

THE PSYCHOLOGY OF WRITTEN COMPOSITION



Carl Bereiter
Marlene Scardamalia

 **Routledge**
Taylor & Francis Group

The Psychology of Written Composition

THE PSYCHOLOGY OF EDUCATION AND INSTRUCTION

A series of volumes edited by:

Robert Glaser and **Lauren Resnick**

CARROLL • *Perspectives on School Learning: Selected Writings of John B. Carroll*

BUSSIS, CHITTENDON, AMAREL, KLAUSNER • *Inquiry into Meaning: An Investigation of Learning to Read*

CHIPMAN, BRUSH, WILSON • *Women and Mathematics: Balancing the Equation*

DUSEK • *Teacher Expectancies*

FOORMAN and SIEGEL • *Acquisition of Reading Skills*

PARIS, OLSON, STEVENSON • *Learning and Motivation in the Classroom*

Thinking and Learning Skills

SEGAL, CHIPMAN, GLASER • *Relating Instruction to Research, Vol. 1*

CHIPMAN, SEGAL, GLASER • *Research and Open Questions, Vol 2*

BEREITER and SCARDAMALIA • *The Psychology of Written Composition*

WEINERT and KLUWE • *Metacognition, Motivation, and Understanding*

The Psychology of Written Composition

CARL BEREITER

MARLENE SCARDAMALIA

Ontario Institute for Studies in Education

Q Routledge

§ ^^ Taylor & Francis Group

NEW YORK AND LONDON

To Theodore and Bianca
To the memory of Walter and Charlotte

First Published by
Lawrence Erlbaum Associates, Inc., Publishers
10 Industrial Avenue
Mahwah, New Jersey 07430

Transferred to Digital Printing 2009 by Routledge
270 Madison Ave, New York NY 10016
2 Park Square, Milton Park, Abingdon, Oxon, OX 14 4RN

Copyright © 1987 by Lawrence Erlbaum Associates, Inc.
All rights reserved. No part of this book may be reproduced in
any form, by photostat, microform, retrieval system, or any other
means, without the prior written permission of the publisher.

Library of Congress Cataloging-in-Publication Data

Bereiter, Carl.
The psychology of written composition.

Bibliography: p.
Includes index.

1. Rhetoric—Psychological aspects. 2. Written
communication—Psychological aspects. I. Scardamalia,
Marlene, 1944- . II. Title.

P301.5.P75B47 1987 808'.001'9 86-19955

ISBN 0-85859-647-5

ISBN 0-8058-0038-7 (pbk)

Publisher's Note

The publisher has gone to great lengths to ensure the quality of this reprint
but points out that some imperfections in the original may be apparent.

Contents

Foreword by Walter Kintsch

Preface

Acknowledgments

PART I CENTRAL CONCEPTS

- 1 Two Models of Composing Processes
 - Writing as Both Natural and Problematic* 4
 - From Conversation to Knowledge Telling to Knowledge Transforming* 6
 - Knowledge Telling Versus Knowledge Transforming* 10
 - Observable Differences Between Knowledge Telling and Knowledge Transforming* 13
 - Testing the Models* 24
 - Cautionary Notes* 27

- 2 An Integrative Schema for Studying the Composing Process
 - The Six Levels of Inquiry* 35
 - Levels of Inquiry in Relation to Current Trends* 50

3	From Conversation to Composition	53
	<i>Learning to Generate Text Without a Respondent</i>	58
	<i>Learning Active Search for Content</i>	62
	<i>Shifting from Local to Whole-Text Planning</i>	69
	<i>Learning to Go Beyond the Text as Written</i>	82
	<i>Summary: Composition and Growth</i>	89
PART II	BASIC COGNITIVE FACTORS IN COMPOSITION	93
4	The Role of Production Factors in Writing Ability	97
	<i>Short-Term Memory Loss Due to Slow Writing Rate</i>	102
	<i>Interference from Mechanical Requirements of Written Language</i>	105
	<i>Discoordination Resulting from Lack of External Signals</i>	111
	<i>Conclusion</i>	130
5	Information Processing Load of Written Composition	133
	<i>The Inadequacy of Informal Evidence</i>	135
	<i>Information-Processing Demand and Complexity</i>	139
	<i>Conclusion</i>	153
6	How Children Cope with the Processing Demands of Coordinating Ideas in Writing	155
	<i>Converting Matrices to Sentences</i>	158
	<i>Problems in Defending a Thesis</i>	162
	<i>Match and Mismatch Between Task and Capacity</i>	168
	<i>Postscript to Chapter 6</i>	174
PART III	PERSPECTIVES ON THE COMPOSING STRATEGIES OF IMMATURE WRITERS	177
7	Knowledge Telling and the Problem of "Inert Knowledge"	179

	<i>Expository Writing as a Paradigm Task for Knowledge Use</i>	181
	<i>The Knowledge- Telling Strategy</i>	183
	<i>The Role of Knowledge Telling in Knowledge Acquisition</i>	186
8	The Development of Planning in Writing	191
	<i>Preliminary Observations</i>	193
	<i>A n Experiment in Advance Planning</i>	196
	<i>Results</i>	199
	<i>Conclusion</i>	210
	<i>Postscript</i>	213
9	Links Between Composing and Comprehending Strategies	215
	<i>Study 1</i>	218
	<i>Study 2</i>	226
	<i>General Discussion</i>	238
	<i>Postscript: Three Follow-Up Studies</i>	242
PART IV	PROMOTING THE DEVELOPMENT OF MATURE COMPOSING STRATEGIES	245
10	Fostering Self-Regulation	249
	<i>Procedural Facilitation</i>	254
	<i>Concretizing of Goals</i>	257
	<i>Goal Construction</i>	260
	<i>Postscript</i>	261
11	Fostering Evaluative, Diagnostic, and Remedial Capabilities	265
	<i>Description of the Experiment</i>	269
	<i>Findings</i>	273
	<i>Interpretation</i>	282

	<i>Postscript</i>	288
	<i>The DIAGNOSE Study</i>	289
	<i>The OPERATE Study</i>	293
12	Fostering Reflective Processes	299
	<i>A Dual Problem Space Model of Reflection</i>	301
	<i>Informal Observations</i>	309
	<i>Conclusion</i>	314
	<i>Postscript: Further Studies on Teaching Reflective Processes</i>	315
13	Helping Children Gain Insight into Their Own Cognitive Processes	319
	<i>Where Cognitive Inquiry May Help</i>	322
	<i>Open Inquiry</i>	324
	<i>Model-Based Inquiry</i>	355
	<i>Conclusion</i>	337
PART V	CONCLUSION	337
14	Knowledge-Telling and Knowledge Transforming Differences: Their Psychological and Educational Implications	339
	<i>Origin of the Knowledge-Telling Model</i>	342
	<i>Validity of the Knowledge-Telling Model</i>	344
	<i>Psychological Implications of the Two Models</i>	349
	<i>Educational Implications</i>	358
	Reference	365
	Author Index	381
	Subject Index	387

Foreword

Only a few years ago, research on writing was a neglected field within cognitive science. By that time, reading and reading comprehension had become familiar and major topics of interest, with an expanding data base and deepening theoretical understanding. But writing was left largely unexplored. Of course, there was no lack of investigation or concern with writing: The study of writing has an old and rich tradition within rhetorics and education, and over the centuries writing teachers have accumulated a great deal of knowledge. But cognitive science researchers did not seem to know how to design the right kind of experiments, nor how to theorize about writing processes within the new framework. The study of writing continued to remain at Levels 1 and 2, as Bereiter and Scardamalia describe in chapter 2; that is, writing research relied on informal observation, introspection, and correlational methods. The kind of approach that characterizes cognitive science—experimentation, analysis, and model building, Bereiter and Scardamalia's levels 3 to 6—has taken a long time to take hold in the area of writing research.

