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ABSTRACT

Drawing upon reading and text comprehension theories and the sociolinguistic studies of M. A. K. Halliday and R. Hasan, this paper builds theoretical links between the reading and writing processes. The major portion of the paper discusses the five language concepts that undergird both processes: (1) text processing in both reading and writing results in knowledge acquisition, integration, and use, as the reader or writer seeks and activates relevant schemata; (2) text processing is preceded and directed by the language user's understanding of the context of situation in which the processing occurs; (3) the reader or writer employs cognitive and linguistic information processing strategies when creating meanings in or from text; (4) text processing and comprehension are guided by a central limited capacity processor that monitors and allocates the resources of the system, synthesizes the data being processed, and keeps account of the alternative meanings and structures until such time that one is selected for realization; and (5) the processing of text is guided by the previous discourse processed and the current cognitive text worlds that have resulted from, as well as guided, such processing. (Figures illustrating the text are included.) (FL)

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USING TEXT COMPREHENSION AS A METAPHOR FOR UNDERSTANDING TEXT PRODUCTION: BUILDING BRIDGES BETWEEN READING AND WRITING

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Recently, there has been an increased interest by various segments in the academic community in how language users go about learning and producing written discourse. Researchers and theoreticians in such varied fields as education, cognitive psychology, and English are presently generating hypotheses which attempt to explain those operations that writers are involved with when producing text. While it certainly cannot be denied that the research which has evolved from these fields during the last decade has vastly increased our understanding of text production, the task of further developing and extending this knowledge is monumental. However, if we are willing to utilize the findings and theoretical con-

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structs in other related language domains, the task becomes more manageable and the likelihood of consensus arising among researchers and theoreticians increases.

We are also fortunate in the sense that much of the groundwork has already been laid for us. We are not in the situation of the linguist during the late fifties, having to advance our theories against a half century of American behavorism. Nor do we need to establish the fact that print is simply an alternate expression of language, as many reading theorists were compelled to do in the seventies. And, while it is certainly true that the psychological processes involved in writing are not well understood, we are in the advantageous position of being able to draw from the work accomplished in linguistics and reading, and in the process creating links with both. Finally, the fields of sociolinguistics and cognitive psychology, while not firmly established when our predecessors began work in their respective language areas, are presently available to writing theorists, offering a correlation between theory and observation.

Theory can arise from a variety of sources. Steiner (1978) proposes three main approaches to theorizing: reductive, deductive, and retroductive. In a reductive approach to theory construction, the wanted theory is equivalent to the source theory. Rather than new concepts being formulated or deduced, one searches for ready-made concepts. Skinnarian psychology which reduces all behavior, animal and human, to stimulus-response-reinforcement relationships would be an example of a reductive theory.

Insert Figure 1 here.

In a deductive generation of a theory, the wanted theory is derivable from the source theory. The theoretician searches out existing concepts and hypotheses from which concepts and hypotheses can be derived. For example, the source of hypotheses about the teaching-learning process would be educational literature.

The use of structures and relationships in one field of study, in this case reading, to support work and theory construction in another, in this case writing, is termed retroductive model building or the theory models approach. In this type of theory constructon, an existing theory is used as a metaphor for the generation of hypotheses for the wanted theory. The theory models approach is therefore one in which ideas are originated and devised rather than simply sought out.

Insert Figure 2 here.

The theory models approach, largely based as it is upon analogy, is of particular interest to those interested in asking quesitons about the internal operations involved in writing. These questions have often been problematic in that they concern a largely silent and unobservable process. We have no direct access, no "windows to the mind" as in reading, to those cognitive and linguistic operations writers are utilizing when producing written discourse. This fact has often stymied attempts to move beyond a product orientation, the experimental problem being that we need to first have an explicit representatin of the ideas or intentions which were the starting point for the writer (Dijk, 1979). However, the validity of any theory can be convincing not only based on empirical evidence, but also by its "potential for representing elaborate processes not accessible to non-theoretical discovery" (Beaugrande, 1981, p. 262). A retroductive approach to theorizing affords such potential for understanding the writing process. This will be particularly true if the theory model used as the metaphor is of a cognitive process with which writing has much in common. Theories of reading comprehension can serve as the source for the needed relationships, structures and similarities in processes.

There are several advantages in using current theories of reading as the metaphor for the writing process. First, since both text production and text comprehenson are language processes growing out of what Burke (1981) has called a common linguistic data pool, many of the psychological, sociological, and linguistic factors operable in the reading process will have direct application to production processes. Concepts and hypotheses, as well as structures and relationships, in theories of reading can therefore be employed when hypothesizing about production operations. It has been proposed by Beaugrande (1980, 1981) that writing should not be seen in isolation from communicative skills in general and that hypotheses formulated in writing need to be closely aligned with current theories of reading. VanDijk (1979) also notes that the same basic information processing principles will be as operable in text production as they are in text comprehension. These links between reading and writing can only come about if the two processes are viewed not as mirror images, one being the reverse of the other, but as running in parallel and using the same mechanisms. In essence, writing becomes another instance of text world production, drawing from the same pool of cognitive and linguistic operations as in reading. The advantage of this perspective is that it facilitates the integration of the two processes and gives support to the eventual formulation of a general language processor.

