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• User Interface Design

A Software Design Manifesto

"The daily experience of using computers far too often is still fraught with difficulty, pain, and barriers for most people."

— Mitch Kapor, Lotus



Slides originally by Ken Wong

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Poor Usability

IT departments neglect usability in favor of cost

— Samsung survey

Poor Usability

What if software engineers developed user interfaces ...



ATI Display Control Panel



“User Interface Design”

<http://www.dilbert.com/strips/comic/2002-09-23/>

<http://www.dilbert.com/strips/comic/2002-09-24/>

<http://www.dilbert.com/strips/comic/2001-04-14/>

Features

Complexity causes 50% of product returns

— Elke den Ouden, TU Eindhoven



Featuritus?

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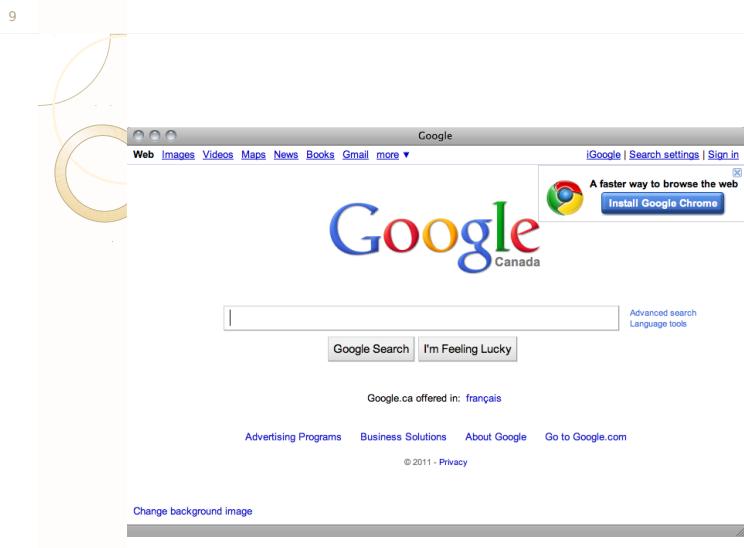


Features

Engineers, scientists, programmers ...
are not representative of *normal people*



© ThinkGeek



"Googley User Experience"

Link:
<http://www.google.com/corporate/ux.html>



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Usability

- Some approaches:
 - focus on user tasks
 - conduct studies of users
 - get feedback from users during design
 - see good and bad examples
 - use user interface design guidelines
 - employ graphic design
- apply principles from psychology & sociology



“Surprises”

Do we really need vowels?

H•p• y•• c•n r••d th•s s•nt•nc• w•th•t th• v•w•ls.

Cn y rd ths qstn?



“Surprises”

Do we really need to spell correctly?

“Aoccdrnig to rscheearch at an Elingsh uinervtisy, it deosn’t mtaer in waht oredr the ltteers in a wrod are, the olny iprmoetnt tihng is taht the frist and lsat ltteer is at the rghit pclae.”

“Surprises”

Link:

[http://web.princeton.edu/sites/opplab
/papers/Diamond-Yauman_Oppenheimer_2010.pdf](http://web.princeton.edu/sites/opplab/papers/Diamond-Yauman_Oppenheimer_2010.pdf)

Disfluency through harder-to-read fonts can be better for long-term learning.

Human Computer Interaction

Many interaction styles over the years:

- rewiring
- punched cards
- programming
- command line
- choices and prompts
- forms
- graphical user interface
- point and click
- touch-based
- gesture-based
- ...

Graphical User Interface

Underlying principles:
user in control

- reduce certain “modes” that overly limit the user
- manipulate objects
 - syntax is select (noun), then act (verb)
- visibility of the objects of interest
 - exploit recognition, not recall
- affordance (appearance suggests form of interaction)

Graphical User Interface

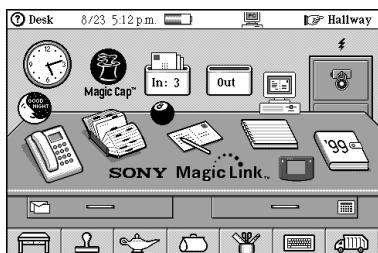
Underlying principles:
incremental action with rapid feedback

- show objects as they are moved or resized
- reversible actions (instant undo) and canceling
 - encourage safe exploration
- every choosable action is legal
 - gray out invalid choices

