Chapter 12

Balancing Function and Fashion

Introduction

- This chapter deals with some design matters that are functional issues but that also leave room for varying styles to suit different people.

- The issues are:

  - Error messages
  - Non-anthropomorphic design
  - Display design
  - Window design
  - Color

Error messages

- Phrasing of error messages or diagnostic warnings is critical

- Avoid (especially when dealing with novices)
  - imperious tone that condemns user
  - messages that are too generic (e.g. WHAT? or SYNTAX ERROR)
  - messages that are too obscure (e.g. FAC RJCT 004004400400)

- Recommendations for preparing error messages:
  - Specificity
  - Constructive guidance and positive tone
  - User-centered style
  - Appropriate physical format

► Error messages

- **Specificity**
  - Be as specific and precise as possible

Poor	Better
SYNTAX ERROR	Unmatched left parenthesis
ILLEGAL ENTRY	Type first letter: **S**end, **R**ead, or **D**rop
INVALID DATA	Days range from 1 to 31
BAD FILE NAME	File names must begin with a letter

► Error messages

- Constructive guidance and positive tone
  - Messages should, where possible, indicate what users should do to correct the problem
  - Unnecessarily hostile messages using violent terminology can disturb non-technical users:
    - FATAL ERROR, RUN ABORTED
    - CATASTROPHIC ERROR: LOGGED WITH OPERATOR
    - Negative terms such as ILLEGAL, ERROR, INVALID, BAD should be eliminated or used infrequently

► Error messages

■ Constructive guidance and positive tone (cont.)

Poor	Better
Run-Time error '-2147469 (800405): Method 'Private Profile String' of object 'System' failed.	Virtual memory space consumed. Close some programs and retry.
Resource Conflict Bus: 00 Device: 03 Function: 01	Remove your compact flash card and restart
Network connection refused.	Your password was not recognized. Please retype.
Bad date.	Drop-off date must come after pickup date.

► Error messages

- **User-centered phrasing**
  - □ Suggests that the user controls the interface – initializing more than responding
  - □ This can be partially provided by avoiding negative and condemning tone; and by being courteous to users
  - □ e.g., In a telephone company,
    - "We're sorry, but we are unable to complete your call as dialed. Please hang up, check your number, or consult the operator for assistance",

    versus

    - "Illegal telephone number. Call aborted. Error number 583-2R6.9. Consult your user manual for further information.'

► Error messages

- **User-centered phrasing (cont.)**
  - ☐ User should have control over the amount of information system provides
    - Short description
    - Description with example
    - Full detail
  - ☐ e.g. screen tips (short), a help button for context-sensitive help, or an extensive online user manual

► Error messages

- **Appropriate physical format**
  - ☐ Use uppercase-only messages for brief, serious warnings
  - ☐ Avoid code numbers
    - ■ if required, include at end of message
  - ☐ There is debate over best location of messages. e.g. they could be:
    - ■ near where problem arose
    - ■ placed in consistent position on bottom of screen
    - ■ dialog box near to, but not obscuring relevant information
  - ☐ Audio signals useful for getting attention, but can be embarrassing
    - ■ should be placed under user control (user-centered principle)

Non-anthropomorphic design

- *Anthropomorphism*: Attributing human/animal qualities to non-living things.

- Intelligence, autonomy, free will, … in computers.
    - ☐ appealing to some people; but can deceive, confuse, and mislead people

- Important to clarify differences between people and computers

    - ☐ human to computer relationship is different than human to human

    - ☐ users and designers must accept responsibility for misuse of computers

► Non-anthropomorphic design

- **Although attractive to some people, an anthropomorphic interface can produce anxiety in others**
  - some people believe computers "make you feel dumb"
  - computers should be transparent and support concentrating on the task in hand
- **Anthropomorphic interfaces may distract users**
  - Microsoft's ill-fated Clippet character was intended to provide help suggestions
    - Amused some, but annoyed many
    - Disruptive interference
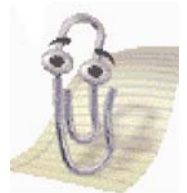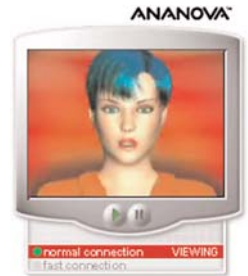
► Non-anthropomorphic design

- Guidelines
    - □ Be cautious in presenting computers as people.
    - □ Interfaces should neither compliment nor condemn. They should be comprehensible, predictable, and controllable
    - □ Use cartoon characters in games or children's software, but usually not elsewhere
    - □ Do not use 'I' pronouns when the computer responds to human actions.
    - □ Use "you" to guide users, or just state facts.

