Module2

Screen Design - Visual Display Layout, Information Structuring and Navigation, HCI in Software process, Design Rules, HCI for Users with Disability, Mobile devices, Earcon design for aural interface.

Variety of distractions

➢Numerous audio and visual interruptions

➢Extensive visual clutter

➢Poor information readability

➢In comprehensible screen components

➢Confusing and inefficient navigation

➢Inefficient operations

➢Excessive or inefficient page scrolling

➢Information overload

➢Design in cosistency

➢Outdated information

Screen designing

- How to distract the screen user
  - ➢Unclear captions
  - ➢Improper type and graphic emphasis
  - ➢Misleading headings
  - ➢Irrelevant and unnecessary headings
  - ➢Inefficient results
  - ➢ Clustered and cramped layout
  - ➢ Poor quality of presentation
    - ✓Legibility
    - ✓Appearance
    - ✓arrangeemnt
  - ➢ Visual inconsistency
  - ➢Lack of design features
  - ➢Over use of 3D presentations
  - ➢Overuse of too many bright colors
  - ➢Bad typography

• **What screen users want**

- ➢ **an orderly clean clutter free appearance**

- ➢ **An obvious indication of what is being shown and what should be done with it.**

- ➢ **Expected information located where it should be.**

- ➢ **A clear indication of what relates to what.**

- ➢ **Plain and simple english**

- ➢ **A clear indication of when an action can make a permanent change in data**

- ➢ **Lecture 21 slide**

- What screen users do

  ➢ **Identifies a task to be performed or need to be fulfilled.**

  ➢ **Decides how the task will be completed or need fulfilled.**

  ➢ **Manipulates the computers controls.**

  ➢ **Gathers necessary data.**

  ➢ **Forms judgments resulting in decisions relevant to task**

- **Design goals**
  ➢ **Reduce visual work**
  ➢ **Reduce intellectual work**
  ➢ **Reduce memory work**
  ➢ **Reduce mentor work**
  ➢ **Eliminate burdens or instructions**

Screen meaning and Purpose

- Each screen element
  - ➢Every control
  - ➢All text
  - ➢Screen organization
  - ➢All emphasis
  - ➢Each color
  - ➢Every graphic
  - ➢All screen animation
  - ➢All forms of feedback
- Must
  - ➢ have meaning to screen users
  - ➢ Serve a purpose in performing tasks

organizing screen elements

- Consistency
  - ➢ **Provide real world consistency**
  - ➢ **Provide internal consistency**
    - ✓ **operational and navigational procedures**
    - ✓ **visual identity or theme**
    - ✓ **Componenet**
      - ❑ **organization**
      - ❑**Presentation**
      - ❑**Usage**
      - ❑**Locations**
  - ➢ **Follow the same conventions**
  - ➢ **Deviate only when there is clear benefit to user**

ordering of screen data & content

- Divide information into units that are logical,meaningful and sensible.
- Organize by interrelationships between data or information.
- Provide an ordering of screen units of elements depending on priority.
- Possible ordering schemes include
  - ➢ Conventional
  - ➢ Sequence of use
  - ➢ Frequency of use
  - ➢ Function
  - ➢ Importance
  - ➢ General to specific

ordering of screen data & content

- form groups that cover all possibilities.
- Ensure that information is visible.
- Ensure that only information relative to task is presented on screen.
- organizational scheme is to minimize number of information variables.

- UPPER LEFT STARTING POINT
- ➢   provide an obvious starting point in the screen's upper left corner.

  - ➢

navigation

Science of determining position, location, distance traveled, and course to a known destination.
l

screen navigation and flow

- Provide an ordering of screen information and elements that:
- ➢is rhythmic guiding a person's   eye through display
  - ➢ encourages natural movement sequences.
  - ➢ minimizes pointer and eye movement distances.
- Locate the most important and most frequently used elements or controls at top left.
- Maintain top to bottom , left to right flow.
- assist in navigation through a screen by
- ➢Aligning elements
- ➢Grouping elements
- ➢Use of line borders

screen navigation and flow

- Through focus and emphasis, sequentially , direct attention to items that are
➢critical
➢Important
➢Secondary
➢Peripheral
- Tab through window in logical order of displayed information.
- locate command button at the end of the tabbing order sequence,
- when groups of related information must be broken and displayed on separate screens, provide breaks at logical or natural points in the information flow.

screen navigation and flow

- In establishing eye movement through a screen, also consider that the eye trends to move sequentially , for example –
➢From dark areas to light areas
➢From big objects to little objects
➢From unusual shapes to common shapes.
➢From highly saturated colors to unsaturated colors.
- These techniques can be initially used o focus a person's attention

screen navigation and flow

- Maintain top to bottom, left to right throgh the screen.This top to bottom orientation is recommended for information entry for the following reasons –
➢Eye movements between items will be shorter.
➢Control movements between items will be shorter.
➢Groupings are more obvious perceptually.
➢When one's eyes moves away from the screen and then back, it returns to about same place it left, even if it is seeking next item in sequence.

screen navigation and flow

- Most product style guides recommend a left to right orientation.
- Our earliest display screens reflected this left to right entry orientation.
- Top to bottom orientation is also recommended for presenting displays of read only information tht must be scanned.

