Advancing Interaction by Synthesizing Theories on Users, Design, and AI

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Abstract
The GUI does not exist in a vacuum. To challenge the fundamental assumptions underlying and inhibiting the growth of graphical interfaces, we must dig deep into our entangled technosocial systems. Turning to recent theoretical advances in HCI, we can improve interaction and relationships between humans and machines. How we turn theory into practice though is an unfolding process. Drawing from recent indictments of the user, of identity, and of sociotechnical entanglements, we can explore how these theories can become a more integral part of how we rethink and redesign our partnerships with machines.

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H.5.2. User interfaces (Interaction styles).

Introduction
To rethink interaction, we need to let go of more than just WIMP (windows, icons, menus, pointing). Rethinking interaction requires us to dream up systems that are not limited by our past reliance on traditional distinctions between people and machines or reductive concepts like *the user*. If we turn to recent theory advancements in HCI, we can create possibility spaces for human-machine relationships that embody emerging and adaptive ways of moving through the world. With a focus on the larger systems that inform the structures our world and our technosocial interactions, these theories can help us tackle the difficult problems inherent in the advancing interaction. Through theory informed practice, praxis, we can create adaptable interfaces, develop equitable human-machine collaborations that enhance both humans and machines, and navigate the unfolding AI-filled landscape in novel ways.

To move forward, we must learn how to develop interactions beyond the user, make sense of the agency of machines, and engage with the systems that shape our understanding of identity differences, social structures, and equity.

Interaction Outside of the User

A key assumption underlying graphical user interfaces is the role of the *user*. Designing HCI systems often asks us to ask, "who is your user?" However, we ought to ask ourselves if this is even the right question to ask. As such, interrogating the theoretical and practical importance we place on the construction of the user is critical for imagining how we might conceive of interaction beyond the user.

So, what has the role of the user been in HCI? Through HCI's three waves, the user has been employed to justify the creation of the field and to reduce human-machine relationships into context-lite design/research formulations [4]. However, the third wave of HCI has surfaced concerns about the larger constructs an interaction occurs within [3]. Previous distinctions regarding whose voices were relevant (designers, researchers, users, managers, participants, etc.) have come under scrutiny. One major result of this scrutiny has been the construction of a more holistic identity for users. Particularly with work like Bardzell's "Feminist HCI" [1], Taylors "Out There" [9], and Schlesinger, Edwards, and Grinter's "Intersectional HCI" [6], identity traits that are tied to larger social systems like gender, race, class, nationality, etc. become an important part of what it means to think about, research, talk about, and write about *the user*. When the user is not just an abstract construct but a fully-fledged entity with various identity traits, desires, interests, and identities, the traditional conception of the user prohibits us from fully exploring interaction possibilities.

Moving Beyond the User

So, with the prevalence of human/user centered design, how can we create relevant and innovative interactions that de-center the user. Baumer and Brubaker propose a path forward through the introduction of Post-Userism [2]. Post-userism encourages us to design for subject positions that deviate from the classical notion of the user. Baumer and Brubaker explain that "a myopic fixation on the user limits our ability to see other configurations of interaction with computers" [2]. Limitations like envisioning users of social networking sites as the sole owner and custodian of their own accounts rather than imagining networks of relationships that rely on delegation and custodianship. Thus, recent theory implores us to look beyond limiting notions of the user to explore new integrations of interaction. Further, there is increasing demand to look beyond humans and consider the way that non-human entities are engaging with people and the technologies we design [8]. Nevertheless, we must still figure out how to contend with the differing identities of people interacting with machines. Overlapping, intersectional identities of those interacting with machine provide important details about how identity and experience inform our interactions every day [6]. Thus, a challenge for rethinking interaction is how we perform the design process without the common conception of the user.

Agency in Machine-User Entanglements

With the increasing role computing plays in everyday life, it is essential we develop ways to contend with the agency of algorithms in our design project. No advance

makes this clearer than the growing prevalence of artificial intelligence and machine learning in all facets of computing. It follows to ask how we will contend with the agency of the machine in our design process.

For insight on how to integrate the "computer in the design process" [5], we can turn to Alex Taylor's work on Machine Intelligence to gain a richer understanding of the ways that people are already attributing agency and intelligence to technical designs [5]. Taylor talks of the way that intelligence, which is not the sole provenance of humans, emerges in the world—in a particular context. Using examples from early computer-controlled art exhibits to Roombas, Taylor illustrates how machines act in context-dependent ways that differ from human intelligence. Taylor argues that if we make sense of the intelligence of machines as it emerges (rather than assuming we understand machine intelligence outright) we can engage in new interactions and assemblages with machines. Through learning to see machine intelligence as an emergent, agential reflection of an artifact's experience, we can rethink our relationships with machine's and how we are already engaging in collaborative endeavors with artificially intelligent agents.

Extending this line of reasoning, we can learn how our understanding of interaction and intelligence have imposed difficulties on advancing interaction. In a forthcoming paper I co-authored with Taylor and O'Hara, we investigated how our historical and social understanding of language and AI have made it difficult for AI chatbots to handle critical topics like race in discourse [7]. In order to rethink our interactions with chatbots, particularly around race-talk, we leveraged theory to investigate why improved interaction around race-talk with chatbots was so difficult. This allowed us to ideate on how we could reconfigure interaction to improve the relationships between chatbots and their conversation partners around race-talk. Without theory, we would not have been able to break down the technosocial systems that were hindering improved interaction, nor could we have made recommendations for advancing interaction that leveraged human and machine intelligence in new and novel ways.

Moving Forward

Considering the four levels of representation outlined by Baumer and Brubaker in "Post-Userism", the interface is just one level of representation in technical systems [2]. Interaction is constructed in ways that connect hardware systems to ideological systems to historical systems. The HCI theories that are challenging the limits of current interactive systems provide us with frameworks for rethinking and advancing interaction.

In my PhD research, I am exploring ways to connect these theories to the design of just interactions between machines, people, and beyond. The works cited in this paper provide us with frameworks that reveal the limiting potential of current interaction interfaces. Fundamentally, these theories ask us to rethink interaction. If we can develop ways to tightly couple these theories with design practice, we will have more options for envisioning human-AI partnerships that allow people to develop enhanced abilities, and we will have more options for envisioning the sliding scale of automated to agential interactions.

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