**Claims set for cognitive limitations**

Cognitive limitations

This document uses claims to provide some possible directions for research and development on cognitive limitations. A claim is a falsifiable hypothesis that encapsulates a feature of an interface with its positive (+) and negative (-) effects. The claims can be purely textual, or they can be elaborated with an explanatory or inspirational picture. The upsides and downsides can be standalone, or they can be accompanied by explanation, supporting quotations, or citations. Often claims extend existing work into new domains, affecting the certainty of the claim and requiring further scientific inquiry. Since claims are hypothetical, they are meant to be a starting point for design and development, not the final word.

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**The use of smartphone technology to replace dedicated accessibility devices**

+ Integrated cameras can replace dedicated CCTV magnification devices and standalone OCRs.

Dedicated magnification devices are commonly used by people with low vision, as are OCR systems in use by people who are blind. The integration of high quality screens and cameras in smartphones and media players offers the opportunity for mass-market devices to replace dedicated devices for many uses.

+ Integrated location awareness allows self navigation without a dedicated GPS device

Of the 19 people studied in (Kane et al., 2009), seven used a GPS device regularly, with only two regularly using a dedicated GPS device. One participant noted “With the GPS, you can just strike out and go. I need that GPS to give me a little bit of assurance. Without GPS, I'd travel a lot less.”

+ Accelerometers, gyroscopes and magnetometers offer new input methods that can be more accessible than traditional input devices

For people with sufficient neurological and motor ability the accelerometers, gyroscopes, and magnetometers that are built into most modern smartphones offer the possibility for spatial and gesture based interfaces that could benefit users with visual impairments. The Virtual Shelves concept successfully demonstrated by (Li, Dearman & Truong, 2010) proved that spatially arranged shortcuts could offer improvements over existing smartphones.

- BUT, many users are hesitant to use accessible devices in public spaces

One problem highlighted in (Kane et al., 2009) was the privacy issues raised by using accessibility options in public spaces. Aside from the obvious issue of having potentially private content read aloud by screen readers, many described their interactions with their devices as awkward in public spaces and shied away from leveraging accessibility features on account of it.

- BUT, damage to a single multi-use device would have multiple problems

As reported in (Kane et al., 2009) the independence gained from mobile devices has the problem of putting the user at significant risk in the event of a failure. One blind participant explained the decision to carry a dedicated GPS despite having a phone with overlapping functionality: “If something happens to my phone, I'd still want to be able to have my [GPS]. If my [GPS] breaks, I still want to be able to have my phone.”

- BUT, costs can prevent users from purchasing devices with robust accessibility support

Despite the cost of commodity devices being significantly lower than those of specialized accessibility devices, it is reported in (Kane et al., 2009) that only 6 out of 19 people used mobile phones that provided accessibility features. Users who had phones without accessibility options were usually aware of better devices, but believed them to be too expensive. Additionally, 2 out of 7 smartphone users chose not to have a mobile data plan in order to reduce costs.

**Non-directed play activities that leverage a computing device**

+ Leverage the communicative abilities of computing devices

+ Can help develop social skills in groups of children (Bekker et al., 2012)

+ Can be used in therapy sessions for kids with ADHD (Pykhtina et al., 2012)

- BUT, only exploratory qualitative studies have probed effectiveness (Pykhtina et al., 2012)

- BUT, it is difficult to assess the effectiveness of non-directed activities

**The use of semi-public social networking tools for small communities**

+ Establishes common, shared communication outlets (Terrell & McCrickard, 2006)

+ Can sense and respond to people in contextually appropriate ways (McCarthy, 2001)

+ Can keep seniors intellectually engaged with their peers (Lee et al., 2012)

- BUT can require significant buy-in from the community

- BUT could promote exclusionary behavior (Lee et al., 2012)

[](http://interrelativity.com/joe/projects/CoCollage.html)

**Use of mobile devices to build/extend vocabulary for people with speech disorders**

+ can encourage use of favorite or most needed words (Messamer et al., 2011)

+ may provide summaries interpretations of conversations (Hailpern & Danilvsky, 2012)

- BUT must be tailored for specific needs of each person (Messamer et al., 2011)