The theory and model of text production to be presented was generated and derived through use of the following reading and text comprehension theories:

> Rumelhart's interactive theory of reading (1977),
> Kintsch and vanDijk's theory of text comprehension (1978),
> Goodman's psycholinguistic theory of reading (1980), and
> Beaugrande's theory of text processing (1980).

Key constructs and hypotheses were also taken from the sociolinguistic work of Halliday and Hasan (1980) and encorporated into the theory. While space does not allow for a full explication of the writing theory and the transaction involved

between its major components, five key language concepts which are proposed as undergirding both processes of reading and writing will be set forth and then briefly developed as each concerns the writing process. These five key concepts correspond to the five key components of the writing model as depicted in Figure 3.

Insert Figure 3 here.

LANGUAGE UNIVERSAL NUMBER 1: KNOWLEDGE DOMAIN. Text processing, whether through reading or writing, results in knowledge acquisition, integration, and utilization, as relevant schemata are sought out, activated, searched, and instantiated by the reader or writer.

The knowledge domain consists of all linguistic and conceptual knowledge which the individual writer has at his or her disposal. This knowledge is represented in the form of schemata. When text production is initiated, the writer engages in a directed and continuous search over these structures in a quest for relevant and appropriate information. If the writer's research or retrieval procedure is successful, it results in the activating of the given schemata. Those schemata activated are subsequently evaluated and verified as containing the needed information, refined if necessary, or discarded if irrelevant. The schemata which are eventually instantiated form a global skeleton or framework around which the text is constructed, serving as a data base for, and guiding the generation, expansion, and integration of, propositions which will form the writer's internal text world.

While retrieval of relevant data from long-term memory is often times one of the major problems facing a writer, these attempts can also lead to the discovery of new and relevant ideas, leading to transformations in existing cognitive structures and subsequently to schemata building or modification. This phenomena of discovery and learning through writing can best be explained through the concepts of schema search and activation. The initial idea to be developed guides the writer in a search for related data as the writer attempts to explore and work

out the thought. As this search over stored knowledge spaces proceeds, the original idea is manipulated and becomes modified, extended, or even rejected as new ideas are located and added to, or supplemented for, the original. In turn, as these new ideas are discovered, they may activate new schemata and lead to the further discovery of ideas. In this way, through proposition manipulation, spreading activation, and discovery, the writer begins to consolidate his or her meanings and extend the original idea into a complete text.

The manipulation and working out of ideas leads not only to a complete composition, but may also result in changed schemata, new linkages being made in stored knowledge, or to the construction of entirely new schemata, writing becoming "a tool of exploration to see beyond what is known" (Murray, 1978). As various schemata are activated and spreading activation initiated along various pathways, intersections between two schemata which the writer had originally thought were unrelated may develop. These points of intersection will lead the writer to predict possible relations among the schemata and hence to the discovery of new meanings in the process (Beaugrande, 1980). Or, if these kinds of intersections between schemata do not exist, the writer may need to build them, transforming the existing schemata in the process. It is within these kinds of writing contexts which an author's comprehension of an experience, event, or concept are altered.

Insert Figure 4 here.

LANGUAGE UNIVERSAL NUMBER 2: CONTEXT OF SITUATION AND REGISTER. Text processing is preceded and directed by the language user's understanding of the context of situation in which the processing occurs. This understanding sets parameters on the meanings and structures which can be realized in any given instance of text processing.

Text production is not only a psycholinguistic process. Nor does writing occur within a communicative vacuum, devoid of situational and social supports

and restrictions. Rather, texts evolve within highly contextualized and functional settings, the context of situation imbuing the writer with a sense of communicative purpose and guiding the generation of meanings through activation of schemata relevant to the context. Without such contexts, and the goals which evolve from them, the system itself would lack directionality, making it impossible for texts to be planned or generated. Writing therefore is a phenomenon which is as much sociolinguistic as psycholinguistic in nature.

The context of situation can be formally defined as all those aspects of the global and local environment which have a direct bearing or impact on the construction of text. It is the environment in which text unfolds and in which it is interpreted (Halliday & Hasan, 1980). The context precedes and guides the production of text, serving to constrain as well as to support the process. The context constrains and supports in that it guides the writer's search for appropriate or relevant processing strategies and expectations. Different contexts give rise to different options precisely because different patterns of schemata are activated which ultimately lead to the construction of different text worlds.

Insert Figure 5 here.

