

# HUMAN COMPUTER INTERACTION

## UNIT- 4

# INDEX- UNIT 4

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# 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
    - ✓ arrangement
  - Visual inconsistency
  - Lack of design features
  - Over use of 3D presentations
  - Overuse of too many bright colors
  - Bad typography

# **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 consistency
- Outdated information

- **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**

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# 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**
  - ✓ **Component**
    - ☐ **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.
  - [back](#)

# 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 to focus a person's attention

# screen navigation and flow

- Maintain top to bottom, left to right through 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

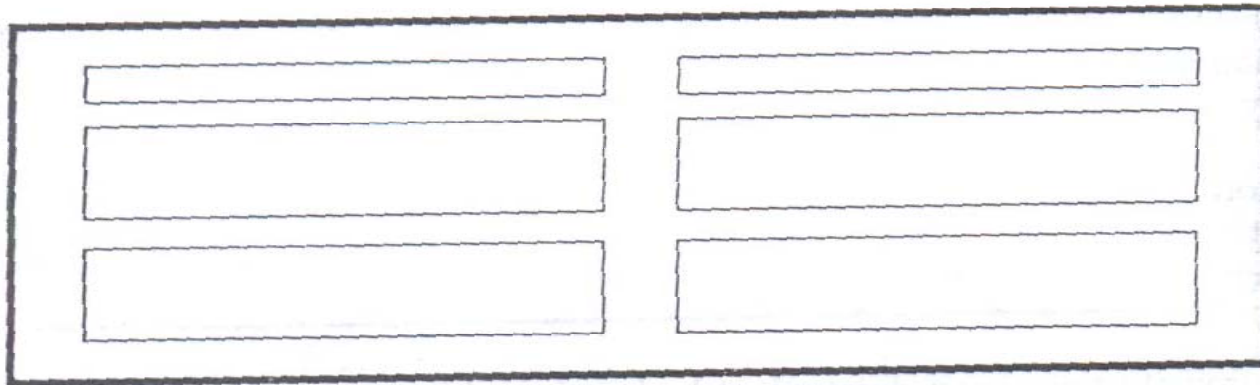
- Most product style guides recommend a left to right orientation.
- Our earliest display screens reflected this left to right entry orientation.
- Top to bottom orientation is also recommended for presenting displays of read only information tht must be scanned.



