

IDI – Universal Design Principles & Perception Laws

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Design 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 Metaphors**
- **Protect Users’s work**: Ensure that users never lose their work

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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

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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

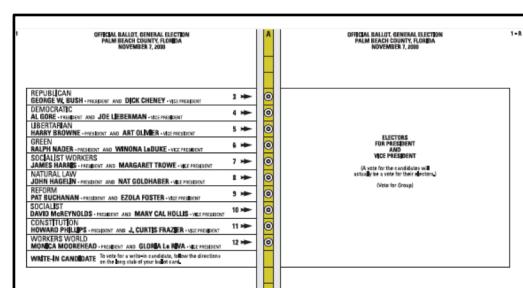
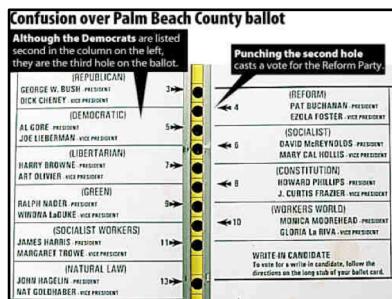
We must devote important efforts to improving our designs.

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Universal Principles of Design

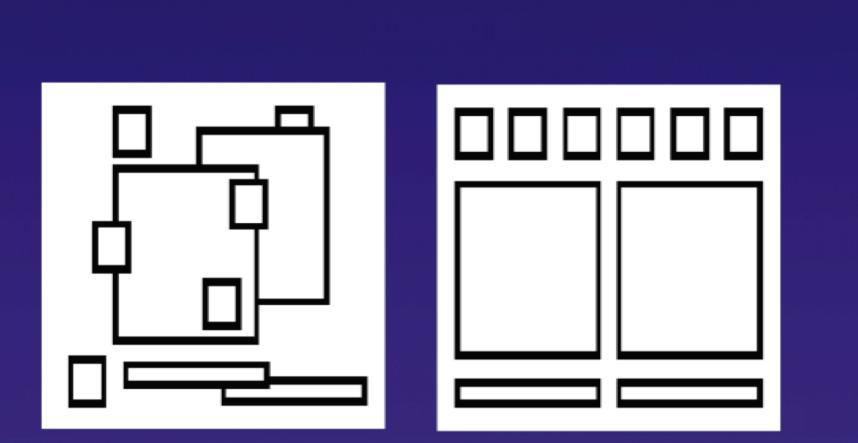
- **Correct alignment**

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



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Universal Principles of Design



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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.

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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

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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

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Universal Principles of Design

- Colour

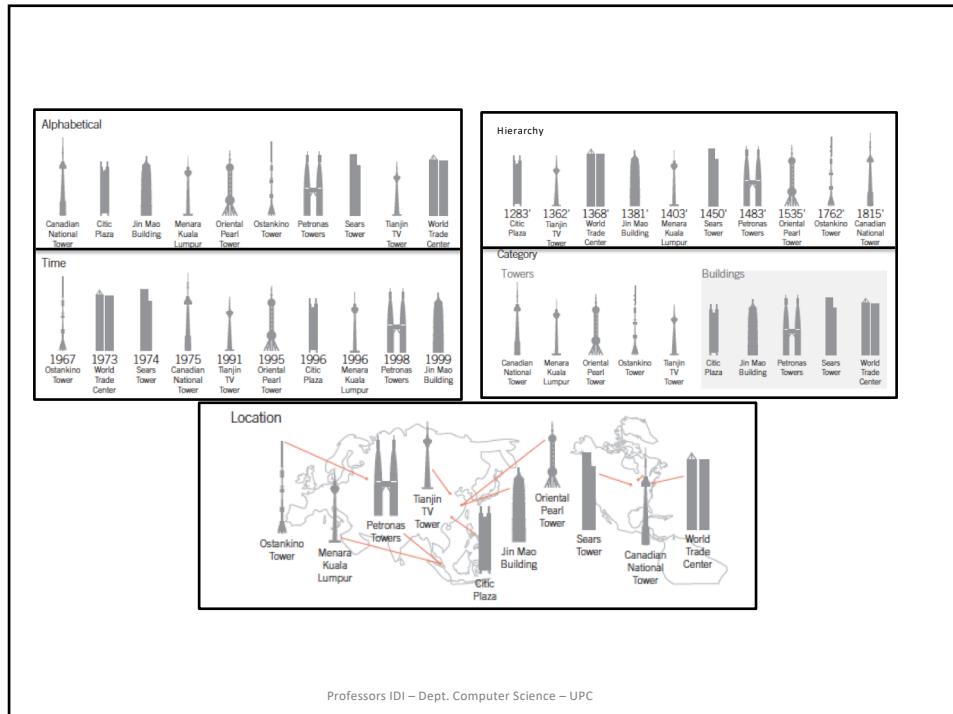


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Universal Principles of Design

- **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

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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.