Navigation Design

local structure – single screen

global structure – whole site

    -hierarchical operation

    - dialog

Levels of interaction

Widget choice

 menus, buttons, sliders, etc.(help)

• View, screen design or widow- understating the logical grouping of buttons

• Application navigation design- what will happen when a button is pressed

• Environment

 equipment, operating system, other applications,

other devices

LEVEL of interaction

PC APPLICation	Website	Physical device
Widget choice	Elements and tags <a href="…">	Controls buttons, knobs, dials
Screen design	Page design	Physical layout
Navigation design	Site structure	Modes of device
Environment	The web, browser, external links	The real world

Think about structure

•individual view, screen

 individual screens or the layout of devices will have their own structure (discussed later)

• Local structure

 looking from one screen or page out

• Global structure

 structure of site, movement between screens

• Wider still

 relationship with other applications

Goal seeking

- Much of interaction involves goal-seeking behavior.
- Users have some idea what they are after and a partial model of the system.

start   goal
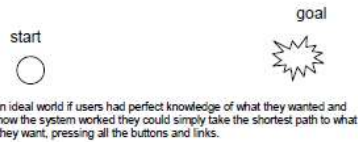
- In ideal world if users had perfect knowledge of what they wanted and how the system worked they could simply take the shortest path to what they want, pressing all the buttons and links.

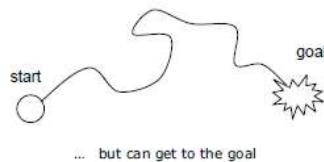Cezary Bolek, Department of Computer Science, University of Lodz

Goal seeking

start   goal
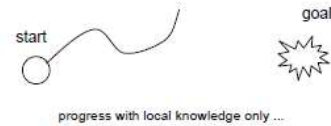
progress with local knowledge only …
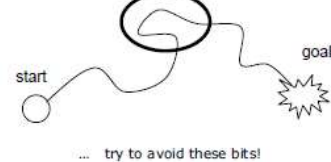
Cezary Bolek, Department of Computer Science, University of Lodz

Four golden rules

- Important knowledge

  - Knowing where you are
  - Knowing what you can do
  - Knowing where you are going
    - or what will happen
  - Knowing where you've been
    - or what you've done

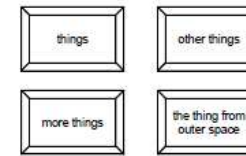Cezary Bolek, Department of Computer Science, University of Lodz

Where you are – breadcrumbs

shows path through web site hierarchy

web site   top level category   sub-category   this page

7 common errors

live links
to higher
levels

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Goal seeking

start   goal

… but can get to the goal

Cezary Bolek, Department of Computer Science, University of Lodz

Goal seeking

start   goal

… try to avoid these bits!
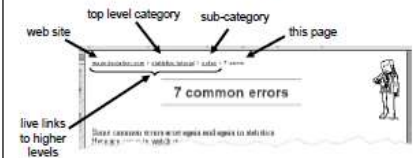
Cezary Bolek, Department of Computer Science, University of Lodz

Beware the big button trap

things	other things
more things	the thing from outer space

- Where do they go?
  - lots of room for extra text!

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Modes - examples

- Lock to prevent accidental use …
  - remove lock – [c] + 'yes' to confirm
  - frequent practiced action
- If lock forgotten
  - in pocket [yes] gets pressed
  - goes to phone book
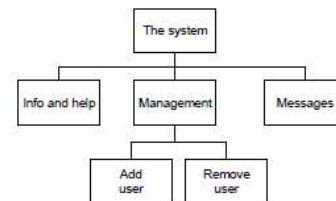 - in phone book …
    - [c] – delete entry
    - [yes] – confirm

  … oops !

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Global structure

between screens
within the application

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Hierarchical diagrams

The system

Info and help   Management   Messages

Add user   Remove user

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Dialogue

'Marriage' service

Minister:	do you *name* take this woman …
Man:	I do
Minister:	Do you *name* take this man …
Woman:	I do
Minister:	I now pronounce you man and wife

- 'Marriage' service
  - general flow, generic – blanks for names
  - pattern of interaction between people
- Computer dialogue
  - pattern of interaction between users and system
  - but details differ each time

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Network diagrams

Main screen   Remove user   Confirm

Add user
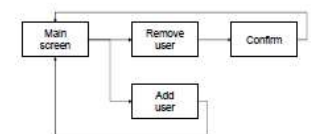
- Show different paths through system

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Hierarchical diagrams ctd.

- Application structure
- Parts of application. Relations between views (screens or groups of screens, states)
- Typically functional separation
- But may be organized by roles, user type, or some esoteric breakdown
  … modules in an educational system

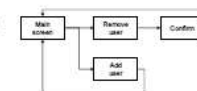Cezary Bolek, Department of Computer Science, University of Lodz

Navigating hierarchies

- Deep hierarchies are difficult to navigate
- It is better to have broad top-level categories to limit depth of hierarchy
- Miller's 7±2 rule is often misused in this context – for short term memory, not menu size
  Many guidelines suggest that menu breadth (the number of choices available at each level) should be around seven – wrong
- For options/menus – visual context
- Example: for web page index, 60 or even more items can be used if the items are organized in a way the eye can easily find the right one
- Optimal?
  - many items on each screen
  - but structured within screen

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Network diagrams ctd.

- Show relations between operations (actions) :
  - what leads to what
  - what happens when
- Including branches

- More task oriented then hierarchy diagrams

Main screen   Remove user   Confirm

Add user

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Wider still...

