

TRAFFIC SAFETY AND HUMAN BEHAVIOR

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BY

David Shinar

*Ben Gurion University of the Negev
Beer Sheva, Israel*



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INVESTOR IN PEOPLE

To
Eva, Adam, Shiri, Pessah, and Bluma

PREFACE

Human beings evolve at a much slower rate than technology, and the gap between our capabilities and those afforded by technology is rapidly increasing. To be of use, the interface between us and the devices we have to operate must be 'user-friendly'. The personal computer and the personal car are two stellar examples where the efficiency of the operation depends greatly on this interface. To complicate things, automobile manufacturers are incorporating ever increasing amounts of computer technology into cars. This has not resulted in automated driving and has not necessarily reduced the driver load. Instead, it has changed - and often added to and even complicated - the tasks of the driver. Thus, in a sense driving today is very different than driving a few decades ago, and fortunately research in this area is much more extensive than it was.

This was quite apparent to me as I set out to write this book. In 1978 I wrote a book "Psychology on the Road: the Human Factor in Traffic Safety" (John Wiley and Sons). At the time, with very few refereed scientific publications in the area and very few dedicated researchers, the task was mostly one of finding and extracting the most accurate information available on the topic. The result of this effort was a 212 page document that as far as I could tell was a fairly comprehensive coverage of the behavioral aspects of traffic safety and crash prevention.

Many things have changed in the course of the 30 years that elapsed. The most gratifying change in the area of human factors in highway safety is in the amount of knowledge we have gained. This is reflected in the multiple journals that focus on this area, the many high-quality scientific papers that are published in them, the many researchers involved in these studies, and the levels of sophistication in the research methods and analyses that enable us to better understand what the reams of data tell us. But possibly the most profound change was the one outside this area: the means of communicating information. Web-based search engines and indexing systems and electronic versions of detailed voluminous papers have made the most obscure studies available to nearly everyone often before they actually hit the proverbial press.

These changes within the area of safety and outside of it required a change in my approach: from one of finding any information to one of selecting the most relevant and most valid information, from one of extrapolating conclusions from few studies, to one of synthesizing the findings of multiple studies to draw conclusions supported by the 'weight of the evidence'. The 1978 book included most of the studies I could uncover at the time, and totaled less than 300 references. In contrast, the present book involved drastic sampling – hopefully of the most relevant – of studies; and it still has over a 1,000 references. The amount of information that is readily accessible today on

each topic covered in this book could fill a separate large volume. I attempted to combine information from classic studies whose results or formulations have withstood the test of time, with findings from studies published in this millennium that seemed (to me) the most interesting, carefully designed, and representative of current or emerging thinking in the area of highway safety and human behavior. Obviously, the resulting choice is personal, but hopefully it does reflect this philosophy.

A book, like any other product, is best if it is designed for a specific customer. A pivotal rule that I used in the selection of information to cite, the depth of coverage, and the topics to cover was to think of the intended reader of this book. Unfortunately just as there is no single 'design driver' I could not think of a single 'design reader'. Instead I tried to think of three target audiences: first and foremost are students of behavioral sciences and engineering with an interest in traffic safety. For these students I assumed some background in experimental design and statistics. My second group was highway safety professionals. People actively engaged in highway safety programs come from various disciplines and in the course of their careers keep expanding their knowledge by learning how different scientific domains apply to their work. This book is intended to provide these readers summaries of the state-of-the-art in the main areas of concern in highway safety (as defined by the chapter captions), as well as with some basic concepts of research design and statistics to better evaluate the different studies and their relevance to real-life applications. My final target group is policy makers. I hope that this book will enable them to make better decisions to improve highway safety. All too often people in these positions have great leadership and management skills, but lack specific knowledge and tools to make the best decisions. Thus, they sometimes promote policies that are not based on data but on gut reactions to attention-drawing dramatic traffic crashes. Hopefully this book – in particular Chapter 18 on crash countermeasures - will enable them to make knowledge-based decisions.

The first and last chapters should serve as a good introduction to understanding the concepts and issues involved in highway safety, and the tremendous impact that knowledge and data-based policy can have on highway safety, respectively. Chapter 2 is a methodology chapter that describes the basic measures, methods, and statistical techniques used in the study of highway safety and human behavior. Chapter 3 is a review of several models of driver behavior in general and in the context of the driver-vehicle-environment system in particular. The purpose of this chapter is to help readers understand empirical findings, guide them in the search for crash countermeasures, and predict – within a tolerable degree of error – the likelihood that various vehicle, environmental, and behavioral approaches will yield safety benefits. The remaining chapters address specific areas of driving and safety that have been studied extensively and they include driver vision, information processing, and personality; specific road user groups such as young drivers and old drivers; factors that influence safety such as fatigue, alcohol, and drugs; safety-related driver behaviors such as speeding and use of occupant protection devices; and approaches to crash analyses and crash causation. In addition to the driver issues listed above, two

chapters are devoted to the issues of the most vulnerable road users: pedestrians and motorcyclists.

I wrote this book while I was on Sabbatical from Ben Gurion University of the Negev at the U.S. National Highway Traffic Safety Administration (NHTSA), and I gratefully acknowledge the support of both institutions. Still, it is individuals that make up these organizations, and I was fortunate to get the support of many in both. At NHTSA I was given the opportunity by Marilena Amoni, the Associate Administrator for Research and Program Development, to formulate my thoughts and present them in the form of 15 seminars that corresponded roughly to the topics covered in this book. In the office of Behavioral Safety Research I benefited from many long discussions and insights of the Office Director, Richard Compton. A true friend with an extensive knowledge of most issues covered in this book, who supported my efforts without hesitating to critique and challenge me.

There were many people who helped me with information and materials that I needed. They included Ariella Barrett, Amy Berning, Alan Block, Linda Cosgrove, Jim Hedlund, Chuck Kahane, Marv Levy, Eunyoung Lim, Paul Marques, Anne McCartt, Joachim Meyer, Ron Mourant, Jack Oates, Mike Perel, David Preusser, Richard Retting, Tom Rockwell, Kathy Sifrit, Michael Sivak, Paul Tremont, Geva Vashitz, Maria Vegega, and Bob Voas. I am also grateful to the graduate students and colleagues who volunteered to read and comment on drafts of various individual chapters, which invariably enhanced their quality. These included Tami Ben-Bassat, John Eberhard, Liat Lampel, Tsippy Lotan, Margit Meissner, Ilit Oppenheim, and Tal Oron-Gilad. In particular, I would like to acknowledge the many hours that Geoff Collier and Edna Schechtman spent carefully reading and critically commenting on most of the chapters in this book. Their comments were instrumental in making the book significantly more coherent and inherently more consistent than it initially was. Finally, I would like to acknowledge the tireless efforts of my assistant Dana Linsker who proofread and made editorial comments on all the chapters, and helped me track and obtain the permissions that I needed from the various publishers to reproduce the more than 250 tables and figures that support the text of the book.

Working with Elsevier was a pleasure from the initial contact with Chris Pringle who encouraged me to write the book and have it published by Elsevier, through Julie Walker and Philip Tite, to Zoë La Roche the editor who helped bring it to its published form. At each stage they each did their best to respond to my needs and to tolerate my repeated failures to meet my self-imposed deadlines.

In ending I would like to thank my family for their unfailing support. This is not a requisite gratuitous acknowledgement, but a very real one. I worked on this book for over 18 months. For most of this time I was living alone in the U.S., while my wife Eva, my children Adam and Shiri, and my nonagenarian parents Pessah and Bluma stayed in Israel. Were it not for their very active encouragement to embark on this project and persist in it, this book would have never been written.