



# Aviation Visual Perception

Research, Misperception and Mishaps

**Randy Gibb, United States Air Force Academy, USA, Rob Gray, University of Birmingham, UK and Lauren Scharff, United States Air Force Academy, USA**

Ashgate Studies in Human Factors for Flight Operations

April 2010  
312 pages  
978-0-7546-7497-9

234 x 156 mm  
Hardback  
\$99.95



Vision is the dominant sense used by pilots and visual misperception has been identified as the primary contributing factor in numerous aviation mishaps, resulting in hundreds of fatalities and major resource loss.

Despite physiological limitations for sensing and perceiving their aviation environment, pilots can often make the required visual judgments with a high degree of accuracy and precision. At the same time, however, visual illusions and misjudgments have been cited as the probable cause of numerous aviation accidents, and in spite of technological and instructional efforts to remedy some of the problems associated with visual perception in aviation, mishaps of this type continue to occur. Clearly, understanding the role of visual perception in aviation is key to improving pilot performance and reducing aviation mishaps.

This book is the first dedicated to the role of visual perception in aviation, and it provides a comprehensive, single-source document encompassing all aspects of aviation visual perception. Thus, this book includes the foundations of visual and vestibular sensation and perception; how visual perceptual abilities are assessed in pilots; the pilot's perspective of visual flying; a summary of human factors research on the visual guidance of flying; examples of specific visual and vestibular illusions and misperceptions; mishap analyses from military, commercial and general aviation; and, finally, how this knowledge is being used to better understand visual perception in aviation's next generation.

Aviation Visual Perception: Research, Misperception and Mishaps is intended to be used for instruction in academia, as a resource for human factors researchers, design engineers, and for instruction and training in the pilot community.

## Contents

Foreword; Vision in aviation; Sensation and perception foundations; The role of basic visual functions in aviation; Pilot perspective of cues used for visual flying; Research on cues used for visual flying; Spatial disorientation - cues, illusions, and misperceptions; Aviation mishaps: misperception of visual cues; Aviation's future: technological advancements to visual perception; Index.

## About the Author

# ASHGATE

To order this book please visit [www.ashgate.com](http://www.ashgate.com), or email [orders@ashgate.com](mailto:orders@ashgate.com)  
A 10% discount applies to orders placed through [www.ashgate.com](http://www.ashgate.com)

Colonel Randy Gibb has served in the United States Air Force since 1986 after earning his commission and Bachelor of Science degree as a Distinguished Graduate from the United States Air Force Academy. He has flown more than 3,400 hours in the following aircraft: Instructor/Evaluator pilot Northrop T-38 Talon, Instructor/Evaluator pilot Lockheed C-5 Galaxy, Instructor pilot T-3 Firefly, Aircraft Commander Learjet C-21, Instructor/Evaluator pilot Raytheon Beechcraft 400 T-1 Jayhawk, and Instructor T-52 Diamond 40. Colonel Gibb's graduate education includes Master of Science in Engineering, Industrial Engineering - Human Factors, Arizona State University, 1996, Master of Arts in National Security and Strategic Studies, Naval Command and Staff College, Newport RI, 2000, and a PhD in Industrial Engineering - Human Factors, Arizona State University, 2007. Col. Gibb had two flying unit commander positions: he led the 84th Airlift Flight, Peterson AFB, C-21 unit as well as the 99th Flying Training Squadron, Randolph AFB, T-1 unit. He is currently an Assistant Professor and Deputy Department Head, Behavioral Sciences & Leadership Department, United States Air Force Academy teaching classes in human factors, engineering psychology, and introductory psychology.

Rob Gray is at the University of Birmingham, UK. He obtained his M.S. and Ph.D. in Experimental Psychology from York University, Canada. After earning his Ph.D. he worked for three years as a Research Scientist with Nissan Research & Development conducting research on driving safety. Since 2002 he has worked as a part-time Research Psychologist with the U.S. Air Force working primarily on flight simulator design. At ASU he directs the Perception & Action Laboratory which investigates visual cues used by pilots for tasks such as landing and low-altitude flight. He has authored 36 journal articles, 17 conference papers, and 7 book chapters. In 2007 he received the American Psychological Association (APA) Distinguished Scientific Award for Early Career Contribution to Psychology and the APA Division 21 Earl Alluisi Award for Early Career Achievement in the Field of Applied Experimental & Engineering Psychology.

Lauren Scharff is the Director for the Scholarship of Teaching and Learning and a Professor in the Department of Behavioral Sciences and Leadership at the United States Air Force Academy. Prior to that she was a Professor in the Department of Psychology at Stephen F. Austin State University, where she worked since 1993. She completed her Ph.D. in Human Experimental Psychology (Visual Perception) in December, 1992 from the University of Texas at Austin. She teaches introductory psychology, research methods, biopsychology, and perception courses at the undergraduate and graduate levels, and has won several teaching awards. Her research interests have included depth perception, visual search, text readability, and the human factors of web site design, although her students continually shift her research efforts to new directions. She has also collaborated with researchers at NASA-Ames Research Center to create a metric to predict text readability, including conditions that apply to head-up displays.

---

[www.ashgate.com/isbn/9780754674979](http://www.ashgate.com/isbn/9780754674979)

## ASHGATE

To order this book please visit [www.ashgate.com](http://www.ashgate.com), or email [orders@ashgate.com](mailto:orders@ashgate.com)  
A 10% discount applies to orders placed through [www.ashgate.com](http://www.ashgate.com)