Order Form: Billing and Shipping Information page 2 of 2

Shipping Address:

Name
Street Address
Street Address
City, State and Zip Code

Billing Address:

Name
Street Address
Street Address
City, State and Zip Code

Credit Card Information:

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

Shipping Method: [dropdown menu]

Date to Ship: [dropdown menu]

continue >>

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- Unconstrained fields increase the probability of garbage input.

Redesigned Form

Order Form: Billing and Shipping Information page 2 of 2

Shipping Address:

First Name	Last Name	
Street Address		
City	State	Zip Code

Billing Address:

First Name	Last Name	
Street Address		
City	State	Zip Code

Credit Card Information:

Name on Card	Type of Card
Credit Card Number	
Expiration Date	

Shipping Method: [dropdown menu]

Date to Ship: [dropdown menu]

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 5/2004
 Name on Card Kristen J. Johnson

make changes **submit order**

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- Allow users to automate input by accessing stored information.
- Constrain input when a specific amount of information is required.
- Constrain input using menus of options.
- 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) 

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Universal Principles & Perception Laws in Design

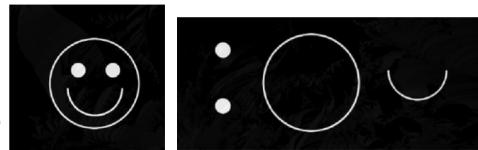
- Principle concepts of Design
From the “Universal Principles of Design” book
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- **Perception Laws in Design: Gestalt Laws and more**
- Color perception

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Perception Laws in Design. Gestalt Laws

- Gestalt Laws relevant for visual design are:

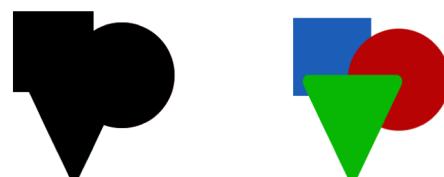
- Präganz Law
- The law of closure
- The law of similarity
- The law of proximity
- The law of symmetry
- The law of continuity
- The law of common fate



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Perception Laws in Design. Gestalt Laws

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



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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



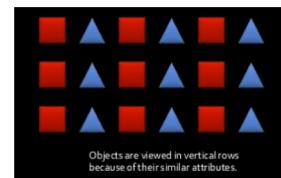
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Perception Laws in Design. Gestalt Laws

- **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.

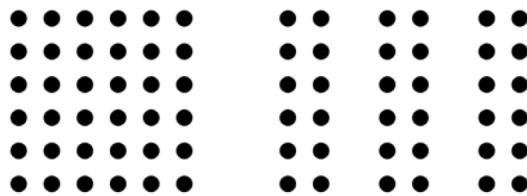


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Perception Laws in Design. Gestalt Laws

- **The law of proximity:**

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



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Perception Laws in Design. Gestalt Laws

- **The law of symmetry:**

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



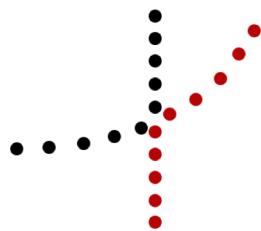
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Perception Laws in Design. Gestalt Laws

- **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.



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Perception Laws in Design. Gestalt Laws

- **The law of common fate:**

Elements with the same moving direction are perceived as a collective or unit.



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Example



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Example

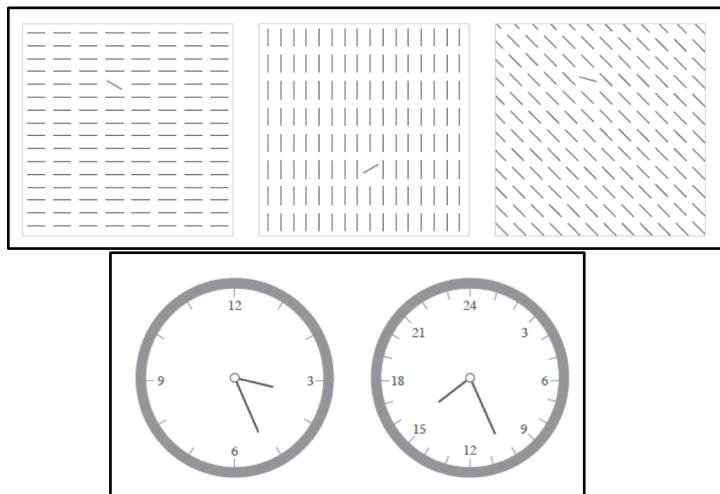


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Perception Laws in Design.

