Vorlesung Mensch-Maschine-Interaktion

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http://www.hcilab.org/albrecht/
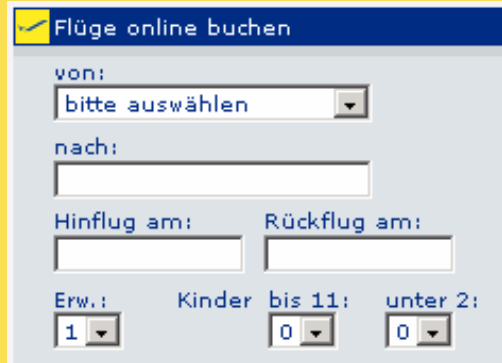
Chapter 6
Implementing Interactive Systems
(selected topics)

Constraints

- **Physical constraints**
  - basic physical limitations

- **Semantic constraints**
  - Assumption that create something meaningful

- **Cultural constraints**
  - Borders provided by cultural conventions

- **Logical constraints**
  - Restrictions due to reasoning

- **Applying constraints is a design decision!**

GUI Example

Date unconstrained

Date constrained

Constraints & Redundancy

- Redundancy is safe!
- Constraints can only work at their own level
- But: things can go wrong elsewhere

Defektes Nakosegerät

Unfallopfer mit Lachgas beatmet -Tödliche Klinik-Panne

Dieser Artikel stellt eine am 25.03.04 um 13:59 veröffentlichte Nachricht dar.
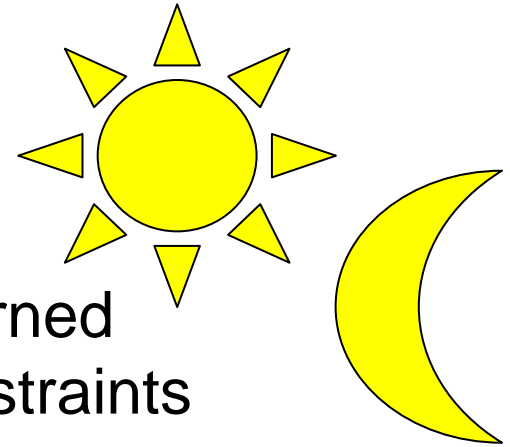
AKTUELLE NACHRICHTEN

Traunstein (rpo). Lachgas statt Sauerstoff - in einer bayerischen Klinik musste diese Verwechslung ein 19-Jähriger mit dem Leben bezahlen.

Durch ein falsch zusammengebautes Narkosegerät ist in einem bayerischen Krankenhaus ein Patient ums Leben gekommen. Der 19-Jährige war nach einem Verkehrsunfall in der Notaufnahme der Klinik in Trostbergan statt mit Sauerstoff mit Lachgas beatmet worden, wie die Staatsanwaltschaft Traunstein am Donnerstag sagte. Ermittelt werde gegen einen Mitarbeiter der Herstellerfirma, der das Gerät zuvor repariert hatte. Dabei seien die Anschlüsse für Lachgas und Sauerstoff vertauscht worden.

Cultural Constraints

- Universal or culturally specific
- Arbitrary conventions that have been learned
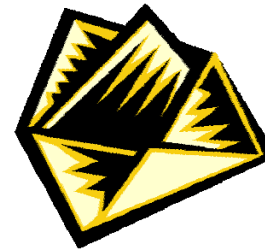- Users' expectations build on cultural constraints

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:D

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8-)