Through a dynamic transaction between the knowledge domain of the author and the context of situation, the writer is able to predict the register or meaning potential for a given setting. The register defines the range of possible meanings and their linguistic forms which are typically associated with a particular setting and sets parameters on which meanings and forms are selected from the knowledge domain of the writer. From this perspective, the writer is never selecting with complete freedom from all possible resources in the linguistic system. Instead, within this conceptual framework, the production of text is viewed as a process of continuous choice and synthesis from among meanings and

forms as defined by the register. Those which are chosen and confirmed ultimately find realization in the text and in turn will constitute the environment for a further set of selections. Therefore, given a particular context and a particular writer, there will be activated a constellation of strategies, expectations, and knowledge (Beaugrande, 1980), those activated dependent on the background of the writer and the context of situation.

LANGUAGE UNIVERSAL NUMBER 3: THE STRATEGIES. Writers and readers employ cognitive and linguistic information processing strategies when creating meanings in or from text. These strategies operate simultaneously and in a parallel and interactive fashion. Each strategy utilizes a particular kind or unit of information and produces a range of possible alternatives to account for the meanings and forms to be constructed.

Strategies are the cognitive and linguistic information processing decisions employed by writers when producing text. The strategies used and their effect on the text are "the outcome of a series of interlocking choices that arise from the context in which the author writes and the resources of experience, linguistic and nonlinguistic, that the writer brings to the occasion" (Britton, Burgess, Martin, McLeod, & Rosen, 1975, p. 28). Through the utilization of these mental operations, the writer constructs a text world or cognitive structure, a configuration of concepts and relations in a knowledge space that is composed of propositions. This configuration of structured propositions is then mapped onto language. Until recently, there have been few attempts to delineate the strategies involved in text production. However, advances in theories of discourse comprehension utilizing macro and micropropositions and structures offer semantic and structural units which can be used to explain aspects of the composing process.

Six strategies are being proposed to account for the construction of text: generating, expanding, integrating, mapping, selecting, and confirming. All six of these strategies involve the creation, selection, manipulation, or rejection of propositions and their structures in some manner. These semantic operations take place within the short-term memory buffer and, while they will

be defined in a somewhat linear, top-down fashion, the strategies operate in parallel and are interactive in nature, each affecting and being affected by the others. Furthermore, the strategies cannot be considered as categorical, context-free rules, but are sensitive to such factors as the context, the evolving text, and the writer's experiences with the process itself and with the topic.

Insert Figure 6 here.

The first strategy of generating is a global operator and involves the construction or selection by the writer of macropropositions which have been created from knowledge of a more general nature drawn from long-term memory. These propositions, once they have been structured, form the global configuration of meaning for the text. Macropropositions and macrostructures are higher-level semantic or conceptual structures and units of meaning which assist the writer in going beyond the immediate local level during text processing. While all structures and conceptual units will be substantially redirected during subsequent text processing, the complexity of text production would be impossible without these global units of meaning (Dijk, 1977).

Using the developing global configuration of meaning, the macropropositions are progressively specified by more particular subtopics as production procedes. The expanding strategy engenders, structures, and attaches micropropositions to the existing macropropositions. These propositions elaborate, expand, and extend the global meanings undergirding the text. This strategy is a local operator in that it produces textual information of a more specific kind. The construction of these local units of information comes about through the multiple processing of a macroproposition in the writer's short-term memory. Those points in the text which are to be more fully developed require given macropropositions to be recycled more often, and expanded upon by the writer through the construction

of conceptually related micropropositions.

It has been proposed by Beaugrande (1980) and Halliday and Hasan (1980) that performance in text processing depends on the extent of organization which language users can impose on the data being formulated during such processing. Text structure must be imposed on the propositions constructed in order for a text to be realized. As has been noted with the generating and expanding strategies, as macro and micropropositions are constructed within the evolving text world, they are constantly being structured in a conceptual manner. The writer weaves these propositions into the text, attaching them to conceptually related propositions and existing structures in an attempt to produce internal text coherence. This is accomplished through the integrating strategy, a strategy which also occurs on the macro and micro level. The macro level involves the structuring of macropropositions and the micro the integrating of micropropositions.

Mapping as a strategy involves putting concepts already in propositional form into visible language. These propositions, be they macro or micro , are put into short-term memory and then mapped onto a surface representation. As compared to the previous strategies which were conceptually based, the mapping strategy is essentially linguistic, requiring the writer to make choices from his or her pool of linguistic knowledge.

There are two basic kinds of choices involved in mapping. The first, and by far most important, requires the writer to decide upon the syntactic structure and wording in which to express the concepts. Both syntactic and lexical decisions involve a reciprocal relationship since neither can be made independently of the other. In both cases, however, it is the meanings contained within the propositions which determine the selection of grammar and vocabulary, the writer having to decide if a given structure and its wording adequately captures the concepts within the propositions being mapped.

