

Designing Complementary Communication Systems

Drew Harry

B.S., Electrical and Computer Engineering
Franklin W. Olin College of Engineering, 2006

S.M., Media Arts and Sciences,
Massachusetts Institute of Technology, 2008

Submitted to the Program in Media Arts and Sciences,
School of Architecture and Planning on August 10, 2012,
in partial fulfillment of the requirements for the degree of
Doctorate of Philosophy in Media Arts and Sciences
at the Massachusetts Institute of Technology

September 2012

© Massachusetts Institute of Technology, 2012
All Rights Reserved

Author

Drew Harry

Media Arts and Sciences

August 10, 2012

Certified by

Chris Schmandt

Principal Research Scientist

Media Lab

Thesis Supervisor

Accepted by

Patricia Maes

Associate Academic Head

Program in Media Arts and Sciences

Designing Complementary Communication Systems

Drew Harry

Submitted to the Program in Media Arts and Sciences,
School of Architecture and Planning on August 10, 2012,
in partial fulfillment of the requirements for the degree of
Doctorate of Philosophy in Media Arts and Sciences
at the Massachusetts Institute of Technology

Abstract

We have long assumed that being face to face is the best environment for social interaction. But is "being there" the best we can aspire to? One common approach to improving face-to-face contexts is to add new communication channels — a strategy often described as creating "backchannels." In my work, I use a series of novel complementary communication systems to show how adding communication platforms to collaborative situations can be useful while also arguing for a new conceptual model of a main stage and a side stage (in the Goffman sense) that contrasts with the traditional model of backchannels. I describe a series of projects that embody this approach and explore its limits. My work covers virtual world meetings and presentations, an audience interaction tool for large groups (*backchan.nl*), a tablet-based system for small group discussions (*Tin Can*), and a platform for connecting huge distributed audiences (*ROAR*). In each of these projects I trace my three major research themes: understanding how conversational grounding operates in these environments, how non-verbal actions complement text-based interaction, and how people make decisions about how to manage their attention in environments with multiple simultaneous communication channels.

Thesis Supervisor
Title

Chris Schmandt
Principal Research Scientist

Designing Complementary Communication Systems

Drew Harry

B.S., Electrical and Computer Engineering
Franklin W. Olin College of Engineering, 2006

S.M., Media Arts and Sciences,
Massachusetts Institute of Technology, 2008

Submitted to the Program in Media Arts and Sciences,
School of Architecture and Planning on August 10, 2012,
in partial fulfillment of the requirements for the degree of
Doctorate of Philosophy in Media Arts and Sciences
at the Massachusetts Institute of Technology

September 2012

© Massachusetts Institute of Technology, 2012
All Rights Reserved

Doctoral Dissertation Committee

Advisor

Chris Schmandt

Principal Research Scientist

Media Lab

Massachusetts Institute of Technology

Thesis Reader

Judith S. Donath

Fellow, Berkman Center for Internet and Society

Harvard University

Thesis Reader

Wanda J. Orlikowski

Alfred P. Sloan Professor of Management

Sloan School of Management

Massachusetts Institute of Technology

Acknowledgements

These last six years have passed faster than I could have imagined. There have been periods where it was hard to see a clear path to the end, but with the help and support of my mentors, colleagues, friends, and family I made it through the rough patches. Before jumping into the work, I hope you'll indulge a brief and incomplete accounting of the many people who have played important roles in my life at the Media Lab.

My first home at the lab was with Judith Donath's Sociable Media Group. Judith gave me the space and permission to learn to think of myself as a designer and researcher and whose vision of what online spaces might become continues to motivate me today. Thanks, too, to SMG's wonderful final class of students: Orkan Telhan, Dietmar Offenhuber, Alex Dragelescu, Yannick Assogba, and Aaron Zinman with whom I was honored to collaborate and travel with. I learned so much from each of you, and I'm grateful for the diversity of perspective and background we had in Sociable Media. Thanks especially to Judith for serving on my committee and helping to close this chapter of my work.

During my first semester at MIT I met Alice Daer who became a fast friend who has helped me find a voice as a researcher and as a person. Her perspective and insights into writing, rhetoric, and audience have played a big role in my thinking on mediated interactions of all sorts. She also introduced me to my friend and colleague Joshua Green, who helped initiate the *backchan.nl* project which became the foundation of much of this dissertation.

