

DEPARTMENT OF COMPUTER SCIENCE  
UNIVERSITY OF TORONTO

CSC318S

**THE DESIGN OF  
INTERACTIVE COMPUTATIONAL MEDIA**

Lecture 18 — 25 March 1998

**ELEMENTS AND PRINCIPLES OF  
TYPOGRAPHY AND DESIGN**

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## 18.1 Elements of graphic design

### Typography

- Typographic vocabulary
- Typesetting

### Symbolism

- Icons
- Illustrations

### Colour, texture, and value

### Page composition and spatial layout

- Grids, rules, space
- Form and structure

### Sequencing, timing, animation

### Design principles

- Emphasis
- Guiding the eye
- Consistency and clarity

All figures taken from:

Baecker and Marcus, *Human Factors and Typography for More Readable Programs*, 1990, ACM Press, copy on reserve in the DCS Library

## 18.2 Typographic vocabulary

Typeface or style of lettering (Fig. 18.1)

- Fixed width or variable width

- Serif or sans serif

- Goal of typeface design: enhancing legibility and readability

Type size (Fig. 18.2)

- Measured in points, 1 point = 1/72"

Type weight (Fig. 18.3)

Type proportion (Fig. 18.4)

Type slant (Fig. 18.5)

Character set

- Usually ASCII

- Mathematical and special symbols (Fig. 18.6)

- Special conditions for character display (Fig. 18.7)

- Resolution of character display (Fig. 18.8)

## 18.3 Typesetting

Letterspacing (Fig. 18.9)

- Kerning (Fig. 18.10)

- Special positions – superscripts & subscripts

Wordspacing (Fig. 18.11)

- Hyphenation and justification (Fig. 18.12)

Linespacing (Fig. 18.13)

Methods of emphasis (Fig. 18.14)

- Examples shown have varying effectiveness

Lists, forms, tables (Fig. 18.15)

*Figure 18.1 Common type faces (Baecker and Marcus, 1990, p. 298)*

*Figure 18.2 Common type sizes (Baecker and Marcus, 1990, p. 299)*

*Figure 18.3 Common type weights (Baecker and Marcus, 1990, p. 300)*

*Figure 18.4 Common type proportions (Baecker and Marcus, 1990, p. 300)*

*Figure 18.5 Common type slants (Baecker and Marcus, 1990, p. 300)*

*Figure 18.6 Math and special symbols (Baecker and Marcus, 1990, p. 297)*

*Figure 18.7 Special display conditions (Baecker and Marcus, 1990, p. 301)*

*Figure 18.8 Low, medium, and high resolution characters (B&M, 1990, p. 297)*

*Figure 18.9 Common letterspacing in 100th-of-em units (Baecker and Marcus, 1990, p. 303)*

*Figure 18.10 Kerning in 100th-of-em units (Baecker and Marcus, 1990, p. 303)*

*Figure 18.11 Common wordspacing in 100th-of-em-units (B&M, 1990, p. 305)*

*Figure 18.12 Styles of justified type (Baecker and Marcus, 1990, p. 306)*

*Figure 18.13 Common variations in linespacing (B&M, 1990, p. 307)*

*Figure 18.14 Common means of emphasis in paragraphs (B&M, 1990, p. 308)*

*Figure 18.15 A table (Baecker and Marcus, 1990, p. 304)*

## 18.4 Symbolism

Rules and leader lines (Fig. 18.16)

Pictograms and ideograms

    Bullets (Fig. 18.17), pi fonts (Fig. 18.18), boxes

    Icons

Charts, maps, diagrams, illustrations, photographs

## 18.5 Colour, texture, and value

Colour (to be covered in next lecture)

Texture (Fig. 18.19)

Value (Fig. 18.20)

## 18.6 Page composition and spatial layout

Page and screen size and proportion (Fig. 18.21)

Layout grids (Fig. 18.22)

Spatial layout (Fig. 18.23)

## 18.7 Sequencing, timing, animation

Sequencing

    Order of images

    Use of repetition, cycles

    Controllable in systems such as HyperCard and Director

Timing

    Rhythm and pacing

    Anticipation

Animation

    Display of series of images in rapid succession

    Possibilities for smooth motion

*Figure 18.16 Rules and leader lines (Baecker and Marcus, 1990, p. 310)*

*Figure 18.17 Typographic bullets (Baecker and Marcus, 1990, p. 310)*

*Figure 18.18 Pi fonts and miscellaneous characters (Baecker and Marcus, 1990, p. 310)*