The second kind of mapping involves the use of conventions. Conventions are

those arbitrary but culturally standardized surface level forms in which meanings and their structures are expressed. Letter formation, spelling, punctuation, and capitalization are typically considered as such.

Text production involves a series of choices on the part of the writer, requiring the selection of conceptual and linguistic meanings and forms from the writer's storehouse of world knowledge. These choices are made from the register of meaning potential which has been activated by the transaction between the context of situation and the knowledge domain of the author. Not an isolated strategy, the strategy of selection involves choosing from various options which have been constructed through generating, expanding, integrating, and mapping operations. Selection is therefore based on the concept that given an author's goals and intentions, there are usually a variety of meanings and forms which can be used to meet these goals and intentions. The writer must determine which ones are most appropriate, relevant, retrievable, and over which there is control.

All text production is tentative and provisional in nature. As the construction of text evolves, the writer must confirm or disconfirm, accept or reject, the choices which have been previously made. The entire process of writing therefore can best be expressed as one of continuous hypothesis-testing. At any point in time, the schemata instantiated, the internal evolving text world, and the graphic display constructed are only predictions. Confirming is intimately linked to the selecting strategy since selecting is the choosing from a variety of possibilities and confirming is the final acceptance of the choice. If a confirmation cannot be made, those strategies relevant to the part of the text being disconfirmed are reactivated and new options constructed and chosen from.

LANGUAGE UNIVERSAL NUMBER 4: THE TEXT PROCESSOR. Text comprehension and production are guided by a central limited capacity processor which monitors and allocates the resources of the system, synthesizes the data being processed, and keeps a running account of the alternate meanings and structures until such time that one is selected for realization in the cognitive text world or the graphic display.

The operation of strategies during text processing is guided by a central-limited capacity processor. A primary responsibility of the processor is to adequately allocate the limited resources of the system among various activities (Adams & Collins, 1977). This cybernectic system operates as a thermostat, distributing resources and attention selectively, while disattending other aspects of text production. The system is capable of adapting to outside influences through self-regulation, its main objective being that of maintaining stability (Beaugrande, 1980). Since resources in the system are limited, activities subserving the same end must compete for attention and resources. When processing demands cannot be met, parts of the system will shut down. In order to avoid this, the processor must juggle and integrate the multiple constraints of knowledge and resources available to it.

Insert Figure 7 here.

As production of discourse evolves, hypotheses for the text are constructed at all levels of processing, the process itself being interactive and recursive in nature. This interaction between processing levels is conceived of as the result of two basic modes of processing, bottom-up and top-down, and as running in parallel, each level constantly consulting the others. A running and ordered list of hypotheses is kept by the text processor with various aspects of the message analyzed in mutual cooperation, shifts and consultations occuring in all directions. Those hypotheses receiving the most reinforcement and support from other exisiting hypotheses at all other levels are the most likely candidates to find realization in the text. Those hypotheses which another stage of analysis have shown to be improbably are subsequently discarded (Rumelhart, 1977).

LANGUAGE UNIVERSAL NUMBER 5: THE EVOLVING TEXT. The processing of text in reading and writing is guided by the previous discourse processed and the current cognitive text worlds which have resulted from, as well as guided, such processing.

There are two types of texts which are evolved during the writing process, one which resides in the mind of the author and one which is presented in the graphic display on the paper. Both serve similar functions as the discourse unfolds, constraining and supporting the language user in ways which are similar to that of the context of situation. The text which has been produced at any given point acts as a context for the text which is to follow, shaping the available options, and determing and limiting what meanings and structures can be expressed next.

The relationship between the two texts becomes especially important when writers are involved in production tasks calling for the manipulating, relating, or structuring of propositions in new and novel ways. Under these conditions, the writer's internal text may be in flux, changing rapidly from moment to moment. Due to this rapid change, the writer may "loose his or her place" cognitively. To regain control over the text, the writer can scan the visual display and retrieve the major idea being developed. The external text thus serves as an external memory cue, assiting the writer "find his or her place" in the process.

At the same time that there exists this dynamic relationship between internal and external texts, there is a similar relationship between the process of writing and the evolved product at any point in time. The process moves the product forward by extending and developing the ideas expressed. Likewise, the product supports and drives the process by supplying available data for the process and thus lessening the use of processing resources in one area of production. In turn, this allows resources to be available for other aspects of the production task which may be in need of more attention.

In conclusion, it has been the intent of this paper to build theoretical links between the reading and writing processes. This has been attempted through

the generation of a writing theory which is based upon constructs common to both processes of writing and reading. There are dangers when insights and knowledge in two such intimately related areas of language processing are not shared and developed in mutual cooperation. Hopefully this paper has begun to build a bridge between the reading and writing processes.