► Non-anthropomorphic design

- Example 1:
  - □ "I will begin the lesson when you press RETURN"
  - □ "You can begin the lesson by pressing RETURN"
  - □ "To begin the lesson, press RETURN"
- Example 2:
  - □ "Welcome to Thrifty Car Rentals. I'm Emily, let me help you reserve your car. In what city will you need a car?"

Display design

- Effective display designs must provide all the necessary data in the proper sequence to carry out the task

- Meaningful groupings and their consistent sequences and formats support task performance

- Groups can be surrounded by blank spaces or boxes.

- Alternatively, related items can be indicated by highlighting, background shading, color, or special fonts

Samples of the 162 data-display guidelines from Smith and Mosier (1986)

- Ensure that any data that a user needs, at any step in a transaction sequence, are available for display.
- Display data to users in directly usable forms; do not require that users convert displayed data.
- Maintain a consistent format, for any particular type of data display, from one display to another.
- Use short, simple sentences.
- Use affirmative statements, rather than negative statements.
- Adopt a logical principle by which to order lists; where no other principle applies, order lists alphabetically.
- Ensure that labels are sufficiently close to their data fields to indicate association, yet are separated from their data fields by at least one space.
- Left-justify columns of alphabetic data to permit rapid scanning.
- Label each page in multipaged displays to show its relation to the others.
- Begin every display with a title or header, describing briefly the contents or purpose of the display; leave at least one blank line between the title and the body of the display.
- For size coding, make larger symbols be at least 1.5 times the height of the next-smaller symbol.
- Consider color coding for applications in which users must distinguish rapidly among several categories of data, particularly when the data items are dispersed on the display.
- When you use blink coding, make the blink rate 2 to 5 Hz, with a minimum duty cycle (ON interval) of 50%.
- For a large table that exceeds the capacity of one display frame, ensure that users can see column headings and row labels in all displayed sections of the table.
- Provide a means for users (or a system administrator) to make necessary changes to display functions, if data-display requirements may change (as is often the case).

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► Display design

- **Field layout**
  - ☐ Blank spaces and separate lines can distinguish fields.
  - ☐ Labels are helpful for all but frequent users.
  - ☐ Distinguish labels from data with case, boldfacing, etc.
  - ☐ If boxes are available they can be used to make a more appealing display, but they consume screen space.
  - ☐ Specify the date format for international audiences

Display design: Example

Poor: TAYLOR,SUSAN034787331WILLIAM TAYLOR
THOMAS10291974ANN08211977ALEXANDRA09081972

Better: TAYLOR, SUSAN 034787331   WILLIAM TAYLOR
THOMAS   10291974
ANN   08211977
ALEXANDRA 09081972

Better: TAYLOR, SUSAN 034-78-7331   WILLIAM TAYLOR
ALEXANDRA 09-08-1972
THOMAS   10-29-1974
ANN   08-21-1977

► Display design: Example

Better: SUSAN TAYLOR 034-78-7331   WILLIAM TAYLOR
ALEXANDRA 09-08-1972
THOMAS   10-29-1974
ANN   08-21-1977

Better: Employee: SUSAN TAYLOR
Social Security Number: 034-78-7331
Spouse: WILLIAM TAYLOR
Children: Names   Birthdates
ALEXANDRA   09-08-1972
THOMAS   10-29-1974
ANN   08-21-1977

