Preface

Creation of this book has been a labor of love, but a labor indeed. The first and highest hurdle stemmed from the simple fact that the main topic of this volume, human factors in the interpretation of remote sensing imagery, is truly interdisciplinary. Dealing as this volume does, with psychological aspects of remote sensing—perception, conceptualization, expertise—it would seem that some sort of venue in experimental psychology would be most appropriate. But the volume's focus on the domain of remote sensing makes it seem distant from the topics that are close to the heart of mainstream psychology. Conversely, dealing with psychological aspects of remote sensing makes this volume seem distant from the traditional concerns of mainstream remote sensing. In remote sensing, whenever the term "interpretation" is used, it is taken as a reference to automated methods for image analysis. We are very pleased to have found a receptive ear at Lewis Publishers / CRC Press.

The psychological factors in remote sensing are abundantly clear. I became aware of them some 20 years ago when physicist friend Dr. Walter Carnahan of Indiana State University demonstrated his project on thermography. "How were the colors assigned to the temperatures?," "How can you tell that that green blob is a house that needs better insulation?" Clearly, the then-new field of remote sensing was ripe for the analytical eye of the experimental psychologist. The first step was to pursue training, acquired with the support of the U.S. Army Corps of Engineers—which just happened to need an experimental psychologist to help determine how to elicit expert knowledge for the creation of expert systems for aerial photointerpretation. Psychological factors including knowledge, experience, and perception quickly manifested themselves as important considerations. There was no research base of studies on how experts interpret images, how the color codings for nonliteral imagery are devised, etc.

The editors of this volume came together at the suggestion of a colleague, mentor, and friend, Dr. Dedre Gentner of Northwestern University, a world-renowned pioneer in the study of concept formation and analogical reasoning. I approached her with a discussion of the topic of remote sensing, to make a point about the state of the art in psychological research on concept formation. True to its tradition in the academic laboratory, psychological research on concept formation has tended to rely upon highly controlled,

some would say artificial, experimental materials and tasks. My view was that the field of remote sensing offered a prime opportunity to study the processes of concept formation using a "real world" domain of abundant imagery and diverse image types that could be useful in studies of concept formation. Dr. Gentner arranged for me to meet her former student, Art Markman, then at Columbia University, not far from Adelphi University on Long Island where I then taught. That led to our collaboration on this volume.

Over the years of our attempts to conduct research, on such issues as expert / novice differences in the interpretation of thermograms and weather satellite images, other non-mainstream scientists started to come "out of the woodwork," including those individuals whose work we are pleased to present in this volume.

We see great hope in the continuing collaboration of remote sensing scientists and experimental psychologists in the area of remote imagery interpretation. How can research guide the design of image displays and workstations? How can we preserve the knowledge and skills of senior experts? How can we better train people? Lifetimes of research lie open and waiting. Indeed, despite advances in the computational analysis of images, the human factors will not disappear, but instead will become more salient and more important.

This book is an attempt to map this new territory and to provide guidance to future research.

Acknowledgment

The senior editor would like to thank Professor Walter Carnahan (Department of Physics, Indiana State University) for introducing him to remote sensing, stimulating his exploration of the human factor in remote sensing, and training him in the interpretation of aerial thermograms. If it were not for the fact that trees are hot in winter infrared photography, this volume would not exist. Special thanks go in memoriam to Olin Mintzer of the U.S. Army Corps of Engineers, who devoted valuable time so that the senior editor could attempt to learn terrain analysis. Thanks also to Mike Mogil for his generosity, including his willingness to share both his knowledge and his repository of remote sensing images. Finally, the senior editor would like to acknowledge the nurturing support provided by the Institute for Human and Machine Cognition and the Department of Psychology of the University of West Florida.

The editors would like to thank William Howell for assisting in the preparation of the indices.

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About the Editors

Robert R. Hoffman earned his B.A., M.A., and Ph.D. in experimental psychology at the University of Cincinnati, where he was awarded McMicken Scholar, Psi Chi, and Delta Tau Kappa Honors. After a postdoctoral associateship at the Center for Research on Human Learning at the University of Minnesota, Hoffman joined the faculty of Adelphi University. There, he received awards for outstanding research and service, and also served as Chair of the Institutional Review Board and the University Grants Officer. He joined the Institute for Human and Machine Cognition of the University of West Florida in 1999, as a Research Associate.

Dr. Hoffman's first book, *Cognition and Figurative Language*, coedited by his mentor Richard Honeck of the University of Cincinnati, is now regarded as a classic. Hoffman has published widely, in journals including *Human Factors*, *Memory and Cognition*, *Organizational Behavior and Human Decision Processes*, *The Bulletin of the Psychonomic Society*, *The Journal of Psycholinguistic Research*, *Ecological Psychology*, *Applied Cognitive Psychology*, *Metaphor and Symbol*, *The AI Magazine*, *Weather and Forecasting*, and *The Journal of Experimental and Theoretical Artificial Intelligence*. He is a member of the board of editors for the journals *Human Factors* and *Cognitive Technology,* and is series editor for the book series, *Expertise: Research and Applications.*

Hoffman's research has focused on psychological aspects of remote sensing and meteorology, including expert reasoning, knowledge elicitation for expert systems, workstation and display design, and the development of training and performance aids. His current effort is aimed at specifying the principles of "human-centered computing" and establishing the methodologies for cognitive work analysis and cognitive field research.

Dr. Hoffman is a member of the Human Factors and Ergonomics Society, the American Association for Artificial Intelligence, the Psychonomic Society, the International Society for Ecological Psychology, the American

Meteorological Society, and the American Society for Photogrammetric Engineering and Remote Sensing. In 1994 Hoffman received a Fullbright Scholar Award and was appointed an Honorary Fellow of The British Library Eccles Center for American Studies. In 1990 he was elected Fellow of the American Psychological Society.

Arthur B. Markman completed his B.S. in cognitive science at Brown University where he was awarded the William Gaston Fund Prize for Excellence in Cognitive Science. He earned his M.A. and Ph.D. in psychology from the University of Illinois where he was awarded a fellowship in cognitive science and artificial intelligence and Sigma Xi and Phi Kappa Phi honors.

Dr. Markman was a Faculty Fellow at the Institute for Learning Sciences at Northwestern University and subsequently an Assistant Professor at Columbia University before joining the University of Texas at Austin, where he is an Associate Professor in the Psychology Department.

Dr. Markman's research has explored similarity, analogy, categorization, and knowledge representation. In 1998 he received a National Science Foundation Career Award, and in 1999 he received an honorable mention in the APA Division 3 Young Investigator Award Competition.

Dr. Markman has written over 40 scholarly papers and chapters and has written or edited three books including *Knowledge Representation* (1999), *Cognitive Dynamics* (2000), and *Cognitive Psychology, 3rd Ed.* (2001). He is a member of the editorial boards of the *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *Memory and Cognition*, and *Cognitive Science*, and serves on the Panel on Human Cognition and Perception for the National Science Foundation.

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