Usable Intelligent Interactive Systems
CHI 2009 Special Interest Group Meeting

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Abstract
"The AI and HCI communities have often been characterized as having opposing views of how humans and computers should interact" observes Winograd in *Shifting Viewpoints* [10]. It is time to narrow this gap. What was once considered the forefront of artificial intelligence (AI) research can now be found in commercial products. While some have failed, others, such as face detection in digital cameras or product recommendation systems, have become so mainstream they are no longer thought of as artificial intelligence. This special interest group provides a forum to examine the apparent gap between HCI and AI communities, to explore how intelligent technologies can enable novel interaction with computation, and to investigate the challenges associated with understanding human abilities, limitations, and preferences in order to drive the design of intelligent interactive systems.

Keywords
Human Computer Interaction, Artificial Intelligence.

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Rationale and Focus

The gap between researchers in human-computer interaction and in artificial intelligence persists, despite overlap of practitioners, and annual meetings such as the International Conference on Intelligent User Interfaces. From the HCI perspective, many interactive intelligent systems appear to be technology-driven solutions with interfaces developed without an in-depth understanding of human perception, cognition, or preferences. It is challenging enough to ensure usability in a system that acts predictably; to design and evaluate systems that learn, evolve over time, or act proactively, inevitably adds complexity [5].

Meanwhile, AI researchers—motivated by the promise of more efficient or human-like interactions— may feel that HCI practitioners too conservatively interpret consistency as constancy and predictability as repetition, leading them to believe that the HCI community is unwilling to consider novel interaction paradigms that embrace proactive and uncertain behavior.

Consequently, the very boundary of AI and HCI has remained underexplored to the detriment of both fields. Earlier, some AI researchers tended to see adaptive user interfaces as a natural solution to usability problems [1], while many HCI researchers were equally convinced that such interfaces would necessarily disorient the users, causing more harm than good [8],. Only recently have attempts been made to systematically explore the design space of such adaptive interfaces, resulting in concrete empirical evidence with implications for the design of both interactions [3] and machine learning algorithms [4] for user interfaces that automatically adapt to the user's task.

There are however, several notable examples of successful intelligent interactive systems. Recommender systems help us discover music, pick movies to see, and find the perfect gift [6]. Reasoning systems are employed to analyze the stock market, detect SPAM email, and pick winning race horses [9]. Sophisticated tools allow users to automate their workflow without writing a line of code [7]. Assistive agents help the elderly manage their health and raise alerts in case of emergency [2]. Speech and handwriting recognition systems are now included in many mobile phones and tablet PCs. The maturing of AI technologies opens new opportunities to meet user needs and calls for evolving paradigms of interaction between the human and the computer.

Realizing the full potential of AI to assist users is dependent on creating a usable interactive system that directly addresses a real need and fits the user's workflow. More concretely, the user may require an understanding of the abilities of the system, of how to direct its operation, and of how those operations support desired tasks. The system must have information that is formal and complete enough for its reasoning and learning to be effective, and it may need to allow this information to be understood, applied, and altered at times appropriate for the user. Finally, the user must be able to effectively assimilate and respond to the output of the system and, possibly, to its internal state or processing.

This SIG follows the success of the CHI 2008 *Workshop on Usable Artificial Intelligence* and the AAAI 2007 Spring Symposium, *Interaction Challenges for Intelligent Assistants*, two forums that brought together practitioners from HCI and AI fields to explore HCI issues from the perspective of improving usability in intelligent systems.

Goal

The intent of this special interest group is to foster a discussion into how HCI and AI collaboration can lead to new developments that integrate the strengths of humans and AI systems. In particular, we are interested in the following questions:

- **How can AI increase usability in systems?** What general principles of interface design can AI help to satisfy? For instance, all interfaces should accomplish interactions in ways that make efficient use of user input, and use methods of input and output that are natural for the human user. How can intelligent systems expand this space? How can they enable novel, useful, and usable ways of interacting with computing systems?

- **What are the usability challenges common to interactive intelligent systems, and how can these be mitigated?** How do we design robust interactions for systems that include components that do the "right thing" only some of the time? How do we make proactive systems appear predictable? How can we help users form helpful mental models of systems whose behavior is governed by complex statistical inference?

- **What are the effective methods for ensuring and improving the usability of intelligent systems?** Given that designers are currently tackling problems in the HCI-for-AI design space, how do the existing usability evaluation methods hold up? Which ones work best for which kinds of applications or algorithms? Are there systematic gaps in evaluation methods? For example, what evaluation methods are appropriate for applications with user intent recognition and/or machine learning algorithms? What are the gaps in design theory (computational theory, evaluation theory, interaction design approaches) that would benefit from systematic research? Do AI systems need new design methods or prototyping tools? How do we identify and fill these gaps?

The overall goal of this special interest group is to initiate a community of researchers and practitioners who are interested in this topic and who want to exchange information and experience and form collaborations on specific projects.

The most visible result will be a website for this community, which will be initialized before the SIG meeting and extended after the meeting with the help of participants in the meeting.

The initial plan is for this website to include:

- Links to relevant literature, conferences, and other events
- Pages for individuals and groups on which they can describe their own experience and interests

- A discussion forum in which projects and issues of interest to the community can be discussed

Audience

The audience of this SIG consists of practitioners and researchers who work in the overlap of human-computer interaction and artificial intelligence. This includes end user programming, knowledge capture, user modeling and adaptivity, robotics, assistive and agent technologies, multimodal systems, cognitive science, and fields that address complex socio-technical systems.

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