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User Interface Design

Slides originally by Ken Wong

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

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?


Screen SysRq
Lock
Break
Insert
Home
Page Up
Num Lock
Delete
End
Page Down
7 Home
Enter
4
Shift
1 End
Ctrl
0

Features

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

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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 mttaer 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/Diemand-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

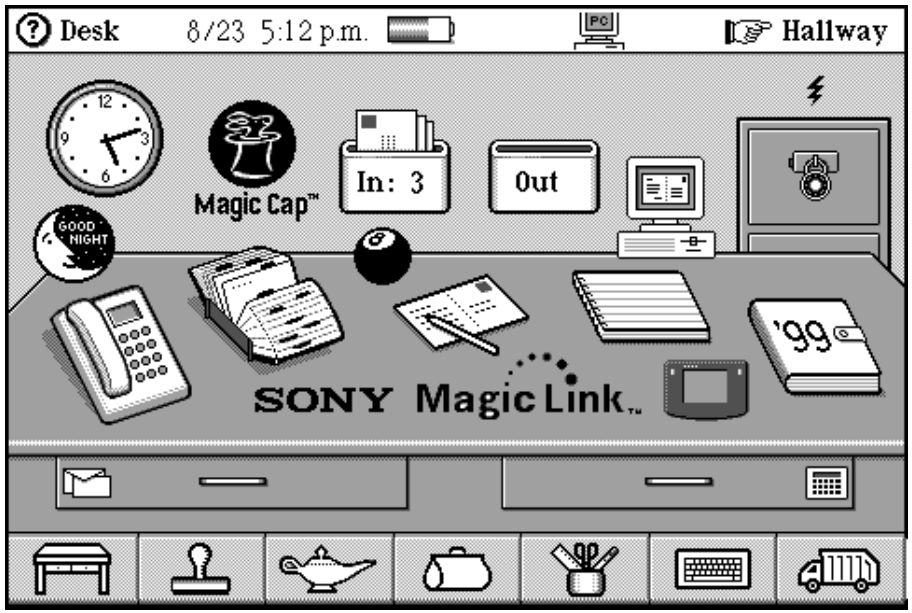
- trash can on the desktop?

carried to non-intuitive situations

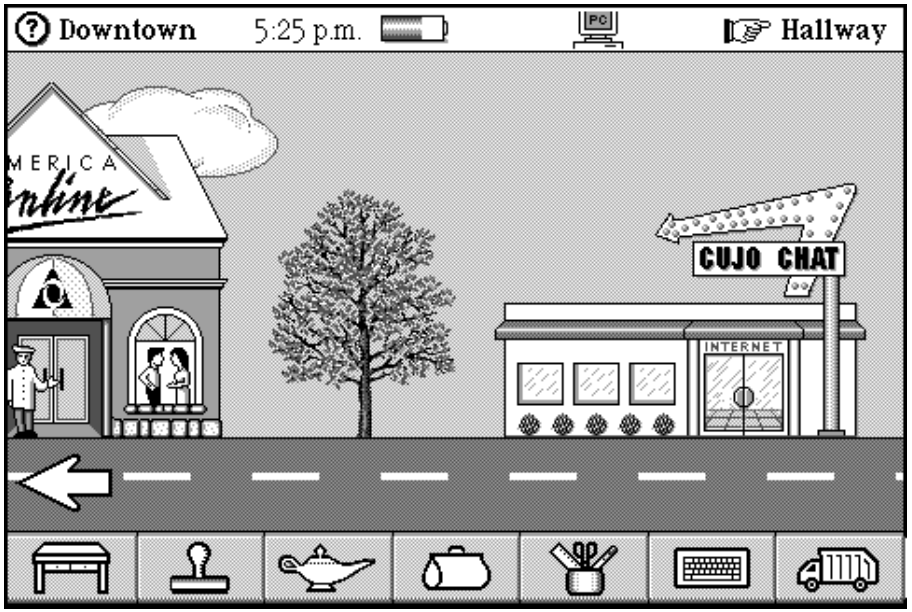
- drag disk icon to trash to unmount it?

