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ABSTRACT

After a short introductory chapter to this literature review on composing processes, the second chapter examines research that covers the timing and content of planning, planning subprocesses, employing planning strategies, and instruction in planning. Studies in the third chapter are divided into two sections, oral and written discourse production and instruction in producing texts. The sections in the fourth chapter deal with research concerning classification systems for revision changes, revising strategies, why writers revise, and instruction on revision. The final chapter deals with studies that outline the kinds of knowledge a writer possesses about language, the conventions of writing, and a particular writing situation. This chapter argues that examining a writer's knowledge is essential to understanding changes in composing and suggests directions for future research. The studies cited in the document are then listed. (JL)

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WRITERS' PROCESSES AND WRITERS' KNOWLEDGE: A REVIEW OF RESEARCH

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WRITERS' PROCESSES AND WRITERS' KNOWLEDGE: A REVIEW OF RESEARCH

TECHNICAL REPORT NO. 6

FUND FOR THE IMPROVEMENT OF POSTSECONDARY EDUCATION
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Writing Program Assessment Project
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I. INTRODUCTION

During the past decade a major trend in writing research has been an emphasis on composing. Numerous researchers have studied composing processes, examining how writers plan, draft, and revise. These studies have in turn influenced classroom practice. Many writing teachers, under the banner of "teach process, not product," now claim to follow a process-oriented curriculum. Hairston (1982) describes the movement to process as a major paradigm shift in the teaching of composition. While advocates of "teaching writing as a process" may not agree on what that phrase means, it is clear that many college writing instructors believe that they are taking a "process" approach to the teaching of writing and that changes in the ways students compose are among the most important outcomes of their courses.

The trend toward "process" in the writing classroom, however, poses difficult questions for evaluators of writing courses and programs and for the profession at large. These questions include: How can a writing program that claims to emphasize "process" demonstrate that it is affecting the way its students compose? How does a teacher of writing diagnose the deficiencies in the ways individual students compose? How do teachers know which aspects of how a student composes should be altered? What do writers at particular levels need to know about writing that they don't know? How does knowledge of writing affect how students compose and what they produce?

Prevailing methods of evaluating the effects of writing courses and programs on student performance--such as standardized testing, visits of outside experts, and the qualitative rating of essays collected at the beginning and the end of the course--measure changes in students' composing processes indirectly at best. Research in composing has offered certain insights into how writers compose, but the methodologies used in these studies are generally unsuited for either classroom or program evaluations. Another problem is that there is no one "best" composing process, even by relative standards of judgment. Successful writers use different methods of composing. Thus we have little certainty about how to measure changes in process on a large scale or even what changes are necessarily desirable ones.

The purpose of the present review is to examine studies in composing that might inform efforts to describe changes in composing that result from instruction. We concentrate on actual studies of composing and other related research. We have not attempted to review the many theoretical and pedagogical views on composing. The present review uses the terms Planning, Producing Text, and Revising to group studies in composing. We use producing text as an equivalent term for what some researchers refer to as "translating" or "transcribing." We find "translating" and "transcribing" inaccurate metaphors for text production, an issue which we deal with in Chapter 3. Our use of planning, producing text, and revising does not reflect our belief in a particular model so much as it reflects the fact that most studies of composing have focused on one or more of these basic processes. Accordingly, Chapter 2 discusses studies concerned with planning, Chapter 3 with producing text, and Chapter 4 with revising. In Chapter 5, we outline the kinds of knowledge a writer possesses about language, conventions of writing, and a

particular writing situation. We argue that examining a writer's knowledge is essential to understanding changes in composing, and we suggest directions for future research.

II. PLANNING

Planning is one of the most frequent human activities. People continuously plan what they will do in the near an not-so-near future. Planning can be broadly defined as "the predetermination of a course of action aimed at achieving some goal" (Hayes-Roth & Hayes-Roth, 1979, pp. 275-276). Planning also involves the monitoring of goal-directed action to a satisfactory conclusion. Planning is often opportunistic; that is, people often begin toward a goal and alter their plans as they go along, refining their initial plan as they become more aware of opportunities for changing and developing their plans (Hayes-Roth & Hayes-Roth, 1979).

The process of planning written texts is one of the more elaborate kinds of human planning. In planning, "writers form an internal representation of the knowledge that will be used in writing" (Flower & Hayes, 1981c, p. 372). The building of this often abstract representation requires several subprocesses and strategies. In this chapter we review studies that have examined the timing of planning, what writers do when they plan, planning subprocesses, planning strategies, and studies of instruction in planning.

II. 1. THE TIMING OF PLANNING

Early studies of planning tended to focus on the timing of planning. In an important early statement on composing, Rohman and Wlecke (1964) posited a three-stage linear model consisting of "Pre-Writing," "Writing," and "Re-Writing." Rohman and Wlecke's work stimulated much subsequent research on composing. One of the issues that researchers began to examine was how much time writers spend planning before they begin to write. Sowers (1979) and Graves (1975) observed that before writing, many of their first- and second-grade subjects felt a need to draw a picture, the subject of which became the topic of their writing. Mischel (1974) found that his one senior-high school subject spent little time planning before writing began but that this brief time varied. The student spent less than one minute engaged in pre-writing planning on autobiographical assignments but twenty minutes on a memoir-writing task. Stallard (1974) compared the writing behavior of 15 good (determined by STEP Essay Writing Test scores) high-school senior writers with that of 15 randomly selected writers from the same senior class. He found that both groups quickly began to write when they received a writing task but that the good writers did wait longer (mean=4.18 minutes) than the writers selected at random (mean=1.20 minutes).

But the primary outcome of studies of the timing of planning has been the rejection of Rohman and Wlecke's linear-stage model. Emig (1964) denounced the linear model of composing and later found evidence to support her view that composing is more complex. Emig (1971) gathered "writing biographies" from twelfth-grade writers that dealt with their past writing experiences at school and at home. She also observed these students while they wrote, and she obtained thinking-aloud protocols while they were writing. Emig found that the students did little pre-writing planning, but they did pause during writing, apparently to plan. Several other researchers have observed that planning takes place throughout composing (e.g., Calkins, 1979; Flower &

Hayes, 1980a; Matsuhashi, 1981; Pianko, 1977, 1979a, 1979b; Perl, 1980; Sommers, 1978, 1980).

Another issue in the timing of planning is how much time writers spend planning in relation to the actual writing of a text. Gould (1980) conducted a series of experiments with eight college graduates who had never composed by dictating and eight business executives who were expert dictators. All 16 subjects composed by dictating, writing, and speaking. In experiments where subjects wrote and spoke routine letters, complex letters, "competitive" letters, and messages, Gould found that planning time maintained a constant ratio of two-thirds total composition time--regardless of the type of letter being written or spoken. While this ratio did differ for individual subjects (from 47% to 87%), the mean planning time for all subjects was 65%.

Matsuhashi (1981) studied time spent planning by videotaping four high school writers composing. The students wrote two reporting tasks, two generalizing tasks, and two persuading tasks. Matsuhashi found that the means of total pause times ranged from 47% to 70% of total composing time. All pause times were recorded during writing. The substantial proportion of time spent pausing is especially interesting because students selected their topics for writing two days in advance. Although they were not allowed to bring notes to the writing sessions, they were "encouraged to rehearse and plan" their papers ahead of time (1981, p. 117).

Matsuhashi's main concerns were to determine when in the text pauses occurred and how long these pauses were in relation to type of discourse. She reached several conclusions. Students paused longer before abstract T-units than they did before T-units which added supporting details. Furthermore, students paused longer before abstract T-units when they were generalizing than when they were reporting some incident, a fact that Matsuhashi attributed to the additional need while generalizing to consider the organization of larger segments of text.

Using the data collected in the above study, Matsuhashi (1982) made a detailed analysis of one high school student's decision-making activity during text production. She studied the writer's hand and eye movements during the ten longest pauses in the first 100 words in both his reporting and generalizing tasks. In addition, Matsuhashi determined where in the texts these pauses occurred--whether at a sentence boundary or within a sentence. Matsuhashi used her findings to offer "some speculations on the character of writing as an instrumental, planful, and purposeful act" (1982, p. 271).

II. 2. THE CONTENT OF PLANNING

Recent research in planning has emphasized what writers do when they plan rather than the timing of planning. The work of Flower and Hayes (Flower & Hayes, 1980a, 1980b, 1981a, 1981b, 1981c, in press; Hayes & Flower, 1980) has been instrumental in this shift. Their research follows from a cognitive process model of composing (Flower & Hayes, 1980b, 1981a) based on problem-solving theory (Newell & Simon, 1972) and on their several years of collecting and analyzing thinking-aloud protocols. In their model composing processes operate within two major constraints: the writer's long-term memory, which

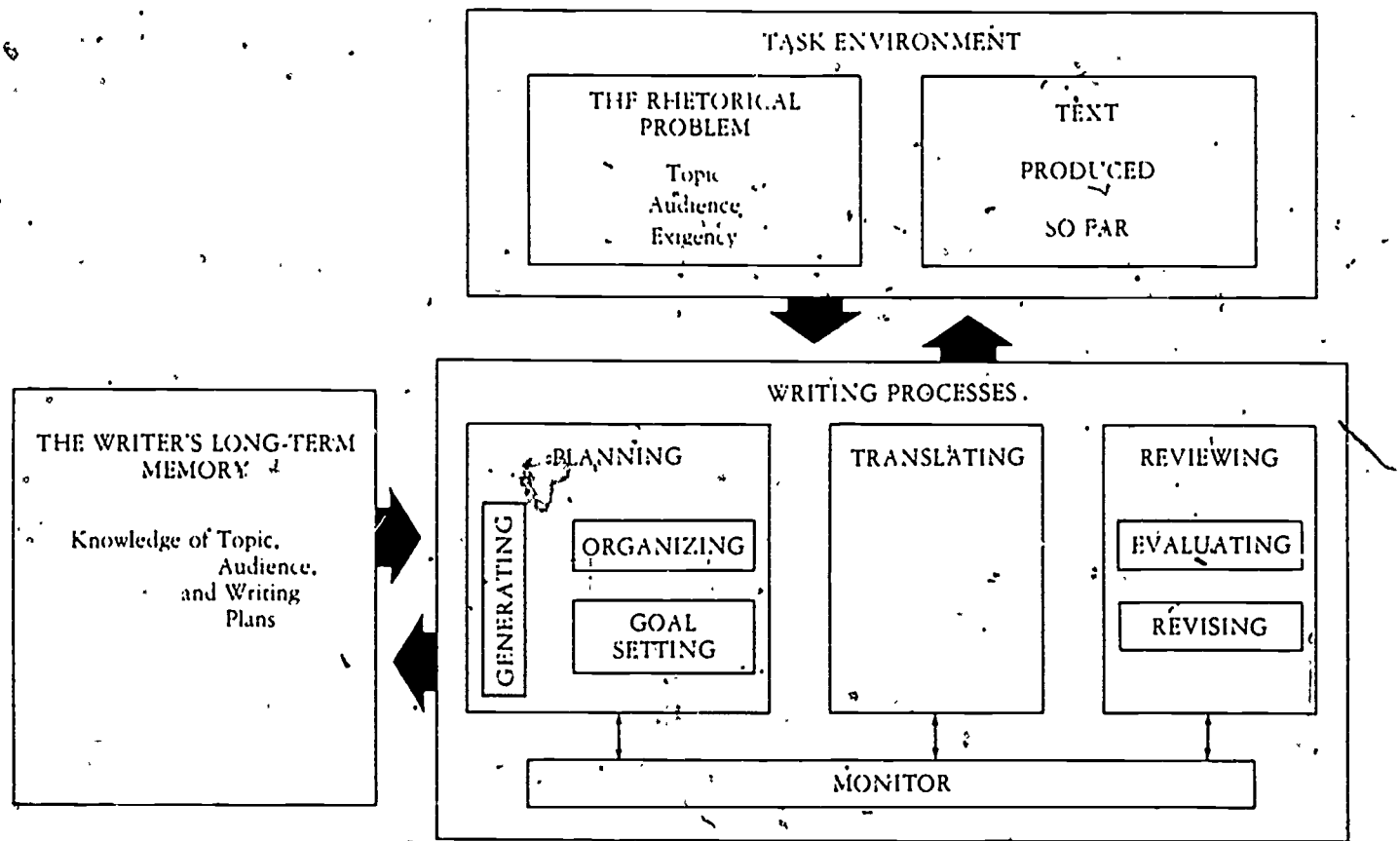
consists of all a writer's knowledge about the topic and audience and his or her stored writing plans, and the task environment, which is subdivided into the rhetorical problem and the text produced so far.

The first composing process in their model is Planning, which consists of the generation of ideas, the organization of ideas, and the setting of goals related to what writers want to do or say in the text. During composing, new ideas may occur to the writer, so that he or she may set new goals related to these ideas or organize them to fit into the already-produced text in some way. Flower and Hayes call the second process in their model Translating--the act of transforming the writer's ideas into actual written text on a page--and the third process Reviewing--which consists of evaluating and revising.

The mechanism of control at work at any given moment in the composing process is the monitor, consisting of each writer's style, work habits, and goals. Flower and Hayes' model of the composing process is illustrated in Figure 1:

FIGURE 1

Flower and Hayes' Model of Composing



Flower and Hayes (1981c) studied the contents of planning pauses using thinking-aloud protocols. Three experts and one novice writer participated in their study. Their writing task was the following: "Write about your job for the readers of Seventeen magazine, 13- and 14-year old girls." Specifically, Flower and Hayes sought to discover whether writers were thinking about what to say in the next sentence when they pause or whether they were thinking about broader rhetorical considerations such as the intended audience. Flower and Hayes established the existence in the writers' protocols of "composing episodes," goal-directed psychological units made coherent by the writer's focusing on one particular goal. The boundaries of these episodes seemed to

be a major source for lengthly or "pregnant" pauses of the writers. In addition, "nearly 70% of the comments at episode beginnings [were] related to [rhetorical] goals and nearly 50% of them [were] devoted to actually setting goals" (1981c, p. 241). Neither paragraph beginnings nor shifts in topics were good predictors of a shift in episodes. "Goal-related activity," according to Flower and Hayes, was the best predictor. Finally, Flower and Hayes found that the pauses of both the experts and the one novice were used for sentence-level planning and for setting more global rhetorical goals, but the experts were far more proficient at making a variety of plans than the one novice.

