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HANDBOOK OF WARNINGS

EDITED BY

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PREFACE

Warnings are much more than most people think they are. Arguably warnings are some of our most important communications. They are commonly used to prevent personal injury and property damage. In some circumstances, a failure in the warning process can lead to death or devastating injury. Thus, warnings are being asked to perform a substantial role in the welfare and safety of people. Clearly, then, effective warnings are an important, serious concern.

Advancements in technology have enhanced our lives. However, technology has brought new hazards. Consider some common household products such as cleaning solutions and medications. Without some form of labeling and warnings, we would not know about these products' hazardous potential. In other words, the hazards are not apparent, and in many cases, it is nearly impossible to tell just by looking at a product what the hazards are. In these cases, warnings are needed to enable safe use. Unfortunately, many warnings are being used in a broad array of actual applications that are poorly designed, reducing their effectiveness to perform their role of hazard control.

Over the last 2 to 3 decades, numerous warning design standards and guidelines have been developed and promulgated. During the same time period, there has been tremendous growth in the research literature on the factors that increase and reduce warning effectiveness. As a consequence of these developments, plus the growth of product liability and personal injury cases in the United States, there has been substantial interest in warnings in recent years.

Most warnings research has been conducted and published in the human factors and ergonomics (HF/E) area. HF/E is the study of the interface between people and technology, or more specifically, how people cognitively and physically interact with products, equipment, environments, and tasks. Most HF/E researchers have background and interest in psychology, engineering, and/or design. Just in the psychology arena alone, warnings' effects can be traced across the domains of perception, cognition, attitudes and beliefs, motivation, and behavior. Indeed, warning effects cut across the breadth of human abilities and limitations and can be manifested in a wide variety of ways.

Besides HF/E, many other disciplines including communications, safety engineering, health/medical, marketing, and law have contributed to the growing body of technical literature on warnings. This multidisciplinary interest and relevance of warnings has resulted in several separate bodies of literature related

to the topic. This major compendium reviews and organizes this varied literature. The Handbook's immense size reflects the broad scope and wealth of information on the topic.

Primarily, the book presents a technical discussion on warnings, including theory, research, and application. Much of the research and theory can be organized using the communication-human information processing (C-HIP) model. An overview can be found in chapter 5 (Wogalter, this volume). Although this book has a considerable academic inclination, there are numerous chapters addressing various application areas. This "applied" material concerns warning design and use and the challenges in real-world and legal settings. Combining both research and application not only promises the obvious benefit of better prevention but also helps direct future research in the area.

Included are chapters that describe warning design standards and guidelines, including the American National Standards Institute's Z535 standard. Other chapters describe aspects of law relevant to warnings, such as government regulations, case/trial litigation, and the role of expert testimony in these cases. Still other chapters concern international, health/medical, and marketing issues. These perspectives are very different and have important implications for each other.

The book is a multiauthored edited handbook. It contains 63 chapters and an appendix of standards referenced in the chapters. All of the chapters are peer reviewed by the Editorial Advisory Board (see page xxiii) and the ad hoc reviewers (listed later in the Preface). The book has more than 200 figures and 60 tables. Although most of the figures are black and white, selected color examples are provided across 8 plates. The chapters are grouped under 13 major sections: Introduction, Research Methodology, Modeling the Process, Source and Channel Predelivery Aspects, Visual Warnings, Auditory and Active Warnings, Postreception Processing, Individual Differences and Extrinsic Factors, Guidelines From Research, Development Methods, Regulations, Civil Litigation, and Selected Applications and Case Studies. These sections and chapters cover theory, research, applications, law, and many different perspectives on topics associated with warnings. No other book gives a more comprehensive treatment of warnings.

The warnings literature has moved forward at a fairly rapid clip in the last few decades, but it now appears to have reached a maturing point. Undoubtedly, there will still be many new innovations in the warnings area in future years. The last chapter

covers some of them (Wogalter & Mayhorn, chap. 63, this volume). Nevertheless, the editor is willing to bet that much of this *Handbook* will still be serving users well many years postpublication.

AUDIENCE

The main target audience of this Handbook is persons whose study, work, or research concerns the design of hazard communications by linguistic, symbolic, and auditory means. Much of this group is comprised of HF/E professionals (employees, consultants) working with industry and government, as well as faculty and students working in education and research in areas related to psychology, industrial engineering, and technical communications. In addition, the blending of research, theory, and application sections should also be informative to a much wider array of target audiences. These groups include professional safety engineers, health and medical professionals, occupational safety specialists, consumer product and industrial equipment designers, government regulators of consumer products and industrial safety, documentation writers, and plaintiff and defense attorneys involved in product- and premises-liability claims. In particular, individuals in the safety and legal professions should find this Handbook valuable in aiding judgments as to whether a warning is needed or whether the one being considered is adequate. The book should also be useful to individuals who need to develop hazard communications in actual applications. Because of the wide range of areas having interest in warnings, this reference source is likely to be found in university libraries, government agencies, corporate libraries, consulting services, law offices, and of course, the offices of researchers interested in warnings.

Readers with some basic behavioral science background will find the chapters most accessible. Readers without this background should greatly benefit from the content, too. This Handbook could be appropriately used in a special topics course

in a graduate curricula, such as in HF/E, applied cognitive/experimental psychology, and engineering psychology programs. In addition, the book could be used in communication, industrial engineering, and design programs.

CHAPTER AUTHORS

The chapter authors are highly respected individuals from academic, industry, consulting, government, and law. They contributed to this volume at the invitation of the editor. Every chapter was reviewed by one or more individuals from the Editorial Advisory Board and/or one or more from a knowledgeable group of ad hoc reviewers. Not only were excellent chapters produced, but contributors allowed the editor to put them through one or more revise-and-resubmit cycles. More than one cycle was the norm. This high quality collection is a result of their hard work and productive efforts.

EDITORIAL ADVISORY BOARD

The Editorial Advisory Board (see list on pp. xxiii) is a special group of individuals. Many of them helped in developing the initial structure of the book and as a group helped to guide the Handbook's formation and development. Almost all of them served as a reviewer for one or two chapters. Some did more than one review. They helped make this Handbook a credible and valuable resource.

AD HOC REVIEWERS

An appreciative thank you is given to the reviewers who gave their expertise and time in providing comments to chapter authors. Their excellent comments and criticisms helped to guide chapter authors in producing higher quality manuscripts.

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I hope this book helps to advance knowledge that leads to better warnings.

—Mike Wogalter
Raleigh, NC