

# Design Principles

# Analytical Evaluation

## Unit 4

Zeno Menestrina, MSc

*zeno.menestrina@unitn.it*

Prof. Antonella De Angeli, PhD

*antonella.deangeli@unitn.it*

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# Learning outcomes

- Fundamental design principles
- Usability heuristics
- Develop
  - Awareness of how to apply them in design
  - Critical ability to evaluate design

# Design principles

- Generalizable abstractions for thinking about different aspects of design
- The do's and don'ts of interaction design
- What to provide and what not to provide at the interface
- Derived from a mix of theory-based knowledge, experience and common-sense

# Which one do you prefer?

YAHOO!  Cerca sul web

Entra Mail

- Mail
- Notizie
- Sport
- Finanza
- Celebrity
- Style
- Cinema
- Video
- Auto
- Answers

Altri siti Yahoo >

eBay  
Amazon  
Meetic

Rendi YAHOO! la tua pagina iniziale

## Sarli da applausi, lezione di stile a tutto il mondo del calcio

Nel post partita contro la Lazio l'allenatore del Napoli ha rilasciato una dichiarazione che ha colto tutti di sorpresa. [Cosa ha detto?](#) » 1-5 di 40

- Il selfie più spaventoso
- Emilio Fede senza soldi
- Può un calciatore valere così tanto?
- Sarli da applausi, lezione di stile**
- Il pesce gigante di Hokkaido

### Tutte le notizie

Attualità Sport Economia Entertainment

#### Giuliano Giuliani, dopo la cacciata da U&D lo troviamo così

Dopo essere stato allontanato dalla trasmissione della De Filippi, l'ex Cavaliere del Trono Over si è trasformato e...  
LOLnews 42 min fa

#### Schumacher, ecco come sta veramente dopo due anni

Sulle condizioni del campione vige uno stretto riserbo, ma qualcosa trapela dall'inglese Daily Express: la fonte sarebbe vicina alla famiglia  
LOLnews

### Trend del giorno

- Papa e Fidel Castro
- Scandalo Volkswagen
- Carte bancomat
- Skype fuori uso
- Dimagrire glutei
- Riforma pensioni
- Meteo
- Alexis Tsipras
- Auto usate
- Alice Sabatini

### Yahoo Screen

Canali in primo piano

Da non perdere

- Vivi al massimo con Renault Kadjar
- Vivi al massimo con Renault Kadjar
- Vivi al massimo con Renault Kadjar

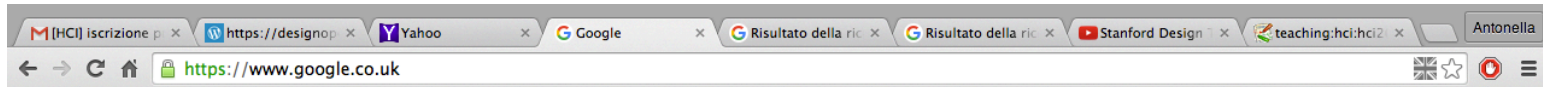
Video Curiosi

- Cosa c'è nel kebab?
- La bimba tifa Milan
- La frutta diventa arte: sfilata di ca...

Attualità

<https://it.sports.yahoo.com/notizie/sarli-maradona-resta-il-mio-203309276>

# Which one do you prefer?



Posta Immagini antonella.deangeli@unitn.it



Cerca con Google

Mi sento fortunato

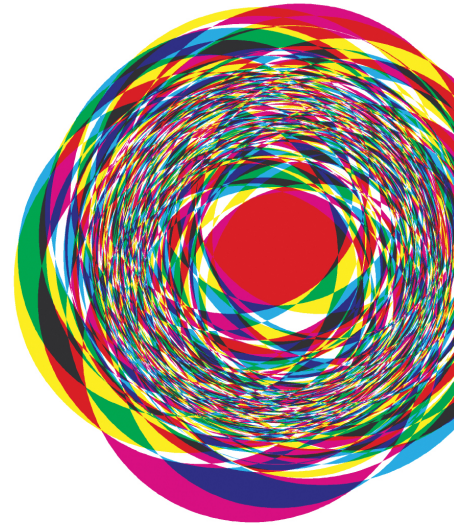
Google.co.uk disponibile in: [English](#)

[Pubblicità](#) [Soluzioni aziendali](#) [Informazioni](#)

