User Interfaces for Non-Literate and Semi-Literate Users

Indrani Medhi, Kentaro Toyama  Microsoft Research India
The Problem

- 26% of world’s adult population is illiterate and 98% of all non-literate people live in the developing countries

- Large population cut off from access to information and communication due to importance of literacy in any knowledge-based culture

- People with low-literacy are unable to access functions and services implemented on computing information systems
Goal: Devise and implement design principles such that a non-literate person can, at first contact with a computing system, immediately realize useful interaction with minimal or no assistance.
Design Process

- Ethnographic Interviews
- Subject Trials
- Participatory Design

involving over 450 hours and 400 people from India, the Philippines, South Africa
Target Community

- Household income: USD 20 – USD 200 per month
- Informal sector jobs
- Low levels of formal education (highest education attained being schooling up to eighth grade)
- Functional illiteracy or semi-literacy but partial numeracy
- Zero experience with PCs
- Some used and owned cell phones- mostly low-end, limited functionality
- Some households had TVs, music players and gas burners
- Languages spoken: Kannada, Hindi and Tamil (India), Tagalog (Philippines), Afrikaans, Xhosa, Zulu (South Africa)
- Did not speak English but associated it with wealth and prestige
Applications

- Job-Information for Domestic Helpers
- Health Information Dissemination
- Map Navigation

PC based
Applications

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- Mobile Banking

PC based
PC-based UIs
Design Principle- 1

A full-context video explaining the broader context of the application in addition to the instructional material about how to use the application.
Use **static hand-drawn representations with voice annotations**
Pay attention to **subtle graphical cues**. User response may depend on **psychological, cultural, or religious biases**.
Design Principles- 3

Provide “help” on all screens
Usability Test: Experimental Set-Up

- **Cultural Consideration** - Modifications to ensure that subjects were comfortable in the environment and testing scenario.

- **Application** - We tested applications with two interfaces (text-based vs. text-free)

- **Subjects** - 35 participants varying in age, environment they lived and worked and familiarity with technology.
Usability Test: Results

• Unable to make sense or navigate through the text-based UIs
• Immediate comprehension of voice feedback
• Collaborative use seemed more effective
• The “help” instructions were a constant source of reassurance to users.
• Navigation metaphor of a book helped
• Subject involvement among test subjects
• After watching movie all 35 test participants could complete the task and took an average of 7.5 minutes and 5.2 prompts
Mobile Phone-based UIs
Current Usage

Strong preference for:
• Voice calls (India, South Africa)
• Followed by SMS texting (Philippines)
Current Usability Barriers

- Inability to understand hierarchical menu structures
- Discoverability of apps very low
- Difficulty using scroll bars
- Difficulty with soft-key function mapping
- Difficulty with non-numeric text-input

Diagrams produced by semi-literate subjects to represent menu structures for user tasks.
Design Recommendations

• Provide graphical cues.
• Provide voice-annotation support wherever possible.
• Provide local language support, both in text and audio.
• Minimize hierarchical structures.
• Avoid requiring non-numeric text input.
• Avoid menus that require scrolling.
• Minimize soft-key mappings.

Previous work in PC based UIs for Low-literate Users

Working with mobile phones
Usability Test: Results

Rich multimedia UI (without text)
Usability Test: Results

Comparative study with 58 subjects

- Non-text designs are strongly preferred over text-based designs.
- While task-completion rates are better for the rich multimedia UI, speed is faster and less assistance is required on the spoken-dialog system.
Overall Work

- UI design principles
- Optimal Audio-Visual Representation Research
- Full-Context Video
- Working system
- UIs for mobile phones
  - Computerized Job Search
  - Computerized Health Info
  - Authoring tool
- Cognitive Structures in illiterate users
Thank You