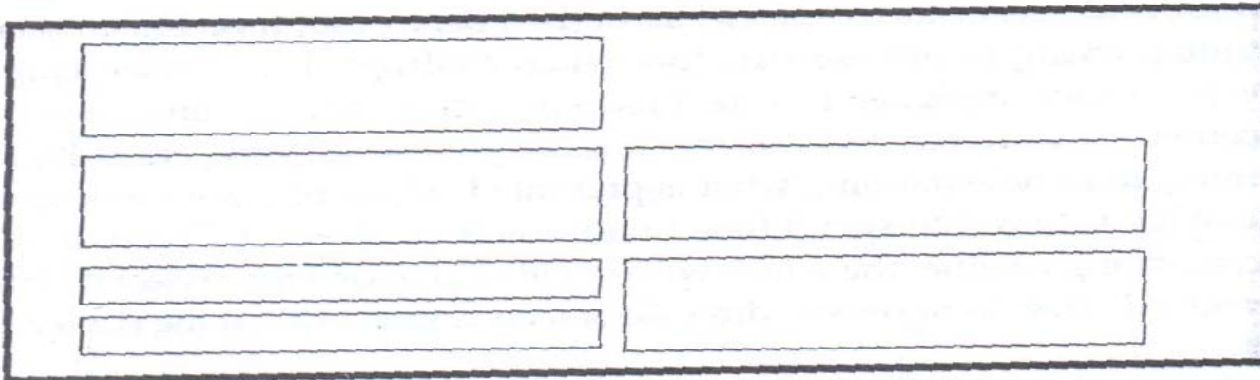
# Visually pleasing composition

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

# Balance



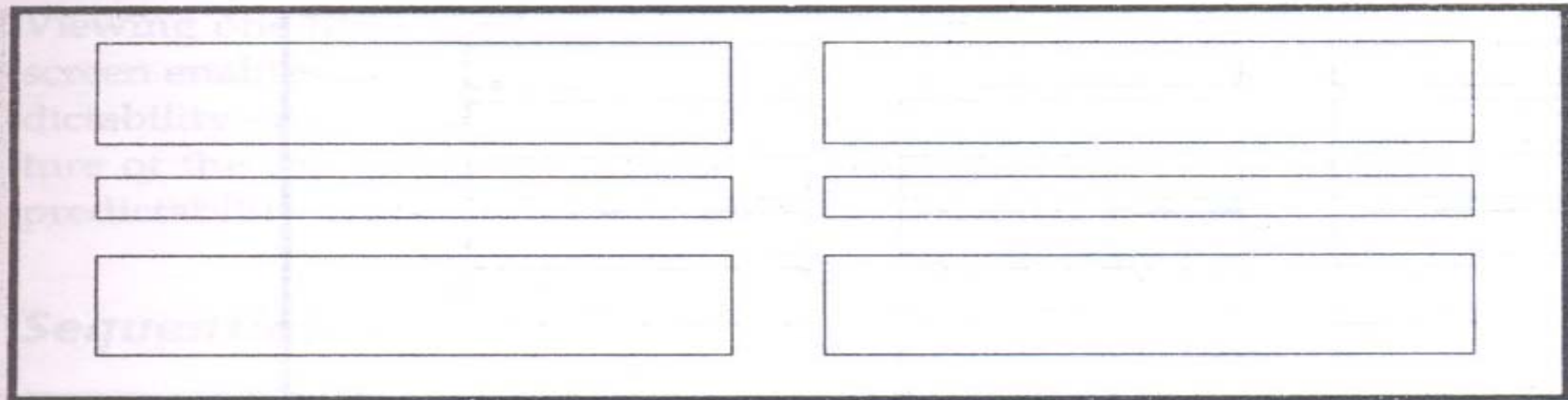
Balance



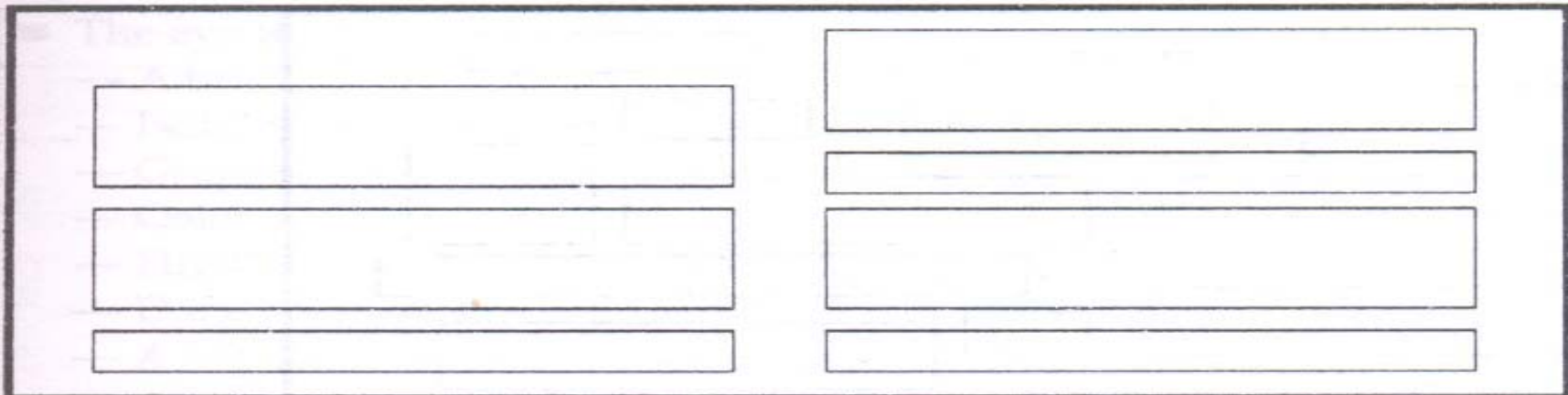
Instability

**Figure 3.1** Balance (versus instability).

# symmetry



Symmetry



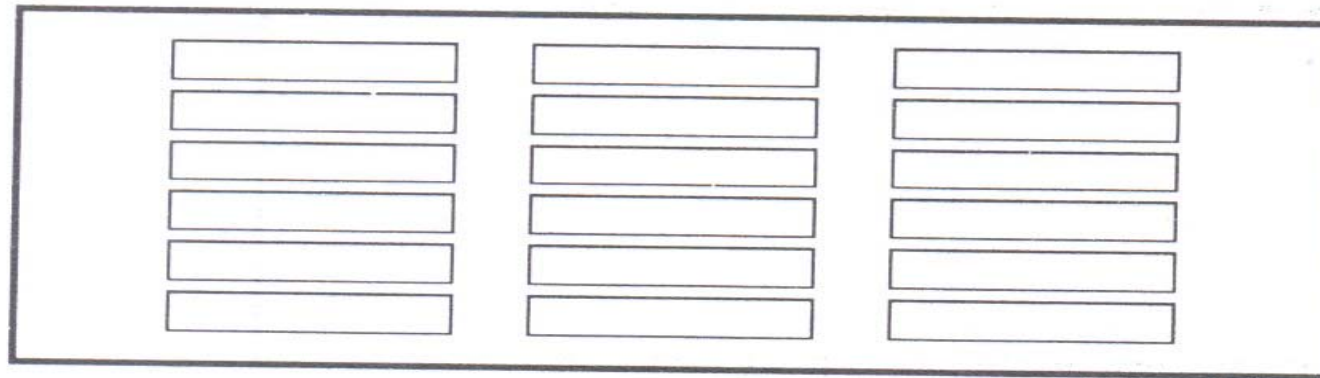
Asymmetry

**Figure 3.2** Symmetry (versus asymmetry).

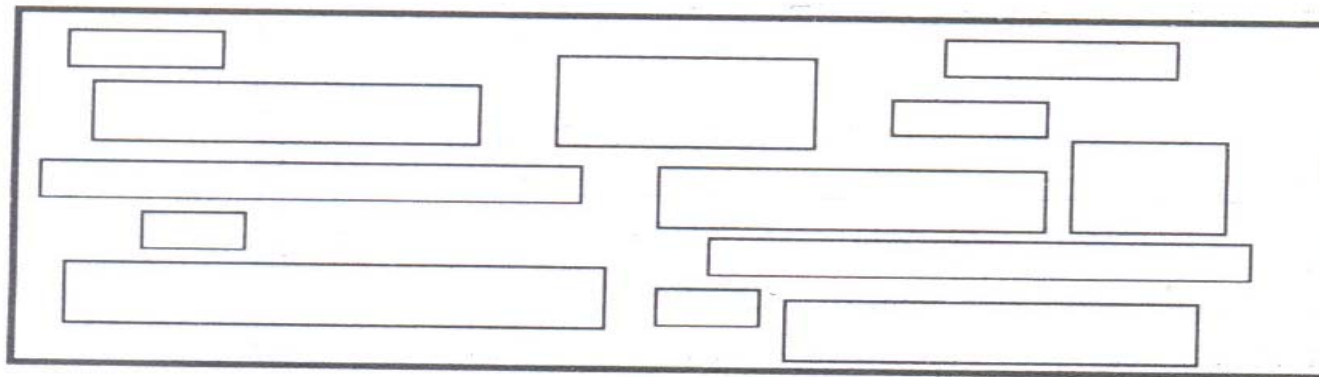
# Regularity

## ***Predictability***

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



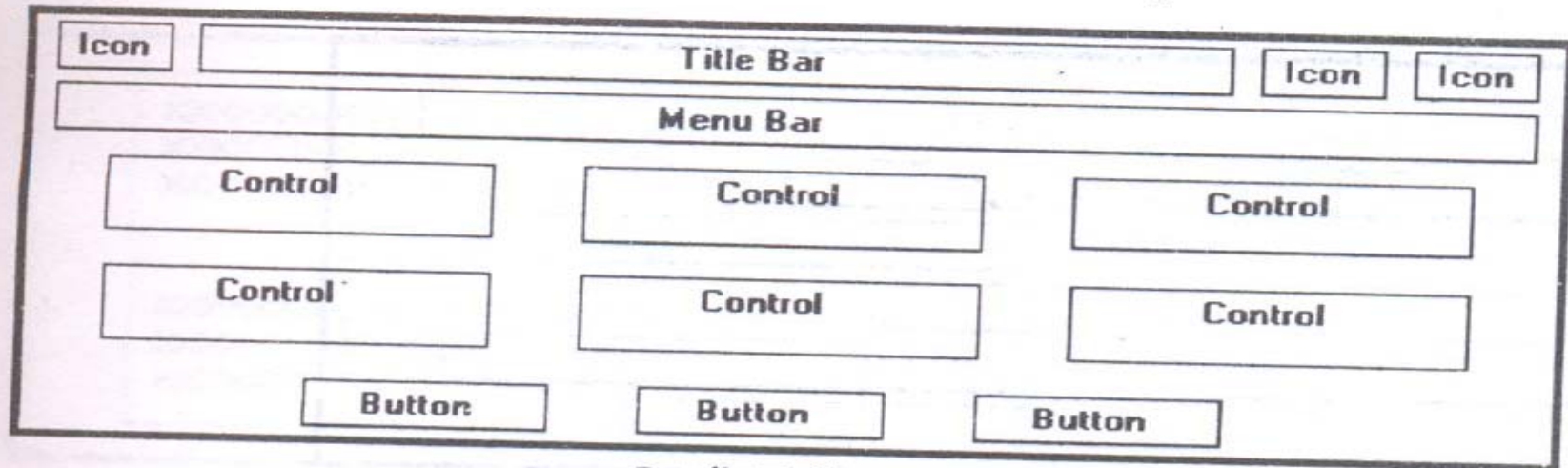
Regularity



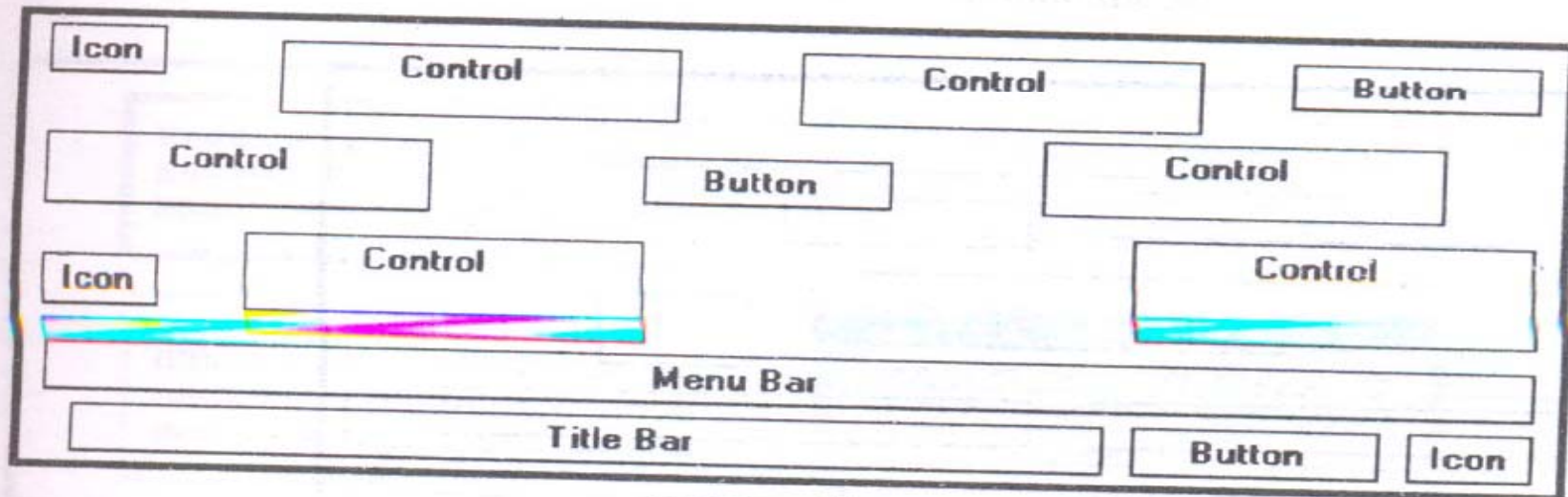
Irregularity

**Figure 3.3** Regularity (versus irregularity).

# Predictability



Predictability