This has all changed very quickly within the last few years. Task analyses, experimental studies, and the first models and theories began to appear; in schools, a "writing crisis"⁵ was diagnosed, joining and sometimes even replacing the more familiar "reading crisis." Books on writing from a cognitive perspective appeared. Newsletters were started to disseminate the new knowledge beyond the research community. Progress has been rapid, and writing research has assumed its rightful place within the study of the higher cognitive processes.

Bereiter and Scardamalia's *Psychology of Written Composition* marks a high-point in this development. Their book makes contributions at three levels. First, it significantly expands the data base upon which our understanding of writing rests. We have learned a great deal about writing processes in the last

few years, both through experiment, protocol analyses, and observation, and Bereiter and Scardamalia have a lot more to tell us. Secondly, the book presents an original theory, or at any rate, the beginnings of a theory of writing and the development of writing skills, emphasizing the control processes in writing. Their views are bound to have a strong impact on future theorizing and model building in this field. Last but not least, Bereiter and Scardamalia fulfill a very important bridging function between the older literature on writing in educational psychology and the new cognitive approach. Since they know and understand both viewpoints, they are able to use a great deal of the pre-cognitive work to help us formulate our present concerns. Many cognitive scientists who are interested in writing lack the background to deal with the older literature on their own; Bereiter and Scardamalia make it possible for them to integrate some of these findings. This is a real service, since there is, after all, no point in continually reinventing the wheel.

The Psychology of Writing and Cognitive Theory. One notion that might be entertained concerning the relation between the psychology of writing and cognitive theory would be that the former is nothing more than a particular domain of application of the latter, just as building bridges is an engineering application of physics. Perhaps this would be the ideal state of affairs in the distant future, but, alas, nothing could be further from the truth at present. It is not possible to derive from cognitive theory a model of the writing process—cognitive theory is not yet sufficiently detailed or sufficiently complete to support such a complex application. Our knowledge about general cognitive processes is still fragmentary, incomplete, unsystematic, and unreliable in several areas. At best, it serves as a local constraint on writing research or helps us to understand and relate the findings uncovered by the research to other phenomena. Indeed, in this situation, the general theory receives more from the "applied" field than it gives: Writing research itself contributes greatly to the development and elaboration of our ideas about cognition in general. In grappling with such complex phenomena as writing, we learn to sort out the basic elements of a general cognitive theory—perhaps more so than from the more traditional concentration on the elementary processes themselves.

Thus, Bereiter and Scardamalia's work suggests that writing research is becoming an integral part of the cognitive science enterprise, where the methods of cognitive science—from experiment to model building and simulation—will be routinely employed. (This is not quite the case yet: Both in terms of formal theorizing and computer simulation, the writing field still has some catching-up to do.) On the other hand, Bereiter and Scardamalia also demonstrate that research on writing provides an excellent opportunity and challenge for cognitive science. Writing research today is basic research, contributing its share and constraining the general theory of cognitive processes.

Cognitive Principles. It is instructive to examine some of the ways in which Bereiter and Scardamalia make use of general principles from cognitive science in their own work on writing. Most fundamentally, Bereiter and Scardamalia manage to take over from current research on reading comprehension some useful notions about the units of representation at various levels. Explanations and interpretations differ, whether they are concerned with the actual words used and their linear organization into phrases, sentences, and paragraphs, or with the propositional meaning-units at the semantic level with their hierarchical structure, or directly with the objects, events, and states-in-the-world which are being written about, as they are reflected in the writer's memory organization and knowledge. Similarly, Bereiter and Scardamalia find the distinction between micro and macroprocesses useful in accounting for writing processes as it has been in theories of reading comprehension. Thus, while reading and writing strategies are of course different, the general framework of comprehension models appears to be readily exportable.

Throughout this book, the authors emphasize the role of control strategies. Cognitive theory today is characterized by a particular kind of architecture based on the distinction between fixed structures and flexible control processes. The structures establish the constraints within which the control processes can operate. The development of writing skills consists to a large extent in acquiring suitable control strategies. Structural changes (e.g., the knowledge structures of the writer) interact with the development of control strategies, creating a very rich and complex pattern of experimental results and observations. The structure/strategy distinction provides Bereiter and Scardamalia with one means of systematic analysis in the face of all this complexity.

Another characteristic of current theorizing about information processing relies on arguments about resource limitations and resource assignments for competing demands. Of particular interest in this connection are short-term memory limitations and their consequences for the writing process. At some stage in the development of models of writing behavior, formal process models that trace quantitatively the implications of various resource limits on writing processes may be required.

We write about what we know, what we have experienced, what we remember. Writing, therefore, always involves memory retrieval (plus, of course, a great deal else). Retrieval processes have been studied intensively for some time by memory researchers. It is interesting, instructive, and a little depressing to note, therefore, how little memory theory has to offer writing research in this respect. We know a lot about memory retrieval in list-learning experiments, and the principles derived from these studies are certainly relevant to the concerns of Bereiter and Scardamalia. What they would need, however, are not merely some general principles, but explicit models of information retrieval in various writing environments that could be used as subcomponents in theories of writing processes. Such models are only available

today in rudimentary versions or not at all. There is some work appearing today on models for the retrieval of personal experiences and some work on general knowledge retrieval. However, the latter, for instance, at best deals with the situation that Bereiter and Scardamalia have called "knowledge telling." All the more complex strategies, where writing researchers could really use some help and guidance from their colleagues in the memory laboratories, remain unexplored. Indeed, if you want to know about knowledge retrieval, other than the simplest cases, you are better off turning to research on writing than to general cognitive theory. I am confident that this situation will change, and change soon, but at present it is still the general theory that has some catching up to do. Clearly, what I would regard as the applications field is leading and guiding the basic research effort—not the other way round!

Perspectives for Cognitive Science. Writing research, of course, has its own fields of application: in education, the teaching of writing at all levels, and more recently, in the design of software systems to support writing. Bereiter and Scardamalia concentrate on the educational implications of their work. Once again, it is not so much the case that they formulate a theory of writing, and then investigate its implications for education. Instead, they never lose sight of their educational concerns, which guide every phase of their work. This perspective has important consequences for the way they present their research in this book: It tempers theoretical analysis with a healthy dose of common sense. This common sense affects neither the sharpness nor the depth of their analysis, but it helps keep the real complexity of the problem in view. Bereiter and Scardamalia make theoretical predictions that are unhedged and testable, yet they are very aware of boundary conditions. In other words, their educational perspective helps them to do analytic research on a real, complex problem, without turning that problem into a laboratory version that is a mere shadow of the original.

