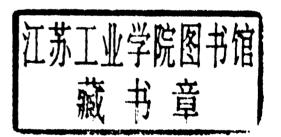
SCIENTIFIC PAPERS and PRESENTATIONS

SCIENTIFIC PAPERS and PRESENTATIONS

REVISED EDITION

MARTHA DAVIS



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Preface to the Revised Edition

The Celtic culture was based upon a complex, interwoven set of beliefs as depicted in the characteristic representation of their tree of life on the cover and in the frontispiece of this book. The Celts were a powerful but somewhat disjunctive civilization bound together by common convictions. For the most part, they have become recognized chiefly for an influential cultural and linguistic legacy that is still quite evident in Great Britain and Western Europe. Their influence on succeeding civilizations, cultures, and languages could have rivaled that of the Greeks and Romans in the Western world with one major exception: they essentially had no written language whereby to preserve and transfer information to those who followed. Instead, they depended almost wholly on oral communications to transmit their knowledge of law, science, history, and culture from generation to generation. Consequently, what we know of the Celts comes to us through the writings of other cultures. Their visual communications were exceptionally strong and remain with us today in the Celtic art and statuary found throughout Europe. Through visual imagery, the Celts preserved some knowledge of their culture and symbols for today's world. Their images reflect the fractals in nature and are now used as symbols communicating a wide range of ideas from love to the continuing cycle of life.

Preservation of the legendary Celtic oral tradition did not fare as well as their art, except when stories were recorded by early Christian scholars. The ultimate flaw in the Celtic culture was in their system of communications. A nonexistent written tradition and over-reliance on oral communications leave us little knowledge of an ancient and once powerful civilization. They have provided a compelling demonstration of the importance of both writing and speaking, especially in science where an immediate or oral presentation of information

and a more lasting written form of knowledge are needed to sustain the progress of learning. As Scott Montgomery suggests, "Science exists because scientists are writers and speakers."

The Celtic tree of life, as designed here by Sheri Wheeler Wiltse, can represent a view of life, but also it is a fitting image of the complexity of communication itself with its evolving languages and various roots and branches, visual images, and the myriad of cultural and environmental influences in the semantic ecosystem. In spite of the impossibility of understanding all the components that evolve, grow, interact and interweave to make up the tree of semantics, our job as communicators of scientific information is to simplify this complexity as much as possible for other scientists as well as non-scientists whose work and lives are influenced by our messages. The goal of this second edition of Scientific Papers and Presentations is to improve upon the earlier attempt to aid graduate students and other scientists in their efforts to understand what influences their scientific papers and speeches and to communicate more clearly both with the written and spoken word and visual imagery.

This edition has been extensively revised, expanded, and updated. Like the first edition, most chapters are relatively independent, and you can go directly to the chapter that deals with the subject you are interested in. However, I suggest that you read the first two or three chapters to get an idea of my own attitudes toward communication. Additions and changes to this edition have again been motivated by the questions and needs of my graduate students in the sciences. Probably the questions that I get most often begin with "Where can I find..." or "Can you show me an example of...". I've tried to answer these with a concentrated attempt to update the literature as thoroughly as possible and to add more appendices to provide ready, recent sources or examples that can be helpful for writing, speaking, and using visual aids. I have added a chapter dedicated to international students studying science in the United States. And I have made a fervent effort throughout to improve my own communication with my readers. I will have been successful, albeit less than perfect, if this edition proves valuable to students of science.