- BUT may lose usefulness as vocabularies expand or change



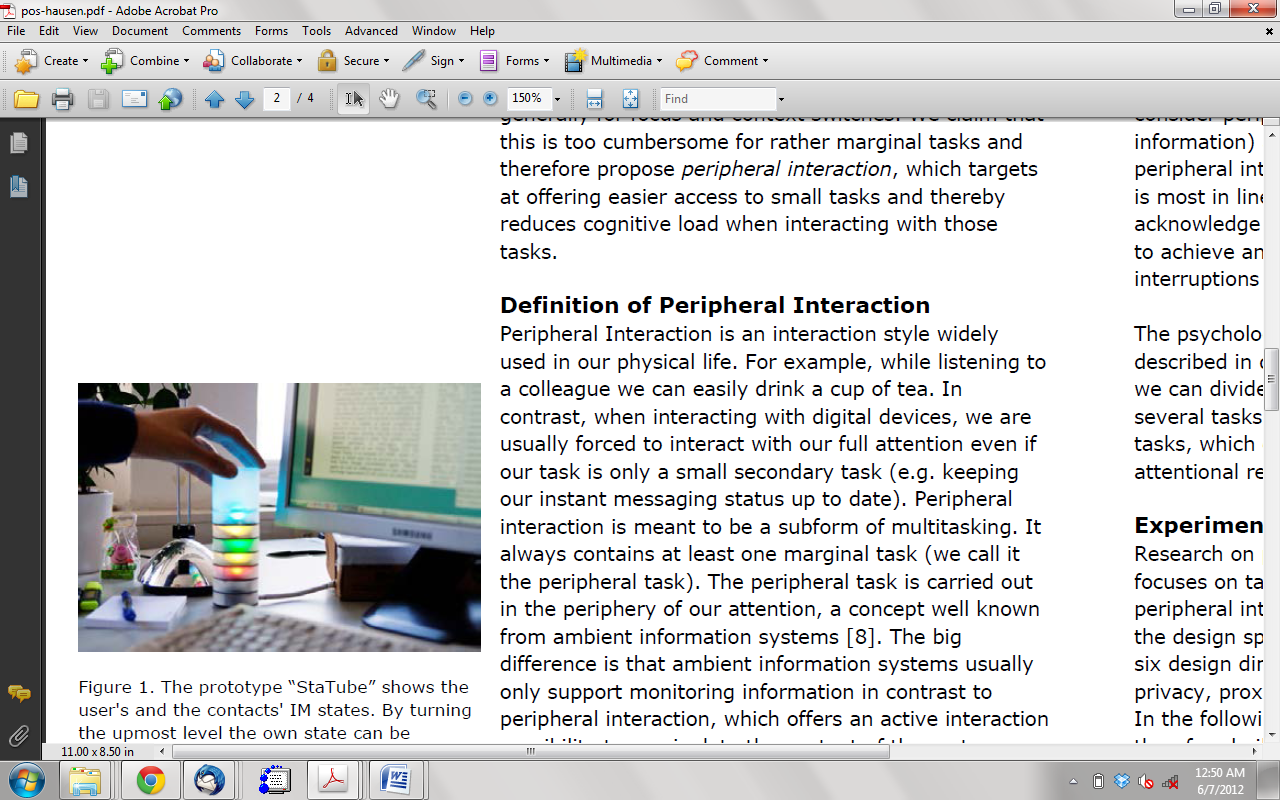
**Peripheral interfaces for cumbersome but beneficial tasks (like setting IM status)**

+ can lead to neglected tasks being performed more frequently (Hausen, 2012)

+ can be completed without direct focus by many people after two weeks (Hausen, 2012)

- BUT may require training and/or a steep learning curve (Hausen, 2012)

- BUT, it is difficult to assess effectiveness of peripheral interactions

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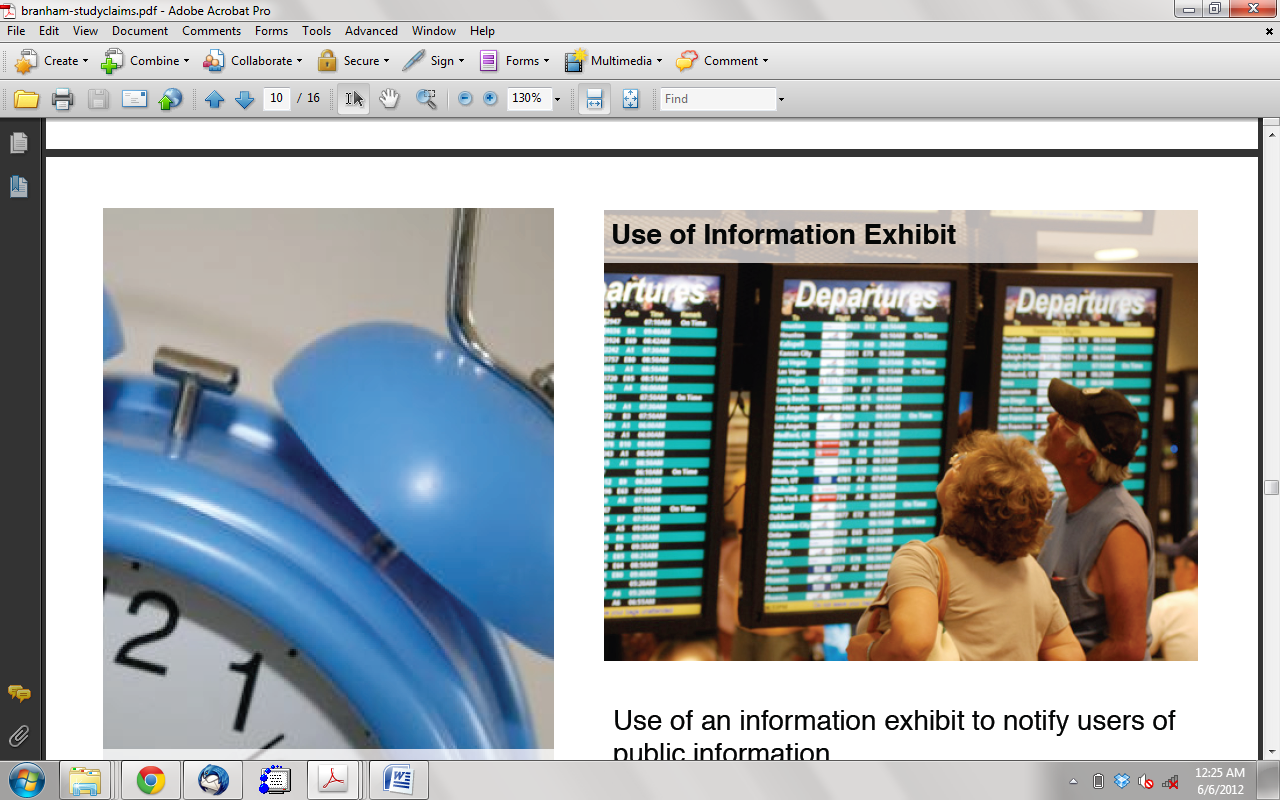
**Use of a large public information exhibit to notify users**