Other researchers have studied decision-making during planning. Pianko (1977, 1979a, 1979b) examined the composing processes of 17 college freshmen, 7 in regular classes and 10 in remedial classes. Pianko's subjects, drawn from 400 students enrolled in freshman writing courses in a community college, wrote five essays over a five-week span--one descriptive, one narrative, one explicative, one persuasive, and one unspecified. These text types overlap considerably, since two types represent modes and two purposes or aims (Britton, Burgess, Martin, McLeod, & Rosen, 1975; Kinneavy, 1971). Students had the option on all assignments to write on a topic of their choice. All writing was done in a classroom, and students had as much time as they desired to complete the writing tasks. They were videotaped during one of their writing sessions and questioned immediately after about their composing behavior and how they felt about writing. In addition to looking at the amount of time her subjects devoted to pre-writing planning, Pianko tried to find out what they were thinking about during this time. She found that they were making decisions about the following: (1) whether to write on the topic given them or to choose another topic, (2) what subject or incident to focus on in the essay, (3) how to begin, and, (4) for some students, how, generally, they might develop their essay.

In a general study of how unskilled adults compose, Perl (1978, 1979) had five community college students write in four sessions on topics from an introductory social science course each student was taking. Each student wrote two essays in "extensive modes" and two in "reflexive modes"--types defined by Emig (1971). In the first case, students approached their topic from an impersonal, objective perspective. In the second, students took a personal, affective perspective. During the writing sessions, the students verbalized their thoughts during composing. Perl examined transcriptions of the tape-recorded sessions of students composing aloud, looking particularly at what students said during their brief pre-writing planning (mean=4 minutes). She found that they (1) rephrased the topic until they thought of an appropriate experience to write about, (2) changed the "large conceptual issue in the topic" into "manageable pieces for writing," and (3) from a word in the topic, began free associations leading to the development of one or more of the associations in writing the essay (1979, p. 328).

II. 3. PLANNING SUBPROCESSES

Flower and Hayes (1980b, 1981a) have divided planning into three component subprocesses: generating, goal-setting, and organizing. Like other processes in composing, these subprocesses are not clearly distinct from each

other.

Generating. Children and adults have little difficulty generating ideas in conversation because of the many external cues for memory retrieval. While writing, however, these cues are often absent, and teachers of writing at all levels often hear the same complaint: "I can't think of anything else to say." Writing teachers have offered numerous methods of generating ideas--including writing itself as a method of discovering ideas (Murray, 1978)--but very few studies have focused specifically on this subprocess.

Bereiter and Scardamalia (in press-a) outline three basic strategies that children and adults use to cope with the difficulties of generating ideas. Bereiter and Scardamalia find that by age 12 most children have developed a "knowledge telling" strategy that allows them to sidestep many of the complex demands of planning. "Knowledge telling" consists of translating a writing assignment into a topic and then telling what is known about that topic. Bereiter and Scardamalia infer the knowledge telling strategy from several kinds of evidence, among them the fact that goal-setting is absent from the protocols of young writers (Burtis, Bereiter, Scardamalia, & Tetroe, in press) and that novice writers return to the assignment for cues when they are stuck (Flower & Hayes, 1980a, in press). A second general strategy is what Bereiter and Scardamalia call "means-end" planning. Means-end planning is similar to other kinds of problem solving described by Newell and Simon (1972). A writing task becomes a form of problem, and the writer attempts to solve that particular rhetorical problem. While means-end planning has been identified in verbal protocols of writers composing problem-like writing tasks (Flower & Hayes, 1980b), Bereiter and Scardamalia find that this strategy does not produce most operative goals for writing. A third strategy--"reflective planning"--is typical of successful adult writing. In reflective planning, goals take shape as the composition is written. A pragmatic, external goal (such as finishing an assignment) may initiate the writing task, but the goals that guide composing are generated from the process of composing itself.

Caccamise (1981) conducted two experiments that examined what hinders writers from retreiving ideas from long-term memory. In both, students were told that the ideas they generated were to appear in a "pamphlet which presented all facts on the topic" (p. 33). For the first experiment, students were asked to generate ideas orally for an adult audience on two different topics, one familiar to the writers and one unfamiliar to them. In the second, the topics were held constant, but the audience was varied, one specified as adults and the other as children. Cacccamise then analyzed these verbal protocols for effects imposed by the writer's long-term memory, the writing task, the topic specificity, and the audience type. These effects were measured in terms of the number of ideas produced, repetition of ideas, and the time when new ideas were introduced during the idea generation task.

Under the more-constrained conditions--the audience of children and the unfamiliar topic--students generated a smaller range of ideas (perhaps appropriately for an audience of children) and these ideas were less cohesive. Furthermore, in the more-constrained conditions, students were more likely to repeat ideas, a fact that Caccamise suggested might be due to editing processes based on the higher number of metacomments evaluating previously

expressed ideas. In temporal characteristics, the rate of ideas generated slowed down across time and related ideas were also clustered in time, findings which replicate existing research in memory retrieval. Caccamise, however, observed that current models of information processing are inadequate for predicting how writers generate ideas because they are based on relatively small, fixed memory sets. Writing, on the other hand, uses a vast amount of memory.

Goal setting. Flower and Hayes (1980a, 1981a) describe the setting of goals as an essential subprocess of planning. Goals help the writer to reduce the number of constraints that the writer must work within (Flower & Hayes, 1980b). Although writers draw some goals and plans directly from long-term memory, most goals are created by the writer in response to a specific situation. Flower and Hayes found evidence in protocols that the creation and revision of goals continues throughout composing. Goals are frequently tested and reevaluated in light of what has been written. Furthermore, they found that good writers more readily move back and forth between higher-level and lower-level goals. This finding is consistent with problem-solving research, where successful problem-solvers divide problems into sub-problems and solve the sub-problems one at at time (Newell & Simon, 1972). Miller, Galanter, & Pribham (1960) discuss how goal setting guides human behavior in general.

Organizing. When material is drawn from long-term memory, it must be organized in some sequence. Inexperienced writers often write down information in the order of retrieval, creating what Flower (1979) calls "writer-based" prose. More experienced writers attempt to find an order that will meet the needs of the rhetorical situation ("reader-based" prose). The writer's knowledge of discourse structure assists in this organizing. One of the oldest tenets of rhetoric as a discipline is that structural paradigms shape discourse. Greek rhetoric (e.g., Aristotle, trans. 1960) contains structural formulas for arranging orations, and in Roman rhetoric, arrangement was established as a major department of rhetoric (e.g., Cicero, trans. 1942; Quintilian, trans. 1920-1922). Many twentieth-century textbook discussions of organization derive from the 19th-century theorist, Bain (1866). Bain's influence has been supplemented by a number of important models of basic organizational patterns from writing researchers (e.g., D'Angelo, 1976; Kinneavy, Cope, & Campbell, 1976) and from researchers in other disciplines (e.g. Grimes, 1975; Longacre, 1976). While researchers in composing have tended to neglect organization, researchers in comprehension have found it a fruitful area of study. Several researchers have investigated simple stories (e.g., Mandler & Johnson, 1977; Rumelhart, 1975; Thorndyke, 1977), finding evidence for a strong intuitive sense of organization for this text type. Other text types have more overt kinds of organizations, which affect how well they are remembered (e.g., Meyer, 1979; Meyer & Freedle, 1979). One implication for composing is that organization in some text types, such as simple stories, is easily achieved (Applebee, 1978), but the ability to organize other types, such as classificatory essays, develops much later (Stein & Trabasso, 1982). Some rhetoricians assign a much larger role to organization. For example, D'Angelo (1979, 1981) claims that organizational paradigms represent patterns of thought, thus linking organizational skills with conceptual development. In his view the same organizational patterns underlie invention, arrangement, and style.

II. 4. EMPLOYING PLANNING STRATEGIES

Rereading. Whatever the impulse or pressure that causes a writer to begin a text, once that text is begun, the text itself exerts a strong influence over what follows. New ideas have to be meshed with existing ones. Thus, while rereading is a major subprocess of revision, several researchers have pointed out the importance of revision as a planning strategy as well. Four studies have examined the effects of "blind" writing--denying writers the opportunity to reread what they have just written. Britton and his London University associates (1975) gave writers inkless pens to complete a writing task. A record of their writing appeared on a carbon copy below the paper they were writing on. Writers did not seem impeded when they were writing a narrative, but more complex tasks, such as persuasive tasks, proved to be very difficult. Britton and his colleagues attributed this difficulty to the fact that the writers could not reread what they had written to help plan what to say next. Gould (1980) had eight novice dictators and eight expert dictators write both routine and complex letters with a wooden stylus that made an impression on a carbon copy underneath. Gould found that the quality of the written products--in the judgment of independent raters--was not affected by the restraint of being unable to see what was written. The writers, however, felt uncomfortable with this method of composing.

Atwell (1981) and Hull, Arnowitz, and Smith (Note 1) conducted studies in which college students wrote essays in a normal, visible condition and in a blind condition. Atwell's subjects--ten students in traditional freshman composition classes and ten in basic skills classes--wrote narrative essays. Atwell analyzed the essays for coherence, and she found little difference in the products composed under blind and visible conditions. The basic writers, however, had a great deal more difficulty than the traditional freshmen students in producing text under the blind condition. Hull et al. (Note 1) asked nine graduate students and nine basic skills students to write persuasive essays in both blind and visible conditions. For each of the two groups, Hull et al. compared several syntactic features in the essays produced under the two conditions. They found few differences for most syntactic measures. The essays written under the blind condition, however, received lower ratings for quality when the essays were scored holistically.

Other researchers have investigated whether students do, in fact, reread the texts that they are in the process of producing, and, if they do, why they reread. While observing his 17-year-old senior-high student, Mischel (1974) noted that he would often reread what he had written, seemingly "to keep the subject whole in his mind" (p. 309). Stallard (1974) found that his fifteen good twelfth-grade writers reread what they had written much more often during composing than did his randomly selected group of fifteen writers from the same grade. Pianko (1977, 1979a, 1979b) obtained similar results among her ten community college writers in remedial classes and seven community college writers in regular composition classes. The writers in the regular classes used the strategy of rescanning their texts, usually reading the last one or two sentences or the last paragraph, as they were composing. Writers in remedial classes, on the other hand, rarely rescanned their texts.

In studies of five unskilled college writers (1978, 1979) and of writing

teachers and college students of various skill levels (1980), Perl found that all writers reread while composing. All groups of writers paused to reread sections of their writing "until the act of rehearsal led to the creation of a new sentence" (1979, p. 330), or they referred to their topic, "particularly when they [were] stuck" (1980, p. 364), using it to think of something else to write. Like Pianko (1979a, 1979b), Shaughnessy (1977), and Sawkins (1971), Perl observed unskilled writers to be especially preoccupied during pauses with correct spelling, word choice, or punctuation. She found that this preoccupation interupted composing, breaking the flow of any ideas the writer might be developing. In verbal protocols gathered from novice and expert writers, Flower and Hayes (1981c) also noted the importance of rereading both the writing topic and sections of extant text during composing. Flower and Hayes speculated, however, that novice writers seemed more tied to rereading in order to produce text than expert writers and that "exclusive dependence on sentence-level planning may . . . be one of the marks of a poor writer" (1981c, p. 231).

Concern for the rhetorical situation. Factors such as audience and purpose are often described as aspects of the rhetorical situation. Models of a rhetorical situation (e.g., Booth, 1963) usually include a persona (the image the writer wants to project), an audience (the readers), a subject (the information the writer wants to convey). In some models (e.g., Kinneavy, 1971; Britton et al., 1975), purpose is a configuration of writer, subject, and audience.

Stallard (1974) found that 14 out of the 15 good twelfth-grade writers he observed were concerned with purpose when planning, while only 8 of 15 randomly selected students claimed to be concerned with purpose. Sawkins (1971) found that those fifth-grade students in her "high" composition group--the more able writers--were concerned with ideas, organization, and, to some extent, purpose, while less able writers were primarily concerned about mechanics. Gould (1980) found his adult subject to be conscious of purpose, organization, and the audience.

Flower and Hayes suggest that inexperienced writers use a limited repertory of planning strategies and expert writers use diverse planning strategies, many of them generated by the rhetorical situation (1977, 1981c, in press). Flower and Hayes (1980a, in press) explored how novice and expert writers represent the rhetorical situation, using thinking-aloud protocols. The researchers sought answers to the following questions: (1) "What aspects of a rhetorical problem do people actively represent to themselves?" (2) "If writers do spend time developing a full representation of the problem, does it help them generate new ideas?" (3) "Are there any significant differences in the way good and poor writers go about this task?" (1980a, p. 23). Flower and Hayes found that expert writers, when faced with a novel writing task, develop as they are composing significantly more goals related to the rhetorical situation than do poor writers. The expert writers whom Flower and Hayes observed generated the majority of their ideas (67%) by setting goals related to the rhetorical problem. Inexperienced writers, on the other hand, generated most ideas (83%) in response to the writing topic. Flower and Hayes concluded that "good writers are simply solving a different problem than poor writers" (1980a; p. 30). Furthermore, these researchers viewed these findings

as strong evidence for the composition teacher's need to teach students new composing strategies (in press). Flower's (1981) textbook and Humes' (1980) instructional model of the composing process are attempts to provide practical support for this aim.

In an extensive study of the writing done in several nonacademic settings, Odell and Goswami (Note 2) investigated writers' concerns for the rhetorical situation in ways different from Flower and Hayes. First, they developed research procedures for studying writing in nonacademic settings. Second, they explored rhetorical strategies that writers use in their on-the-job writing. Finally, they compared the writing strategies of nonacademic writers with those of college students and suggested implications for teaching writing.

Odell and Goswami analyzed cohesion and syntax in routine memos, formal memos, and business letters written on agency letterhead addressed to persons outside the agency. The researchers then wrote drafts of documents, asking workers to choose between alternative wordings which these workers had used at various times when composing documents themselves. Each worker was questioned about which alternative he or she would be willing to use in a specific situation and why a particular alternative would be preferable.

Odell and Goswami found that nonacademic writers often adapted style and content according to the demands of the rhetorical situation. The nonacademic writers demonstrated a strong "awareness of the purpose they wish to achieve and the particular writer/audience relationship they wish to project" (pp. 6-7). In addition, Odell and Goswami found that there were major differences in the perceptions of writing between these workers and a group of undergraduates doing school-sponsored writing. For example, workers perceived the audience for their writing "as immediate and having a need for the information contained in their writing [whereas] the undergraduates perceived a more distant audience who would not actually be reading their writing to learn something or to use it as the basis for making a decision" (p. 8).

A stratified survey of 200 college-trained people writing on and off the job also found that people who frequently write have a developed awareness of the specific differences in writing for varied audiences and purposes (Faigley & Miller, in press; Faigley, Miller, Meyer, & Witte, 1981). Although most college-trained people are not acquainted with rhetorical theory, they often talk about writing in terms of subject matter, audience, and the image of themselves which they wish to project through their writing. When a person in marketing was asked to explain her concept of clarity, she replied: "Planning and organization are most important in meeting the needs of the intended reader, whether he is a client, a potential client, a regulator, or some other person" (1981, p. 43).

