

STRUCTURED WRITING AT TWENTY-FIVE

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Performance and Instruction 32(February): 11-17. 1993
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a journal of The National Society for performance and Instruction.

Abstract

This article is a historical and theoretical summary of structured writing. The approach describes the major innovations of the approach including: (1) the invention and description of the information block as a new kind of modular approach to writing, (2) the precise specification of different kinds of information blocks for specific purposes, (3) the invention of a content analysis approach of seven major information types that cluster different information blocks to guide question asking and ensure completeness analysis, (4) the invention and description of an intermediate organizational unit of writing, the information map, that permits easy and natural topic clustering vital to efficient retrieval of information, (5) the development of a comprehensive and systematic set of criteria for labeling blocks and maps, (6) the systematic specification of where graphics should be used and where text would be better, (7) the development of easy-to-scan formats that exactly fit with the analysis methodology and categories to aided learning and reference. Each of these topics are developed by the originator of structured writing with an aim toward emphasizing their specific contribution to a comprehensive performance-based approach to structured writing.

Introduction

The problems of today's instructional developers and business writers are considerable. They have to prepare training manuals that enable managers, sales people, office personnel, and technicians to learn new products, services, and operating procedures rapidly and precisely. They have to describe complex, technical and administrative subject matters to a huge variety of audiences. In newer challenges they have to provide online, just-in-time documentation and training to millions working at their personal computers. Proposals, reports, and memos must be prepared rapidly, clearly, and concisely to meet the high performance communication needs of business today. Structured writing

was developed to meet these challenges.

Twenty-five years have passed since the structured approach to writing was first conceived. (Note 1) Perhaps it is a good time to examine just what it has brought into being, to review its claims for novelty, and appraise its accomplishments.

This paper is divided into two parts: (A) an introduction to the principal components of the method and, (B) a section that surveys the major innovations in the method that represent historical "firsts" and their implications for the analysis, writing and presentation of text.

Section A. The Three Major Parts of the Approach

Initially, the structured writing approach grew out of a research program focused on the broad question: How can we make learning easier and quicker for people in complex information rich environments? As this question was examined from a number of different angles, my research began to focus on the a three part approach of (1) content analysis, (2) project life-cycle synthesis and integration of the content analysis, and (3) sequencing and format.

Content Analysis The content analysis side of the methodology initially focused on devising a taxonomy and criteria for a new set of the smallest practical unit of meaning for writing documents in the domain of relatively stable subject matter. This work differed from the approaches to modularity taken by others in that it focused on a deep understanding of the basic units of the subject matter. It depended for its success on the ability to teach others easily and with great uniformity to sort sentences and diagrams of a subject matter into an easily understood taxonomy. (Horn 1992) This was facilitated by the discovery of an underlying structure of subject matter called the information types that clustered a unique prescription for chunking information, called "information blocks" into seven information categories. There is something fundamental about this taxonomy. It has proved capable of first-pass sorting of 80 percent or more of the content of virtually every subject matter that it has been applied to. Thus, the method can be said to capture and sort the "core" sentences of the subject matter. It clusters them into meaningful units for further refinement in the writing phase of documentation and training materials.

Life-Cycle Integration and Synthesis

Eventually, the content analysis was integrated with various planning approaches into a life cycle methodology for writing projects, particularly for projects that were complex and lengthy. It was refined to incorporate efficient recursive procedures for ensuring, in so far as humanly possible, that all relevant subject matter sentences would be gathered from the subject matter expert by the analyst or writer. The life-cycle integration and synthesis is important because the approach has been modified and extended to handle document writing projects at every level of detail and size from the office memo to the

largest and most complex documentation projects encountered by industry and academia. The life-cycle begins with an initial definition of need through definition of the audience to management of the information gathering, to sequencing and final choices of presentation media and format.

Getting the content analysis complete and chunked properly early in the initial analysis phase has enormous benefits all along the way in the life-cycle. In particular, it helps specify what information is missing at any given time in the process. Knowing what you don't know is an important advantage. Therefore, the information gathering phase is greatly simplified. Because the content analysis categories correspond to the deep structure of the subject matter, a systematic way of labeling the content is possible.