- **Orientation Sensitivity:** Efficient perception of line orientation is highly limited.
 - Vertical or horizontal orientations are ok, while oblique orientations are more difficult to distinguish (30° is the 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 30°

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Perception Laws in Design.

- Pictorial superiority effect:

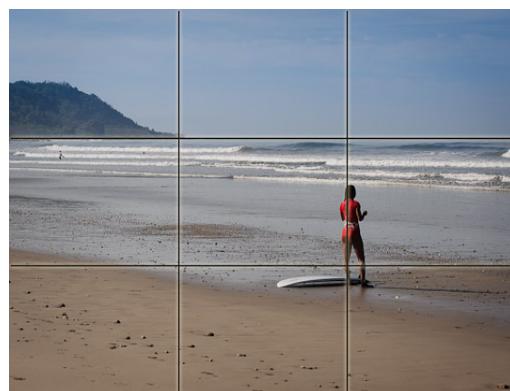
Concepts are much more likely to be remembered experientially if they are presented as pictures rather than as words.

- After 30 seconds
- Before 30 seconds, the same amount of information can be recalled in text than in pictures

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Perception Laws in Design.

- Rule of thirds



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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

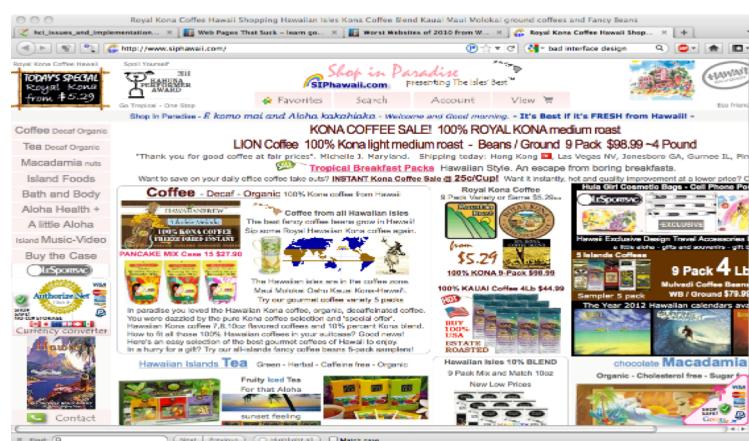
We can enhance information by using redundant coding and highlighting.

Remove noise by eliminating unnecessary elements.

