Lecture 8 – Models and Metaphors

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[Taken from Stanford CS147 with permission]
Learning Goals

• Understand the use of metaphors in designing interfaces and be able to choose them appropriately

• Understand the need for a clear conceptual model in interface design and be able to analyze and create appropriate models for specific applications
Conceptual Models

• In interacting with any system (software or others), a person has a concept of what the system is: what its components are, what properties they have, and what interactions they can enter into. This conceptual model underlies the more specific aspects of interface, such as screen representations and command structures.
Metaphors

• A key issue in software design is to make the model as clear and comprehensible as possible, and to relate it appropriately to the person's models based on prior experience with other systems and aspects of ordinary life.

• Metaphors can help the designer communicate the mental model based on the user’s prior understanding.
Three Paradigms [Cooper]

• Technology paradigm
  – To use the device (or program) you need to understand the mechanism

• Metaphor paradigm
  – Let users apply what they know from some familiar part of life in understanding the interface

• Idiomatic Paradigm
  – Design simple interactions and imbue them with meaning
The Desktop Metaphor – Xerox Star, 1981
Icons for Familiar Office Objects
Notebook Metaphor – Penpoint, 1991

Dear Ms. Huerta:

This is our agreement for a new bottle design for New World.

1. You agree to supply design services and technical drawings to New World.

2. If your design proves to be inadequate to withstand the stresses, heat, and shock for which you have guaranteed it, you will complete a new design at no charge.

3. Your cost estimates must be submitted in advance every week and approved by Richard Hopkins before you continue work.

4. New World will pay each invoice from an approved estimate within thirty (30) days.

Please sign a copy of this agreement and fax it back to me.
Good evening.
Click on the door to sign in...
WindowsBeta.., to start a program just click on it.
To see the programs in this room, hold down the F1 key.

Other options
Setting up your e-mail address...

The first step is to subscribe to the Bob E-Mail service.

How to subscribe to the service

The second step is to tell me your account info and e-mail address so I can pick up and deliver your e-mail.

Tell me your e-mail information

Finally, if you have trouble sending or receiving e-mail messages, I can help you fix any problems.

Troubleshoot e-mail problems
Lava Lamp

Note: This is a decorative object. It does not start any programs or do anything special.

- Change it

Cancel
House for a PDA – Magic Cap 1994
Virtual World metaphor

There.com
Secondlife.com
Bookshelf

http://www.ifs.tuwien.ac.at/~andi/somlib/libviewer.html
Physical Device Metaphors

Apple Quicktime 4.0

Figure 2-3: IBM's RealPhone Application Interface
Conversational Agents
Clippy - Microsoft

It looks like you’re crafting a crude forgery.

Would you like help?

- Get Dan Rather’s phone number
- See fonts that were available in 1973
- Grab a beer and some popcorn and watch the festivities on Democratic Underground.

Memo to File

SUBJECT: CYA

1. Staudt has obviously pressed lodges more about interference
Three basic physical interaction metaphors

• **Manipulation:**
  – Desktop, notebook,…

• **Navigation:**
  – WWW, virtual spaces…

• **Conversation:**
  – Speech, agents…
The Spreadsheet – Visicalc, 1979
Timeline Metaphor - Lifestreams, 1997

http://www.cs.yale.edu/homes/freeman/lifestreams.html
Map Metaphor(s)
Map Metaphor(s)

To map your run, enter in a starting location below. Note that if you select an international city, you will not be able to enter in an Address or Zip. State is required for addresses within the United States.

1404 Vacation Road
San Diego
California 92109
United States

Find your Address in the "BEGIN HERE" box on the left, then click on the map below to plot your Run...
You can now Drag & Drop and Edit your points. To Edit, click on the icon you plotted.

To Drag & Drop, click on the icon and while holding your mouse button down you move the icon around the screen!

Distance:

Workout Calculator

Use the form below to calculate your various workout stats for this run.

