Welcome to CMSC 434
Introduction to Human-Computer Interaction
Douglas Adams

Ford flipped the switch which he saw was now marked "Mode Execute Ready" instead of the now old-fashioned "Access Standby" which had so long ago replaced the appallingly stone-aged "Off"

Excerpt from: So Long, and Thanks For All the Fish
Why do you think this sign is posted?

Are there really any other options available?
Why list them all?

Which talk would you go to?

Logic and AI Seminar
November 14, 10:15 am
Room:AVW 2-103
Diane Litman
Xerox PARC

"Discrimination, Categorization and Precision in Symbolic Dialogue Systems"

Understanding how people can talk to each other and classify different types of information. In practice, people proceed backwards: they first classify the information and then proceed to the next step. This is a very natural way of thinking about how people classify and then proceed to the next step. However, the way people actually do it is not as straightforward. The classification process is not a simple one-step process, but rather a multi-step process that involves a lot of interplay between different aspects of the classification process. For example, a system that classifies items into categories based on their attributes may not necessarily be able to classify an item into a category that is not the most appropriate one.
Which graphic tells the clearer story?

The letters A through G represent chemicals. The numbers 1 though 10 represent crops. Black = Improved White = Got worse

images: Bob Waddington

How does this door work?

image: Robert Spence
How many people *still* share this sentiment?

SHERMAN’S LAGOON

by Jim Toomey

Which image would you associate with a phone?
Which of these would make a better “phone” icon?
Where might you click for info on the IC400C?

Some History of HCI: Input / Output devices

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Early days</strong></td>
<td><strong>Output</strong></td>
</tr>
<tr>
<td>connecting wires</td>
<td>lights on display</td>
</tr>
<tr>
<td>paper tape &amp; punch cards</td>
<td>paper</td>
</tr>
<tr>
<td>keyboard</td>
<td>teletype</td>
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<tr>
<td><strong>Later days</strong></td>
<td><strong>Output</strong></td>
</tr>
<tr>
<td>keyboard (different types)</td>
<td>scrolling glass teletype</td>
</tr>
<tr>
<td>cursor keys</td>
<td>character terminal</td>
</tr>
<tr>
<td>mouse (different types)</td>
<td>bit-mapped screen (different types)</td>
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<tr>
<td>microphone</td>
<td>audio</td>
</tr>
<tr>
<td><strong>Next Wave</strong></td>
<td><strong>Output</strong></td>
</tr>
<tr>
<td>fancier keyboards and mice</td>
<td>higher resolution screens</td>
</tr>
<tr>
<td>touchscreen and pens</td>
<td>multiple screens</td>
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<tr>
<td>better voice recognition</td>
<td>“retina” displays</td>
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<tr>
<td>natural language commands</td>
<td>audio</td>
</tr>
<tr>
<td>digital cameras</td>
<td>video</td>
</tr>
<tr>
<td>simple biometric devices</td>
<td>“force feedback”</td>
</tr>
<tr>
<td>simple computer vision</td>
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</tbody>
</table>
Some History of HCI: Input / Output devices

**Input** | **Output**
--- | ---
“Modern” fancier keyboards/mice | higher resolution screens
 | touchscreens and pens
 | better voice recognition
 | natural language
 | cameras
 | computer vision
 | biometric devices
 | wearable sensors
 | higher resolution screens
 | multiple screens
 | retina displays
 | audio
 | video
 | haptic feedback
 | head-mounted / VR
 | wearable displays

Bleeding Edge?
OLEDs, data gloves, implanted devices, more advanced biometrics, autonomous agents, …

What’s a computer? What’s a peripheral device?
If you asked someone to draw a computer, what parts would they draw? Would the CPU be among them?
• are keyboards & “boxes of electronics” just artifacts of today’s technologies?
• how will new input/output devices continue to change the way we interact with computers?

Is an iPhone a computer? An iPad? A dSLR?
Is a FitBit a computer? A peripheral device?
Everything old is new again?

The first mouse was in the early 1960s – 20 years before the Xerox Star or Apple Mac or Microsoft Mouse. Are today’s mice significantly different from Douglas Engelbart’s? How? Will tomorrow’s mice be significantly different from today’s? Will we even still have them?

Pen-based input dates back to the late 1950s – almost 40 years before the Apple Newton and almost 50 years before the Microsoft TabletPC push and 60 years before the stylus resurgence.

Alan Kay presented the idea of a “DynaBook” in 1968, almost 40 years before the successful wave of tablets.

What moves technology from research labs and pet projects into the business world and home use?

