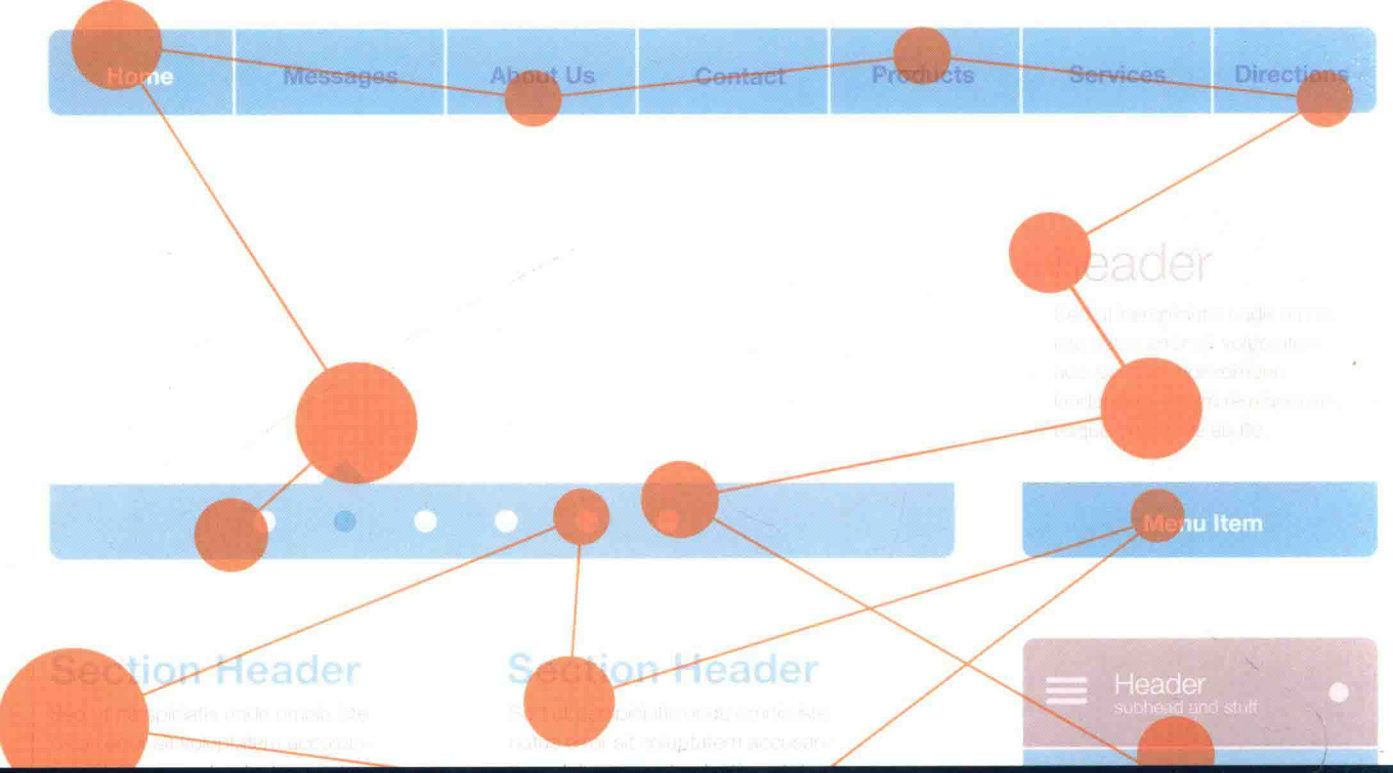
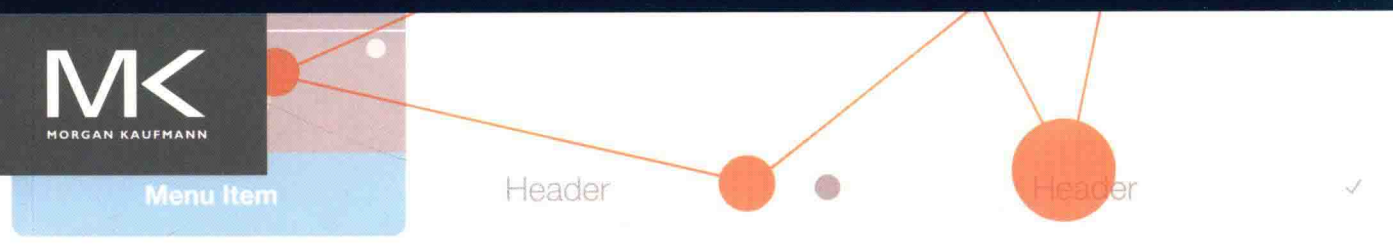


EYE TRACKING

IN USER EXPERIENCE DESIGN

JENNIFER ROMANO BERGSTROM, PH.D. &
ANDREW JONATHAN SCHALL

MORGAN KAUFMANN



Eye Tracking in User Experience Design

Jennifer Romano Bergstrom, Ph.D
Andrew Jonathan Schall

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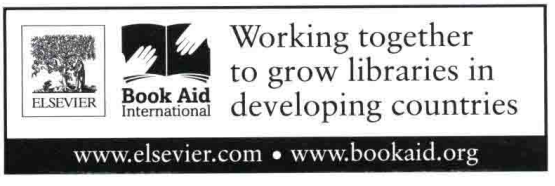

