

Week 3-2

Design Principles: Part 2

SFWRENG 4HC3/6HC3 Human Computer Interfaces

** Slides adapted from previous instructors of COMPSCI/SFWRENG 4HC3/6HC3*

Week 3 Goals Overview

- Monday
 - Design Principles: Part 2
- Wednesday
 - **Design Principles: Part 3**
- Friday
 - Design Principles: Examples and Practices

Fundamental Design Principles

- Discoverability (Visibility)
- Feedback
- Mappings
- Constraints
- **Affordances**
- **Signifier**
- **Conceptual Model**

Seven Fundamental Design Principles by Don Norman from “The Design of Everyday Things”

Design Principles: Affordance

- Defines the **possible interactions between an agent/user and object**
- The **relationship** between an object's properties and an agent/observer's capabilities that determines how the object might be used
- Jointly determined by agent abilities and object qualities
- Might be perceivable, but not always
- Anti-affordance can prevent interactions

Affordance: Example



A door panel affords pushing



A door handle affords pulling

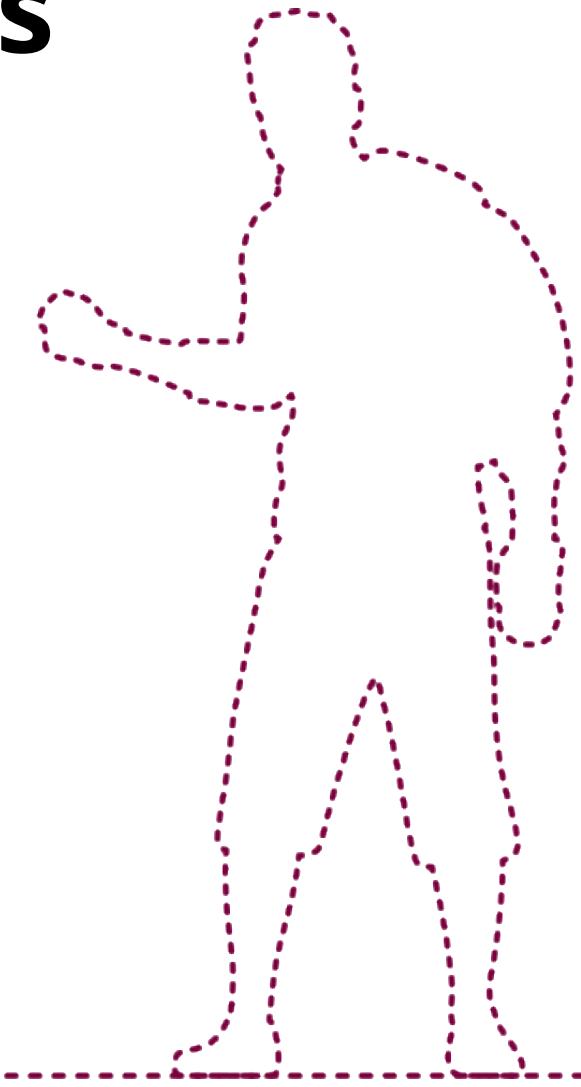
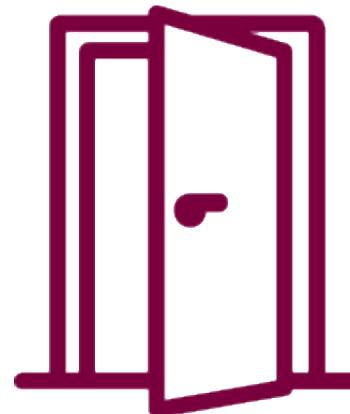
Affordance: Anti-Affordance

- Barriers prevent passage of solid objects
- People (among other things) have solid bodies
- Barriers prevent people from falling from the landing/sideways off the stairs



Affordance: Observer Matters

Does the door afford
entering for all users?



Design Principles: Signifier

- Communicate **where** action takes place; **what** actions are possible and **how** they should be done
- Helps answer: “How can I do it?”
- Signals communicating **how** to use something
- Examples: Signs, labels, drawings, sounds

Signifier: Example



What are the signifiers?



