

## Announcements

- Sprint 1 grading released by Thursday
  - Project planning — do not scramble at the end
- Sprint 2 has been released
  - We will discuss it on Thursday
- Quizzes
  - Not possible to have make-ups
  - Thursday quizzes will likely be at the end of the class
  - We are going to drop one of the quizzes
  - Please plan accordingly

## Interaction Design Concepts

- Usability goals
- Design principles
- Affordance
- Visibility, Consistency, Feedback
- Design guidelines

## Nielsen's usability goals

1. Learnability
2. Efficiency
3. Memorability
4. Errors (safety)
5. Satisfaction

## Class exercise

- For each goal, write down one software application where: (5 min)
  - The usability goal is very important
  - The usability goal is not very important
- Learnability
- Efficiency
- Memorability
- Errors (safety)
- Satisfaction



Put the other one back up.

## Learnability

- How easy a system is to **learn to use**
- Questions:
  - Can the user figure out the system by exploring
  - How hard will it be to learn the whole set of functionality



This is the cockpit of an Airbus 319. It was not designed with learnability as one of the primary usability goals

## Learnability



This is the cockpit of an Airbus 319. It was not designed with learnability as one of the primary usability goals

## LEARNABILITY

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# EFFICIENCY

- The way a product supports users in carrying out their tasks
- Question: Once a user has learned the system can they sustain a high level of productivity?

## EFFICIENCY



# EFFICIENCY

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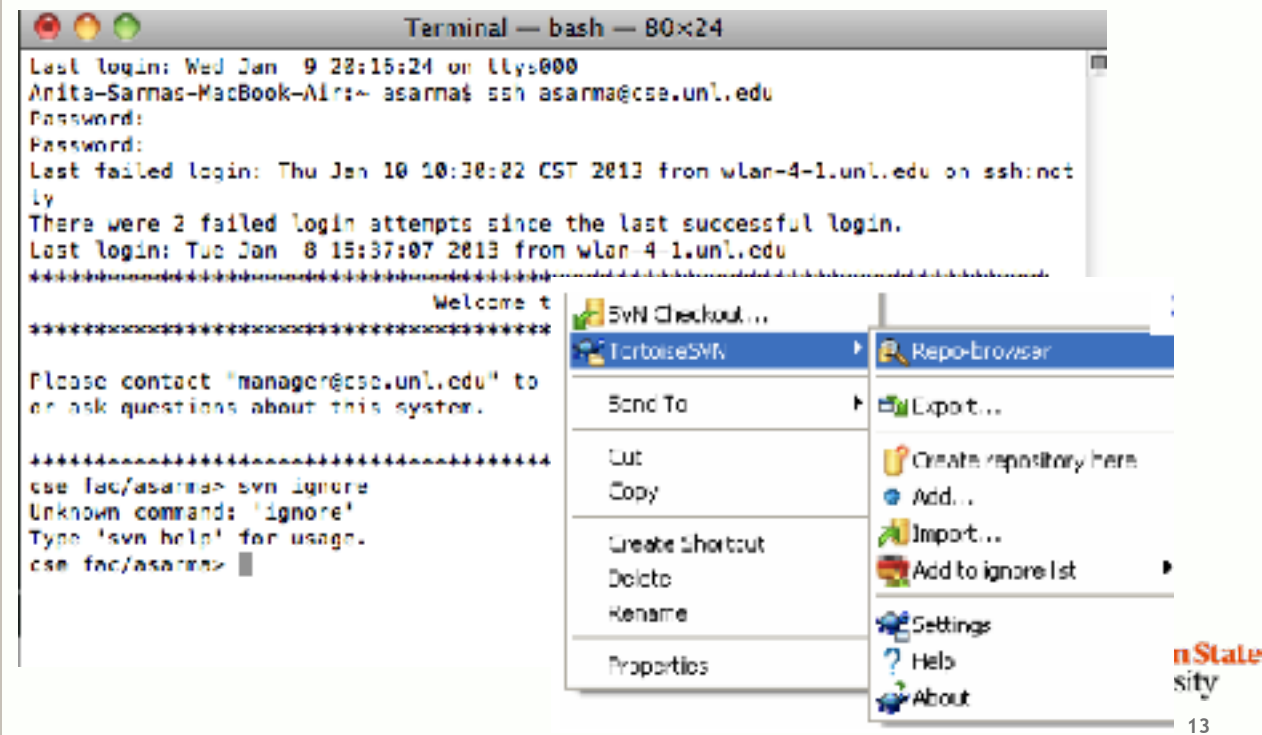