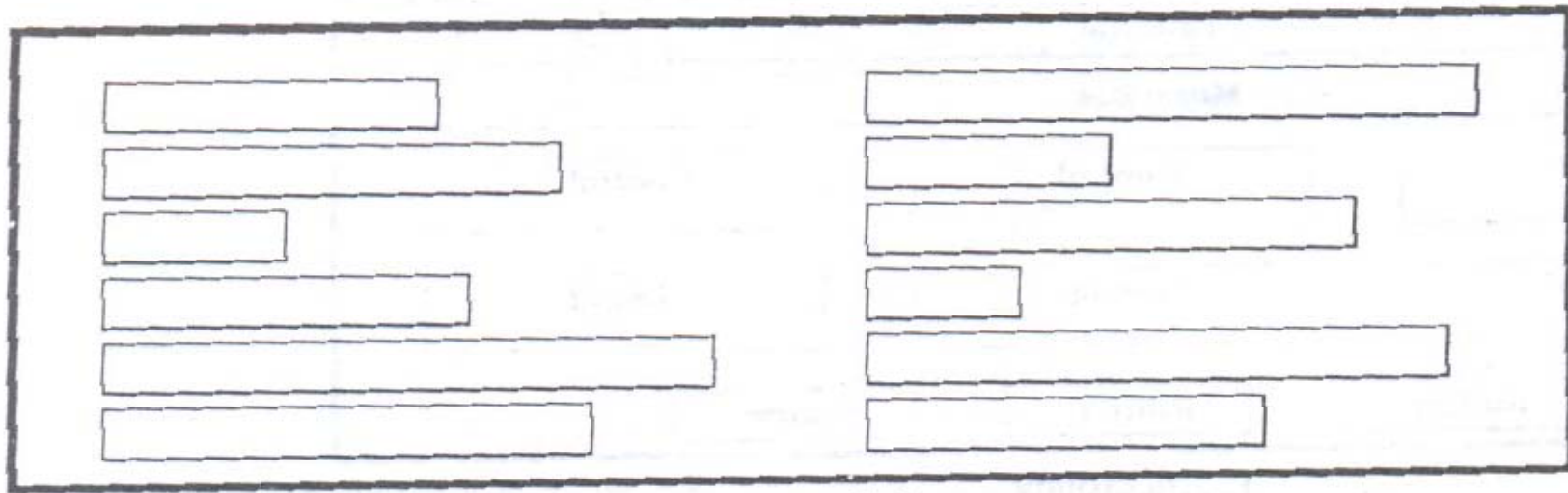
Spontaneity

**Figure 3.4** Predictability (versus spontaneity).

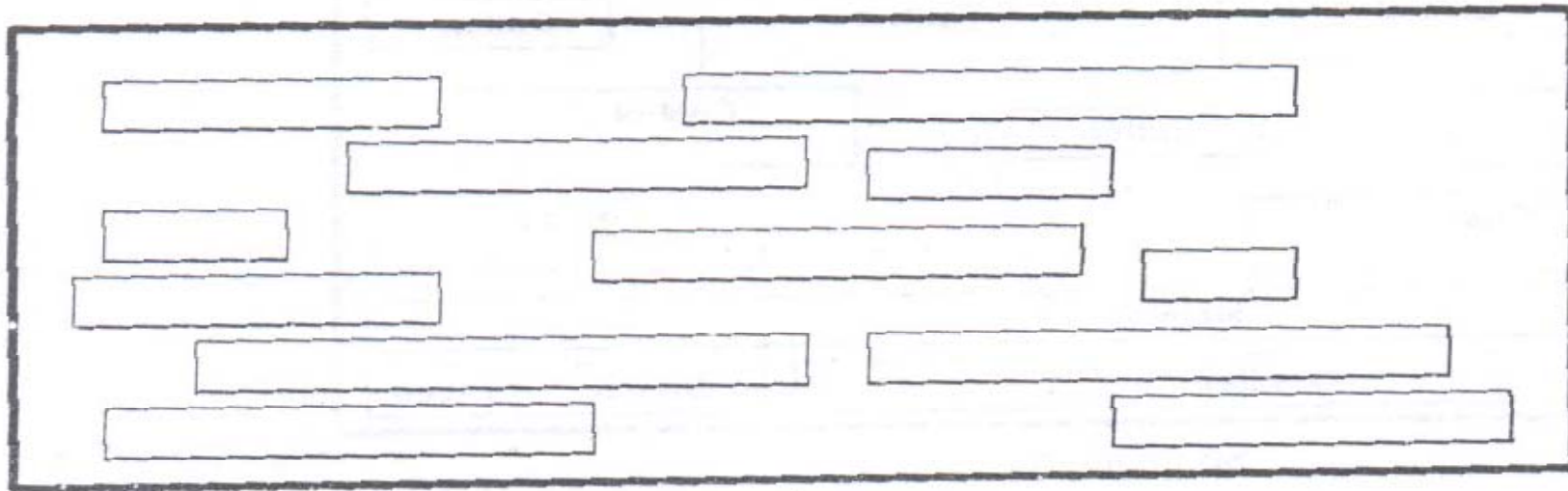
# sequentially

- 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



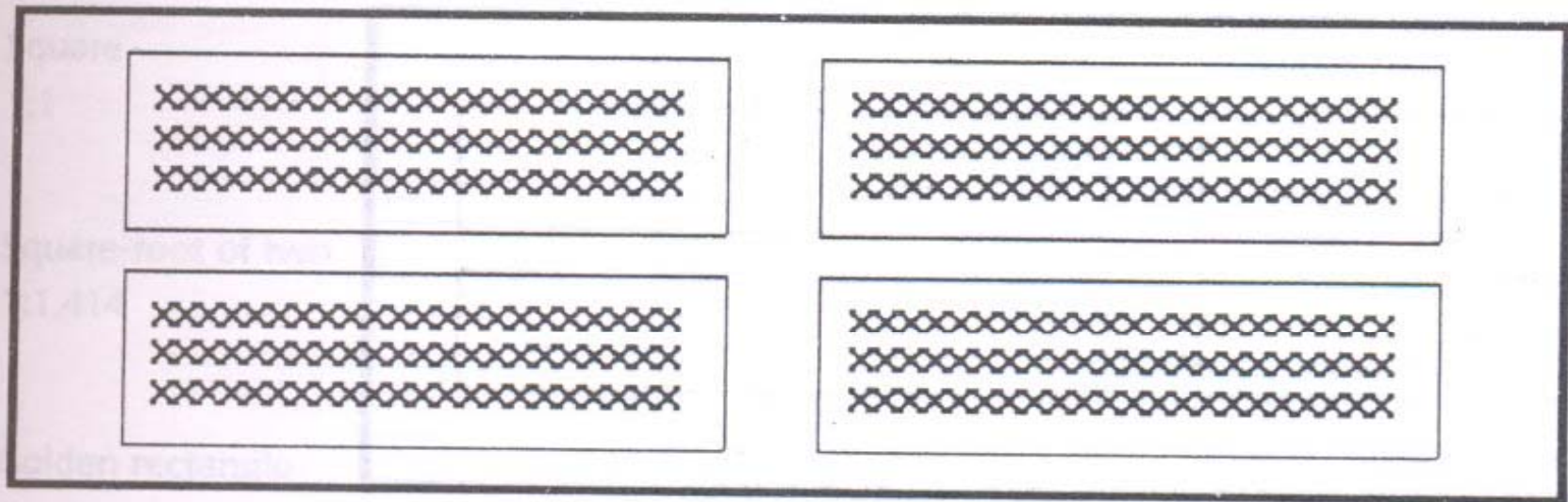


Sequentiality

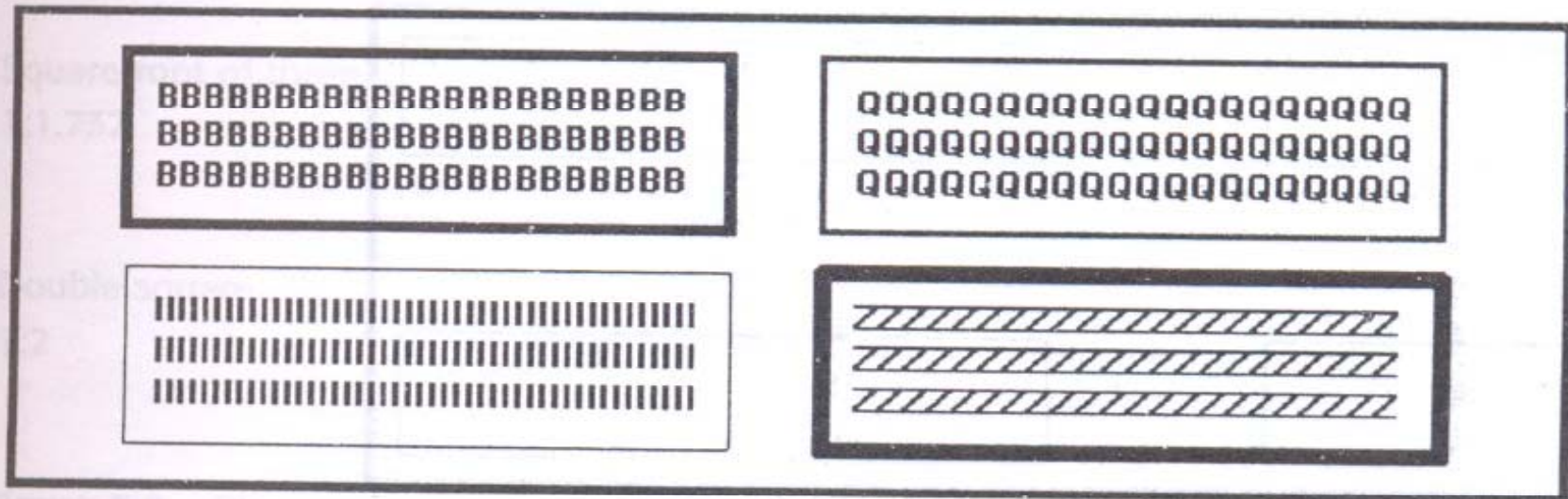


Randomness

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



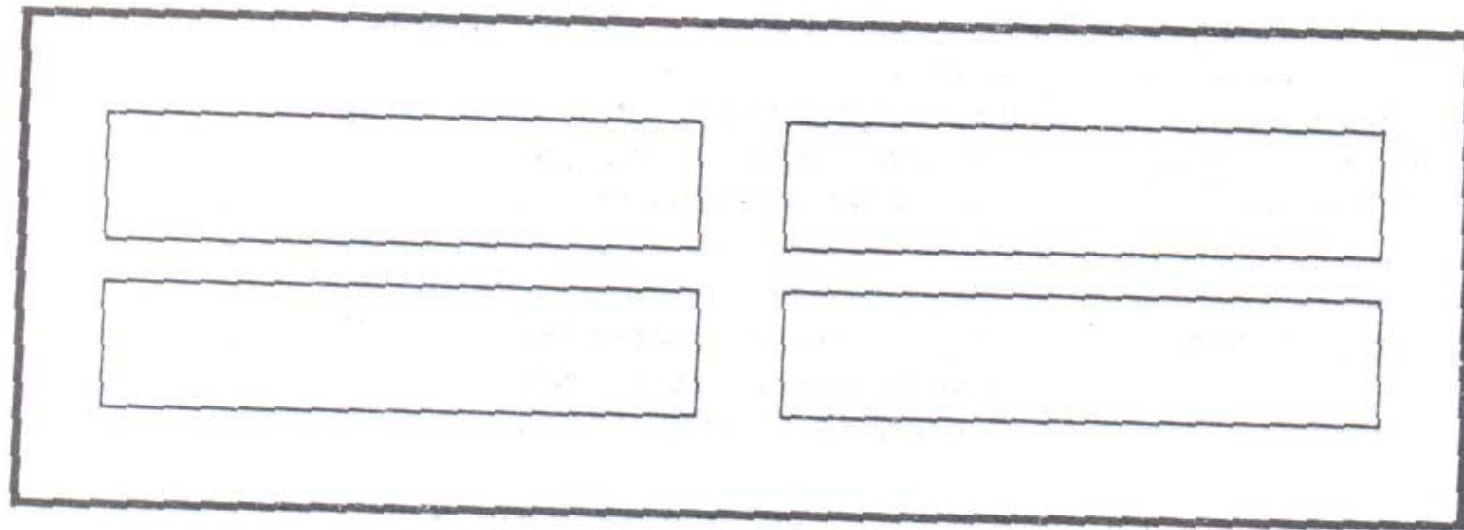
Economy



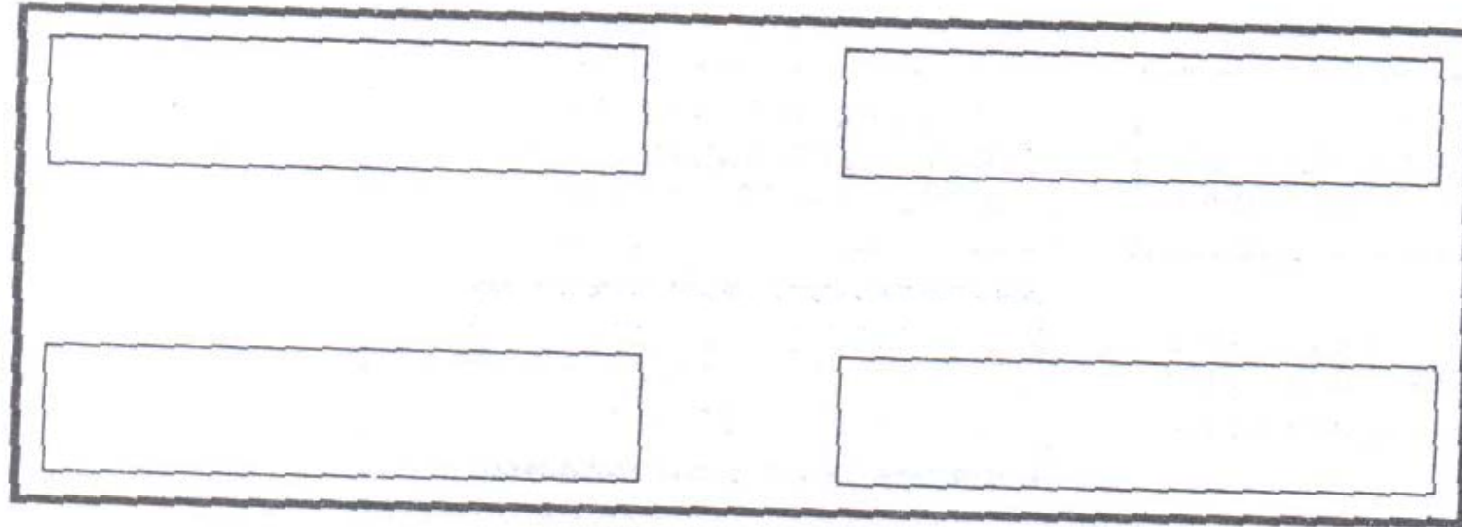
Intricacy

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





Unity

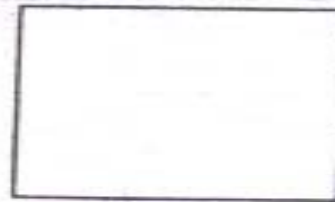


Fragmentation

**Figure 3.7** Unity (versus fragmentation).

Square

1:1



Square-root of two

