A Panel on Cybernetics and the User Experience of AI Systems

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Abstract

Cybernetics was influential in the early age of AI, and might hold the keys towards making AI systems more interactive. Our panel will recall the history of AI and cybernetics and explore cybernetics as a useful framework for designers of artificially intelligent (AI) systems. Our four panelists—Hugh Dubberly, Deborah Forster, Jody Medich, and Paul Pangaro—will each discuss how they have used cybernetic theory in their own work. Our goal for this panel is to expose people to cybernetics from the perspective of design and to discuss how it can be applied to the user experience of AI systems.

Cybernetics and Artificial Intelligence (AI) have often been closely associated and even equated with each other, though they each take different approaches to understanding and developing intelligent systems (Papert 1988). While AI focuses on the creation of intelligent systems based on computers, cybernetics is broadly interested in understanding communication and control within interacting systems—systems which can be biological, mechanical, computational, or social (Wiener 1961). Moreover, cybernetics is interested in understanding and designing the interaction between intelligent systems and elevates *action* and *interaction* as a means of generating intelligent behavior (Pangaro 2006).

As new technological advances allow for AI to be widely used in products and services that interact with people, there is a need for designers to understand and equip themselves with tools for creating systems that can learn and adapt with their users in order to meet people's needs and goals. These are the goals of cybernetics (Dubberly and Pangaro 2015). Curiously, many of the most prominent facets of contemporary AI, including artificial neural nets, conversational agents, and smart distributed systems, are rooted in the foundations of cybernetics. It has been suggested, and we agree, that cybernetics is the "silent partner" of design (Glanville 1999), and provides a good framework for assisting designers in creating intelligent human-centered systems (Krippendorff 2007; Dubberly and Pangaro 2015).

In this panel, we plan to explore the topic of cybernetics in relation to the design of AI systems that interact with

people. Our goal during our conversation will be to expose people to cybernetics, its history, and its relation to design. We will discuss how cybernetics has influenced the ways our panelists view the world and how it has shaped their own work. We will also discuss how aspects of cybernetic theory can benefit designers in creating new intelligent systems.

Panelists

Throughout the years, cybernetics has championed itself as a way of understanding and making change in the world across many disciplines. It has brought together people and encouraged discussion from mathematicians, biologists, engineers, anthropologists, sociologists, designers, and economists. We look to bring together a group of people from different backgrounds within academia and industry to share their perspectives.

Hugh Dubberly is a design planner and teacher. At Apple Computer in the late 80s and early 90s, Hugh managed cross-functional design teams and later managed creative services for the entire company. While at Apple, he co-created a technology-forecast film called Knowledge Navigator, that presaged the appearance of the Internet in a portable digital device. While at Apple, he served at Art Center College of Design in Pasadena as the first and founding chairman of the computer graphics department. Intrigued by what the publishing industry would look like on the Internet, he next became Director of Interface Design for Times Mirror. This led him to Netscape where he became Vice President of Design and managed groups responsible for the design, engineering, and production of Netscapes Web portal. Hugh graduated from Rhode Island School of Design with a BFA in graphic design and earned an MFA in graphic design from Yale.

Deborah Forster is a primatologist and cognitive scientist, currently a research specialist at the Contextual Robotics Institute at UC San Diego. She studied social complexity and distributed cognition in olive baboons in Kenya, developing a state-space (and time series) approach to analyzing complex social behavior. Forster applied this relational systems framework in her work with car designers, intelligent driver support systems research, architecture education, social robotics research, art-science collaborations, and

movement education practice. Her current projects support interdisciplinary design teams developing infant biometrics, automated pain detection in horses and other animals, cognitive robotics, and autonomous transportation research.

Jody Medich creates superhumans, not supercomputers. She uses perceptual computing (AI, machine learning, AR/VR, robotics, sensors, etc.) to make technology as easy to control as our own body and mind; creating tools that help humans become more powerful. Today, she is Director of Design for Singularity University Labs, where she incubates solutions to Global Grand Challenges using exponential technologies. Her previous work includes User Experience (UX) design for DARPAS Big Dog, Principal Experience Designer on Microsoft HoloLens, Principal UX at LEAP Motion, and UX Strategy for Toyota's AiCar. Jody is also a practicing artist with an MFA in Painting and Design + Technology from the San Francisco Art Institute.

Paul Pangaro is Chair and Associate Professor for MFA Interaction Design at the College for Creative Studies in Detroit. His career spans roles as teacher and curriculum designer; chief technology officer, product designer, and co-founder in tech startups; consultant in organizational effectiveness and innovation; and future-caster all from the perspective of cybernetics as a frame for understanding and designing systems for conversation. He holds a BS from MIT in Humanities/Computer Science and a PhD from Brunel (UK) in Cybernetics where his dissertation advisor and then collaborator in government research contracts was Gordon Pask, founder of Conversation Theory.

Author Biographies

Nikolas Martelaro is a Ph.D. student in Mechanical Engineering at Stanford University's Center for Design Research DesignX Group. His current work focuses on how computationally-aware physical products can elicit meaningful interactions with users and how these products can relay those experiences back to designers.

Wendy Ju is Executive Director of the DesignX group at Stanford University's Center for Design Research and Assistant Professor at Cornell Tech. Her current research in the areas of physical interaction design and ubiquitous computing investigates how implicit interactions can enable novel and natural interfaces through the intentional management of attention and initiative.

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