The other application area of writing research—software tools for the writer—is one in which there is currently a considerable interest. A great many of such writing tools are being developed, and there appears to be a ready market for them. This development, unfortunately, proceeds for the most part without a serious theoretical basis. Software tools are developed, but tools for what? What really are the problems writers need tools for? Until such questions are answered more satisfactorily than is possible by intuition and first-order task analyses, progress in this field will probably remain restricted. *The Psychology of Written Composition* and similar work will help to change this state of affairs. What we are doing, or should be doing, in writing instruction as well as in the construction of writing tools, may soon be based on a sound theoretical foundation—and that emerging theory of writing promises to become a major component of cognitive science and a significant influence on it.

—Walter Kintsch

Preface

The subject of this book is the mental activities that go into composing written texts. For brevity we will often refer to the subject simply as *writing*, but the term should not be taken too literally. In this book we are not concerned with the physical act of writing, except insofar as it influences other processes. The mental activities of writing considered in our research are the same kinds of higher mental processes that figure in cognitive research on all aspects of human intelligence. They include goal setting, planning, memory search, problem solving, evaluation, and diagnosis. Writing is, of course, easily recognized as an activity in which a good deal of human intelligence is put to use. Its neglect, until very recently, by cognitive scientists is, however, easy to understand. Cognitive research has been gradually working its way from well-defined to ill-defined problems, from tasks that draw on limited knowledge to tasks that draw on large bodies of knowledge, and from tasks that are easily constrained experimentally to ones that are more susceptible to intentions of the participants. On all of these counts, writing lies far out on the yet-to-be-reached end of the continuum.

Theorizers about the composing process face a difficulty that is not faced by theorizers about even such closely related processes as reading. It is that people will judge your theory against an elaborate set of intuitions of their own, formed from their own experience as writers. Reading[^] along with many other cognitive processes, tends to go on with little conscious awareness of the process itself. But writers, especially when grappling with a difficult task, tend to be keenly aware of at least certain aspects of what is going on in their minds. This is no accident, we shall argue: Skilled writers need to be able to exert a measure of deliberate control over the process. As a by-product, however, experienced writers tend to have rich intuitive theories, in contrast to which the theoretical propositions emerging from a young science are

likely to seem rather thin. It is perfectly reasonable to insist that a psychology of writing should not violate our intuitions—at least not without putting up a good argument. But it is not reasonable to insist that a psychology of writing in this day and age should do justice to all our intuitions. For our intuitions about what goes on in writing range across all dimensions of the human spirit.

A theory of writing that could explain writing in all its fullness could pretty much send all other psychological theories packing. We believe it is a mistake, however, to try to build a psychology so as to encompass the widest possible range of intuitions. Such efforts win plaudits, but they neglect the basic task of science, which is to tell us things we do not already know.

In an effort to find out things about the nature of the composing process that are not already intuitively known, we have concentrated on comparisons between the composing processes of unskilled writers and those of more expert writers. The body of intuitive knowledge about writing is, after all, knowledge accumulated by people of mature intellect for whom writing is a significant enough activity that they have taken the trouble to introspect about it. Is writing basically the same process for beginners, with a few parameters set differently, or does it follow a qualitatively different model? These are questions we have pursued through comparative studies of older and younger writers, writers of the same age, skilled and less skilled, coupled with experimental and instructional interventions designed to reveal aspects of writing that are normally hidden from examination.

The upshot of this research is that we have come to believe that there are distinctly different strategies that involve writers in different kinds of thinking when they write. These differences have structure and are not simply a matter of more of this or less of that. Producing discourse without a conversational partner—which is what writing amounts to—is a formidable task for novices. To cope with it they devise a simplifying strategy. Expertise in writing does not come from refining this strategy or from mastering the use of it. Expertise comes from subordinating the simple strategy to another that is a great deal more complex. In the following chapters we present evidence leading up to this view of writing competence and investigate what is involved in moving from the simpler to the more complex strategy.

The book is aimed at three classes of readers. One is people who are generally interested in cognition or cognitive development, and who we hope will find that research on writing contributes knowledge relevant to understanding major issues in these fields. Another class is people primarily interested in writing, but who are curious about how the mind copes with this task. We believe that the story to be told about the composing process is sufficiently fascinating and garnished with surprises to repay the effort of wading through some psychological jargon and experimental details in order to get the story. The final class of people is instructional psychologists. Instruction is both a goal and a tool of our research. That is, we use

instructional interventions to test theoretical ideas but also have an eye on devising instructional approaches that are effective for difficult-to-acquire abilities.

Because the book does include instructional research, it may be helpful to say a few words about how it relates to what is currently happening in the teaching of writing. There is a reform movement afoot, concerned with making writing a more substantial, meaningful, and successful experience for students. A salient notion guiding this movement is that children have a great deal more natural aptitude for writing than is revealed under traditional school conditions (Graves, 1983). It is easy to see how our claim that novices and experts follow qualitatively different models could be construed as a denial of children's natural aptitude for writing.

In point of fact, we also argue that children have a great deal of competence that is not manifested in their typical school writing. Differences have to do with interpretation. Some take the finding of how much better students write when they are in a supportive environment and allowed to write on what really matters to them, to mean that we already know enough to sweep away the obstacles to expert competence. We are struck by how much more dependent novices are than experts on environmental supports on particular genres—most particularly the personal experience narrative—and on the topic of writing. We see a major unsolved educational problem in enabling students to sustain high-level parts of the composing process independently, in a variety of genres and topics, not simply those most suited to their strategy.

Educationally, our interest is in what it takes for students to grow beyond their dependencies and acquire the autonomous competence of the expert writer. As for the issue of what children can and cannot do at a certain age, it is probably safe to declare that this is always a false issue as far as contemporary developmental psychology is concerned. Cognitive developmental psychology tends to be concerned with what develops and how (see, e.g., Siegler, 1978). But *when* it develops is of interest only insofar as issues of synchrony and asynchrony, prerequisite conditions, and the like are concerned. In the pages that follow we present strong contrasts between mature and immature competence in writing. But it is the contrast between two different executive systems for composing that is of interest. There is good reason to believe that many educated adults follow the immature model. This is, in fact, a reason for believing that the study of these contrasting models is of educational as well as psychological importance. If someone could show us a seven-year-old who followed the mature model or (better yet) could show us an educational program that turned out children who follow the mature model, this would be of considerable interest but would not undermine claims we make about these models.

In both instructional and noninstructional research, our persistent interest has been *the effects of the composing process on the ideational content of what is*

written. Language production itself has been considered mainly insofar as it may aid or interfere with the processing of content. When writing is viewed from the standpoint of language, it often seems that children do a better job of expressing what is on their minds than adults do of expressing what is on theirs, and so the challenge to writing instruction becomes that of preserving and nurturing the early genius. When writing is viewed from the standpoint of ideational content, however, it becomes clear that children have something important to learn. Mature competence is not merely a more sophisticated way of expressing what is on one's mind. It is a whole different way of interacting with one's knowledge, a cultural attainment of a high order, and one that we are only beginning to have inklings about how to develop.

BACKGROUND OF THE BOOK

The authors began research on writing in 1976. Our previous collaborative research had been on working memory capacity and intelligence (Bereiter & Scardamalia, 1979). What motivated us to study writing was not the "writing crisis," which was just beginning to grab attention at that time, but rather the belief that cognitive research had progressed to the point where research on the mental processes of composition could be profitable. During the next 8 years we and our coworkers completed about 120 studies, which form the empirical basis of this book.

