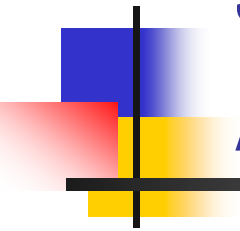


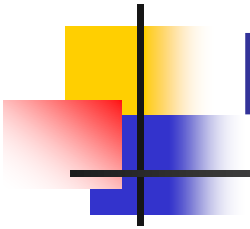
# SOEN 6751: Human Computer Interface Design

## Interaction Design Principles

Based on Chapter 1 of the textbook

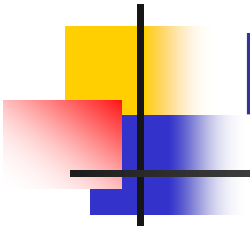
# A good interface should be ...

- Easy to learn and use
  - Supports both the initial orientation and continued learning throughout the complete lifetime of use
- Engaging
  - Draws the user into the interaction and is pleasant and satisfying to use
- Effective
  - The task or experience is completed or goals reached completely and accurately
- Efficient
  - Helps complete the task quickly
- Error Tolerant
  - Prevents errors and helps the user recover from mistakes



# Design Principles

- Generalizable abstractions for thinking about different aspects of design
- The do's and don'ts of interaction design
- What to provide and what not to provide at the interface
- Derived from a mix of theory-based knowledge, experience and common-sense



# Design Principles

- Simplicity
  - Keep the UI as simple as possible.
- Structure
  - Organize in a meaningful and useful way.
- Consistency
  - Uniformity in appearance, placement, and behavior.
- Tolerance
  - Prevent the user from making errors.
- Visibility, Affordance and Feedback
  - What controls are for, how to use them and indication that they are used.

# Visibility

From:
www.baddesigns.com

- This is a control panel for an elevator
- How does it work?
- Push a button for the floor you want?
- Nothing happens. Push any other button? Still nothing. What do you need to do?

It is not visible as to what to do!

# Visibility

...you need to insert your room card in the slot by the buttons to get the elevator to work!

How would you make this action more visible?

- make the card reader more obvious
- provide an auditory message, that says what to do (which language?)
- provide a big label next to the card reader that flashes when someone enters

- make relevant parts visible
- make what has to be done obvious

# Affordance: to give a clue

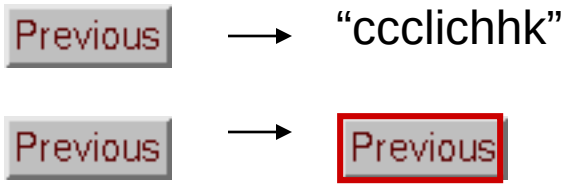
- Refers to an attribute of an object that allows people to know how to use it
  - e.g. a mouse button invites pushing, a door handle affords pulling
- Norman (1988) used the term to discuss the design of everyday objects
- Since has been much popularised in interaction design to discuss how to design interface objects
  - e.g. scrollbars to afford moving up and down, icons to afford clicking on

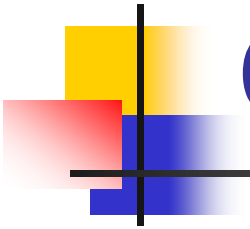
# What does ‘affordance’ have to offer interaction design?

- Interfaces are virtual and do not have affordances like physical objects
- Norman argues it does not make sense to talk about interfaces in terms of ‘real’ affordances
- Instead interfaces are better conceptualized as ‘perceived’ affordances
  - Learned conventions of arbitrary mappings between action and effect at the interface
  - Some mappings are better than others

# Feedback

- Sending information back to the user about what has been done
- Includes sound, highlighting, animation and combinations of these
  - e.g. when screen button clicked on provides sound or red highlight feedback:





# Constraints

- Restricting the possible actions that can be performed
- Helps prevent user from selecting incorrect options
- Physical objects can be designed to constrain things
  - e.g. only one way you can insert a key into a lock

# Logical or ambiguous design?

- Where do you plug the mouse?
- Where do you plug the keyboard?
- Top or bottom connector?
- Do the color coded icons help?

From: www.baddesigns.com

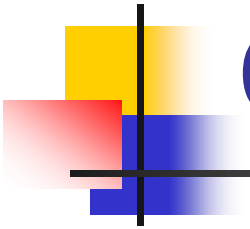
# How to design them more logically



(i) A provides direct adjacent mapping between icon and connector

(ii) B provides color coding to associate the connectors with the labels

From: www.baddesigns.com



# Consistency

- Design interfaces to have similar operations and use similar elements for similar tasks
- For example:
  - always use ctrl key plus first initial of the command for an operation – ctrl+C, ctrl+S, ctrl+O
- Main benefit is consistent interfaces are easier to learn and use

# When consistency breaks down

- What happens if there is more than one command starting with the same letter?
  - e.g. save, spelling, select, style
- Have to find other initials or combinations of keys, thereby breaking the consistency rule
  - e.g. ctrl+S, ctrl+Sp, ctrl+shift+L
- Increases learning burden on user, making them more prone to errors

# Internal and external consistency

- Internal consistency refers to designing operations to behave the same within an application
  - Difficult to achieve with complex interfaces
- External consistency refers to designing operations, interfaces, etc., to be the same across applications and devices
  - Very rarely the case, based on different designer's preference

