Information Design (Rosson, Ch 4)

Objects and actions possible in a system are represented and arranged in a way that facilitates perception and understanding (make people's activities easier or more pleasant)

Stages of action in HCI

gap between users understanding of their tasks vs computer systems support of these tasks.

Fig 4.1 "Gulf of evaluation" represents user cognitive distance between what's displayed on screen and mental representation of task objects/goals

Understanding into construction through active process of perception and interpretation

Therefore, we want to support this process.
Perceiving Information

want users to see structures in info display. colors, pixels, tones used to represent this info.

Gestalt Principles (Table 4.1)

- German psychologists describe perceptual organization theories of visual perception to describe how people organize visual elements into groups when certain principles applied.

- don't tell you which icon/figure to use, just consequences of low level perceptual details.

Fig 4.3 Dialog box in Word shows gestalt principles in user interface design trying to convey functional info about system.

- viewer perceives sense of organization & see individual control elements.

- tradeoff - display all tasks gives user better understanding of system functionality (control) but adds complexity.

Suggestion - decompose & link related info (open new window, tabbed dialog boxes,..)
similarity & proximity group these controls

commands - rounded rectangles w/single line description

proximity, similarity, closure, area, symmetry, continuity

which one used here?
color/whitespace/borders - help to provide perceptual cues.

"Squint test" to check if organization apparent

gird design -
  - on vertical col: of equal width across design space
  - display balanced across central vertical axis
  - can define font size (sm grid height)
or size of images/logo

Interpreting Information

interpreting what display elements means in context of particular system

Fig 4.3 - visual language used to help interpret what to do, used in a regular & consistent fashion

rounded rectangle → command to apply border setting "ok" rectangle

→ for "Auto" the label on pull down menu indicates command parameter
take advantage of familiarity

user already have relevant knowledge either because of experience using computers or as part of natural language

"Find" or "search" button suggest us functionality

"Grep" is an acronym for global regular expression print which returns all lines in set of files that match a regular expression but not as familiar w/ most users.

familiar to whom? understand user country/culture/language simple translation doesn't always work.

What about images/graphics instead?
produce more universal interpretation because we all live in physical world

mail box slide → still can have problem if familiar to whom?

visual refinement - include only most critical visual features

traffic signs good ex, not a literal translation
realism vs. abstract

people are very good at recognizing realistic images, but perception/interpretation may take longer. Learning simpler/abstract image leads to better performance. Realistic suggest instance of concept (printer down the hall) vs. concept (print).

Recommendation – remove all but most distinctive features of characteristic.

Recognizing affordances

→ aspect of an object that make how to use object obvious

visual / tactile / auditory

buttons → affords pushing
check box → affords checking
input field → affords entering/typing text
Making Sense of Information

6 last step is to make sense of information perceived and interpreted.
relate info to what they currently understand about task and eval whether/how address goals.
requires information integration
connect new knowledge w/ knowledge they have

Consistency

info similar across different displays, users able to integrate across screens \(\rightarrow\) transfer of learning
when things look & act as expected, easier to make sense of what's happening

visual metaphors

info display can be consistent with objects in real world (Fig 4.7)
use visual metaphor implied by similarity to make sense of info

balance consistency & familiarity w/ inconsistency & innovation
not too literal; technology to enhance phy. world.
Information models

A set of concepts, relationships, and representations developed to help users make sense of large data sets and complex functionality.

- Hierarchy
  - Each node has a unique parent (except the root)
  - Multiple child nodes
  - Increasing levels of detail

  Breadth vs. depth in menu systems
  - Broad & shallow lead to better performance

- Network (or graph)
  - Webpage may be referenced by more than 1 site
  - Bidirectional relationship

- Information visualization
  - Visual features to code attributes of data
  - (4.8) Color shows cancer statistics based on state
  - (4.9) Hyperbolic display - large overview of info model with local expansion of portion currently in focus
eliminate need to show overview all time
Instead "zoom" in/out details needed (Fig 4.10)
overall structure understood by integration
across screens

- semantic filtering

Semantic attributes of each data point determine
its visual representation (structure/meaning)

Semantic attributes of data determine visual representation
visible/not visible, location, color...