## MEMORABILITY

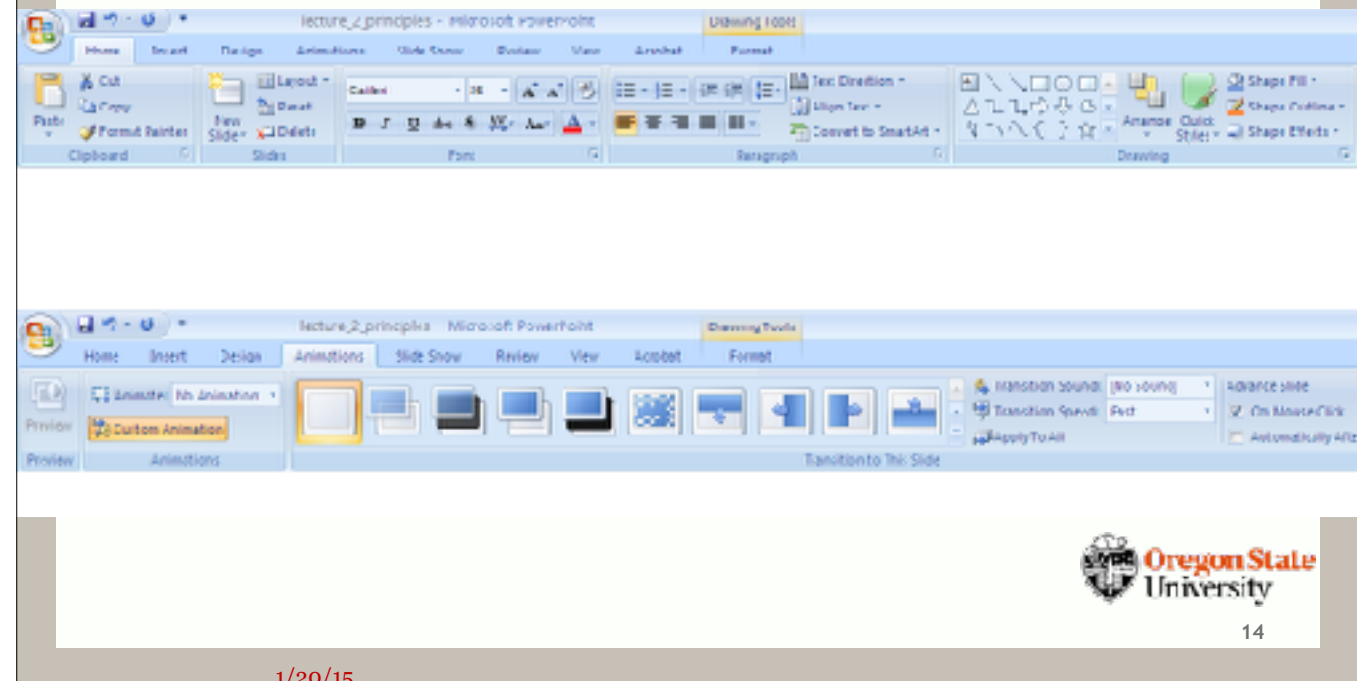
- How easy a product is to remember to use once learned
- Question: what kinds of interface support have been provided
- Especially important for interactive products that are used infrequently