:`-(

عربي

大阪大学

"Hi there!"
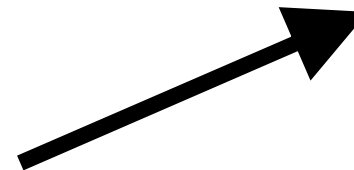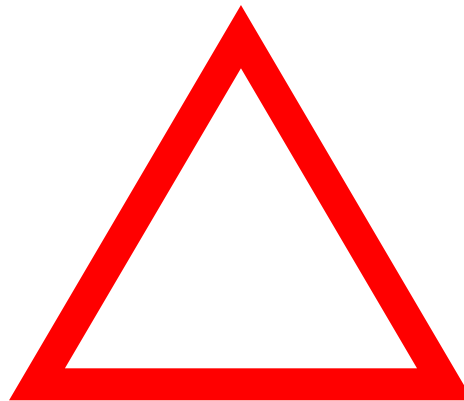
Foreign Cultures: Example

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Physical Constraints & Affordances Examples

- **USB Memory Stick vs. DVD vs. money**
  - If there is more than one option (physically) cater these cases

- **Dials vs. Buttons vs. Sliders**
  - Dials are turned
  - Buttons are pressed
  - Sliders are pushed

Chapter 6
Implementing Interactive Systems
(selected topics)

- 6.1 Constraints
- **6.2 Mapping**
- 6.3 Guidelines

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Mapping

- Relationship between controls and action

- Mappings should be
  - Understandable (e.g. moving the mouse up move the slider up)
  - Consistent
  - Recognizable or at least quickly learnable and easy to recall
  - Natural, meaning to be consistent with knowledge the user already has

- Example: cooker
(for these issues see also Gestalt theory)
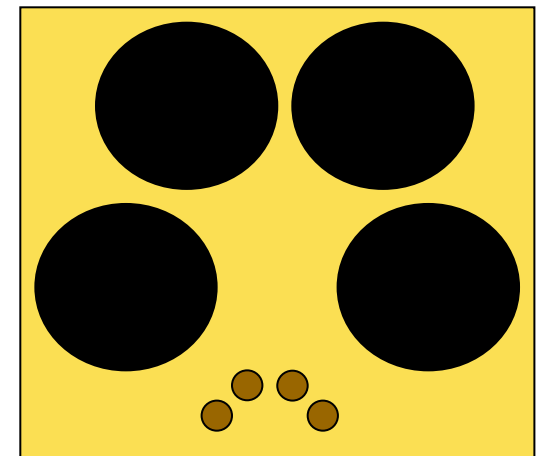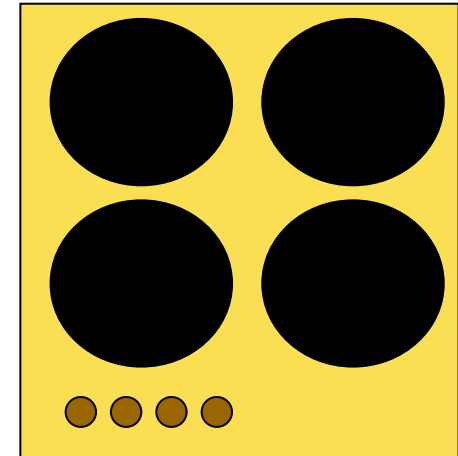
Mapping & Human Error

- Labels are correct
- However full context is needed
- Built-in source for potential frustration

- Missing context

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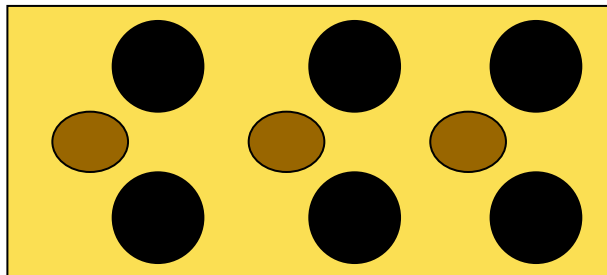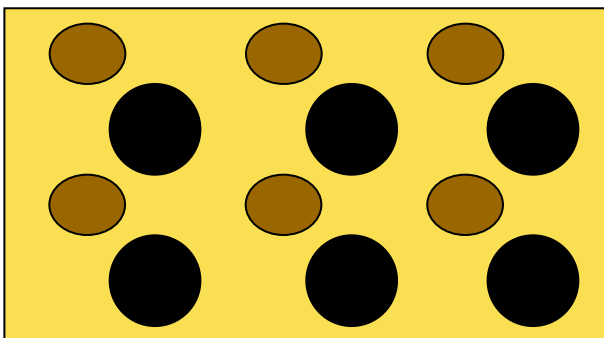
Mapping – Examples (1)

- **Relationship between controls and action**

Please attach a Message to Your Order.

