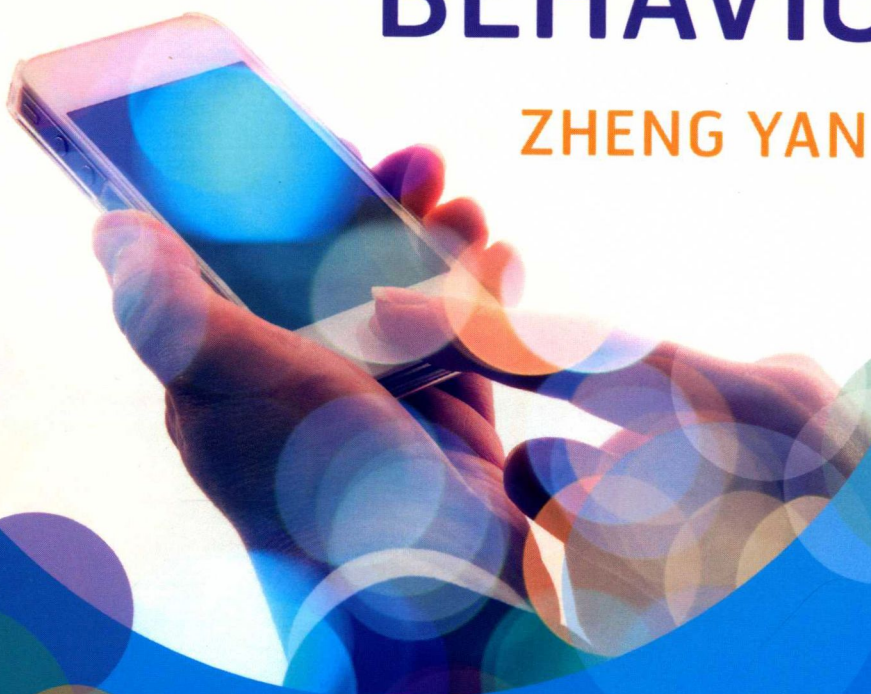


MOBILE PHONE BEHAVIOR

ZHENG YAN



This book provides the first comprehensive introduction to the rapidly emerged science of mobile phone behavior. It presents the unexpected complexity of human mobile phone behavior through examining four basic aspects of mobile phone behavior (users, technologies, activities, and effects) and four major domains of such behavior (medicine, business, education, and everyday life). Chapters open with the common thoughts on mobile phone behavior of ordinary mobile phone users, then present a series of real-life cases, scientific studies, and synthesized knowledge, concluding in complex but highly readable summaries of each aspect of mobile phone behavior. Readers should achieve two intellectual goals: gaining a usable knowledge of the complexity of mobile phone behaviour and developing the skills to analyze the complexity of mobile phone behavior.

ZHENG YAN is Associate Professor of Developmental Psychology at the University at Albany. He has a doctoral degree from Harvard University and previously lectured at the Harvard University Graduate School of Education. His previous publications include the *Encyclopedia of Cyber Behavior* (2012) and the *Encyclopedia of Mobile Phone Behavior* (2015), and he has been a co-editor of the *International Journal of Cyber Behavior, Psychology and Learning* since 2012.

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University at Albany, State University of New York



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About the Author

ZHENG YAN is Associate Professor of Developmental and Educational Psychology at University at Albany since 2007. He graduated from Harvard University Graduate School of Education with a doctoral degree in Human Development and Psychology. His research mainly concerns dynamic and complex relations between contemporary technologies and human development as well as research methodology of human development, and specifically focuses on computer behavior, cyber behavior, and mobile phone behavior. He is the editor of *Encyclopedia of Cyber Behavior* and *Encyclopedia of Mobile Phone Behavior*. He is the co-editor of the *International Journal of Cyber Behavior, Psychology and Learning* and the guest editor/co-editor of special issues/sections on mobile technology and child and adolescent development; mobile computing behavior; children, adolescents, and the Internet; and the psychology of e-learning.