# MEMORABILITY

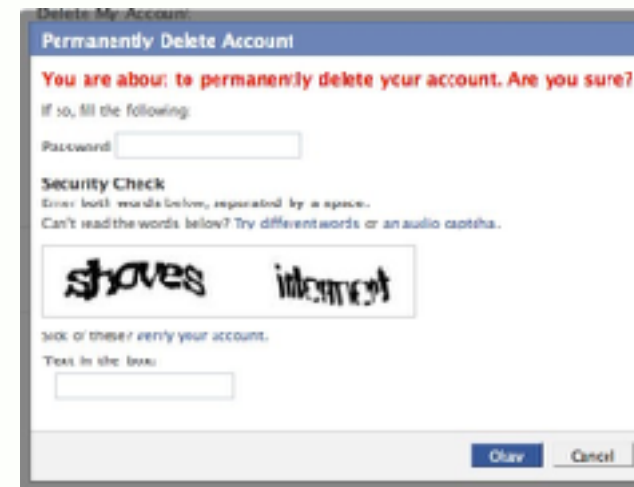
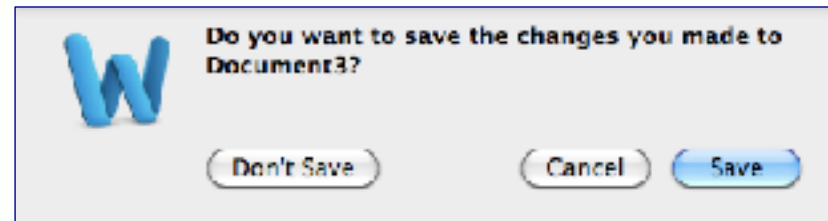


# MEMORABILITY



## ERRORS (SAFETY)

- Protecting the user from dangerous conditions and undesirable situations, also from perceived fear
- Question:
  - What is the range of errors possible
  - What measures to recover easily from them



Perceived fears of consequences of making errors and how users react to it

- Preventing users from making serious errors by reducing the risk of wrong key button (delete file, quit buttons close by)
- Providing users with means of recovery (are you sure you want to delete)



# ERRORS (SAFETY)



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1/20/15

Perceived fears of consequences of making errors and how users react to it

- Preventing users from making serious errors by reducing the risk of wrong key button (delete file, quit buttons close by)
- Providing users with means of recovery (google - everything is archive)

## ERRORS (SAFETY)



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# SATISFACTION

- Subjective quality of how a system feels to a user
- Question: What is the user's response after finishing their task/interaction

