Universal Principles & Perception Laws in Design

Dessign Principles & Usability

- Usability: Defined in ISO 9241 standard as

  - The ability in which a product may be used by **specific** users in order to carry out **specific** tasks *effectively, efficiently, and with satisfaction* in a **specific** use environment.
  - **Usability is always referred to a concrete user group and a concrete user application**
    - *Efficacy* is the ability of correctly and completely achieving a certain goal.
    - *Efficiency* is the relation of used resources and the completeness and correctness of achieved goals.
    - *Satisfaction* is the comfort and acceptation of a system by the users and other people that are affected by its use.

Usability Principles (Bruce Tognazzini)

- Fashion should never trump usability **(Aesthetics)**
- Bring to the user all the information and tools needed for each step of the process **(Anticipation)**
- Computer interface, and task environment all "belong" to the user **(Autonomy)**:
  - ➢ *Customized interfaces,*
  - ➢ *Keep user informed: status, errors, progress indicators,…*
- When using color to convey information in the interface, also use clear, secondary cues **(Color)**
- ***Consistency*** : levels of consistency, induced inconsistency, continuity, *with user expectations*
- **Default Values:** easy to blow away, not everything default,
- **Discoverability**: Any attempt to hide complexity will serve to increase it, if user cannot find it, it does not exist:
  - ➢ *Controls should be visible, communicate the gestural vocabulary, use active discovery,..*
- Look at the user's productivity, not the computer's **(Efficiency):**
  - ➢ *formularies, error messages, latency reduction*
- **Explorable interfaces:** *Actions reversible*
  - ➢ *always allow undo, back to home page, visible navigation*
- **Good Methaphors**
- **Protect Users's work:** *Ensure that users never lose their work*

Universal Principles & Perception Laws in Design

- **Principle concepts of Design**
  From the "Universal Principles of Design" book
  by William Lidwell, Kritina Holden, Jill Butler

- Perception Laws in Design: Gestalt Laws
- Color perception

Universal Principles of Design

- Aesthetic-Usability Effect
  - Aesthetics play an important role in the way designs are used
  - Aesthetic designs look easier to use, and encourage its use more than non aesthetic designs
  - This effect produces the perception that an aesthetic design is easier to use than a non-aesthetic design

  We must devote important efforts to improving our designs.

Universal Principles of Design

- Correct alignment
  - Elements must be aligned, this creates a sense of unity and cohesion, as well as facilitates reading.
  - More later..

Universal Principles of Design

- Chunking
  - A *chunk* is a unit of information in short-term memory
  - *Chunking* is a technique that seeks to place the information in a way that accommodates to the limits the humans have to process bits of information.
    - Smaller chunks are easier to remember than larger lists
      Most people can remember a list of 5 words for 30 seconds,
      but few can remember a list of 10 words for 30 seconds.
    - Magical number: 7+- 2 (contemporary estimation 4+-1)
  - It refers to elements that must be memorize:
    - *Menu items, telephone numbers…*
  - But it is not required to divide all the elements in a screen or page in groups of 5 or so
    - *Elements such a dictionary pages must not be chunked.*

Universal Principles of Design

- Colour
  - It is an important feature that can make a design
    more visually pleasing and aesthetic
  - Can be used to *reinforce layout design* and the *meaning of elements*

