - I want to open with an implied question or a direct one and put them in the middle of some situation - then expand from there to talk about my job more generally . . . and try to tie it in with their interest. (3b) So one question is where to begin - what kind of situation to start in the middle of - probably the first day of class. . . . They'd be interested - they'd probably clue into that easily because they would identify with first days of school and my first days are raucous affairs - it would immediately shake-em up and get them to thinking a different context. (3c) Okay - so - First day of class - lets see. - Maybe the first 101 class with that crazy skit I put on - that's probably better than 305 because 101 is freshmen and that's nearer their level and that skit really was crazy and it worked beautifully.

Write and Regenerate

This pattern is clearly analogous to the explore and consolidate pattern, except that instead of planning, the writer is producing prose. A miniature example of it can be seen in Figure 2, in which the writer, whose planning we have just seen, attempts to compose the first sentence of his article for *Seventeen*. Although he had done a good deal of explicit planning before this point, the prose itself worked as another, more detailed representation of what he wanted to say. In writing the sentence, he not only saw that it was inadequate, but that his goals themselves could be expanded. The reciprocity between writing and planning enabled him to learn even from a failure and to produce a new goal, "play up sex." Yet it is instructive to note that once this new plan was represented in language—subjected to the acid test of prose—it too failed to pass, because it violated some of his tacit goals or criteria for an acceptable prose style.

The examples we cite here are, for the purposes of illustration, small and

rather local ones. Yet this process of setting and developing sub-goals, and—at times—regenerating those goals is a powerful creative process. Writers and teachers of writing have long argued that one learns through the act of writing itself, but it has been difficult to support the claim in other ways. However, if one studies the process by which a writer uses a goal to generate ideas, then consolidates those ideas and uses them to revise or regenerate new, more complex goals, one can see this learning process in action. Furthermore, one sees why the process of revising and clarifying goals has such a broad effect, since it is through setting these new goals that the fruits of discovery come back to inform the continuing process of writing. In this instance, some of our most complex and imaginative acts can depend on the elegant simplicity of a few powerful thinking processes. We feel that a cognitive process explanation of discovery, toward which this theory is only a start, will have another special strength. By placing emphasis on the inventive power of the writer, who is able to explore ideas, to develop, act on, test, and regenerate his or her own goals, we are putting an important part of creativity where it belongs—in the hands of the working, thinking writer.

Notes

1. Aristotle, *The Rhetoric*, trans. Lane Cooper (New York: Appleton-Century-Crofts, 1932), Richard Lloyd-Jones, "A Perspective on Rhetoric," in *Writing: The Nature, Development and Teaching of Written Communication*, ed. C. Frederiksen, M. Whiteman, and J. Dominic (Hillsdale, N.J.: Lawrence Erlbaum Associates, in press.)

2. Lee Odell, Charles R. Cooper, and Cynthia Courts, "Discourse Theory: Implications for Research in Composing," in *Research on Composing: Points of Departure*, ed. Charles Cooper and Lee Odell (Urbana, IL: National Council of Teachers of English, 1978), p. 6.

3. Lloyd Bitzer, "The Rhetorical Situation," *Philosophy and Rhetoric*, 1 (January, 1968), 1-14.

4. Richard E. Vatz, "The Myth of the Rhetorical Situation," in *Philosophy and Rhetoric*, 6 (Summer, 1973), 154-161.

5. James Britton et. al., *The Development of Writing Abilities, 11-18* (London: Macmillan, 1975), p. 39.

6. Gordon Rohman, "Pre-Writing: The Stage of Discovery in the Writing Process," *CCC*, 16 (May, 1965), 106-112.

7. See Britton et. al., *The Development of Writing Abilities*, pp. 19-49.

8. Nancy Sommers, "Response to Sharon Crowley, 'Components of the Process,'" *CCC*, 29 (May, 1978), 209-211.

9. Nancy Sommers, "Revision Strategies of Student Writers and Experienced Writers," *CCC*, 31 (December, 1980), 378-388.

10. John R. Hayes, *Cognitive Psychology: Thinking and Creating* (Homewood, Illinois: Dorsey Press, 1978); Herbert A. Simon and John R. Hayes, "Understanding Complex Task Instruction," in *Cognition and Instruction*, ed. D. Klahr (Hillsdale, N.J.: Lawrence Erlbaum Associates, 1976), pp. 269-285.

