User-Centered Website Development: A Human-Computer Interaction Approach
2. Capabilities of Human Beings

In this chapter you will learn about:

- Human senses, perception, memory, and interruptions
- Mental models, metaphors, and perceived affordance
- Some design guidelines based on these topics
Definitions

- **Cognitive psychology**: the study of how people perceive, learn, and remember
- **Cognition**: the act or process of knowing
- The issue: confronted with a new experience (or website) how does a user draw on past experience to make sense of it?
- Example: underlined blue text is understood to be a link
Why do we care?

Because when people try to understand something, they use a combination of:
- What their senses are telling them
- The past experience they bring to the situation
- Their expectations
Senses

- Senses (sight, hearing, smell, taste, touch) provide data about what is happening around us.
- We are visual beings ("See what I mean?")
- Designing good Web materials requires knowledge about how people perceive.
Constructivism

- Our brains do not create pixel-by-pixel images
- Our minds create, or *construct*, models that summarize what comes from our senses
- These models are what we perceive
- When we see something, we don’t remember all the details, only those that have meaning for us
Example: familiar objects that we see, but don’t store in detail

- How many links are there on top menu of amazon.com?
- What are the colors on your favorite cereal box?
- How many lines are there in the IBM logo?
- Who cares?
- Moral: People filter out irrelevant factors and save only the important ones
Context

- Context plays a major role in what people see in an image
- Mind set: factors that we know and bring to a situation
- Mind set can have a profound effect on the usability of a web site
Example of context: What do you see?
Hint: it’s an animal, facing you . . .
Hint: this animal gives milk, and her face takes up the left half of the picture . . .
Why couldn’t you see the cow’s face at first?

- It’s blurry and too contrasty, of course, but more:
- You had no idea what to expect, because there was no context
- Now that you do have a context, you will have little difficulty recognizing it the next time
Another example of context: are these letters the same?
Well, yes, but now in context:

top  ace
Figure and ground

- Images are partitioned into
  - Figure (foreground) and
  - Ground (background)

- Sometimes figure and ground are ambiguous
Figure and ground: What do you see?
Gestalt psychology

- “Gestalt” is German for “shape,” but as the term is used in psychology it implies the idea of perception in context.
- We don’t see things in isolation, but as parts of a whole.
Five principles of Gestalt psychology

- We organize things into meaningful units using
  - **Proximity**: we group by distance or location
  - **Similarity**: we group by type
  - **Symmetry**: we group by meaning
  - **Continuity**: we group by flow of lines (alignment)
  - **Closure**: we perceive shapes that are not (completely) there
Proximity
Example: a page that can be improved . .
By using proximity to group related things
Example: can you use similarity to improve this page?
Sure: make the buttons the same size:
Sure: use the same font everywhere:
Symmetry: we use our experience and expectations to make groups of things.

We see two triangles. We see three groups of paired square brackets.
Continuity: flow, or alignment

We see curves AB and CD, not AC and DB, and not AD and BC

We see two rows of circles, not two L-shaped groups
Can you use alignment (one form of continuity) to improve this page?
Sure: the lines on the previous slide show how to use horizontal alignment.
But why stop? Left-align both columns to get vertical alignment also.
Closure: we mentally “fill in the blanks”

All are seen as circles
2.4 Memory

- Hierarchical Model

Pratice and effort needed to make this transfer ➔
“The Magic Number 7, Plus or Minus 2”
George Miller, 1956

- Value of “chunking”
  - 2125685382 vs. 212DanHome
  - 10 chunks vs. 3 (assuming 212 is familiar)

- Can you remember:
  - Vsdfnjejn7dknsdn33s
How many chunks in . . .

- www.bestbookbuys.com
- 20? Not really:
  - www.
  - best
  - book
  - buys
  - .com
Recognition vs. recall

- Why is a multiple choice test easier than an essay test?
  - Multiple choice: you can recognize the answer
  - Essay: you must recall the answer
- A computer with a GUI allows us to recognize commands on a menu, instead of remembering them as in DOS and UNIX
Memory aids

- Post-It® notes
- In Windows
  - ctrl- N (new)
  - ctrl- C (copy)
  - ctrl- S (save)
- Favorites List and bookmarks to store URLs
- Hyperlinks—if their wording indicates the content of the target page. (“Click here” is not a memory aid.)
2.5 Interruptions

- Focusing attention and handling interruptions are related to memory.

- In website design you need to give cues or memory aids for resuming tasks:
  - Back button
  - Followed links change color
  - When filling in forms, blank boxes show where to pick up the job.
Chapter 2: Capabilities of Human Beings

Interruptions, continued

- How fast must a system respond before the user’s attention is diverted? (Robert Miller, 1968)

- **Response time**
  - < 0.1 second: Seems instantaneous
  - < 1 sec: Notices delay, but does not lose thought
  - > 10 sec: Switches to another task
2.6 Mental Models

- How do people use knowledge to understand or make predictions about new situations?
- People build mental models
- For example, a car: put gas in, turn key, and it runs. (Not exactly a car mechanic’s model!)
- Can’t ignore user’s mental model
- And how do we know what the users’ mental models are? Through user testing.
2.7 Metaphors

- Way to relate a difficult or more abstract concept to a familiar one
  - Open file
  - Save file
Metaphors have problems

- Disadvantage: metaphor may not be widely known or correctly understood
- The mailbox icon meant nothing outside rural United States until explained. And it’s backwards: we put the flag up *to tell the mailman* that we have put mail in the box *to be picked up.*
2.8 Affordance

Affordance: “The functions or services that an interface provides”

- A door affords entry to a room
- A radio button affords a 1-of-many choice
- On a door, a handle affords pulling; a crash bar affords pushing
Perceived affordance

- We want affordance to be visible and obvious to the user
  - The Up and Down lights on an elevator door should have arrows, or they should be placed vertically so that the top one means Up
  - On a car, turning the steering wheel to the left makes the car go left
Example of perceived affordance

Top switch controls top lights

By convention, with a light switch “up” is “on”
2.9 Design Guidelines for the Web

- Lessen burden on user’s memory:
  - Use recognition instead of recall
  - Help users chunk information
  - Require as little short-term memory as possible

- Consider user’s mental models

- Provide visual clues and memory aids

- Provide feedback: let users know their input was received
Summary

In this chapter you learned that

- Sight is the most important sense—on the Web and in general
- We construct mental models; we don’t store bitmaps
- Context and expectations influence what we see
- Five principles of Gestalt psychology: proximity, similarity, symmetry, continuity, closure
- Metaphors are tricky
- Chunking helps memory
- Perceived affordance depends on users’ backgrounds, mental models, and expectations