Sequencing and Formatting

The third broad area of innovation in the method has been the ability to specify sequencing precisely and the ability to devise very effective formats for presentation of information complementary to the content analysis system.

In the history of writing, especially in training and documentation, there has been a considerable fuzziness in discussions of sequencing. Thus communication among practitioners has been ambiguous at best. The sequencing challenge has always been to specify patterns in a way that one writer or editor can communicate precisely with another about exactly which chunks of information go in exactly what order in the final presentation of the material. Unfortunately, most often they relied on the idea of making the sequence of parts "logical," without specifying and thus we must assume, without knowing, just what "logical" meant and without being precise about the specification of the parts. The content analysis brought the powerful capability of a taxonomy and technical vocabulary adequate to the task of specifying a sequence in even the most complex of documents. The approach provides basic sequencing templates and facilitates communication in precise ways about sequencing patterns.

I will deal with each of these three topics (content analysis, life cycle integration and sequencing and formatting) in more detail in the next section as I explore the contribution of different parts of Information Mapping's method.

Section B. Innovations Incorporated in the Method

As this paper is a summary of the structured writing and its progress, it is a good place to survey in retrospect the specific advances made and to begin to assess their effects. In this section I will first examine the various innovations that represent historical "firsts" and then examine the impact of putting them all together.

1. Precision Modularity of Information Blocks

Modularity is a major concept in engineering. It has been thoroughly incorporated into software engineering as subroutines. This concept certainly influenced my work on developing information blocks. There were precursors to the structured writing concept of modularity into technical and business writing. (Note 2) But, beginning in 1967, structured writing can claim to be the first to define and develop a precise modular concept ("information blocks") that are firmly grounded in a taxonomy of information types. (Note 3) Let us examine both the concept of modularity and then the concept of information types.

Horn, et. al. 1969 were the first to specify a finite group of 40 information blocks that claimed to cover 80% of a given domain of discourse. The initial discourse described was that of relatively stable subject matter (Horn, 1989). It will be useful for the reader who is unfamiliar with the method for me to unpack the above sentences to give some depth of understanding to the concept of a finite group of precisely specified block types.

What are blocks? Information blocks are the basic units of subject matter in structured writing analysis. They replace the paragraph as the fundamental unit of analysis and of presentation. They are composed of one or more sentences and/or diagrams about a limited topic. They usually have not more than nine sentences. They are always identified clearly by a label. Information blocks are normally part of a larger structure of organization called an information map which can be defined as a collection of one to nine blocks all related to a specific topic. In short, they are a reader-focused unit of basic or core parts of a subject matter.

Among the many constraints on the writing of blocks are four principles: (1) The chunking principle (which says, "group all information into small manageable units"); (2) The relevance principle (which says "include in one chunk only information that relates to one main point based on that information's purpose or function for the reader"); (3) The consistency principle (which says "for similar subject matters, use similar words, labels, formats, organizations and sequences"); and (4) The labeling principle (which says "label every chunk and group of chunks according to specific criteria"). These principles along with a variety of specific guidelines and rules give blocks the property of considerable precision. The initial kinds of blocks for relatively stable subject matters are shown in Table 1. What is the importance precision modularity? It accomplishes a number of purposes. First it enables the analyst/writer to manage information by guiding systematic questioning of subject matter expert. When combined with the information types analysis (see below), it enables writer/analyst to do completeness analysis (i.e. to determine within, the bounds of possibility of today's level of technology, exactly when the analysis is complete and all information needed for the document has been gathered). When applied properly, it refines the basic idea of modularity to a place where each chunk of information can be considered a true subassembly for documentation engineering. Further, such precision enables the manager of documentation to specify guidelines and rules that apply only to

certain types of blocks rather than to more fuzzily defined units, permitting the kind of efficiency, reliability and effectiveness that such standardization usually provides. Precision modularity provides the solid basis for assisting the analyst/writer in organization/sequencing phase later on. And it enables computer-based training and reference systems to be built on precision modularity.