# SATISFACTION



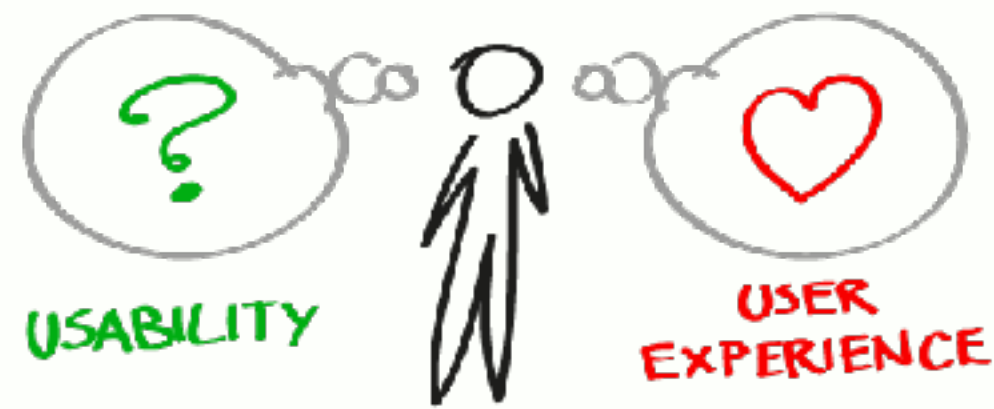
# SATISFACTION



# SATISFACTION



1/20/15



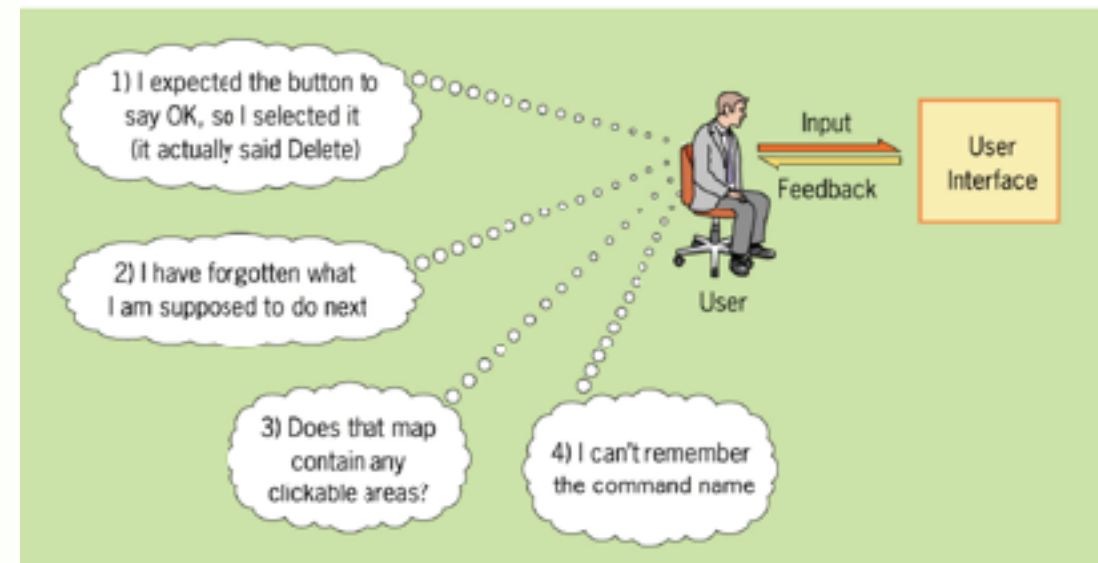


## Four psychological Principles

1. Users **See** What They Expect to See
2. Users Have Difficulty **Focusing** on More than One Activity at a Time
3. It Is Easier to Perceive a **Structured** Layout
4. It Is Easier to **Recognize** Something than to Recall It



## User's confusions with the UI:



## Principle 1

- People see what they want to see
- People don't read

TAE CAT

Design Guideline:

- Exploit prior knowledge
- Consistency in your UI

## Principle 2

### Users Have Difficulty Focusing on More Than One Activity at a Time

#### The Cocktail Party Effect

- Use the concept of Perceptual Organization
  - Group alike things together
- Use Importance to highlight items
  - Prominent display for important items

## Principle 3

### It Is Easier to Perceive a Structured Layout

- Law of proximity
- Law of similarity
- Law of symmetry

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					Business	Standard
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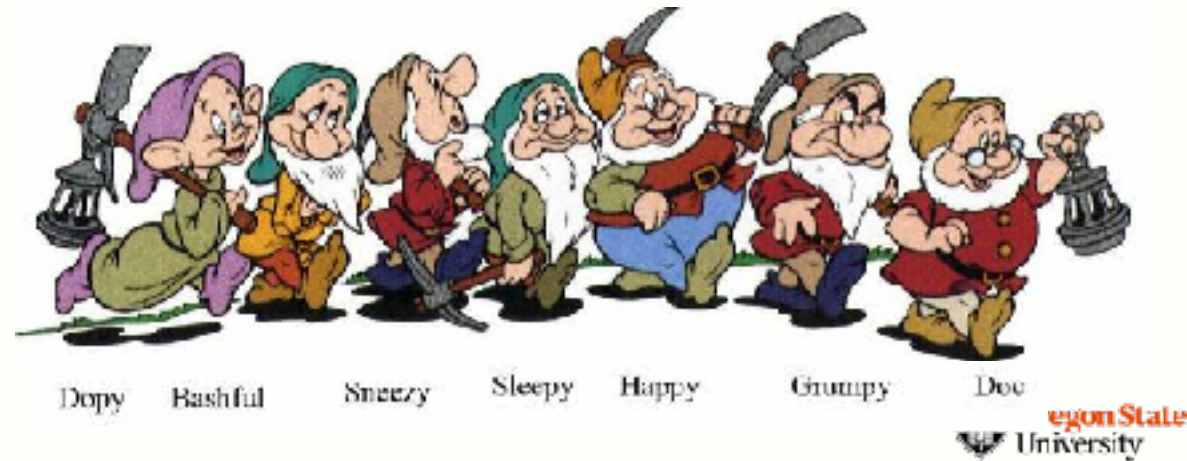
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Dest: Munich (LH4526) Dep: 1225; Arr: 1525  
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(3/S; £222/152)  
Dest: Aberdeen (BA4172) Dep: 1245; Arr: 1345  
(3/S; £155/102)