1:1.414



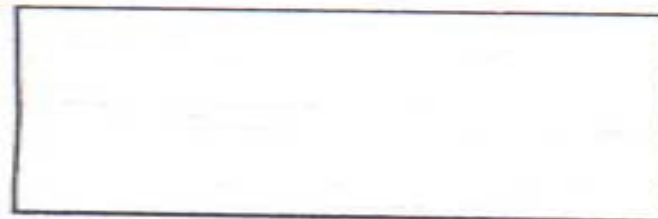
Golden rectangle

1:1.618



Square-root of three

1:1.732

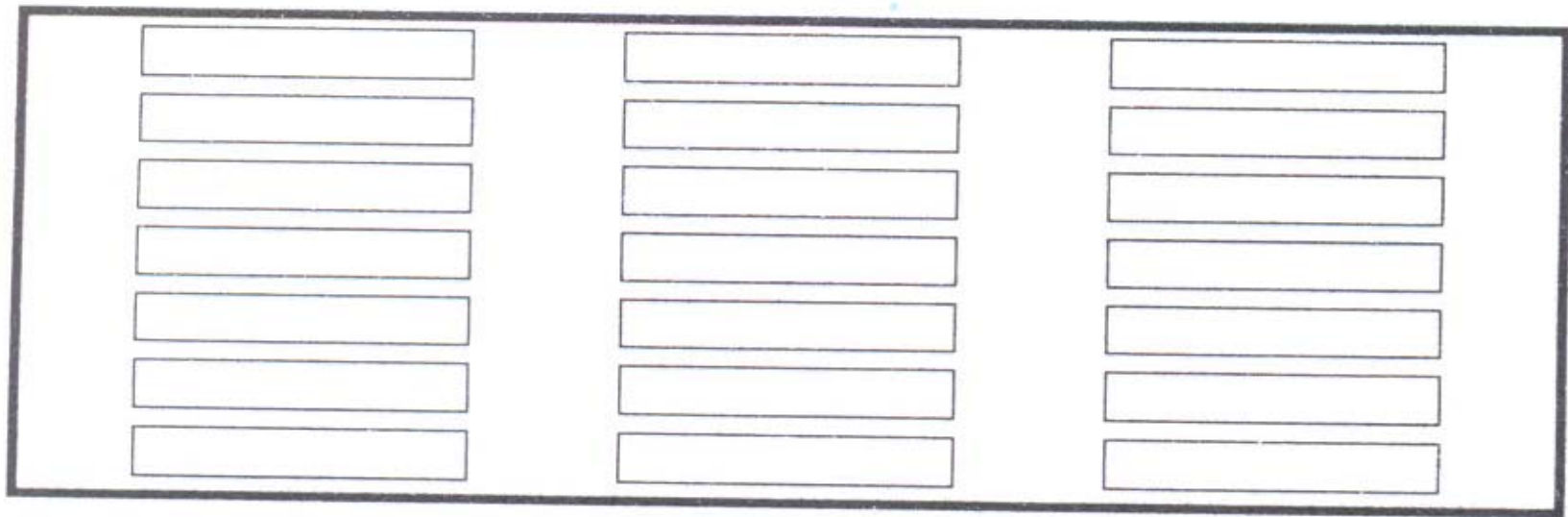


Double square

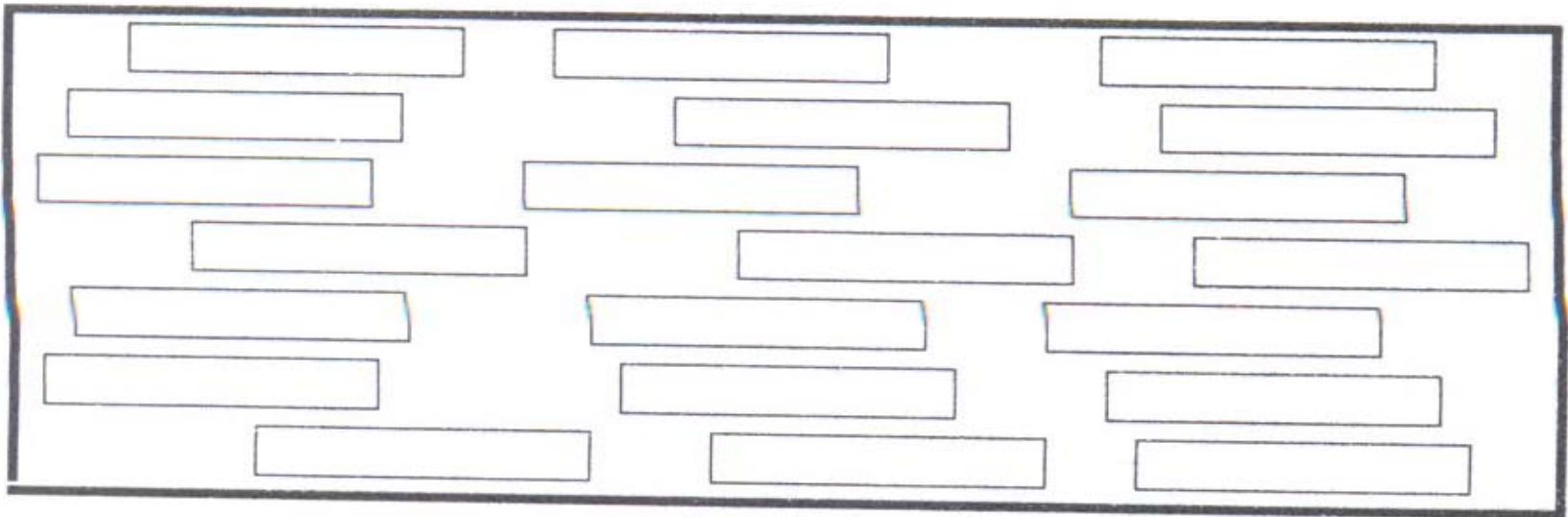
1:2



**Figure 3.8** Pleasing proportions.



Simplicity



Complexity

**Figure 3.9** Simplicity (versus complexity).

| TEST RESULTS                   |  | SUMMARY:           |  | GROUND |  |
|--------------------------------|--|--------------------|--|--------|--|
| GROUND, FAULT T-G              |  |                    |  |        |  |
| 3 TERMINAL DC RESISTANCE       |  |                    |  |        |  |
| >                              |  | 3500.00 K OHMS T-R |  |        |  |
