**CS 350: Computer/Human Interaction**

**Lecture 16 Overview**

- Gulf of Execution: Executing action sequences
- Exam 1 Review
- **Assignment out**: Group Project

**Project Groups**

- Group 1: Muslim, Aaron, Guy, Zach
- Group 2: Kevin, Sade, Josh
- Group 3: Abdullah, Jonathan, Jessica

Groups should meet next Thursday when instructor is out of town. Questions on following Tuesday.

**Gulf of Execution**

- How to get from user task goal to the physical movements to accomplish the task.
- System goal – software-oriented goal to accomplish task
- Action plan – steps for accomplishing goal
- Execution – physical actions that implement action sequence

**Executing Action Sequences**

- Physical implementation of plan steps
- **Articulatory directness** is the mapping of physical movement with a device to task input requirement
  - Direct – twist a knob
  - Indirect – type in a number

**Pragmatics**

- **Pragmatics** are physical behaviors required by a user interface
- They should have underlying structure matching the conceptual task being implemented, i.e., match the chunks
- Example: selecting text chunk – press down on mouse button to specify start of selection, hold down while dragging, release mouse button to specify end point

**Input Devices**

- Different input devices have different affordances. What are the input characteristics and sample applications the following are used for?
  - Buttons?
  - Keyboard?
  - Mouse?
  - Joystick?
  - Trackball?
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Speech Interface

- Star Trek future – talk to computer
- What are the input characteristics of a speech interface?
- What types of applications should a speech interface be good for?
- What are the current limitations of technology?

Feedback

- Formally, feedback is the system-generated information that lets users know that their input is being processed or a result has been produced.
- Ideal is constant and complete feedback, but too much feedback can introduce delays

Anticipate Errors

- Carefully analyze physically challenging actions. Fitts' Law: time to select a target is function of distance and size of target. Of course not all targets can be large...
- Overlearned procedures (e.g. from other systems) lead to interference (slips, not mistakes). E.g. Ctrl-N in emacs vs. in MS Word

Support Error Correction

- Forward/backward delete, click to deselect
  - Often not a design decision, since built into the UI platform directly
  - But what does “Back” do?
- Providing “undo” is a design problem
  - Hard to predict/support the right level of reversibility
  - Issue with logical vs. physical. Example: MS Word AutoFormat quotes

Optimization

- Long or clumsy sequences lead to more errors, longer to type in, frustration for users
- Tradeoff of expressive power and ease of use. Example: typed command language is much faster physically than point/click GUI.

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Optimization

- Compromise by mixing: keyboard shortcuts, default actions for frequent choices. But be careful not to violate overall consistency or favor one task over other common/important tasks.
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Customization

- Allow users to write macros to define their own sequences.
- Especially good for special needs cases
- Special needs accessibility is an on-going area of research in HCI

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Exams

- Use of technical vocabulary to describe concepts and techniques
- What is scenario-based design (SBD)? How does it address and/or document tradeoffs in design?
- Given a problem statement, identify root concept and stakeholders.
- Given an interface constructed with specified object names, how are the prototype tools used to provide interaction with users?

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SBD Case Studies

- What is the root concept? Who are the stakeholders?
- What are the current activities? What is being claimed?
- What are the new activities? What is being claimed?
- What information is being presented? What is being claimed?
- How are these phases supported with specific techniques?

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Tradeoffs

- Tradeoff 1.3: Designers are motivated to make progress quickly, BUT premature decisions and commitment can lead to poor solutions.
- Tradeoff 1.7: Software development provides concrete and rewarding evidence of progress, BUT can direct attention away from reflection and analysis.
- Tradeoff 2.1: Hierarchical task analysis documents the functional goals of a workplace, BUT may direct attention away from an organization’s social relationships and goals.

- Tradeoff 3.1: Technological innovation can transform tasks in exciting and satisfying ways, BUT incremental changes to existing practice are easier to understand and adopt.
- Tradeoff 3.5: People seek to understand the world in familiar terms, BUT they must go beyond the familiar in order to develop new (and improved) ways of acting.

- Tradeoff 4.5: Dynamic hiding of controls that are not in use conserves space and simplifies the display, BUT also conceals the control’s affordances from the user.
- Tradeoff 4.8: Hierarchy is an intuitive and powerful structuring device, BUT heavily nested hierarchies with artificial relationships are confusing and difficult to navigate.