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## Principle 4

It Is Easier to Recognize Something Than to Recall It

- Principle of recognition
- Knowledge in the **head** & Knowledge in the **world**



## Principles from experience: Affordance

The Principle of Affordance:

- It Should Be Obvious How a Control Is Used



## Affordances

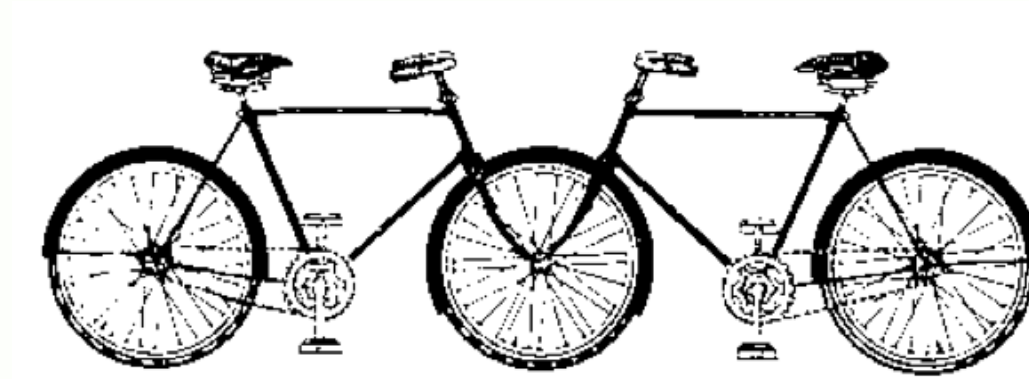
- *The perceived and actual fundamental properties of the object that determine how it could possibly be used (Gibson 1977)*
- Some affordances are **obvious**, some **learned**
- Have suggestions or clues about to how to use these properties
- Can be **dependent** on the
  - Experience
  - Knowledge
  - Culture of the actor
- Can make an action easy or difficult

## Affordances of a Teapot?





## Affordance of a tricycle?

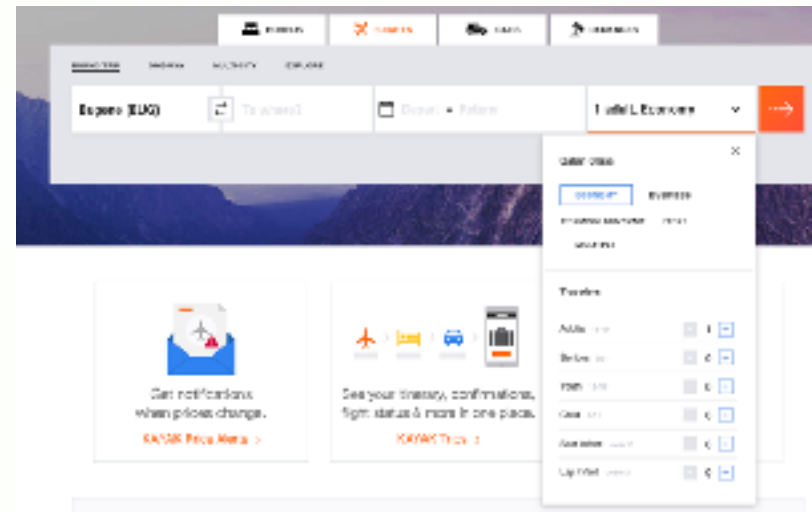
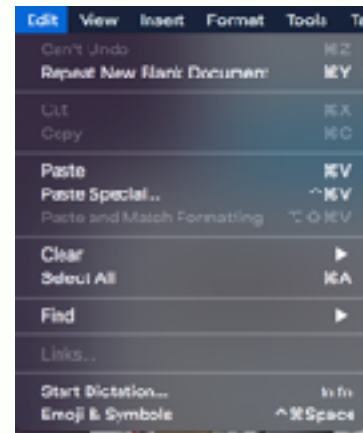