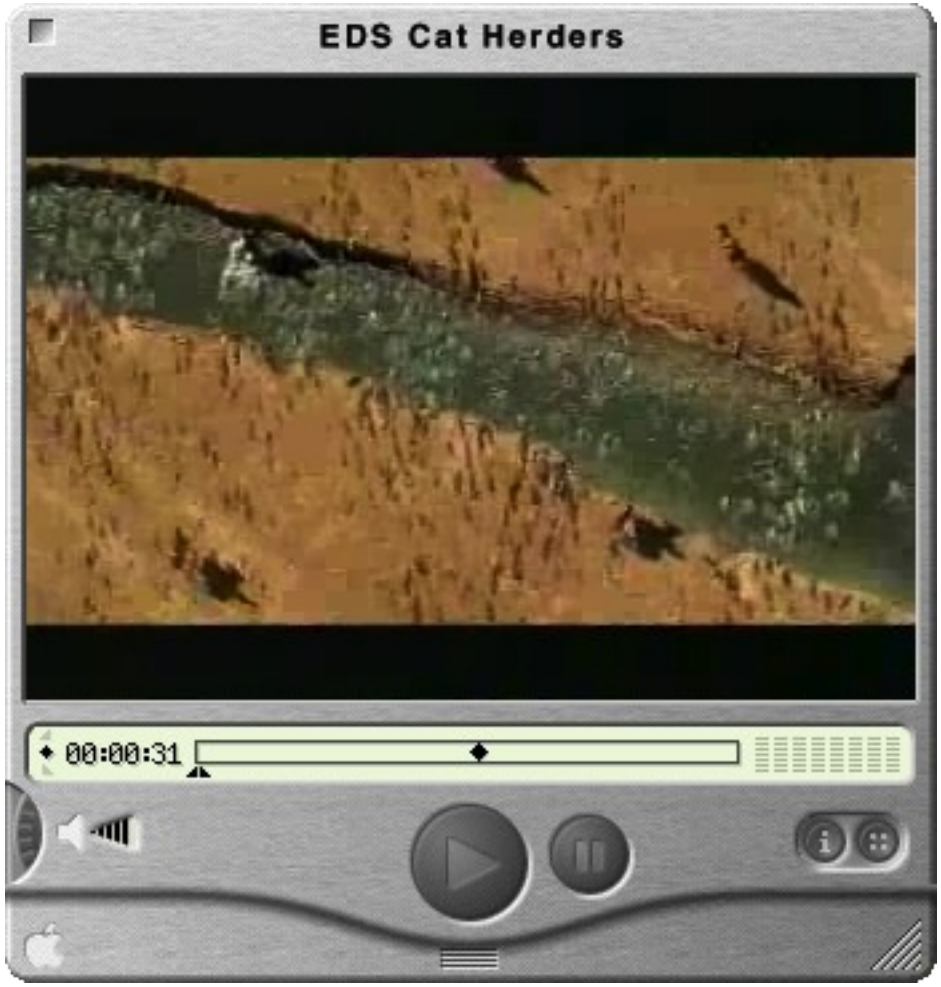
cultural differences

- menus imply the availability of choice



© General Magic




EDS Cat Herders
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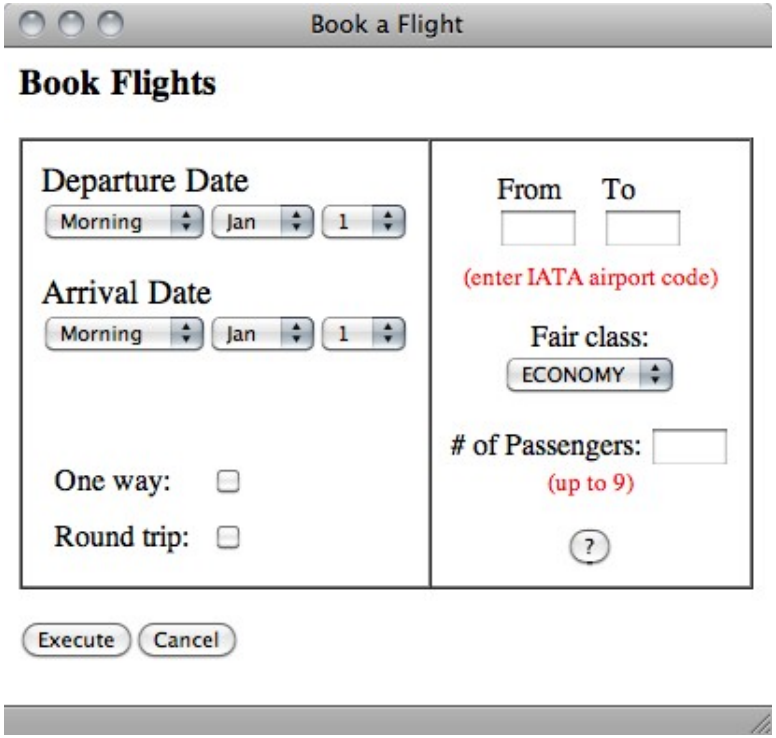
Exercise

Find user interface problems.



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)

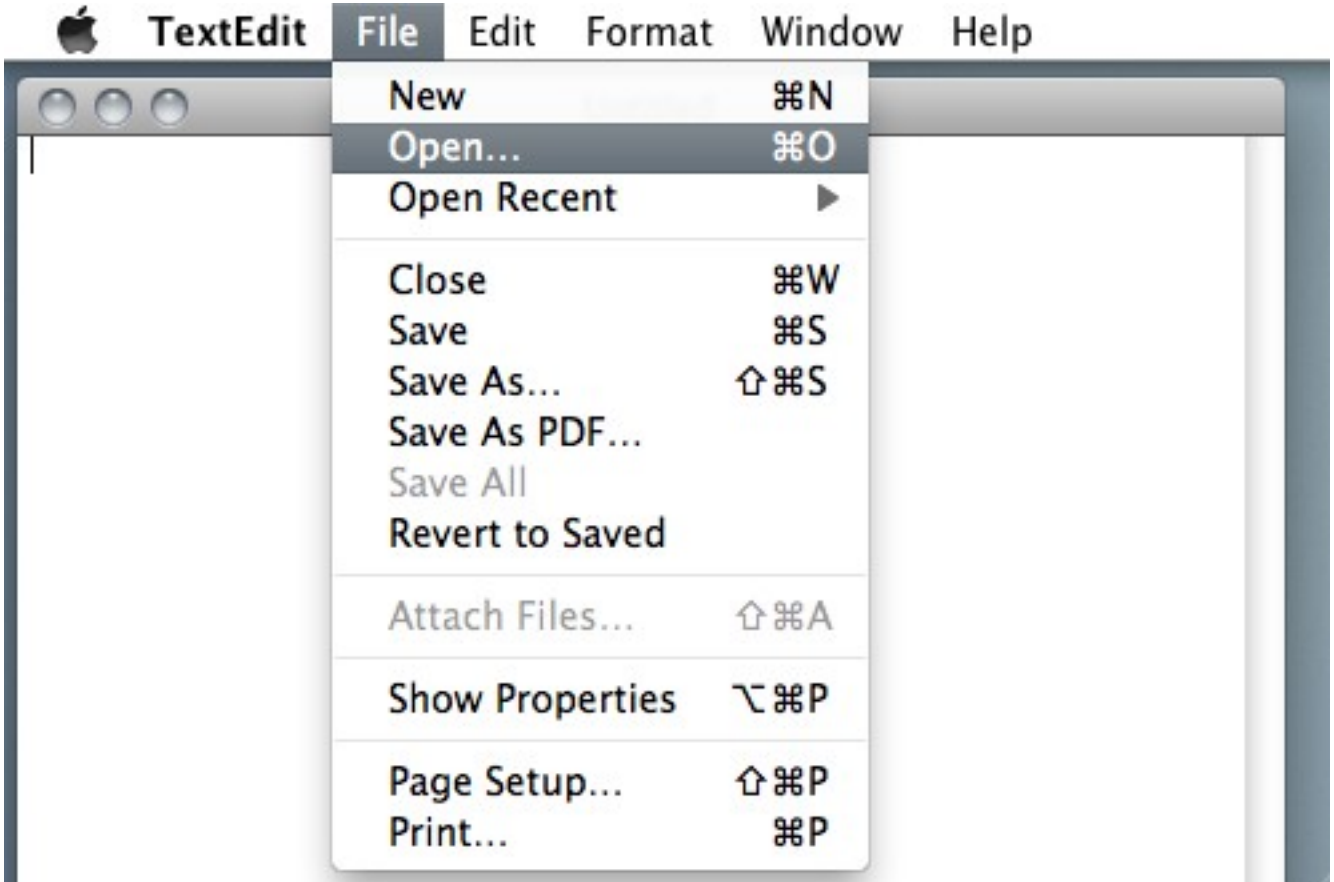
symbols used consistently

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

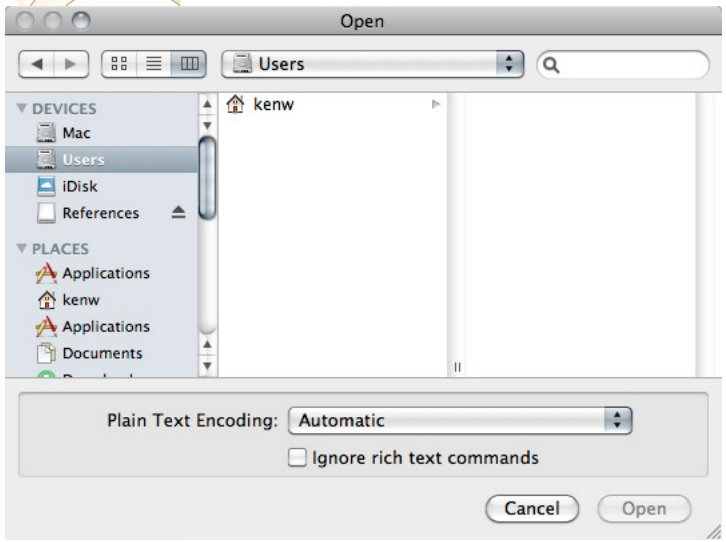
Consistency, Consistency, Consistency

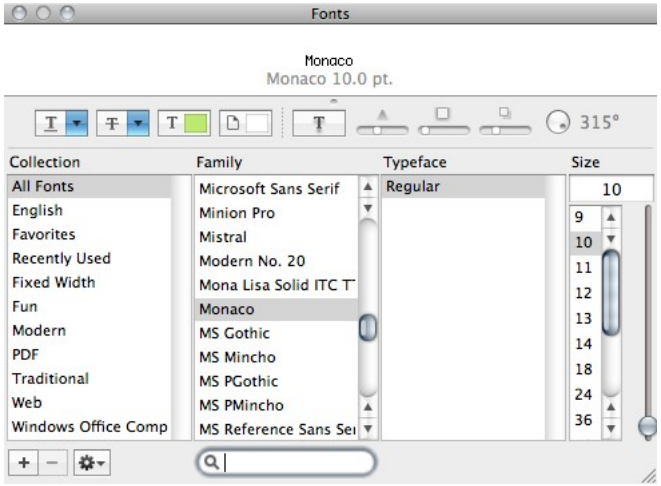
Syntactic consistency:

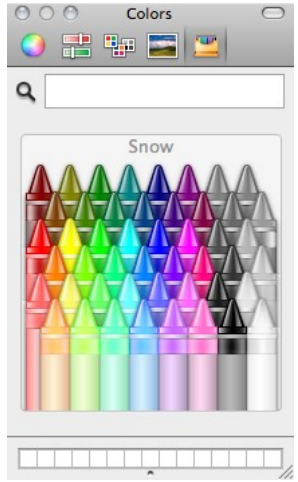
e.g., consistent order of menus and menu items



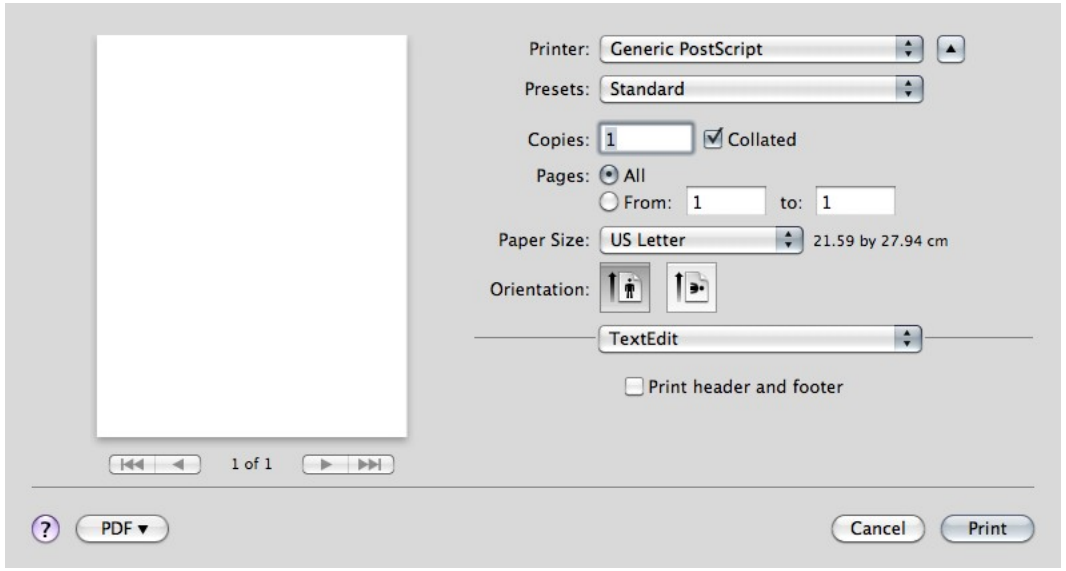
Platform Consistency







standard dialogs, sheets, and palettes in each platform



Graphic Design

Graphic Design

Goal:

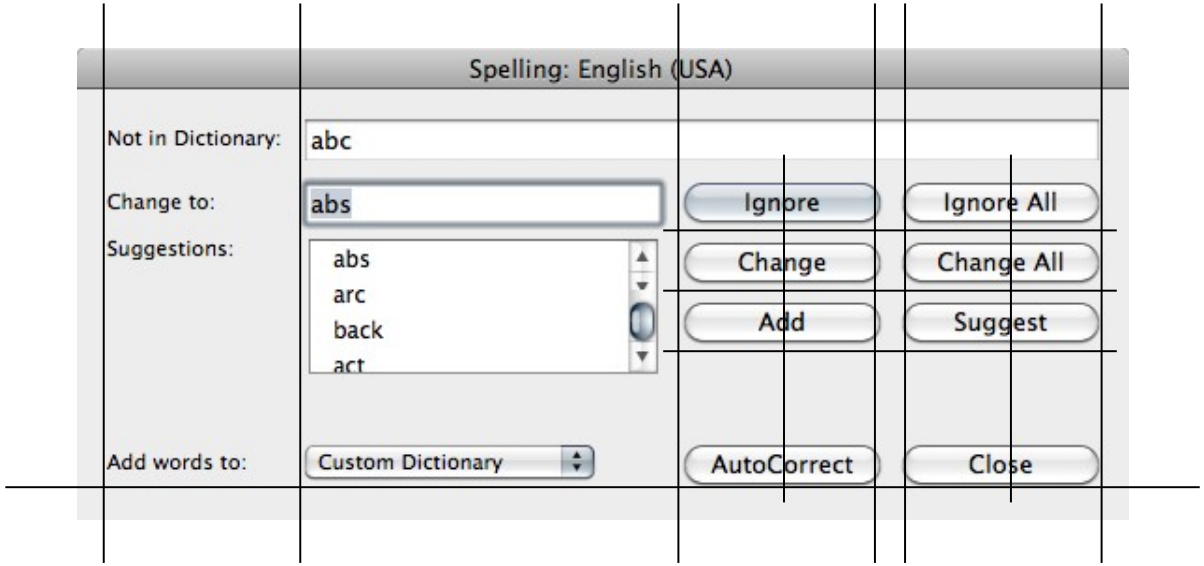
guide the user's attention and convey information clearly about the system's functionality and state

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

Graphic Design Principles

Organize for neatness:

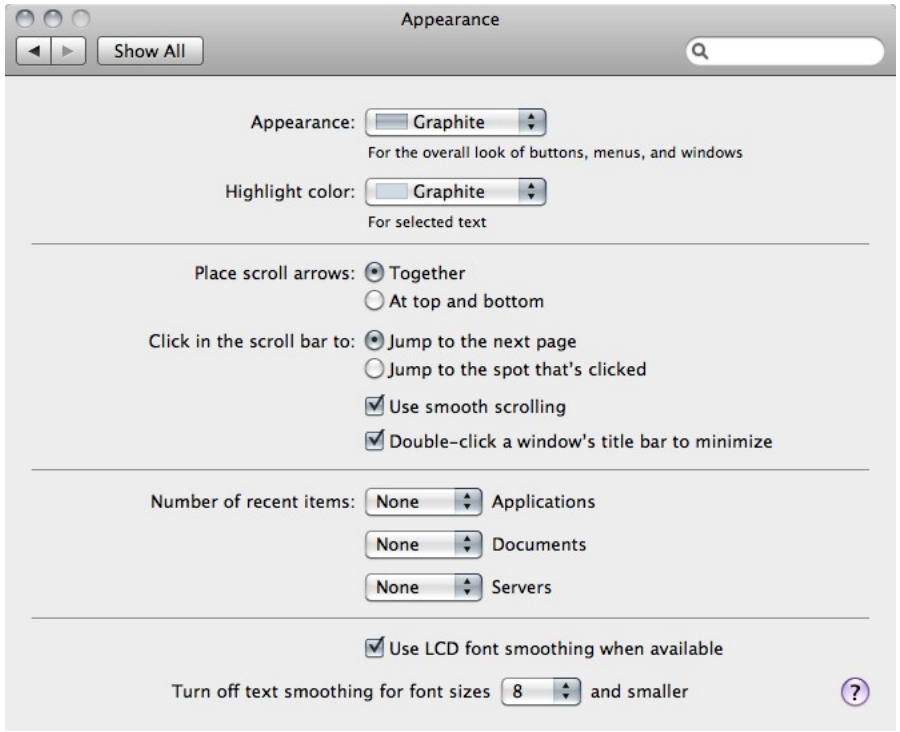
use grids and alignment, balance and symmetry, nothing placed arbitrarily



