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.

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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

- The 80/20 Rule (Pareto principle)
  - Approximately 80 percentage of the effects generated by any large system are caused by only the 20 percentage of the variables in that system
  - It is observed in all large systems
    - Economics: 80% of a company revenue comes from 20% of its products
    - Computer systems: 80% of errors are caused by 20% of the components
    - Usability: 80% of application usage on only 20% of its features
  - Useful rule for focusing resources
    - Focusing on aspects of the system that are beyond the critical 20% rapidly yields diminishing returns

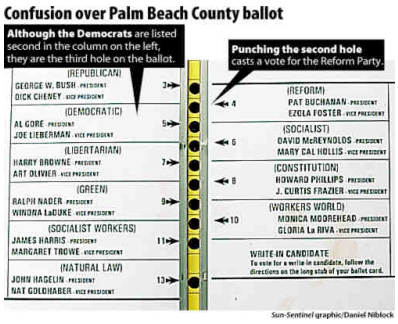
Universal Principles of Design

- 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
  - 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. Use 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 are perceived as more exciting and dynamic
  - 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. 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.

    Ex.: Amounts of money.

    May be alleviated with confirmations and previews.

Universal Principles of Design

- Iconic representation: Images try to represent objects or actions. Four types:
  - **Similarity:** The icon is 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) 

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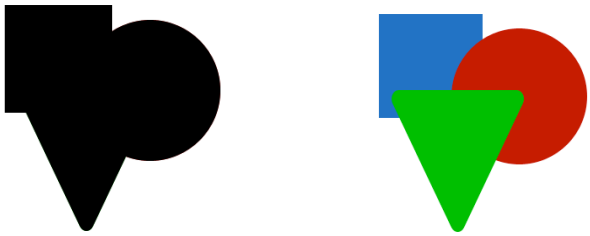
Perception Laws in Design. Gestalt Laws

- 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.

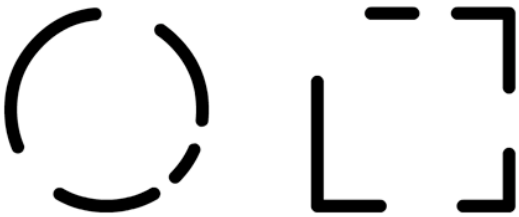
  We tend to perceive simpler shapes



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

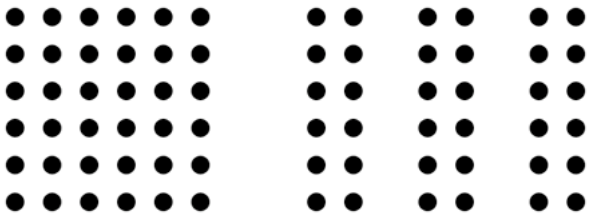
- **The law of similarity:**

  The mind groups similar elements into collective entities or totalities. This similarity might depend on relationships of form, colour, size, or brightness.

Perception Laws in Design. Gestalt Laws

- **The law of proximity:**

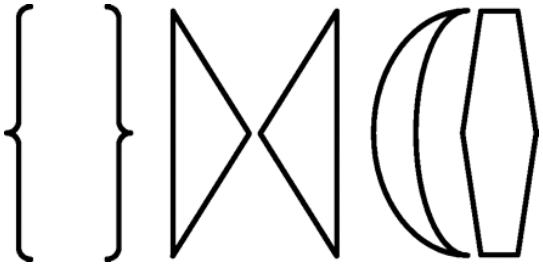
  Spatial or temporal proximity of elements may induce the mind to perceive a collective or totality.



Perception Laws in Design. Gestalt Laws

- **The law of symmetry:**

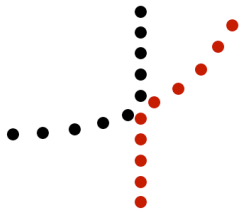
  Symmetrical images are perceived collectively, even in spite of distance.



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.

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

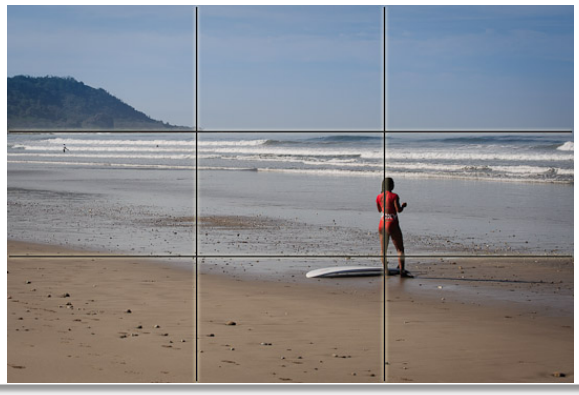
Perception Laws in Design.

- 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.

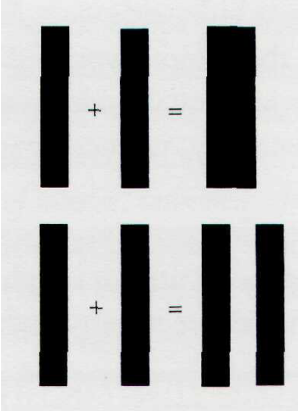
- Signal to noise ratio:

  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.

Universal Principles of Design

- 1+1 = 3



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