2. Analysis Categories of Information Types

Another historical first credited to structured writing was the definition and development of a set of content analysis categories and question types based on the (now) seven (then, six) information types. (Horn, 1966; See Horn, 1989 for a more extensive explanation than given here)

The seven information types are:

- % Procedure
- % Process
- % Concept
- % Structure
- % Classification
- % Principle
- % Fact

This is a key set of categories for specifying and describing how human beings think about relatively stable discourse domains (Horn, 1989). Guidelines permit the information blocks to be assigned to information types and thus it permits the identification of what has come to be called "key specific block" information, that which one must have, to fully understand specific topic. Key blocks, by themselves, do not give one all of the information needed for a piece of writing but they enable writers to anchor their writing firmly and reliably to the centrally important structure of a subject matter, and, thus, aid in the process of specifying the subject matter.

What is the importance of the information types? The information type taxonomy enables the analyst/writer to more easily specify the subject matter and contributes to achieving completeness of analysis. Being able to identify the information type of the topic under analysts further enables the analyst/writer to formulate questions for subject matter experts that bring information gathering phase toward completeness and comprehensiveness. It further enables the analyst/writer to formulate specific more appropriate and systematic labels that will aid readers in scanning and learning.

3. Information Management Through Information Maps

An unending sequence of structured information blocks would fail to provide readers with natural and logical ways to cluster important concepts, procedures, processes, etc. It would be little better than an endless sequence of gray paragraphs one after another. It would hinder rather than aid searching for retrieval. To solve this problem, the method was also the first to develop and incorporate the concept of the information map, as a collection of one to nine

information blocks.

The information map provides an important intermediate level of specification of document organization. It enabled the clustering of blocks all related to a topic (and where possible an information type) together and to suggest an appropriate labeling system for them. (see below for further discussion of labeling) It was also first to link the idea of the information map with the seven information types. (Horn et. al., 1969)

What is the importance of the information map? The information map enables the user/learner to receive all information connected with a particular topic together. This facilitates the organization of the document. The information map enables the analyst writer to specify and know what information is present and what is absent at the level of individual concepts, procedures, etc.

4. Systematic Criteria for Labeling Modules

Another structured writing innovation first was the recognition that a criteria and method of specifying the headings and subheadings was needed for a true technology of structured writing. It goes without saying that we did not invent labeling. But, structured writing was, the first to specify a systematic criteria for headings and subheadings (called, in the methodology, "block labels" and "map titles"). It specified the criteria for labels for specific information types, maps, and blocks. It specified the criteria important for learning use, reference use and for mid-project information management. (Horn, et. al., 1969; see also Horn, 1989) Incorporated in this approach was a three-fold approach to creating labels: (1) those labels which described the specific content of the subject matter, (2) those labels that described the functions which the block or map performed that were similar across subject matters (e.g. definition, example), and (3) those labels that were combinations of these two types. Each of these types were carefully studied and guidelines for effective use have been prepared.

What is the importance of this part of systematic labeling? With systematic labeling comes great efficiencies in managing and rearranging the information for different users. Also based on the validity and appropriateness of the content analysis, the method has the ability to specify rules and guidelines at the appropriate level of detail that make them extremely sharp and useful to the writer. This contrasts with the usual experience of writing guidelines which are typically either too detailed or too general and vague to be really useful. The information block and information map levels as well as their division into types, gives a powerful way to divide writing guidelines. The life-cycle efficiencies also accrue because of the common language that the content analysis gives to users of the method. This common language permits intensive and efficient work in teams.

In summary, the importance of the labeling technology is that it: %

enables readers to scan content to and quickly understand the structure of the documentation and the subject matter % enables readers/learners to find what they are looking for in a consistent, relevant, complete manner; % enables to analyst/writer to manage the intermediate stages of information gathering and analysis in a more efficient way; % enables learners to anticipate learning problems by showing its structure to them.