Homfinder example:

- displays map of location (Washington DC)
  w/ dot of home for sale

- price range/# bedrooms/ cost/garage... filter
query & conveys how each parameter
affects info on display

- multiple coordinated views

different view points of same example (Fig 4.11)
Science Fair -> Information design

specify representations of tasks, objects, action to help users perceive, interpret, and make sense of what's happening.

effort activity design w/presentation details
user interface elements developed (4.13 exhibit space)
combined to convey overall info model (fits into 400854)
• The Gulf of Evaluation in human-computer interaction (after Norman 1986). The Gulf of Execution is discussed in Chapter 5.)
Gestalt Examples

• Proximity principle
  – Elements near each other tend to be seen as a group

• Similarity principle
  – Elements that share visual characteristics (shape, color, etc.) tend to be seen as a group

Images from http://www.scholarpedia.org/article/Gestalt_principles
Gestalt Examples

- Closure principle
  - Tendency to organize elements into complete closed figure

- Area
  - Tendency to group elements in a way that creates the smallest possible figure
    - Perceive the smaller square to be a shape on top of the other figure (left)
    - Box with a hole in the larger shape (right)

Image from http://graphicdesign.spokanefalls.edu/tutorials/process/gestaltprinciples/gestaltprinc.htm
Gestalt Examples

- **Symmetry principle**
  - Tendency to see symmetric elements as part of the same figures
    - 2 diamonds versus 3 shapes

- **Continuity principle**
  - Tendency to group elements into continuous contours or repeating patterns

Image from http://graphicdesign.spokanefalls.edu/tutorials/process/gestaltprinciples/gestaltprinc.htm
<table>
<thead>
<tr>
<th>Gestalt Principle</th>
<th>User Interface Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximity: elements near each other tend to be seen as a group</td>
<td>Words on a menu bar, columns in a tabular display, text in a paragraph</td>
</tr>
<tr>
<td>Similarity: elements that share visual characteristics (shape, color, etc.) tend to be seen as a group</td>
<td>Toolbar icons (proximity operates here as well), data visualization</td>
</tr>
<tr>
<td>Closure: there is a tendency to organize elements into complete, closed figures</td>
<td>Overlapping windows, menus, dialog boxes and other user interface controls</td>
</tr>
<tr>
<td>Area: there is a tendency to group elements in a way that creates the smallest possible figure</td>
<td>Icons on a workstation screen, pop-up menu on top of a document display</td>
</tr>
<tr>
<td>Symmetry: there is a tendency to see symmetric elements as part of the same figures</td>
<td>Window manipulation controls (e.g., scroll bar, selection handles)</td>
</tr>
<tr>
<td>Continuity: there is a tendency to group elements into continuous contours or repeating patterns</td>
<td>A page of paragraphs, a grid of spreadsheet cells, a left-justified list of selections or parameters</td>
</tr>
</tbody>
</table>

- Gestalt principles of perceptual organization that aid perception of user interface visual elements
Fig 4.3

- Dialog box used to set and preview page borders in Microsoft Word
Fig from pg 118

- Grids for information design
Mailbox Icon
Road signs (from Fig 4.4)

- Road signs are highly refined images, because they include only the most critical visual features

These images are from the Manual of Traffic Signs, by Richard C. Moeur (http://www.trafficsign.us/)
Road signs in Japan
(from http://www.okinawa.usmc.mil)

- Road signs are highly refined images, because they include only the most critical visual features
Fig 4.7

- Overly literal user of a metaphor
  - toggle to change labels/functions
  - closer keys to reduce pointer travel & allow more room for keys
  - scrollable output display
Fig 4.8

- Visualizing U.S. cancer statistics as a function of state
• Hyperbolic browser used to visualize webpages
John Lamping, Ramana Rao, and Peter Pirolli. A Focus+Context Technique Based on Hyperbolic Geometry for Visualizing Large Hierarchies, CHI 95.
Fig 4.10

- Three views of the map used to access locations in MOOsburg.
  
  map is zoomed out to the coarsest level of detail
  
  intermediate view
  
  zoomed in to provide outline of buildings
The View Matcher for learning Smalltalk coordinates five different view of an example application.
Fig 4.13

- Three views of a virtual exhibit space suggested by the metaphors of (a) a high school gymnasium, (b) cocktail party, and (c) classroom lecture
Fig 4.16

• Sketch of the overall exhibit space