*Figure 18.19 Textures (Baecker and Marcus, 1990, p. 312)*

*Figure 18.20 Variations of grey value (Baecker and Marcus, 1990, p. 312)*

*Figure 18.21 Alternative proportions of pages and screens (B&M, 1990, p. 293)*

*Figure 18.22 Layout grids within various page sizes (B&M, 1990, p. 294)*

*Figure 18.23 Typical page layout with primary and secondary features  
(Baecker and Marcus, 1990, p. 295)*

## 18.8 Principles of graphic design

### *Principles of Communication*

- Principle 1— Legibility  
Design the individual characters of the textual vocabulary for a screen so that they are rapidly and reliably identifiable and recognizable.
- Principle 2 — Readability  
Design the textual components of a screen so that they are as easy to interpret and understand as possible.
- Principle 3 — Clarity  
Design all non-textual components of a screen so that their semantics are as unambiguous as possible.
- Principle 4 — Emphasis  
Use visible language elements to emphasize the most salient features of a screen.

### *Principles of Economy*

- Principle 5 — Simplicity  
Include on a screen only those elements that communicate something important. Try to be as unobtrusive as possible. Maximize the effectiveness of a minimal set of techniques or cues.

### *Principles of Organization*

- Principle 6 — Consistency  
Observe the same conventions and rules for all elements. Be consistent from screen to screen. Deviate from current conventions only when there is clear benefit to be gained in doing so.

- Principle 7 — Relationships  
Use visible language elements to show relationships among those elements of a screen that need to be linked, and to show lack of relationship among those that should not be linked.
- Principle 8 — Distinctiveness  
Use visible language elements to distinguish important properties of essential parts of a screen.
- Principle 9 — Focus and navigability  
Use visible language elements to position the initial attention of a user or viewer to the screen or one of its components, to direct attention, and to assist in navigating around the screen.

## 18.9 Typical flaws in screen design and layout

There is fancy, but illegible or unreadable text  
(violates Principles 1, 2)

There is poor choice of terminology (2)

There are intriguing but mysterious icons (3)

Inappropriate elements are emphasized, or nothing is emphasized (4)

Too many typefaces, styles, and sizes are used (5)

The screen is too busy, too cluttered (5)

There is not enough white space (5)

There are inconsistencies from screen to screen, or from system to system (6)

There is no apparent logic to the application of typographic style (7, 8)

There is no organizing principle for the layout (4, 7, 9)

The viewer doesn't know where to focus among a sea of undifferentiated text or image (9)

## 18.10 Digital typography

The representation and storage of digital typography

- Bit maps

- Vector, curve, outline representations

- The role of Postscript

The appearance and readability of screen typography

- Appearance: jaggy, crummy

- Readability: significantly lower than from paper

Grey scale fonts

- Problem with jaggies similar to that of lines

- Solution: introduce grey scales

- 2 or 3 bits of grey is sufficient

- Effect is to enhance legibility, readability, appearance

- Slides courtesy of Avi Naiman, Univ. of Hong Kong

## 18.11 An example: source code design & typesetting

Goals of the SEE project

Example results (Figs. 18.24 – 18.26)

For more details, see Baecker and Marcus, *Human Factors and Typography for More Readable Programs*, 1990, ACM Press

Experimental verification

*Figure 18.24 The “phone.c” program conventionally formatted and output on a dot matrix printer (Baecker and Marcus, 1990, pp. 4-5) (Pages 20-21)*

*Figure 18.25 The same program conventionally formatted and output on a laser printer (Baecker and Marcus, 1990, pp. 6-7) (Pages 22-23)*

*Figure 18.26 The same program produced by the SEE visual compiler (Baecker and Marcus, 1990, pp. 9,11) (Pages 24-25)*













## 18.12 The principles applied to source code design

### *Principles of Communication*

- Principle 1— Legibility  
Confusion of “ . ” versus “ , ”
- Principle 2 — Readability  
“ >= ”, “ <= ” not very readable  
Issues of variable naming
- Principle 3 — Clarity  
Two uses of “ \* ”
- Principle 4 — Emphasis  
Function names, global variables in bold face

### *Principles of Economy*

- Principle 5 — Simplicity  
Critique: Our approach perhaps overdesigned

### *Principles of Organization*

- Principle 6 — Consistency  
Rules for typographic emphasis: use of boldface, italics, etc.
- Principle 7 — Relationships  
The nesting context  
Display of comments
- Principle 8 — Distinctiveness  
Parts of a function definition  
Parts of a preprocessor definition
- Principle 9 — Focus and navigability  
Points of focus: file names, function names  
Footnotes: Distributed cross-reference index