Preface

In October 2014, I finished editing the three volumes of the *Encyclopedia of Mobile Phone Behavior*. One of the follow-up projects I was thinking about was to write an introductory book on mobile phone behavior as a companion to the *Encyclopedia*. The reasons are quite simple: (1) the three-volume *Encyclopedia* is really comprehensive, but somehow hard for ordinary readers to learn quickly about mobile phone behavior; and (2) the *Encyclopedia* synthesizes the scientific literature really effectively, but it is somehow too technical for ordinary readers to really appreciate the complexity of mobile phone behavior easily. Cambridge University Press has successfully published multiple widely recognized books on the psychology of the Internet, such as: *The Psychology of the Internet*; *Psychology and the Internet: Intrapersonal, Interpersonal, and Transpersonal Implications*; *Cyberpsychology: An Introduction to Human-Computer Interaction*; and *Psychological Aspects of Cyberspace: Theory, Research, Applications*. Mobile phones are becoming the most ubiquitous technology in human history and mobile phone behavior is becoming one of the most important social phenomena of the twenty-first century. While the next major wave of the psychology of mobile phones is rapidly forming, Cambridge University Press should be leading the wave again. Thus, I sent my pre-proposal inquiry to Cambridge University Press in January 2015. After just two hours, I received an enthusiastic e-mail from Senior Editor David Repetto. This e-mail led to the pleasant journey of completing this book in 2017.

Many excellent books on mobile phone behavior are already currently available, taking different perspectives, targeting different audiences, and presenting at different levels. These existing books can be grouped into the three major types: (1) scholarly monographs on specific topics of mobile phone behavior, such as Katz's *Perpetual Contact: Mobile Communication, Private Talk, Public Performance* and Magic in the Air: *Mobile Communication and the Transformation of Social Life*, Ling's *Taken for Grantedness:*

The Embedding of Mobile Communication into Society, Ling and Campbell's *Mobile Communication: Bringing Us Together and Tearing Us Apart*, Baron's *Always On: Language in an Online and Mobile World*, Goggin and Hjorth's *The Routledge Companion to Mobile Media*, and Carlo and Schram's *Cell Phones: Invisible Hazards in the Wireless Age*; (2) general references on mobile phone behavior, such as Katz's *Handbook of Mobile Communication Studies* and Dushinski's *The Mobile Marketing Handbook*; and (3) technology books on how to design and use mobile phones, such as Felkers' *Android Application Development for Dummies*, Muir's *iPhone for Seniors for Dummies*, and Meurling and Jeans' *The Mobile Phone Book: The Invention of the Mobile Telephone Industry*. In addition, there are new books in press or under development (e.g., the *Mobile Communication Research Series* which Ling and Campbell have been editing). All of these indicate that the field of mobile phone behavior has been growing exponentially. I highly recommend these excellent books in order for us to stand on the shoulders of giants. This is the broad intellectual context that a reader should know when using this book, which features introductory levels, comprehensive coverage, and interdisciplinary orientation.

Looking back at this pleasant journey, I would like to acknowledge those who have made invaluable contributions to the completion of this book.

Intellectually, the book was deeply influenced by a few great thinkers of our time: (1) Daniel Kahneman's theory is one of the primary analytic frameworks used in the book to analyze mobile phone behavior. A brief conversation with him on April 16, 2008 when he gave a series of talks at Harvard inspired and motivated me to study online judgements and mobile phone judgements as he indicated that it was an emerging area and the research was still limited. (2) The complex system theory by Yaneer Bar-Yam at New England Complexity Institute (my postdoctoral mentor) and the system dynamics by Jay Forrester and John Sterman at the MIT Sloan School of Management (the two instructors of multiple system dynamics courses I audited at Sloan) is another major analytic framework used in the book. (3) Donald Norman's ground-breaking book, *Psychology of Everyday Things*, taught me how extremely important it is to develop deep scientific insights from everyday observations to psychological research and how particularly useful it is to write a serious scientific book in a relaxing way. (4) Kurt Fischer and Catherine Snow, my mentors at Harvard Graduate School of Education, supported my ideas of examining modern technologies and human development from the very beginning. Without their encouragement, I might still be