+ Takes advantage of group settings, making notifications to groups of users easier

+ Typically can carry a higher density of information for notification

- The information shown may not apply to all the users

- May be harder to interact with a public information exhibit



**Use of voice commands to interact with a system**

+ Supports users with limited reading and writing skills

+ Allows for quick interaction

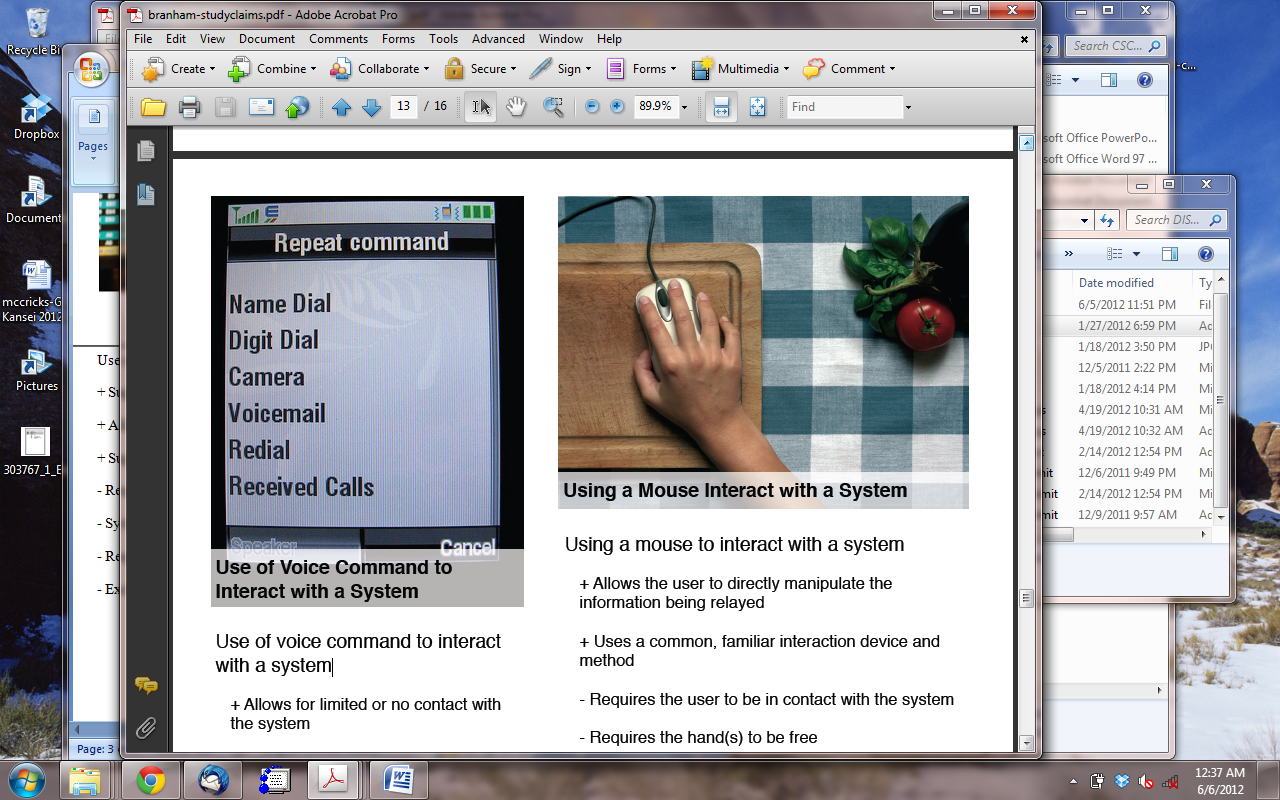
+ Supports a natural form of communication

- Requires the user to learn all the commands needed to interact with the system

- System might be triggered inadvertently by normal conversation

- Requires careful and user-appropriate error handling and recovery

- Excludes certain user categories



**Use of tactile information to notify**

+ Can provide personal notifications to users such that only the user is aware of the notification

+ Effective for people with certain disabilities because it does not rely on sight or sound

- Notification device needs to be in physical contact with the user