- Style issues:
  - platform standards, consistency
- Functional issues
  - e.g. cut and paste
- Navigation issues
  - embedded applications, embedding data from other apps
  - links to other apps ... the web

- Provide visually pleasing composition with the following qualities –
  - balance
  - Symmetry
  - Regularity
  - Predictability
  - Sequentiality
  - Economy
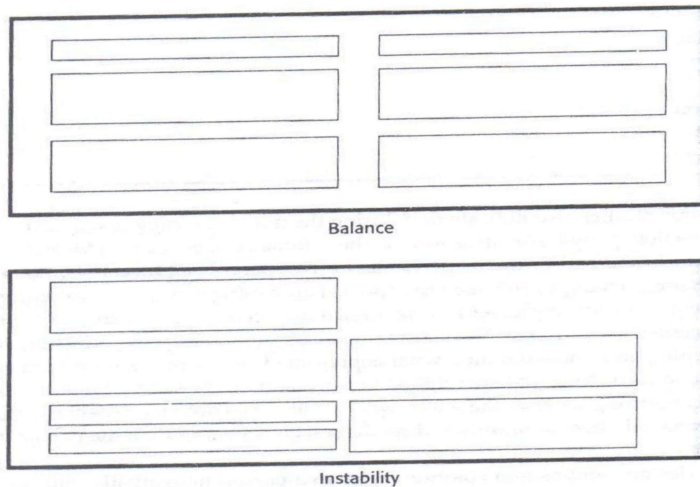 - Unity
  - proportion
  - Simplicity
  - Groupings.

Balance

Balance

Instability

Figure 3.1   Balance (versus instability).

symmetry

Symmetry
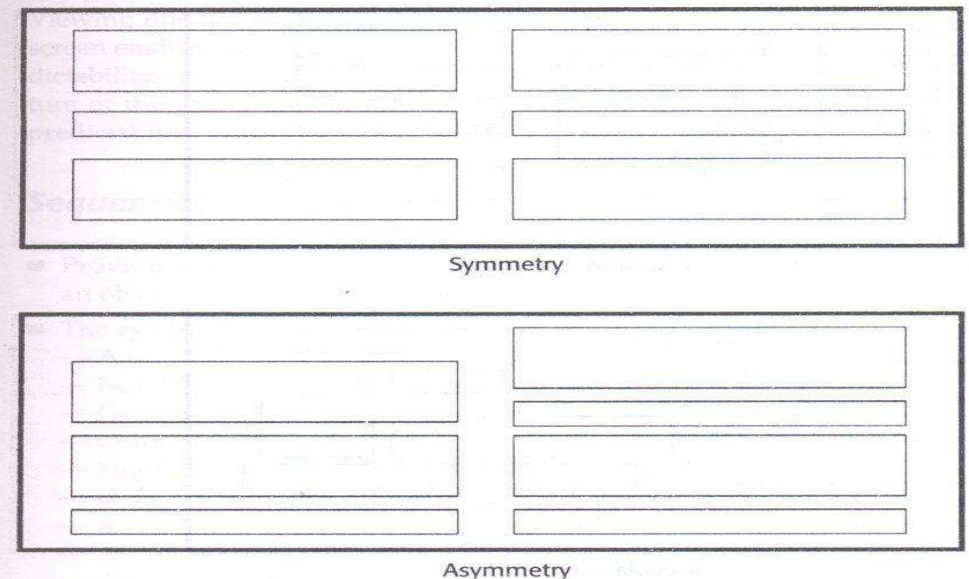
Asymmetry

Figure 3.2   Symmetry (versus asymmetry).

Regularity

Predictability

- Create predictability by being consistent and following conventional orders or arrangements.
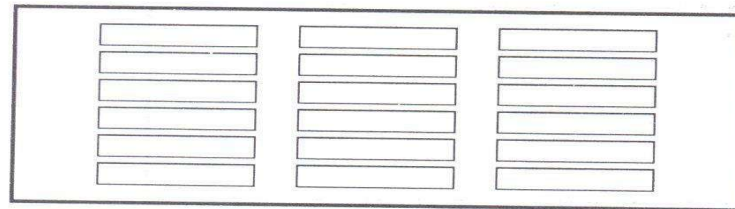
Regularity
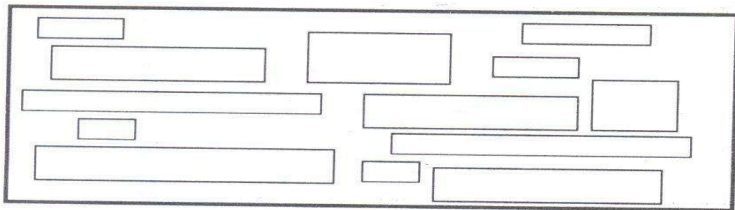
Irregularity