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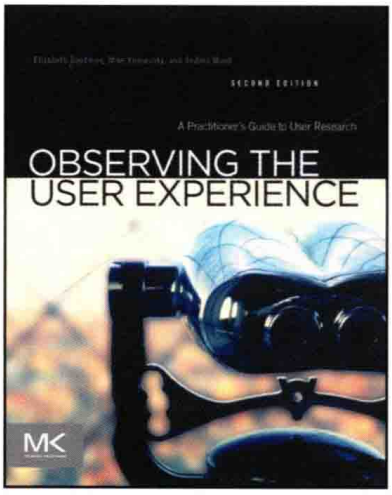

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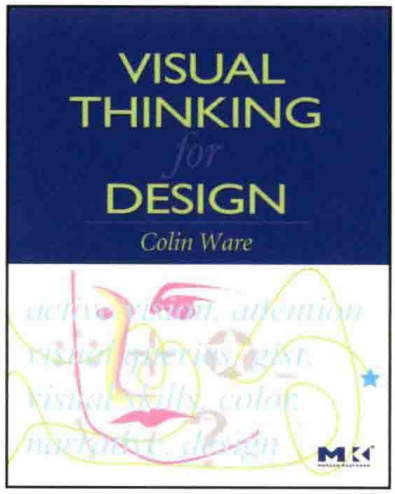

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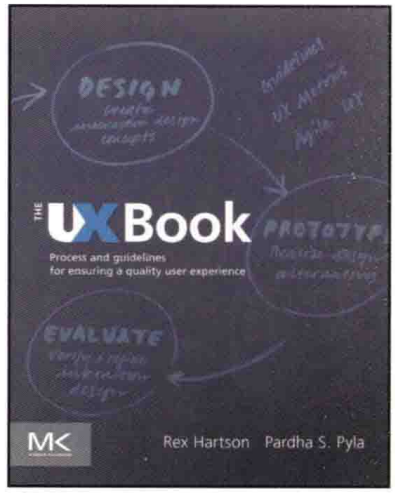

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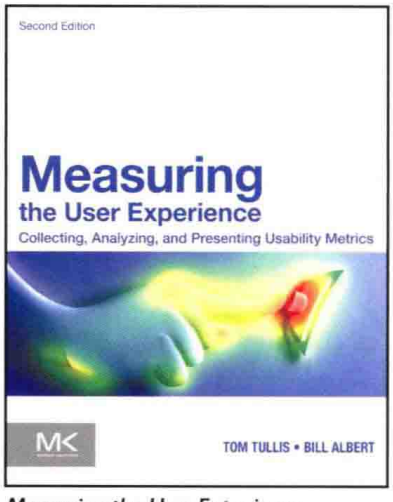

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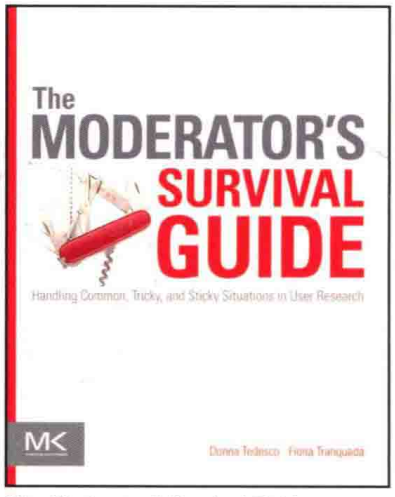

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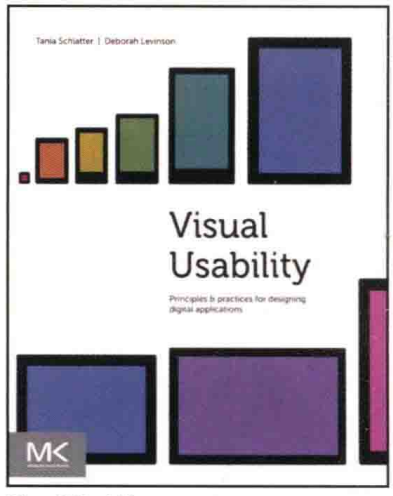

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Eye Tracking in User Experience Design

DEDICATION

To Hadley, for your endless encouragement and inspiration.

-Jen

To Grandma Mollie for helping to instill in me a love of learning and to never be satisfied with just doing "good enough."

-Andrew

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ABOUT THE EDITORS

Andrew Schall has worked with numerous public and private organizations to use eye tracking as part of their user-centered design process including organizations such as Aflac, Fossil, GlaxoSmithKline, NASA, PBS, Rovio, and the U.S. Department of Energy. His eye tracking projects have ranged from understanding how children interact with online multimedia to evaluating advanced search and retrieval systems.