11. John R. Hayes and Linda S. Flower, "Identifying the Organization of Writing Processes," in *Cognitive Processes in Writing: An Interdisciplinary Approach*, ed. Lee Gregg and Erwin Steinberg (Hillsdale, N.J.: Lawrence Erlbaum Associates, 1980), pp. 3-30. Although diagrams of the sort in Figure 1 help distinguish the various processes we wish our model to describe, these schematic representations of processes and elements are often misleading. The arrows indicate that *information* flows from one box or process to another; that is, knowledge about the writing assignment or knowledge from memory can be transferred or used in the **planning** process, and

information from **planning** can flow back the other way. What the arrows *do not mean* is that such information flows in a predictable left to right circuit, from one box to another as if the diagram were a one-way flow chart. This distinction is crucial because such a flow chart implies the very kind of stage model against which we wish to argue. One of the central premises of the cognitive process theory presented here is that writers are constantly, instant by instant, orchestrating a battery of cognitive processes as they integrate planning, remembering, writing, and rereading. The multiple arrows, which are conventions in diagramming this sort of model, are unfortunately only weak indications of the complex and active organization of thinking processes which our work attempts to model.

12. Linda S. Flower and John R. Hayes, "The Cognition of Discovery: Defining a Rhetorical Problem," *CCC*, 31 (February, 1980), 21-32.

13. Britton *et. al. The Development of Writing Abilities,* pp. 61-65.

14. Sondra Perl, "Five Writers Writing: Case Studies of the Composing Process of Unskilled College Writers," Diss. New York University, 1978.

15. Linda S. Flower and John R. Hayes, "The Dynamics of Composing: Making Plans and Juggling Constraints," in *Cognitive Processes in Writing: An Interdisciplinary Approach*, ed. Lee Gregg and Erwin Steinberg (Hillsdale, N.J.: Lawrence Erlbaum Associates, 1980), pp. 31-50.

16. Linda S. Flower, "Writer-Based Prose: A Cognitive Basis for Problems in Writing," *College English*, 41 (September, 1979), 19-37.

17. Flower, "The Cognition of Discovery," pp. 21-32.

18. Ellen Nold, "Revising," in *Writing: The Nature, Development, and Teaching of Written Communication*, ed. C. Frederiksen *et al.* (Hillsdale, N.J.: Lawrence Erlbaum Associates, in press).

19. Mina Shaughnessy, *Errors and Expectations* (New York: Oxford University Press, 1977).

20. Marlene Scardamalia, "How Children Cope with the Cognitive Demands of Writing," in *Writing: The Nature, Development and Teaching of Written Communication*, ed. C. Frederiksen *et al.* (Hillsdale, N.J.: Lawrence Erlbaum Associates, in press). Carl Bereiter and Marlene Scardamalia, "From Conversation to Composition: The Role of Instruction in a Developmental Process," in *Advances in Instructional Psychology*, Volume 2, ed. R. Glaser (Hillsdale, N.J.: Lawrence Erlbaum Associates, in press).

21. Bereiter and Scardamalia, "From Conversation to Composition."

22. John R. Hayes and Linda Flower, "Uncovering Cognitive Processes in Writing: An Introduction to Protocol Analysis," in *Methodological Approaches to Writing Research*, ed. P. Mosenthal, L. Tamor, and S. Walmsley (in press).

23. Cf. a recent study by Mike Rose on the power of ineffective process plans, "Rigid Rules, Inflexible Plans, and the Stifling of Language: A Cognitivist's Analysis of Writer's Block," *CCC*, 31 (December, 1980), 389-400.

24. Janet Emig, "Writing as a Mode of Learning," *CCC*, 28 (May, 1977), 122-128; Richard E. Young, "Why Write? A Reconsideration," unpublished paper delivered at the convention of the Modern Language Association, San Francisco, California, 28 December 1979.