Figure 3.3 Regularity (versus irregularity).
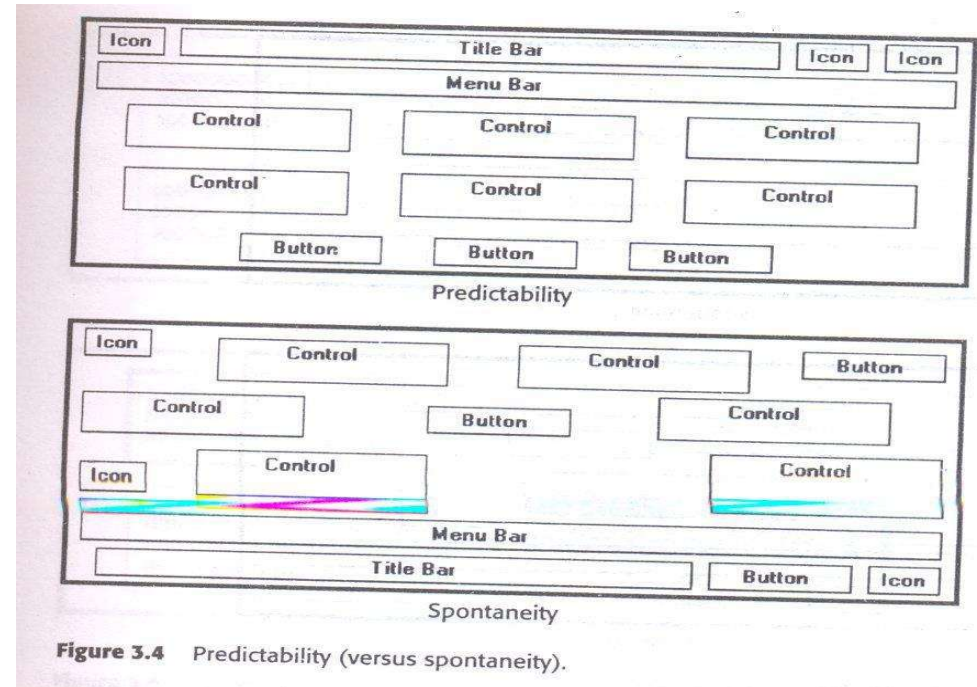
Predictability

Predictability

Spontaneity

Figure 3.4 Predictability (versus spontaneity).

sequentially

- The eye trends to be attracted to :
- A brighter element before one less bright
- Isolated elements before elements in a group
- Graphics before text
- Color before black and white
- Highly saturated colors before those less saturated.
- Dark areas before light areas
- A big element before a small one
- An unusual shape before a usual one
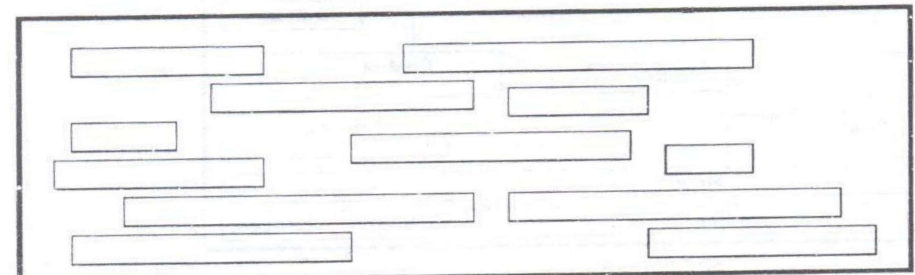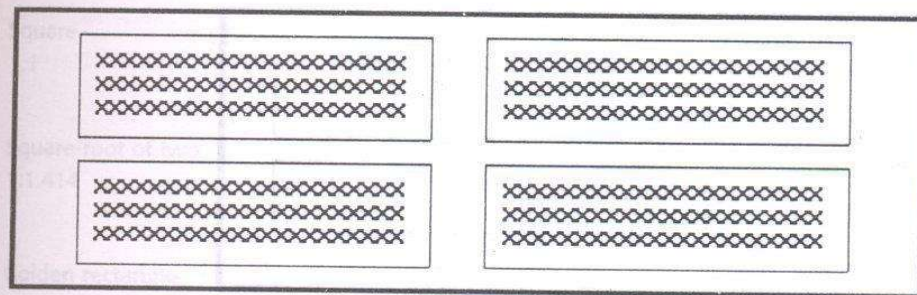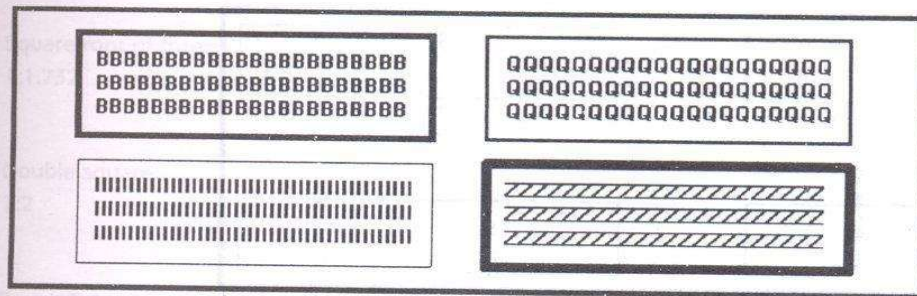- Big objects before little objects