[Privacy](#) [Termini](#) [Impostazioni](#)

the laws of  
S I M P L I C I T Y

DESIGN, TECHNOLOGY, BUSINESS, LIFE



John Maeda

*“Maeda is the Master of Simplicity.”*

—Andrea Ragnetti BOARD OF MANAGEMENT, ROYAL PHILIPS ELECTRONICS

# Simplicity

- Simple things are more beautiful
  - Strong correlation between simple interfaces and aesthetic rating
- Simple things work better
  - Correlation with usability
- Processing fluency

# Design factors

- Visual clutter
- Number of Colours
- Symmetry
- Figure-ground contrast



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- Number of Colours
- Symmetry
- Figure-ground contrast

**PIMORONI**  
Purveyors of fine Maker goods, worldwide

Location of pirate treasure... **Search**

£0  
0 items [View](#) [Checkout](#)

Raspberry Pi 3 | micro:bit | Arduino & Co. | **Kits** | Electronics | Prototyping | Tools | Kids | More... | **NEW!**

## Kits

Kits are great as gift, holiday projects or for just getting started with something new and interesting. Dip a toe into the world of microcontrollers with a SparkFun Starter Kit, make your own electronic dough, practice soldering and more.

1 2 3 Next »

Showing products 1 to 10 (30 total)

Sort products by: [Featured](#) [Popularity](#) [Title](#) [Newest](#) [Price](#)

**New!**

### Raspberry Pi Beginners' Kit

 PIM212  
Just starting out with Raspberry Pi? This kit includes all the goodies you'll need for your first Maker projects.  
**£75** [In stock](#)

**New!**

**Micro:bit** MIM002

**Arduino Compatible**

- Camera
- Circuit Stickers
- Component
- Cosplay & Costuming
- Hand Tools
- Kids
- Kit
- LED