With the upsurge of interest sparked by the "writing crisis," numerous conferences and edited book projects arose, to which we contributed papers. We chose this medium for publishing our findings because our research was moving very rapidly and book chapters provided an opportunity to integrate a number of studies at one time. The various chapters were written with a view to minimizing redundancy and to producing a coherent body of documentation. Coherence was militated against, however, by having the chapters scattered through many different books, so that even the most assiduous reader would be unlikely to read all of the chapters, much less read them in an order that would convey the cumulative force of the research program. The present volume is an attempt to convey such a sense of the whole. It consists of 12 previously published documents, along with two newly written chapters intended to introduce and sum up the research, and a variety of prefaces and postscripts to tie chapters together and to report more recent findings. The previously published chapters have been edited to remove major redundancies, but have not been revised to incorporate the

virtues of hindsight. Consequently the reader will see some variations among the chapters in emphasis and interpretation. We hope that these variations will add breadth rather than confusion to the book's message.

Acknowledgments

The research on which this book is based was undertaken with initial grants from York University and the Ontario Institute for Studies in Education (OISE), later augmented by grants from the Alfred P. Sloan Foundation and the Social Sciences and Humanities Research Council of Canada, and with continuing support from the Ontario Ministry of Education, through its block grant to OISE. An award from the National Institute of Education, funded by the Spencer Foundation, made possible the purchase of computing equipment that greatly facilitated later stages of the research and also the preparation of this book. Grants from the Sloan Foundation were especially important both in providing released time from teaching duties and in supporting the free-ranging exploration of problems that eventually led to the central findings of the research program.

Of the many people whose contributions we would like to acknowledge, first thanks must go to those who have worked with us on writing research projects as research associates, assistants, or students. The total list would run to dozens, but among them we would like especially to cite the following, who made sustained contributions not only to the conduct of the research but to the intellectual life of the research program: Valerie Anderson, Bill Baird, Bob Bracewell, Clare Brett, Jud Burtis, Suzanne Hidi, Roz Klaiman, Pamela Paris, Rosanne Steinbach, Jacqueline Tetroe, Larry Turkish, and Earl Woodruff.

Fellow researchers whose interest and ideas have helped us greatly include Robert de Beaugrande, Ann Brown, Joseph Campione, Robbie Case, Allan Collins, Bryant Fillion, Linda Flower, Jim Greeno, Dick Hayes, Walter Kintsch, Juan Pascual-Leone, and Ian Pringle. A critical reading of the entire manuscript by Andre Cams contributed more than a just noticeable difference to such coherence as this book has managed to achieve.

The writing research projects have taken experimenters into scores of classrooms, often for repeated visits, and almost always at the wrong time of year. That so many teachers and principals have invited us back bespeaks not only forbearance but a truly impressive commitment to the hope of educational improvement through research. We would especially like to thank Roberta Charlesworth who, as Director of English for the North York, Ontario, schools, was unflagging in her dedication to excellence through knowledge and imagination.

The research program also owes much to its project secretaries, Carol Broome, succeeded by Yvonne Lucas. Barbara White assisted in a number of valuable ways in bringing this book to completion. But the main burden for handling manuscript preparation and references has fallen on Carolyn Taylor, whose competence and perseverance have been a marvel to us.

Finally, we wish to thank the following publishers for permission to reprint papers or to quote material from their publications:

Ablex Publishing Corporation

Teachability of reflective processes in written composition (with Rosanne Steinbach) *Cognitive Science*, 8, 173-190. Copyright © 1984 by Ablex Publishing Corporation and used by permission.

Academic Press, Inc.

The role of production factors in writing ability, (with H. Goelman), in M. Nystrand (Ed.) *What writers know: The language, process, and structure of written discourse*, pp. 173-210. Copyright © 1982 by Academic Press, Inc. and used by permission.

Lawrence Erlbaum Associates

From conversation to composition: The role of instruction in a developmental process. In R. Glaser (Ed.) *Advances in instructional psychology (Vol 2)*, pp. 1-64. Copyright © 1982 by Lawrence Erlbaum Associates and used by permission.

How children cope with the cognitive demands of writing. In C. H. Frederiksen & J. F. Dominic (Eds.) *Writing: The nature, development and teaching of written communication*, pp. 81-103. Copyright © 1981 by Lawrence Erlbaum Associates and used by permission.

Information-processing demand of text composition. In H. Mandl, N. Stein & T. Trabasso (Eds.) *Learning and comprehension of text*, pp. 407-428. Copyright © 1984 by Lawrence Erlbaum Associates and used by permission.

Cognitive coping strategies and the problem of "inert knowledge". In S. S. Chipman, J. W. Segal, & R. Glaser (Eds.), *Thinking and learning skills: Current research and open questions (Vol. 2)*. Copyright © 1985 by Lawrence Erlbaum Associates and used by permission.

Development of strategies in text processing. In H. Mandl, N. Stein, & T. Trabasso (Eds.), *Learning and comprehension of text*, pp. 379-406. Copyright © 1984 by Lawrence Erlbaum Associates and used by permission.

Fostering the development of self-regulation in children's knowledge processing. In S. S. Chipman, J. W. Segal, & R. Glaser (Eds.), *Thinking and learning skills: Current research and open questions (Vol. 2)*. Copyright © 1985 by Lawrence Erlbaum Associates and used by permission.

Child as coinvestigator: Helping children gain insight into their own mental processes. In S. Paris, G. Olson, & H. Stevenson (Eds.) *Learning and motivation in the classroom*, pp. 61-82. Copyright © 1983 by Lawrence Erlbaum Associates and used by permission.

Longman Inc.

Levels of inquiry in writing research. In L. Tamor and S. A. Walmsley (Eds.) *Research on writing: Principles and methods*, pp. 3-25. Copyright © 1983 by Longman Inc., New York. Reprinted by permission of Longman, Inc, New York.

Viking Penguin Inc.

Quotations from interviews with T. S. Eliot and Aldous Huxley. *Writers at Work: The Paris Review Interviews*, 2nd series, pp. 100, 197. Copyright © 1963 by The Paris Review Inc. and used by permission.

John Wiley & Sons, Ltd.

The development of planning in writing, (with P. J. Burtis and J. Tetroe). In B. M. Kroll & G. Wells (Eds.), *Explorations in the development of writing*, pp. 153-174. Copyright © 1983 by John Wiley & Sons, Ltd. and used by permission.

The development of evaluative, diagnostic, and remedial capabilities in children's composing. In M. Martlew (Ed.), *The psychology of written language: Developmental and educational perspectives*, pp. 67-95. Copyright © 1983 by John Wiley & Sons, Ltd. and used by permission.

Parti

Central Concepts

Chapter 1

Two Models of Composing Processes

1 Chomsky (1980) has argued that if we want to advance our understanding of the mind'as a biological entity, we should study what it does easily and well. In particular, we should study those abilities that people acquire most naturally, with the least dependence on the environment. If that is to be the role of cognitive psychology, what becomes of instructional psychology? For if instructional psychology has a province, it is the province of things that have proved difficult to learn, that are believed to require substantial and purposely arranged contributions from the environment.