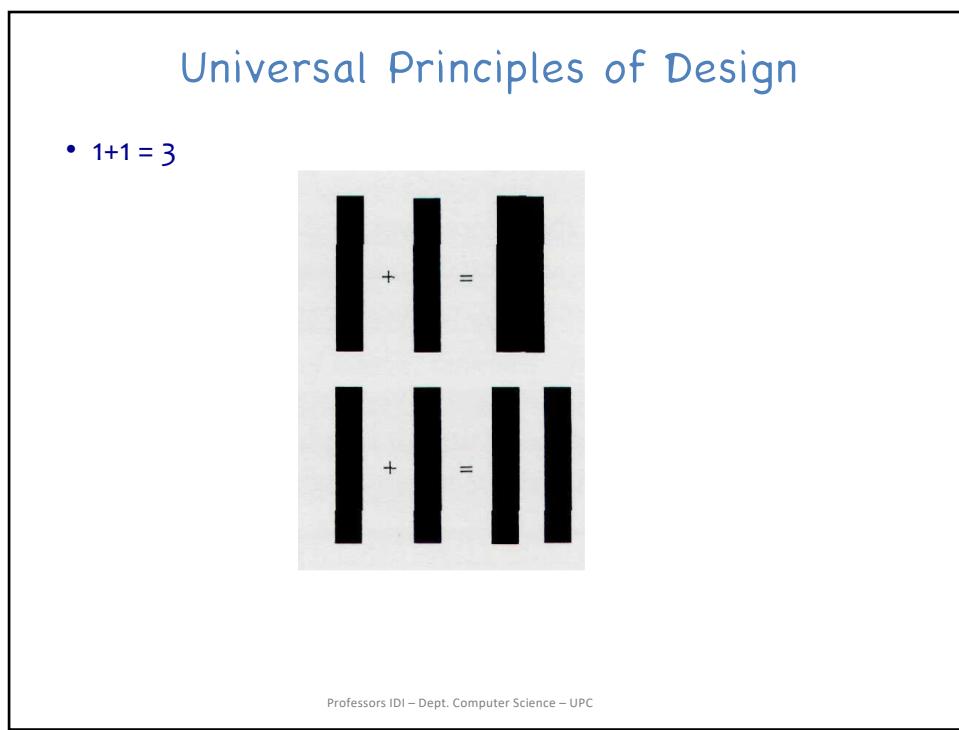
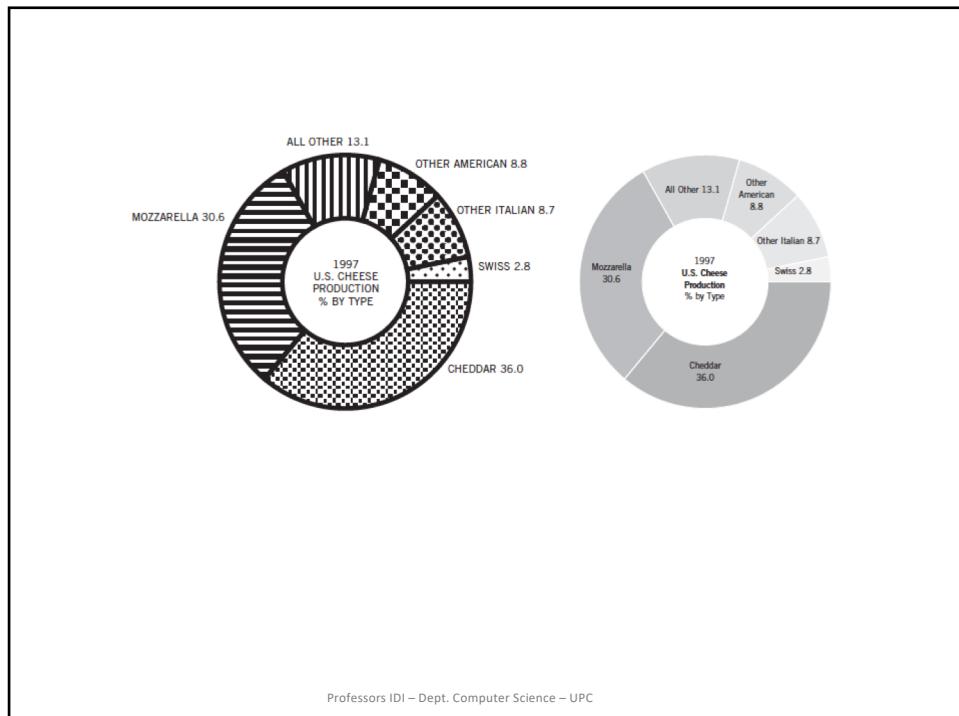
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Design Mistakes. Web pages

Problems • White space?