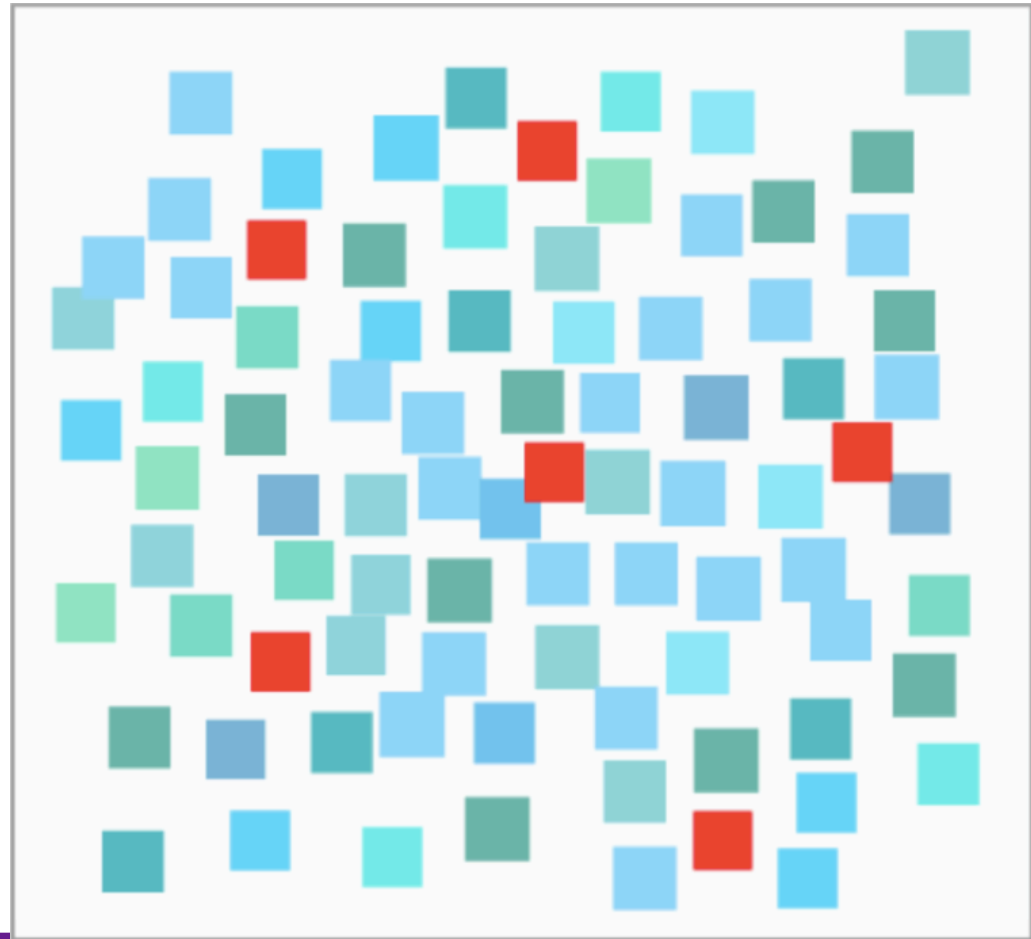
# Design factors

- Visual clutter
- Number of Colours
- Symmetry
- Figure-ground contrast

The screenshot shows the PIMORONI website interface. At the top, there is a search bar with the placeholder text "Location of pirate treasure..." and a "Search" button. To the right, a shopping cart icon shows "£0 0 items" and a "View" link, with a "Checkout" button. Below the search bar is a navigation menu with categories: "Raspberry Pi 3", "micro:bit", "Arduino & Co.", "Kits", "Electronics", "Prototyping", "Tools", "Kids", "More...", and a "NEW!" button. The main content area features a "Kits" section with a purple background and a white text box containing the following text: "Kits are great as gift, holiday projects or for just getting started with something new and interesting. Dip a toe into the world of microcontrollers with a SparkFun Starter Kit, make your own electronic dough, practice soldering and more." Below this text is a photograph of various electronic kits, including "DIY INSTRUMENT KIT", "DIY SYNTH KIT", "Evil Mad Scientist", and "THE 'THREE FIVES' DISCRETE 555 TIMER KIT". A pagination bar shows "1 2 3 Next »" and a "Showing products 1 to 10 (30 total)" indicator. Below the photograph, there is a "Sort products by:" dropdown menu with options: "Featured", "Popularity", "Title", "Newest", and "Price". The first product listing is for the "Raspberry Pi Beginners' Kit" (PIM212), which is marked as "New!". The listing includes a small image of the kit, a description: "Just starting out with Raspberry Pi? This kit includes all the goodies you'll need for your first Maker projects.", a price of "£75", and an "In stock" status with a shopping cart icon. To the right of the product listings is a vertical sidebar menu with a dashed border, listing various categories: "Arduino Compatible", "Camera", "Circuit Stickers", "Component", "Cosplay & Costuming", "Hand Tools", "Kids", "Kit", and "LED".

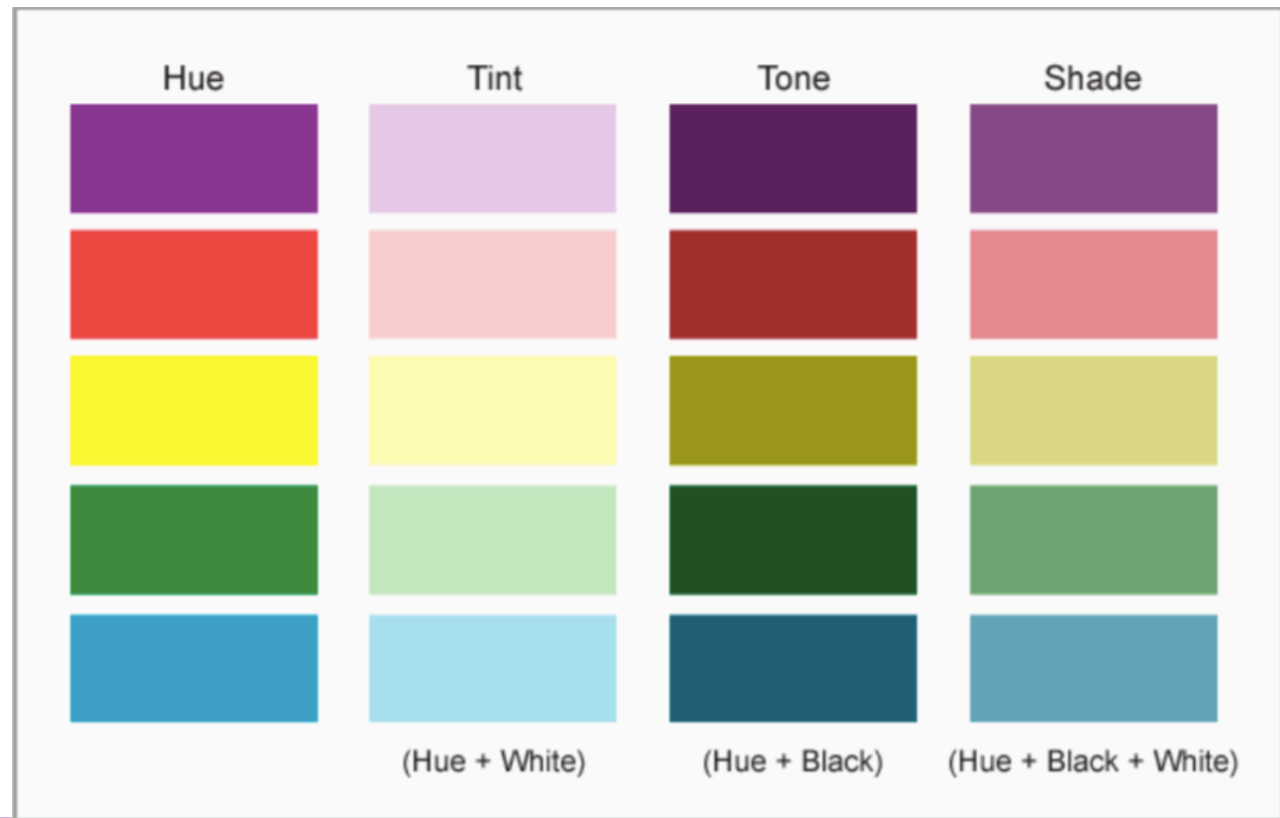
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# Exercise