Sequentiality

Randomness

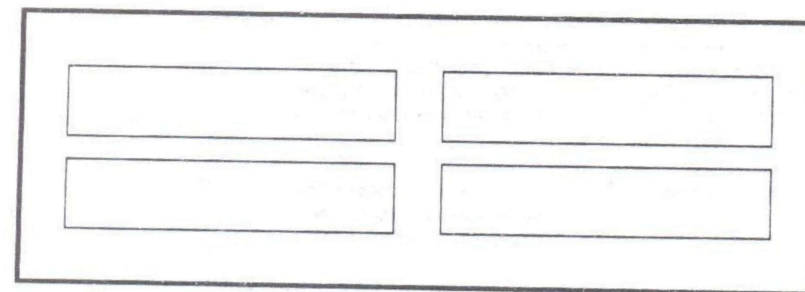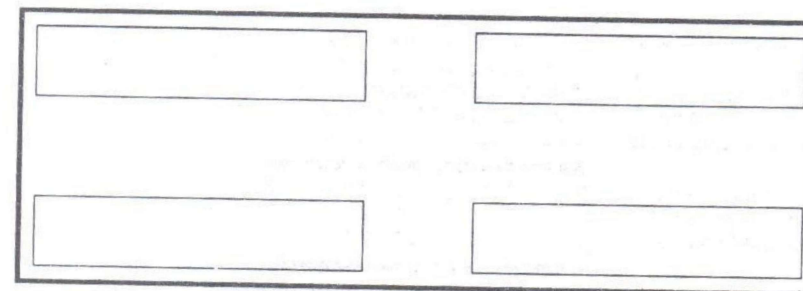**Figure 3.5** Sequentiality (versus randomness).

Economy

Intricacy

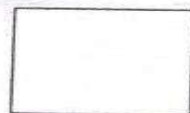**Figure 3.6** Economy (versus intricacy).

Unity

Fragmentation

Figure 3.7 Unity (versus fragmentation).
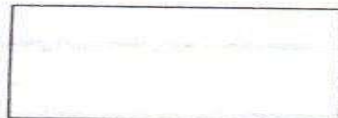

Square
1:1

Square-root of two
1:1.414

Golden rectangle
1:1.618

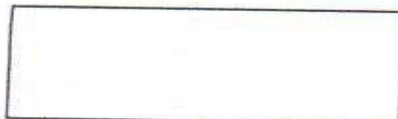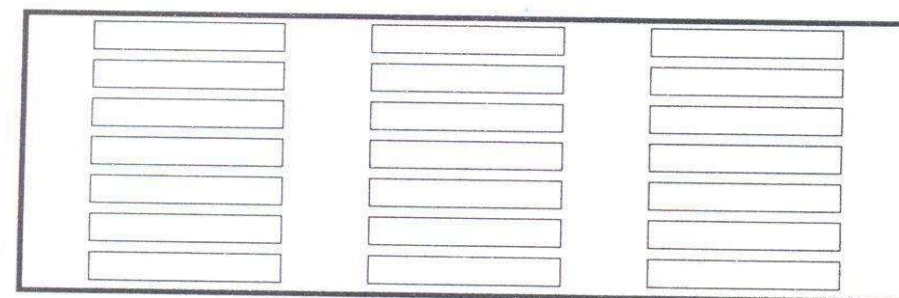Square-root of three
1:1.732

Double square
1:2

Figure 3.8 Pleasing proportions.

Simplicity
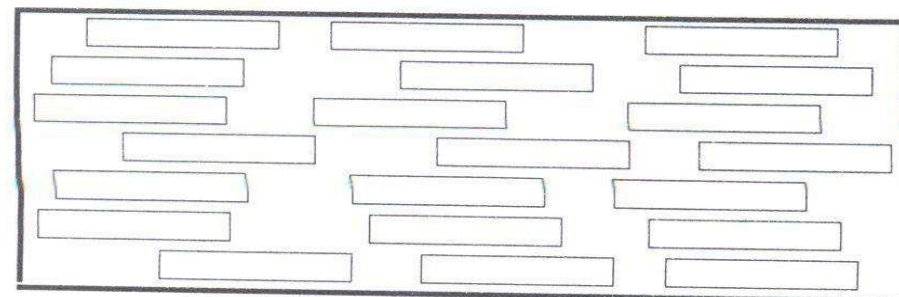
Complexity

Figure 3.9 Simplicity (versus complexity).

Figure 3.10 Original screen, from Tullis (1981), with title, captions, and data inscribed by rectangles.

18 fields with 7 horizontal (column) alignment points = 43 bits.
18 fields with 8 vertical (row) alignment points = 53 bits.
Overall complexity = 96 bits.

Figure 3.11 Redesigned screen, from Tullis (1981), with title, captions, and data inscribed by rectangles.

Figure 3.12 Original screen, from Tullis (1981), with grouping indicated by bold boxes.

Figure 3.13 Redesigned screen, from Tullis (1981), with grouping indicated by bold boxes.