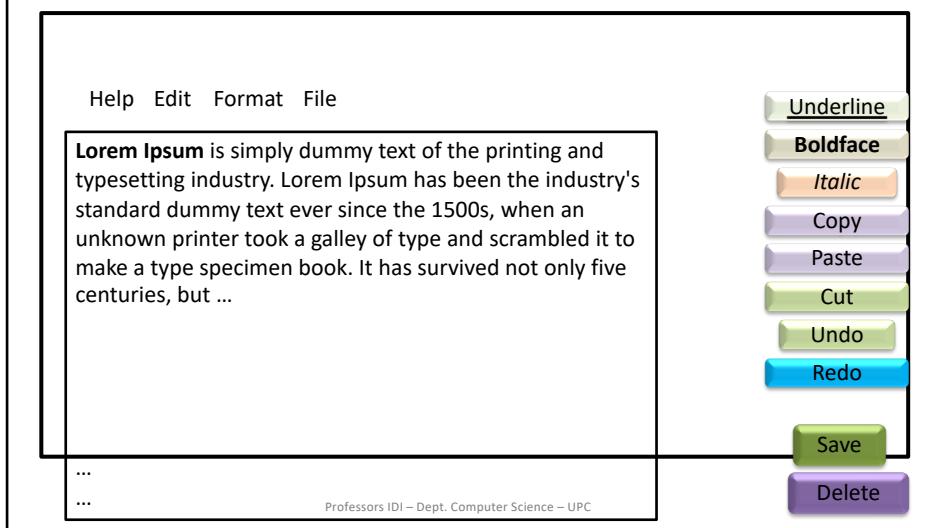


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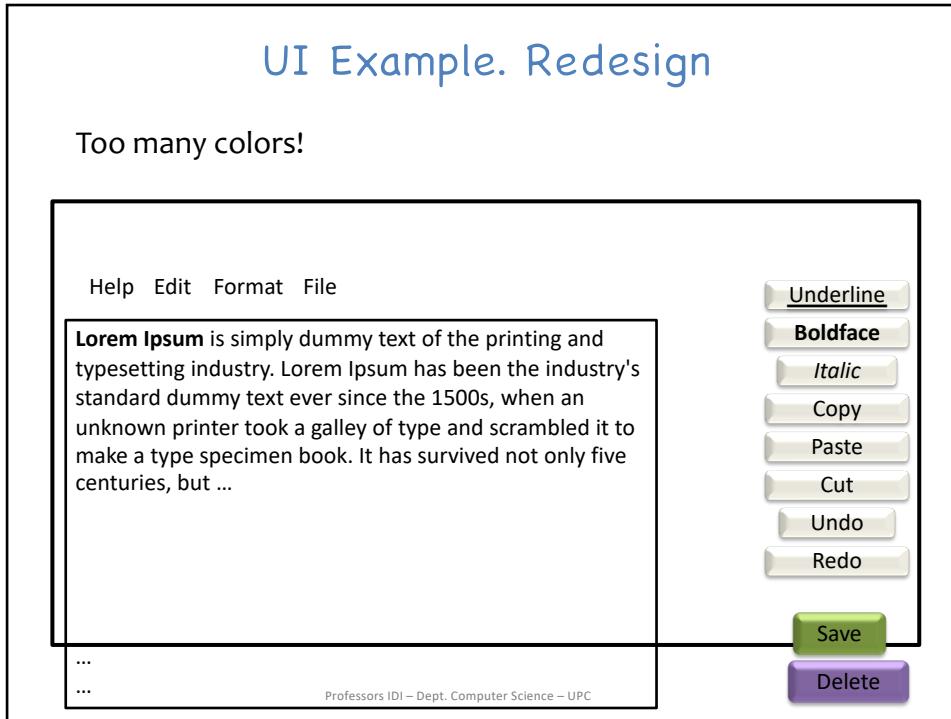
UI Example. Redesign

What's wrong with this simple text editor?



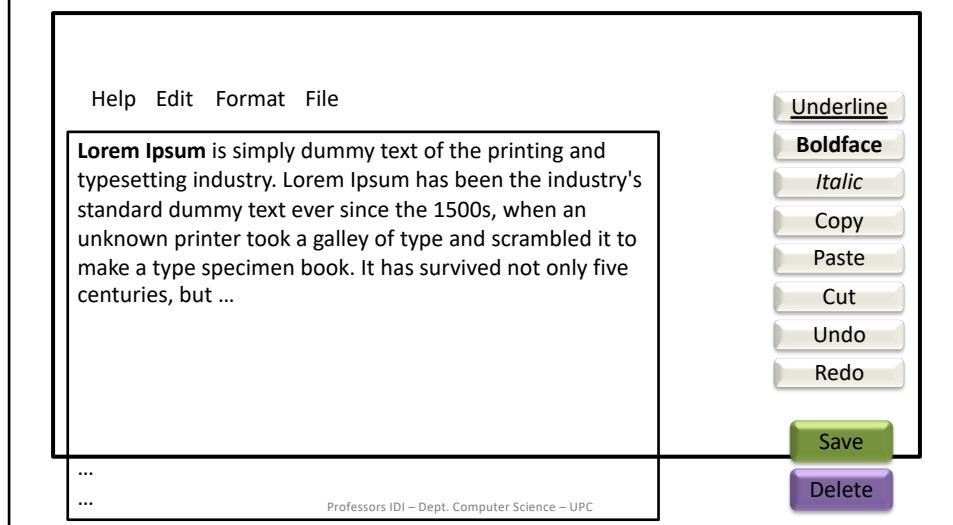
UI Example. Redesign

Too many colors!