Graphic Design Principles

Organize for grouping:

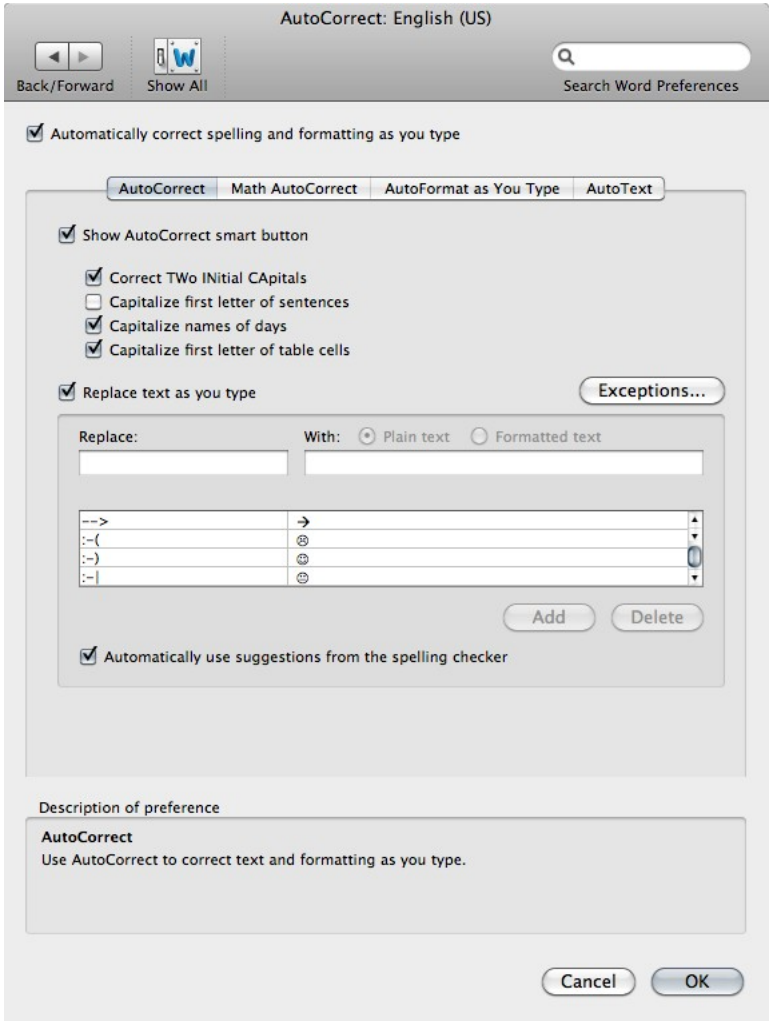
e.g., use labels, separators, proximity



Graphic Design Principles

Organize for grouping:

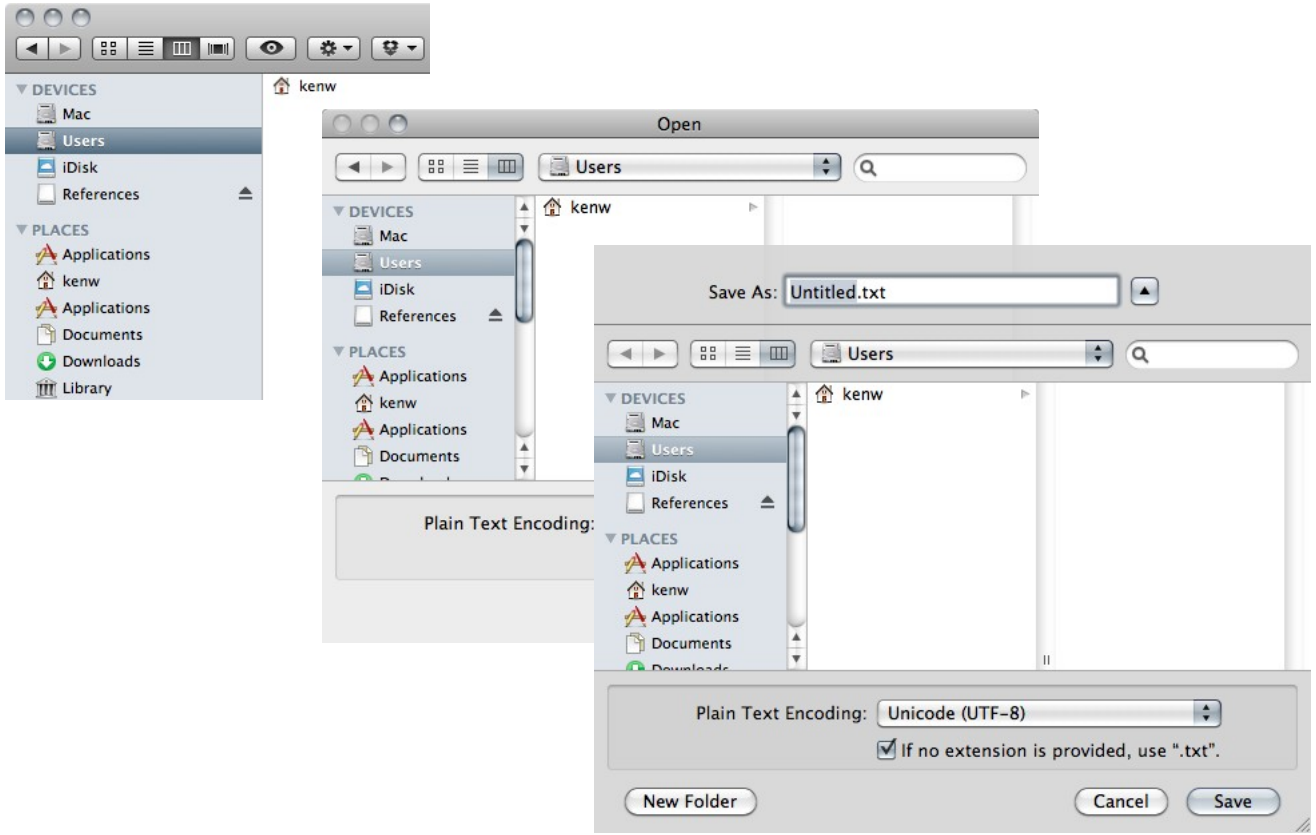
- e.g., use tabs, indentation, borders



Graphic Design Principles

Organize for grouping:

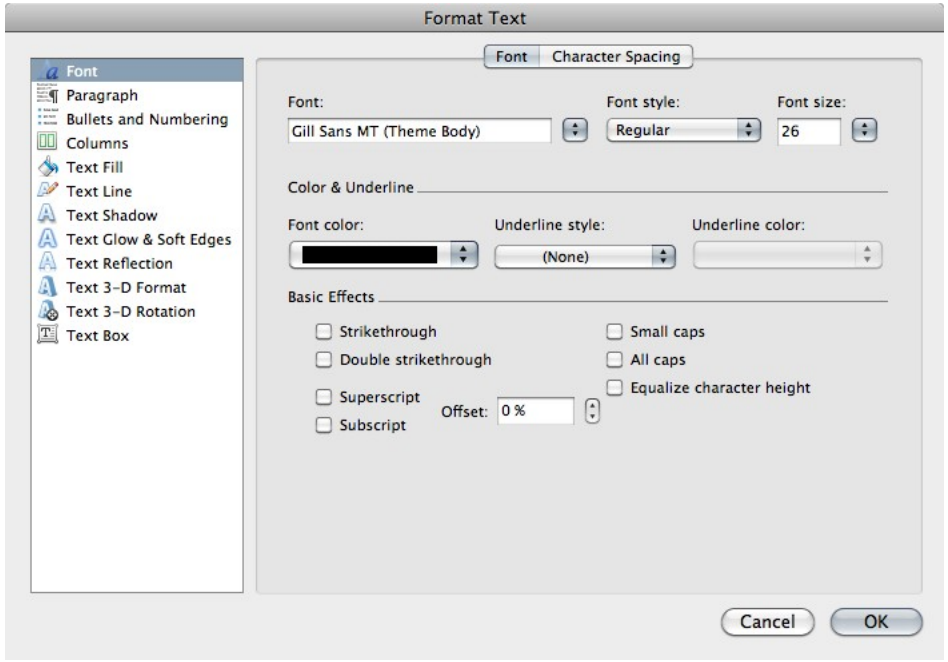
use repetition to show similarity and unity



Graphic Design Principles

Organize for order and flow:

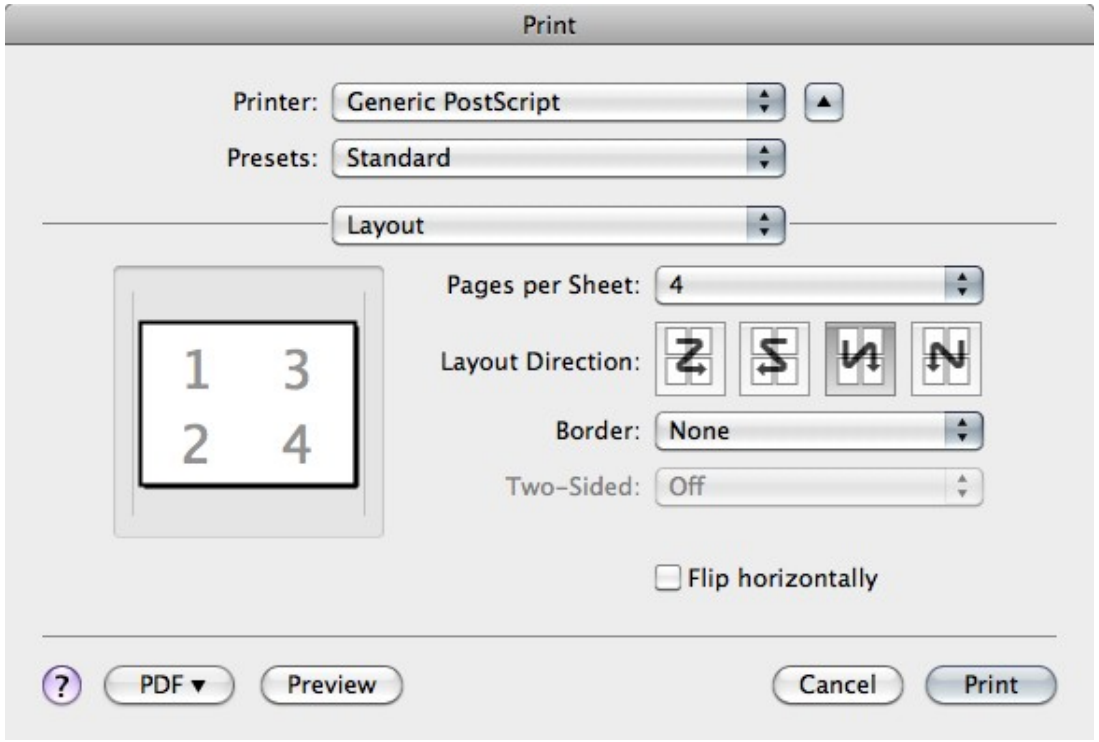
arrange elements in sequence to efficiently guide the user's eyes and support the task



Graphic Design Principles

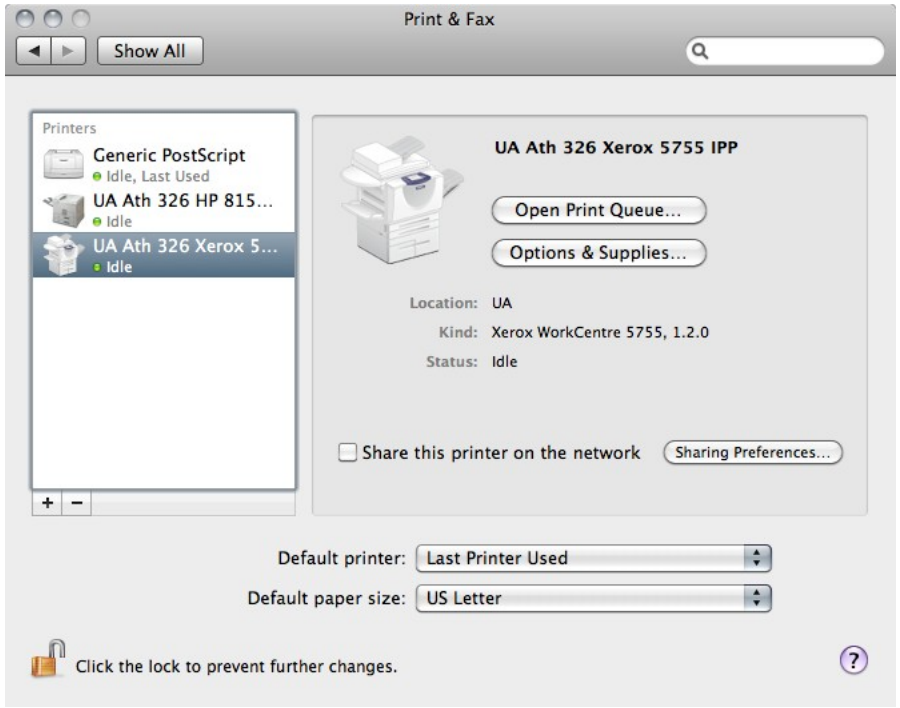
Economize for clarity:

get the most out of a minimal set of cues



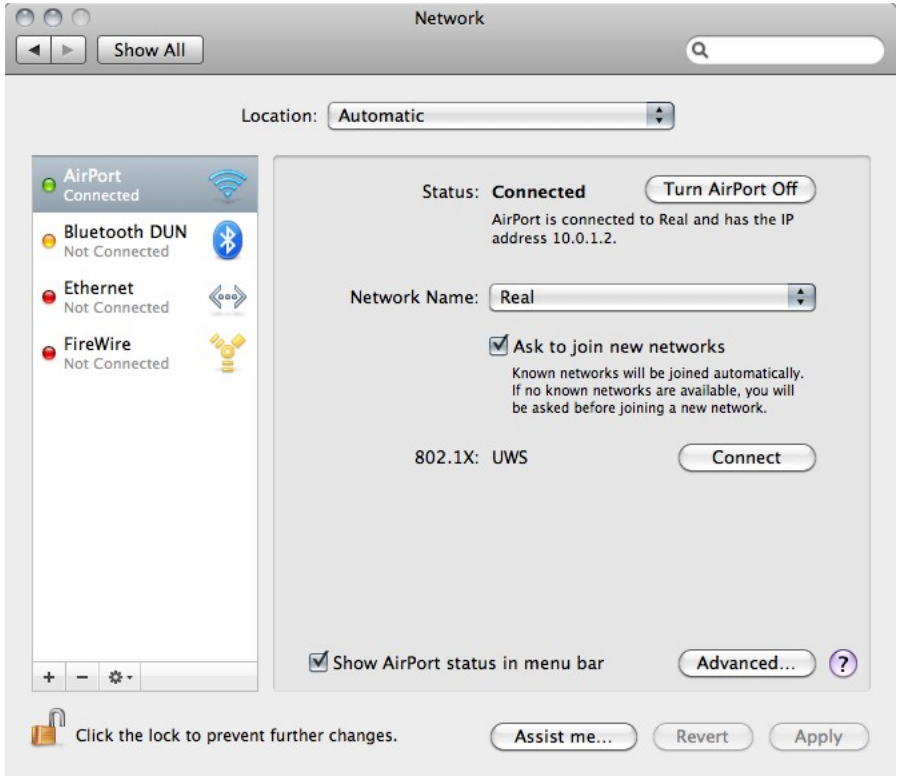
Graphic Design Principles

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



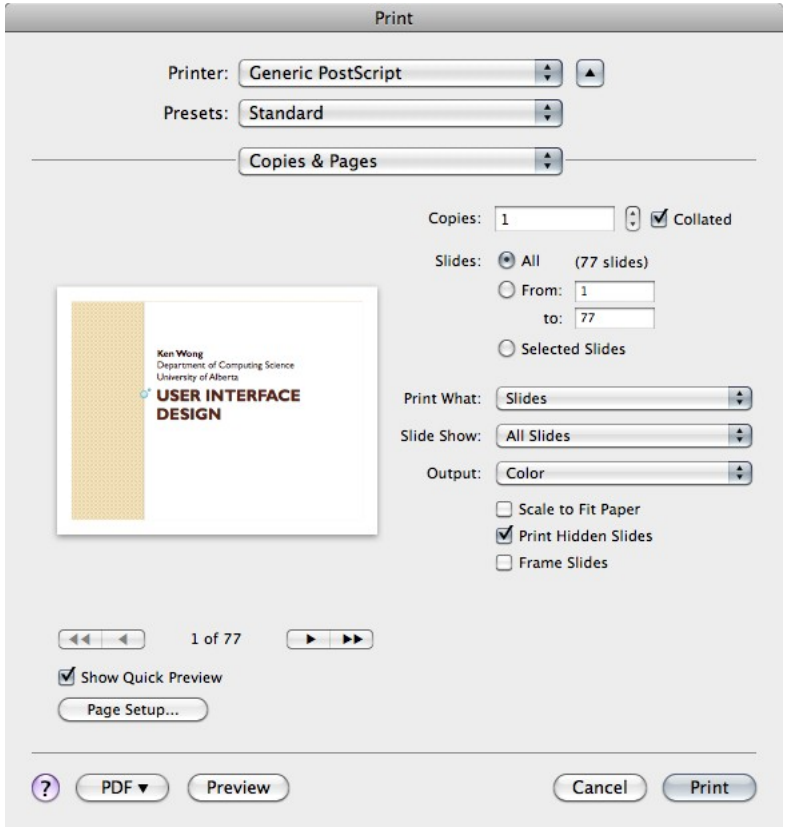
Graphic Design Principles

Economize for reducing clutter:
focus on the essentials



Graphic Design Principles

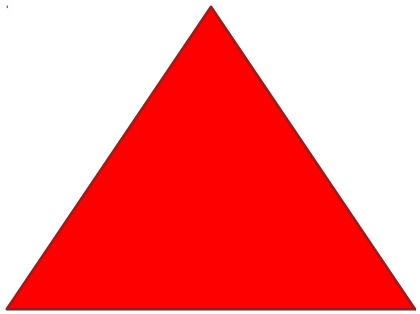
Economize for streamlining tasks:
simplify the most common case



Graphic Design Principles

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

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



Graphic Design Principles

Distinctiveness:

the eye is attracted by

at is isolated

color versus non-color

saturated colors

different typefaces

bigger elements

Using Color

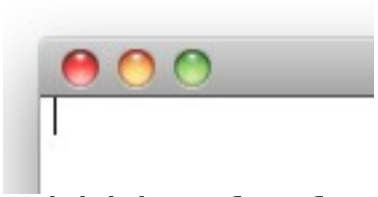
Tips:

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:

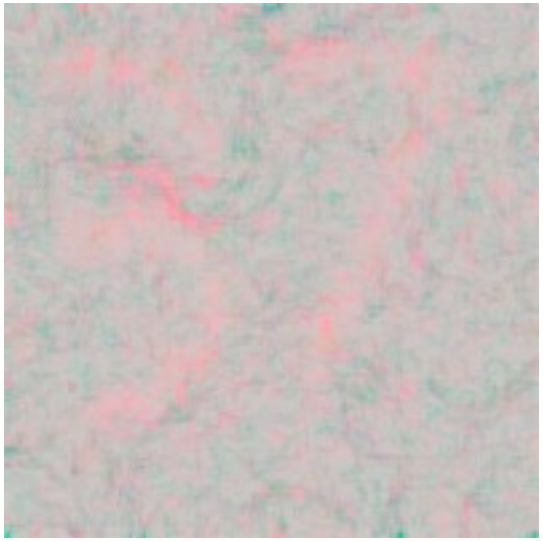
use foreground and background colors that contrast well

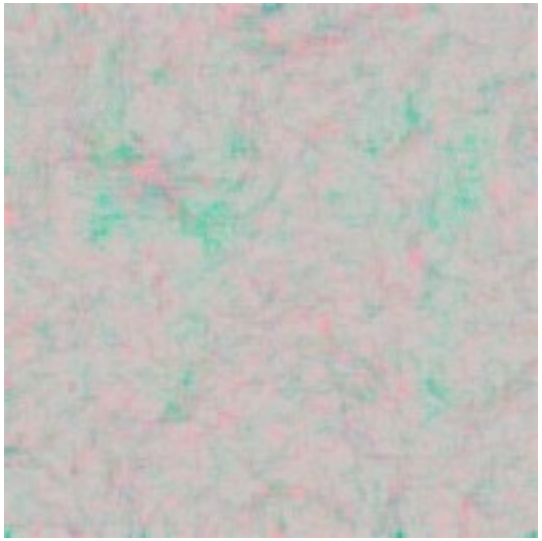
Using Color

Tips:

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

- because of color blindness or poor vision





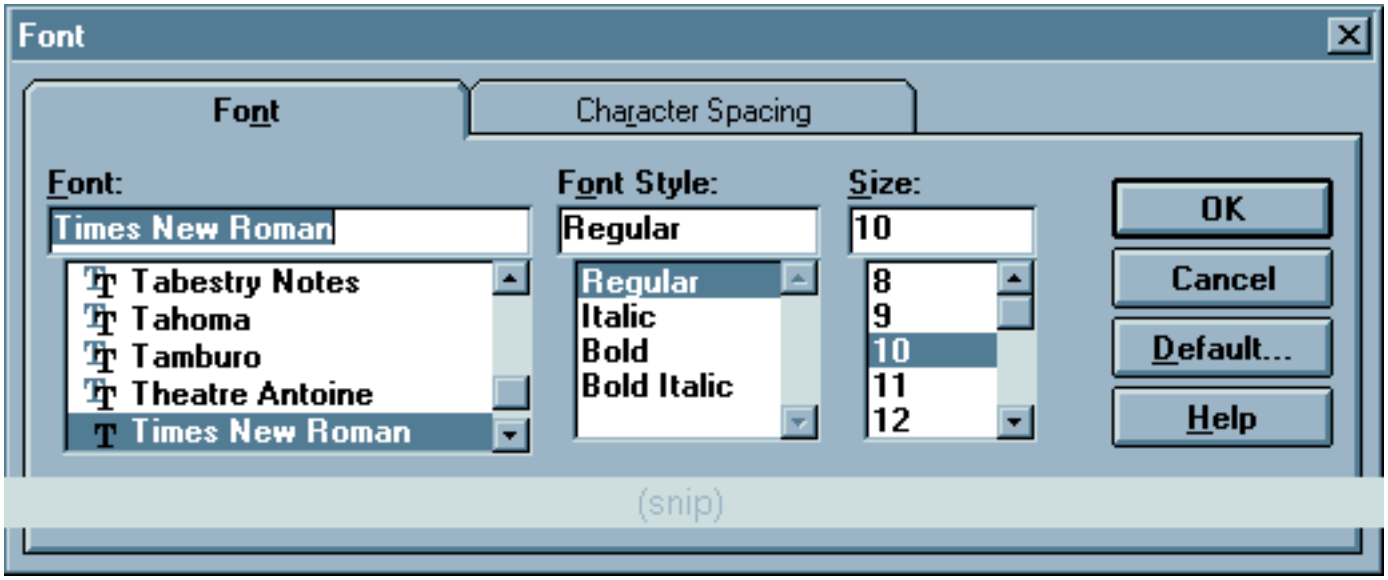
Bad Designs

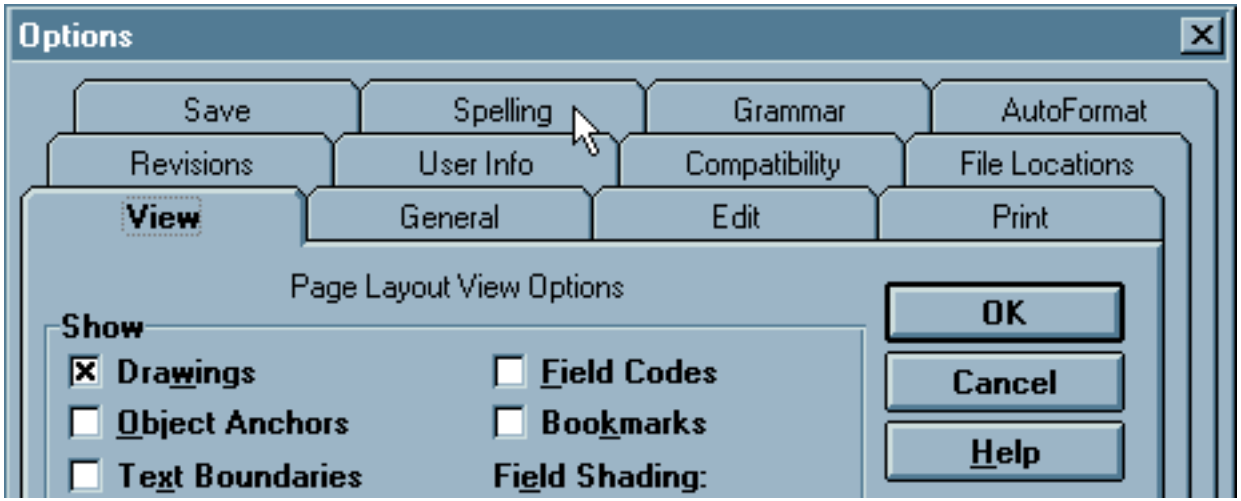
Interface Hall of Shame

Link:

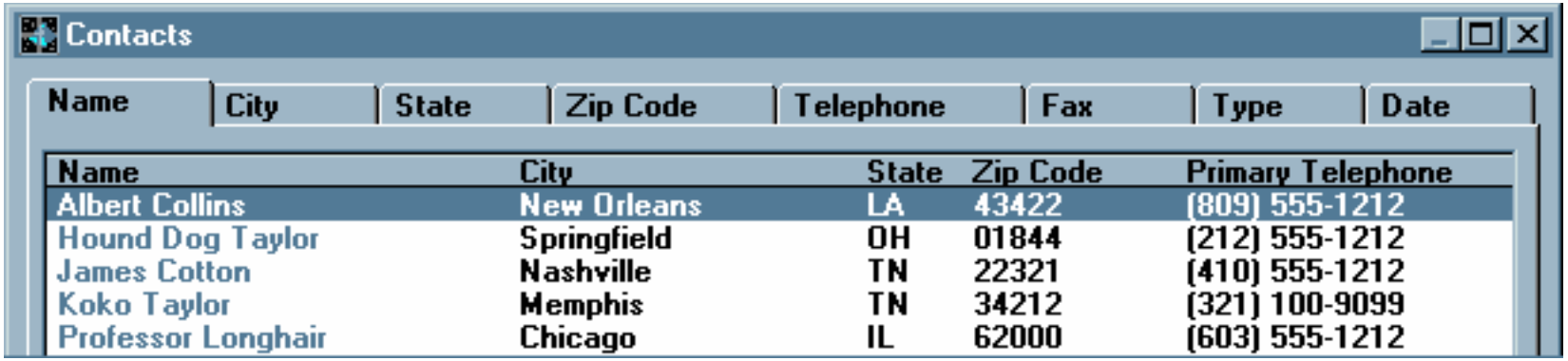
http://homepage.mac.com/bradster/iarchitect/shame.htm