For each principle:

1. Presentation of the principle

2. ~30 seconds to think about an example (good or bad)

# Visibility



This is a control panel for an elevator:

- How does it work?
- Push a button for the floor you want?
- Nothing happens.
- Push any other button?
- Still nothing.
- What do you need to do?

From: [www.baddesigns.com](http://www.baddesigns.com)



# Visibility

...you need to insert your room card in the slot by the buttons!

How would you make this action more visible?



From: [www.baddesigns.com](http://www.baddesigns.com)

# Visibility

...you need to insert your room card in the slot by the buttons!



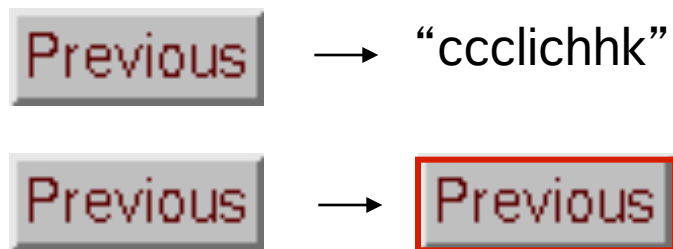
From: [www.baddesigns.com](http://www.baddesigns.com)

How would you make this action more visible?

- make the card reader more obvious
- provide an auditory message that says what to do (which language?)
- provide a big label next to the card reader that flashes when someone enters
- make the lights near the reader blink when someone pushes a button

# Feedback

- Sending information back to the user about what has been done
- Includes sound, highlighting, animation and combinations of these
  - e.g. when screen button clicked on provides sound or red highlight feedback:



# Constraints

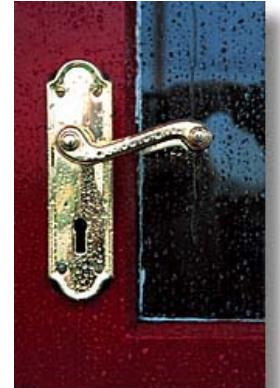
- Restricting the possible actions that can be performed
- Helps prevent user from selecting incorrect options
- Three main types (Norman, 1999)
  - Physical
  - Cultural
  - Logical

# Physical constraints

- Refer to the way physical objects restrict the movement of things
  - E.g. only one way you can insert a key into a lock
  - How many ways can you insert a CD or DVD disk into a computer?
  - How physically constraining is this action?
  - How does it differ from the insertion of a floppy disk?

# Affordances

- Refers to an attribute of an object that allows people to know how to use it
  - e.g. a mouse button invites pushing, a door handle affords pulling
- Norman (1988) used the term to discuss the design of everyday objects
  - Learned conventions of arbitrary mappings between action and effect at the interface
  - Some mappings are better than others
- Much popularised in interaction design to discuss how to design interface objects
  - e.g. scrollbars to afford moving up and down, icons to afford clicking on



# Logical constraint



Exploits people's everyday common sense reasoning about the way the world works

- Where do you plug the mouse?
- Where do you plug the keyboard?
- Top or bottom connector?
- Do the colour coded icons help?