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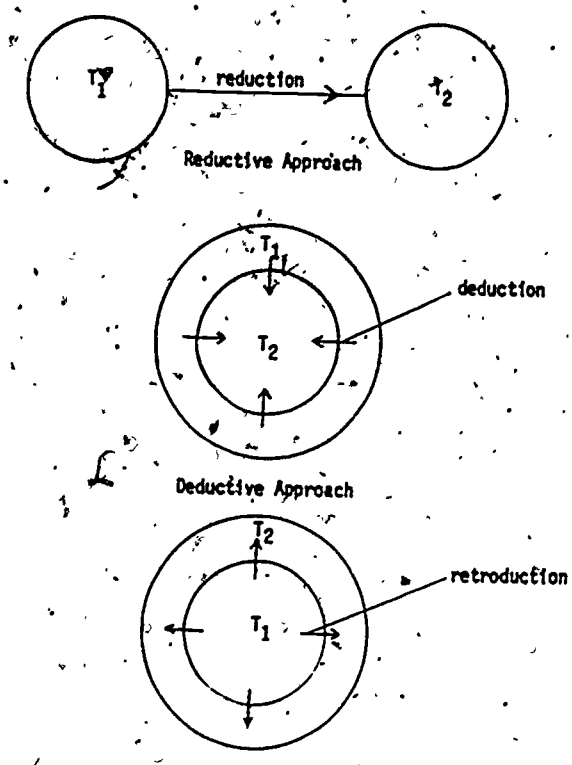

Figure 1. Comparison of approaches to theorizing (Steiner, 1978, p. 20).

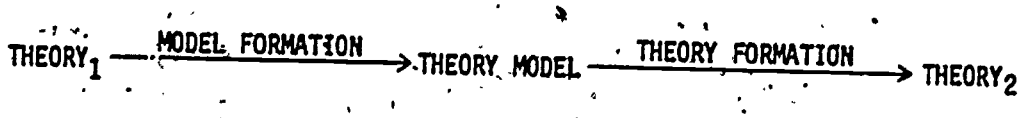

Figure 2. Theory models approach (Steiner, 1978, p. 19).