Universal Principles of Design

- Colour: Aspects to consider:
  - Number of colours**:**
    - Keep it low, up to five and Use a second cue.
  - Colour combinations (more later):
    - Analogous (neighbours), complementary, or combinations of colours found in nature
  - Saturation: Attracts attention
    - When performance and efficiency are important,
      the use of desaturated colours may help, perceived as more professional
    - Saturated colours attract attention and are perceived as more exciting and dynamic
      (but may increase eye fatigue)
  - Symbolism:
    - The meanings of colours may vary among cultures
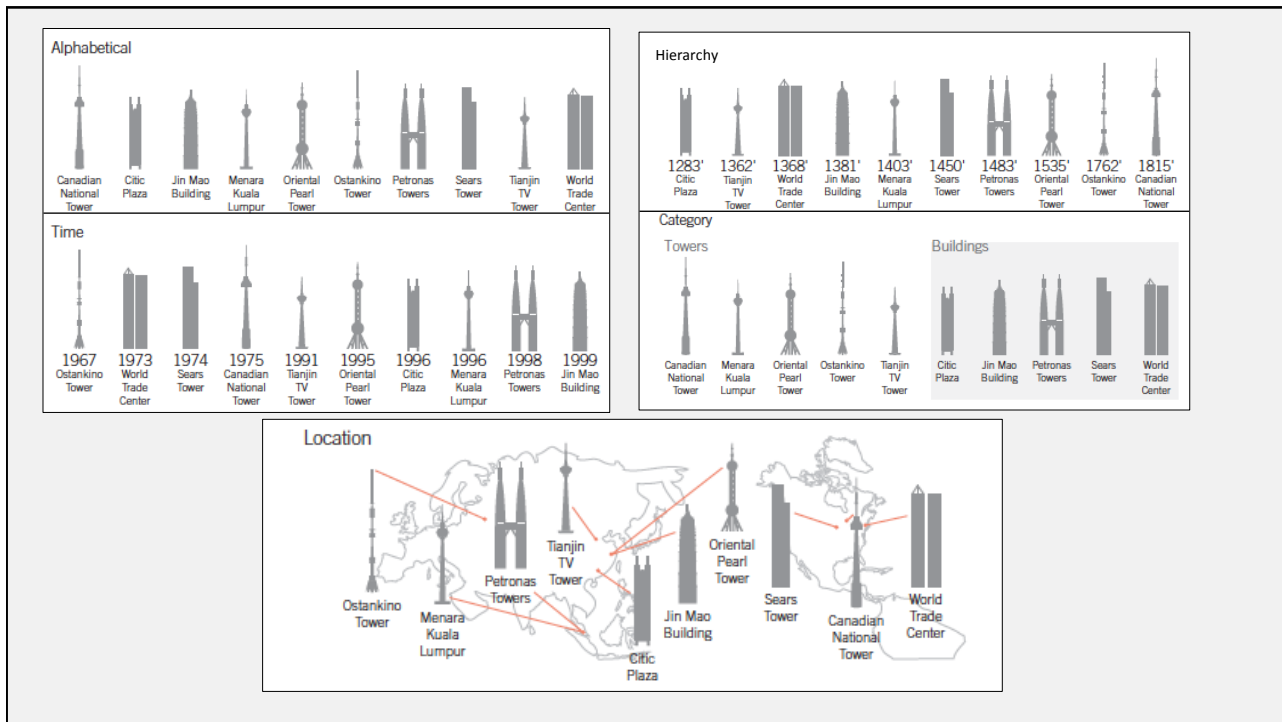
Perception Laws in Design.
Universal Principles of Design

• Colour

Perception Laws in Design.
Universal Principles of Design

• *LATCH principle.* Information is organized according to:
  • **Location:** Information comes from different places (medicine: location of the body,).
  • **Alphabet:** Usually for large amounts of data (words in dictionary…)
  • **Time:** Events with fixed durations. (meeting schedules).
  • **Category:** To classify goods/elements of similar importance. Suitable for shops…
  • **Hierarchy:** By magnitude, order of importance

Perception Laws in Design.
Universal Principles of Design

- Garbage-in garbage-out (GIGO):
  Computer scientists have long known that
      inadequate input information often generates bad results
  - **Type error:** The input is provided in an incorrect type (*mistakes*).
    If undetected, it may generate large amounts of garbage.
      Ex.: Numerical fields filled with a phone number or credit card number…
      Type checks, input formatting, default values, example of inputs
  - **Quality error:** The input has the correct type but has some defects (*slips*).
      Ex.: Amounts of money.
      May be alleviated with confirmations and previews.

Original Form

Order Form: Billing and Shipping Information   page 2 of 2

Shipping Address: **Billing Address:**

Name	Name
Street Address	Street Address
Street Address	Street Address
City, State and Zip Code	City, State and Zip Code

Unconstrained fields increase the probability of garbage input.