searching for a dream research topic in the darkness. (5) Martin Cooper, the Father of Mobile Phones, is a real role model to me, personally and professionally. In his fabulous Forward written for the *Encyclopedia of Mobile Phone Behavior*, he wrote a short story about a poor woman in an Indian village. The woman first borrowed some money to buy a mobile phone, and then lent it to other farmers to call the neighboring villages to find the best markets for their farm goods. For the first time in my life, I have learned how powerful a small story like this could be to help understand the complexity of mobile phone behavior.

I am a student of mobile phone behavior. My understanding of mobile phone behavior has been developing as a result of learning from many leading scholars in the field, including: Robert Atkinson, Naomi Baron, Joël Billieux, Karel Brookhuis, Jennings Bryant, Heidi Campbell, Scott Campbell, Elisabeth Cardis, Susan Carey, Judith Carta, Jonathan Donner, David Finkelhor, Xiaolan Fu, Cynthia Garcia Coll, Rui Gaspar, Susan Gelman, Patricia Greenfield, Mark Griffiths, Leslie Haddon, Lennart Hardell, Larissa Hjorth, Randi Hjorthol, Gwo-Jen Hwang, Reynol Junco, Sara Kiesler, Robert Kraut, Amanda Lenhart, Louis Leung, Sonia Livingstone, Jenny Radesky, Donald Redelmeier, Michael Repacholi, Eric Rice, Martin Rösli, Matthew Schneps, David Strayer, Kaveri Subrahmanyam, John Traxler, Marion Underwood, Patti Valkenburg, Dan Wang, Ellen Wartella, Janis Wolak, Clare Wood, Heng Xu, Kimberly Young, Tingshao Zhu, and especially James Katz at Boston University and Rich Ling at Nanyang Technical University, the two pioneering scholars in the field. To all of them, and to many others not listed here, I personally want to extend my heartfelt thanks.

I wish to express my profound appreciation to five anonymous reviewers for their first-class reviews of my book proposal. Their insightful reviews have shaped the book in multiple significant ways, from overall book designs to various technical details, which can be grouped into four categories: (1) The overall design. The reviewers stressed the importance of focusing the book on *behavioral* and psychological aspects of mobile phones rather than on “too much discussion of actual mobile phones.” They recommended “packaging this area of research and theory from a *perspective that is new*” and expanding beyond the “usual suspects” of just putting together the edited collections in order to include more scholarly breadth in the materials available for teaching and research. They analyzed the *pros and cons* of developing and marketing the book as a textbook, a monograph, or a hybrid one. (2) The pedagogical features. The reviewers

emphasized the importance of *pedagogical* features of a book to make the publication “an intuitive and educational read,” with one consistent voice and various effective uses of introduction, diagrams, images, cases, and summaries. (3) The comparative perspective. The reviewers recommended *comparing* similarities and differences among different modern technologies and technology-based behavior (e.g., comparing the prevalence rates among all the modern technologies) in order to effectively address unique features of mobile phones and mobile phone behavior. (4) The technical treatment. The reviewers discussed possible treatment of various *technical* issues, such as how to accurately estimate the number of mobile phone users, what the logical starting point of mobile phone behavior should be, and how to include the important topic of privacy and security. I have taken all of these excellent recommendations to heart and worked hard to implement them as much as I can. If I find out who they are in the future, I will buy each of them a large beer!

I would like to thank many people at Cambridge University Press who contributed directly to the completion of the book: Alexandra Poreda, Jane Bowbrick, Joshua Penney, especially Dave Repetto for his extraordinary enthusiasm, trust, and wisdom, Bethany Johnson for her exceptional production management, and Sophie Rosinke for her outstanding editing abilities.