Classical rhetoricians such as Aristotle (trans. 1960) stressed the role of audience in invention. This tradition has continued to the present, where twentieth-century authors of composition textbooks usually include a section on audience. Classical rhetoric, however, is almost exclusively concerned with persuasive oral discourse. Many modern writing textbooks have followed the classical tradition, dealing in emotional appeals and other legacies from

classical rhetoric. Only recently have the differences between a writer's and speaker's audience been explored. Ong (1975) claims that composing is artificial because writers have no audience before them. Successful writers, according to Ong, are able to create a rhetorical situation by imagining their potential readers.

Several studies of composing bear upon Ong's theory, and they illustrate that researchers have differing perceptions of what constitutes audience awareness. Calkins (1979, 1980) claimed that such concerns as the desire to make compositions legible and mechanically "correct" in the first- through fourth-grade writers that she observed marked the beginning of audience awareness. Other studies suggest that developing writers may take many years to extend their concerns about readers beyond correctness. For example, Mischel found that his senior-high-school writer "appeared to have little conception of writing for an audience" (1974, p. 211). Neither the good high-school-senior writers nor the randomly selected seniors in Stallard's study (1974) were generally concerned with writing to a particular audience.

Crowley (1977) found that in the three semesters she studied the writing patterns of college composition students, they rarely wrote for anyone except their English teachers, whom they thought of as error hunters. Likewise, Britton et al. (1975) found that while their 500 subjects from ages eleven through eighteen seemed to demonstrate a growing conception of audience, a much more prevalent trend was toward writing for their teachers as examiners. Perl (1979) explained her five unskilled college writers' neglect of their readers' knowledge:

> The students in this study wrote from an egocentric point of view. While they occasionally indicated a concern for their readers, they more often took the reader's understanding for granted. They did not see the necessity of making their referents explicit, of making the connections among their ideas apparent, or carefully and explicitly relating one phenomenon to another, or of placing narratives or generalizations within an orienting, conceptual framework (p. 332).

Pianko (1979a, 1979b) found that twelve college freshmen enrolled in remedial composition classes were more prone to demonstrate their concern for audience only in attempting to write "correctly" in standard written English. She felt that her subjects enrolled in traditional freshman composition classes demonstrated more awareness of audience in their greater concern "with getting their ideas across" (1979a, p. 14).

A few experimental studies have explored different aspects of audience awareness among writers. Atlas (1979) conducted a series of three experiments testing the abilities of community college students to adapt to a specific audience. He found that novice writers in general fail to address the concerns of their audiences. In one experiment Atlas gave subjects a questionnaire that elicited an evaluation of the reader's beliefs--in this case "Mr. Beyer," a leader of a group of handicapped persons who expressed reservations about a new transportation system. Atlas divided writers into

high-, medium-, and low-ability groups. He found that writers in the low-ability group did not understand their audience's position as well as the other writers. Of the writers who clearly demonstrated an understanding of Mr. Beyer's position, however, very few were able to use their understanding to answer his complaints. When provided with a letter from Mr. Beyer specifically detailing his concerns about the new transportation system, these writers were much better able to address his concerns. Thus Atlas concluded "that novice writers are not really insensitive to their audiences . . . but [rather] they are very context-dependent, relying on the most salient cues to tell them what points to address" (p. 37). Atlas further cautioned that crude methods of focusing attention on audience may have little effect upon how a student actually addresses an audience.

Experiments testing audience awareness among children in the primary grades also have bearing on the present discussion. Kroll (1978) compared the audience responsiveness of 36 fourth graders in writing and speaking. He hypothesized that these young subjects' ability to decenter their perspective in their writing is less developed than their ability to decenter it in their speaking. Kroll nonverbally taught each student a simple game and continued playing the game with each student until the student thoroughly understood the game. Afterwards, eighteen students were asked to explain the game verbally, and the other eighteen wrote explanations. The subjects were then asked to explain the game a second time in the medium they had not used before. All explanations were scored for content. The fourth graders showed limited ability to explain the game effectively regardless of the medium of communication. The spoken explanations during the first session, however, contained much more information than the written explanations, supporting Kroll's main hypothesis that children can decenter their perspective more readily when speaking than when writing.

Scardamalia, Bereiter, and McDonald (1977) explored the audience awareness of writers in grades 4, 6, 9, and 11. The students were taught a game through a televised demonstration of the game being played. Some writers in each class viewed another videotape of someone attempting--inadequately--to explain how the game was played. The second videotape was designed to sensitize writers by indirect means to the possible problems in communicating the game. All students were asked to write instructions for playing the game. Students who watched the second videotape included more of the essential ideas of the game, but their overall explanations were no clearer than those students who had only watched the first videotape. Viewing the second videotape produced certain specific effects among writers at different levels of development. For example, the youngest writers produced the most words. Scardamalia et al. concluded that writers develop their role-taking capacities in different ways at different stages.

Berkenkotter (1981) conducted a study to determine whether adult skilled writers trained in rhetorical theory consider audience needs more actively than "expert" writers in other fields. As subjects she selected five professors of rhetoric and composition and five professors in other disciplines such as anthropology and metallurgy. All ten had published in their fields. Using thinking-aloud protocols from these writers as her data source, she codified the types of audience-related statements these

professionals made as they were writing about their career to an audience of high school seniors. Berkenkotter found that how the writer interpreted the writing task was more important in determining the number and kind of audience-related comments than professional background. The writers who wrote persuasive essays expressed the greatest number and most varied kinds of audience-related comments. The writers who chose informative discourse were second in both categories, making half as many audience-related comments as the writers of persuasive essays. Subjects who wrote narratives made still fewer comments. Nevertheless, Berkenkotter noted that what writers from the two groups shared was more important than the differences among them. She found that all "formed a rich representation of the audience" (p. 395), which significantly affected what goals for writing these subjects set for themselves. Also, all of them created a specific rhetorical context for the task. Berkenkotter concluded that we need to teach students how to represent their audiences as the skilled academic writers were able to do in this study.

II. 5. INSTRUCTION IN PLANNING

Current interest in the composing process was in part inspired by a pedagogical study aimed at improving students' skills in invention. Rohman and Wlecke (1964; Rohman, 1965) devised a heuristic for helping them develop ideas about their subject before they begin writing. Believing that "writing is a personally transformed experience of an event" (Rohman, 1965, p. 109), Rohman and Wlecke had students keep a daily journal to learn more about themselves. Second, students were provided with a set of directions designed to help students gain personal insight into their subject. Third, students were asked to think of some analogy to their subject in their own experiences, again with the purpose of discovering "possibilities of their subject" (1965, p. 111). Rohman and Wlecke found that the essays of those students who used the heuristic to be significantly better than the papers of students who did not.

Other, more systematic heuristics have also been tested. Young and Koen (1973) conducted an experimental class designed to determine whether teaching students tagmemic discovery procedures developed by Young, Becker, and Pike (1970) would result in improved invention skills. The twelve university engineering seniors who participated in the study were taught tagmemic discovery procedures as part of a required rhetoric course. Three kinds of data were collected from the subjects during the semester. Students kept a "reading log"--a journal expressing their feelings about the reading they were assigned to do in their courses--which faculty looked at three times during the semester. Students were also asked to do two writing tasks during the first and last weeks of the semester as a pre- and posttest. In one, students listed "problems that they were aware of in any domain of their experience," (Young & Koen, 1973, p. 17) and in the other, students wrote a list of "problems that came to mind" about two short stories" (1973, p. 21). These lists were judged for the number and kinds of statements expressed, and judges found that students exhibited significantly "more systematic thinking in the posttest, more careful analysis and more precise statements, suggesting greater control of the process of inquiry" (1973, p. 22).

In another test of the tagmemic discovery procedures, Odell (1974) taught

two of his classes of college freshmen to use the Young, Becker, and Pike heuristic. He collected essays from the students at the beginning of the semester and at the end, using the pre- and posttest essays to assess their improvement in writing. The posttest essays contained numbers of "conceptual gaps" similar to the pretest essays, but they did show evidence of an increase in the number of various kinds of intellectual operations--for example, "reference to contrast" and "reference to classification." There was also some evidence that students were able to "solve problems more adequately than they did in the pretest essays" (1974, p. 236).

Burns (1979) explored the effects of three invention strategies on the qualitative and quantitative growth of ideas among college freshmen. The 69 subjects were distributed in four classes, each receiving different treatments. Three classes were taught to use a computer-assisted instruction module based on one of three heuristic systems: the Young, Becker, and Pike (1970) tagmemic matrix, Burke's (1969) dramatistic pentad, and Aristotle's (trans. 1960) topics. A fourth class receiving no instruction in heuristics served as a control group. The students receiving computer-assisted instruction were given 30 minutes to develop ideas about their paper topic by typing responses to open-ended questions such as "What could be considered a cause of [YOUR TOPIC]?" The control group was asked to spend 30 minutes during class writing down all of their ideas about their topic. All students were then asked to develop a plan for their paper, in no more than two hours, using either the computer printout of their ideas or the list of ideas written in class. Burns found that regardless of which computer-prompted heuristic students used, the quantity and quality of their ideas was significantly greater than the control group's. Furthermore, students using the computer-assisted instruction internalized their particular heuristic method well enough to list that strategy's questions when asked. They also responded favorably on an attitude questionnaire to computer-assisted instruction.

Two other studies examining computer-assisted composing have been conducted by Woodruff, Bereiter, and Scardamalia (1981-82). In both studies students composed opinion essays with the assistance of computers. In the first, six male and six female sixth graders received help from a computer in reponse to requests of aid in developing ideas, developing the next sentence in a text, and changing words. Students wrote two essays on successive days on randomly assigned topics: one using the computer and one using pencil and paper. Students were interviewed concerning both writing experiences, and raters scored the essays holistically. Among other results, Woodruff, Bereiter, and Scardamalia found that students were able to compose using the computer and were willing to do so. In fact, they spent almost twice as much time composing their essays on the computer as they did composing with pencil and paper. When using the computers, the children most requested assistance with sentence openers. There was no difference in quality between the essays composed on the computer and the essays composed with pencil and paper. The researchers attributed this fact to the heavy reliance on the computer for help with sentence openers: "the students were . . . adopting [the] 'What next?' strategy of planning" which they used when producing texts with pencil and paper (p. 14).

In order to stimulate students to use the computer for help with "higher

level" composing strategies, Woodruff, Bereiter, and Scardamalia designed a second study in which 36 eighth graders participated--half males, half females. The students used two computer programs quite different from the one which students used in the first study. The questions in one of the new programs "were designed to foster more carefully considered and more fully developed essays" and had a "semi-rhetorical quality" (p. 142). The other computer program did not provide questions or prompts but was also designed to facilitate students in composing better essays. Students participating in the study were randomly assigned to one of three groups. Each group first wrote a theme using pencil and paper and then composed essays using the computer. Raters assessed all papers using a primary-trait scale. The researchers found that students participating in this study not only enjoyed composing on computers better than with pencil and paper, but also felt that using the computer to compose produced better themes. There was no significant difference, however, in the quality of essays as judged by the raters. The researchers felt that the subjects in both studies might have produced better essays on the computer if they had had repeated practice doing so. But regardless of this possibility, the researchers emphasized the affective value of composing on the computer.

In spite of many theoretical and pedagogical studies of teaching invention, research in planning appears to have had little impact on writing instruction in the schools. Applebee (1982) conducted a national study of 754 teachers, finding that except for occasional brainstorming sessions by about 20% of responding teachers, invention skills were not formally taught. In observational studies Applebee found that the average time that teachers devoted to preparing their students for writing was just over three minutes. College writing instruction may place more emphasis on invention. In a national survey of 115 college writing teachers, Witte, Meyer, and Miller (1982) reported that 25.6% of the teachers listed teaching invention among the most successful aspects of their classes. Moreover, invention skills, as well as other aspects of composing, are often taught in methods emphasizing conferencing (Arbur, 1977; Freedman, 1981; Reigstad, 1980) and methods using peer response (Beck, Hawkins, & Silver, 1978; Bruffee, 1973; Elbow, 1973).

III. PRODUCING TEXT

Most people think of writing as text production--the process of physically putting words on the page. In this view, production is a distinct process from planning, involving the transcription of ideas generated during planning. Spelling, punctuation, word choice, and syntactic form are like clothing put on the incubated idea. Some researchers, however, see a much more complex relationship between planning and production. Chafe (1977) theorizes that knowledge is not stored in any form analogous to linguistic structures, thus making production a distinct process from planning. Strong arguments can be made that meaning exists at least before syntactic form (Longacre, 1976). Perhaps the most useful way to view planning and text production is to see planning as progressing from some abstract form--whether or not propositional--through successive substantiations until words are formed on the page. De Beaugrande and Dressler (1981) describe five phases of text production--planning, ideation, development, expression, and parsing--allowing for the possibility that all five phases could interact simultaneously. As production moves closer to the surface, additional constraints must be met, and the writer often has to adjust or substitute local goals. When inchoate ideas take form on the page, the writer the writer must make certain decisions about the text that will follow or decisions to perform local revisions. There is no point when production necessarily stops.

In this chapter we review studies that have examined the nature of oral and written discourse production and studies of instruction in the skills of producing texts.

III. 1. ORAL AND WRITTEN DISCOURSE PRODUCTION

In comparison to the massive literature on comprehension, relatively few studies in psycholinguistics have addressed production. A few lines of research in oral sentence production have developed, including syntax (Garrett, 1975), semantics (Rosenberg, 1977), pauses (Goldman-Eisler, 1961), and speech errors (Fromkin [Ed.], 1973). Beaugrande (1982) criticizes psycholinguistic studies of production for testing narrow hypotheses, looking at aspects of production in isolation, instead of developing comprehensive models. Beaugrande suggests that production processes may vary in different contexts and that different aspects of production may co-occur. For example, Scardamalia, Bereiter, and Goelman (1982) cite evidence that the ability to produce text and plan subsequent text simultaneously develops around the fourth grade.

In spite of the general absence of comprehensive models, some of the main factors in oral sentence production are now known (Fodor, Bever, & Garrett, 1974). People use clause-like structural frames in producing sentences, which do not have to be regenerated for each sentence. The speaker monitors the meaning of the previous clause while producing subsequent clauses. The process of speech production, therefore, is dependent upon the limits of short-term memory. Daiute (1981) finds evidence from errors that suggests the same psychological model for writing. Errors in writing tend to occur after strong perceptual clauses, large numbers of words, and complex syntactic

structures, indicating that errors are caused by the semantic recoding of initial sentence sequences. The writer no longer has the grammatical information available to complete the sentence correctly. Beyond these few findings the linguistic aspects of production remain largely uninvestigated.