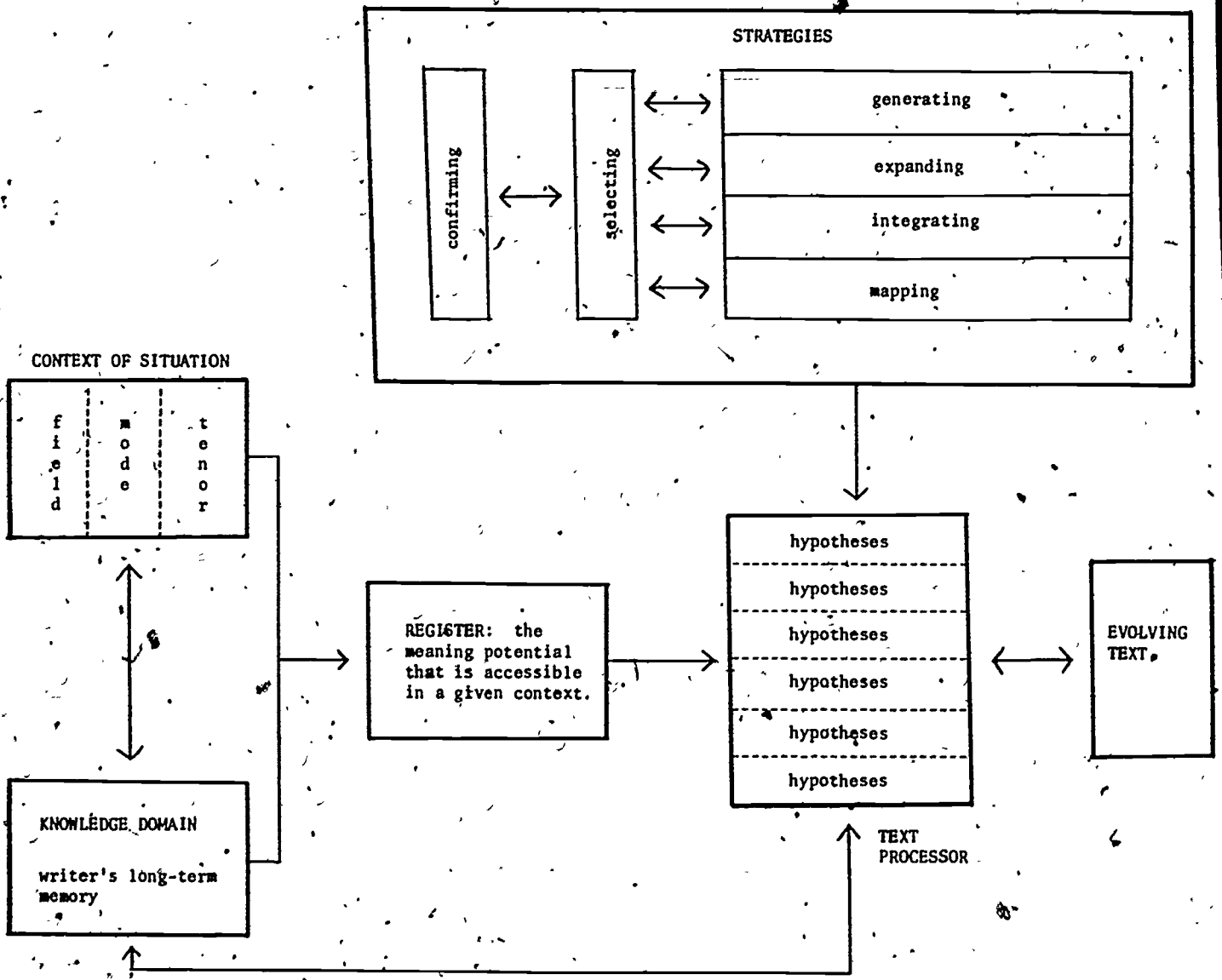

Figure 3. The model.

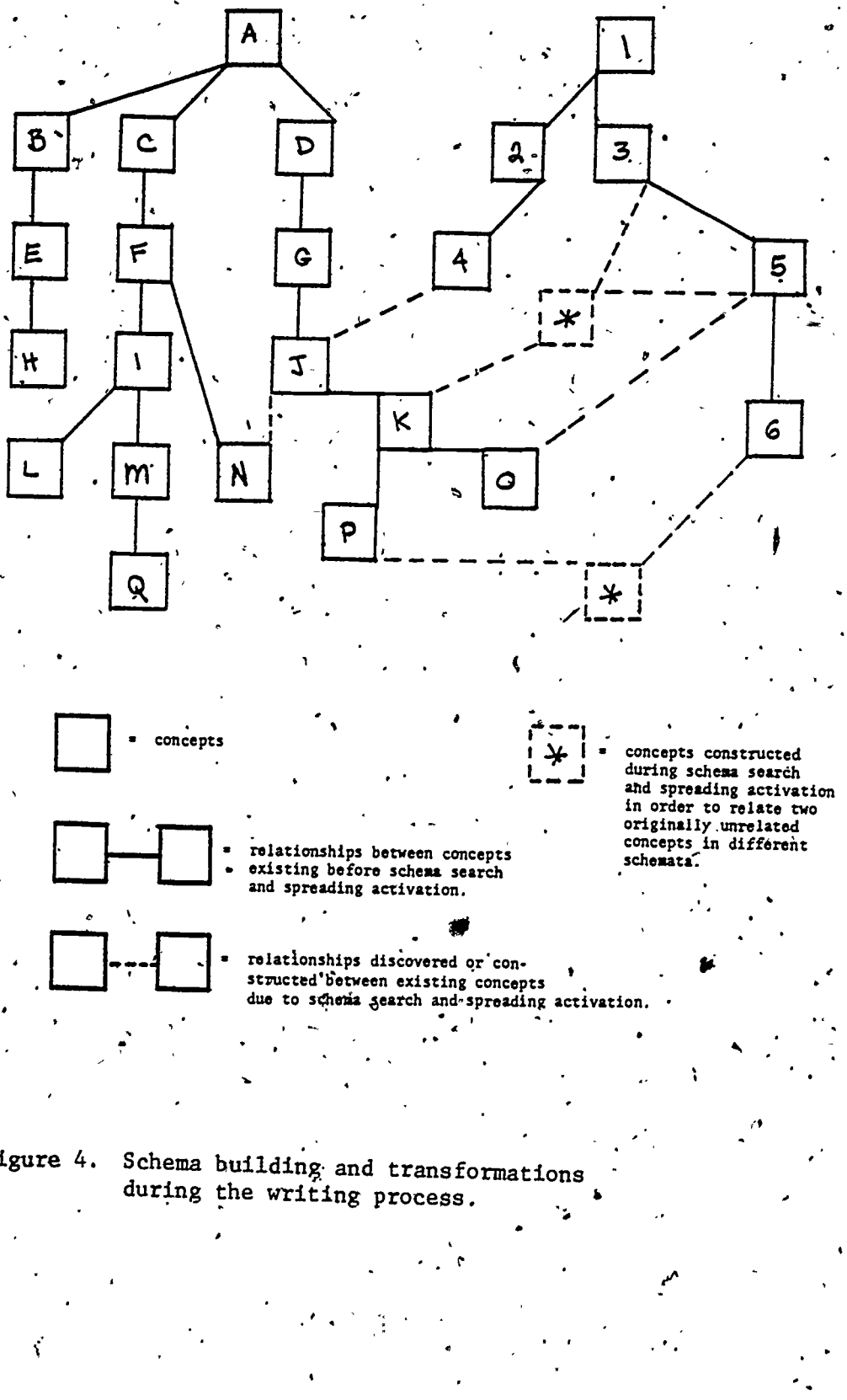

Figure 4. Schema building and transformations during the writing process.