5. Systematic Specification of Graphics

Structured writing respects the importance of visual communication in today's complex world. Among its firsts was the specification, as a normal part of analysis and writing, of exactly where (i.e. in precisely which information blocks) graphic formats, diagrams and illustrations should be preferred over text. (Horn, et. al. 1969; see also Horn, 1989 for examples of the use of graphics fully integrated with text.)

In so far as we know, this was the first, as a part of a system, to require that the graphic or illustration always be located within the text where the reader needs it, rather than at some other location as is done in most documents (where the illustration may be located on facing page, next page, or some other place in of the document, but not where it is referred to in the text). It further specifies that information put in the caption of the illustration should often actually be incorporated into the illustration itself so that the reader's eye does not have to search to identify verbal meaning associated with the visual element. It is significant to note that these were all specifications of routine use of the method, not occasional guidelines.

What is the importance of systematic specifications of graphics? The importance of this integration of graphics and words permitted the specification in a precise manner the question "Exactly when and where is a picture worth a thousand words?" It further enabled readers to more swiftly scan and use documents, because they did not have to search all over the document for illustrations and diagrams and their explanations. It also ensured that content that should be explained with visuals were done that way.

6. Systematic Specification of Formats

In addition to the specification of graphics that appear in the text, the structured writing from its inception, paid attention to the formatting of content. This was important because it was recognized from the start that readers needed help in coping with the immense amount of information they had to process every day. It was recognized that much of this information processing in everyday situations of business, science, and technology involved the scanning of documents to find exactly the parts that were important while skipping the rest. And it was recognized that innovations were needed to provide the type of formats that would aid such scanning. Since then, a large variety of formats have been developed to suite different needs of different document types. These formats help the

writer get the document ready for print media as well as display on computer screens.

While the formats were initially developed to aid the reference and rapid scanning modes of use, these same formats also aid learners in pre-organizing and sizing up their learning tasks. They also convey the organizing of the subject matter and the organization of the document to the learner.

One format, used early in structured writing development, was the now familiar use of a title at the top of every page (which is the title of the map) and labels for each information block in the left margin. The title at the top functioned to orient the reader at all times and to show the chunking. The marginal labels were borrowed from 18th and 19th century printers who sometimes used them in textbooks. But a large number of improvements were made in this idea, including the exact specification of labels size, and type of use, as well as the combining of them with map titles to form a kind of grid that kept the reader oriented while they dip into the document at any place. The formats are also the most visible aspect of mapped documents. People immediately recognize how easy it is to scan and skip to what they want to read. They recognized the rapid access that the formats provide on every page. They begin to have confidence in the document and in their ability to understand what it contains.

Over the past 25 years, this format has caught the attention of many graphic designers and document publishers in industry. And unfortunately they have often borrowed the formats without the structured writing requirements of the analysis phase thus providing for readers only a superficial rendering of the approach by using only its formats.

This lack of analysis has sometimes reflected negatively upon structured writing in two ways. First, such unanalyzed documents do not provide readers with the information that they need (because no other approach provides as much guarantee of completeness of analysis). Second, the lack of analysis has also reflected negatively upon the method because many people have come to think of the method have thought of is as "only a format."

However, there is a large and growing group of writers (that numbers over 150,000 world wide) that recognize the critical distinctions that warrants the name of "true" structured writing.

8. Life Cycle Methodology

Documents in business, industry, science, and technology have a life of their own. They go through many drafts, often being looked at and approved by many levels and parts of an organization. Then, after publication, they are revised and kept in place, sometimes for many years, even decades. This requires the document manager to have in place a methodology that enables quick and easy revision of the document, for document managers know that maintenance can be one of the most costly aspects to document management.

Here again, the structured writing was the first to present a comprehensive technical writing methodology that covered the document life cycle. It was the first to show that the precision modularity of information blocks and information maps affected the entire life cycle from (A) initial project specification and learner/user analysis to (B) information gathering and analysis to (C) management and organization of the growing subject matter content database in large projects (D) to the sequencing and final formatting and display of documents on screen or paper. (Horn, et. al. 1969) And after full implementation it was the first to show how easy document maintenance could be, no matter how complex the subject matter. (See Horn, 1989)

Previous writing styles are a lot more intricately interwoven. Themes and paragraphs are written to please the more literary taste. Documentation managers continue to face many maintenance problems if they chose such old, non-structured writing approaches.