Grouping using borders

- Provide functional groupings

- Create spatial groupings

- Provide meaningful titles for aech grouping

- Incorporate line borders

- Do not exceed three line thickness

- Create lines consistent in height and length

- For adjacent groupings with borders whereever possible

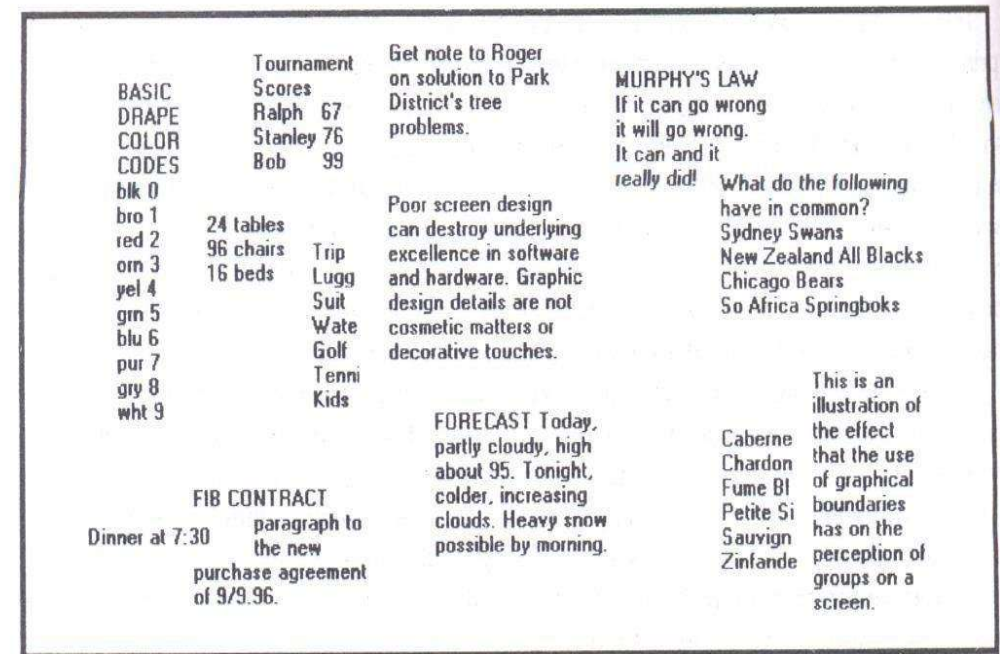- Use rules and borders sparingly

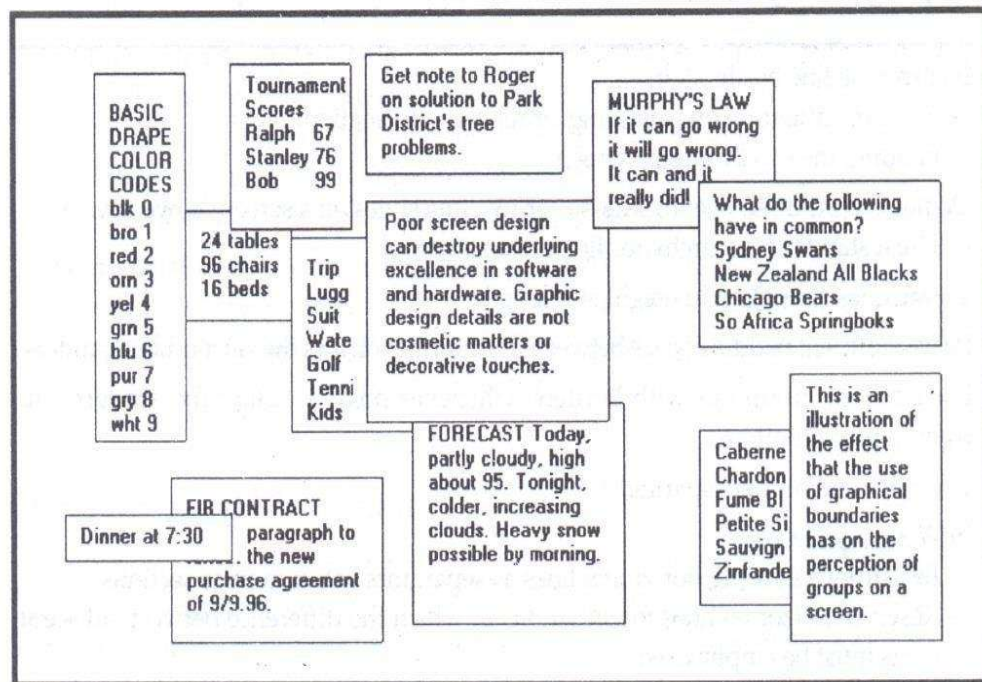**Figure 3.14** The effect of line or graphical borders. Groupings without borders.

Figure 3.15 The effect of line or graphical borders. Groupings with borders.
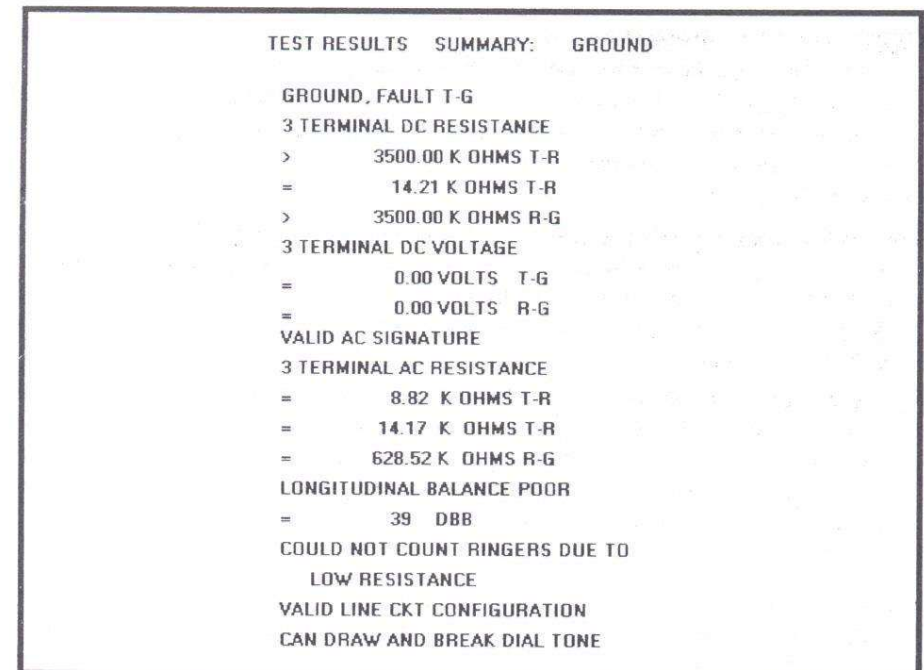
Figure 3.16 Original screen, from Tullis (1981).

```
          . . . . . . . . . . . . . . . . . . . . . . . .
          .  TIP GROUND      14 K                       .
          . . . . . . . . . . . . . . . . . . . . . . . .


  DC RESISTANCE           DC VOLTAGE              AC SIGNATURE

  3500 K  T - R                                   9  K  T - R
    14 K  T - G           0 V  T - G             14 K  T - G
  3500 K  R - G           0 V  R - G             629 K  R - G


  BALANCE                                         CENTRAL OFFICE

   39   DB                                        VALID LINE CKT
                                                  DIAL TONE OK
```