Affordance & Signifier

Affordance is Relational

- Relationship between agent abilities and object properties
- Possible interactions
- Perceived affordances are often signifiers but can be ambiguous

Signifier is Property

- Object property
- Signal what actions are possible and how they can be done
- Signifiers are never affordances

Design Principles: Conceptual Model

- All information needed **for users** to create a good mental model of the system **so that users understand how it works and feels like they are in control**
- Enhances **discoverability** and understanding of **feedback** (e.g. “What does it mean?”)
- Helps to link user actions + system responses (i.e. helps close the **gulfs of execution and evaluation**)
- Can help users figure out **what to do if something goes wrong**

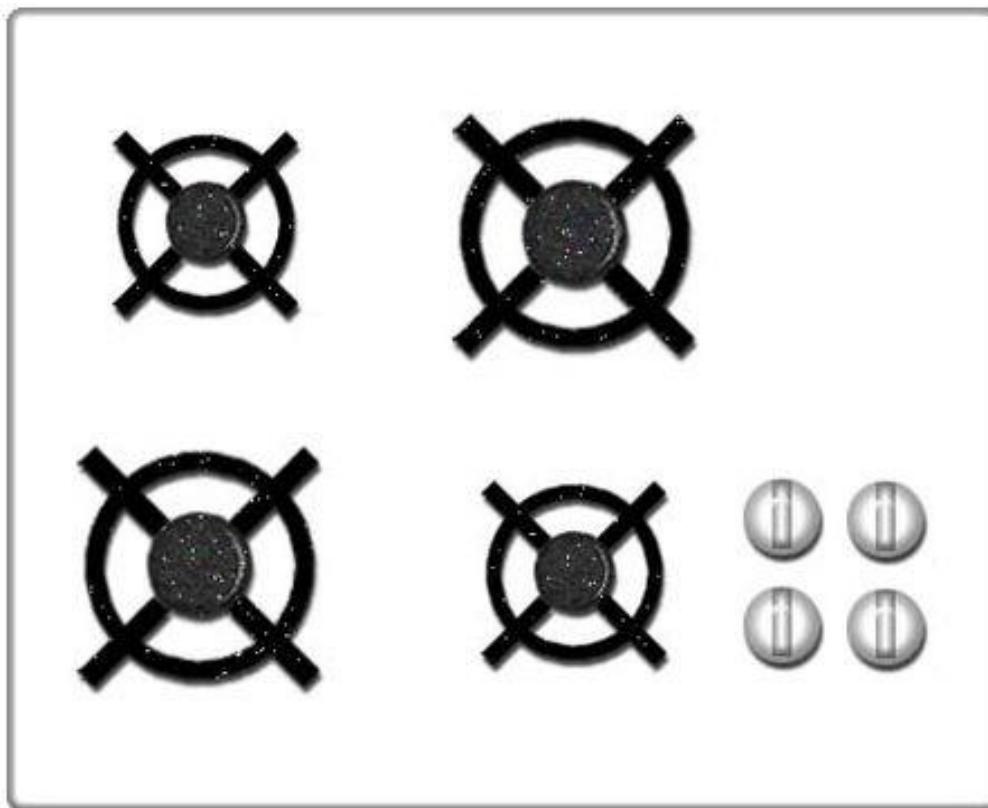
Design Principles: Conceptual Model

All principles contribute to the creation of a conceptual model:

- System communicates **potential user actions** with affordances, signifiers, mappings, and constraints
- Discoverability ensures that **users can find** those elements
- Feedback conveys **causality between actions and results**

Conceptual Model: Example

Natural **mapping**
creating a logical
constraint can help
build a **conceptual**
model of this stove



Design Principles: Conceptual Model

- Can be a **simplified representation** if their assumptions always hold true
- Doesn't have to be **complete or accurate**

A conceptual model can include:

- Central **design metaphors**
- **Concepts:** objects, actions, user roles, etc.
- **Relationships** among concepts
- **Relationship** between concepts and user experience
- **Interaction** properties
- **Interface** properties

Design Principles: Conceptual Model

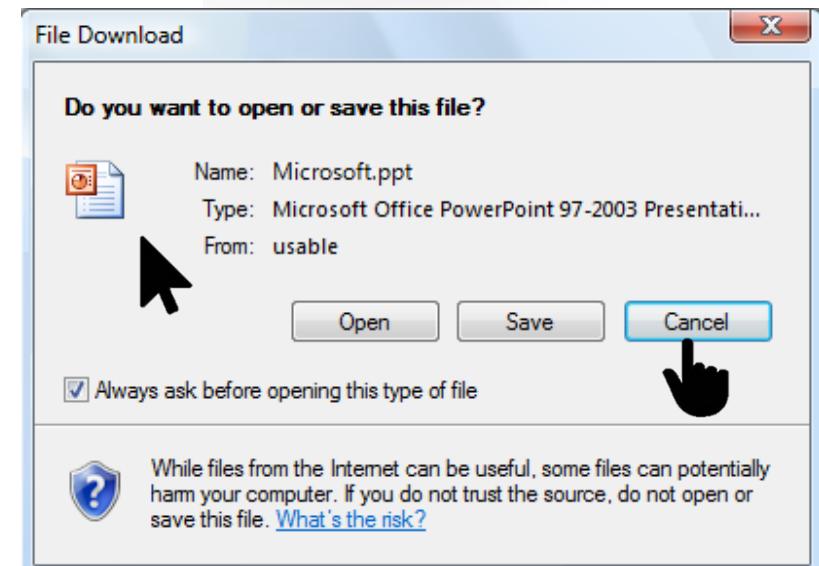
Building conceptual model:

- **Transferring existing knowledge** (e.g., learning, expectations) of similar experiences to current ones
 - Positive transfer → existing knowledge applies to current situation
 - Negative transfer → existing knowledge conflicts with current situation
- This is where **understanding affordances** of objects in the real world can help the design of digital systems

Conceptual Model: Example

Using **transfer effects** from affordances

- Physical buttons afford pushing
- Pointer icon changes to hand icon in certain areas
- Hand icon + highlighted rectangle implies that it works like a button

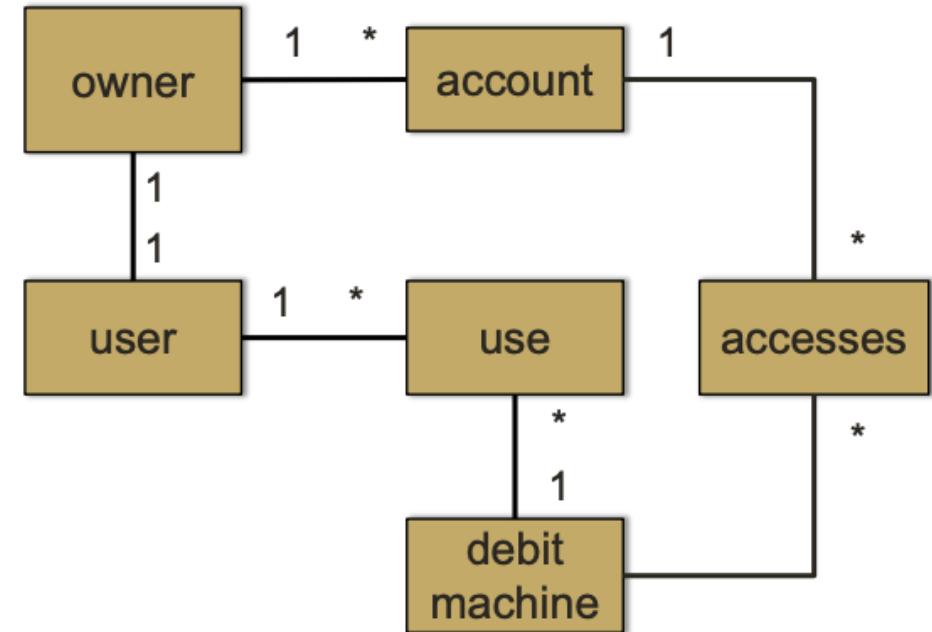


Design Principles: Conceptual Model

Various methods can help you build a conceptual model

- Lists and tables
- Diagrams
- Storyboards and sketches
- Written descriptions
- Mood boards

Different methods might capture different parts



Design Principles: Conceptual Model

- A system can have **different conceptual models** for **different types of user**
- Best strategy is to **understand people** and how they already do/use things



Design Principles: Summary

- **Discoverability:** Users should be able to figure out what actions are possible and where/how to perform them without instruction.
- **Feedback:** The system should communicate the results of any action back to the user clearly and immediately.
- **Mappings:** The relationship between controls and their effects should be logical and intuitive (like turning a steering wheel left to go left).
- **Constraints:** Design should limit possible actions to prevent errors and guide users toward correct behaviors.
- **Affordances:** Objects should suggest their own use through their physical properties (buttons afford pushing, handles afford pulling).
- **Signifiers:** Visual or audible cues that communicate where action should take place (arrows, highlights, labels).
- **Conceptual Model:** Users should understand how the system works through a clear mental model of its structure and behavior.



A door handle that's flat against the door surface is primarily an example of which principle?

- ① The Slido app must be installed on every computer you're presenting from



When you press a button on your phone and it briefly changes color, this demonstrates:

- ⓘ The Slido app must be installed on every computer you're presenting from



A form that grays out submit buttons until required fields are completed is using:

- ⓘ The Slido app must be installed on every computer you're presenting from

In-Class Exercise: Good/Bad Designs

Find an example of design from your everyday life (app interface, physical object, signage, etc.) and submit the following:

- **Brief description** of your design example (~1 sentence)
- **Evaluation:** State whether this is good or bad design (1 sentence)
- **Justification:** Explain your evaluation using **at least 2 of Norman's design principles** (~2 sentences)

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