Professors d'IDI - UPC

# IDI – Universal Design Principles& Perception Laws

### **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 Design Principles & Perception Laws

- Principle concepts of Design From the "Universal Principles of Design" book by William Lidwell, Kritina Holden, Jill Butler
- Perception Laws in Design: Gestalt Laws & more
- Color perception

### 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 improve our designs.

- Fix a visual hierarchy.
- Modular scale guarantees harmonious proportions. How to make a modular scale:
  - Choose a ratio (for example, the golden ratio, 1:1.618)
  - Choose a base size (i.e. 10), then multiply and divide to get many resonant numbers:

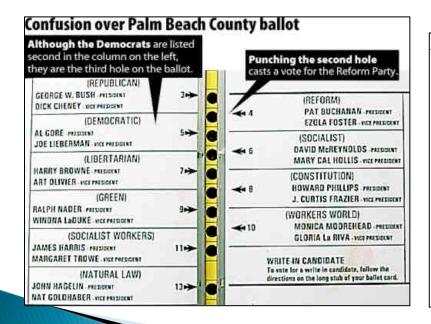


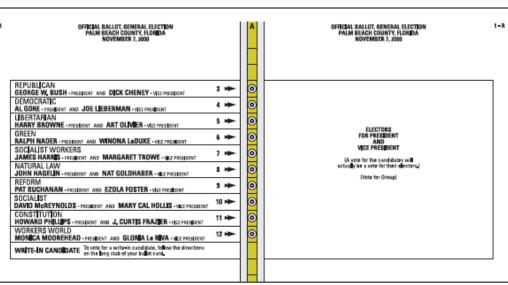


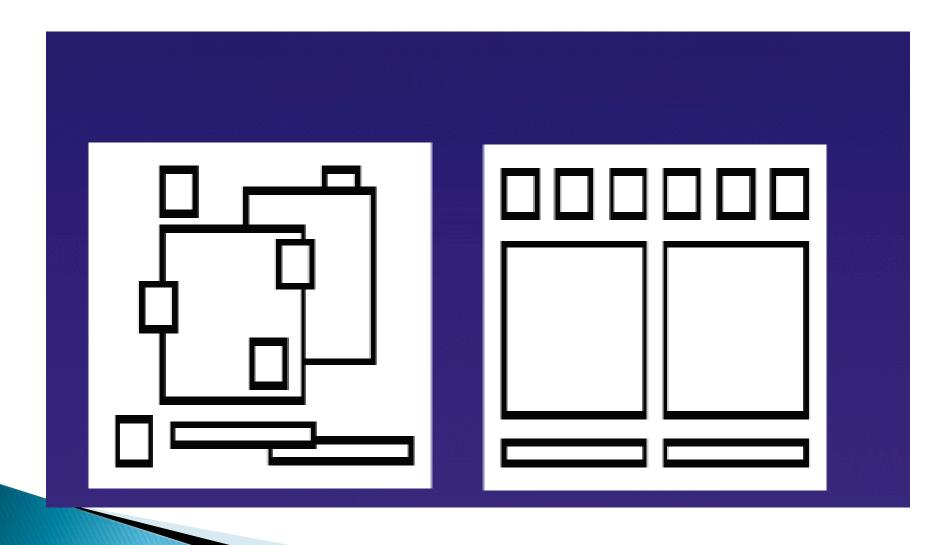
Less important

### Correct alignment

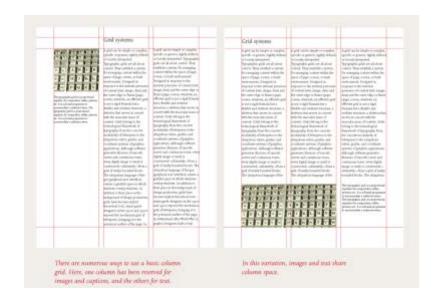
- Elements must be aligned, this creates a sense of unity and cohesion, as well as facilitates reading.
- More later...