When it looked like I would leave the lab, Nicole Yankelovich guided me back to my advisor Chris Schmandt who graciously stepped in and offered me a new home in his Speech + Mobility group. His thoughtful guidance, soft touch, and trust was the perfect environment in which for me to find my way. He's built a wonderful group, and I've been grateful for the advice, support, and friendship of Jaewoo Chung, Wu-Hsi Li, Charlie DeTar, Andrea Colaço, Matt Donahoe, and Misha Sra. I'm also glad to have known S+M alumni Matt Adcock and Polina Modlibta before I joined the group.

Thanks also to Joe Paradiso for his help smoothing my transition to the Ph.D. program, providing a second home with his Responsive Environments group, and for giving me the opportunity to co-teach a virtual world design class. I enjoyed the opportunity to collaborate with his students Mat Laibowitz, Nan-Wei Gong, Alex Reben, Mark Feldmeier, Matt Aldrich, Mike Lapinski, and Bo Morgan.

Over my years at the lab, I've had many great collaborators and friends from around MIT. Thanks especially to the 4chan team for creating a tremendous collaborative environment: Michael Bernstein, Andrés Monroy-Hernández, Paul André, Katrina Panovich, and Greg Vargas. Thanks also to Matt Boch, Vanessa Harden, and Retro Poblano. I tremendously enjoyed my time working with the India Initiatives team, managed by Mihir Sarkar and Andrea Colaço: Amit Zoran, Nan Zhao, Ksthitij Marwah, Santiago Alfaro, Ahmed Kirmani, Rohit Pandharkar, Micah Eckhardt, Dennis Jiang, Ken Endo, and many others. Thanks to Owen Macindoe for a wonderful (and surprisingly fruitful) Battlecode experience.

Thanks to Amon Millner for introducing me to the lab so many years ago, and thanks to all my other colleagues throughout the institute over the years: Seth Hunter, Jaime Zigelbaum, Dawei Shen, Aithne Pao, Jinha Lee, Manas Mittal, Brent Fitzgerald, Kate Hollenbach, Ana Luisa Santos, Pranav Mistry, and Philip Long. Thanks as well to the staff around the lab: Kristin Hall, Will Glesnes, Peter Planz, Stacie Slotnick, Felice Gardner, Nicole Freedman, Jon Ferguson, and Kevin Davis.

Like any student, I've grown a tremendous amount through my interactions with faculty and mentors. In particular, Hiroshi Ishii, Chris Csikszentmihalyi, and Wanda Orlikowski showed me important new perspectives on the world that have had a major positive impact on my work. Thanks especially to Wanda for serving on my dissertation committee, and for introducing me to a world of scholarship that helped develop my sense of my own research practice from a beyond-the-Media-Lab perspective. I'm grateful to Mark Ackerman for serving on my general exam committee and giving me the confidence to talk about research methods and think about the way my work is situated in the broader field of computer supported cooperative work. And of course to my collaborator Eric Gordon for encouraging my early work with *backchan.nl* and working with me to develop *Tin Can* in a classroom context. *Tin Can* would never have become the project it is now without his guidance, writing, and analysis. Thanks to Martin Wattenberg and Jonathan Feinberg for their mentorship and collaboration at IBM Research that played a major role in leading me to the Media Lab. Thanks to Frank Bentley and Paul Moody for their continued support long after I left their respective organizations.

Through the years I've had the pleasure of working with a number of remarkable undergraduates. The projects I present here would not have been possible without the work and insights of Cherrie Yang, Trevor Filter, Mark Fayngersh, and Matt Peairs among many others.

I owe the periods in my Ph.D. to my friend, housemate, and collaborator Jon Chambers. He has helped me through this process in more ways than I could ever enumerate or reasonably expect, from sounding board to technical support to proof reading to timely distractions. I couldn't have done this without his gracious support. Thanks also to my other friends during these years: Mikell Taylor, Rob Quimby, Katherine Kim, Janet Tsai, Lee Edwards, Christie Lee, Avery Anderson, Kimble McCraw, Andrew Hollett, Will Clayton, Chris Murphy, Susan Fredholm, Meena Vembusubramanian, Mike Siripong, Dan Foran, Brian Shih, and many others.

Through the end of this process, Lian Chang has been my companion and partner. Her patience, support, stability, and understanding in this period of uncertainty and stress has been tremendously important to me, and I will be forever thankful for her presence.

I am grateful to my family for their love and support. These haven't been the easiest six years for us, but we've managed okay. I couldn't have done this without Jason and Hannah Harry. My thoughts always remain with my mother, Karla Harry, who saw this journey start but unfortunately didn't get to see it end.