Credit Card Information:

Name on Credit Card | Type of Credit Card | Credit Card Number | Exp. Date

Shipping Method: **Date to Ship:**

continue >>

Redesigned Form

Order Form: Billing and Shipping Information   page 2 of 2
☐ click here to use the information saved with your account

Shipping Address: **Billing Address:**
☐ click here if Billing Address is the same as Shipping Address

First Name | Last Name   First Name | Last Name
Street Address   Street Address

City | State ⬍ | Zip Code   City | State ⬍ | Zip Code

Allow users to automate input by accessing stored information.

Credit Card Information:

Name on Card | Type of Card ⬍ | Credit Card Number | Month ⬍ | Year ⬍
Expiration Date

Constrain input when a specific amount of information is required.

Shipping Method: **Date to Ship:**

Standard Shipping $7.00 ⬍   Month ⬍ | Day ⬍ | Year ⬍

Constrain input using menus of options.

continue >>

Your order will not be placed until you review the information you entered and click the "submit order" button.

March 21, 2003

1 dozen
  chocolate chip cookies

Ship to:
  Randy Williams
  101 Main Street
  Houston, TX 90990

Ship on:
  March 30, 2003

Bill to:
  Kristen Johnson
  211 Elm Blvd.
  Columbus, OH 44356

VISA: **** **** **** 3041
Exp. Date 5/2006
Name on Card: Kristen J. Johnson

make changes | submit order

Allow users to preview information before they complete transactions.

Universal Principles of Design

- Iconic representation: Images try to represent objects or actions.

  Four types:
  - **Similarity:** The icon is visually similar to the action/object to be represented. Adequate for simple objects (turn right)
  - **Example:** Elements can be related to the image (plane for airport).
  - **Symbolic:** High level of abstraction (unlock icon)
  - **Arbitrary:** No relationship with element or action (nuclear symbol)

Universal Principles & Perception Laws in Design

- Principle concepts of Design
  From the "Universal Principles of Design" book
  *by William Lidwell, Kritina Holden, Jill **Butler***

- **Perception Laws in Design: Gestalt Laws and more**
- Color perception

Perception Laws in Design.
Gestalt Laws

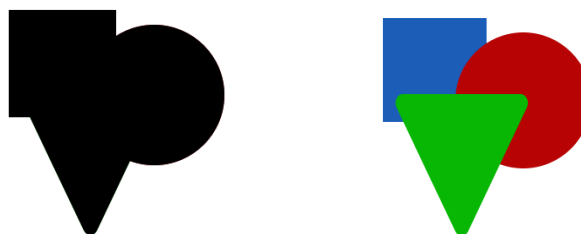- Gestalt Laws relevant for visual design are:
  - Präganz Law
  - The law of closure
  - The law of similarity
  - The law of proximity
  - The law of symmetry
  - The law of continuity
  - The law of common fate

Perception Laws in Design.
Gestalt Laws

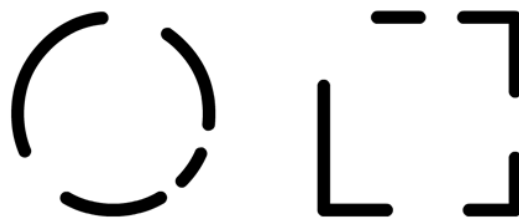- **Pragnänz Law:** Law of good figure, simplicity.
  We tend to perceive simpler shapes

Perception Laws in Design.
Gestalt Laws

- **The law of closure:**

  The mind may experience elements it does not perceive through sensation, in order to complete a regular figure
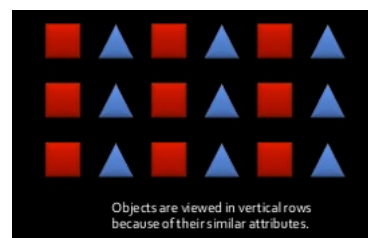

Perception Laws in Design.
Gestalt Laws

- **The law of similarity:**

 The mind groups similar elements into collective entities or totalities.

  This similarity might depend on relationships of form, colour, size, or brightness.

Objects are viewed in vertical rows because of their similar attributes.

