Lecture 10
Design Principles #2

Design principles
- **Stimulus intensity**
- **Proportion**
- **Screen complexity**
- **Resolution/closure**
- **Usability goals**

Heim, Chapters 6.7-6.11

Other Principles of Perception - *Stimulus Intensity*

- We respond first to the intensity of a stimulus and only then do we begin to process its meaning.

1	3	**9**	7
4	8	**6**	2
5	7	**1**	3
2	4	**8**	6
7	9	**3**	1
6	2	**8**	4
7	1	**3**	9

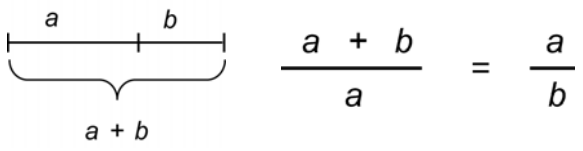
Other Principles of Perception – *Proportion*

- Proportion can be used to represent logical hierarchies

Heading Level 1
Heading Level 2
Heading Level 3
Heading Level 4
Heading Level 5
Heading Level 6

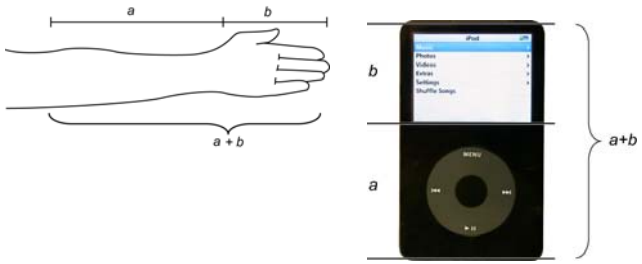
Other Principles of Perception – *Proportion*

- **Golden Ratio** - The golden ratio expresses the relationship between two aspects of a form such as height to width and must equal 0.618



Other Principles of Perception – *Proportion*

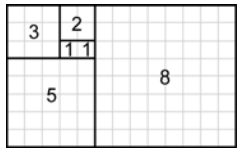
- **Golden Ratio**



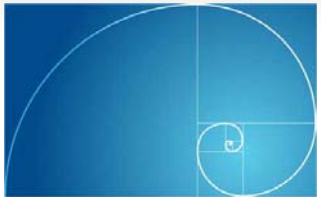
Other Principles of Perception – *Proportion*

- **Fibonacci -** A sequence of numbers in which each number is the sum of the two preceding numbers.
  - The relationship between the numbers in the Fibonacci series is similar to the golden ratio

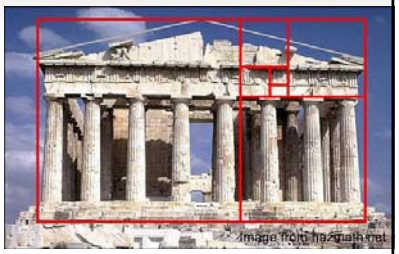
1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987, …



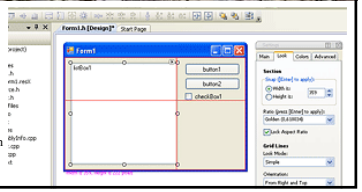
Golden ratios & Fibonacci



www.mathsisfun.com



journalofcosmology.com



www.atrise.com

Other Principles of Perception - *Screen Complexity*

- The measure of complexity developed by Tullis (1984) can be used to calculate the relative complexity, and therefore the difficulty, of a design.
  - This measure of complexity uses information theory (Shannon & Weaver, 1949)

$$C = -N \sum_{n=1}^{m} p_n \log_2 p_n$$

Other Principles of Perception - *Screen Complexity*

• Formula for calculating the measure of complexity

$$C = -N \sum_{n=1}^{m} p_n \log_2 p_n$$

C, complexity of the system in bits

N, total number of events (widths or heights)

m, number of event classes (number of unique widths or heights)

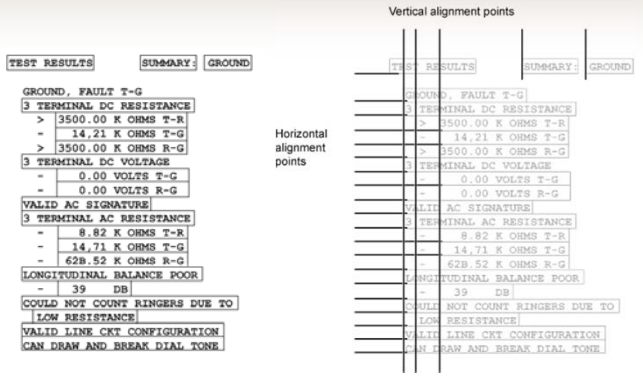
p_n, probability of occurrence of the n^{th} event class
(based on the frequency of events within that class)

Other Principles of Perception - *Screen Complexity*

• To calculate the measure of complexity for a particular screen, do the following:

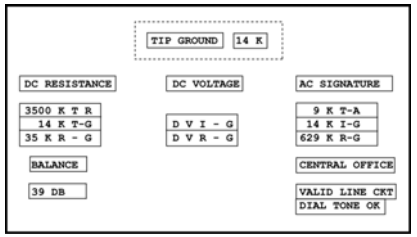
1. Place a rectangle around every screen element
2. Count the number of elements and the number of columns (vertical alignment points)
3. Count the number of elements and the number of rows (horizontal alignment points)

Other Principles of Perception - *Screen Complexity*



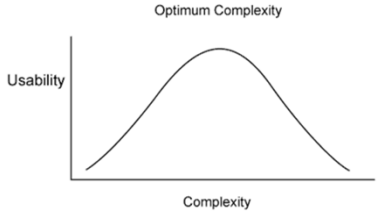
Other Principles of Perception - *Screen Complexity*

• Redesigned screen



Other Principles of Perception - *Screen Complexity*

- **Complexity vs. Usability**
  - Comber and Maltby (1997) found that both overly simple and overly complex screens were low in usability



Other Principles of Perception - *Screen Complexity*

- **Complexity vs. Usability**
  - Comber and Maltby defined usability in terms of the following three components:
    - Effectiveness
    - Learnability
    - Attitude

Other Principles of Perception - *Screen Complexity*

- Comber and Maltby found tradeoffs between usability and complexity:
  - As complexity decreased, predictability increased.
  - As complexity decreased, it became harder to differentiate among screen objects; the screen became artificially regular.
  - Decreased complexity meant that there were fewer ways to group objects.
  - Excessive complexity made screens look artificially irregular.
  - Increased complexity could occur from increased utility.

What are some of the trade-offs when decreasing screen complexity in regards to usability?

How would this influence your approach to user interface design?

Other Principles of Perception - *Resolution/Closure*

- Resolution/Closure - Relates to the perceived completion of a user's tasks.
  - When the user's objective is satisfied, he or she will consider the task complete and move on to the next goal

Usability Goals – Principles - Guidelines

- **Usability Goal—**Easy to use
  - Most people are interested in completing their tasks and do not enjoy struggling with the tools they need to use. One of the most important goals of user-centered design is to make things easy to use.
- **Design Principle—**Simplicity
  - Simple things require little effort and can often be accomplished without much thought. If interaction designs are guided by the principle of simplicity, they will be easier to use.

Usability Goals – Principles - Guidelines

- **Project Guideline—**All dialogue boxes should present only the basic functions that are most often used and that other, less used functions can be accessed using an expandable dialogue with a link for "More Options."

Summary

- Aim for simple interfaces, but not simplistic
- Complexity can be measured and contrasted across alternative designs