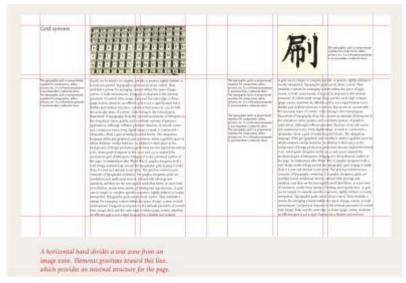






Define a grid. There are infinite options:



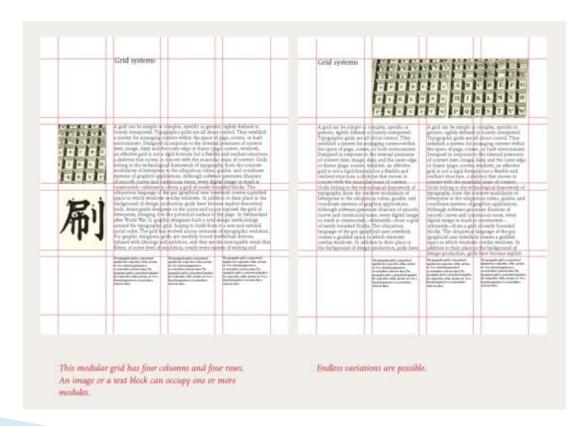


Column grid.

Hang Line (top area reserved for images and captions).

Josef Muller-Brockmann's *Grid Systems in Graphic Design*, 1961. (Image credit: <a href="http://thinkingwithtype.com/grid/">http://thinkingwithtype.com/grid/</a>)

 Modular grid. One element can occupy several neighboring cells.

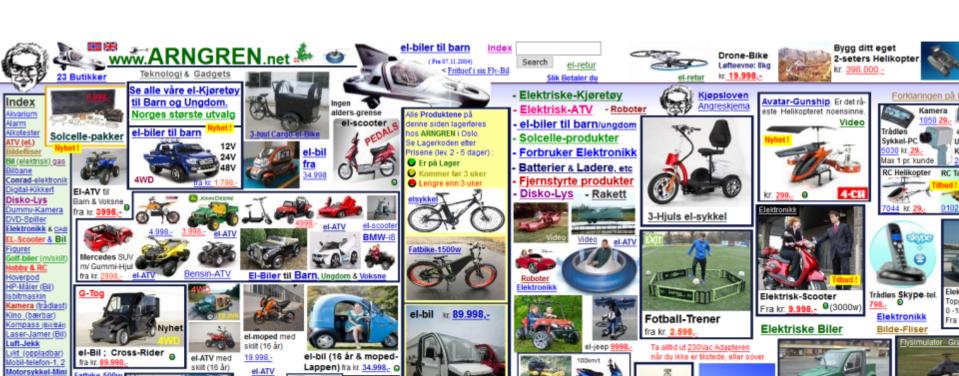


- Base line grids ensure the vertical rhythm between columns.
- The font sizes, line heights and margins are fixed to fit in a base grid of fixed height.
- Try <u>gridlover</u> for grid generation!



the baseline grid.

### **DON'T**







kr. 1998,- 0

Mål Internet hastighet 1.2





RC Fly-Bat

70 cm lang





Airwolf-Hel

m/ Innfellbare

T-Rex 450SE V

Digital-TV mottaker for PC & TV. Se Gratis @ NRK 1,2,3 & TV-2 498,-

Trádløs Kamera m/ Alarm & GSM

Bil-elektronikk Båt-elektronikk

Omformer (110V)

PC-mini (9 "), 2.

RC Produkter

Robot-Hund Robot-Støvsuger Roboter

Star Wars

Sykkel-PC

Walkie Talk

ogbane (til PC)

Traktor (elektrisk)

TV-Ur & Armb. Ur

Elektronikk

Rakett-Fly



el-sykkel

m/Oljestyrte

skivebremse

Star-I

selv-

En-hjul

balanse

el-scooter



RC Fiskebåt

m/Fish-Finder

kr. 3,998,- Q

el-ATV

Luft-jekk (4.2 tonn)

til Bil eller Båt.



el-ATV

Alarm Wi-Fi

GSM &

kamera

1.999,- 🔾



20-144x.

3-Hjuls

el-sykkel

fra kr 9,998

Disko-Lys

Fotball-Tren Teleskop



Metall (55 cm)

med Luftkanon

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Kikkert Damp-maskin

RC-Produkter



Alarm Wi-Fi & GSM



Hobby

El-Bil: Comarth

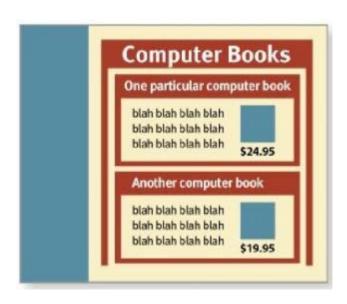
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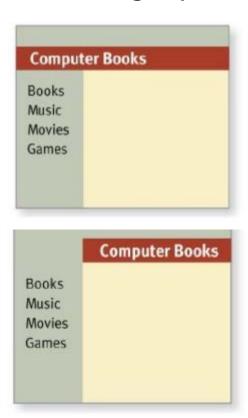
2WD/4WD, 2 eller 4 seter

### Nesting

Nesting is also a visual queue of the hierarchy of the information shown.