| =                              |  | 14.21 K OHMS T-R   |  |        |  |
| >                              |  | 3500.00 K OHMS R-G |  |        |  |
| 3 TERMINAL DC VOLTAGE          |  |                    |  |        |  |
| =                              |  | 0.00 VOLTS T-G     |  |        |  |
| =                              |  | 0.00 VOLTS R-G     |  |        |  |
| VALID AC SIGNATURE             |  |                    |  |        |  |
| 3 TERMINAL AC RESISTANCE       |  |                    |  |        |  |
| =                              |  | 8.82 K OHMS T-R    |  |        |  |
| =                              |  | 14.17 K OHMS T-R   |  |        |  |
| =                              |  | 628.52 K OHMS R-G  |  |        |  |
| LONGITUDINAL BALANCE POOR      |  |                    |  |        |  |
| =                              |  | 39 DB              |  |        |  |
| COULD NOT COUNT RINGERS DUE TO |  |                    |  |        |  |
| LOW RESISTANCE                 |  |                    |  |        |  |
| VALID LINE CKT CONFIGURATION   |  |                    |  |        |  |
| CAN DRAW AND BREAK DIAL TONE   |  |                    |  |        |  |

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



■ Figure 3.11 (redesigned):

18 fields with 7 horizontal (column) alignment points = 43 bits.

18 fields with 8 vertical (row) alignment points = 53 bits.

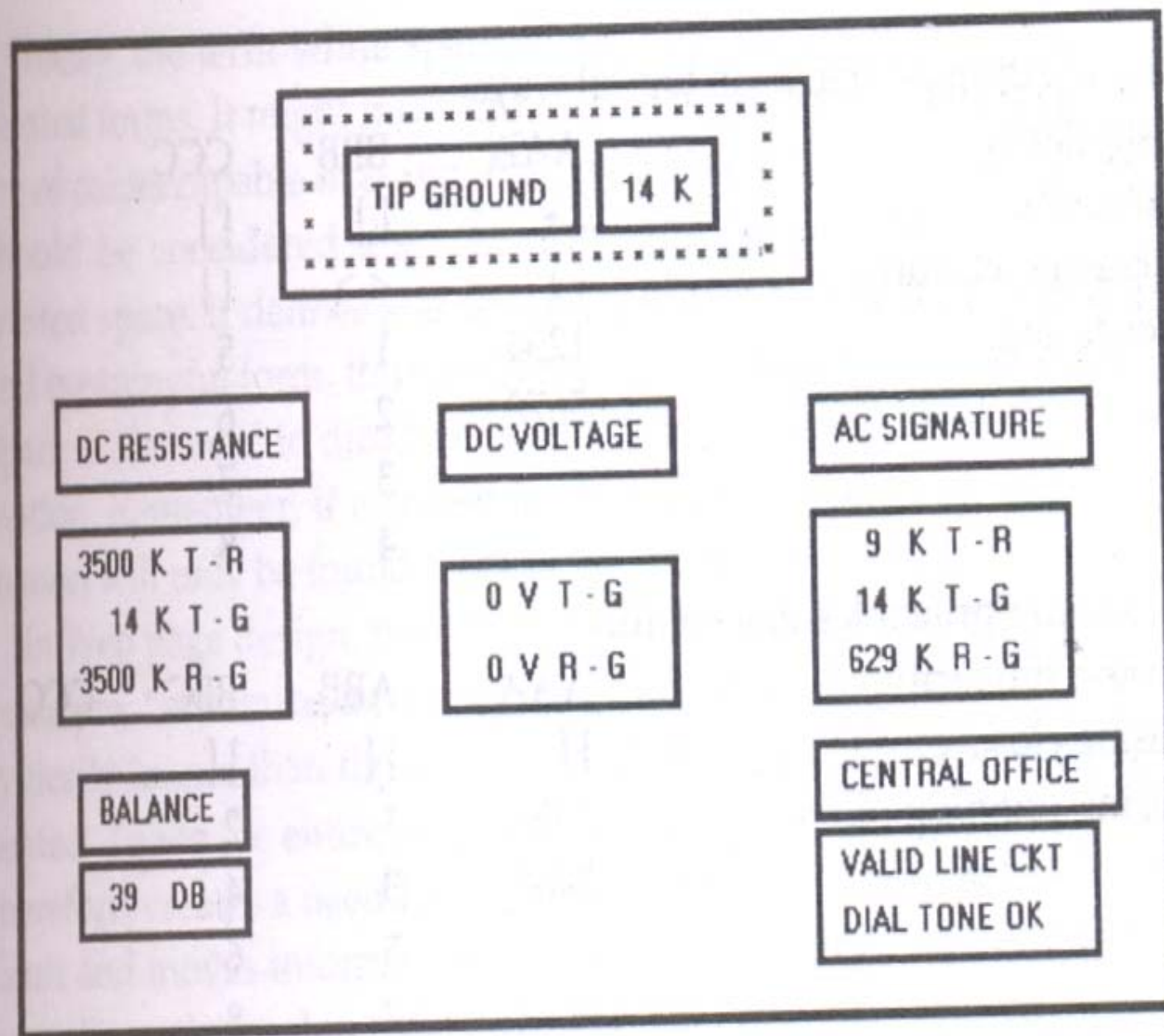
Overall complexity = 96 bits.