I must say a special thank you to my wonderful doctoral students: (1) Holly Meredith for her extremely careful proofreading and particularly insightful comments on the entire book. Without her meticulous corrections of many errors and mistakes, this book simply would have not been completed; (2) Samantha Bordoff for her assistance in completing the references and indexing; (3) Sung Yong Park for his excellent work in searching the existing literature on human behavior with telephones, television, computers, the Internet, and mobile phones; (4) Quan Chen for her inspiring studies on multitasking when driving and learning and for our collaborative work on the science of mobile phone behavior; (5) Fusun Sahin for our collaborative work on mobile assessment; (6) Dr. Lai-Lei Lou for our collaborative work on the possible links between mobile phones and brain cancers; as well as (7) Dr. Qiufeng Gao at Southern China Normal University for our collaborative work on mobile phone school policy. It is my true fortune to work with them and learn from them all.

I also want to thank many students, friends, and relatives for their quick responses to my questions about their understanding of mobile phone

behavior. Their intuitive and authentic responses form the extremely useful baseline knowledge of ordinary people and an important part of the book.

Finally, I would like to thank my family, WQY, YAM, ZXS, ZKX, YY, YH, BJ, LK, and especially ZJK, Riv, and Sisi, for their support during the special process of finishing this book while fighting against unusual odds.

Zheng Yan

Newton

14 October 2016

Contents

<i>List of Figures</i>	page vi
<i>List of Tables</i>	vii
<i>About the Author</i>	viii
<i>Preface</i>	ix
1 The Science of Mobile Phone Behavior	1
2 Mobile Phone Users	23
3 Mobile Phone Technologies	57
4 Mobile Phone Activities	85
5 Mobile Phone Effects	115
6 Mobile Phone Behavior in Medicine	146
7 Mobile Phone Behavior in Business	185
8 Mobile Phone Behavior in Education	215
9 Mobile Phone Behavior in Daily Life	242
10 The Complexity of Mobile Phone Behavior	270
<i>Index</i>	285

Figures

1.1	The Basic Relationship between Technologies and Humans	page 9
1.2	The Four Basic Elements of Mobile Phone Behavior	10
1.3	Initial Search of Published Journal Articles on Mobile Phones	13
1.4	Initial Search of Published Journal Articles on Television	14
1.5	Initial Search of Published Journal Articles on Computers	14
1.6	Initial Search of Published Journal Articles on the Internet	15
1.7	The Overall Organization of the Book	20
2.1	A Summary Diagram of User-Based Mobile Phone Behavior	54
3.1	A Summary Diagram of Technology-Based Mobile Phone Behavior	83
4.1	A Summary Diagram of Activity-Based Mobile Phone Behavior	113
5.1	A Summary Diagram of Effect-Based Mobile Phone Behavior	143
6.1	Trend of Published Articles on Medical Mobile Phone Behavior Research	170
6.2	A Summary Diagram of Mobile Phone Behavior in Medicine	183
7.1	The Linear Growth Trend of Journal Article Publications on Mobile Phone Behavior in Business	204
7.2	A Summary Diagram of Mobile Phone Behavior in Business	212
8.1	A Summary Diagram of Mobile Phone Behavior in Education	240
9.1	A Summary Diagram of Mobile Phone Behavior in Daily Life	269
10.1	A Summary of the Complexity of Mobile Phone Behavior	274
10.2	Two Examples of the Summary Diagrams: (a) the Summary Diagram of Technology-Based Mobile Phone Behavior and (b) the Summary Diagram of Mobile Phone Behavior in Medicine	277
10.3	(a) The Four-Element Basic Model as a General Model for Structural Equation Modeling and (b) the Specific Hypothesized Model for Structural Equation Modeling	281
10.4	A Simple System Dynamics Model of Two Friends Sending or Receiving Text Messages Reciprocally and Developing Together over Time through Co-Construction	282