## Affordances in Screen-based UI

In graphical, screen-based interfaces:

- designer has control over perceived affordances
  - display screen
  - pointing device
  - selection buttons
  - keyboard
- afford touching
- pointing
- looking
- clicking on which part/every pixel of the display

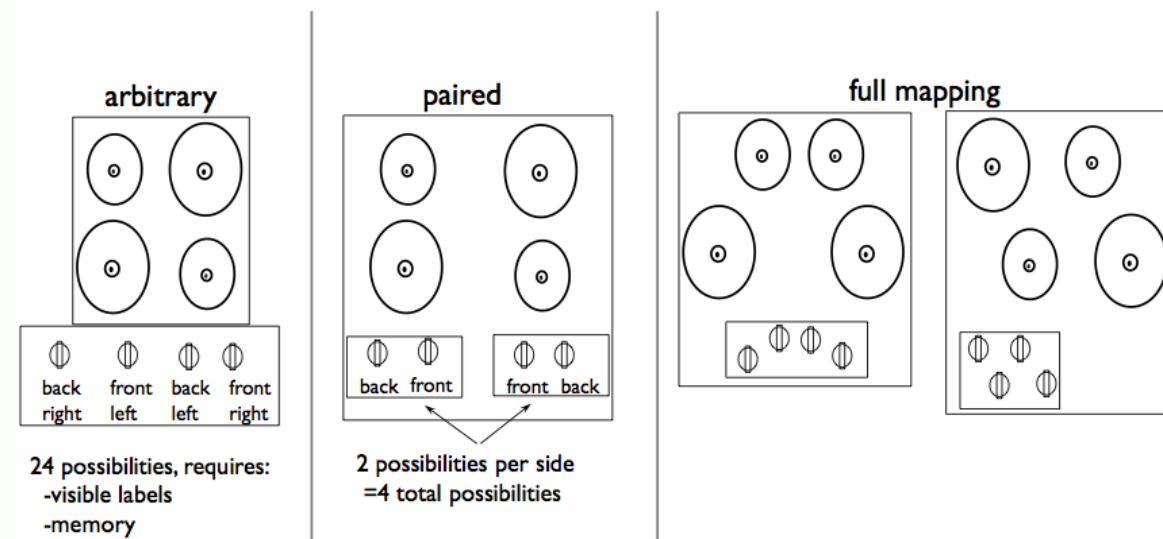
## Restricting interaction to reduce errors



## Mappings

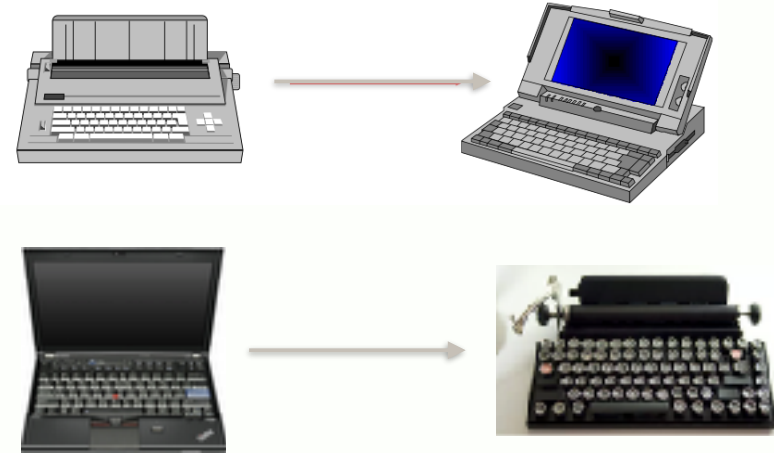
- Relationships between controls and their results
- For devices, appliances
  - natural mappings use constraints and correspondences in the physical world
    - Controls on a stove
    - Controls on a car
      - Radio volume
        - Knob goes left to right to control volume
        - Should also go in and out for front to rear speakers
- For computer UI design
  - mapping between controls and their actions on the computer
    - Controls on a digital watch
    - Controls on a word processor program

## Mapping controls to physical outcomes



## Transfer effects

- People transfer expectations from known objects to similar new ones
  - Positive: previous experience applies to new situation
  - Negative: previous experience conflicts with new situation