Icon Types:
- Point
- Start
- Aid
- Water
- Bath
- Stop
Collaborative Tagging

All time most popular tags

amsterdam animal animals april architecture art australia baby barcelona beach berlin bird birthday black blackandwhite blue boston bridge building bw california cameraphone camping canada car cat cats chicago china christmas church city clouds color colorado concert day dc dog dogs england europe family festival fireworks florida flower flowers food france friends fun garden geotagged germany girl graduation graffiti green hawaii holiday home honeymoon house india ireland italy japan july june kids lake landscape light london losangeles macro march may me mexico moblog mountains museum music nature new newyork newyorkcity newzealand night nyc ocean orange oregon paris park party people phone photo pink portrait red reflection river roadtrip rock rome sanfrancisco school scotland sea seattle sign sky snow span spring street summer sun sunset taiwan texas thailand tokyo toronto travel tree trees trip uk unfound urban usa vacation vancouver washington water wedding white winter yellow zoo

http://del.icio.us/tag/
Three design aspects [Liddle]

- Conceptual model
- Information display
- Control mechanism
Conceptual Model

• User’s concept of (software) system she interacts with
  – Components, properties, interactions

• Goal in interaction design
  – Clear, comprehensible model
Three models of the same system

- Designer’s model
- User's model
- System image
How do conceptual models present themselves to the user of a system?

- Implied by the interface metaphor
- Design of affordances
  - (e.g., how much lights up when you do a selection)
- Responses to actions
- Use of natural language terms
  - (e.g., "page, kill, trash") which have prior understandings.
  - In documentation, help, tutorials, etc.
  - In menus, dialog boxes, etc.
Example: Word processing

• Uses metaphors from many worlds
  – language, direct manipulation, typewriter, teletype, typography & printing

• Many conceptual model differences between alternative applications
Example: Formatting a Paper

- What kinds of page elements are manipulable as distinct objects?
- What aspects of their layout can you control?
- What happens when you make changes?
- What is the overall conceptual model for how things are laid out onto pages?
- For that matter, what is a "page"?
The Target Layout

Barehands: Implement-Free Interaction with a Wall-Mounted Display

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ABSTRACT
We describe Barehands, a hand-guided command interface, in which the user can create the sequence of system commands and such a student hands on the wall. Using hand-drawn gestures and a video camera on an X server, we enable a high-performance SGI/IRIS (a commercially available SGI/IRIS machine) to identify and respond to several hand gestures. Barehands presents a natural, quick, implementation method of interacting with large, wall-mounted computer displays.

Keywords:
Command interface, user interfaces, hand gestures, natural, using gestures, SGA/IRIS, Barehands, using touchpad, using menus, automatic and manual.

INTRODUCTION
As part of our group, we are developing a gesture command system. We have created an intuitive interface which augments a variety of devices,including laptop, PDAs, and large displays, both virtual (well-known) and behavioral (abnormal). Our research focuses on creating a system which augments the existence and awareness levels, as skin movement and interface can be measured with ease and with more detail than with geometric device surfaces.

Barehands addresses the issue of effective interaction with large-scale computer interfaces by employing hand-guided command techniques.

The Camera

A key design criterion for our commands is to generate a dynamic interface for real-time detection of students on the wall. The camera is placed above the wall to allow a student to move in and out of the camera's field of view.

Figure 1: An example of a wall-mounted computer display.

The camera is placed above the wall to allow a student to move in and out of the camera's field of view. The camera is equipped with a high-quality CMOS camera and a motorized zoom system. The camera is controlled by a dedicated computer, which is connected to a video server via a dedicated network. The video server is connected to a display server, which is used to display the video stream on the wall.

The display server is a high-performance SGI/IRIS machine, which is used to display the video stream on the wall. The display server is connected to the video server via a dedicated network. The display server is equipped with a high-quality display and a powerful graphics card, which is used to display the video stream on the wall.
Microsoft Word

Section with 1 column

Section with 2 columns

Section with 2 columns

Page and column margins

Some paragraphs

Barehands: Implement-Free Interaction with a Wall-Mounted Display

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ABSTRACT

We introduce Barehands, a foundational user interface challenge, in which the user can control the movement of mouse commands and edit on a small screen by tracing on a large immovable display. Using traditional means (e.g., keyboards), the user can manipulate objects on the screen by tracing on it with a mouse. By tracing on the screen, the user can move objects on the screen and execute menu items.

Keywords: Barehands, wall-mounted display, large-screen, input, interaction, computer science, computer vision, computer science

INTRODUCTION

In today's high-tech society, users are constantly interacting with computer systems. However, these systems are often too complex to be used effectively by users. In our daily lives, we often need to use complex computer systems to complete tasks. For example, when we use a computer to search for information on the internet, we need to understand the complex user interface of the computer. In order to use the computer effectively, we need to understand the complexity of the computer system.