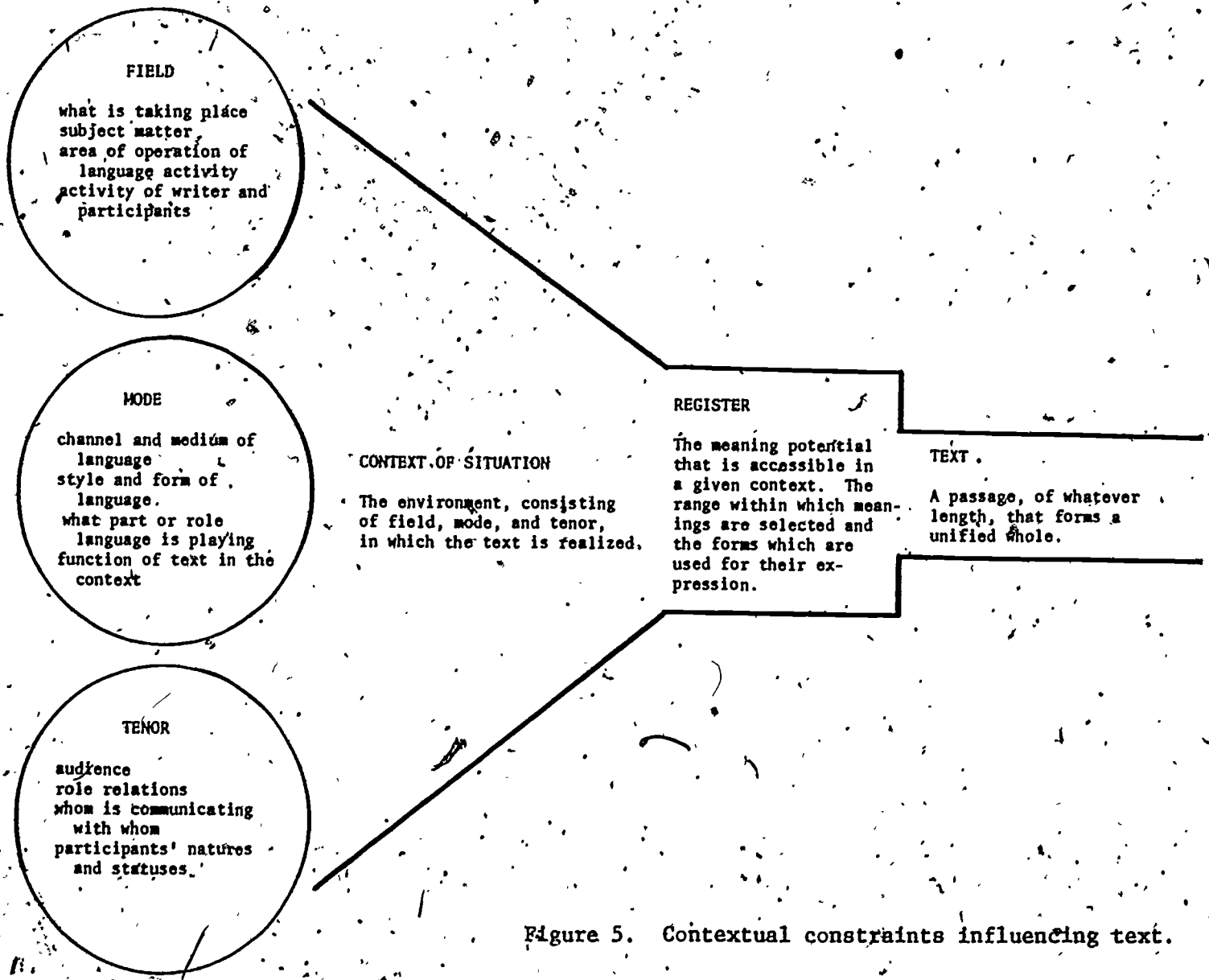

Figure 5. Contextual constraints influencing text.