Tables

2.1 The <i>Encyclopedia</i> Chapters on User-Based Mobile Phone Behavior	page 47
3.1 The <i>Encyclopedia</i> Chapters on Technology-Based Mobile Phone Behavior	72
4.1 The <i>Encyclopedia</i> Chapters on Activity-Based Mobile Phone Behavior	104
5.1 The <i>Encyclopedia</i> Chapters on Effect-Based Mobile Phone Behavior	134
6.1 The <i>Encyclopedia</i> Chapters on Mobile Phone Behavior in Medicine	171
6.2 Numbers of Journal Articles Published on Different Technology Addictions	178
7.1 The <i>Encyclopedia</i> Chapters on Mobile Phone Behavior in Business	205
8.1 The <i>Encyclopedia</i> Chapters on Mobile Phone Behavior in Education	232
9.1 The <i>Encyclopedia</i> Chapters on Mobile Phone Behavior in Daily Life	264

CHAPTER I

The Science of Mobile Phone Behavior

Outline

1. *Surprising Responses*
2. *Mobile Phones*
 - 2.1 *Classic Mobile Phones*
 - 2.2 *Modern Mobile Phones*
 - 2.3 *Future Mobile Phones*
3. *Mobile Phone Behavior*
 - 3.1 *The Human Side*
 - 3.2 *A Special Human Behavior*
 - 3.3 *The Four Basic Elements*
 - 3.4 *The Four Complex Systems*
 - 3.5 *Diverse Contexts*
4. *The Science of Mobile Phone Behavior*
 - 4.1 *Mobile Phone Behavior Research*
 - 4.2 *The Intellectual Childhood (1991–2005)*
 - 4.3 *The Intellectual Adolescence (2005–2015)*
5. *Understanding Mobile Phone Behavior*
 - 5.1 *Target Readers*
 - 5.2 *Intellectual Goals and Content Organization*
 - 5.3 *The Style*

1. Surprising Responses

One afternoon in 2015, I received an email inviting me to give a talk to a group of graduate students about mobile phone behavior. This was the very first time I had received such an invitation to talk about mobile phone behavior. Since this is my current research focus, I accepted the invitation with great pleasure. In preparing for this talk, I found that I knew little about how much my audience would know about mobile phone behavior.

Thus, I started my talk by first asking participants whether they had mobile phones and whether they used them daily. Everyone immediately raised their hands, indicating that each of them had a mobile phone and used it daily. Then I asked them to quickly write down their initial thoughts about a few brief questions so that I could learn their initial knowledge about mobile phone behavior, adjust my speech plan based on their knowledge, and warm them up for my talk on mobile phone behavior.

The talk went well and we had an interesting discussion about mobile phone behavior research. After the talk, I read their responses again and summarized them as follows: (1) When they were asked to quickly write down two key features of mobile phones, the majority of them indicated calling and texting. (2) When they were asked to quickly list two to three examples of mobile phone behavior, the majority of them listed sending text messages, looking up emails, and using Facebook. (3) When they were asked to estimate how many journal articles have been published on mobile phone behavior, the majority of them came up with a number ranging from 6 to 500 with an average of 173.

These responses were both interesting and surprising to me for several reasons. First, although I have been studying mobile phone behavior for several years and at the time of my talk had just finished editing the *Encyclopedia of Mobile Phone Behavior*¹ a few weeks prior, this was the first time I was able to explicitly see what people's *intuitive* knowledge about mobile phone behavior actually looked like. Obviously, these were very quick and informal responses from a group of graduate students. However, these quick and informal responses delivered authentic and interesting information: how much ordinary people may intuitively know about mobile phones, mobile behavior, and mobile behavior research.

Second, although we all know that many people have their own mobile phones and they use their mobile phones every day, looking at these responses, I was quite surprised to see how *limited* the knowledge was that some ordinary people had about their mobile phones and their mobile phone behavior. They tended to substantially oversimplify the complexity of mobile phone behavior. As we will first discuss in this introduction chapter and throughout this book later on, modern mobile phones, mobile phone behavior, and mobile phone behavior research are much more complex than we thought. After the talk, I had several more opportunities to communicate with multiple institutions, groups, and individuals

¹ Yan, Z. (ed.). (2015). *Encyclopedia of Mobile Phone Behavior*. Hershey, PA: IGI Global.