# Keypad numbers layout

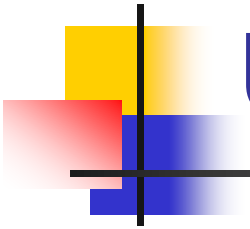
- A case of external inconsistency

(a) phones, remote controls

| | | |
|---|---|---|
| 1 | 2 | 3 |
| 4 | 5 | 6 |
| 7 | 8 | 9 |
| | 0 | |

(b) calculators, computer keypads

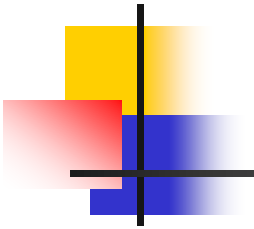
| | | |
|---|---|---|
| 7 | 8 | 9 |
| 4 | 5 | 6 |
| 1 | 2 | 3 |
| 0 | | |



# Usability principles

- Similar to design principles, except more prescriptive
- Used mainly as the basis for evaluating systems
- Provide a framework for heuristic evaluation

# Usability principles (Nielsen 2001)



- Visibility of system status
- Match between system and the real world
- User control and freedom
- Consistency and standards
- Help users recognize, diagnose and recover from errors
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help and documentation

# The User Experience

- How a product behaves and is used by people in the real world
  - the way people feel about it and their pleasure and satisfaction when using it, looking at it, holding it, and opening or closing it
  - “every product that is used by someone has a user experience: newspapers, ketchup bottles, reclining armchairs, cardigan sweaters.” (Garrett, 2010)
- Cannot design a user experience, only design *for* a user experience

# Defining user experience

- How users perceive a product, such as whether a smartwatch is seen as sleek or chunky, and their emotional reaction to it, such as whether people have a positive experience when using it.

  (Hornbæk and Hertzum, 2017)

- Hassenzahl's (2010) model of the user experience
  - Pragmatic: how simple, practical, and obvious it is for the user to achieve their goals
  - Hedonic: how evocative and stimulating the interaction is to users

# Why was the iPod user experience such a success?

- Quality user experience from the start
- Simple, elegant, distinct brand, pleasurable, must have fashion item, catchy names, cool, etc.

# User experience goals

**Desirable aspects**

| | | |
|---|---|---|
| Satisfying | Helpful | Fun |
| Enjoyable | Motivating | Provocative |
| Engaging | Challenging | Surprising |
| Pleasurable | Enhancing sociability | Rewarding |
| Exciting | Supporting creativity | Emotionally fulfilling |
| Entertaining | Cognitively stimulating | Experiencing flow |

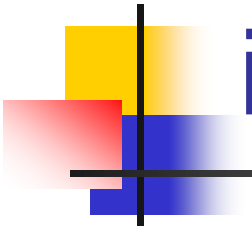
**Undesirable aspects**

| | |
|---|---|
| Boring | Unpleasant |
| Frustrating | Patronizing |
| Making one feel guilty | Making one feel stupid |
| Annoying | Cutesy |
| Childish | Gimmicky |

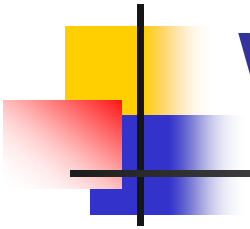
# Usability and user experience goals

- Selecting terms to convey a person's feelings, emotions, etc., can help designers understand the multifaceted nature of the user experience
- How do usability goals differ from user experience goals?
- Are there trade-offs between the two kinds of goals?
  - e.g. can a product be both fun and safe?
- How easy is it to measure usability versus user experience goals?

# Core characteristics of interaction design



- Users should be involved throughout the development of the project
- Specific usability and user experience goals need to be identified, clearly documented, and agreed to at the beginning of the project
- Iteration is needed through the core activities



# Why?

Help designers:

- Understand how to design interactive products that fit with what people want, need, and may desire
- Appreciate that one size does not fit all (for example, teenagers are very different to grown-ups)
- Identify any incorrect assumptions they may have about particular user groups. (for example, not all old people want or need big fonts)
- Be aware of both people's sensitivities and their capabilities

# Accessibility and inclusiveness

***Accessibility:*** the extent to which an interactive product is accessible by as many people as possible

- Focus is on people with disabilities; for instance, those using android OS or apple voiceover

***Inclusiveness***: making products and services that accommodate the widest possible number of people

- For example, smartphones designed for all and made available to everyone regardless of their disability, education, age, or income

# What is a "Good" User Interface

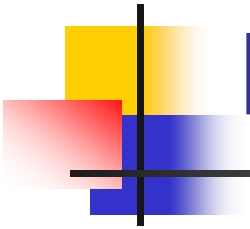
- Ideally, the UI should represent the capabilities of the entire system, not one part.
- The UI should help the user build a "Mental Model" easily, or intuitive to use.
- When the UI feels natural to its user, it is easy to learn and retain. No surprises occur.
- A good UI helps tailoring it to the end user
- A good UI helps to perform the task efficiently.
- A good UI meets the principal design goals (e.g: usability, catering to the first time user, infrequent user, expert user, etc.)

# What a "Good" User Interface can do?

- Enhances human productivity
- Reduces training/learning time and costs
- Increases end-users' satisfaction
- Improves work quality
- Help minimizing errors in task performance

An Experience with American Express Customer Service [Fisher-97]

- Making an existing system more usable (by distributing information and learning resources on how to do their common tasks more efficiently) improved:
  - Training period (12h reduced to 2h)
  - Productivity (increased from 17 minutes/request-handling to 4)
  - Errors rate (reduced from an average 20% to 2%)



# Key points

- Interaction design is concerned with designing interactive products to support the way people communicate and interact in their everyday and working lives
- It is concerned with how to create quality user experiences
- It requires taking into account a number of interdependent factors, including context of use, type of activities, cultural differences, and user groups
- It is multidisciplinary, involving many inputs from wide-reaching disciplines and fields