From: [www.baddesigns.com](http://www.baddesigns.com)

# How to design them more logically



- A. provides direct adjacent mapping between icon and connector
- B. provides color coding to associate the connectors with the labels

From: [www.baddesigns.com](http://www.baddesigns.com)



# Example

The screenshot shows a Microsoft PowerPoint 2007 window titled "Microsoft PowerPoint - [week 2\_2006]". The main slide content is as follows:

How to design them more logically

- (i) A provides direct adjacent mapping between icon and connector
- (ii) B provides color coding to associate the connectors with the labels

From: [www.baddesigns.com](http://www.baddesigns.com)

2006/2007 INFO21002 - User-Centred Design 9

Click to add notes

The interface includes a menu with options like "New Slide", "Duplicate Slide", "Slide Number", "Date and Time...", "Symbol...", "Comment", "Slides from Files...", "Slides from Outline...", "Picture", "Diagram...", "Text Box", "Movies and Sounds", "Chart...", "Table...", "Object...", and "Hyperlink...". The "Slide Layout" task pane on the right shows "Apply slide layout:" and "Other Layouts" sections. The status bar at the bottom indicates "Slide 9 of 19" and "Default Design".

# Cultural constraints

- Learned arbitrary conventions
  - e.g., red triangles for warning
- Can be universal or culturally specific

# Cultural constraints



# Cultural constraints



# Mapping

Relationship between controls and their movements and the results in the world



A



B



C



D

# Why is this a better design?

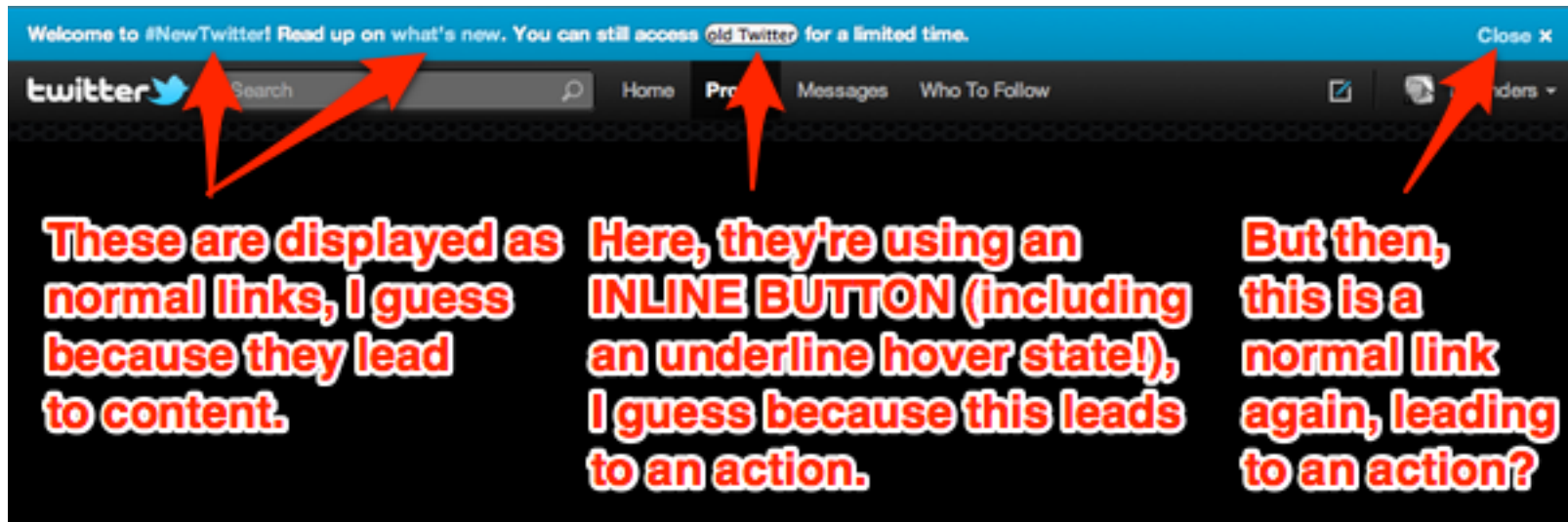


# Consistency

- Design interfaces to have similar operations and use similar elements for similar tasks
  - e.g., always use ctrl key plus first initial of the command for an operation – ctrl+C, ctrl+S, ctrl+O
- Consistent interfaces are easier to learn and use

# Internal and external consistency

- Internal consistency: designing operations to behave the same within an application
  - Difficult to achieve with complex interfaces



The image shows a screenshot of the Twitter interface with three red arrows pointing to specific elements. The top bar is blue and contains the text: "Welcome to #NewTwitter! Read up on what's new. You can still access [old Twitter](#) for a limited time." and a "Close x" button. Below this is a dark navigation bar with the Twitter logo, a search bar, and links for "Home", "Profile", "Messages", and "Who To Follow".