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Empathy

We could design the product with a simple point-and-click interface…

Or we could require the user to choose among thousands of poorly documented commands, each of which must be typed exactly right on the first try.

Bear in mind, we’ll never meet a customer ourselves.

Make it so they have to reboot after every typo.

Human needs and thoughts: Crucial to Understand

User-centered design
Task-centered design
Joy-centered design?

From a real 360° camera’s manual (circa 2017)...

Power On: Push down the shutter button for 2 seconds and then release it.

Power Off: Push down the shutter button for 3.5 seconds and then release it.

Hold the shutter button down between .4s to 1.8s to record a video.
“Moore’s Law” -vs- Human Psychology

The so-called “Moore’s Law” is connected to the idea of processing power per dollar doubling every 18 months.

What about human psychology and brain physiology? How much does it change over time?

What about cognitive skills?

For example, how do we create menu structures?

Do we want a simple design or a complex design?

Should it be narrow and deep or should it be broad and shallow?

How many things can the typical user remember in short-term memory?
  – there can be speed advantages for expert users that have learned where things are on a menu

Are there costs associated with loading a new page
  – an application such as Microsoft Word
    • how much memory does the machine have
  – a series of web pages
    • how much latency is there in the connection today
“Make it Usable” can’t be an add-on thought…

[Comic strip showing a discussion about usability]

http://dilbert.com/strip/2001-04-14

Human Computer Interaction
A discipline concerned with the design, implementation, and evaluation of interactive computing systems for human use.

Ideally, this is an iterative process:

Design → Evaluate → Implement

Diagram: Design, Evaluate, Implement arrows connected in a cycle.
**Course Team Project Structure**
Projects will be done in groups of 3 or 4 students and have multiple graded phases and sub-phases.
As each phase is assigned, its value towards the whole will be published as well.
Each phase will have peer assessment and that can impact individual student grades (details of this will be given as we proceed).
Planned phases posted at

**Why have an interface design process?**
Many (most?) large software projects go over cost...
When asked, managers gave four usability-related reasons:
- users requested changes
- designers overlooked tasks
- users did not understand their own requirements
- insufficient user-developer communication and understanding

**Usability engineering is part of software engineering (ie: CMSC435)**
Does a developer want to pay a little now, or pay a lot later? It can be far too easy to jump into detailed design that is founded on incorrect requirements, has inappropriate dialogue flow, is just not easily used in practice, or is never tested until it is too late.
Cost to fix a problem?

The time during development that you notice a change needs to be made.

Some Foundations for Interaction Design

Understanding *users* and their *tasks* and ideally designing *with* the user

- User centered design and prototyping
- Evaluating interfaces with users: qualitative and quantitative

Understanding issues in visual interfaces

- Psychopathology/psychology of everyday things (what makes visual design work)
- Beyond screen design (representations and metaphors)
- Graphical screen design (the placement of interface components on a screen)

Implementing Graphical User Interfaces (GUIs)

Understanding the past and thinking about the future of HCI
**Some Course Objectives**

By the end of this course, outcomes should include…

- having a better definition of what “good design” means.
- being more familiar with a variety of design guidelines and models and how to apply them.
- understanding the value of understanding users and their tasks and the different methods for involving the user in the design process and have applied them in your work.
- having created the specifications for, and built a prototype of, an application using good design methods.
- knowing how to evaluate an interface design’s quality.
- having learned enough about HCI to learn *even more* about HCI!

**How you will be evaluated**

**Team Project:** 40%
- Projects will be done in groups of 3 or 4 students and have multiple graded phases and sub-phases.

**Exams:** 40%
- There will be two exams; a “midterm” and a “final” exam.
- The “final” might have material that was covered earlier in the term.

**Homework, class participation, polls/quizzes:** 20%
Several things contribute to this portion of the grade. Examples include:
- Participation in various exercises done during class time.
- An expected 4 homework assignments.

[See posted syllabus for more details…](#)
**Text and additional references**

**Required readings:**
Will be posted to the class site and ELMS site associated with the course as the term progresses.

**Primary course web site:**
http://www.cs.umd.edu/class/spring2019/cmsc434-02XX-03XX/

A worthwhile general text on this topic if you like having one is *Designing the User Interface: Strategies for Effective Human-Computer Interaction*, by Shneiderman/Plaisant/et.al. The newer one covers a larger scope, but if you’d just like a causal (*and cheaper*) secondary source, a used copy of the 4th or 5th edition should also prove interesting.

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**Readings for the week:**

Excerpts from Don Norman’s *The Design of Everyday Things*  (excerpts on ELMS in the Readings folder under Files)

If you find these of interest, I recommend the book in general.