Andrew has pioneered new ways to collect, analyze, and present eye-tracking data. He is currently working on strategies to integrate eye-tracking data with other user research metrics for a more holistic understanding of the user's experience. He was formerly the eye-tracking guru and trainer at Human Factors International and has conducted his Eye Tracking Bootcamp with several organizations including Comcast and GlaxoSmithKline. He is a frequent presenter on eye tracking, speaking at conferences such as Human Computer Interaction International, User Experience Professionals Association, and User Focus.

Andrew has over 10 years of experience as a UX researcher and designer and is currently Vice President of User Experience at SPARK Experience, a UX consulting firm outside Washington, DC. He received his B.S. in Information Technology and New Media from the Rochester Institute of Technology, M.S. in Interaction Design and Information Architecture from the University of Baltimore, and is currently pursuing a Ph.D. in Human-Centered Computing at the University of Maryland, Baltimore County.

After many years of studying human behavior and decision making, studying the user experience comes natural to Jennifer. She views the user experience from a psychological perspective to understand why design influences experience.

At Fors Marsh Group, Jennifer Romano Bergstrom is the UX Project Leader and specializes in experimental design, quantitative analysis, and usability for older users. She frequently leads a variety of user experience studies, including low- medium- and high-fidelity studies with eye tracking on desktop, mobile, and paper. Prior to joining Fors Marsh Group, she studied age-related differences in Internet performance, which led to the improvement of websites and Web-based surveys for all users, including older adults. She completed a post doc at the U.S. Census Bureau where she conducted numerous usability studies, many including eye-tracking analyses. Before joining the Census Bureau, Jennifer studied cognitive aging and lifestyle factors, such as bilingualism and piano playing, which promote healthy cognition in old age.

Jennifer has presented research at numerous national and international conferences and publishes in peer-reviewed journals. She teaches training courses in usability, information architecture, writing for the Web, eye tracking, and survey design. She has peer-reviewed articles in *International Journal of Human-Computer Interaction*, *Journal of Usability Studies*, *Applied Cognitive Psychology*, and *Memory*. She currently serves as the Director of Marketing and Communications for the User Experience Professionals Association (UXPA), and she was previously President of the D.C. Chapter of UXPA and President of the D.C. Chapter of the American Association for Public Opinion Research (AAPOR).

Jennifer received a Ph.D. and M.A. in Applied/Experimental Psychology from The Catholic University of America and a B.A. in Psychology from Central Connecticut State University.

FOREWORD

Evaluation of user experience is critical to every domain in which people interact with products and services. Whether intending to make an automobile dashboard easy to interpret, a cereal box on a store shelf attention grabbing, or a new Web page component easily understandable, substantial resources are allocated to evaluating end user performance. This book considers how a data stream of a user's visual gaze points can inform this user experience assessment.

Eye tracking is now accepted as a proven contributor in the arsenal of UX evaluation tools. The frequency of UX activities utilizing eye tracking has recently exploded, largely due to huge improvements in the calibration and usage of eye-tracking hardware and software systems, coupled with cheaper costs. The coming of open source eye-tracking systems will further drive down these costs. This book is the first to clearly demonstrate the breadth of eye tracking's contributions across domains such as commercial websites, social networking, mobile devices, video games, literacy, and physiological interactions. Common threads, like visual hierarchies, areas of interest, and judicious use of heat maps emerge, and form the backbone of a larger body of practical knowledge.

Eye-tracking hardware will soon become a commodity. Many inexpensive, video-based systems, intended for a variety of evaluation and control applications, have recently entered the market. Mobile devices are also starting to include the basic

ability to track users' eyes for a variety of purposes. While low-cost eye trackers may have poorer resolution, calibration, accuracy, and frame refresh compared to higher cost systems, they may still be sufficient for many potential UX evaluation applications.

There is a large potential to make eye-tracking analysis software more capable and easier to use by a variety of user experience professionals. Quantitative indicators are needed to quickly compare scanning strategies within and between groups of end users. Areas of interest must be defined automatically for dynamic Web interfaces using methods such as video processing. Additional work is also needed to determine the validity of eye-tracking metrics, relative to more traditional usability measures of efficiency, effectiveness, and satisfaction.

What was once a very specialized field requiring deep knowledge and substantial patience has matured sufficiently, allowing user experience and marketing specialists to easily incorporate gaze analysis into a study. There are, however, many subtle aspects of setup, calibration, recording, analysis, and interpretation that can benefit from guidance provided by this book. Topics such as measurement and calibration standards in usability evaluation are now under discussion. The anecdotes and scenarios in this volume will help to provide a framework for further research in the area. Readers approaching from eye tracking, marketing, website development, and usability evaluation domains will find this material very helpful for setting expectations and guiding studies.

This book covers both the art and practice of eye tracking within the context of UX research for improving user experience and informing development and marketing decisions. It is an important contribution for the promotion of eye tracking and is one of the first works to specifically consider the intersection of eye tracking and user research. I'm certain that this book will help to expand your previous notions for how eye tracking can be applied to measuring user experience.

Joseph H. Goldberg, Ph.D., CPE
Chief Research Scientist, Applications User Experience,
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