We would suggest that there are, in fact, complementary roles for a psychology of the easy and a psychology of the difficult, and that a complete cognitive science needs to encompass both. Research on cognition in infants and young children makes it increasingly evident that human beings come into the world already primed for certain kinds of knowledge. That is, they either already possess the knowledge in embryonic form or possess some kind of innate readiness to acquire it. Such appears to be the case not only with grammar, which is Chomsky's prime example, but also number (Gelman & Gallistel, 1978) and perceptual organization (Spelke, 1982). On the other hand, human beings are distinguished by their ability to acquire expertise—that is, to develop high levels of ability and knowledge of kinds that do not arise naturally out of everyday living but that require sustained effort over long periods of time. Hayes (1981) has concluded that in all those areas where top levels of expertise are equated with genius, it takes 10 years of sustained effort to achieve the necessary knowledge and skill.

In the preceding paragraph we conflated easy with natural and difficult with requiring special provisions for learning. Obviously there is no strict correlation between the naturalness and the difficulty dimensions. Walking comes naturally, yet infants work hard at it. One must be taught how to drive a car, but it is not difficult for most people to learn. The key distinction, for which we have found no convenient labels, is between those kinds of abilities that are almost inevitably acquired through ordinary living (including ordinary living in school classrooms) and those that require some special effort to transcend naturally occurring limitations. With due recognition that the terms do not fully condense the intended meanings, we shall refer to the two kinds of abilities as *natural and problematic*.

A complete cognitive science needs to account for both ends of the natural-to-problematic continuum. But more than that, it needs to consider possible interactions, such as the following:

To what extent are the more problematic kinds of human capabilities built up from more naturally acquired capabilities?

To what extent may naturally acquired abilities stand in the way of development of more expert ways of performing the same functions?

In this book we want to consider written composition from the standpoint of naturally acquired and more problematic human capabilities, with a view toward issues like the two just raised. By looking at both the easy and the hard aspects and their interaction, we hope to contribute to understanding both the mind's natural capabilities and what is involved in going beyond those natural capabilities.

WRITING AS BOTH NATURAL AND PROBLEMATIC

Writing—by which we mean the composing of texts intended to be read by people not present—is a promising domain within which to study the relationship between easy and difficult cognitive functions. On the one hand, writing is a skill traditionally viewed as difficult to acquire, and one that is developed to immensely higher levels in some people than in others. Thus it is a suitable domain for the study of expertise. On the other hand, it is based on linguistic capabilities that are shared by all normal members of the species. People with only the rudiments of literacy can, if sufficiently motivated, redirect their oral language abilities into producing a written text. Indeed, children lacking even the most rudimentary alphabetism can

nevertheless produce written characters that have some linguistic efficacy (Vygotsky, 1978).

There is, indeed, an interesting bifurcation in the literature between treatments of writing as a difficult task, mastered only with great effort, and treatments of it as a natural consequence of language development, needing only a healthy environment in which to flourish. Convincing facts are provided to support both views. On the one hand we have evidences of poor writing abilities, even among relatively favored university students (Lyons, 1976) and professional people (Odell, 1980). On the other hand we have numerous reports of children taking readily to literary creation when they have yet scarcely learned to handle a pencil (Graves, 1983). While children's writing is unquestionably recognizable as coming from children, it often shows the kind of expressiveness and flair that we associate with literary talent.

One could perhaps dismiss such contradictory findings as due to the application of different standards of quality. It may, in short, be easy to write poorly and difficult to write well. But that is a half truth which obscures virtually everything that is interesting about writing competence.

The view of writing that emerges from our research is more complex than either the "it's hard" or the "it's easy" view or any compromise that might be struck between them. We propose that there are two basically different models of composing that people may follow. It is possible to write well or poorly following either model. One model makes writing a fairly natural task. The task has its difficulties, but the model handles these in ways that make maximum use of already existing cognitive structures and that minimize the extent of novel problems that must be solved. The other model makes writing a task that keeps growing in complexity to match the expanding competence of the writer. Thus, as skill increases, old difficulties tend to be replaced by new ones of a higher order. Why would anyone choose the more complex model? Well, in the first place it seems that not very many people do, and it is probably never used to the exclusion of the simpler model. But for those who do use it, the more difficult model provides both the promise of higher levels of literary quality and, which is perhaps more important for most people, the opportunity to gain vastly greater cognitive benefits from the process of writing itself.

One way of writing appears to be explainable within a "psychology of the natural." It makes maximum use of natural human endowments of language competence and of skills learned through ordinary social experience, but it is also limited by them. This way of writing we shall call *knowledge telling*. The other way of writing seems to require a "psychology of the problematic" for its explanation. It involves going beyond normal linguistic endowments in order to enable the individual to accomplish alone what is normally accomplished only through social interaction—namely, the reprocessing of

knowledge. Accordingly, we shall call this model of writing *knowledge transforming*.

A two-model description may fit many other domains in addition to writing. Everyday thinking, which is easy and natural, seems to follow a different model from formal reasoning, which is more problematic (Bartlett, 1958). Similar contrasts may be drawn between casual reading and critical reading, between talking and oratory, between the singing people do when they light-heartedly burst into song and the intensely concentrated effort of the vocal artist.

In each case the contrast is between a naturally acquired ability, common to almost everyone, and a more studied ability involving skills that not everyone acquires. The more studied ability is not a matter of doing the same thing but doing it better. There are good talkers and bad orators, and most of us would prefer listening to the former. And there are surely people whose formal reasoning is a less reliable guide to wise action than some other people's everyday thought. What distinguishes the more studied abilities is that they involve deliberate, strategic control over parts of the process that are unattended to in the more naturally developed ability. That is why different models are required to describe these processes.

Such deliberate control of normally unmonitored activity exacts a price in mental effort and it opens up possibilities of error, but it also opens up possibilities of expertise that go far beyond what people are able to do with their naturally acquired abilities. In the case of writing, this means going beyond the ordinary ability to put one's thoughts and knowledge into writing. It means, among other things, being able to shape a piece of writing to achieve intended effects and to reorganize one's knowledge in the process. The main focus of this book is on the development of these and other higher-level controls over the process of composition.

FROM CONVERSATION TO KNOWLEDGE TELLING TO KNOWLEDGE TRANSFORMING

Although children are often already proficient users of oral language at the time they begin schooling, it is usually some years before they can produce language in writing with anything like the proficiency they have in speech. Longitudinal studies by Loban (1976) suggest that the catch-up point typically comes around the age of twelve. The most immediate obstacle, of course, is the written code itself. But that is far from being the only obstacle.

Others of a less obvious nature are discussed in Chapter 3. These less obvious problems have to do with generating the content of discourse rather than with generating written language. Generating content is seldom a problem in oral discourse because of the numerous kinds of support provided by conversational partners. Without this conversational support, children encounter problems in thinking of what to say, in staying on topic, in producing an intelligible whole, and in making choices appropriate to an audience not immediately present.

In order to solve the problems of generating content without inputs from conversational partners, beginning writers must discover alternative sources of cues for retrieving content from memory. Once discourse has started, text already produced can provide cues for retrieval of related content. But they are not enough to ensure coherent discourse, except perhaps of the stream-of-consciousness variety. Two other sources of cues are the topic, often conveyed by an assignment, and the discourse schema. The latter consists of knowledge of a selected literary form (such as narrative or argument), which specifies the kinds of elements to be included in the discourse and something about their arrangement. Cues from these two additional sources should tend to elicit content that sticks to a topic and that meets the requirements of a discourse type. In essence, the knowledge-telling model is a model of how discourse production can go on, using only these sources of cues for content retrieval—topic, discourse schema, and text already produced.