I again acknowledge with sincere gratitude those mentioned in the preface to the first edition for their invaluable contributions to this version as well. From among them, let me accentuate for this edition the support of Jody Davis for her reviews and her computer enhancement of the tree of life drawing. I am certain that without Jody I would have given up or still be working on the computer technology that goes into producing a text today. Also, thanks again to Marion Davis Dunagan, this time especially for her enlightenment about the Celts. I reiterate the contribution of Luti Salisbury in updating the material for literature searches. Additions to the list of contributors are equally important. First and foremost is Sheri Wiltse whose idea of drawing the Celtic tree of life gave me a vehicle for expressing the complexity of communication and whose

influence and encouragement have become a striking enrichment to my life. I thank Magnolia Ariza-Nieto, Andrea Wilson, and Vibha Sirvastava for use of their poster. For their suggestions relative to the new chapter on international students, I am indebted to the comments of Carol Ojano, Pengyin Chen, Elizabeth Maeda, Luis Maas, Ali Jifri, Maria Mashingo, Nilesh Dighe, Palika Dias, Christian Bomblat, and Wenjun Pan as well as other international students who have enriched my classes.

And always, I want to recognize that major force in supporting all my efforts, Aaron Davis.

MD, 2004

Preface to the First Edition

Whether it is a chemical structure, the anatomy of a rose, or an odyssean siren hidden in the recesses of a DNA code, something stirs the curiosity and lures people into the realm of science. Most scientists are effective, intelligent, logically thinking individuals who are coordinated enough not to destroy the laboratory or the field plans and samples, but many of them become frustrated with communication. The siren did not tell them that many hours of their scientific days would be spent writing reports, preparing for presentations, serving with committees to solve problems, or telling the non-scientist about the value of the science. This book is an attempt to alleviate some of those frustrations with papers and presentations.

Because it is a single, relatively brief volume, I cannot hope to treat every kind of scientific communication in great detail. Other more definitive books concentrate on their respective subjects such as writing skills, journal article publication, writing proposals, group communications, public speaking, and all the other topics to which I have dedicated single chapters. My purpose here is to introduce fledgling scientists to most of the kinds of professional communication that will confront them during graduate studies and as career scientists. My objectives are (1) to answer the basic questions that might be asked about scientific communications and (2) to refer the scientist to more detailed sources of information.

To accomplish these objectives, the first part of the book proposes some practical ideas relative to preparing for, organizing, and producing a rough draft of any scientific paper or presentation. From these general concepts, the book moves to specific written forms that graduate students in science will likely encounter—the literature review, the research proposal, the graduate thesis,

the journal article, and the practices and problems that accompany these forms. In scientific writing and speaking, it is important to understand publication styles, abstracts and titles, presenting data, reviewing and revising, and even ethics, copyrights, and patents.

Although a clear distinction between written and oral forms of scientific communication cannot be drawn, I have concentrated in the latter part of the book on slide presentations, communication without words, effective visuals, poster presentations, and oral group communications. I include a chapter on communicating with non-scientists in both writing and speaking.

The appendices and the references are perhaps more important than they are in most books. The appendices provide additional information and examples on the topics discussed in the text. The references extend the views on communication beyond what I can include in this volume. I can give you an introduction to each topic, but you must go elsewhere for other details. At the end of each chapter are references cited in that chapter. Finally, following the last chapter is an annotated bibliography of select works that I find most valuable. I am grateful for what I have discovered in all these sources and believe reference to them will be valuable to any scientist.

Everyone who begins a career in the sciences would do well to have had courses in technical and scientific writing, public speaking, group communications, graphic design, scientific presentations, journalism, leadership and interpersonal skills, professional ethics, audiovisual principles, rhetoric, and other subjects that develop the practical skills of communications. Because taking all these courses would accrue enough college credits for more than a degree in themselves, it is unreasonable to suppose that scientists will be trained in all these areas. They will have little time for practicing writing and speaking skills beyond the efforts required by their work. Similarly, the reading load for a given specialized area of science does not allow time to read all the books that have been written on the formats and skills used in scientific communication. This single handbook will often answer the questions that a graduate student or scientist would ask about scientific papers and presentations and will provide references that can lead to more comprehensive information.