| TIP GROUND    |  |            | 14 K |                |  |
|---------------|--|------------|------|----------------|--|
| DC RESISTANCE |  | DC VOLTAGE |      | AC SIGNATURE   |  |
| 3500 K T - R  |  | 0 V T - G  |      | 9 K T - R      |  |
| 14 K T - G    |  | 0 V R - G  |      | 14 K T - G     |  |
| 3500 K R - G  |  |            |      | 629 K R - G    |  |
| BALANCE       |  |            |      | CENTRAL OFFICE |  |
| 39 DB         |  |            |      | VALID LINE CKT |  |
|               |  |            |      | DIAL TONE OK   |  |

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

| TEST RESULTS                                     | SUMMARY: GROUND    |
|--|--------------------|
| GROUND, FAULT T-G                                |                    |
| 3 TERMINAL DC RESISTANCE                         |                    |
| >  | 3500.00 K OHMS T-R |
| =  | 14.21 K OHMS T-R   |
| >  | 3500.00 K OHMS R-G |
| 3 TERMINAL DC VOLTAGE                            |                    |
| =  | 0.00 VOLTS T-G     |
| =  | 0.00 VOLTS R-G     |
| VALID AC SIGNATURE                               |                    |
| 3 TERMINAL AC RESISTANCE                         |                    |
| =  | 8.82 K OHMS T-R    |
| =  | 14.17 K OHMS T-R   |
| =  | 628.52 K OHMS R-G  |
| LONGITUDINAL BALANCE POOR                        |                    |
| =  | 39 DBB             |
| COULD NOT COUNT RINGERS DUE TO<br>LOW RESISTANCE |                    |
| VALID LINE CKT CONFIGURATION                     |                    |
| CAN DRAW AND BREAK DIAL TONE                     |                    |