What is the importance of life cycle methodology? The life-cycle concept is the most efficient method of document development. It increases the chances of gathering all of the information needed early in the project and reduces rewriting to a minimum; it also helps specify at any given point what is not known about the content. Finally, it provides efficiencies in costly document revision cycles, no matter when they occur.

9. Synthesis and Integration of All Important Components Document Development

A good deal of the success of structured writing is that it gives attention to all of the critical aspects of document development and integrates these with the novel methodological components described above. While there is much innovation that sets structured writing apart, we have never claimed that everything in structured writing is novel or unique to it. It incorporates many concepts and techniques invented by others. (Horn 1992a) Notable among these borrowings are the incorporation of the critical elements of performance technology, the use of job aids, the incorporation of ordinary language algorithms (Lewis,1967) and decision tables. What has been unique about these borrowings, has been the ability of the overall structure of structured writing's taxonomies, life cycle procedures, and guidelines to specify exactly where these other techniques are needed and to incorporate them seamlessly into the final presentation.

An additional advantage is that structured writing incorporates many of the tools from performance support technology while presenting itself as an analysis and writing methodology. And it does this with the minimum of technical terminology from the performance and training field so that writers who encounter it are not encumbered by gigantic amounts of jargon. The synthesis it provides, has resulted many large improvements in effectiveness and efficiency, as we shall elaborate on below.

10. Specify Requirements for Just-in-Time Learning and Reference

Before the introduction of structured writing, it was rare to find practitioners distinguishing clearly between initial learning and reference for the specification of what users required. Mager (1975) had pioneered in the specification of learning objectives, and Lewis (1967) had shown the usefulness of ordinary language algorithms for job aid and reference use. But few researchers or practitioners had paid attention to the fact that most people forgot most of what they learned within a few weeks of learning it. Few called attention to the different requirements that the world of business technology was growing so complex and was changing information faster than we could learn it. Few thought then that this situation called for a completely different approach to the analysis and presentation of many kinds of learning documents. In fact, twenty-five years ago, there was puzzlement when I first began to say that what was needed now was a whole new information environment in which human beings could learn things as they needed it, rather than preparing themselves to know everything they needed to know before taking on a job.

In structured writing there is a requirement to specify in the first phase, exactly what is required of the documents. The first distinction was to call attention to (and to precisely specify) requirements for the dual functions of initial learning and reference. Then specialized applications of these approaches were designed specially for combining or dividing the two functions. (Horn, et. al., 1969; 1971) They can be kept separate in such initial learning methodologies as in pure fluency training (Binder, 1990), or in pure reference such as some kinds of user documentation. The two functions of initial learning and reference can be combined as in reference-based training (Ross, 1987; Horn, 1989, p. 118) which is a term for just-in-time training. The early concern for this has helped shape the specific applications for the material and has led to the more recent specification of discourse domains (Horn, 1989, p. 104) which help the writer keep clear that quite different purposes and interaction produce quite different analyses and presentations.

What is the importance of carefully analyzing learning and reference? The importance of making clear distinctions among purposes and following them with the kind of structured analysis described above enables analyst/writer to make precise determinations of sequencing of documents for different learning and reference situations. It also enables analyst/writer to analyze precisely prerequisite and classificatory relationships of information blocks. This in turn provides clear criteria as to what to include in a particular document.

11. Experimental Research Program for Rhetoric

There has been an ongoing research program, instructional writing, since 1965. Prior to it, there was little, if any experimental work, done in the area of rhetoric. But one of the most unique aspects of our early research was to insist upon using research that had been

done in various fields, such as psychology, education, advertising, human factors engineering and cybernetics. In so doing, it became an important force in shaping the field of rhetoric, which for centuries has been more closely aligned with the study of persuasive communication, the composition of literary art, legal reasoning, and coaching for better speech-making.