I owe a debt of gratitude to all the graduate students in the sciences who have asked the questions I attempt to answer here. They have provided the motivation and stimulation that have prompted me to put my lecture notes in a form to provide assistance in communication for any graduate student, scientific neophyte, or even the seasoned scientist who may consult this book. I appreciate all that these students have taught me. A special thank you is in order for Terry Gentry, David Mersky, and Katie Teague who have allowed me to use their work in my examples.

I also appreciate all the colleagues who have encouraged me in my teaching and writing, but especially helpful has been Duane Wolf. Without him I would never have pursued this or many other projects. His contributions to the subject matter and to my morale are immeasurable. Thanks, DCW.

Others have helped with the writing, reviewing, and revising, and I truly appreciate their time and attention. Thanks to Marion Davis, who read the whole thing, scrubbed out much of the wordiness, and complained very little the whole time. Thanks to Jody Davis, who read much of it too and was always there to buffer me from the word processor and to keep me motivated. Special thanks to Nora Ransom who gave helpful suggestions on much of the text. Other reviewers on particular parts include Carole Lane, Sara Gregg, Rick Meyer, Lisa Wood, Lutishoor Salisbury, Bob Brady, Domenic Fuccillo, and Bill DeWeese. Suggestions from all of you have helped tremendously.

For the appendices, Justin Morris provided information for the abstract; Gail Vander Stoep allowed me to use her review of a manuscript; and the editorial, "Let There Be Stoning," is from Jay Lehr. I appreciate all of these contributions and the permission granted by Marilyn Hoch, Senior Editor of *Ground Water*, for the use of Lehr's editorial. I appreciate the permission from Walter de Gruyter & Co. for use of the excerpt from pages 69 to 73 of Eduard Imhof's book, *Cartographic Relief Presentations*. Thanks to E. M. Rutledge, M. A. Gross, and K. E. Earlywine as well as D. C. Wolf for the use of a photograph and the text of their poster.

For artistic contributions, I thank Gloria Fry who has provided most of the illustrations, but also Steve Page for the computer drawing on posters. I appreciate the use of Martha Campbell's cartoon, which appeared originally in the *Phi Delta Kappan* (73, 130) and the one from A. (Toos) Grossman, which was published in *The Chronicle of Higher Education* on July 1, 1992.

Finally, a special thanks to Aaron Davis for his constant love and support.

MDavis, 1996

Contents

Preface to the Revised Edition xiv

1

THE SEMANTIC ENVIRONMENT OF SCIENCE	
References	9
2	
BEFORE YOU BEGIN	
Kinds of Scientific Communication	13
Sources of Help	13
Pencils, Mice, and Cyberspace	15
References	18
3	
ORGANIZING AND WRITING A ROUGH DRAFT	
Thinking and Writing	22
Prewriting Exercises	22
Organization and Development	26
Coordinating Organization and Development	28
Organizing and Your Point of Emphasis	29
Fransitions	30
Writing the Rough Draft	31
Safaranose	-34

4

SEARCHING AND REVIEWING SCIENTIFIC LITERATURE

JOIDMINIO HILLIAM ONE	
Planning the Literature Search	35
Finding the Literature	39
Selecting and Evaluating the Literature	42
The Literature Review	46
References	49
5	
THE PROPOSAL	
The Graduate Proposal	51
The Grant Proposal	52
Content and Form	5 3
Other Considerations	63
Progress Reports	64
References	65
6	
THE GRADUATE THESIS	
The Thesis and Your Graduate Program	67
Avoiding Problems	70
Planning the Thesis	76
Acceptable Forms for Theses	77
The Thesis Defense	82
References	83
7	
PUBLISHING IN SCIENTIFIC JOURNALS	
Planning and Writing the Paper	86

After the Paper Is Written

Contents	ix
The Editing and Reviewing Process	89
References	92
8	
STYLE AND ACCURACY IN THE FINDRAFT	AL
Style	93
Styles in Headings	95
Accuracy and Style in Documentation	96
Proofreading	99
References	101
9	
REVIEWING AND REVISING	
Reviewing and Revising Your Own Paper	104
Making Use of Reviewers' Suggestions	106
Reviewing the Work of Others	107
References	109
10	
TITLES AND ABSTRACTS	
Titles	111
Abstracts	112
References	114
11	
PRESENTING DATA	
Tables	117
Figures	120