Message Text:

Position to Print Message:
- ○ bottom
- ○ bottom-left
- ○ bottom-right
- ○ centre
- ○ left
- ● right
- ○ top
- ○ top-left
- ○ top-right

submit | reset

Mapping – Examples (2)

- Relationship between controls and action
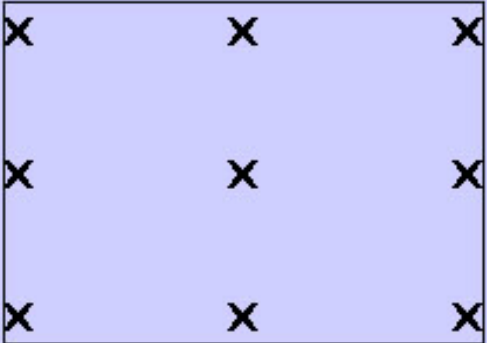
Please attach a Message to Your Order.

Message Text:

Position to Print Message:
- ○ bottom
- ○ bottom-left
- ○ bottom-right
- ○ centre
- ○ left
- ● right
- ○ top
- ○ top-left
- ○ top-right

Possible Label Positions

[submit] [reset]

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Mapping – Examples (3)

- Relationship between controls
  and action

Please attach a Message to Your Order.

Message Text:

Position to Print Message

- top-left   - top   - top-right
- left   - centre   ◉ right
- bottom-left   - bottom   - bottom-right

[submit] [reset]

Mapping – Examples (4)

- Relationship between controls and action

Please attach a Message to Your Order.

Message Text:

Position to Print Message

⚪ top-left	⚪ top	⚪ top-right
⚪ left	⚪ centre	⦿ right
⚪ bottom-left	⚪ bottom	⚪ bottom-right

submit   reset

Mapping – Examples (6)

- **Relationship between controls and action**

Please attach a Message to Your Order.

Message Text:

Position to Print Message:
- bottom
- bottom-left
- bottom-right
- centre
- left
- ⦿ right
- top
- top-left
- top-right

[submit] [reset]

Please attach a Message to Your Order.

Message Text:

Position to Print Message

○ top-left	○ top	○ top-right
○ left	○ centre	⦿ right
○ bottom-left	○ bottom	○ bottom-right

[submit] [reset]

Mapping – Examples (5)

Show Appointments

next week	last week	tomorrow	yesterday	today

Show Appointments

last week	yesterday	today	tomorrow	next week

Show orders received — today
- today
- this week
- this month
- last month

Sort Data — Ascending
- Ascending
- Random
- Descending

- "natural" mappings can be found in many areas

- It is not always obvious what the "natural" mapping is

- Correlation with cultural constraints

Chapter 6
Implementing Interactive Systems
(selected topics)

- 6.1 Constraints
- 6.2 Mapping
- **6.3 Guidelines**

Hix and Hartson's guidelines

1. User centered design
2. Know the user
3. Involve the user
4. Prevent user errors
5. Optimize user operation
6. Keep control with the user
7. Help the user to get started

8. Give a task-based mental model
9. Be consistent
10. Keep it simple
11. Design for memory limitations
12. Use recognition rather recall
13. Use cognitive directness
14. Draw on real world analogies

Hix and Hartson guidelines (2)

15. Use informative feedback
16. Give status indicators
17. Use user-centred wording
18. Use non-threatening wording
19. Use specific constructive advice
20. Make the system take the blame
21. Do not anthropomorphise