We need to be careful when designing the visual nesting dependences.



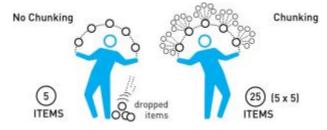


Images: Don't Make Me Think, Revisited, 3rd Edition

### Chunking

- A chunk is a unit of information in short-term memory
- <u>Chunking</u> 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.

654563465 654 - 56 - 34 - 65



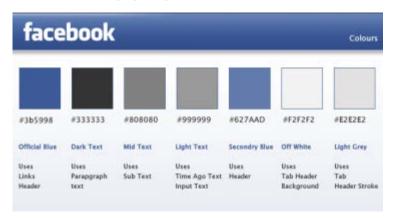
- $\triangleright$  Magical number: 7+/-2 (contemporary estimation  $4+/-1 \rightarrow 5$ )
- It refers to elements that must be memorize:
  - Menu items, telephone numbers...
- But it is not required to divide all the elements in a screen or page in groups of 5 or so, just the information to be memorized.
  - Elements such a dictionary pages must not be chunked.

#### Color

- 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

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

#### **COLOR PALETTE**



#### **CORPORATIVE PALETTE**

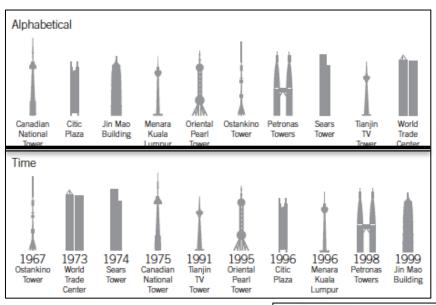


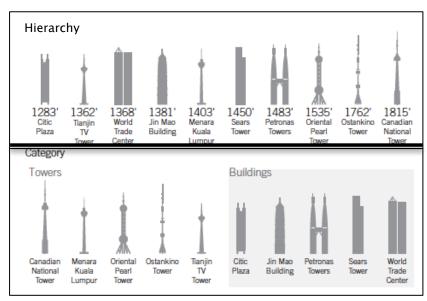
#### **COLOR HARMONY**

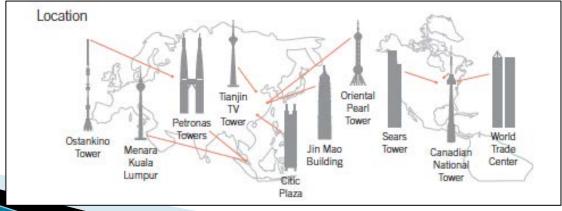


- LATCH principle. Information is organized according to:
  - Location: Information comes from different places (cities in a map, medicine: location of the body).
  - Alphabet: Usually for large amounts of data (words in dictionary...)
  - Time: Events with fixed durations. (meeting schedules).
  - Category: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

### LATCH principle.







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.

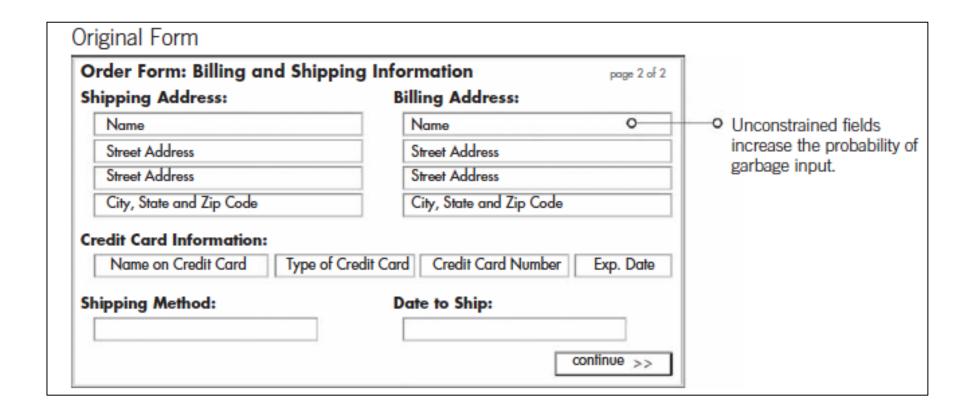
Ex.: Numerical fields filled with a phone number or credit card number...

