Workshop on
Designing for Cognitive Limitations

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ABSTRACT
People with cognitive disabilities that affect their memory, attention, and comprehension can become overwhelmed when using technology—just as cognitively-demanding situations like driving or multitasking can hinder technology use for most people. However, appropriately-designed technology can assist in overcoming cognitive disabilities and cognitive limitations. This workshop seeks to bring together researchers and practitioners with design experience in the many areas of cognitive disability and cognitive limitation to exchange, evolve, and develop strategies for design. Workshop participants will present key lessons from their own experiences, and workshop activities will employ claims-based design strategies toward identifying, comparing, contrasting, and mapping approaches for addressing cognitive disabilities and limitations.

Author Keywords
cognitive disabilities, cognitive limitations, attention, interruption, mobile computing, interface design

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous. K.4.2. Social issues: Assistive technologies for persons with disabilities

General Terms
Design, Human Factors.

SHORT DESCRIPTION
Cognitive disabilities—including birth or developmental disabilities, brain injury and stroke, and severe and persistent mental illness—affect tens of millions of people worldwide [Waldrop & Stone, 2003]. Cognitive disabilities can lead to difficulties with memory, attention, problem-solving, and comprehension, and people with cognitive disabilities can become overwhelmed when using technology.

The community of researchers developing technologies for people with cognitive disabilities has begun to create design guidelines (e.g., limiting text or choices on a screen, providing multiple navigation paths to information, and increasing size of selectable areas on a screen) and identify interface techniques (e.g., [Chandler et al, 2009; Lewis et al., 2009]). However, the great variation in strengths and weakness among those who experience cognitive disabilities makes it difficult to identify similarity to other cognitively demanding tasks, and there have been few opportunities for knowledge exchange between different cognitive disability communities.

In addition, many design situations—e.g., mobile interfaces, in-vehicle technologies, computing in busy environments—must account for users who are experiencing issues similar to those encountered by people with cognitive disabilities. Even tasks as seemingly simple as sending a text message, making a phone call, or selecting music to play become difficult when also undertaking a task like driving, walking, or running—leaving users similarly overwhelmed to people with cognitive disabilities who seek to use interfaces in less active settings.

This workshop provides an opportunity for researchers and practitioners in many design areas (cognitive disabilities, distraction and interruption, mobile and ubiquitous computing, in-vehicle computing, and others) to exchange ideas and approaches in the design of interactive systems—to the expected benefit of all of the communities. To aid in the exchange of ideas, we will employ a claims-based approach to the workshop activities. Claims, as introduced in [Carroll & Kellogg, 1989], encapsulate an interface design feature with its projected upsides and downsides. Claims are falsifiable hypotheses, which are intended to encourage debate and reconsideration as situations and technologies change. We will conduct claims-based analysis and discussions relating to the key design claims in their areas. The focus on claims will allow experts to think in a creative and integrative manner, resulting in a map of interconnected concepts that reflect cross-pollination for interfaces for mobile users and interfaces for users with

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cognitive disabilities [McCrickard et al., 2011; Wahid & McCrickard, 2006].

Benefits and Significance

This workshop will connect researchers and practitioners in the fields of interface design and cognitive disabilities, encouraging mutually beneficial reflection on the challenging problems and valuable approaches that the participants have identified in their fields.

More tangibly, we expect the participants to generate a repository of design claims in preparation for the workshop, which will be refined during and immediately after the workshop and posted on the workshop web page. Given the novelty of this approach, we expect to generate a highly-visible paper in SIGCHI interactions or a similar venue that reflects upon the approach and the workshop findings. We are hopeful that the opportunity to interact that the workshop affords will result in collaborations, funding, and possibly a follow-up workshop at a future venue.

Workshop Overview

This one-day workshop will begin with a 15-minute overview of the workshop goals, as were outlined in the short description:

1. Identification of and raised awareness to interface design approaches that lead to helpful solutions for people with cognitive disabilities.

2. Development of crossover knowledge within cognitive disability approaches and between cognitive disability approaches and those used in other cognitively-limited situations.

3. Testing and evolution of the claims-based knowledge development and sharing mechanisms that will be used to identify promising directions during this workshop.

4. Plans for further collaboration and discussion of the ideas and approaches from the workshop.

There will be a brief time for introductions by the participants, limited to 5-10 minutes each, to allow everyone to associate a person with their work. We intend to keep this brief because we expect the participants to have looked over the collection of brief position statements, and because we expect people to get to know each other through the small group activities.

There will be two small-group work sessions, one right before lunch and the other right after, in which groups of 3 or 4 participants are asked to undertake a design problem for users with cognitive disabilities. An example problem might be to design a mobile interface to assist a person recovering from a stroke to remember once-familiar landmarks around her community. We will create the groups beforehand, taking care that the groups have diverse backgrounds. The groups will be encouraged to develop claims that capture the key directions that they feel should be pursued in the further design of the interfaces.

After the second work session, each group will share lessons that were learned and hypotheses that were developed, leading to an interconnected set of directions for further investigation. We will seek to associate names of participant who are interested in pursuing some of the directions, and we will post the results to our workshop page. We anticipate authoring an article for SIGCHI interactions or a similar venue about the workshop topic.

Workshop Organizer Short Bios

Scott McCrickard is an Associate Professor of Computer Science at Virginia Tech and a member of the Center for Human-Computer Interaction. His research interests include notifications, interruptions, awareness, and cognitive impacts of computing devices. He has attended, presented at, and participated in several DIS Conferences and Workshops previously, and he has organized workshops at CHI and other conferences.

Clayton Lewis is a Professor of Computer Science and Scientist in Residence at the Coleman Institute for Cognitive Disabilities at the University of Colorado, Boulder. He was manager of the Human Factors Group at the IBM Watson Research Center in the early 1980s where he led and inspired some of the first HCI projects on iterative, user centered design. He was elected to the CHI Academy in 2009, and in 2011 he received the CHI Social Impact Award for his strong influence on HCI with regard to designing for people with cognitive, language, and learning disabilities.

DRAFT CALL FOR PARTICIPATION

The call for participation provides a introduction to the workshop and asks potential participants to submit a 1-2 page position paper that contains around three claims important to keep in mind when designing for people with cognitive disabilities.

If accepted to the workshop, participants will be asked to prepare a brief, 5-10 minute introduction to their research and interests. The position papers and their self-identified claims will be added to the online call for participation, and participants will be encouraged to read and review the papers—or at a minimum to read and think about the extracted claims. The call for participation will be updated after the workshop with any additional or updated claims that emerge during the workshop, thus allowing it to serve as a information resource moving forward.

The current draft of the call for participation is available at http://people.cs.vt.edu/~mccricks/dis12-cogdisab/ (which will become its permanent home if the workshop is accepted).

RECRUITMENT STRATEGY

Broad and targeted recruiting should yield a mix of DIS regulars and interested first-timers to this workshop. Based on prior relevant papers at DIS (e.g., some papers in the 2010 Track on Diversity of Family Life and the 2010 Track on Diabetes Management), we expect there to be interest within the DIS community—many of these people will find the workshop through announcements on the conference web site, email list, twitter feed, and Facebook page. We also intend to approach prior and upcoming DIS authors who have written relevant papers in the area.

We intend to send email to relevant listservs, including the CHI announcements listserv and the ASSETS listserv, to draw from their broad pool of researchers and practitioners interested in design of interfaces for people with cognitive disabilities. We will also approach, via email and in person, researchers and practitioners who have relevant experiences to our workshop.

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