Much recent work has examined differences between oral and written discourse. Some of this work has the impact of literacy on nonliterate peoples and the functions of literacy in society (Goody & Watt, 1963; Havelock, 1976; Heath, 1980; Scribner & Cole, 1981; Stubbs, 1980). Other recent work has attempted to characterize differences between oral and written texts. Two assumptions run through this literature: (1) that oral discourse is bound to the immediate context while written discourse is not (e.g., Olson, 1977; F. Smith, 1982), and (2) that cohesion in oral discourse is, in part, achieved through nonverbal means while cohesion in written discourse is achieved through explicit lexical and syntactic means (Chafe, 1981; Gumperz, Kaltman, & O'Connor, 1981; Halliday & Hasan, 1976). Numerous exceptions call both assumptions into question, with literate strategies occurring in oral discourse and conversational strategies occurring in written discourse (Tannen, 1982).

More important to the present discussion, researchers have begun to study the differences between oral and written discourse production. Nystrand (1982b, p. 6) points out that most accounts of discourse production, whether written or spoken, place production after the ideational fact. Thus production is often defined as the translation of ideas (usually in propositional form) into well formed sentences (Clark & Clark, 1977). Up to now most researchers have considered writing as if it were transcribed speech. There are many similar aspects of oral and written discourse production. For example, the subprocesses of generating ideas, organizing, and goal setting discussed in the previous section all operate in both spoken and written language production. But there are also aspects of production which differ between speech and writing, aspects more profound than transcription formats and text types. As Nystrand notes, the standard psycholinguistic conception of language production as a transcription of ideas fails to recognize that the resources of language for discourse are not entirely subsidiary to thought but "actually shape the possibilities for and hence the conduct of discourse itself" (1982, p. 7).

Nystrand (in preparation) elaborates this argument. Whereas transcription models handle certain discourse problems (e.g., narrative as characterized by some story grammars) fairly well, relationships and differences between spoken and written language present more troublesome production issues. Spoken and written language cannot be differentiated at the level of plans, goals, and purposes, since, as language, they are equally purposeful. This is the chief reason why transcription models work as general models of discourse but provide only a rough account of production processes. An adequate account of the latter requires an alternative formulation of production--a model of discourse which adequately encompasses the species of discourse production (writing, speaking) as well as the genus (language) and can, for example, differentiate writing and speaking.

One way of studying differences between oral and written discourse

production is to have people compose on the same subject in each medium. Scardamalia and Bereiter (Note 3) asked fourth- and sixth-grade children to produce texts in three ways: by writing, by dictation, and by "slow dictation"--dictation transcribed by the experimenter at the child's previously determined rate of writing. The medium had a great effect on the quantity of text produced. In normal dictation children produced texts 163% longer than in writing, and in slow dictation, texts 86% longer. Texts were also rated for overall quality, where the differences approached significance ($p=.06$). Texts produced by slow dictation were rated highest, followed by normal dictation and writing. Scardamalia and Bereiter concluded that freeing children from mechanical concerns improved writing quality but increasing the rate of production did not.

Scardamalia, Bereiter, and Goelman (1982) again tested the effects of medium, adding a further experimental intervention. When children were finished composing, they were asked to add more. The next two times the children stopped, they were again prompted to say or write more. As a result children produced much longer texts in every condition. The prompting led to texts twice as long in the writing and normal dictation conditions. Texts written or spoken before the three prompts were analyzed for quantity and quality. The results replicated the earlier Scardamalia and Bereiter (Note 3) experiment. For the extended compositions, however, the texts produced by writing were rated significantly higher ($p=.016$) than the dictated compositions. To probe the effect of prompting on ratings of quality, Scardamalia, Bereiter, and Goelman analyzed the children's texts for several features of content and structure. They found the added content for written texts to be more closely connected to the text produced initially than was the case for the dictated texts. They concluded that "signaling to produce more led children in writing to extend coherent strings whereas in the dictated compositions the initial coherent string was usually already ended" (1982, p. 200).

Scardamalia, Bereiter, and Goelman interpret these findings on the effects of medium assuming four postulates: that a text is not a transcript of a text held in memory, but one possible realization of a more abstract set of plans; that higher-level representations of text plans are not automatically stored but have to be constructed or reconstructed when needed; that mental effort is required to shift from lower- to higher-level representations (e.g. to shift from debating about the spelling of a particular word back to the overall plan for a text segment); and that mental representations vary a great deal according to the sophistication of writers, their familiarity with particular tasks, and their momentary needs. In normal dictation, Scardamalia, Bereiter, and Goelman theorize that since speech production is largely automatic, children can remain at higher-levels of representation and thereby produce much more relevant content. In slow dictation, the children are forced to wait and to engage in more reconstructions. In writing, children have the large additional burden of graphic representation. They are frequently forced to reconstruct the gist of their text, but apparently these successions of reconstructions better enable them to incorporate new information coherently into the fabric of the existing text.

III. 2. INSTRUCTION IN PRODUCING TEXTS

The teaching of writing has long been associated with the teaching of skills such as forming letters on the page, placing them on the page neatly, and spelling and punctuating in accordance with conventions. Much has been written on the teaching of written conventions, such as spelling (Fergus, 1973), punctuation (Mills, 1974), and handwriting (Shaughnessy, 1977). Gould (1980) points out that such skills are not automatic for young children but require planning; therefore, for young learners, perhaps all aspects of producing texts are aspects of planning. With years of practice children form words on pages, make word and syntactic choices, spell, and punctuate with less and less conscious effort. Many plans for physically producing texts are gradually reduced to considerations such as "I don't have to write neatly since I'm going to type it after I finish." But researchers have repeatedly called attention to the fact that inexperienced adult writers frequently lack mastery over some production skills (Perl, 1979; Pianko 1979a, 1979b; Sawkins, 1971; Shaughnessy, 1977). They are unsure of spelling and punctuation, and they often struggle with word choice and syntactic form. Perl (1979) speculates that these preoccupations interrupt the flow of ideas, leading to the poorer quality of inexperienced writers' texts. Evidence for Perl's contention in children's writing is inconclusive. Scardamalia (1981) claims that "recent evidence indicates that concerns with mechanics are not the major impediment to presentations of coherent ideas in discourse" (p. 100).

Another line of research influenced heavily by linguistics has theorized a close relationship between syntactic form and idea generation. One of the most influential has been Christensen (1967, 1968a). His interest in syntax began as a reaction to what he considered misguided advice about sentence structure in composition textbooks. Christensen (1968b) compared the syntax of major nonfiction writers and college students, finding that the most important syntactic difference between the two groups of writers is the frequency and placement of nonrestrictive modifiers (cf. Faigley, 1979a; Wolk, 1970). Christensen developed a method of teaching writing that encourages students to use nonrestrictive modifiers (1968a; Christensen & Christensen, 1976). He felt that practice using nonrestrictive modifiers could generate the supporting detail that is characteristically absent from student writing. Christensen's method has been criticised as applicable only for paraliterary discourse (e.g., Johnson, 1969; Tibbetts, 1970). But still uninvestigated directly is Christensen's most important claim: "solving the problem of how to say helps solve the problem of what to say" (1968a, p. vi.).

Christensen called his method of teaching writing "generative rhetoric," although he did not make use of contemporary "generative grammar" theory. Others researchers were strongly influenced by Chomsky's (1957, 1965) work in transformational grammar. Hunt (1965) conducted a major study of written syntax of children and adults, charting what he called the development of "syntactic maturity." Subsequent studies using different methodologies supported the notion of syntactic maturity (Hunt, 1970; O'Donnell, Griffin, & Norris, 1967). Hunt (1965) suggested that sentence-combining practice would enhance the syntactic maturity of developing writers. Mellon (1969) made the first pedagogical applications of Hunt's research in a year-long study of the effects of sentence-combining practice on the syntactic "fluency" of 247 seventh-grade students. (See Williams (1979) and Faigley (1980) for a discussion of the terms "maturity," "fluency," and "complexity" used in syntactic research.) Mellon observed gains in 12 measures of syntactic

fluency far beyond the increases registered by students not taught sentence combining. Mellon thought sentence combining to be an a-rhetorical activity, and he was concerned that sentence-combining practice not harm writing quality. O'Hare (1973) argued along the lines of Christensen that sentence-combining practice could positively affect writing quality. He reported significant gains in writing quality as well as gains in syntactic maturity among seventh-grade writers as a result of sentence-combining practice. Numerous sentence-combining studies at various grade levels (reviewed in Kerek, Daiker, & Morenberg, 1980) supported O'Hare's results with certain exceptions.

The Miami University study (Daiker, Kerek, & Morenberg, 1978; Kerek, Daiker, & Morenberg, 1979, 1980; Morenberg, Daiker, & Kerek, 1978) extended the potential of sentence combining to produce significant gains in syntactic maturity and overall writing quality to the college level. The Miami University investigators first assumed that the sentence combiners' gains in quality were related to the increases in Hunt's syntactic indices (Morenberg et al., 1978). After the completion of the Miami University study, Faigley (1979b, 1979c) examined syntactic indices as predictors of overall quality and found that Hunt's measures explained less than 3% of the raters' judgments of quality (see also Nold & Freedman, 1977; Witte & Faigley, 1981b). Harris (1977) and Freedman (1979) conducted experiments to determine which internal factors in essays were significant influences upon raters. They rewrote essays to be strong or weak in content, organization, and sentence structure, and they found the influence of sentence structure considerably less important than the influences of content and organization upon raters' judgments of quality. When the Miami University investigators analyzed the relationship between syntactic maturity and quality in the data they collected, they too found the syntactic indices to be very poor predictors of overall quality (Kerek et al., 1980).

If syntatic differences have little influence upon judgments of writing quality, then how are the gains in writing quality produced by syntactic approaches to college writing to be attributed? Various explanations have been advanced, including the rhetorical assumptions introduced into sentence-combining pedagogy (Kerek et al., 1980; Kinneavy, 1979; Mellon, 1979; Witte, 1980). Other theories concern the composing process and are of most interest to the present review. Both Flower and Hayes (1980b) and Winterowd (1976) see the value of sentence combining in reducing the demands upon a writer. They propose that increasing students' ready store of sentence patterns improves the quality of their writing because students no longer have to spend as much planning effort on sentence-level considerations and can devote more mental capacity to "higher-level" planning concerns such as generating ideas, organizing, and goal setting.

Kerek (1981) extends the "cognitive load" hypothesis. He sees every writer operating within two kinds of constraints: developmental constraints--such as an 8-year-old's difficulty using left-branching structures--and rhetorical constraints--such as the demands of a particular situation. Kerek's distinction is similar to Flower's (1979) description of "writer-based" and "reader-based" prose. As children progress through the grades, developmental constraints govern less and less of their writing and rhetorical

constraints become more important. Moreover, Kerek's claim for the value of sentence combining goes beyond the reduction of cognitive demands. He theorizes that sentence-combining practice can "enlarge the students' syntactic repertoire and increase their capacity for syntactic processing, by maximizing their chunking ability and thus expanding the size of their mental 'armful'--the amount of information that they can pay attention to" (1981, p. 105-106).

IV. REVISION

According to Nold, revising is "the retranscribing of text already produced after a portion of the already existing text is reviewed and found wanting" (1979, p. 2). Revising involves both producing and planning, a fact which Emig (1971) acknowledges in her choice of the term "reformulation" rather than revision. In spite of the difficulty of isolating revision for study, researchers have devoted a great deal of attention to this subprocess of composing. A few research studies have sought to develop classifications for coding the kinds of revisions made by writers. Another concern of researchers which has received less attention is dissonance--the writer's sense of incongruity between what was intended and what was executed. Most interest in revision has focused on describing in a general way what revision strategies writers use. Finally, a few studies have looked at the effects of instruction on revision.

IV. 1. CLASSIFICATION SYSTEMS FOR REVISION CHANGES

Experienced writers often make complex changes in their work during revision (Dembo & Pondrom, 1972; Faigley & Witte, 1981; Flower & Hayes, 1980a; Plimpton, 1963, 1967, 1976; Sommers, 1980). Developing a reliable system for distinguishing between structural and surface revisions has proved to be a difficult task. Thus, most studies exploring revision have relied on intuitive descriptions of what revisions their subjects made.

One of the earliest attempts to catalog revisions systematically is Hildick's (1965) effort to classify the types of revision changes used by major writers of English fiction and poetry. Another major study of the effects of revision was the 1977 survey of the National Assessment of Educational Progress (Rivas, 1977). Focusing on the revisions of elementary and secondary students, the NAEP study used categories such as "organizational," "stylistic," "continuational," and "holistic" changes, categories that overlap considerably with Hildick's and render the NAEP study equally impressionistic.

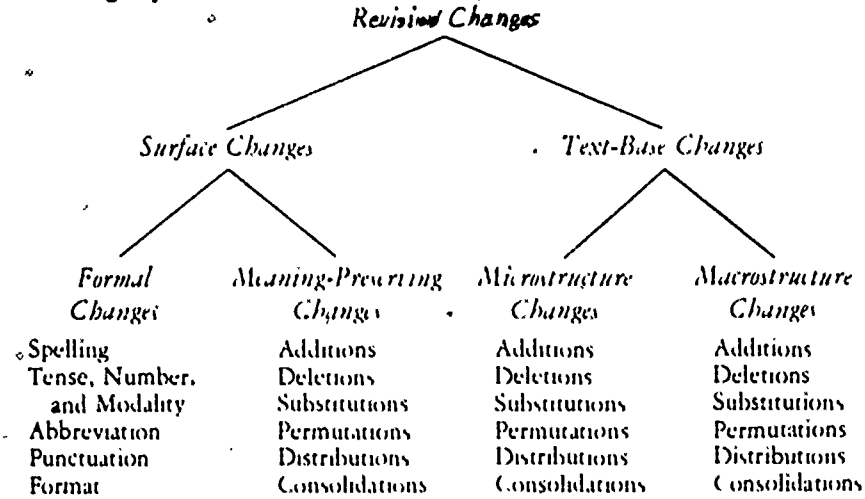
In his study of the composing processes of high school seniors, Stallard (1974) devised a classification system for revisions based primarily on the amount of text affected. His categories were "spelling," "punctuation," "single word," "multiple word," "syntactic," and "paragraph." More rigorous classifaction efforts were made by Sommers (1978, 1980) and Bridwell (1980). Sommers classified changes by length--word, phrase, sentence, and "theme"--and by type of operation--deletion, addition, substitution, and rearrangement--using the same categories that Chomsky (1965) used to group transformations. Sommers' study led to additional research in revision, but measuring the effect of revision on the meaning of texts lies beyond the scope of her study. Bridwell (1980) employed a classification system similar to that of Sommers with one important difference: Bridwell included a category for broad, text-motivated changes, even though she found no examples among her twelfth-grade writing sample. The categories in her classification were "surface level" (involving principally mechanical corrections), "lexical level," "phrase level," "clause level," "sentence level," "multi-sentence level," and "text

level."