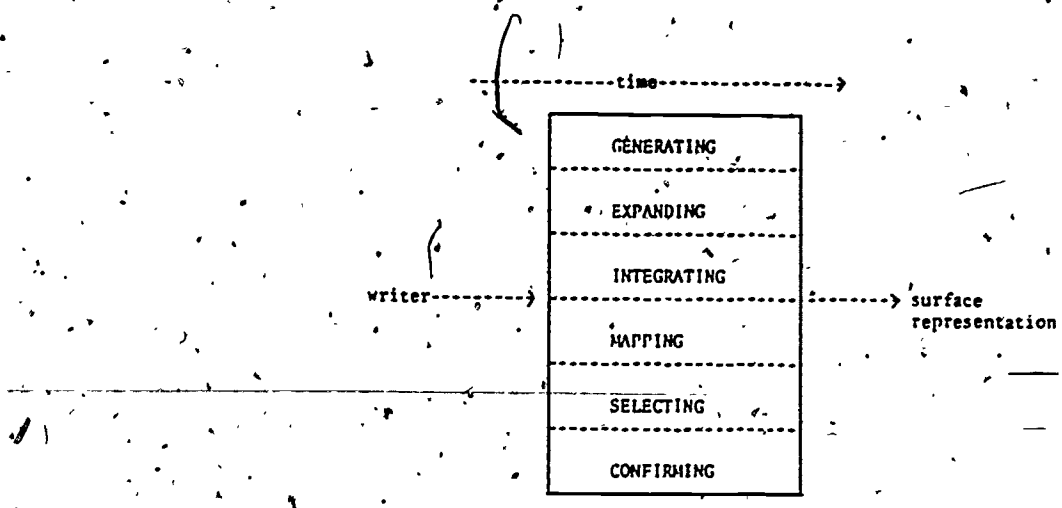

Figure 6. The strategies.

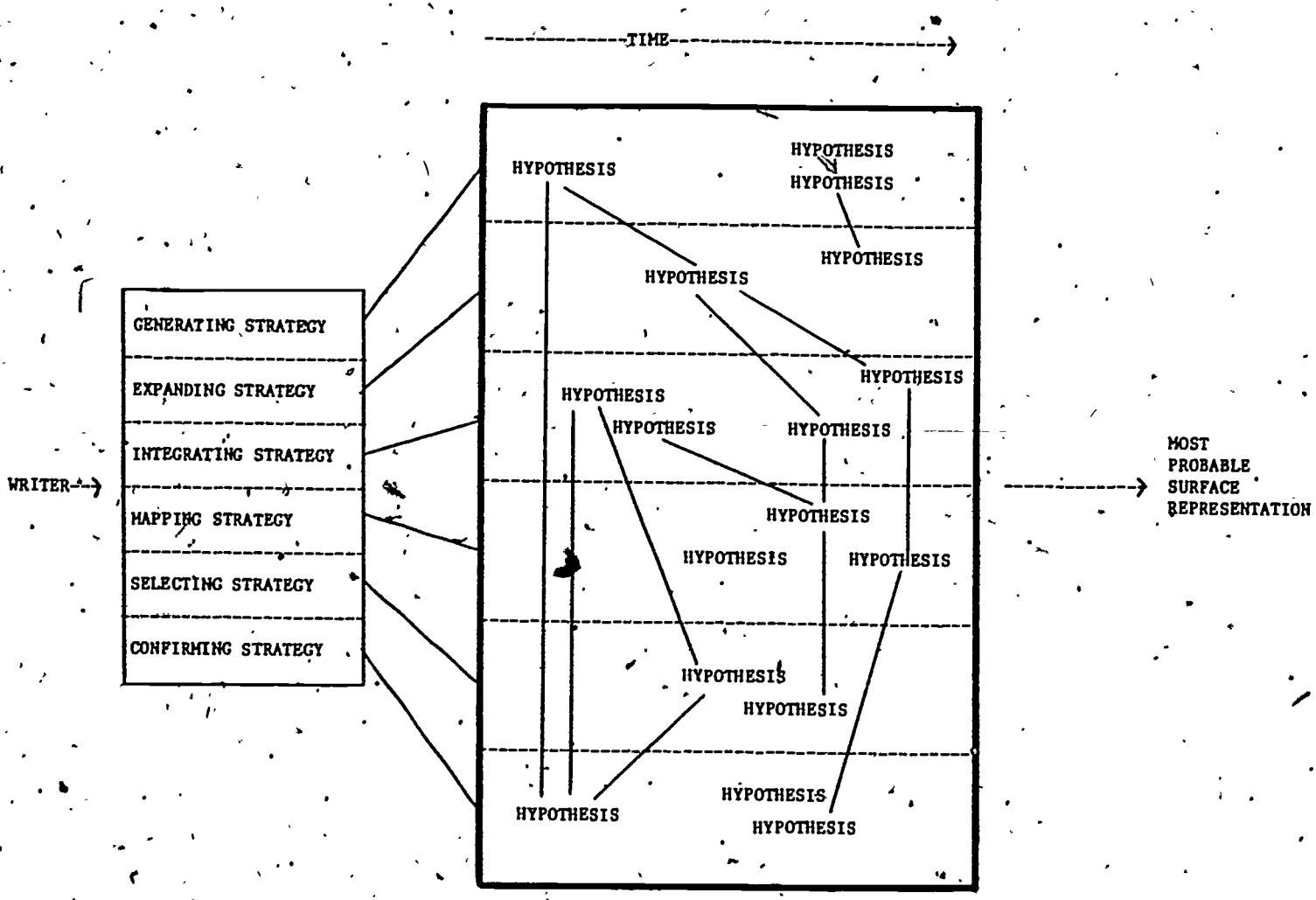

Figure 7. The text processor.