Perception Laws in Design.
Gestalt Laws

• **The law of proximity:**

Spatial or temporal proximity of elements may induce the mind to perceive a collective or totality.
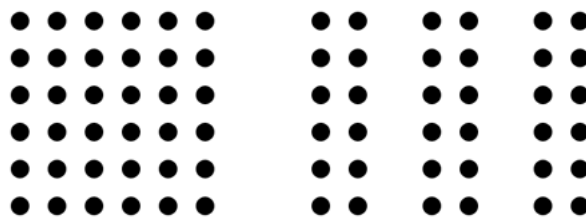
Perception Laws in Design.
Gestalt Laws

• **The law of symmetry:**

Symmetrical images are perceived collectively, even in spite of distance.
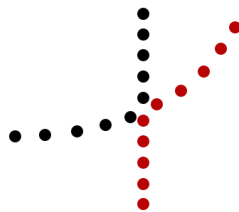
Perception Laws in Design.
Gestalt Laws

- **The law of continuity:**

  The mind continues visual, auditory, and kinetic patterns.

  Elements on a line/curve may be perceived as more related than elements not on the line/curve.
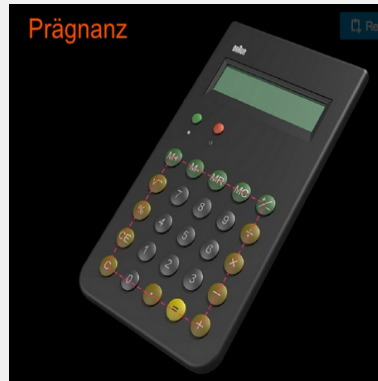
Perception Laws in Design.
Gestalt Laws

- **The law of common fate:** Elements with the same moving direction are perceived as a collective or unit.

Exampe

Prägnanz

Symmetry

Similarity

Similarity

Perception Laws in Design.

- Orientation Sensitivity: *Efficient perception of line orientation is highly limited.*
  - Vertical or horizontal orientations are ok, while oblique orientations are more difficult to distinguish (30º is de minimum recommended).
  - Due to two main phenomena in visual perception:
    - **Oblique effect:** The relative deficiency in perceptual performance of our neurons for oblique contours as compared to the performance for horizontal or vertical contours.
    - **Pop-out effect:** It is the tendency of certain elements in a display to pop out as figure elements, and therefore be easily detectable. Better if they differ minimum 30º
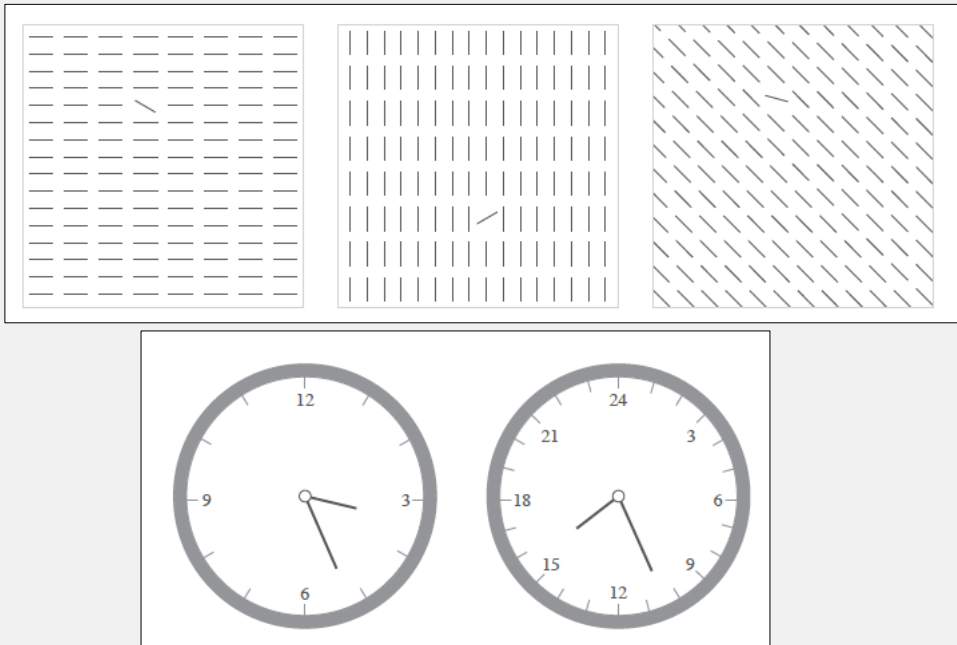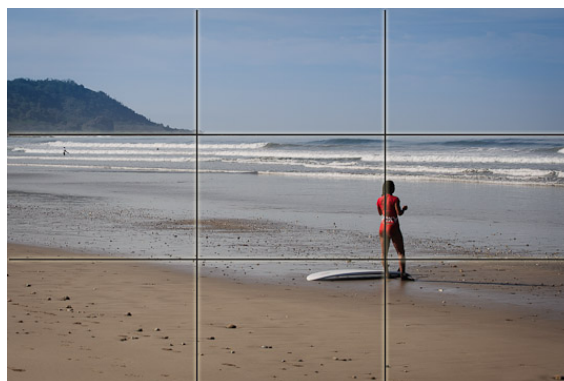
Perception Laws in Design.