In order to provide a classification scheme adequate to describe satisfactorily the nature of revision changes and the effects they have on the meaning of a text, Faigley and Witte (1981, in press-a) developed a system drawing on work in text linguistics (van Dijk, 1977; van Dijk, 1980) and cognitive psychology (Crothers, 1979; Kintsch & van Dijk, 1978). The primary distinction in their taxonomy is between those revision changes that do not affect the meaning of text (Surface Changes) and changes that affect the meaning of a text (Text-Base Changes). Surface Changes include Formal Changes, mostly changes in mechanics, and Meaning-Preserving Changes, changes that "paraphrase" the concepts in a text. Text-Base Changes are divided according to whether the change in meaning would affect the summary of a text (Macrostructure Changes) or would not (Microstructure Changes) affect the summary of a text. Faigley and Witte also characterized six types of revision operations: additions, deletions, substitutions, permutations, distributions, and consolidations.

FIGURE 2

Faigley and Witte's Taxonomy of Revision Changes



IV. 2. REVISING STRATEGIES

The overwhelming concern of researchers interested in revision has been in determining what strategies writers employ when revising, strategies ranging from simple editing to very complex operations.

Revision strategies of children. While observing very young writers in the first through fourth grades, Calkins (1979), Sowers (1979), and Graves (1979) observed that these children were capable of many revision strageties, some quite sophisticated. Graves noted several patterns of revising behaviors in his study. When students have just begun to put letters together to make words, adjusting the form of the letters is the only revising activity. As children gain more control over the process of putting words on paper, they begin revising in other ways. The most common revision strategy is adjusting spelling, but young students also cross out occasional words and substitute others. Some young writers even perform more advanced revisions such as

deleting paragraphs, rearranging sentences and paragraphs, and adding new information. Young writers tend to revise more easily accounts of their own experiences than accounts of the experiences of others. While revision strategies broaden as the child develops, Graves noted that "teachers play a significant role in releasing a child's potential for revision" (1979, p. 319).

In another study of the composing processes of a young child, Kamler (1980) demonstrated the effects that a primary teacher had on the revision strategies of one student who worked on a story about her cockatiel over a three-week period. After the initial writing of the story, the teacher first had the student read and discuss the story with a peer. Later, the student had two conferences about the paper with her teacher and, finally, met in a peer-group conference to discuss the paper. As a result of each conference, she made changes in her paper. Her composition evolved from a few unrelated, brief generalities about her bird to a much longer development of her topic--several accounts of the bird's activities. Kamler observed that even in primary grades, children are capable of making extensive revisions beyond editing for mechanical errors. The student revised to add information, delete irrelevancies, clarify meaning, and add transitions. Kamler claimed that what was most notable about the student's experience was not the product itself, but the "process that helped develop an inadequate beginning into a competent end" (p. 693).

Bartlett (1982) conducted a series of experiments with 250 young children, grades 4-7, to find out whether certain textual problems are more difficult to detect and correct in one's own writing than in the writing of others. In her studies regarding detection of textual problems, Bartlett focused on syntactic anomalies--missing subjects, predicates, or prepositions--and referential ambiguity. In these experiments, each student wrote a short text which he or she edited one week later; then, all the students were asked to edit eight short texts provided by the experimenter. Bartlett found that the students detected both syntactic anomalies and referential ambiguities much more often in the texts of others than in their own texts. In addition, they had great difficulty in detecting referential ambiguity in their own texts. Bartlett suggested that this last result is probably due to the interference, when a writer attempts to edit his or her own text, of the writer's "privileged knowledge." Students probably could not detect ambiguous references because these references were perfectly clear to them.

In her studies regarding correction of textual problems, Bartlett investigated children's ability to correct ambiguous coreferences in narrative texts. Among other results, she found that these students had a great deal of difficulty "generating and coordinating [disambiguating information] about two sets of ambiguous noun phrases" (p. 359), even though they were able to "recognize and use disambiguating information when it was provided in the text" (p. 360). Bartlett concluded that the choice of correction strategies for elementary students "is likely to depend less on the constraints of a particular context than on the ease with which a strategy can be executed" (p. 361). By and large, the children ignored contextual constraints in making corrections, a fact which suggested to Bartlett "that knowledge available to

comprehension and detection processes need not be equally accessible for production and correction" (p. 361).

One large-scale study of older children's revisions conducted by the National Assessment of Educational Progress (Rivas, 1977) included three groups of 2,500 students aged 9, 13, and 17. The 9- and 13-year olds were first asked to write in pencil a science report about the moon and then asked to make any revisions in pen. The 17-year-olds followed the same procedure, except that their writing task was a note to a grocer about the sale of some rotten peaches to a child. Of the students writing the science report, the 13-year-olds revised more extensively, even though they were better prepared to write this report than the 9-year-olds. Nold (1981) attributed this result to "a complex developmental relationship between knowledge and the increasing use of strategies" (p. 76). Nold held that the increasing number of organizational changes was due to the 13-year-old's increasing ability to view their discourse holistically, a sign of "predictable cognitive and social development" (p. 76). While the majority of students in all of the age groups attempted some revision of their texts, the 17-year-olds revised much less extensively than the 13-year-olds. Nold attributed this circumstance to the easier writing task which the 17-year-olds were asked to do.

Scardamalia and Bereiter (in press-b) studied what competencies children need to perform various revision strategies. The subjects for the study were ninety children--thirty each from grades 4, 6, and 8. While composing a paragraph on the topic, "Should children choose the subjects they study in school?" half of the students from each class were asked to stop after each sentence was written and perform three related tasks: (1) The students evaluated their sentences using eleven evaluation phrases supplied by the researcher, such as "People may not understand what I mean" or "This is good." (2) They then made a "tactical choice" of what to do with the sentence by using the six directives supplied by the researchers, e.g., "I'd better say more." (3) These students then either changed the sentence or generated the next one. Scardamalia and Bereiter called the process "Compare, Diagnose, and Operate," likening it to one of the operations which experienced writers generally perform when they are producing texts. During the entire process, students gave thinking-aloud protocols. The other half of the subjects wrote a paragraph to which afterwards they applied the "C-D-O" process, sentence-by-sentence, also making thinking-aloud protocols. These researchers found that students' evaluations of their papers agreed to a large extent with the assessments of an adult rater; however, students were generally unable to diagnose specific problems. Their difficulty with diagnosis seemed to be caused by their focus on problems within sentence rather than considering the effect of particular sentences in the text as a whole.

The C-D-O process used in the study described above was one of the many intervention techniques or "facilitators" which Bereiter and Scardamalia have developed in conjunction with other researchers to explore children's writing processes. Specifically, they have sought to discover in which aspects of composing children have competence but are not able to demonstrate in their performance because of other problems with composing. Thus, for example, in the study cited above, children were able to assess individual sentences as inadequate using the C-D-O evaluation procedure. But because of their

inability to name the specific problem causing the inadequacy and their general inability to change these sentences effectively, they were not demonstrating competence in evaluating texts. In a retrospective report of their research, Bereiter and Scardamalia (1982) focus on what they see as a crucial problem for children learning to produce written texts: "the transition from a language production system dependent at every level on inputs from a conversational partner to a system capable of functioning autonomously" (p. 1). In addition to reporting the results of their many studies, they offer suggestions on the potential for instruction in the classroom of applying "procedural facilitation, . . . any reduction in the executive demands of a task that permits learners to make fuller use of the knowledge and skills they already have" (p. 52). The C-D-O procedure is such a case. Children enjoyed using the C-D-O procedure and viewed it as profitable. In addition, Bereiter and Scardamalia speculate that children will become better self-evaluators with practice in using the C-D-O procedure. These researchers suggest how to implement procedural facilitation techniques in a variety of classroom tasks.

Revision strategies of high school seniors and adults. Revision has been of great interest to researchers studying the composing processes of adults. For three years Crowley (1977) observed the composing processes of freshmen students. She described their revisions as virtually limited to correcting mechanical errors after the first draft was written "straight through, sentence by sentence, in classic Sherman-through-Georgia fashion" (p. 167). Crowley reported that her students conceived of a second draft of a paper as "a neat recopying of the first" (p. 167). Bridwell (1980) also found that many of the second drafts of her twelfth grade subjects whose papers were rated as poor were mere recopies of their preliminary drafts. Pianko (1977, 1979a, 1979b) found similar results for the majority of her seventeen freshmen in remedial and traditional composition classes. Most of her subjects "revised" their text, by recopying them, "but with some word and sentence changes as well as mechanical corrections" (1979a, p. 10). Sommers (1978, 1980) reported the same revision procedures for her inexperienced writers.

Perl (1979) described very different patterns of revision for the five unskilled college writers in her study, even though, as in the above studies, the majority of their revisions were mechanical or word level revisions. During the writing of their first draft, these students stopped constantly to edit their papers. Their revision strategies were "primarily an exercise in error hunting" which "intrudes so often and to such a degree that it breaks down the rhythms generated by thinking and writing" (p. 333). Furthermore, Perl observed that despite this overwhelming preoccupation to "correct" their papers--to improve them--the quality of the unskilled writers' final products was inferior, a phenomenon also noted by Bridwell (1980). Perl discovered that the unskilled writers' lone editing strategy--eliminating errors--was not only inadequate but created additional problems:

> The simple set of editing rules at their disposal was often inappropriate for the types of complicated structures they produced. As a result, they misapplied what they knew and either created a hypercorrection or impaired the meaning they had originally intended to clarify (p. 332).

Perl concluded that these students seemed to have little, if any, understanding of how to revise their work effectively. Sommers (1978, 1980) and Faigley and Witte (1981) made similar conclusions about the inexperienced writers in their studies.

Mischel (1974) found that his one high school subject demonstrated a lack of knowledge of how to revise. The student explained that when one of his teachers asked him to make multiple drafts of the same paper, he tried it, writing two drafts of the paper. He described the result:

> When I looked at them and I was going to put the two together, they [weren't] too much alike, so I couldn't put them together. I tried anyway, but when I put them together it sounded stupid, so I just forgot about it. (p. 309)

Mischel observed that the student did stop occasionally during writing to correct mechanical errors, and after writing a paper, he generally reread it, changing some words. But his conception of revision to produce a second draft was simply writing the same paper over again.

Bridwell (1980) found that many of her twelfth grade subjects demonstrated the same behavioral pattern as Michel's subject when writing second drafts of their texts. They "chose something like a second 'free write'" (p. 212). Bridwell suggested that these subjects either had too little interest in the writing task to go to the trouble of working back and forth from text to text or were incapable of doing so. She speculated that if these subjects' changes had not been classified with the changes of students who consistently revised instead of merely beginning again, there might have been a significant correlation between multiple sentence revisions and the quality of the final product.

Beach (1976) examined differences between the revision strategies of extensive revisers and non-revisers, a study in which Beach assumed that non-revisers produced poorer quality papers. This assumption was later discounted by several researchers (Bridwell, 1980; Faigley & Witte, 1981; Hansen, 1978; Perl, 1979; Rivas, 1977) as well as by Beach himself in a later study (1979). Nevertheless, his study did produce some interesting results. Beach's subjects were 26 college juniors and seniors in a course on methods of teaching writing. They wrote two papers on topics of their choice. For each paper, they wrote a first draft and then taperecorded their evaluations of this draft. They continued writing drafts and taping evaluations (allowing a two-day interval between drafts) until they were satisfied that they had made all the changes they wanted to. The drafts were rated by two professional editors as either extensively revised or revised little, resulting in 11 students classified as extensive revisers and 15 as non-revisers. Beach analyzed the transcribed self-evaluations to determine the differences between the two groups. He concluded that extensive revisers "conceived of revising as involving substantive changes in content and form" (1976, p. 164) while non-revisers saw revising as making minor changes. Non-revisers were "often unwilling to criticize themselves" and "rarely predicted changes for subsequent drafts" (1976, p. 164).

While extensive revising cannot be equated with higher quality products, Stallard (1974) found that his group of good high-school senior writers did revise more extensively than the control group of randomly selected seniors from the same class. The group of good writers made significantly more word, multiple word, and paragraph changes in their drafts than the randomly selected group. There was no significant difference, however, between the two groups in spelling, punctuation, and syntactic revisions. Perhaps the critical point here was not so much in differences in the number of revisions as in the different kinds of revisions the two groups of writers made. Faigley and Witte (1981) found that their inexperienced freshman writers made far less frequent changes in meaning than the advanced students and expert adult writers who participated in the study.

Sommers (1978, 1980) examined the revisions of 20 college freshmen and 20 experienced adult writers. Each writer wrote three drafts of three different essays--one expressive, one explanatory, and one persuasive. In general, the students viewed their first draft as conceptually "finished," requiring only changes to correct mechanical errors and lexical changes to get the paper "rightly worded" (1980, p. 382). These inexperienced writers had what Sommers called a "thesaurus philosophy of writing" (1980, p. 381). They lacked any revision strategies which would help them develop ideas in their essays or change the focus of their ideas. Sommers concluded that inexperienced writers' strategies for revision are "teacher-based, directed toward a teacher-reader who expects compliance with rules" (1980, p. 383).

The experienced adult writers in Sommers' study demonstrated a vastly richer conception of the revision process. Sommers found their revising to be recursive, a pattern observed among other expert adult writers (Faigley & Witte, 1981). In preliminary drafts Sommers found that her expert writers generally suppressed concerns about correctness or getting the right word. Instead, these writers thought of their first draft as a free writing of ideas which could later become a developed and focused essay ready for editing. Experts, Sommers explained, had "develop[ed] strategies to sort out and organize their different concerns in successive cycles of revision" (1980, p. 387). Two other major revising strategies distinguished these writers from the inexperienced student writers. Unlike the student writers, the experienced writers revised on the basis of a clear sense of audience expectations, and they used dissonance--the incongruity between their intentions for their texts and execution of those intentions--as a means to discover new ideas.

Bridwell (1980) conducted another study centered exclusively on revision. She examined how high-school seniors revise and whether the revising patterns of better writers differ from those of less proficient writers. One hundred randomly selected students wrote essays describing a place they knew well to another twelfth grader who had never seen it. They were given the assignment the day before they were to write their first draft. The following day they wrote the first draft, and on the next day they were asked to make any revisions they would like to make on this draft and to write a second revised draft of the paper. Bridwell classified the type and frequency of revisions, and she codified them according to when they were made: during the writing of the first draft, between the writing of the first and second drafts, or during

the writing of the second draft.

Bridwell found that the great majority of revisions performed by students in her study were at the mechanical and word levels. She discovered no correlation between the amount of revising a student did and the quality of the product, a finding also reported by Faigley and Witte (1981). Some of the papers rated as successful were written both by students who revised little and by students who were extensive revisers. The poorer writers in this study fell into one of two groups: those who "revised" the first draft by simply recopying it and those who "labored through hundreds of spelling and punctuation changes while writing" (p. 218). Bridwell saw these tendencies as signs of developmental differences among the writers.