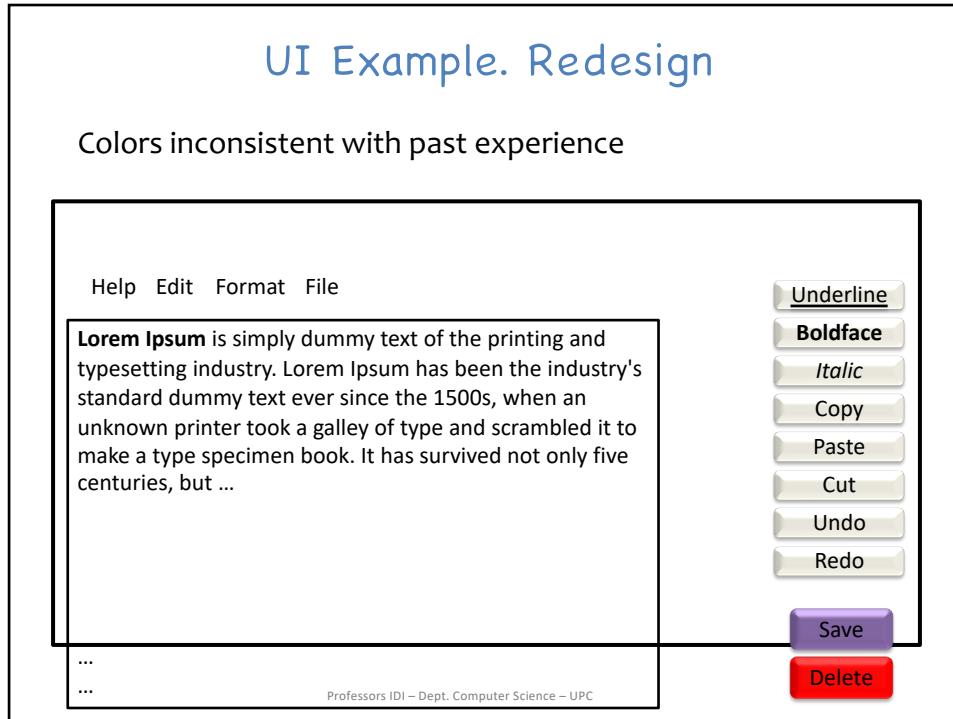
UI Example. Redesign

Inconsistent sizes & alignment



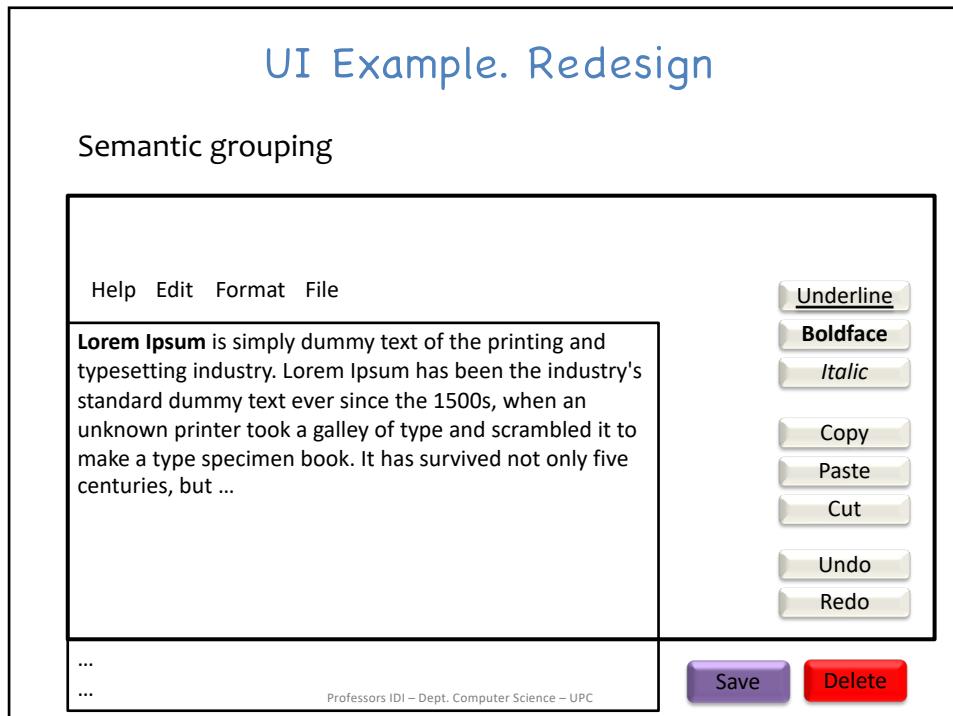
UI Example. Redesign

Colors inconsistent with past experience