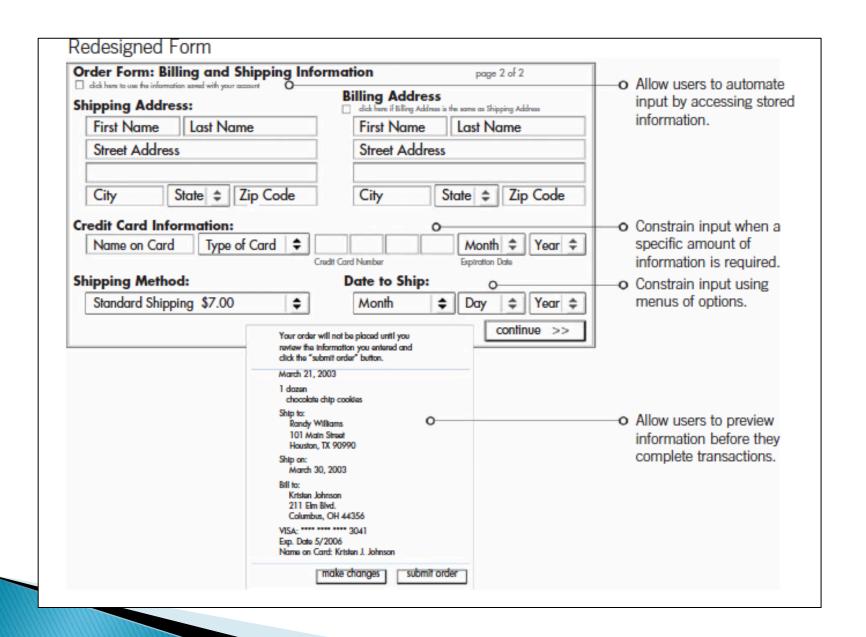
Type checks, input formatting, default values, example of inputs

 Quality error: The input has the correct type but has some defects (slips).

Ex.: Amounts of money in a money transfer.

May be alleviated with confirmations and previews.



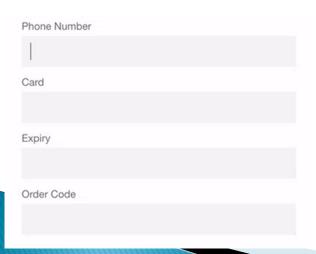


### Input control: avoid errors

Choose the appropriate input for each field:



Masked textboxes are a great option:

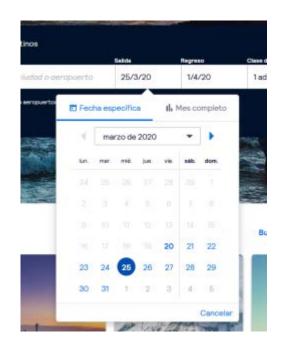




Use location services

STREET ADDRESS *		
Enter a location		
APARTMENT/SUITE #		
CITY *		
STATE *	ZIP *	
	<u> </u>	

### Input control: avoid errors

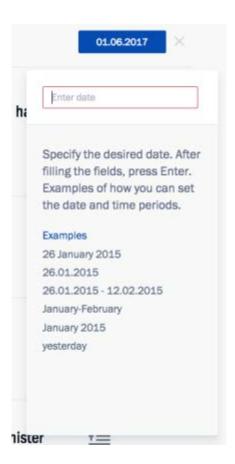


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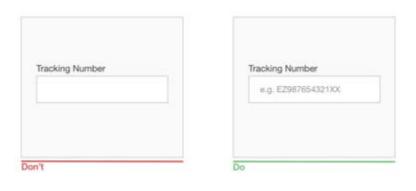
August 2 2018
September 3 2019
October 4 2000

http://en.kremlin.ru/



### Input control: avoid errors

Use placeholders to inform of the correct format of the inputs. Activate the proper keyboard for each field.







▶ And....use the camera!



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 Design Principles & Perception Laws

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- Gestalt Laws relevant for visual design.
- Gestalt: Psychology term people tend to organize visual elements into groups when certain principles are applied.