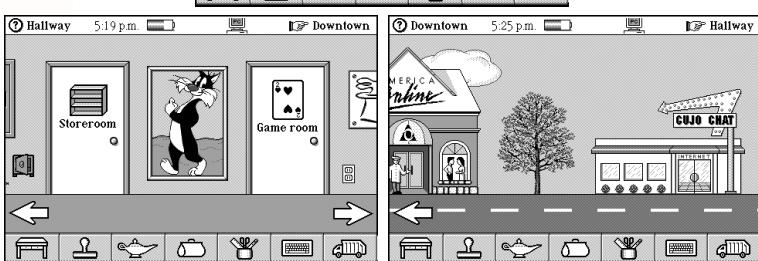
Graphical User Interface

Support learning through metaphors:
familiar settings to teach new concepts

- desktop, menus, rooms, shopping carts
- metaphors can only go so far
 - trash can on the desktop?
- carried to non-intuitive situations
 - drag disk icon to trash to unmount it?
- cultural differences
 - menus imply the availability of choice



© General Magic



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Exercise

Find user interface problems.



© Isys Information Architects

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Book a Flight

Book Flights

| | |
|--------------------------------------|--|
| Departure Date Morning Jan 1 | To (enter IATA airport code) |
| Arrival Date Morning Jan 1 | Fair class: ECONOMY |
| One way: <input type="checkbox"/> | # of Passengers: <input type="text"/> (up to 9) |
| Round trip: <input type="checkbox"/> | <input type="button" value="Execute"/> <input type="button" value="Cancel"/> |

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Consistency, Consistency, Consistency

Principles:
predictable

- what comes next is clear from what came before

generalizable

- specific cases extend to new situations

stable

- consistently placed targets in the user interface

Consistency, Consistency, Consistency

Lexical consistency:
consistent with common usage

- e.g., left = less, right = more

consistent abbreviation rules

- e.g., Jan, Feb, Mar, etc. (all equal length)

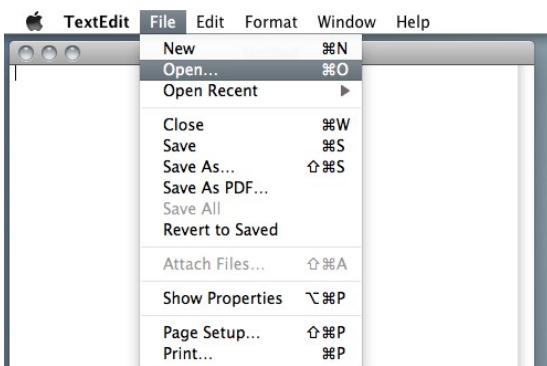
symbols used consistently

- e.g., ellipsis (...) to bring up a dialog from a button

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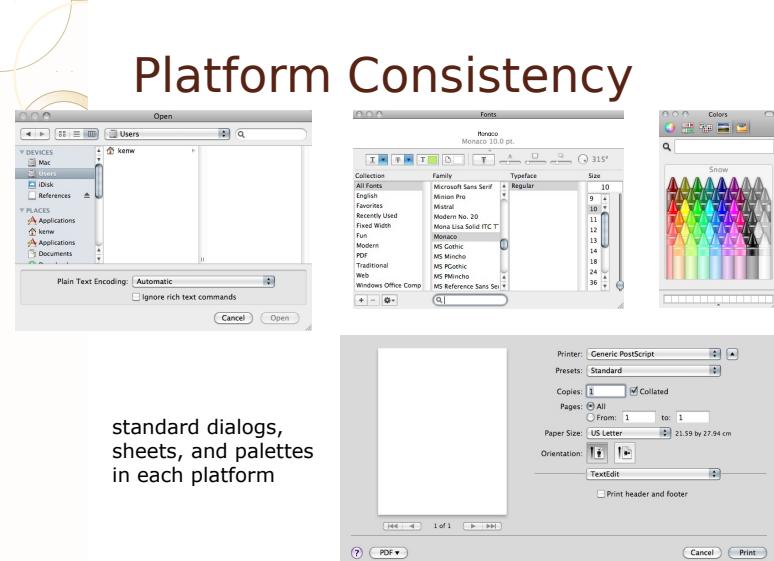
Consistency, Consistency, Consistency

Syntactic consistency:
e.g., consistent order of menus and menu items



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Platform Consistency



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• Graphic Design



Graphic Design

Goal:

guide the user's attention and convey information clearly about the system's functionality and state

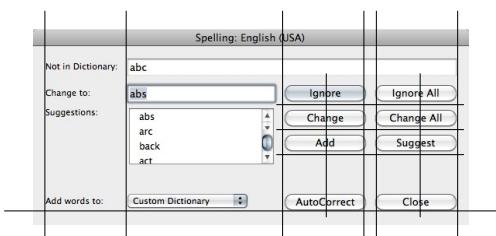
i.e., use layout and color to organize and communicate economically