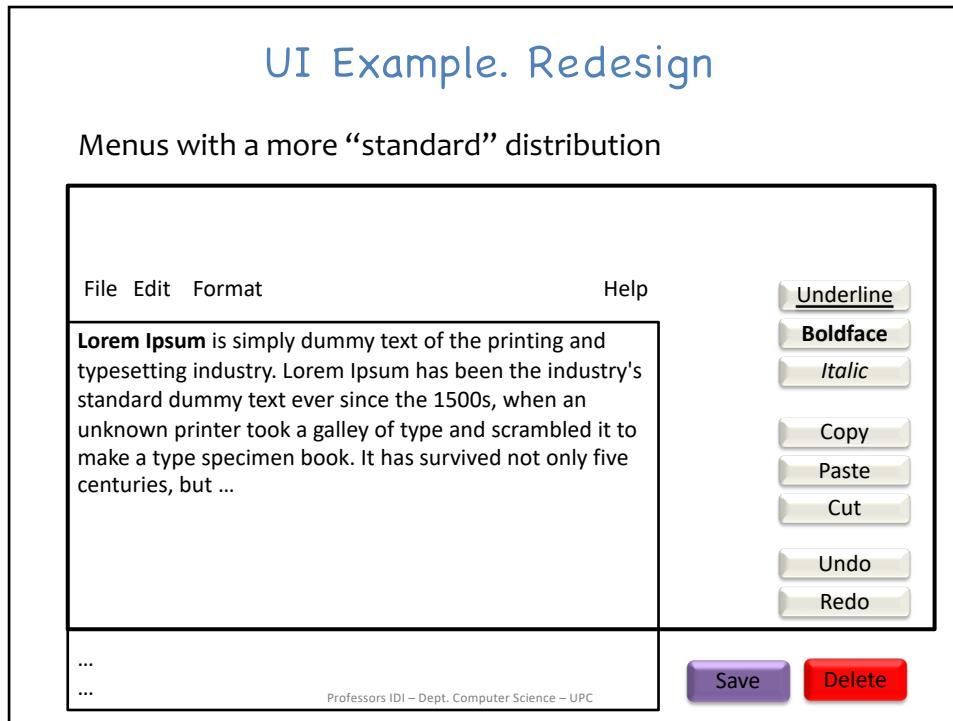
UI Example. Redesign

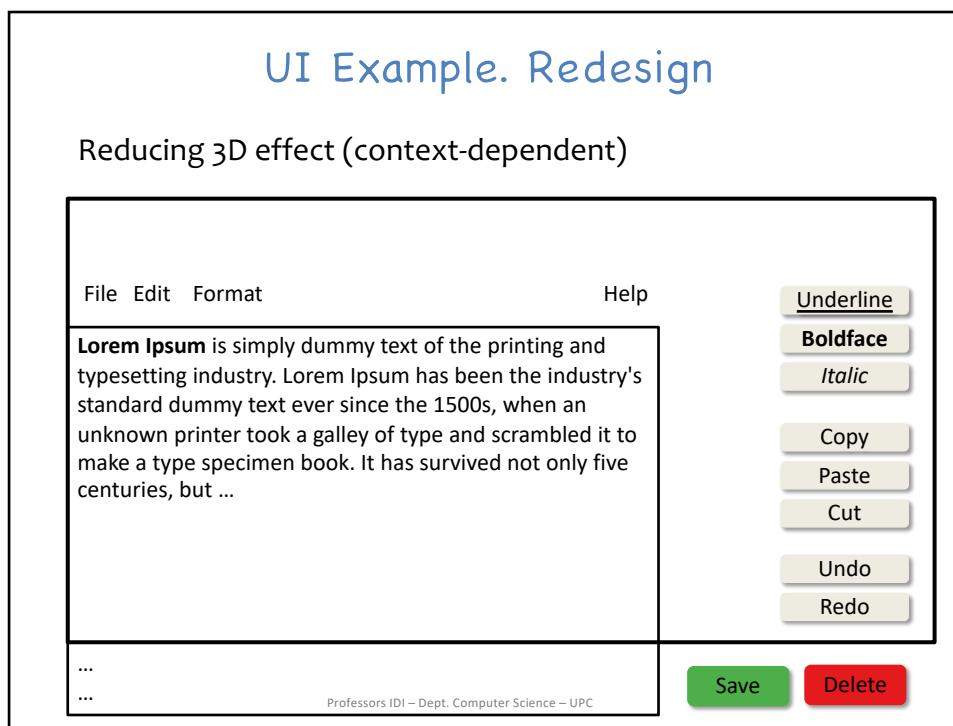
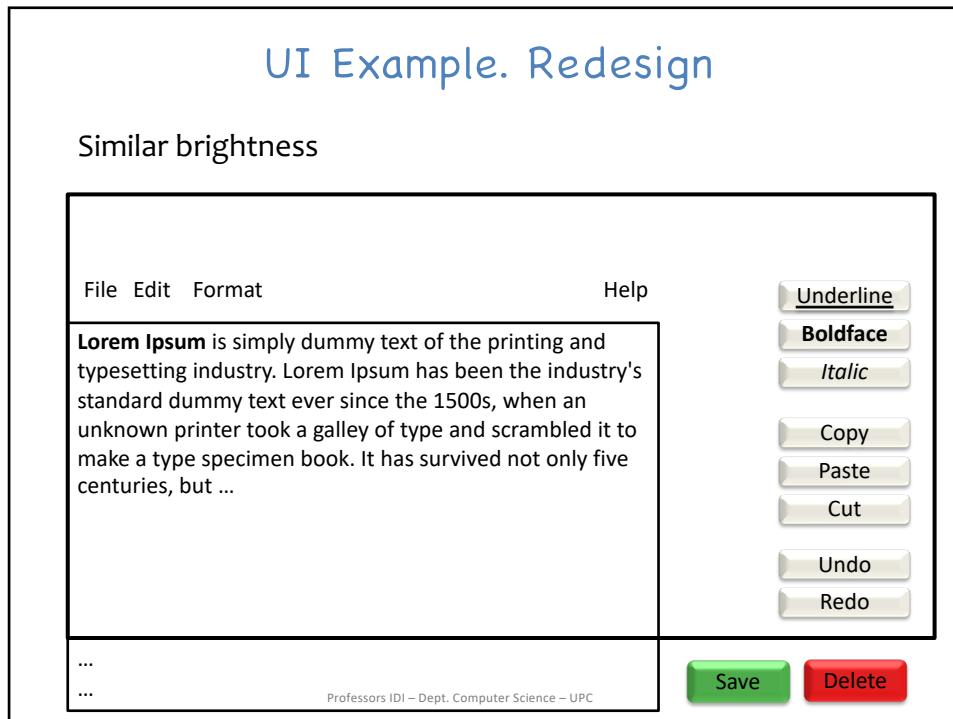
Semantic grouping