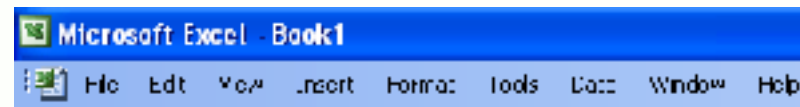
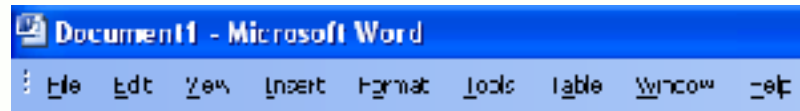
## Visibility

Making it obvious which actions are available



## Consistency

Uniformity in appearance, placement, terminology, and behavior



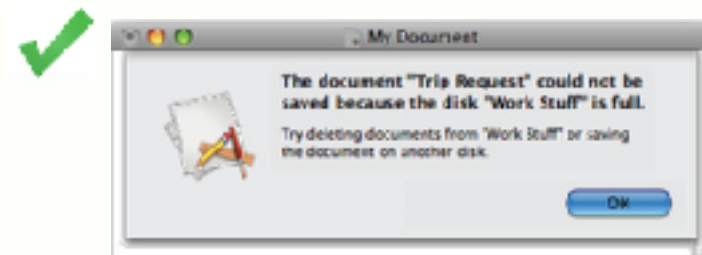
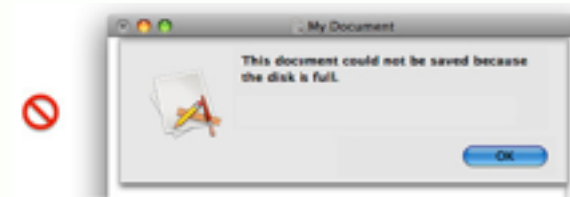
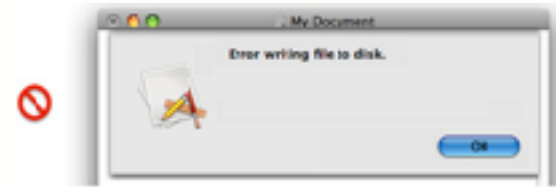