A large-screen display is an effective interface that can be used to display information and control the user interface. It is a good choice for implementing a large-screen display because it allows users to easily understand the complexity of the computer system.

The Game

A large-screen display is an excellent interface that can be used to display information and control the user interface. It is a good choice for implementing a large-screen display because it allows users to easily understand the complexity of the computer system.

Figures 1. Interaction between user and computer using a wall-mounted display.
Barehands: Implement-Free Interaction with a Wall-Mounted Display

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ABSTRACT
A Barehands, a free-handed interaction technique, in which the user can control the interaction of system commands and tools on a touch screen by touching it with distinct hand postures. Using behind-screen infrared (IR) illumination and a video camera with an IR filter, we enable a back-projected SMARTboard (a commercially available, 6" x 4" touch-screen display) to identify and respond to several distinct hand postures. Barehands provides a natural, quick, implementation-free method of interacting with large, wall-mounted interactive surfaces.

Keywords
Interaction technique, user interface, hand posture, infrared, image processing, finger tracking, SMARTboard, interactive workspaces, touch interaction, interaction tool.

INTRODUCTION
As part of our project to develop a pervasive computing environment [2], we have created an interactive workspace which integrates a variety of devices, including laptops, PDAs, and large displays, both vertical (wall-mounted) and horizontal (tabletop). Our research focus is on providing integration at both the system and user levels, so that information and interaction can be associated with a user and task rather than with a particular device or surface.

Barehands addresses the issue of effective interaction with large touch-sensitive surfaces by employing hand-posture recognition techniques.

IMPLEMENTATION
A key design consideration for our environment is to provide support on a variety of devices for

FIGURE 1: Projection, camera, and lighting setup, side view. The infrared LED arrays are placed in coordination with the camera shutter to illuminate the rear of the board, including objects that reflect light being near to its front side. The camera records the image for analysis.
Barehands: Implement-Free Interaction with a Wall-Mounted Display

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ABSTRACT
We describe Barehands,...interactive surfaces.

Keywords
Interaction technique, ...interaction tool.

INTRODUCTION
As part of our project ...surface.

The Overface
A key design criterion for our environment is to provide support on a variety of devices for....

These include:

- existing modes of ....
- device augmentation ...screen)

 existing modes of ....

 multi-device ...wall-screen)

 FIGURE 1: Projection, ...analysis.
Powerpoint
The Concept of “Paragraph”

• Non–computer: Semantic unit
  – One thought, start on new indented line with topic sentence

• Word: “the” building block of a document
  – Carries formatting, even used for figures, headers

• HTML: One building block of a document
  – Forces whitespace \( \rightarrow \) often misused for layout

• PowerPoint: not part of natural model (visuals+bulleted lists), added later from Word
The Concept of “Layout”

- Non–computer: Typographical–physical
  - Cut & Paste anywhere
- Word: Mostly typographical
  - Sections [with attributes like #columns], paragraphs [with attributes like indent.], inconsistent pictures model (added late), tables
- HTML: Sequential, but gone bad
  - Intended for simple sequential “scroll” rendering
  - But: tables used to create page layouts
  - “Don’t let HTML become the DOS of the WWW!” [Alan Kay, WWW3, 1995]
- PowerPoint: Graphical
  - Overlapping objects, no flow beyond page
Back to Metaphor

• A metaphor implies many elements of the model to a user who is familiar with the metaphorical object (e.g., a physical desktop)

• In general a model requires more learning without metaphors to which users can anchor it to their previous experience.

• There is a fine line between metaphor and non-metaphor (e.g., in natural language "The stock market is up today").
Problems with metaphors

- Don’t scale well
- Too constraining
- Conflict with design principles
- Makes true functionality invisible
- Overly literal translations
- Can limit the designer's imagination
The Myth of Metaphor [Cooper]

• ... basing a user interface design on a metaphor is not only unhelpful but can often be quite harmful. The idea that good user interface design is based on metaphors is one of the most insidious of the many myths that permeate the software community.
• Use 'em if you find 'em, but don't bend your interface to fit some arbitrary metaphoric standard. [Cooper]