Graphic Design Principles

Organize for neatness:

use grids and alignment, balance and symmetry, nothing placed arbitrarily



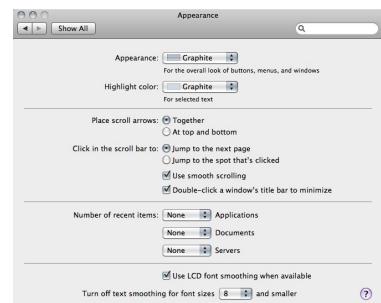
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Graphic Design Principles

Organize for grouping:

e.g., use labels, separators, proximity



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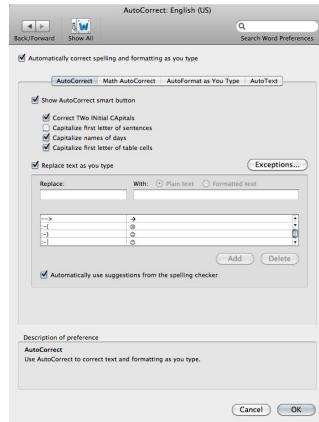
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Graphic Design Principles

Organize for grouping:
e.g., use tabs,
indentation,
borders



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Graphic Design Principles

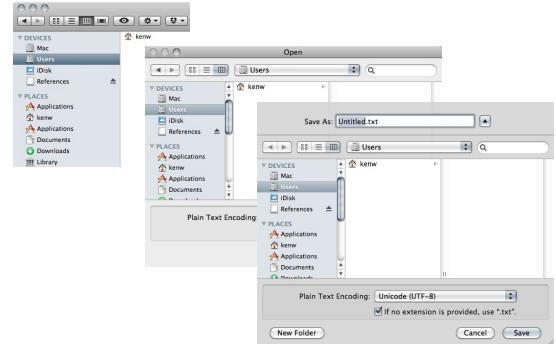
Organize for order and flow:
arrange elements in sequence to efficiently guide the user's eyes and support the task



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Graphic Design Principles

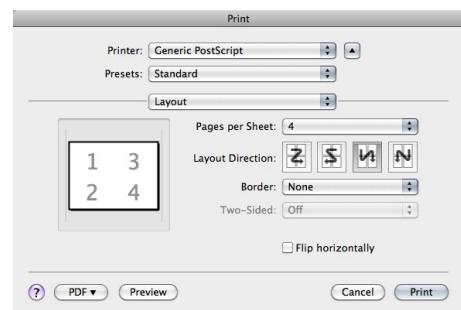
Organize for grouping:
use repetition to show similarity and unity



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Graphic Design Principles

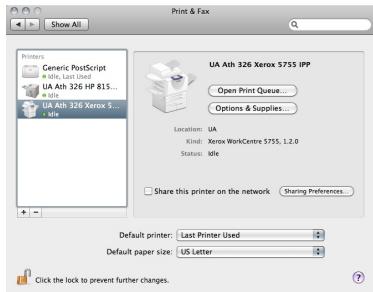
Economize for clarity:
get the most out of a minimal set of cues



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Graphic Design Principles

Economize for quick recognition:
use icons, pictures, previews, and affordances to remind



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Graphic Design Principles

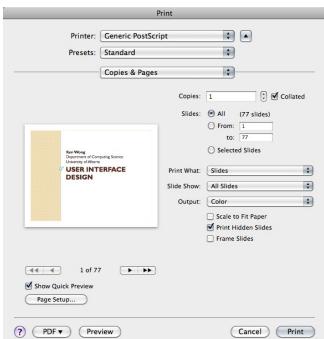
Economize for reducing clutter:
focus on the essentials



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Graphic Design Principles

Economize for streamlining tasks:
simplify the most common case



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Graphic Design Principles

Distinctiveness:
if two nearby things are not the "same",
make them look different

- position
- size
- shape
- color
- lightness
- texture
- etc.