- Pictorial superiority effect:

  Concepts are much more likely to be remembered experientially if they are presented as pictures rather than as words.
  - After 30 seconds
  - Before 30 seconds, the same amount of information can be recalled in text than in pictures

Perception Laws in Design.

- Rule of thirds

Perception Laws in Design.

- **Signal to noise ratio:**

  Measure used in science and engineering that compares the level of a desired signal to the level of background noise.
  - A ratio higher than 1:1 indicates more signal than noise.
  - *The goal of communication is maximizing signal and minimizing noise.*
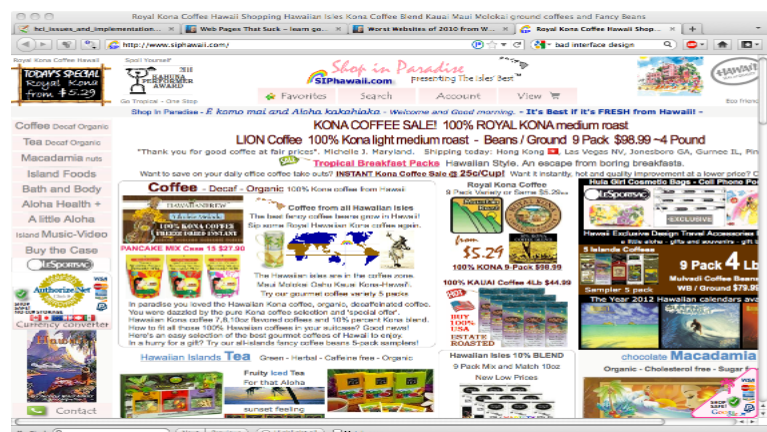
  Keep de design simple => enhance perception
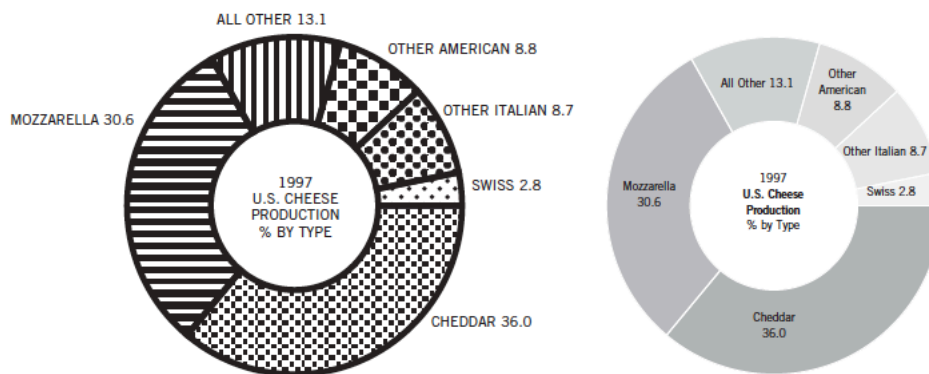 We can enhance information by using redundant coding and highlighting.
  Remove noise by eliminating unnecessary elements.

Design Mistakes. Web pages

Problems

- White space?

Universal Principles of Design

- 1+1 = 3