Using their classification system of revisions, Faigley and Witte (1981) conducted two revision studies. In the first study, subjects were six inexperienced college freshmen, six advanced college students, and six expert adult writers. They were asked to describe for an out-of-town newspaper a place in Austin, Texas. (All subjects resided in Austin.) In a procedure similar to Bridwell's, subjects received the assignment on the first day, wrote their first draft on the second day, and a second draft on the third day. The revisions which the writers made during the writing of each draft were determined and all differences between the first and second draft were coded. Revisions were classified according to their effect upon the meaning of the text and type of operation involved when the writer made the change.

Faigley and Witte found that the way in which the three groups of writers revised their work was not the same. The advanced students turned out to be the most frequent revisers, making Surface Changes about twice as often as the expert writers, but making a comparable number of changes affecting meaning as the expert adults. The inexperienced student writers' revisions were overwhelmingly Formal or Meaning-Preserving Changes. Between drafts inexperienced writers tended to substitute synonyms just as they did in the Bridwell (1980) and Sommers (1978, 1980) studies. At this stage the expert writers directed most of their efforts to reworking the content of their first draft. At all stages the experts made fewer Formal Changes and Meaning-Preserving Changes than either of the student groups. The few Surface Changes that expert writers made were done during and after the writing of the second draft, when the meaning they wished to convey was in place. The advanced writers also delayed cosmetic revisions until the second draft.

In their second study, Faigley and Witte gave copies of the first drafts of three inexperienced writers to six expert adult writers, asking the experts to revise the drafts as if they were their own. While the experts exhibited considerable diversity in revising their own texts, they revised inexperienced students' drafts in similar ways: "they condensed what the students had written and then either elaborated or added information to support the points the students apparently had wanted to make" (1981, p. 409).

The results of the two studies tend to support the suggestion of Perl (1979) and the conclusions of Sommers' (1978, 1980) study--that expert writers revise in ways different from those of inexperienced writers. The Faigley and Witte studies provide a way of describing through text analysis what Sommers

learned through interviews.

Finally, several claims have been made for the benefits of using computers as aids in revision (reviewed in Bridwell, Nancarrow, & Ross, Note 4), either with programs developed to give "text feedback" such as the Writer's Workbench (McDonald, Frase, Gingrich, & Keenan, 1982) or with text editing programs that facilitate revision (Card, Moran, & Newell, 1980). Gould (1980) suggests that the use of such equipment increases the number of revisions a writer elects to make. Research is now underway that examines both how composing processes can be studied with computers and how teachers can best use computers in the writing classroom (Bridwell et al., Note 4).

IV. 3. WHY WRITERS REVISE

Dissonance. R. L. Graves (1978) discussed the role of dissonance merely as the stimulation for correcting what is "wrong" with in a text, which in his study entailed flawed sentences. He claimed that when readers are dissatisfied with a sentence, they "reconstruct, mentally, the existential situation," and then "recast the sentence, making its form reflect the situation" (p. 230).

Graves' view of the role of dissonance is a very limited one according to several researchers Sommers, 1978, 1980; Perl, 1980; (Della-Piana, 1978; Flower & Hayes, 1981a; Sommers, 1978, 1980; Perl, 1980). Sommers assigned dissonance a much larger role for experienced adult writers. When these writers "recognize[d] incongruities between intention and execution," this dissonance, which "both provokes revision and promises, from itself, new meaning" (1980, p. 386) stimulated them to discover new ideas for their writing. Both Perl (1980) and Flower and Hayes (1981a) recognized the creative nature of dissonance. Perl (1980) describes dissonance as a "felt sense" that prompts the writer to move backward in his or her writing. Flower and Hayes (1981a) have provided for creative function of dissonance in their model of composing by incorporating revising and evaluating under the broader process of reviewing: reviewing can lead to idea generation.

One extensive exploration of the role of dissonance in revision has been conducted, focusing on the revision of poetry. Della-Piana (1978) incorporated dissonance into his "Model of Writing as Revision." He theorized that dissonance may lead to tension which a writer can reduce by reconception.

Situational variables. A great deal of anecdotal evidence indicates that situational variables are important determinants of how writers revise (Dembo & Pondrom, 1972; Faigley & Witte, 1981, in press-a; Hildick, 1965; Plimpton, 1963, 1967, 1976). Nold (1981) attributed to uncontrolled situational variables the anomalous finding of the 1977 NAEP study that 17-year-olds revise less than 13-year-olds. Little research, however, has directly addressed the influence of situational variables upon revision. Beach (1979) noted a significant effect among writing topics on the degree to which writers revised. He theorized that "differences in topic, even within one discourse mode, affect revising" (1979, p. 119).

Textual variables. Although a multitude of style manuals and composition handbooks offer advice on revising specific textual features (such as "Change passive sentences to the active voice"), until recently no researcher attempted to identify what textual cues prompt revision. Witte (Note 5) investigated what textual cues may contribute to a writer's decision to revise. Eighty students enrolled in several levels of university composition courses were given a short informative text which they were asked to revise so that it would be easier to read and understand. Four raters--two composition teachers and two professional lay persons--judged how well students accomplished this task. The 20 texts with the lowest ratings and the 24 texts with the highest ratings were chosen for analysis. Several discourse variables identified by Daneš (1964) and adapted by Lautamatti (1978) were analyzed, including: (1) the "type" of T-unit based on the relationship of initial sentence element, topical subject, and grammatical subject; (2) the type of progression of subtopics; and (3) the number of different subtopics. Witte found several significant differences in the topical structure of the high- and low-rated texts. The most striking was the difference in the mean number of subtopics in the high- and low-rated revisions. The low-rated revisions contained almost twice as many subtopics as the high-rated revisions. Witte suggested that students who received low scores failed to understand the focus or gist of the original text, accounting for the high number of subtopics and the arrangement of those subtopics.

IV. 4. INSTRUCTION IN REVISION

Hansen found that there was no significant difference between the two groups in mean gains in essay quality over the term. Both groups showed "appreciable gain[s] in composition skills" (p. 959). Hansen concluded that what seemed to be the determining factor in the improvement in compositions of both groups was the extensive instruction in revising strageties that both groups received. One-fourth of class time was spent on this activity. She suggested that "if comprehension of revision techniques is achieved, the actual writing out of what has been comprehended may be irrelevant" (p. 960). Fulkerson (1978) has seriously questioned Hansen's conclusions on the grounds that making judgments about students' revision skills on the basis of the quality of one piece of writing gathered at the end of a term is an invalid procedure.

Beach (1979) conducted an experiment to determine the effects which two treatments--between-draft teacher evaluation and between-draft guided self-evaluation--would have on the amount of revision and the quality of student compositions. Beach's subjects, 103 senior-high students, were randomly assigned to one of three different groups--a control group receiving no treatment, a group whose rough drafts would be evaluated by their teacher, and a group who would use a guided self-evaluation form to assess their own rough drafts. The students wrote two drafts each on three expository topics assigned by the researcher. Judges first scored all of the drafts on such quality dimensions as focus, support, and sequence. Afterwards, the rough and final drafts of each paper were rated for degree of change. A fluency score was assigned on the basis of the number of words in each draft.

Beach found that his subjects receiving teacher evaluations rated

significantly higher scores for both degree of change and fluency than the other two groups. Nevertheless, the only quality dimension for which the group receiving teacher evaluation obtained a significantly higher score was support, a fact which Beach attributed to the teacher's empahsizing support in the evaluations. In any case, writing more words and revising extensively did not necessarily produce better results. There were no overall significant differences between the other two groups' performances on any of the ratings. Beach accounts for this result in three ways: the students' lack of training in how to perform self-assessment, their "not [being] accustomed to critically detaching themselves from their writing" (1979, p. 118), and their lack of strong motivation to perform self-assessment. Beach also found that differences in topics--which varied along a familiarity-to-writer dimension--affected to some extent the revision strategies of the subjects.

Revision skills appear to be emphasized more than invention skills in the schools, at least in English classrooms. Applebee (1982) found that 59% of responding teachers regularly require more than one draft, but only 7% of the science teachers ask for revisions. At the college level, Witte et al. (1981) found that 39.7% of responding teachers listed teaching revision among the most successful aspects of their courses.

V. EVALUATING CHANGES IN COMPOSING PROCESSES

Up to now we have looked at studies which examine a variety of processes and subprocesses involved in composing. These processes often overlap and interact in complex ways. The extreme complexity of composing coupled with the fact that so little is directly observable necessarily makes the study of composing a very difficult endeavor. Although we have not tried to sort out the many sources of theoretical and methodological confusion in the studies we have described, it should be evident that terms such as "planning," "transcribing," and even "composing" often differ in meaning from researcher to researcher. These terms are often overlapping, and some researchers do not find it necessary to distinguish among them.

For example, Scardamalia, Bereiter, and Goelman (1982) offer a simple, but elegant, distinction for analyzing processes of composing. They distinguish components "having to do with goals, plans, strategies, task-related knowledge and the like" as metacomponents (1982, p. 173). They call another set of components used to carry out the writer's decisions and plans production factors. Following this distinction, we can sort composing subprocesses for adult writers along these lines:

PRODUCTION FACTORS	METACOMPONENTS
psycho-motor activities	task-related knowledge
syntactic processes	subject-related knowledge
grapholect	audience-related knowledge
inferences	goal setting
short-term memory	organizing
etc.	etc.

From this brief list of metacomponents, we can see that knowledge of writing is of two kinds: knowledge of strategies for composing and declarative knowledge about writing. Ryle (1949) described this distinction as the difference between knowing "how" and knowing "that." Polanyi (1962) makes a similar distinction that Reither (1981) has applied to composing and the teaching of writing. Recently, researchers in artificial intelligence have debated how to represent declarative and procedural knowledge, coming to the conclusion that they are not easily divisible (Winston, 1977).

Many of the studies of composing that we have discussed up to now have focused on writers' observable behavior. A few have examined the knowledge that underlies this behavior. The study of a writer's knowledge is essential to understanding why that writer does or does not make particular decisions and execute particular strategies during composing. In the next two sections, we will outline the kinds of knowledge that a writer possesses. We make a broad distinction between a writer's general knowledge--knowledge of language systems, discourse, and conventions of writing--and a writer's knowledge of a particular writing task--essentially situational knowledge that is matched with a writer's general knowledge. We highlight some of the issues in the vast literature on knowledge of language and context that are pertinent to the

study of writing processes.

V. 1. A WRITER'S GENERAL KNOWLEDGE

Knowledge of language systems and discourse are highly developed before children form their first letters on the page. Consequently, the nature and sequence of development of oral language strongly influnces the development of writing abilities. We will briefly review some of the important work in language systems and discourse that is part of a writer's knowledge. Much of research in language and discourse is technical and specialized, as our review below suggests, but together this work suggests the complexity of a writer's general knowledge of writing. We have divided general knowledge into knowledge of language systems, knowledge of discourse, and knowledge of conventions of writing.

(1) Language Systems. All healthy humans can talk; not all learn to read and write. Since Bloomfield's dictum that "Writing is not language" (1933, p. 21), the discipline of linguistics has focused on spoken, not written, language. A few contemporary linguists in both Europe (Stubbs, 1980; Vachek, 1973) and America (Read, 1981; Tannen (ed.), 1981) have finally broken the restriction on the study of written language just as they have ventured beyond Bloomfield's restriction of linguistics to sentence-level structures and below. Nevertheless, most linguists in America still observe the traditional boundaries of linguistics, ignoring written language.

The traditional boundaries of linguistics do prove useful to the present discussion because they isolate those aspects of writing that are the birthright of all healthy children. These aspects include systems of phonology, lexical items, and syntax, which children acquire in developmental stages. Much is known about the sequence of development. In general, the rates of development vary greatly among the major components, with learners devoting more attention to phonology and vocabulary at earlier stages than to syntax. As learners become more proficient in using a particular system, that system becomes increasingly automatized, demanding less of the user's awareness (Shuy, 1981).

The usual sequence of writing instruction follows a pattern similar to oral language acquisition, where children are first taught to make and recognize letters, then taught to spell, and finally to form sentences (Bissex, 1980). But there are more differences than similarities between how children learn to talk and write. Children learn to speak without instruction, but they must be taught to write. Furthermore, children are taught to write after they learn how to speak. What a child already knows about language influences how he or she learns to write. For example, children in the first and second grades frequently invent spellings based on their knowledge of sound-letter correspondence (Bissex, 1980; Gundlach, 1981; Read, 1980). The complexity of speech-writing relationships is also illustrated in written syntactic development. O'Donnell, Griffin, and Norris (1967) found that the written syntax of third graders was much simpler than spoken syntax, but in the fifth and seventh grades, written syntax tended to be more complex. Loban (1976) reported similar findings in a study of language development from kindergarten through grade 12, although he found

that syntactic development in oral language is more regular than in written language. Much remains to be learned about oral and written language development, especially the relationships of systems such as syntax to abilities to construct whole texts and to meet the needs of particular contexts for speaking and writing.

Another important relationship between oral and written language development lies in what sociolinguists have called the speech community. Hymes (1974) argues against the view of Bloomfield (1933) and Chomsky (1965) that a speech community is essentially the same thing as a language. Hymes points out that boundaries between communities cannot be determined by the use of a common language. Instead, members of a speech community share knowledge about how to use language and how to interpret language through a process of socialization. Several studies have analyzed the written language of particular occupations such as law (Charrow, Crandall, & Charrow, in press) and in large organizations (Redish, 1981).

(2) Discourse. Human ability to produce and understand language cannot be described solely in terms of traditional linguistic systems such as syntax and phonology. People use language to form texts that have a communicative function. When we study texts as communicative acts, we study language as discourse. Among the most important properties of discourse are cohesion--the sentence by sentence links in a text, coherence--the links between a text and the external reality, and intentionality--the text as a human action.

Cohesion is a blanket term for several kinds of grammatical and semantic relations signalled within a text. Beaugrande and Dressler (1981) distinguish between short-range and long-range cohesion. Short-range cohesion is maintained through grammatical dependencies and can be represented by grammatical networks (Beaugrande, 1980; Woods, 1970) or propositional grids of the concepts in a text (van Dijk, 1977; Frederiksen, 1977; Kintsch, 1974; Meyer, 1975). Long-range cohesion is established primarily through various kinds of recurrence, especially the repetition of key words and concepts (Halliday & Hasan, 1976). Cohesion is also related to the distribution of "old" and "new" information in a text (Clark & Haviland, 1977; Daneš, 1970, (ed.) 1974; Dillon, 1981; Palkova & Palek, 1978; Prince, 1981; Vachek (ed.), 1975). Old information is that information which the listerner either knows or has been made aware of by previous mention in the text. Together, these relations provide not only the "glue" that holds a text together but also signal the discourse topic, mark relationships among elements in a text, and supply cues for salient information and intentions.