UI Example. Redesign

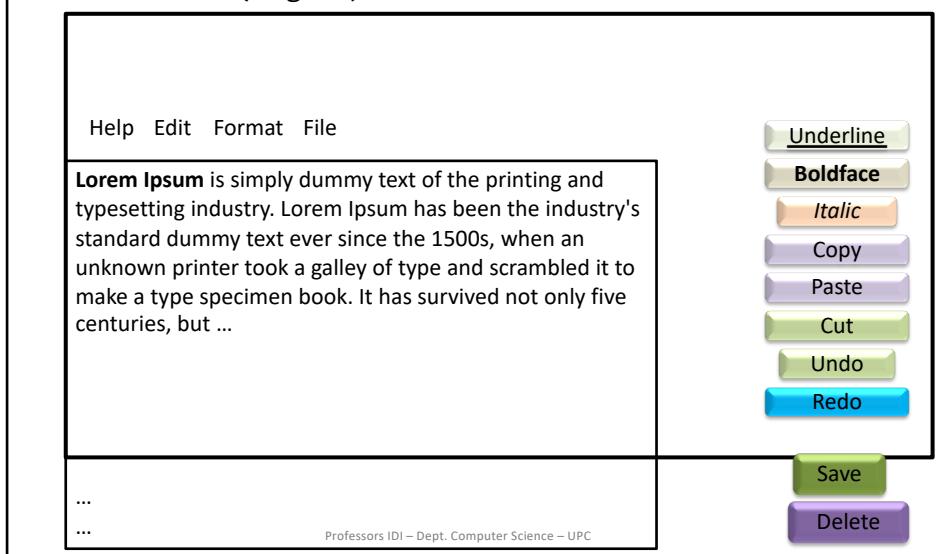
Menus with a more “standard” distribution





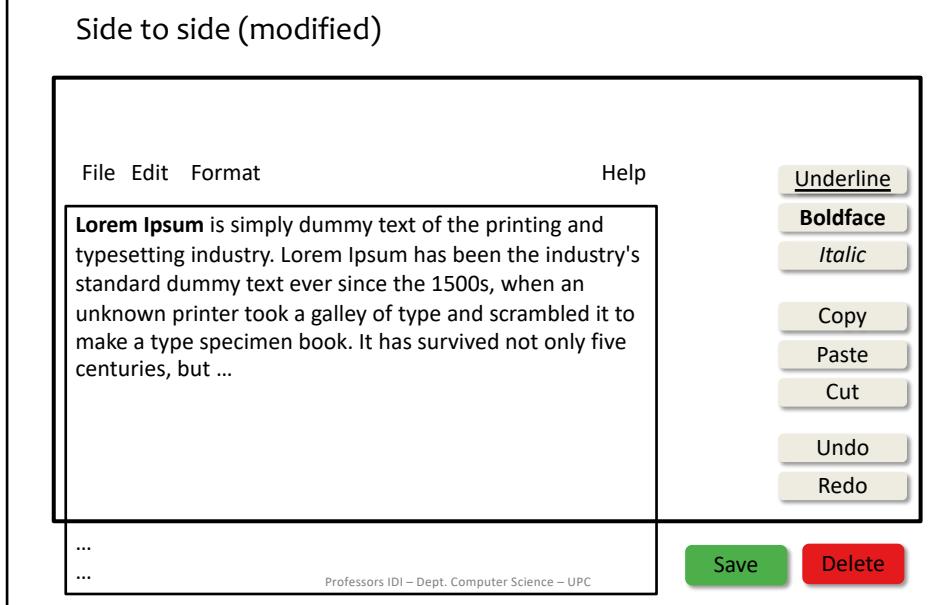
UI Example. Redesign

Side to side (original)



UI Example. Redesign

Side to side (modified)



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