Figure 3.17 Redesigned screen, from Tullis (1981).

Focus and emphasis

➢ Visually emphasize the

  ✓ most prominent element

  ✓ Most important elements

  ✓ Central idea or focal point

➢ De emphasize less important elements

➢ To ensure that

  ✓ too many screen elements are emphasized.

  ✓ screen clutter

  ✓ using too many emphasize techniques

Scrolling and Paging

■ Scrolling:
  — Avoid scrolling to determine a page's contents.
  — Minimize vertical page scrolling.
  — When vertical scrolling is necessary to view an entire page:
    • Provide contextual cues within the page that it must be scrolled to view its entire contents.
    • Provide a unique and consistent "end of page" structure.
  — Avoid horizontal page scrolling.
■ Paging:
  — Encourage viewing a page through "paging."
  — Create a second version of a Web site, one consisting of individual screens that are viewed through "paging."

Focus and emphasis

➢ To provide emphasis use techniques such as :
  ✓ Higher brightness
  ✓ Reverse polarity
  ✓ Larger and distinctive font
  ✓ Underlining
  ✓ Blinking
  ✓ Line rulings
  ✓ Contrasting colors
  ✓ Larger size
  ✓ Positioning
  ✓ Isolation
  ✓ Distinctiveness
  ✓ White space

Presenting Information Simply and Meaningfully

- Provide legibility.
  - Information is noticeable and distinguishable.
- Provide readability.
  - Information is identifiable, interpretable, and attractive.
- Present information in usable form.
  - Translations, transpositions, and references to documentation should not be required to interpret and understand information.
- Utilize contrasting display features.
  - To attract and call attention to different screen elements.
- Create visual lines.
  - Implicit and explicit, to guide the eye.
- Be consistent.
  - In appearance and procedural usage.

Font Size

- Use no more than three sizes.
  - Consider "X" height.
- For graphical systems use:
  - 12 point for menus.
  - 10 point for windows.
- For Web pages use:
  - 12–14 points for body text.
  - 18–36 points for titles and headings.
- For line spacing use one to one and one-half times font size.
- Never change established type sizes to squeeze in more text.

Chapter headings:	24-point bold
Section headings:	18-point bold
Subsection headings:	14-point bold
Paragraph headings:	12-point bold
Body text:	10-point
Annotations/footnotes:	8-point

abcdefghijklmnopqrstuvwxyz

abcdefghijklmnopqrstuvwxyz

abcdefghijklmnopqrstuvwxyz

Figure 3.20 Types with same point size and different x heights (from top to bottom, Gatsby, Times Roman, and Avant Garde).

Font Styles and Weight

- Use no more than:
  - Two styles of the same family.
    - Standard and *italic*.
    - *Italic* is best presented in a serif font.
  - Two weights.
    - Regular and **bold**.
    - **Bold** is best presented in a sans serif font.
- Use *italics* when you want to call attention.
- Use **bold** when you want to call attention or create a hierarchy.
- In Web pages, use an underline only to indicate a navigation link.

First Amount: ☐

Last Amount: ☐

This Amount: ☐

That Amount: ☐

Who Cares Amount: ☐

AMOUNT >>   First: ☐

Last: ☐

This: ☐

That: ☐

Who Cares: ☐

Figure 3.21 Providing better control caption discrimination. (The redundant word "amount" is incorporated into a heading.)

Control Caption/Data Field Justification

- 1. First Approach
  - Left-justify both captions and data fields.
  - Leave one space between the longest caption and the data field column.

Division: ☐

Department: ☐

Figure 3.26   Title: ☐

- 2. Second Approach
  - Left-justify data fields and right-justify captions to data fields.
  - Leave one space between each.

Division: ☐

Department: ☐

Figure 3.27   Title: ☐

Control Captions/Data Fields

- Differentiate captions from data fields by using:
  - Contrasting features, such as different intensities, separating columns, boxes, and so forth.
  - Consistent physical relationships.

Sex: ☐ Female

Figure 3.22   Relation: ☐ Daughter

- For single data fields:
  - Place the caption to left of the data field.

Figure 3.23   Relation: ☐ Daughter

  - Align the caption with the control's data.
  - Alternately, place the caption above the data field.
  - Align captions justified, upper left to the data field.

Relation:
Figure 3.24   ☐ Daughter

  - Maintain consistent positional relations within a screen, or within related screens, whenever possible.
- For multiple listings of columnar-oriented data, place the caption above the columnized data fields.