**These are displayed as normal links, I guess because they lead to content.**

**Here, they're using an **INLINE BUTTON** (including an underline hover state!), I guess because this leads to an action.**

**But then, this is a normal link again, leading to an action?**



# Internal and external consistency

- External consistency: designing operations, interfaces to be the same across applications and devices
  - Very rarely the case, based on different designer' s preference
  - Brand Identity

# Keypad numbers layout

## A case of external inconsistency

(a) phones, remote controls

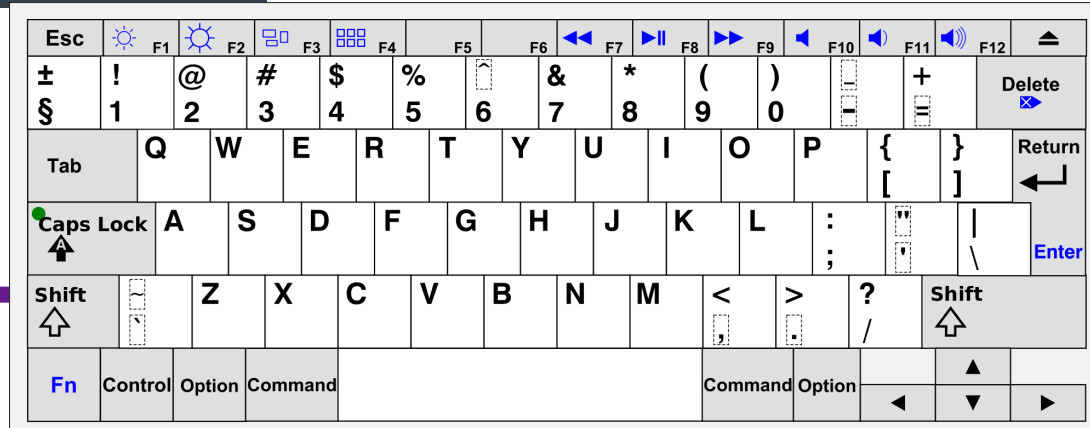
1	2	3
4	5	6
7	8	9
	0	

(b) calculators, computer keypads

7	8	9
4	5	6
1	2	3
0		

# Keyboard layout

A case of external inconsistency



# Usability principles

- Similar to design principles, except more prescriptive
- Used mainly as the basis for evaluating systems
- Provide a framework for heuristic evaluation

# Usability heuristics (Nielsen 2001)

- Visibility of system status
- Match between system and the real world
- User control and freedom
- Consistency and standards
- Help users recognize, diagnose and recover from errors
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help and documentation

[http://www.useit.com/papers/heuristic/heuristic\\_list.html](http://www.useit.com/papers/heuristic/heuristic_list.html)

<http://designingwebinterfaces.com/6-tips-for-a-great-flex-ux-part-5>

0	I don't agree that this is a usability problem at all
1	Cosmetic problem only. Need not be fixed unless extra time is available on project
2	Minor usability problem: fixing this should be given low priority
3	Major usability problem: important to fix, so should be given high priority
4	Usability catastrophe: imperative to fix this before product can be released

<http://www.useit.com/papers/heuristic/severityrating.html>

# Key points

- Design principles
  - Simplicity
  - Visibility
  - Feedback
  - Constraint
  - Mapping
  - Consistency
  - Affordance
  - Heuristics

# Recommended reading

- Sharp et al. Chapter 1/15
  - More on design principles
    - Don Norman 1988 The design of everyday things
    - Usability: <http://www.useit.com>  
[http://www.useit.com/papers/heuristic/heuristic\\_list.html](http://www.useit.com/papers/heuristic/heuristic_list.html)
    - <http://designingwebinterfaces.com/6-tips-for-a-great-flex-ux-part-5>
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