CSC 484 Lecture Notes Week 4, Part 2

Understanding Users, Cognitively

I. Relevant Reading

-- chapter 3 of the book.

II. **Applying cognitive understanding to interaction design.**

A. *Cognition* is how people think.

B. Understanding cognition can provide *useful guidelines*

Applying cognitive understanding, cont'd

E.g.,

1. how to lay out an interface,
2. how much to put in an interface,
3. how to keep a user's attention

Applying cognitive understanding, cont'd

C. "Useful guideline" is important.

1. Very few "laws" of design.

2. Cognition is immensely complicated.

Applying cognitive understanding, cont'd

D. Designers be aware that

1. different people think differently

2. the same people think differently, depending on the task

Applying cognitive understanding, cont'd

3. many aspects of cognition weakly understood, or not understood at all

4. cognitive theories subject to change

This week's schedule:

- **Mon Lab:** Quiz
- **Wed Lec:** 1-minute madness talks
- **Wed lab:** Poster session 1
- **Fri lab:** Poster session 2

Continuing with

Notes 4.2, Item II

Applying cognitive understanding, cont'd

E. The golden rule -- *know thy users*.

1. Cognitive theories can be helpful.

2. However, ...

Applying cognitive understanding, cont'd

F. What to take away from this chapter.

1. A lot of research available.

2. When cognitive aspects come to fore, look at the literature.

Applying cognitive understanding, cont'd

3. E.g., if your product requires a user to remember, look at the extensive literature on human memory.

III. **Intro to Ch 3 (Sec 3.1).**

A. Aspects cognition useful for ID.

B. Understand what people are ***good at, bad at.***

1. Technologies can *extend* capabilities.

2. Can *compensate* for human weaknesses.

Intro to Ch 3, cont'd

C. Specific topics covered:

1. explanation of what cognition is
2. ways cognition applied to ID
3. examples
4. explanation of *mental models*.

IV. What is cognition? (Sec 3.2)

A. It’s what goes on in the "wetware".

B. Norman identified two general modes:

What is cognition?, cont'd

1. *experiential* -- doing things
2. *reflective* -- thinking about things

What is cognition?, cont'd

C. More specific categorization

1. ***attention*** **--** selecting things to concentrate on

2. ***perception and recognition*** **--** acquiring information from the environment

What is cognition?, cont'd

3. ***memory*** **--** recalling knowledge to support action

4. ***learning*** **--** learning to use something, or using something to learn

What is cognition?, cont'd

5. ***reading, speaking, listening*** **--** using and processing language

6. ***problem solving*** **--** planning, reasoning, and deciding how to act

V. **Design implications related to attention.**

A. Organize info into ***categories***,
provide distinguishable separation.

B. Make information that requires attention
prominent and noticeable.

Design implications related to attention, cont'd

C. ***Avoid clutter.***

D. Use ***color*** and decoration to ***focus attention***, not just eye candy.

E. As always, ***KEEP IT SIMPLE***.

VI. **Design implications related to perception and recognition.**

A. Make display elements meaningful and ***readily distinguishable***.

B. As for attention, structure info into ***related categories***.

C. Apply to all forms of presentation graphical, textual, audio, and tactile.

VII. **Design implications related to memory.**

A. ***Keep it simple***.

B. Promote ***recognition*** over ***recall***.

C. Use visual cues to index info.

Design implications related to memory, cont'd

D. Provide a ***variety of ways*** to save and retrieve info.

1. mnemonic naming
2. keyword tagging
3. hierarchical organization
4. prioritized ordering
5. temporal ordering

VIII. **Design implications related to learning.**

A. Promote exploration.

B. Guide and constrain learning users,
allow experts users to disable guidance.

Design implications related to learning, cont'd

C. Allow users to undo mistakes easily.

D. Allow learning users to zoom in on details, from higher-level abstractions.

IX. Design implications related to reading, speaking, listening.

A. Keep speech-based instructions short.

B. Allow text size to be varied.

C. Be hypesensitive to particular users' abilities.

X. Design implications related to problem solving.

A. Provide ***selectively accessible details***.

B. ***Keep it simple.***†

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† Did I mention, ***Keep it simple***?

XI. Cognitive Frameworks (Sec 3.3)

A. Explain and predict human behavior.

B. Some applicable to ID:

Cognitive Frameworks, cont'd

1. ***mental models*** **--** what's in users' heads

2. ***theory of action*** **--** explain or predict action

3. ***information processing*** **--**
   humans as information processing agents

Cognitive Frameworks, cont'd

4. ***external cognition*** **--** models of humans combined with external cognitive support

5. ***distributed cognition*** **--** models of multi-human, multi-machine cognitive systems

XII. **Mental models (Sec 3.3.1)**

A. Users' models of interactive systems:

1. Some users have ***shallow*** understanding.
2. Others want or need ***deep*** understanding.
3. Designers should accommodate ***both.***

Mental models, cont'd

B. Regarding engineered representations:

1. Variety of research, particularly in AI.
2. Not much yet applied to ID.
3. An interesting formal approach in ***next week's research reading***.

XIII. **Theory of action (Sec 3.3.2).**

A. Don’t provide concrete guidance for ID.

B. Suggest importance of providing feedback
(Recall Nielson’s first heuristic.)

Theory of action, cont'd

C. Another theory focuses on ***gulfs*** between users and systems.

D. Spark some interesting HCI work.

E. Next week's reading addresses the gulf.

XIV. **Information processing (Sec 3.3.3).**

A. Tries to model cognition humans as information processing agents.

B. Norman and others have dismissed as overly simplistic.

XV. External cognition (Sec 3.3.4).

A. Simply a recognition that people use external media to help them remember things.

B. ID should consider all forms of external cognitive support.

XVI. **Distributed cognition (Sec 3.3.5).**

A. Model that includes

- multiple human actors
- multiple machine-based systems
- the distributed environment

Distributed cognition, cont'd

B. Next week's research reading focuses on the airline cockpit, sited in book as an example.

XVII. **Epilogue -- Google versus Yahoo.**

A. What does Google know that Yahoo doesn't?

B. Consider

`weblogs.media.mit.edu/SIMPLICITY/nonflickr/05_yahoogle.html`

Google versus Yahoo, cont'd

C. Will Yahoo ever learn?

- `http://yahoo.com`
- `http://google.com`