- Use modes cautiously
- Make user action reversible
- Get attention judiciously
- Maintain display inertia
- Organize screen to manage complexity
- Accommodate individual difference

(Hix and Hartson, Developing User Interfaces, Wiley, 1993)

GNOME Guideline

- 1. Usability Principles
  - Design for People
  - Don't Limit Your User Base
  - Accessibility
  - Internationalization and Localization
  - Create a Match Between Your Application and the Real World
  - Make Your Application Consistent
  - Keep the User Informed
  - Keep It Simple and Pretty
  - Put the User in Control
  - Forgive the User
  - Provide Direct Manipulation

- 2. Desktop Integration
  - Placing Entries in the Applications Menu
  - Menu Item Names
  - …

- 3. Windows
  - Titles
  - …
  - Layout
  - Common Dialogs

- 4. Menus
  - The Menubar
  - Types of Menu
  - Drop-down Menus
  - …
  - Help

- 5. Toolbars
  - Appearance and Content
  - …

- 6. Controls
  - …
  - Sliders
  - Buttons
  - Check Boxes
  - …

Drag and Drop Semantics

Your application must determine whether to move or copy a dragged item after it is dropped on a destination. The appropriate behavior depends on the context of the drag-and-drop operation, as described in this section.

Move Versus Copy

If the source and destination are in the same container (for example, a window or a volume), a drag-and-drop operation is interpreted as a move (that is, cut and paste). Dragging an item from one container to another initiates a copy (copy and paste). The user can perform a copy operation within the same container by pressing the Option key while dragging. When performing a copy operation, indicate a copy operation to the user by using the copy cursor. (See "Standard Cursors" (page 67).)

Table 3-1   Common drag-and-drop operations and results

**Example 1:
Apple Human
Interface Guidelines
(page 42)**

Dragged item	Destination	Result
Data in a document	The same document	Move
Data in a document	Another document	Copy
Data in a document	The Finder	Copy (creates a clipping)
Finder icon	An open document window	Copy
Finder icon	The same volume	Move
Finder icon	Another volume	Copy

Icon Genres and Families

Icon genres help communicate what you can do with an application before you open it. Applications are classified by role—user applications, software utilities, and so on—and each category, or genre, has its own icon style. This differentiation is very important for helping users easily distinguish between types of icons in the Dock.

Figure 5-1   Application icons of different genres—user applications and utilities—shown as they might appear in the Dock

For example, the icons for user applications are colorful and inviting, while utilities have a more serious appearance. Figure 5-2 shows user application icons in the top row and utility icons in the bottom row. These genres are further described in "User Application Icons" (page 57) and "Utility Icons" (page 58).

Figure 5-2   Two icon genres: User application icons in top row; utility icons in bottom row
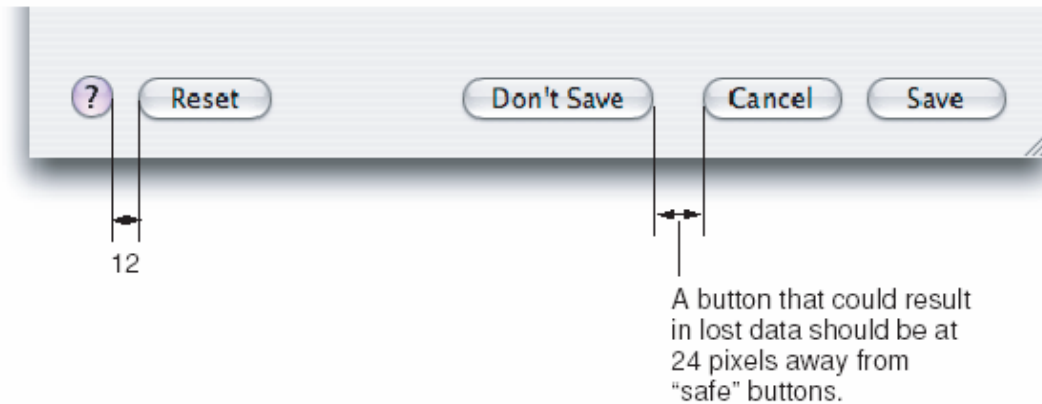