ETHICAL AND LEGAL ISSUES	
Ethics in Scientific Communication	125
Professional Respect for Others	128
The Legal Issues: Copyrights and Patents	133
References	137
13	
SCIENTIFIC PRESENTATIONS	
Departmental Seminars	140
The Professional Meeting	141
Speaking at the Job Interview	144
The Question and Answer Session	146
Role of the Moderator	148
Fit the Occasion	149
References	150
14	
COMMUNICATION WITHOUT WORDS	
Symbols	152
Type Styles	153
Color	154
Physical Communication	156
Listening	159
References	161
15	

VISUAL AIDS TO COMMUNICATION

Slide Composition	165
Slide Production	172
References	173

Contents	xi
Contents	xi

THE ORAL PRESENTATION

Conditioning Yourself	176
Timing	178
The Visual Aids	179
Coordinating the Visual Aids and the Speech	179
Transitions in a Slide Presentation	183
The Peer Review	187
Check List for Scientific Slide Presentation	187
References	189

17

POSTER PRESENTATIONS

Audience	192
Text	194
Type Size and Style	197
Color and Physical Qualities	197
Spacing and Arrangement	199
Presentation of Data	200
The Presenter	201
Handouts	202
Making It Fit	202
Time and Construction	203
References	204

18

GROUP COMMUNICATIONS

Group Communication with No Audience	205
Group Communication with an Audience	209
References	214

COMMUNICATING WITH OTHER AUDIENCES

Audiences	216
Avenues	219
Subject	220
Techniques	221
Science Writing and Presentation	222
References	223

20

TO THE INTERNATIONAL STUDENT

Becoming Adjusted to U.S. Cultures	226
General Cultural Differences	228
Scientific Writing in American English	230
Oral Presentations	234
Casual Conversation	236
Body Language	237
References	240

Appendix 1 Weaknesses in Scientific Writing 243

Appendix 2
The First Draft 249

Appendix 3
Sample Manuscript 253

Appendix 4
Sample Literature Review 261

Appendix 5
Sample Proposal 269

Appendix 6 Alternate Routes to the Thesis 279

Appendix 7
Sample Review of Manuscript Submitted for Publication 285

Appendix 8
Evolution of a Title 289

Appendix 9
Evolution of an Abstract 293

Appendix 10
Putting Data into Tables and Figures 297

Appendix 11
Sample Letter Requesting Copyright Permission 303

Appendix 12
Use of Color in Visual Aids 305

Appendix 13
Sample Slides and Slide Set 311

Appendix 14
Oral Presentations at Meetings 323

Appendix 15
Sample Text for Poster 329

Annotated Bibliography of Select References 335

Index 341

THE SEMANTIC ENVIRONMENT OF SCIENCE

"If it dies, it's biology, if it blows up, it's chemistry, if it doesn't work, it's physics."

JOHN WILKES as quoted from graffiti on a bathroom wall

Scientific communication is essential for helping us use and take care of this earth. Researchers who discover the wonders of science must tell someone about their findings in clear, complete, and concise terms. To add to the pool of scientific knowledge, scientists must synthesize available information with what they discover. If a scientist garbles words or leaves out important points, messages become unclear, and the progress of science suffers.

No special talent is required nor is magic involved in clear scientific communication. It is simply a skill developed for exchanging meaning by use of words and other symbols within a social and scientific environment. Meaning associated with those symbols must be the same for both the sender and the receiver. But either the author or the audience can manipulate the meaning and, being human, both probably will. Communication is the vehicle that carries progress, but it also carries disputes and disruption of progress. Generation gaps, wars, and prejudices result, at least in part, from something communicated.