Three aspects in particular have contributed to this new approach to the study of rhetoric: (1) the continuous attention to keeping structured writing in tune with contemporary research, (2) its continuous focus on providing the utmost in the clarity of communication, and (3) its focus on developing a new units and frameworks for precisely structuring communication.

What is the importance of continuous updated research base? The focus on research based methodology for analysis and writing moved writing methodology into realm of learning and retrieval experiments so that research and social science methods could be used to investigate rhetorical variables associated with a comprehensive methodology. (See Horn, 1992c, in press) It further enabled practitioners to use believably such new metaphors as "documentation engineering" for what they were doing. (Horn, 1986) This firm foundation in research and practice is a strong base for future development.

Summary

To summarize, perhaps it would be appropriate to list the range of novel techniques, approaches, and syntheses that have been integrated into structured writing. In this article, we have pointed out these innovations:

- The invention and description of the information block as a new kind of modular approach that permits the use of truly structured writing.
- The precise specification of different kinds of information blocks for specific purposes
- The invention of a content analysis approach of question and information types that clusters different information blocks to guide question asking and ensure completeness analysis
- The invention and description of an intermediate unit of structured writing, the information map, that permits easy and natural topic clustering
- The development of a comprehensive and systematic set of criteria for labeling blocks and maps
- The systematic specification of where graphics should be used and where text would be better
- They development of easy-to-scan formats that exactly fit with the analysis methodology and categories to aided learning and reference

- The incorporation of research results from many fields and the creation of an ongoing research program to keep the methodology current
- The creation of a structured framework that would permit the incorporation and synthesis of good approaches to communication from many different sources.

Notes

1. The structured writing approach dates back to 1965 when I was a researcher at Columbia University's Institute for Educational Technology. The earliest publication is Horn, et. al., 1969. Most of the literature on structured writing refers to it by a trademarked name "Information Mapping" which is a registered trademark of Information Mapping, Inc. 300 Third Ave., Waltham, MA. 02154. However the generic term for the approach, which I suggested in the early 1980's is "structured writing". Often authors of "structured writing" documents use different and more loose standards for analysis, organization and display of information than those who practice Information Mapping's method. The characteristics described in this article refer to those which I first synthesized into Information Mapping's method. Since the name "Information Mapping" is trademarked, we must abide by the requirements of the trademark law and mention that fact.

2. The STOP (Sequential Thematic Organization of Proposals) developed at the Hughes Aircraft Company in the late 1950's had a formatting style that required the text to be divided into no more than 500 word units with a fixed format for all of the two-page spreads, text on the left, and graphics on the right.

3. The information types were completed in 1965; first published as a schema in Horn (1966); incorporated into a research proposal in 1967 and first published in Horn, et. at. 1969.

4. The formatting innovations are that aspect from which it takes its name. Information has a topography like geographical terrain. Information has peaks and valleys, cities and countryside, and roads and superhighways that connect them. Like geographical maps, formats should relate to this topology on an point-to-point basis, in so far as possible. Information maps should guide you through the information just like a geographical map do. The ability to show relationships and guide the user quickly to relevant places are features of the formats, and the key to the metaphor of Information Mapping's name.

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Acknowledgements

I would like to extend my appreciation to Doug Gorman and Irwin Mesch of Information Mapping, Inc. for reading earlier versions of this paper. I would also like to thank Carl Binder for especially helpful comments on an earlier version.

Table 1.
Most Frequently Used Block Types
(in domain of relatively stable subject matter)

Analogy
Block Diagram
Checklist
Classification List
Classification Table

Classification Tree
Comment
Cycle Chart
Decision Table
Definition

Notation
Objectives
Outlines
Parts-Function Table
Parts Table

Prerequisites to Course
Principle
Procedure Table
Purpose
Rule

Specified Action Table
Stage Table
Synonym
Theorem
When to Use

WHIF Chart
Who Does What
Worksheet

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