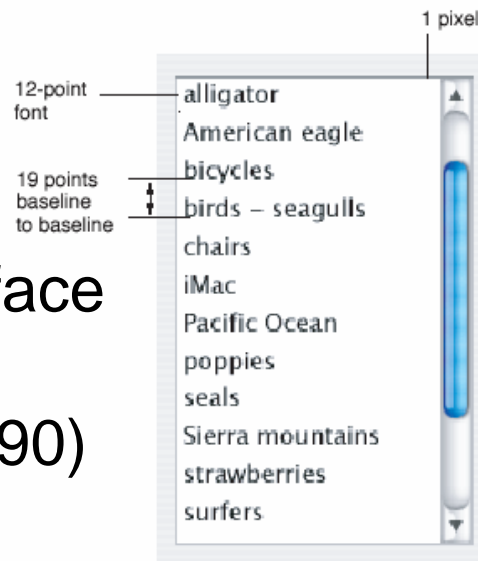# Example 2: Apple Human Interface Guidelines (page 55)

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Application title
14-point Lucida Grande
Bold

Application description
Small system font
11-point Lucida Grande
Regular
Flush left

Application Icon
64 x 64 pixels

Application Name

0.1 (v0.1)

You can provide a brief description of
your application here.

Copyright 2004 Apple Computer, Inc.

Application version
Label font
10-point Lucida Grande Regular

Copyright information
Label font
10-point Lucida Grande Regular

Figure 9-2   A standard alert

Message text   No title   Informative text

Example 2:
Apple Human
Interface Guidelines
(page 126 & 134)

**Are you sure you want to empty the cache
storing the contents of web pages?**

Safari saves the contents of web pages you open in a
cache so that it's faster to visit them again.

Cancel   Empty

Application icon   Cancel button   Action button

Figure 9-7   Position of buttons at the bottom of a dialog

| ? | Reset | | Don't Save | | Cancel | Save |

12

A button that could result in lost data should be at 24 pixels away from "safe" buttons.

Radio Button Specifications

Figure 10-14   Radio button spacing

Full-size radio button

8

Kind: ○ Radio off   ○ Radio off
7 ———   6 ———
       ◉ Radio on   ◉ Radio on

Scrolling List Specifications

Figure 10-44   Scrolling list dimensions

1 pixel

12-point font	alligator
	American eagle
19 points baseline to baseline	bicycles
	birds – seagulls
	chairs
	iMac
	Pacific Ocean
	poppies
	seals
	Sierra mountains
	strawberries
	surfers

Small radio button

6

Kind: ○ Radio off   ○ Radio off
7 ———   6 ———
       ◉ Radio on   ◉ Radio on

Mini radio button

5
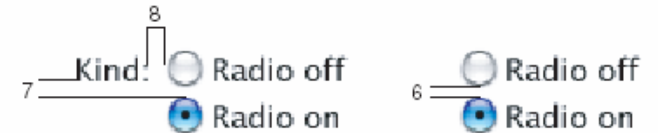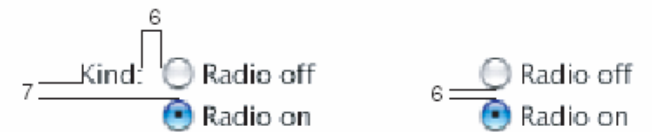
Kind: ○ Radio off   ○ Radio off
6 ———   5 ———
       ◉ Radio on   ◉ Radio on
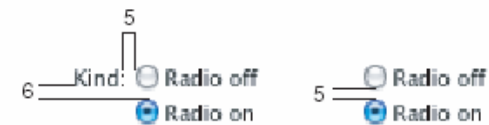
Align the baselines of the label and the first button's text.