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

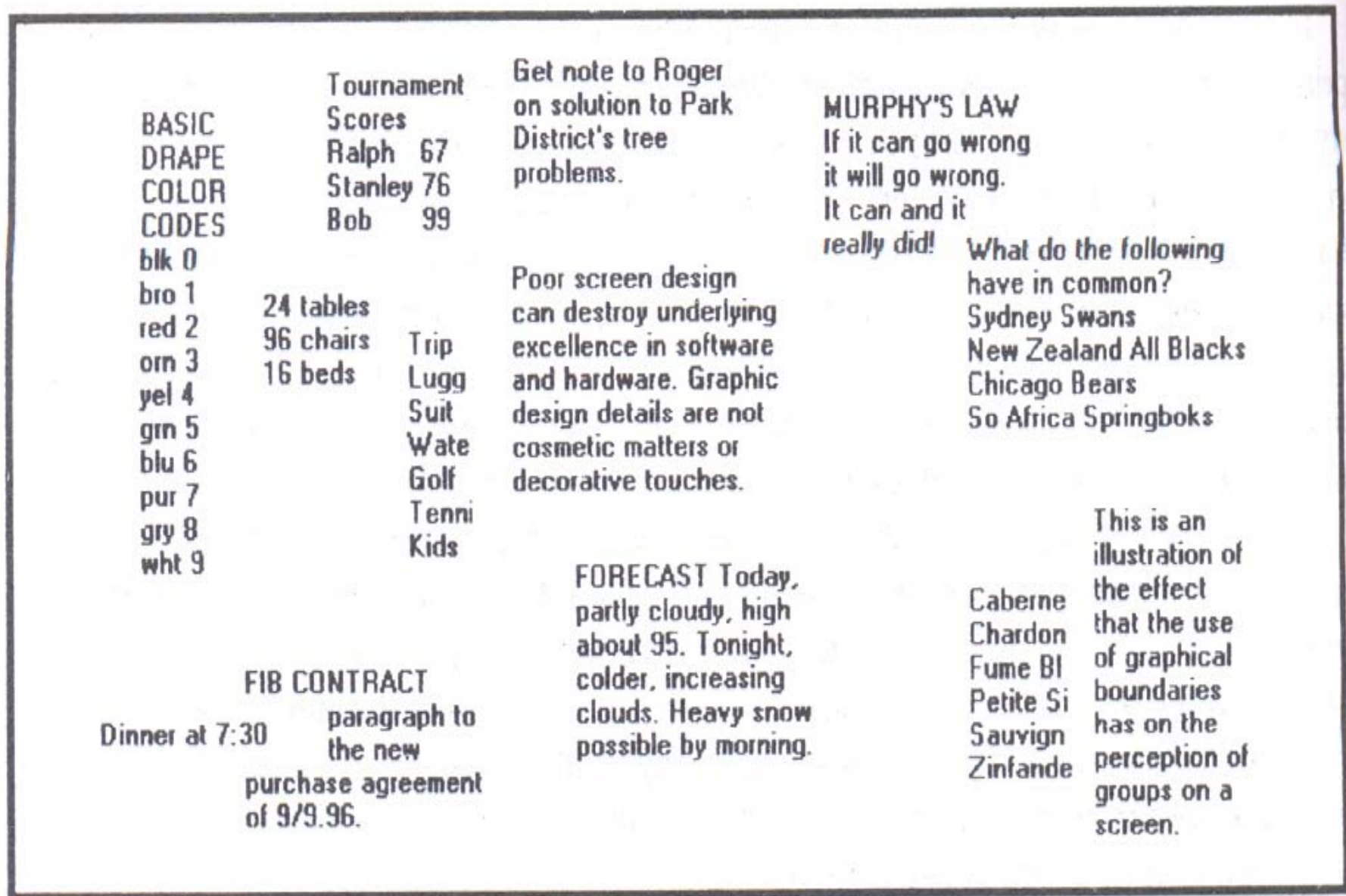


**Figure 3.13** Redesigned screen, from Tullis (1981), with grouping indicated by bold boxes.

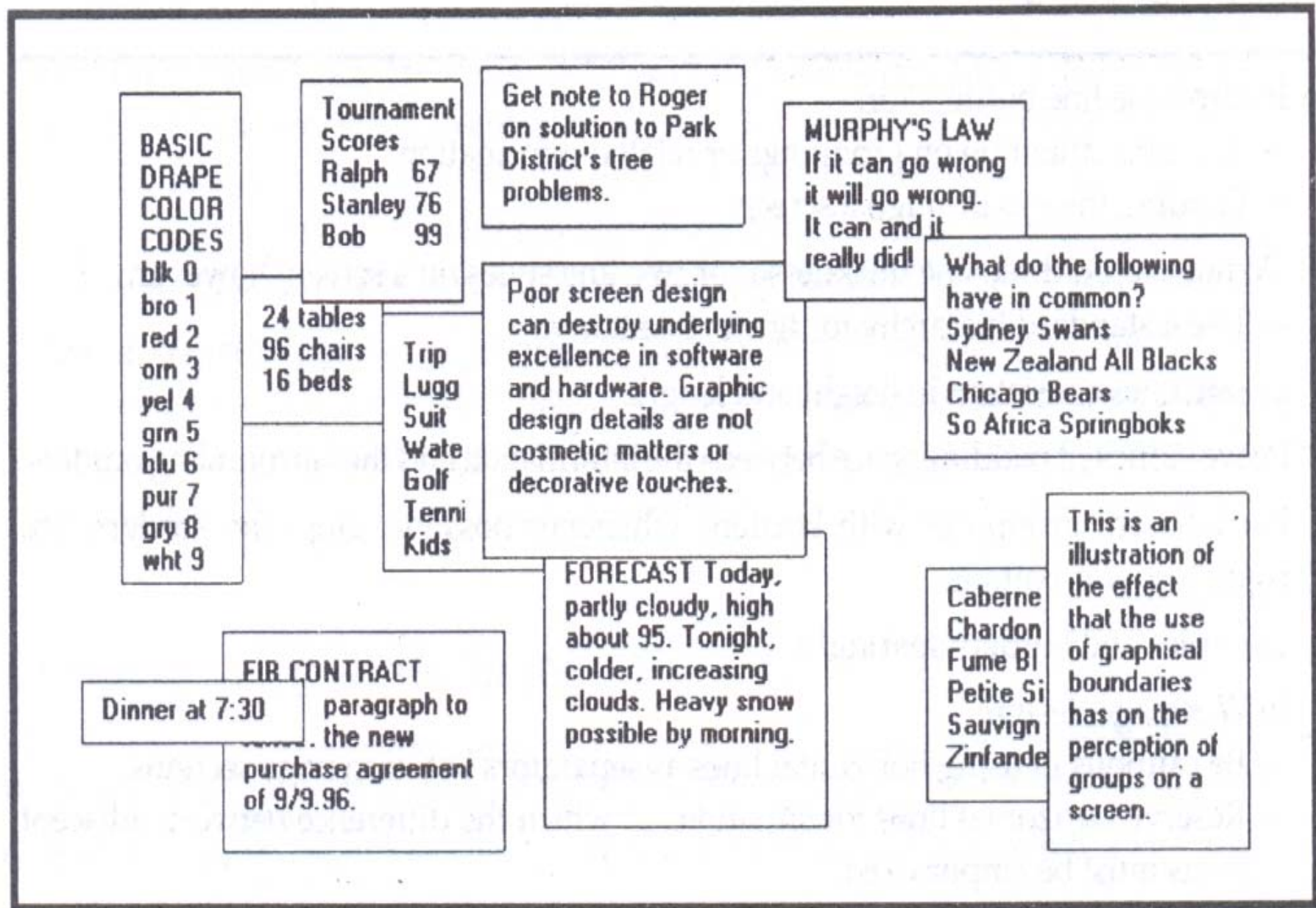
# Grouping using borders

- Provide functional groupings
- Create spatial groupings
- Provide meaningful titles for each grouping
- Incorporate line borders
- Do not exceed three line thickness
- Create lines consistent in height and length
- For adjacent groupings with borders wherever 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.

TEST RESULTS SUMMARY: GROUND

GROUND, FAULT T-G

3 TERMINAL DC RESISTANCE

> 3500.00 K OHMS T-R

= 14.21 K OHMS T-R

> 3500.00 K OHMS R-G

3 TERMINAL DC VOLTAGE

= 0.00 VOLTS T-G

= 0.00 VOLTS R-G

VALID AC SIGNATURE

3 TERMINAL AC RESISTANCE

= 8.82 K OHMS T-R

= 14.17 K OHMS T-R

= 628.52 K OHMS R-G

LONGITUDINAL BALANCE POOR

= 39 DBB

COULD NOT COUNT RINGERS DUE TO

LOW RESISTANCE

VALID LINE CKT CONFIGURATION

CAN DRAW AND BREAK DIAL TONE

**Figure 3.16** Original screen, from Tullis (1981).

\*\*\*\*\*  
\*  
\* TIP GROUND 14 K \*  
\*  
\*\*\*\*\*

DC RESISTANCE

3500 K T - R

14 K T - G

3500 K R - G

BALANCE

39 DB

DC VOLTAGE

0 V T - G

0 V R - G

AC SIGNATURE

9 K T - R

14 K T - G

629 K R - G

CENTRAL OFFICE

VALID LINE CKT

DIAL TONE OK

**Figure 3.17** Redesigned screen, from Tullis (1981).



# Scrolling and Paging

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## ■ 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

- **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**

# 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       |

abcdefghijklmnopqrstuvwxy

abcdefghijklmnopqrstuvwxy

abcdefghijklmnopqrstuvwxy

**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 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:

Relation:

**Figure 3.22**

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

**Figure 3.23**

Relation:

- 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.

**Figure 3.24**

Relation:

- 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:

**Figure 3.25**

---



## 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:

Title:

**Figure 3.26**

### ■ 2. Second Approach

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

Division:

Department:

Title:

**Figure 3.27**

---

The image shows a graphical user interface window titled "ACCOUNT". Inside the window, there are several text input fields arranged in a grid-like fashion. The labels for these fields are placed directly above them, but the alignment is inconsistent. The fields are: "Number" (a small box), "Name" (a long box), "Street" (a long box), "City" (a medium box), "State" (a small box), "Zip" (a medium box), and "Telephone" (a medium box). At the bottom of the window, there are three buttons labeled "OK", "Apply", and "Cancel". The overall layout is simple but lacks visual grouping and consistent alignment.

| ACCOUNT  |                      |                      |
|--|----------------------|----------------------|
| Number   | Name                 |                      |
| <input type="text"/>   | <input type="text"/> |                      |
| Street   | City                 |                      |
| <input type="text"/>   |                      | <input type="text"/> |
| State  | Zip                  | Telephone            |
| <input type="text"/>   | <input type="text"/> | <input type="text"/> |
| <input type="button" value="OK"/> <input type="button" value="Apply"/> <input type="button" value="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**



# 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.

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

# Scanning guidelines

- Organization
  - Minimize eye movement
  - Provide groupings of information
  - Organize content 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 the 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 switching 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 referred 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

## ➤ 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

## ➤ Segmented or stacked bars.

- ✓ Data category ordering
- ✓ Large segments
- ✓ Coding schemes
- ✓ labeling

## ➤ Flow charts

- ✓ Order of steps
- ✓ Orientation
- ✓ Coding conventions
- ✓ Arrows
- ✓ Highlighting
- ✓ One decision at each step
- ✓ Consistently order and word all choices

## ➤ Pie chart

# 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

- End of unit 4