#### Gestalt Laws are:

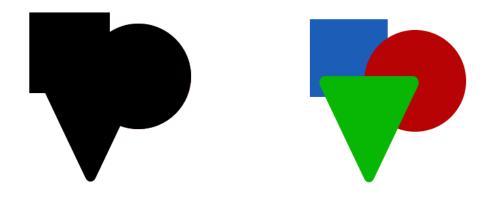
- Prägnanz Law
- The law of closure
- The law of similarity
- The law of proximity
- The law of symmetry
- The law of continuity
- The law of common fate

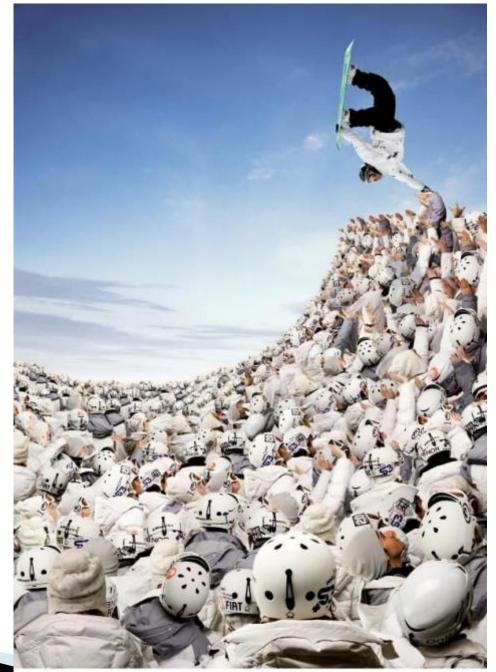




Pragnänz Law: Law of good figure, simplicity.

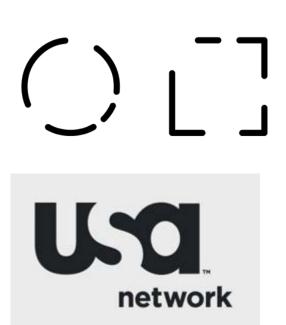
We tend to perceive simpler shapes because it is the interpretation that requires the least cognitive effort to us.





### ▶ The law of closure:

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

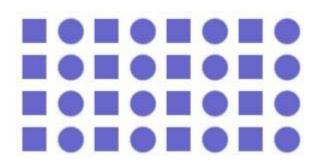


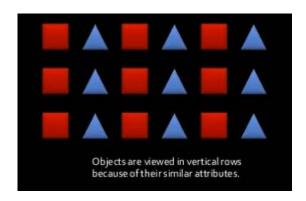


▶ The law of similarity:

The mind groups similar elements into collective entities or totalities.

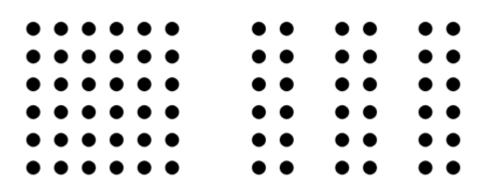
This similarity might depend on relationships of form, color, size, or brightness.





The law of proximity:

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





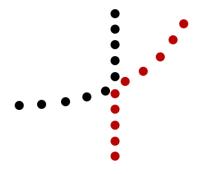
The law of symmetry:

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



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. Gestalt Laws

The law of common fate:

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



## Perception Laws. Gestalt Laws

#### Example







## Perception Laws. Gestalt Laws

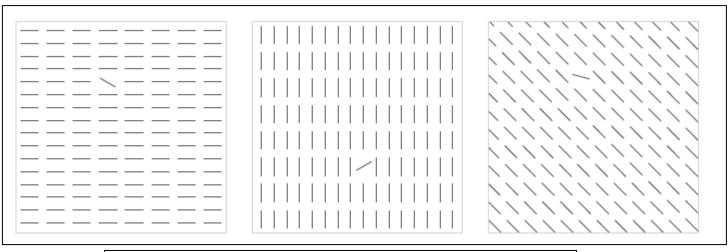
#### Example

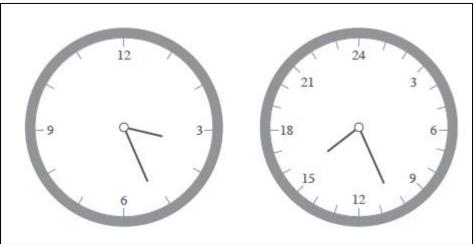






- Orientation Sensitivity: Efficient perception of line orientation is highly limited.
  - Vertical or horizontal orientations are ok, while oblique orientations are more difficult to distinguish (30° is de minimum recommended).
  - Due to two main phenomena in visual perception:
    - Oblique effect: 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 30°