The main features of the knowledge-telling model are diagrammed in Figure 1.1. The diagram indicates a composing process that begins with a writing assignment. It could also begin with a self-chosen writing project, however, so long as there is some mental representation of the task that can be analyzed into identifiers of topic and genre or discourse type. The task might, for instance, be to write an essay on whether boys and girls should play on the same sports teams. Depending on the sophistication of the writer, the topic identifiers extracted from this assignment might be *boys*, *girls*, and *sports* or *amateur sports* and *sexual equality*. According to the model, these topic identifiers serve as cues that automatically prime associated concepts through a process of spreading activation (Anderson, 1983). This process does not ensure that the information retrieved will be relevant, but there is a built-in tendency toward topical relevance. As Anderson explains, "spreading activation identifies and favors the processing of information most related to the immediate context (or sources of activation)" (Anderson, 1983, p. 86). Naturally, the appropriateness of the information retrieved will depend on the cues extracted and on the availability of information in memory. For instance, one would expect that the cues, *amateur sports* and *sexual equality*, would have a greater likelihood of eliciting information fitting the intent of the assignment than would the cues, *boys*, *girls*, and *sports*, provided the writer had knowledge stored in memory related to those

cues. In either case, however, the retrieval is assumed to take place automatically through the spread of activation, without the writer's having to monitor or plan for coherence.

Cues related to discourse type are assumed to function in much the same way. The assignment to write an essay on whether boys and girls should play on the same sports teams is likely to suggest that what is called for is an argument or *opinion essay*. Again, the cues actually extracted will depend on the sophistication of the writer. Some immature writers may have an opinion-essay schema that contains only two elements—*statement of belief* and *reason*

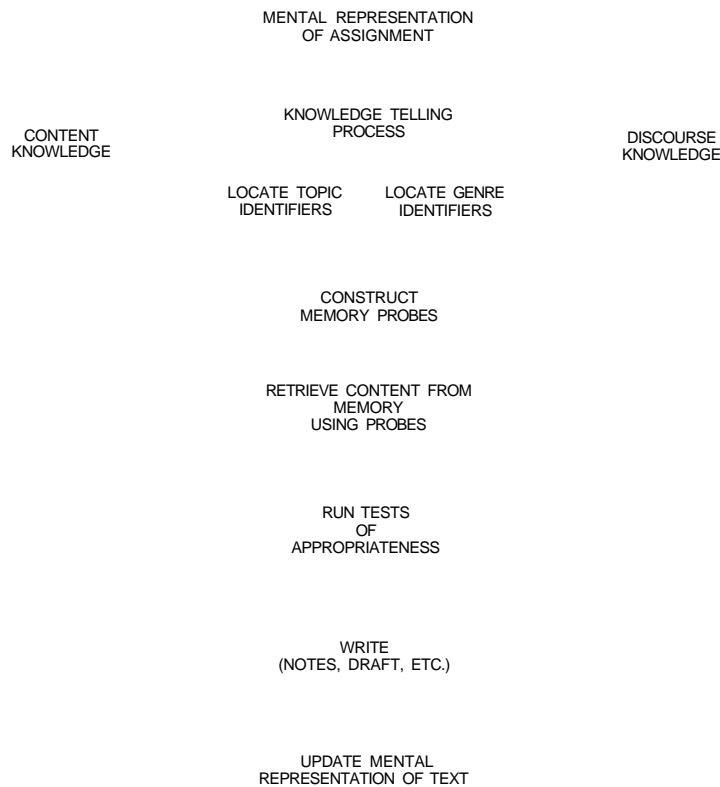


Figure 1.1. Structure of the knowledge-telling model.

(see Chapter 4). Others may have more complex schemas that provide for multiple reasons, anticipation of counterarguments, and so on. In any case, it is assumed that these discourse elements function as cues for retrieval of content from memory, operating in combination with topical cues to increase the likelihood that what is retrieved will not only be relevant to the topic but also appropriate to the structure of the composition. Thus, the cues, *boys*, *girls*, *sports*, and *statement of belief* would be very likely to produce retrieval of the idea that boys and girls should or should not play on the same sports teams, an appropriate idea on which to base the opening sentence of the essay.

According to the model shown in Figure 1.1, an item of content, once retrieved, is subjected to tests of appropriateness. These could be minimal tests of whether the item "sounds right" in relation to the assignment and to text already produced or they could be more involved tests of interest, persuasive power, appropriateness to the literary genre, and so on. If the item passes the tests it is entered into notes or text and a next cycle of content generation begins. Suppose, for instance, that the first sentence produced in our example is "I think boys and girls should be allowed to play on the same sports teams, but not for hockey or football." The next cycle of content generation might make use of the same topical cues as before, plus the new cues, *hockey* and *football*, and the discourse schema cue might be changed to *reason*. A likely result, therefore, would be retrieval of a reason why boys and girls should not play hockey or football together. Content generation and writing would proceed in this way until the composition was completed.

This way of generating text content was described for us by a 12-year-old student as follows:

I have a whole bunch of ideas and write down until my supply of ideas is exhausted. Then I might try to think of more ideas up to the point when you can't get any more ideas that are worth putting down on paper and then I would end it.

Knowledge telling provides a natural and efficient solution to the problems immature writers face in generating text content without external support. The solution is efficient enough that, given any reasonable specification of topic and genre, the writer can get started in a matter of seconds and speedily produce an essay that will be on topic and that will conform to the type of text called for. The solution is natural because it makes use of readily available knowledge—thus it is favorable to report of personal experience—and it relies on already existing discourse-production skills in making use of external cues and cues generated from language production itself. It preserves the straight-ahead form of oral language production and requires no significantly greater amount of planning or goal-setting than does ordinary

conversation. Hence it should be little wonder if such an approach to writing were to be common among elementary school students and to be retained on into university and career.

KNOWLEDGE TELLING VERSUS KNOWLEDGE TRANSFORMING

In the preceding discussion of the knowledge-telling model, it was allowed that there could be large differences in outcome depending on the writer's knowledge of the topic of discourse and on the writer's sophistication in the literary genre. In addition, of course, quality of the written product will vary depending on language abilities, such as diction and syntactic fluency, that are not dealt with in the knowledge-telling model. With all this allowance for individual differences and for improvement through learning, it is not obvious that a second model is required to account for the different ways writers go about generating text content.

Consider, however, the following description by Aldous Huxley of his composing process:

Generally, I write everything many times over. All my thoughts are second thoughts. And I correct each page a great deal, or rewrite it several times as I go along.... Things come to me in driblets, and when the driblets come I have to work hard to make them into something coherent. (Cited in *Writers at Work*, 2nd series, 1963, p. 197.)

The process described here does not sound like merely a more sophisticated or elaborate version of the process sixth-graders describe of writing down thoughts that they already have in their minds. The process Huxley describes is one in which the thoughts come into existence through the composing process itself, beginning as inchoate entities ("driblets") and gradually, by dint of much rethinking and restating, taking the form of fully developed thoughts. This is the process that we shall call "knowledge transforming." It is a process that cannot be accounted for by the knowledge-telling model and that seems to require a differently structured model.