Texts are cohesive only if the surface text achieves coherence with a world that a listener knows or can imagine. If people interpreted texts in strictly logical fashion, coherence would not be a difficult phenomenon to explain. But texts are not strictly logical in structure nor are they interpreted in ways comparable to formal logic. The concepts in texts are often fuzzy and ill-defined, allowing many possibilities for interpretation. Furthermore, ways of establishing coherence differ from culture to culture (Chafe (ed.), 1981).

People derive meaning from texts by integrating concepts in a text with

their knowledge of the world. Consequently, researchers who have sought to understand how texts are comprehended have been forced to study how people store knowledge as well. Researchers have represented knowledge structures as frames (Minsky, 1975), scripts (Schank & Abelson, 1977), and schemata (Anderson, 1978; Mandler & Johnson, 1977; Rumelhart & Ortony, 1977; Thorndyke, 1977). Texts are coherent only when they are integrated with a listener's knowledge. Texts, however, typically are incomplete, and listeners rely upon their knowledge of the world and expectations about texts to make inferences (Clark, 1977; Crothers, 1978, 1979; Schank, 1975). In fact, very explicit texts are difficult to understand not only because they are redundant but also because both listeners and readers make unintended inferences (Shuy & Larkin, 1978). Recent work in the field of artificial intelligence--the attempt to model human thought processes using computers--has demonstrated the extent that listeners must contribute to the construction of meaning. Attempts to have computers to tell stories, for example, illustrate that even simple folktales must be interpreted through subtle chains of reasoning (Black, Wilkes-Gibbs, & Gibbs, 1982).

Intentionality refers to the goal or motive underlying a text. The study of intentions is often called pragmatics following from Morris (1946). Children learn how to express intentions very early in life. Bruner (1978) has found evidence for four types of communicative functions--indicating, requesting, affiliating, and generating possibility--in the prespeech communication of children. Many recent studies have examined the relationship of communicative intentions to social structures (e.g., Halliday, 1978; Sinclair & Coulthard, 1975).

The most extensive attempt to construct a theory of intentions in texts is speech-act theory (Austin, 1962; Bach & Harnish, 1979; Searle, 1969, Steinmann, 1982). Searle (1969) analyses statements in four levels: as utterance acts possessing linguistic meaning (that is, an text that is grammatical), as locutionary acts possessing propositional content (that is, a coherent text), as illocutionary acts possessing intentions that the speaker wishes someone to recognize (such as a request), and as perlocutionary acts capable of bringing desired effects upon listeners (such as changing someone's beliefs). Speakers successfully communicate if the listeners recognize their illucutionary intention, but speakers are successful as persuaders only if their listeners perform the speakers' perlocutionary intentions. In other words, the intent of a speaker's request may be clear, but the listener may not want to do what the speaker requests. Listeners rely upon shared assumptions when interpreting a speaker's intentions. Grice (1975) described four categories of mutual beliefs which he called the cooperative principle. They include quantity (Make your text no more or less informative than is required), quality (Say only what you believe to be true and have adequate evidence to support), relation (Be relevant), and manner (Be brief and orderly; avoid obscurity and ambiguity).

Green (1982) claims that the ability to infer speakers' plans, goals, intentions and purposes from their utterances and the ability to plan and execute communication in such a way that such inferences are most efficiently made are more important than knowledge of language itself. Green outlines four steps, which may occur unconsciously and simultaneously, for making any

-utterance. The communicator must select some constellation of aspects about the subject of the utterance, order this group of aspects, choose suitable expressions for them, and arrange the chosen expressions according to the rules of grammar and whatever principles of rhetoric are available and relevant. These four steps, she claims, are directed more by pragmatic knowledge of goals, plans, and intentions than by grammatical knowledge.

Thus, the ability to convey and recognize intentions is heavily dependent upon the mutual knowledge and beliefs of the speaker and listener. Listeners must be able to distinguish between literal and nonliteral usage and, at times, even interpret the motives of deliberately deceptive texts.

(3) Conventions of Writing. The aspects of speech and discoursing discussed above are learned without formal instruction. Conventions of writing, on the other hand, must be taught. The most obvious of these conventions are visible aspects of written form, such as graphemes (Vachek, 1973), spelling (Stubbs, 1980), paragraphing (Becker, 1965; Christensen, 1965; Rodgers, 1966), and various written formats such as letters and reports. Some researchers even argue that written language represents a special dialect (e.g., Hirsch, 1977).

Besides strictly formal conventions, writers learn aspects of discoursing particular to writing. These would include certain kinds of lexical cohesion (Witte & Faigley, 1981a), certain kinds of logical connectives (Pitkin, 1977a, 1977b; Winterowd, 1970), certain ways of distinguishing old and new information (Vande Kopple, 1982), certain ways of identifying topic (Faigley & Witte, in press-b), certain ways of establishing the context for a text (Olson, 1977), certain ways of expressing intentions (Larson, 1971), certain types of internal structure (Larson, 1976), certain styles (Christensen, 1967; Walker, 1970), and certain genres (Olson, Mack, & Duffy, 1981). Furthermore, readers expect writers to be innovative and distinctive (Black, Wilkes-Gibbs, & Gibbs, 1982). Cliches that might repell readers in a written text are often acceptable in speech.

Writers not only acquire knowledge about writing, they also acquire beliefs and attitudes about writing that influence how they compose. Student writers often have misconceptions about composing, such as the belief that good writers produce finished texts in the first draft (Rose, 1980). Because many people believe that writing is difficult, they tend to avoid writing whenever possible. This anxiety toward writing has been described as writing apprehension (Daly & Miller, 1975). Highly apprehensive writers select careers and make academic choices perceived to require little writing (Daly & Shamo, 1976, 1978). Highly apprehensive writers also perform less well on standardized tests of writing related skills and their written products are judged lower in quality for some types of writing (Faigley, Daly, & Witte, 1981).

V. 2. A WRITER'S KNOWLEDGE OF A PARTICULAR WRITING SITUATION

We can discuss a writer's particular knowledge as his or her ability to apply general knowledge to a particular situation. Particular knowledge refers to knowledge of the situation surrounding the act of writing. In a

particular writing situation, writers know uses for the particular task, the relationship of the writer and reader, the subject matter, and the circumstances for producing a text.

(1) Uses. Writers have some motive for writing. Students write papers to fulfill assignments, people write letters to the editor to express anger, scientists write papers to inform other scientists of their work. We can examine uses for writing from two perspectives--first, in terms of the writer's purpose for writing, and second, in terms of what benefits the writer will receive from writing.

Part of the process of learning (that is, a text that is possible according to the grammar of a language to write is learning what functions writing serves. The functions of writing--such as record keeping, entertainment, and the transmission of information--are so much a part of a literate society that they have not been studied systematically until very recently. Studies of preliterate and semiliterate peoples (Goody, 1968; Goody & Watt, 1963; Havelock, 1976) have drawn attention to the functions and uses of literacy in advanced technological societies. Recent scholarship has examined the cognitive representations underlying writing, especially in relationship to social structures (Olson, 1980). Stubbs (1980) sees writing systems as fostering historical consciousness and critical inquiry, giving people access to vast amounts of knowledge gathered over long spans of time. These functions are essential to a technological society.

Specific functions for writing have been broadly classified in several different systems. Jakobson (1960), Kinneavy (1971), and Britton et al. (1975) have advanced taxonomies of purposes. Kinneavy's classification has as its theoretical basis the four components of the "communication triangle"--which, for written discourse, would include the writer, the reader, the subject, and the text itself. Each of these components, Kinneavy argues, must be present in order for communication to occur; and when a piece of discourse emphasizes one component more strongly than the others, different kinds of discourse result. Emphasis on the writer results in self-expressive discourse; emphasis on the reader results in persuasive discourse; emphasis on the subject results in informative discourse; and emphasis on the text results in literature. More detailed taxonomies of purpose have come from speech-act theory. Bach and Harnish (1979), for example, classify 31 illocutionary acts under 4 general headings.

A second way of looking at uses for writing is in terms of exigency--what's at stake for the writer. For persons on the job, writing may be a way of accomplishing a short-range goal, such as asking a subordinate to do something, and writing can be a way of accomplishing long-range goals, such as enhancing one's reputation and advancing in a corporate hierarchy (Faigley, Miller, Meyer, & Witte, 1981). Historically, writing served as a way of expressing personal political beliefs and debating social issues, thus influencing the society at large (Heath, 1981). Writing has also maintained personal relationships among family and friends. Besides communicative and self-expressive uses, writing can be a way of discovering ideas. Writing allows us to reflect critically upon our ideas and recast them through successive drafts in a dialectical process (Scardamalia & Bereiter, Note 6).

The prompting impulse for a particular written text can be described as a pragmatic goal. Pragmatic goals, in turn, shape the operative goals that guide discourse production. Beaugrande (1980) provides an example of a pragmatic goal controlling several successive operative goals in his analysis of the discourse in Sidney Howard's The Late Christopher Bean. In this play a family during the depression learns that a destitute, fatally-ill painter whom they sheltered has now become famous and that they might resume their former style of living if they could find and sell one of his paintings. The only canvass by the painter that remains in the house is a portrait owned by their maid. The family attempts one guise after another to talk the maid into giving them the painting, each plan motivated by the same pragmatic goal. Pragmatic goals are not necessarily concealed; in fact, they are inferrable in most discourse. The point we are making here is that pragmatic goals influence other decisions in planning, such as the choice of genre and medium, as well as initiating operative goals.

(2) Writer-reader relationship. When writers begin writing, they ideally know who will read that text and what relationship they hope to establish with those readers. In actual writing, often neither is the case. Writers of fiction, for example, cannot be sure of their readership because their work may continue to be read long after their lifetime. Similarly, writers often struggle with the conventions of a particular genre--such as a business letter--to establish an appropriate relationship with an intended reader. Furthermore, young writers often ignore readers altogether, taking the position that "if readers don't understand what I write, it's their problem."

Effective written communication, however, always depends upon the reader's response to a text. Effective communicators, regardless of the medium, are sensitive to the knowledge and beliefs of the audience. For this reason, audience analysis was a foundation of classical rhetoric. In spite of a long history of rhetoric as a discipline, we still do not understand how successful orators or writers come to a sense of audience and use that awareness. Odell (1980) notes that very little research has addressed how knowledge of audience affects either written products or writing processes. And Park (1982) points out that the meanings of audience are unclear even to scholars who work with language and literature: the concept of audience may mean "actual people external to a text . . . whom the writer must accommodate," or it may suggest an audience implied by the text itself, "a set of suggested or evoked attitudes, interests, reactions, conditions of knowledge which may or may not fit with the qualities of actual readers or listeners" (p. 249).

This confusion about the meanings of audience probably results, at least in part, from the classical rhetoricians' treatment of the concept of audience strictly as a speaker-listener emotional relationship and from their failure to elaborate on how a speaker can develop a sense of audience. Simply stated, the classical dictum was that a speaker should know his audience's character thoroughly and plan his rhetorical strategies according to that knowledge. Clearly, the ambiguity and superficiality of this dictum have led to problems for later rhetoricians. Aristotle, for example, in his Rhetoric (trans. 1960), devotes ten chapters to the emotions a speaker can arouse in an audience and spends six chapters on the types of social groups that audience

members might fall into. However, as Ehniger (1968) has pointed out, Aristotle's Rhetoric is speaker- and subject-centered, treating the matter of audience naively. The Rhetoric deals only with the classes of listeners which a Greek orator might encounter. Thus Aristotle's theories cannot be construed to deal with all types of considerations of an audience's knowledge, reason, character, and emotion. The Roman rhetoricians expanded on Aristotle's work rather than altering it. Cicero, for example, introduces De Oratore (trans. 1945) with the claim that "all the mental emotions, with which nature has endowed the human race, are to be intimately understood, because it is the calming or kindling the feelings of the audience that the full power and science of oratory are brought into play" (p. 15).

Building on the foundations supplied by the Greeks and Romans, modern rhetoricians have continued to treat audience as a monolithic, emotional entity which somehow the writer must accommodate. Additionally, modern treatments of audience knowledge have continued to consider the concept as a matter of "what it is" rather than "how it is." As Park has noted, "most teaching of audience in composition courses is . . . relatively unsystematic, weak on theory, heavily dependent on ad hoc examples" (1982, p. 253).

Researchers in the twentieth century have realized that no one, including classical rhetoricians, had addressed the problem of how a writer comes to know his audience. Important work in this area has been done in cognitive--developmental psychology (discussed in Barritt & Kroll, 1978). In experiments to study communication in children, Piaget (1926/1955) found that young children could rarely adapt a message to the needs of the listener. They seemed to assume "from the start that the [other] will grasp everything, will almost know before-hand all that should be known and will interpret every subtlety" (p. 115). Based on this finding and others, Piaget coined the term egocentrism to explain the finding that young communicators could take only their own perspective and not recognize that of a listener. He explained further that, as children age and develop, they eventually learn how to decenter, to take another's perspective and adapt a message to it.

In another approach to cognitive development, Vygotsky (1934/1962) distinguished oral and written discourse by asserting that the latter calls for a much higher level of abstraction than the former. He contended that a writer must compensate for a lack of physical presence of the audience and its accompanying lack of cues, as well as recognize that writing is second-order symbolism, where graphic signs replace the sounds of words which in turn are signs of objects and ideas in the real world. In writing, Vygotsky explained, "the motives are more abstract, more intellectually removed from immediate needs" (p. 99). Thus the knowledge of audience for written discourse naturally lags behind knowledge of audience for spoken discourse, a speculation confirmed by Kroll (1978).

Flavell (1968) has described the developmental system of role-taking abilities which lead to knowledge of audience as a series of five steps: existence, need, prediction, maintenance, and application. The existence step comprises knowing that there is such a thing as another's perspective and that what the other perceives, thinks, and feels may not be the same that the writer or listener perceives, thinks, and feels. Flavell later (1974) pointed

out that the absence of the existence element corresponds to Piaget's concept of cognitive egocentrism. The need step represents the speaker's or writer's recognizing that the discourse situation calls for an analysis of another's perspective, and that such an analysis would enable the speaker or writer to achieve more successfully his desired goal. Flavell makes it clear that a major constituent of the need element is the recognition that some situations call for role analysis only implicitly, and the speaker or writer must be able to distinguish those situations from ones which do not mandate analysis. The prediction step comprises knowing how specifically to carry out this analysis, to discriminate with needed accuracy whatever the other's various attributes are. The maintenance step comprises knowing how to maintain this cognitive awareness, assuming that it is in active competition with the speaker or writer's own point of view. Finally, the application step includes knowing how actually to apply knowledge of another's role to some end--for example, a piece of spoken or written discourse. Flavell suggests that these five steps constitute a cognitive-developmental pattern, yet he concedes that, especially in older children, a recognition that the message has not been successfully conveyed forces the speaker or writer to return to, and reassess, the need function.

