



User Interfaces for Non-Literate and Semi-Literate Users

1500



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

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

Design Principles- 2

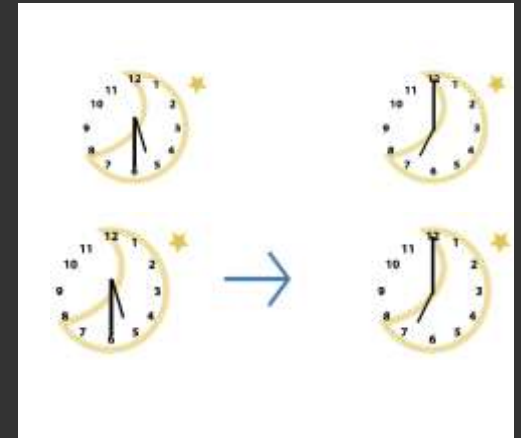
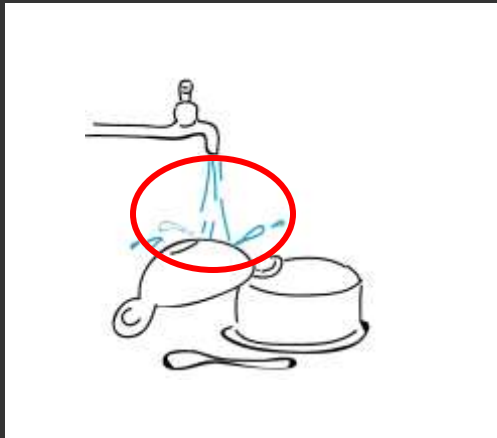


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Use **static hand-drawn representations with voice annotations**

Details of Design Principle-2



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

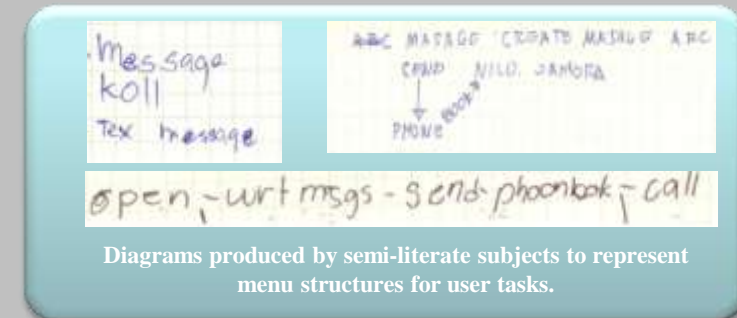
Current Usage

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



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

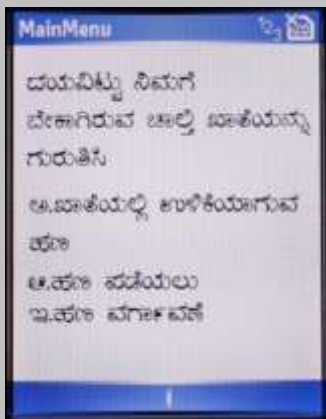
Usability Test: Results



Rich multimedia
UI (without text)

Usability Test: Results

Comparative study with 58 subjects



Text-based UI



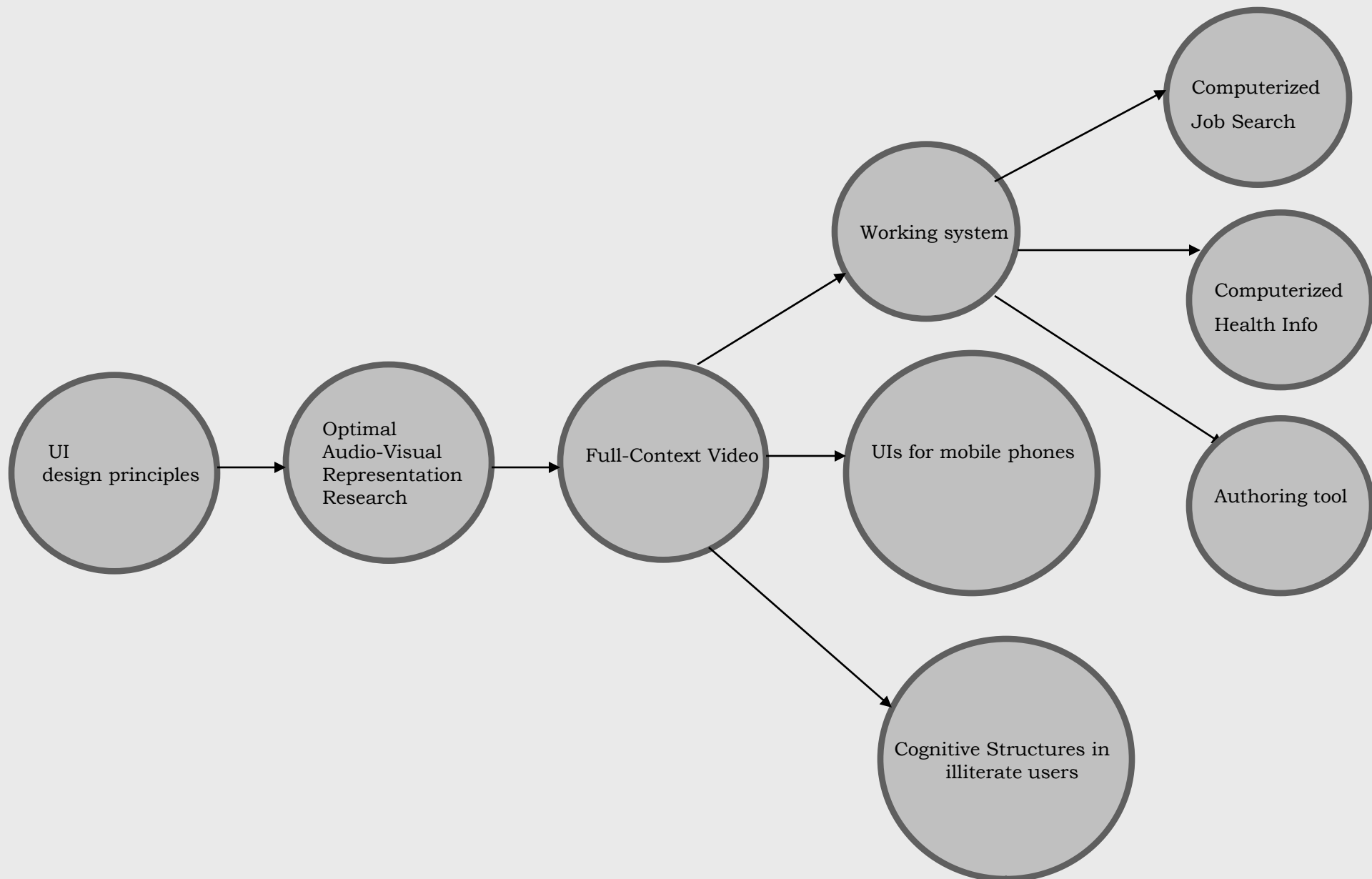
Spoken-dialog UI
(without text)



Rich multimedia
UI (without text)

- 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



Thank You