This reworking or transforming of knowledge has been described in a variety of ways by professional writers (Lowenthal, 1980; Murray, 1978; Odell, 1980). But is it, then, a process found only in exceptionally talented people who have made writing their life's work? No. As studies to be reported in later chapters will show (see especially Chapters 8 and 14),

evidence of a knowledge-transforming approach to writing can be found even among people who have no particular talent for or commitment to writing, some of whom would even be judged to be bad writers by literary standards.

Where are writers who use knowledge-transforming strategies to be found? We find them among talented young students, undergraduate and graduate students in psychology, education, and English, but they could probably be found among people at advanced levels in any intellectual discipline. These are people who, like Huxley, actively rework their thoughts. While they may not have Huxley's skill in expressing those thoughts, they are used to considering whether the text they have written says what they want it to say and whether they themselves believe what the text says. In the process, they are likely to consider not only changes in the text but also changes in what they want to say. Thus it is that writing can play a role in the development of their knowledge.

To account for this interaction between text processing and knowledge processing, it is necessary to have a model of considerably greater complexity than the model of knowledge telling. Such a model is sketched in Figure 1.2. It will be noted that the knowledge-telling process, as depicted in Figure 1.1, is still there, but it is now embedded in a problem-solving process involving two different kinds of problem spaces. In the content space, problems of belief and knowledge are worked out. In the rhetorical space, problems of achieving goals of the composition are dealt with. Connections between the two problem spaces indicate output from one space serving as input to the other. For instance, a writer might be working in the rhetorical space on a problem of clarity and might arrive at the decision that she needs to define the concept of *responsibility* that she is building her argument around. This is a content problem, however, and so one might imagine a message going from the rhetorical problem space to the content problem space, saying "What do I really mean by *responsibility*?" Work on this problem within the content space might lead to determining that responsibility is not really the central issue after all but that the issue is, let us say, *competence to judge*. This decision, transferred to the rhetorical space, might initiate work on problems of modifying the text already written so as to accommodate the change in central issue. This work might give rise to further content problems, which might lead to further changes in the writer's beliefs, and so on until a text is finally created that successfully embodies the writer's latest thinking on the subject.

It is this kind of interaction between problem spaces that we argue, in Chapter 12, is the basis for reflective thought in writing. Writing is not always problematic, of course, and often we write things that have been so thoroughly thought out and rehearsed on other occasions that there is no need to reflect on them. Some writers, furthermore, may intentionally

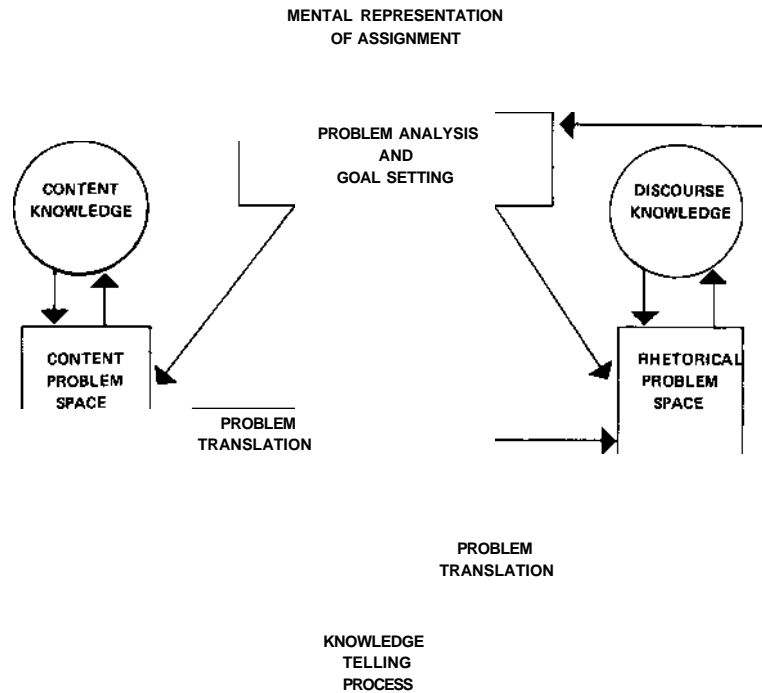


Figure 1.2. Structure of the knowledge-transforming model.

suppress problem-solving operations until a first draft is completed. In all of these cases, knowledge telling might function much as we described it in the preceding section. In this way, knowledge telling remains one of the capabilities of the knowledge-transforming model. But the distinctive capabilities of the knowledge-transforming model lie in formulating and solving problems and doing so in ways that allow a two-way interaction between continuously developing knowledge and continuously developing text.

OBSERVABLE DIFFERENCES BETWEEN KNOWLEDGE TELLING AND KNOWLEDGE TRANSFORMING

The studies to be reported in this book are for the most part experimental studies that try to bring hidden aspects of the composing process to light. In this introductory chapter, however, we will confine ourselves to more directly observable manifestations of different approaches to composition.

It might seem that the way to begin is by showing pieces of writing that exemplify knowledge telling and knowledge transforming. That would be misleading, however. Knowledge telling and knowledge transforming refer to mental processes by which texts are composed, not to texts themselves. You cannot tell by reading this chapter whether we have engaged in problem-solving and knowledge-transforming operations while writing it or whether we have simply written down content that was already stored in memory in more or less the form presented here. You would have had to overhear, for instance, our deliberations about referring to knowledge telling as "easy" versus referring to it as "natural" to judge the extent to which a rhetorical problem led us to revise our thinking about a matter of substance.

When we see a typical example of what Macrorie (1976) calls "Engfish"—a string of vacuous assertions dressed up in the student's impression of academic diction—we feel fairly confident that we are looking at a product of knowledge telling. But it is impossible to be sure. The student's assertion that change is the norm in this modern world of today might, in fact, express an insight sharpened by the struggle for a sententious tone. On the other hand, if it could be established that that assertion appeared on the page within 30 seconds after the essay was assigned, we might with greater confidence judge what kind of composing process generated it. It is such overt indicators of composing processes that we now survey briefly—start-up times, planning notes, thinking-aloud protocols, and revisions. The processes to which these overt indicators point are discussed in subsequent chapters.

Start-up Times

According to the knowledge-telling model, the time it should take to get started writing upon receipt of a writing assignment is the time it takes to retrieve a first item of content fitting requirements of the topic and genre. This would vary, of course, depending on the writer's familiarity with the topic and genre. Where these are very familiar, start-up time could be expected to be very fast indeed. A corollary is that start-up time should not vary with other requirements. According to the knowledge-transforming

model, on the other hand, time to start writing should, in general, depend on goals set by the writer, the kinds of problems that have to be solved in advance, and the complexity of the plan constructed. Start-up times would thus be highly variable, but they should tend to increase as more time is available and, unless there is some requirement of condensation, should be greater for an anticipated long composition than for a short one.

Figure 1.3 (from Zbrodoff, 1984) shows how long people spent between the time they were given a simple story-writing assignment and the time they started to write. The top half of Figure 1.3 shows how people responded to time constraints, which varied from being allowed only 2.5 minutes for completing the story to being allowed 20 minutes. The bottom half of the figure shows comparable data for conditions in which there were no time constraints but where length was controlled instead, with required lengths ranging from 6 to 48 lines. It may be seen that grade 5 children behaved exactly as would be expected from the knowledge-telling model. Their start-up times were very brief—just a few seconds—and they did not vary with either the amount of time allowed or with the size of text they were to produce. Adults, on the other hand, showed the kinds of adaptations to be expected from the knowledge-transforming model. The more time they were allowed, the more time they spent before beginning to write; and when no time constraints were imposed they spent much more time than under even the most liberal time limits. Their start-up times also increased depending on the length of the story they were required to produce. It may be noted that the grade-10 students were more like fifth-graders than like adults in these respects, although there is some suggestion that they took longer to get started on longer stories.