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Graphic Design Principles

Distinctiveness:
the eye is attracted by

[red box] set is isolated

color versus non-color

saturated colors

different typefaces

bigger elements

Using Color

Tips:
be selective

- maximize the effect when used **minimally**
- be consistent in meaning
- test **passed**, program **stopped**



avoid blue for foreground elements

Using Color

Tips:
in an alert, don't highlight the "dangerous" choice in red

avoid overuse of too many saturated colors

can cause visual fatigue



Using Color

Tips:
use foreground and background colors that contrast well



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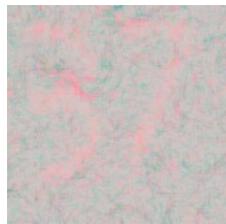


Using Color

Tips:

combine color with shape, brightness, position, text labels, etc. for redundancy

- because of color blindness or poor vision



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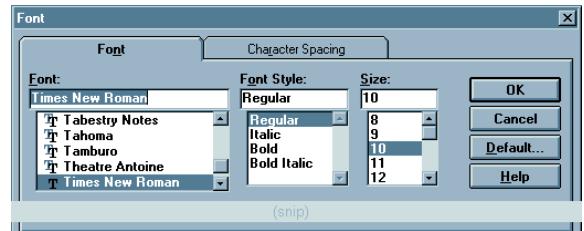
Bad Designs

Interface Hall of Shame

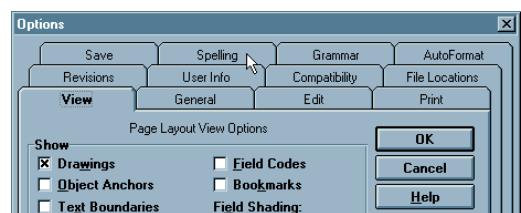
Link:

<http://homepage.mac.com/bradster/iarchitect/shame.htm>

Poor Use of Tabs



(snip)

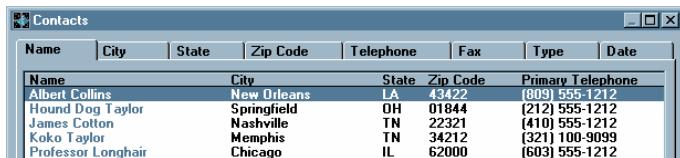


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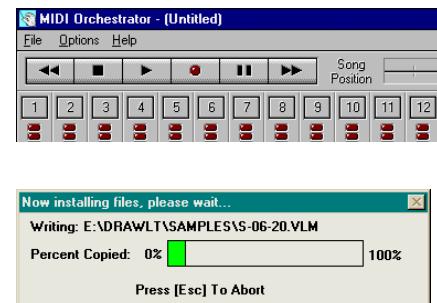
Poor Use of Tabs



A screenshot of a Windows-style application window titled "Contacts". The interface uses tabs at the top to switch between different views or filters. The tabs are labeled "Name", "City", "State", "Zip Code", "Telephone", "Fax", "Type", and "Date". Below the tabs is a grid of contact information. The first row of the grid has a blue background and contains the column headers: Name, City, State, Zip Code, Telephone, Fax, Type, and Date. The subsequent rows list contacts with their respective details.

| Name | City | State | Zip Code | Telephone | Fax | Type | Date |
|--------------------|-------------|-------|----------|----------------|-----|------|------|
| Albert Collins | New Orleans | LA | 43422 | (809) 555-1212 | | | |
| Hound Dog Taylor | Springfield | OH | 01844 | (212) 555-1212 | | | |
| James Cotton | Nashville | TN | 22321 | (410) 555-1212 | | | |
| Koko Taylor | Memphis | TN | 34212 | (321) 100-9099 | | | |
| Professor Longhair | Chicago | IL | 62000 | (603) 555-1212 | | | |

Poor Use of Visual Elements



Bad Designs

Link:
<http://www.baddesigns.com/>

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Visibility Problem



© baddesigns.com

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Affordance Problems



© baddesigns.com

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Mapping Problems



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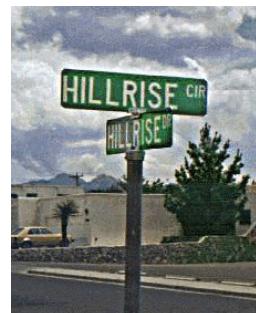
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Distinctiveness Problems



© baddesigns.com

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Proximity Problems



© baddesigns.com

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More Information

Books:

- Java Look and Feel Design Guidelines
 - Sun Microsystems
 - Addison-Wesley, 2001

Interaction Design

- J. Preece, Y. Rogers, and H. Sharp
 - Addison-Wesley, 2002

More Information

Books:

- The Essential Guide to User Interface Design
 - W.O. Galitz
 - Wiley, 2002

One-Minute Designer

- R.C. Parker
 - MIS Press, 1997

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More Information

Books:

- Graphic Design for Electronic Documents and User Interfaces
 - A. Marcus
 - ACM Press, 1992

Designing Visual Interfaces

- K. Mullet & D. Sano
 - Prentice-Hall, 1995

More Information

Links:

User Interface Design for Programmers

- <http://www.joelonsoftware.com/uibook/fog0000000249.html>

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