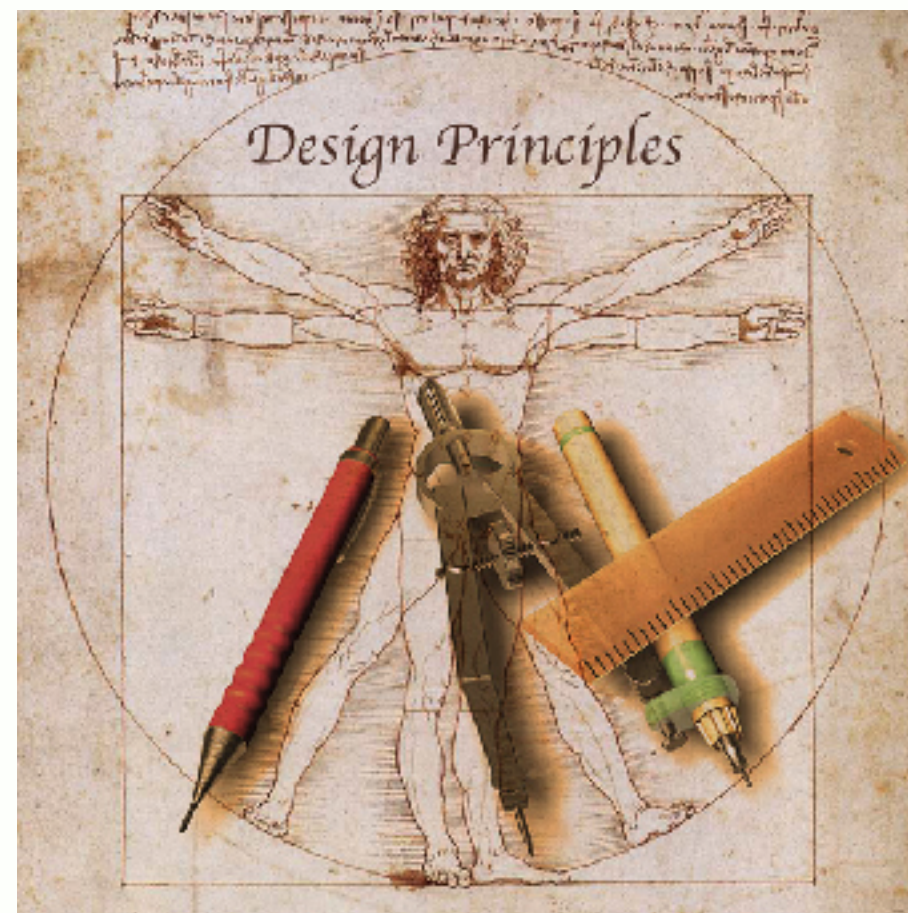
## Feedback

Send information about what is happening back to the user



## Feedback - from Bad to Better





**Keep it simple**



**Oregon State**  
University

# Google



Google Search

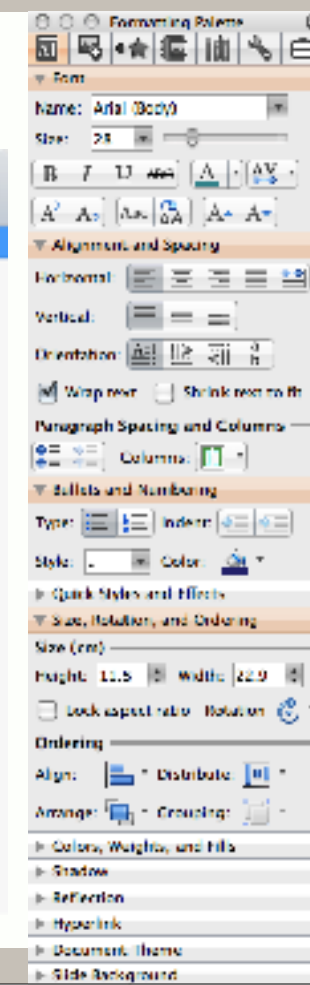
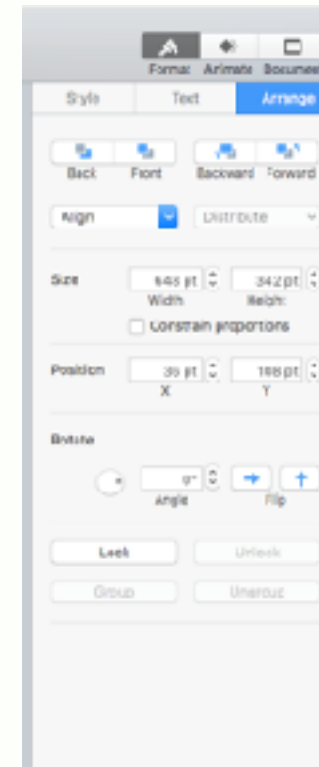
I'm Feeling Lucky



**All in one doesn't work**



## Organize the UI in a meaningful way



## Tolerance

Prevent user from making mistakes

- Prevention
- Recoverability
  - **Forward error recovery** - system accepts the error and helps the user to accomplish their goal
  - **Backward error recovery** - undo the effects of the previous interaction



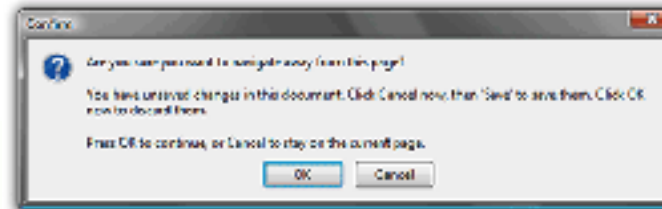
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## Location on screen



## Resources

- Usability Goals: Nielsen's 5 Goals

<https://www.nngroup.com/articles/usability-101-introduction-to-usability/>

- Design principles: First Principles of Interactive Design

<http://www.asktog.com/basics/firstPrinciples.html>

- Design Rules: 8 Golden Rules

<http://www.usask.ca/education/coursework/skaalid/theory/interface.htm>