Notemaking

The data just discussed deal with spans of time in which text planning of some kind is presumably going on, but the data give no evidence as to what sort of mental activity is taking place. In a study that will be reported at greater length in Chapter 8, we tried to bring mental activity more into the open by instructing people to plan a composition in advance of writing it, encouraging them to take notes but urging them not to write actual text. Figure 1.4 shows notes from a graduate student planning a story on an assigned topic. What we have here is best described as a worksheet. On it the writer enters ideas at several different levels of abstraction, evaluates, and builds a structure out of them. Figure 1.5 shows, by contrast, notes typical of a 10-year-old. Except for their telegraphic form, these notes are best described as constituting the first draft of a text. As further analysis in Chapter 8 will

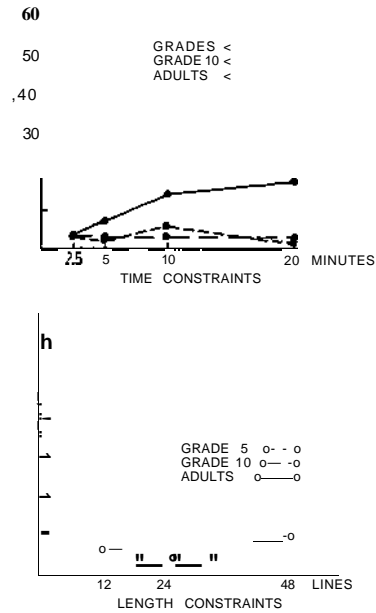


Figure 1.3. Time taken to start writing simple script-based stories on assigned topics (e.g., "Rick goes to a restaurant"). In Experiment 1 stories were written under different time constraints. In Experiment 2 they were written under constraints specifying the number of lines to be written (with unlimited time). From *Writing stories under time and length constraints* by N. J. Zbrodoff, 1984, unpublished doctoral dissertation, University of Toronto, Toronto. Reprinted by permission.

show, in fact, going from notes to final text is primarily a matter of editing in the case of younger students. For adults, on the other hand, going from notes to text involves going from a multi-level data structure, often set out in nonlinear form, to the creation of a linear text—a major transformation (cf. Beaugrande, 1984b).

These differences between younger and older writers are again congruent

YKc K/nX * ^ ^ \osh Jbinj

ff <i O/vJ see /-/-

lie ^ j.^

We ooi \\o^e

14 is Mother W<K\$ n\A-<L

4U fcTty K/^ (^W^T * ^ 'e z^n

Figure 1.5. Notes from a grade-4 student planning a story on the assigned topic, "The Kid Who Lost Things."

(superficially) but cannot alter the process. This is what would be predicted if these young writers were following the knowledge-telling model. For more expert-like writers, however, composing is a complex goal-directed activity, significant parts of which do not involve the actual generation of text content or language. Instructions to plan rather than to write bring out evidences of these other activities in the form of nonverbal symbols (arrows, etc.), comments on ideas, and other types of notes not intended to form part of an eventual text.

Such operations on knowledge, only indirectly related to text generation, are suggested by T. S. Eliot in a response to questioning about his composing processes:

That's one way in which my mind does seem to have worked throughout the years ... doing things separately and then seeing the possibility of fusing them together, altering them, and making a kind of whole of them. (Cited in *Writers at Work*, 2nd series, 1963, p. 100.)

How such a process looks from the standpoint of knowledge telling is suggested by this sixth-grader's comment:

Well, if he got all those ideas ... well, first of all he wouldn't know what order to put them in. He could put them in a really bad order. And sometimes he might forget half of the information.... Then he starts writing the next paragraph on something else, then suddenly remembers something more about the [first thing].... [That's happened to me] once or twice—very confusing for the reader who reads it.

From his own experience, this student concluded that it is best not to get involved with separate clusters of information that must then be fused together. Stick to one source:

I think it's better if you're reading on somebody to get a book that is generally about him. So in one chapter or in one thing it would tell you everything.

Thinking-Aloud Protocols

Under normal circumstances, much of the planning that goes on in composition takes place during writing, not in advance of it (Hayes & Flower, 1980). Protocols obtained from people instructed to think aloud while they write provide a means of access to this kind of planning. The knowledge-telling model would suggest that what goes on mentally in the novice writer would bear a close resemblance to what appears on the page, and this is indeed what our protocol analyses of school-age writers have found (see Chapter 8). The knowledge-transforming model, on the other hand, would suggest that among more expert writers there should be a great deal of activity revealed in the thinking-aloud protocols that is not directly represented in the text. This is what our protocol analyses of graduate students show.

Figure 1.6 gives a gross quantitative indication of adult-child differences.

Darkened bars show the mean number of words in thinking-aloud protocols, plain bars the mean number of words in corresponding essays. At all ages writers say more than they write, but the difference for adults is proportionately much larger (Scardamalia, 1984).

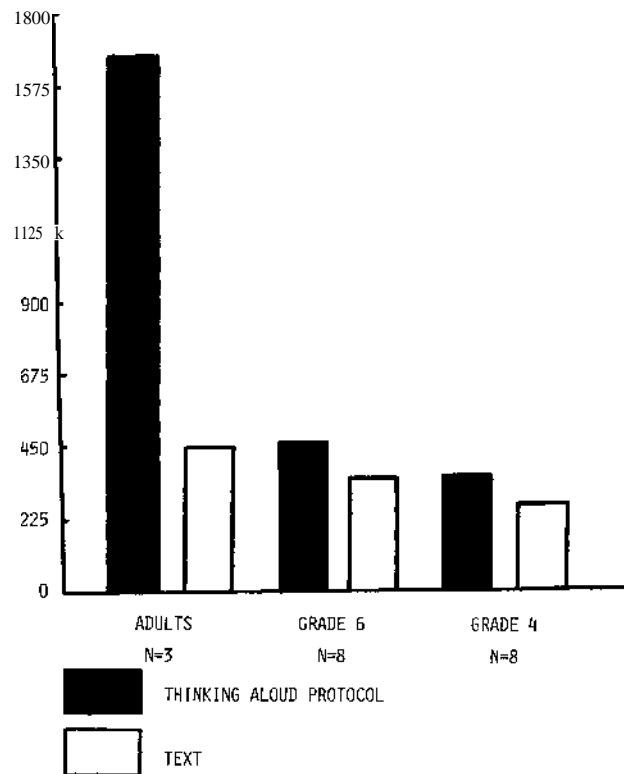


Figure 1.6. Mean number of words in thinking-aloud protocols of subjects planning compositions, compared to mean number of words in the resulting texts.

A look at the content of the protocols indicates that the adults are not simply being more verbose, but seem to be thinking about things that the younger writers do not consider. The following is a portion of an adult protocol. Material printed in boldface duplicates or paraphrases material that actually ends up in the story being written. The remainder, and in this case by far the bulk of the protocol, consists of provisional ideas, goal