The theories of early cognitive-developmentalists have partially answered the question of how a communicator comes to know his audience in a particular writing situation, yet some researchers have asserted that such concepts as egocentrism and role-taking appear too general to be of any great utility in understanding either the development of social perception or its relationship to communication. Delia and Clark (1977), for example, point out that a communicator obtains a potential basis for knowing an audience not only when his own or another's perspective or knowledge is explicitly differentiated, but whenever <u>any</u> attribution of the other's action, role, character, intention, emotional state, or knowledge is made. Changes in abilities to make these attributions represent shifts along interrelated developmental axes. Delia and Clark name egocentrism, perspectivism, liability-stability, concreteness-abstraction, diffuseness-integration, and globality--differentiation as the most important axes. They claim that speakers and writers gain social understanding before they know how to use that understanding to control the content and structure of the texts they produce. A similar connection is made by Nystrand (1982b), who contends that the rhetorical study of audience--the investigation of how writers plan to achieve particular effects on readers--must be tied directly to the study of "the linguistics of writing," or how the readers as a speech community affect the writers and the texts they compose.

The relationship of writer to audience determines what Booth (1963) calls "the rhetorical stance," which Booth describes as the balance among the major elements of the communication triangle--the arguments available about the subject, the knowledge and beliefs of the audience, and the voice and character of the speaker. The writer-reader relationship is a major component of important contemporary theories of discourse, particularly those of Moffett (1968) and Britton et al. (1975) which have been influenced by cognitive--developmental psychology. One axis in Moffett's discourse classification scheme is based on the writer-audience relationship, with the self at one extreme ("interior monologue") and an unknown audience at the other ("public generalization").

Nystrand (1982a) presents a taxonomy for analyzing errors on the basis of the writer-reader relationship. He points out that when a reader doesn't comprehend a text, the "fault" may lie in the writer's expression or the reader's understanding. Nystrand catalogued the kinds of mismatches between "writers' words and readers' guesses" (p. 64), without attributing the cause of the mismatch to either the writer or reader. Thus, Nystrand constructed a study to develop such a classification. He concluded there are three basic kinds of distortions found at five levels of discourse: the graphic, syntactic, lexical, textual, and contextual. The three distortions are (1) "simple misconstraint," which occurs as a result of the reader misinterpreting the text or the writer misleading the reader; (2) "impaction," which occurs when the text is overly dense for the reader; and (3) "rarefaction," which occurs when the reader needs additional information not provided in the text to understand it.

Other efforts to classify discourse according to the writer-reader relationship have examined individual text features. Linguists have examined the "I-you" relationship in texts, devising either discourse categories based on the "I-you" distinction (Longacre, 1976) or clines of interactiveness with both "I" and "you" present in a text at one extreme and both absent at the other extreme (E. Smith, 1982; Tannen (ed.), 1981). Smith concludes that texts are more or less interactive not by the raw number of "I's" and "you's" that a text contains, but by the relative prominence of those features in the overall text scheme.

(3) Subject matter. A writer's knowledge of subject considerably influences how he or she composes. For example, a writer uses different strategies for gathering content when writing about an unfamiliar subject than when writing on a familiar subject. In spite of the obvious importance of knowledge of subject matter, few researchers of composing have consider subject matter other than in discussions of purpose.

Subject matter was not so neglected in classical rhetoric. In the pre-Socratic period in classical Greece, there arose a set of stock arguments and examples that could be memorized and inserted extempore into an oration. These examples and arguments came to be known as the topoi. Aristotle (trans. 1960) defined topoi as "places" or "seats of argument." The sense of topoi is similar to the contemporary notion of a schema, not to the modern notion of topic. The topoi served both as a guide for the speaker in filling out an argument and a guide for the listener in recognizing an argument. In early Greek rhetoric, the sophists gathered collections of topoi on various subjects pertaining to political, legal, and philosophical oratory. The topoi flourished in Roman rhetoric, where they were called loci communes or "commonplaces." In the later Middle Ages and in the Renaissance, commonplaces were collected in numerous manuals that were used to teach invention.

During the 18th century, however, the commonplaces fell into disfavor. The rise of logic stemming from Descartes and Bacon led to increased emphasis upon direct observation. Major British rhetoricians of the 18th century--Smith, Campbell, Blair, and Witherspoon--were also logicians and followers of Locke. Either they dismissed the commonplaces as incapable of accommodating originality or ignored them (see Howell, 1971). By the 19th century, the

commonplaces and treatment of specific subject matter had vanished from the curriculum.

One exception to the general neglect of subject matter among 20th-century rhetoricians is the work of Perelman and Olbrechts-Tyteca (1958/1969). Perelman and Olbrechts-Tyteca maintain that all arguments, including empirical ones, begin with certain shared assumptions or agreements about the nature of the world. For example, geologists now assume that the earth's crust consists of a series of moving plates, but in 1950 they would not have held this assumption. Perelman and Olbrechts-Tyteca claim that these assumptions are in themselves a kind of topoi. Bazerman (1981) has made more detailed efforts to examine the subject matters of disciplines as they are expressed in writing. He demonstrates that different disciplines have different ways of acknowledging previous literature on a subject, of addressing the kinds of implicit assumptions that readers are likely to hold, and of structuring arguments.

Numerous recent studies have investigated the relationship between knowledge of a subject and comprehension (see the discussion of coherence above). Few studies, however, have investigated the relationship between knowledge of a particular subject and generating a text about that subject. Voss, Vesonder, and Spilich (1980) investigated this relationship, testing 20 subjects to determine their level of knowledge about baseball. Half were designated as High Knowledge (HK), the other half as Low Knowledge (LK). All subjects were asked to write a narrative about a half-inning of a fictitious baseball game. Basing their analyses on the subjects' abilities to fill "slots" in a problem-solving model, the investigators found that HK subjects produced significantly more specific propositions about causal "auxiliary actions" in the game itself while LK subjects produced significantly more propositions about non-game-relevant activities, such as crowd size and fan reaction. Voss, Vesonder, and Spilich attributed these differences to the HK subjects' larger "problem space"--in other words, their knowledge of possible settings and actions in a baseball game--and to their greater ability to monitor their selected paths through the problem-solving model--in other words, their greater knowledge of possible alternatives in a game.

(4) Circumstances for composing. Besides knowledge of what is often called the rhetorical situation--the configuration of writer, reader, subject, and purpose--writers must work within certain constraints associated with the writing task. Most studies of composing have dealt with school-sponsored writing where circumstances for composing are controlled. For writing that is done outside of school, however, writers typically must manage these constraints as part of the writing task. One kind of constraint is the amount of time for writing. Researchers in composing have characterized production as ceasing when the writer is satisfied that the text adequately accomplishes the purpose for writing (Beaugrande & Dressler, 1981; Hayes & Flower, 1980). Obviously, the decision to stop writing for experienced writers is influenced by how much time they have to write. Writers on the job frequently do not have time to revise (Faigley, Miller, Meyer, & Witte, 1981). Time constraints also influence how a document is composed. Many executives are required to dictate on the assumption that this method of composing saves time (Gould, 1980; Faigley, Miller, Meyer, & Witte, 1981).

The medium for composing has been shown to affect composing (Scardamalia, Bereiter, & Goelman, 1982). The use of a computer text editor, for example, leads to more revisions (Gould, 1980). Another rarely investigated factor is the nature of authorship. In a recent stratified survey of 200 writers on the job, Faigley, Miller, Meyer, and Witte (1981) found that nearly 75% of the people surveyed sometimes collaborate with at least one other person in composing. The nature of the collaboration varies considerably. Sometimes several experts will contribute a section to a report in a particular area of expertise, with the project leader integrating the sections into a coherent whole. In other cases, a superior will edit the work of an subordinate. In other cases people will work closely together through all phases of a writing project.

Many companies and agencies have explicit review processes that a document must go through. Documents produced by the government typically undergo lengthly evaluation. Researchers in document design have recently proposed a method of evaluation based on testing a proposed document with potential users. For example, Felker and Rose (1981) found that users of revised FCC regulations for radios on recreational boats were better able to identify the proper rules and took less time to answer questions than a group using the original rules. Felker and Rose recommend this method for assessing revisions of documents.

Operative goals. When a writer formulates a pragmatic goal, such as "I want a refund for a defective product," he or she will begin creating operative goals. These goals will shaped by the the subject, the writer-reader relationship, the circumstances for composing, and the writer's knowledge of the conventions of writing, as well as by the pragmatic goal. Operative goals develop as the text advances, and in this sense, they are interactive with the texts itself as well as the situation surrounding the text. For children in the early grades, each sentence they produce prompts the next one--a kind of associate planning that takes the form of "I just said that, now I can say this." As early as the fourth grade (about age 10), children writing one sentence are planning what to say in the next sentence (Scardamalia, Bereiter, & Goelman, 1982). Older children and novice adults often rely on the topic to stimulate new goals in school-sponsored writing tasks so that when they get stuck, they reread the topic for inspiration (Perl, 1980), arriving at such decisions as "Oh yes, I can talk about that too." Experienced writers use both the text and the rhetorical situation to generate goals. Flower and Hayes (1981b) describe four strategies that produce new operative goals from existing text: pursuing an interesting feature in extant text, looking for some contradiction or objection to what has been written, discovering "what I really mean," and looking for a focus. Experienced writers frequently evaluate what they have written in light of their purpose and the knowledge and beliefs of their audience (Flower & Hayes, 1980a, 1981c). They use these evaluations to generate additional operative goals at greater depth, continually refining their conceptions of the task. But the process of forming operation goals--what Bereiter and Scardamalia (in press-a) call "reflective planning"--demands hard intellectual work. Bereiter and Scardamalia conclude that it is virtually impossible to teach reflective planning to students who have not experienced it.

V. 3. IMPLICATIONS FOR ASSESSING CHANGES IN COMPOSING PROCESSES

In the present section we will return to the questions that we set out in Chapter 1: How does a writing program demonstrate that it is affecting how students compose? and How does an individual writing teacher diagnose problems in the ways students compose? Research on composing suggests that there are no simple answers to these questions. For example, Beach's (1976) conclusion that extensive revisers produce better papers than nonrevisers has been refuted in several other studies of revision (see IV. 2). Consequently, we cannot offer definitive answers to the questions we pose, but we can suggest directions for those who wish to pursue these questions.

We have described in Chapter 5 what we believe are the essential components of a writer's general knowledge and a writer's knowledge of a particular writing task. In our discussion of pragmatic and operative goals in the previous section, we examined how a writer's knowledge combines with the kinds of strategies that we discussed in Chapters 2, 3, and 4. It seems clear to us that any investigation likely to advance our knowledge of composing must probe both domains. If investigators look at nothing but a writer's knowledge, they can be misled. Investigators with only this focus will fall victim to the problem common to all indirect assessments of writing--that they examine something besides writing abilities (Odell, 1981). If, on the other hand, researchers consider only strategies that manifest themselves in observable behavior, they have a very limited and often deceptive basis for generalizing about the underlying cognitive operations.

We make the same stipulation for efforts to assess changes in composing as a result of instruction--that these efforts must address knowledge and performance. We add one further stipulation--that investigations of changes in composing should be guided by theories of composing, discourse, and evaluation. Unlike basic research, which is often exploratory, evaluation research necessarily contains theoretical assumptions about the thing or process under evaluation, whether or not these assumptions are expressed (Witte & Faigley, in press). Evaluation research is only as sound as the theory upon which it is based.

Two general and related theoretical assumptions about the development of composing derive from our review of research. Each assumption has several specific correlates which are reported in individual studies. Researchers have developed procedures for investigating these assumptions, procedures that might be adapted for purposes of evaluation.

The first assumption is that as writers mature, they become more aware of their own composing processes. Several studies support this assumption. The protocols of children in the primary grades typically reflect only content (Burtis et al., in press). Even through children are clearly influenced by the rhetorical situation, this influence is apparently unconscious. Writers of about age 18 consciously plan, but they have difficulty evaluating the rhetorical situation (Flower & Hayes, 1980a). Likewise, adult basic writers draw operative goals primarily from the writing assignment rather than from their representations of the rhetorical situation (Perl, 1978, 1979; Flower & Hayes, 1981c). Only expert writers seem to exhibit effective goal-directed planning that takes into account all of the major components of the rhetorical situation (Berkenkotter, 1981; Flower & Hayes, 1977, 1981c, in press). The

procedures used to date for describing composing have been the thinking-aloud procedure (e.g., Emig, 1971; Flower & Hayes, 1977, 1980a, 1980b, 1981b, 1981c; Perl, 1978, 1979; Pianko, 1977, 1979a) and the clinical inteview (Bereiter & Scardamalia, in press-b; Scardamalia & Bereiter, in press-b). Researchers have been enthusiastic about the potential of both procedures. For example, Scardamalia & Bereiter (in press-a) found that young children like to discuss their strategies for reading in much they same way that psychologists discuss these strategies. The key issue is how well self reports of process gathered under less rigorously controlled conditions might reveal changes in composing. Other types of self reports might be process logs, self-evaluation questionnaires, and retrospective interviews. Techniques of analysis developed for protocol research could be usefully applied to these kinds of reports. Also of potential use is the methodolgy for analyzing interviews developed by Agar and Hobbs (1982), which incorporates discourse research on a speaker's goals and beliefs.

The second assumption is that knowledge of writing is reflected in performance. In spite of contentions that investigations of process cannot focus on products, several studies have shown that knowledge of writing can be inferred from careful analysis of texts (Beaugrande, 1980; Lunsford, 1977; Kroll, 1978; Odell, 1977; Odell & Goswami, Note 2; Scardamalia, Bereiter, & Goelman, 1982; Shaughnessy, 1977). More important, one approach to analyzing a writer's knowledge of a particular situation has been developed. Primary Trait scoring (Lloyd-Jones, 1977; Mullis, 1975) attempts to measure the characteristics of a text that make it appropriate for its intended audience and purpose. Its origins are in current discourse theory, which suggests that different purposes and audiences require different writing skills (Odell & Cooper, 1980). The key issue for assessing changes in knowledge through changes in performance is if assessments such as Primary Trait scoring can be refined to the extent that specific information concerning the writer's knowledge is obtained.

Above all, research in composing needs to advance comprehensive theories that will direct efforts to assess changes in composing. We have some sense of how children in the early grades and how adults compose, but we have little sense of how composing abilities are acquired or how instruction in writing affects these abilities. We are now at the point where we can begin to formulate developmental theories of rhetoric, theories including descriptions of how writers at different ages plan and produce texts (Bereiter & Scardamalia, in press-b). Such descriptions could be experimentally verified or rejected and could inform both the ways in which writing is taught and the ways we understand the effects of that instruction.

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