Example 2:
Apple Human Interface Guidelines
(page 138, 163 & 190)

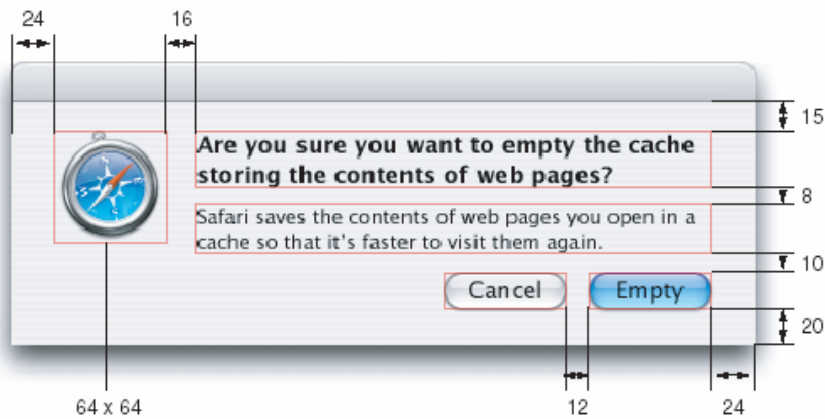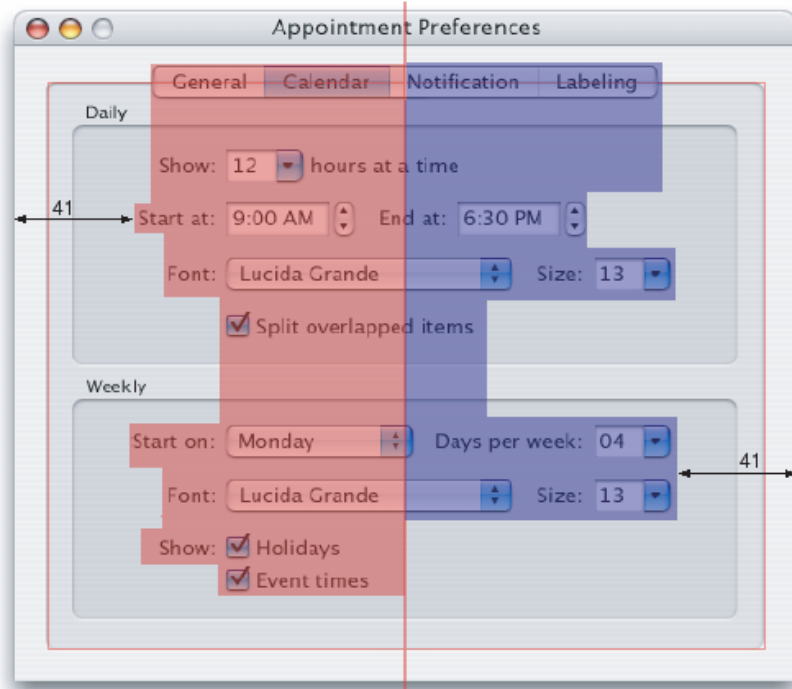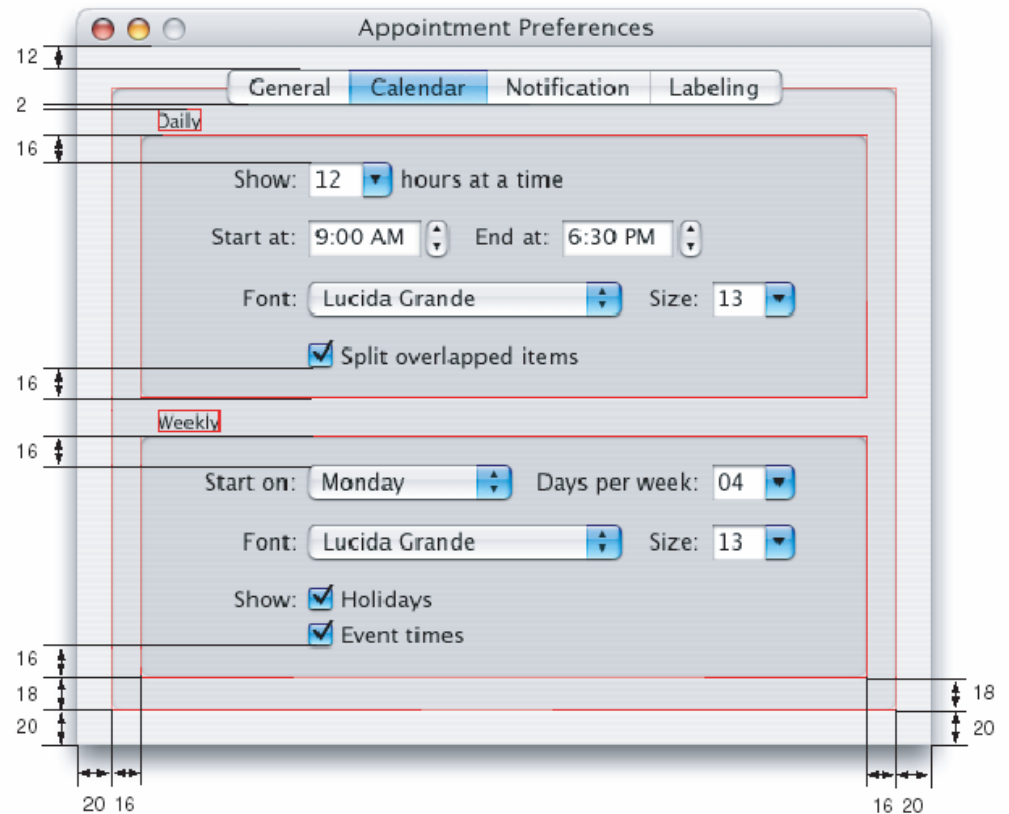Figure 11-10 Layout dimensions for a standard alert