Poor Use of Tabs

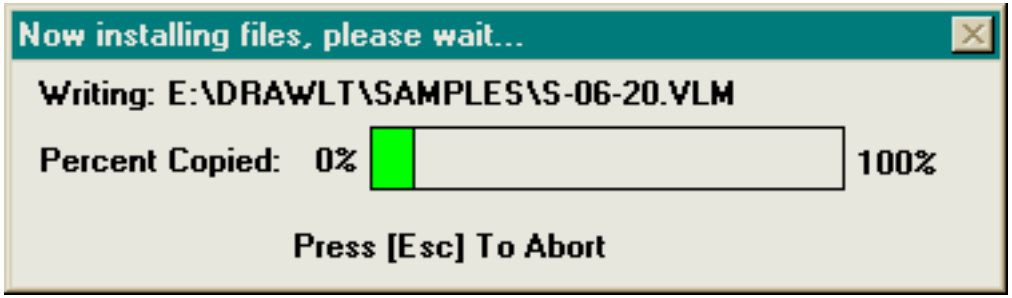




Poor Use of Tabs



Poor Use of Visual Elements



Bad Designs

Link:

http://www.baddesigns.com/

Visibility Problem

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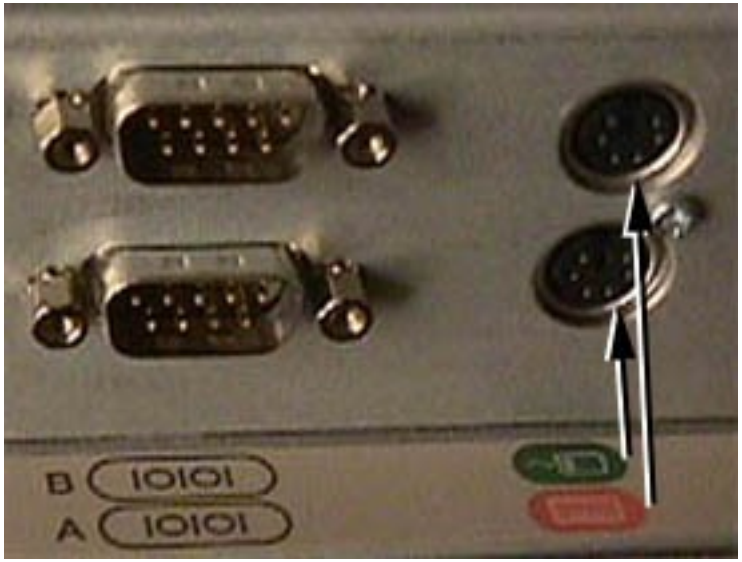
Affordance Problems

Mapping Problems



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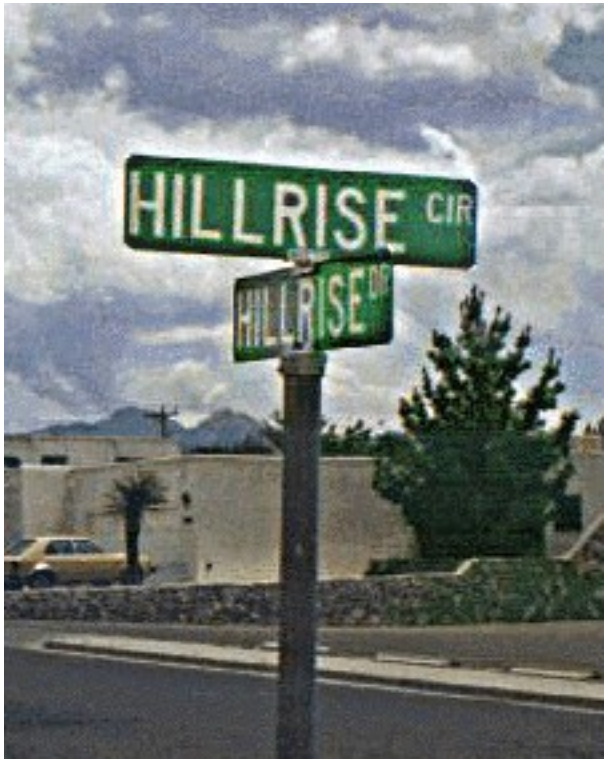
Distinctiveness Problems



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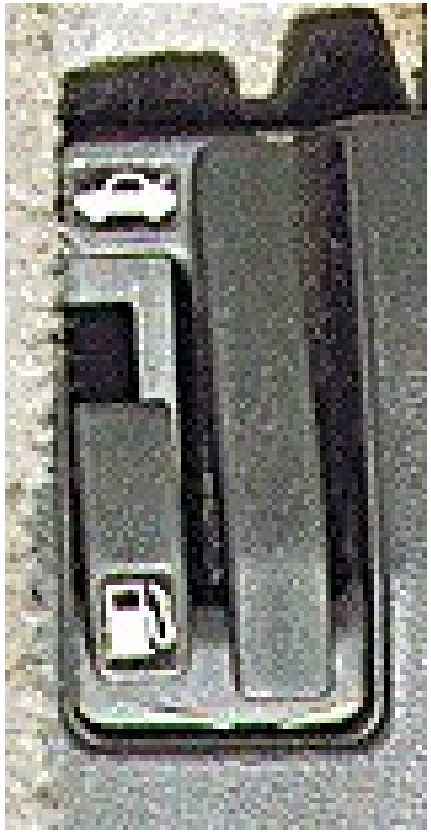
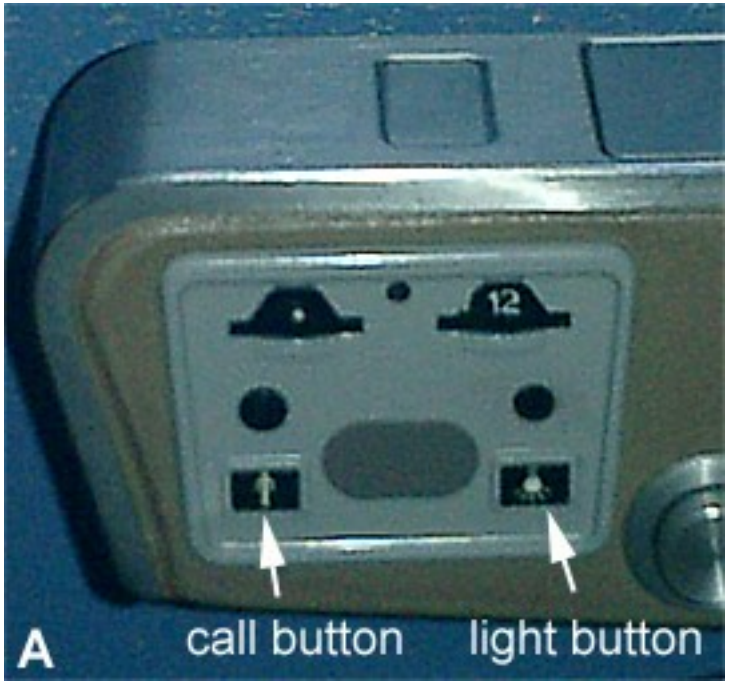
Proximity Problems





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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:

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

Books:

The Essential Guide to User Interface Design

- W.O. Galitz
- Wiley, 2002

One-Minute Designer

- R.C. Parker
- MIS Press, 1997

More Information

Links:

User Interface Design for Programmers

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