Names:
| Deirdra |
| Karin |
| Kim |
| Lauren |

Figure 3.25

ACCOUNT

Number   Name
☐   ☐

Street   City
☐   ☐

State   Zip   Telephone
☐   ☐   ☐

[OK]   [Apply]   [Cancel]

Figure 3.28 Entry screen with captions above single data fields. Captions distinct from data but with poor alignment and organization of fields. Left-to-right orientation and no groupings. Fair readability.

Justification of single captions and data fields can be accomplished in several ways. These include:

A. Left-justifying captions; data field immediately follows caption.

Division: [   ]
Department: [   ]
Title: [   ]

Figure 3.45

B. Left-justifying captions; left-justifying data fields; colon (:) associated with captions.

Division: [   ]
Department: [   ]
Title: [   ]

Figure 3.46

C. Left-justifying captions; left-justifying data fields; colon (:) associated with data field.

Division   : [   ]
Department : [   ]
Title   : [   ]

Figure 3.47

D. Right-justifying captions; left-justifying data fields.

Division: [   ]
Department: [   ]
Title: [   ]

Figure 3.48

➢back

- Initial focus on attention
- Page perusal
- Scanning guidelines
- Browsing
- Browisng guidelines
- Searching
- Problems with search facilities
- Search facility guidelines
- Express the search
- Progressive search refinement
- Launch the search
- Present meaningful results

Information retrieval on web

- The most sought after web commodity is content.
- Behavior is often goal driven.
- Reading is no longer a linear activity.
- Impatience.
- Frequent switching of purpose.
- Web users access site for different reasons: a focused search for a piece of information or an answer less focused for browsing or surf.
- High tech capabilities , fancy graphics do not compensable for inefficient or poor content.

Scanning guidelines

- Organization
  - ➢Minimize eye movement
  - ➢Provide groupings of information
  - ➢Organize contenet in a logical and obvious way.
- Writing
  - ➢Provide meaningful headings and subheadings.
  - ➢Provide meaningful titles
  - ➢Concisely write the text.
  - ➢Use bullets/ numbers
  - ➢Array information in tables
- Presentation
  - – Key information in words or phrases
  - – Important concepts

Browsing guidelines

- Facilitate scanning

- Provide multiple layers of structure

- Make navigation easy

- Respect users desire to leave

- Upon returning help users reorient themselves.

- Users can browse deeply or simply move on.

- Provide guidance to help reorientation

- Understand terms to minimize te need for users to switch context.

Problems with searching

➢Not understanding the user.

➢Difficulties in formulating the search.

➢Difficulties in presenting meaningful results.

➢Identify the level of expertise of user.

Know the search user

➢Plan for user's switchig purposes during search

process.

➢Plan for flexibility in the search process.

➢Anticipate

✓nature of every possible query

✓Kind of information desired

✓How much information will result the search.

statistical graphics

- A statistical graphic is data presented in a graphical format.

- A well designed statistical graphic also refered to as chart or graph.

- Use of statistical graphics

   - reserve for material that is rich, complex or difficult.

- Data Presentation

- emphasize the data

- Minimize non data elements

- Minimize redundant data

- Fill the graph's available area with data.

- Show data variation

- Provide proper context for data interpretation

- Scales and shading
- place ticks to marks scales on the outside edge of each axis.
- employ a linear scale.
- mark scales at standard or customary intervals
- Start a numeric scale at zero.
- display only a single scale on axis.
- provide aids for scale interpretation.
- clearly label each axis.
- Provide scaling consistency
- consider duplicate axis for large scale data.
- Proportion
- Lines
- Labeling
- Title
- Interpretation of numbers

Types of statistical graphs

➢curve and line graphs

➢Single graph
- ✓ Four or five maximum
- ✓ Label identification
- ✓ Legend
- ✓ Tightly packed curves
- ✓ Important or critical data
- ✓ Comparing actual and projected data
- ✓ Data differences

➢ Surface charts
- ✓ Ordering
- ✓ Coding schemes
- ✓ Labels

➢Segmented or stacked bars.
- ✓Data category ordering
- ✓Large segments
- ✓Coding schemes
- ✓labeling

➢ Flow charts
- ✓Order of stps
- ✓Orientation
- ✓Coding conventions
- ✓Arrows
- ✓Highlighting
- ✓One decission at each step
- ✓Consistently order and word all choices

➢ Pie chart

➢back

➢Scatter plots
- ✓ two dimensions
- ✓Consistent intervals
- ✓ multiple data sets
- ✓Significant points

➢Bar graphs
- ✓ consistent orientation
- ✓Meaningful organization
- ✓Bar spacing
- ✓Differentiation
- ✓Important or critical data
- ✓Related bar ordering
- ✓Reference index
- ✓labeling

Technological consideration -interface design

Graphical systems

- Screen design must be compatible with the capabilities of the system –
  - ✓ system power
  - ✓Screen size
  - ✓Screen resolution
  - ✓Display colors
  - ✓Other display features

- Screen design must be compatible with the capabilities of the
  - ✓ Platform compatibility
  - ✓ development and implementation
  - ✓ Platform style guide
- browser
  - ✓ compatibility
  - ✓ monitor size and resolution
  - ✓ fonts
  - ✓ Color
  - ✓ Bandwidth
  - ✓ Version
- other considerations
  - ✓ Downloading
  - ✓ Currency
  - ✓ Page printing
  - ✓ Maintainability