Figure 11-6 Center-equalization in a changeable pane dialog

Example 2:
Apple Human Interface Guidelines
(page 207, 209 & 210)

Figure 11-8 Layout dimensions for a changeable pane dialog

Specific Guidelines for Operating Systems, Window Managers, and the WWW
Some Examples:

- Introduction to the Apple Human Interface Guidelines
  http://developer.apple.com/documentation/UserExperience/Conceptual/OSXHIGuidelines/index.html

- KDE User Interface Guidelines
  http://developer.kde.org/documentation/design/ui/
  http://developer.kde.org/documentation/standards/kde/style/basics/

- Palm OS® User Interface Guidelines
  http://www.palmos.com/dev/support/docs/ui/UIGuide_Front.html

- MSDN - User Interface Design and Development
  http://msdn.microsoft.com

- GNOME Human Interface Guidelines (1.1 - DRAFT)
  http://developer.gnome.org/projects/gup/hig/draft_hig_new/

- Web Guidelines???
  http://www.webstyleguide.com/ … and many others!

References

- B. Shneiderman. Designing the User Interface: Strategies for Effective Human-Computer Interaction , Third Edition. 1997. ISBN: 0201694972

- A. Cooper. About Face 2.0: Chapter 1 - Goal-Directed Design http://media.wiley.com/product_data/excerpt/13/07645264/0764526413.pdf

- Alan Dix, Janet Finlay, Gregory Abowd and Russell Beale. (1998) Human Computer, Interaction (second edition), Prentice Hall, ISBN 0132398648 (new Edition announced for October 2003)

- D. A. Norman. The Design of Everyday Things. Basic Books 2002. ISBN: 0465067107

- GNOME Human Interface Guidelines (1.0) by The GNOME Usability Project http://developer.gnome.org/projects/gup/hig/1.0/hig-1.0.pdf