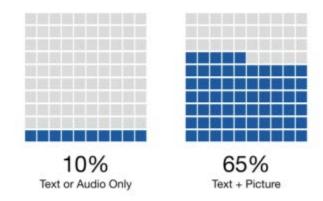
#### Pictorial superiority effect:

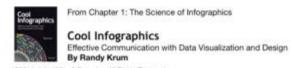
Concepts are much more likely to be remembered experientially if they are presented as pictures rather than as words.

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

#### Picture Superiority Effect

Memory retention after 3 days





of its components down to the weight distribution, which is another reason that only a STHE cuts like a STHE. And those are just the things you can see. There are a bevy of technological advancements that reinforce this machine's leadership position in the industry.

And such attention to detail has resulted in the company cursing ISO 9001 and ISO 14001 certifications. Which means it meets rigid international manufacturing, environmental and quality standards. On another gratifying level, STIHL products win quality and enginoering design awards regularly.

For instance, the introduction of the new MS 171 chain naw mucks the debut of a new generation of catting machine. The MS 171 features a greener, reducedemission engine and utilizes an advanced anti-vibration systems plus conveniences, and the

were taken in the construction. of a new guide bar assembly plant at the 100-acre compus. STIRL demonstrated its comesitiment to socially responsible environmental stewardship when the company built this 60,000 square-foot facility. The plant's roof boasts the Sargest privately funded "green. roof" in Virginia. The more than 56,000 sedom plants on the roof cool the building in the warmer months and help it retain heat in the cooler months, lowering energy usage,

How many chain saw formula that will created manufacturers have their own aproduct concepts. Products discharbetiack competitions? Each was handy gaseline-powered drill year, athletes from around the Idag machines, coffee harvesters world compete in time-benored that shorten harvesting times events such as the STIHL athlet offee harvesters and plus TIMBERSPORTS' Series and January and which already the STIHL' TIMBERSPORTS are in a series of the STIHL's offerings.

real benefits MCpc

10's this kind 00's big
benefits that will created
product concepts. Products dill
as machines, collect harvesters
that shorten barvesting timed
find olive barvesters and plane
hakkers—all of which alreads
ack demong STIBL's offerings

STIHL'

#### Made for professional loggers, landscapers, homeowners, construction workers, farmers, firefighters. . . and long-winded writers.

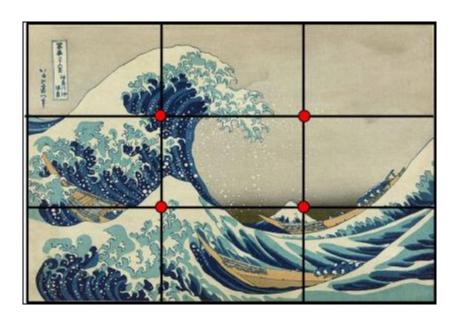
What can you expect from the number one selling brand of chain saws worldwide? Start with legendary design, reliable performance and long-lasting value. Plus innovations like reduced-emission engine technology and the toolless Quick Chain Adjuster. Best of all there's the nationwide network of 8,000 independent STIHE, dealers who service what they sell to help you do more—no matter what it is you do for a living

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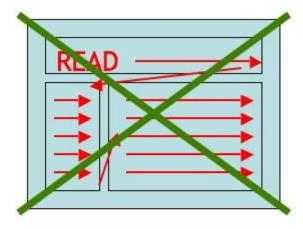


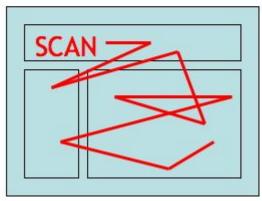
Rule of thirds





We do not read, we scan.





- People start reading from upper left corner of a page (unless the content is written in a right-to-left language).
- Navigation elements work better on the top.
- Users "read" a page diagonally, from upper left corner to lower right one, or in Z or F scan.
- Users pay attention to menu and navigation buttons.
- They commit to headlines.
- They ignore huge blocks of text while scanning.
- Lists hold attention for a longer time.
- Short paragraphs are easier to perceive.
- Users pay attention to subheadings only if they are interesting.



www.useit.com

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?



## Design mistakes. Web pages

Are you kidding?



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