Designing ESI Planner:
The Participatory Design of a Sound and Image Enhanced Planner for People with Aphasia

Karyn Moffatt, Joanna McGrenere, Barbara Purves, Maria Klawe

Department of Computer Science
University of British Columbia
Canada

What is Aphasia?

- Aphasia is a loss of words - not intelligence
- Acquired language disorder
  - Caused by brain damage (e.g. stroke, trauma, etc.)
- Impairment of communication abilities
- Relative sparing of other cognitive abilities
Skip has Aphasia

Video and name used with permission.

Key Design Problems

- mismatch of individual abilities and skills required to use the technology
- failure to address the spectrum of communication contexts
Research Goals

- Understand the strategies used by individuals with aphasia to communicate and to carry out language-based tasks.
- Seek opportunities where technology can support individuals in those activities.

ESI Planner

The Enhanced with Sound and Images Planner

- PDA application (iPaq from HP)
- A computerized daily planner designed for people with aphasia
- Uses images, sound, and text to represent people and places in appointments
Design Approach

- Two phase design:
  - Phase One: Participatory Design
  - Phase Two: Experimental Evaluation

Phase One: Participatory Design

Four sub-phases:
Phase One: Participatory Design

Four sub-phases:
1. Idea brainstorming
   - Interviews
   - Identified needs:
     - Daily planner
     - Recipe book
     - Word dictionary
     - Personal history recorder
     - Conversation primer - to help preplan conversations

Phase One:

Four sub-phases:
1. Idea brainstorming
2. Low-fidelity paper prototyping
Phase One: Participatory Design

Four sub-phases:
1. Idea brainstorming
2. Low-fidelity paper prototyping
3. Medium-fidelity software prototyping
4. High-fidelity software prototyping and formal evaluation

> Demo!
Phase Two: Evaluation

- **Hypothesis:** A planner using triplets of images, text, and sound would be more usable than a text-only planner.

Images, Sound, and Text: ESI Planner  

Text-Only: NESI Planner (The Not Enhanced with Sound and Images Planner)
Phase Two: Methodology

- **8 Participants:**
  - 1 female, 7 male; ages: 47 to 86
  - All at least one year post onset

Participants

- severe
- moderate
- mild

Speech | Audition | Reading | Writing

1 female, 7 male; ages: 47 to 86
All at least one year post onset
Phase Two: Methodology

- **8 Participants:**
  - 1 female, 7 male; ages: 47 to 86
  - All at least one year post onset

Participants:
- **mild**
- **moderate**
- **severe**

Categories:
- **Speech**
- **Audition**
- **Reading**
- **Writing**
Phase Two: Methodology

- Two Sessions:
  - Session 1: Planner Evaluation
    - 30 min with each planner
    - 10 tasks per planner
      - retrieval, creation, modification
      - presentation format: text and oral
  - Quantitative performance measures:
    - Number of tasks completed correctly
    - Number of tasks completed
    - Qualitative self-reported preferences

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<thead>
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<th>Create an appointment</th>
<th>4A</th>
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<td>With</td>
<td>Person: Marilyn Monroe</td>
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<td>At</td>
<td>Place: Eiffel Tower</td>
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<tr>
<td>When?</td>
<td></td>
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<td>End Time:</td>
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Phase Two: Methodology

- **Two Sessions:**
  - Session 1: Planner Evaluation
  - Session 2: Western Aphasia Battery

- Standardized battery used to assess:
  - speech, auditory comprehension, reading, and writing

- Used to describe abilities in terms of severity:
  - mild, moderate, or severe

Phase Two: Results

- **Qualitative Self Reported Measures**
  - Preference varied with severity of impairment

Participants

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More severely impaired

More mildly impaired

Speech  Audition  Reading  Writing
Phase Two: Results

- Qualitative Self Reported Measures
  - Preference varied with severity of impairment

Participants

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Participants

- Speech
- Audition
- Reading
- Writing
Phase Two: Results

- **Quantitative Performance Measures: Tasks Correct**
  - Significantly more tasks correct with ESI Planner
    \( (F(1,7) = 27.00, p<.01) \)

- **Significant interaction between tasks correct and interface order**
  \( (F(1,7) = 8.33, p<.05) \)

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**Averages:**
- ESI Planner: 7.9
- NESI Planner: 6.8

**Trial Data:**

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Phase Two: Results

- Quantitative Performance Measures: Tasks Correct
  - Significant interaction between tasks correct and interface order ($F(1,7) = 8.33$, $p < .05$)

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Ongoing Research

- Additional Analysis
  - Patterns of Behavior
- Longitudinal Field Study
  - Adoptability vs. Usability
- Explore Customization

Research Outcomes

- **ESI Planner**: An application to support a specific daily living activity
- **Guidelines**
  - For working with special populations
  - For improving the accessibility of handheld technology
Questions?

Contact:
Karyn Moffatt
kmoffatt@cs.ubc.ca
http://www.cs.ubc.ca/projects/Aphasia/