► Display design: Example

Better: Employee: **Susan Taylor** SSN: **034-78-7331**

Spouse: **William Taylor**

Children: Names   Birthdates

     Alexandra   **09-08-1972**

     Thomas   **10-29-1974**

     Ann   **08-21-1977**

Better: Employee: **Susan Taylor** SSN: **034-78-7331**

Spouse: **William Taylor**

Children: Names   Birthdates

     Alexandra   **09-08-1972**

     Thomas   **10-29-1974**

     Ann   **08-21-1977**

This may consume more space ☹

► Display design

- **Empirical results**
  - ☐ Structured form superior to narrative form
  - ☐ Performance is improved by:
    - improving data labels,
    - clustering related information,
    - using appropriate indentation and underlining,
    - aligning numeric values, and
    - eliminating extraneous characters
  - ☐ Fewer, denser displays are more time efficient for expert users.
    - Especially, if tasks require comparison of information across displays
  - ☐ Consistent location, structure, and terminology across displays is important

Window design

- **Introduction**
  - ☐ Users need to consult multiple sources rapidly to carry out their tasks
  - ☐ Multiple windows offer users sufficient information and flexibility
  - ☐ Reduce *window housekeeping* actions
  - ☐ Can apply direct-manipulation strategy to window actions
  - ☐ Advanced users who work on multiple tasks can switch among collections of windows called *workspaces* or *rooms*.

► Window design

- Coordinating multiple windows
  - Windows appear, change contents, and close as a direct result of user actions in the task domain.
  - Such sequences of actions can be established by designers, or by users with end-user programming tools
  - *Coordination* is a task concept that describes how information objects change based on user actions.
  - A careful study of user tasks can lead to task-specific coordinations based on sequences of actions
  - Important coordinations:
    - Synchronized scrolling
    - Hierarchical browsing
    - Opening/closing of dependent windows
    - Saving/opening of window state
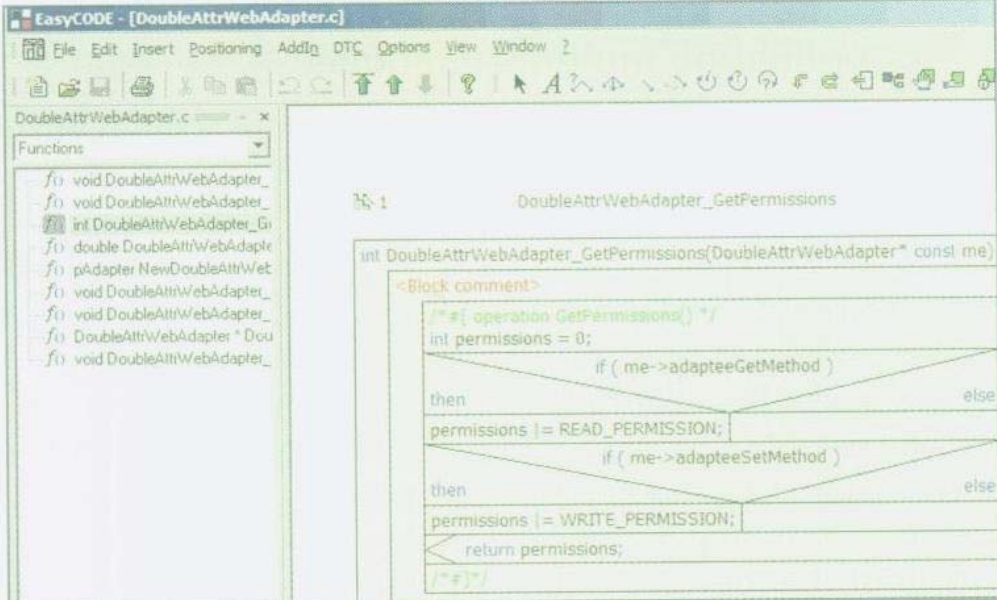
► Window design

- **Synchronized scrolling:**
  - ☐ The scroll bar of one window is coupled to another scroll bar, and action on one scroll bar causes the other to scroll the associated window contents in parallel.
  - ☐ Useful for comparing ☺

► Window design

- **Hierarchical browsing:**

  - ☐ For example, if one window contains a book's table of contents, selection of a chapter title should lead to the display of the chapter contents, in an adjoining window.

  - ☐ Examples: Windows explorer, Outlook, and many email clients

► Window design

- **Opening/closing of dependent windows:**
  - ☐ Opening a window may cause automatic simultaneous opening of dependent windows in a nearby location.
  - ☐ Closing of the children windows is also automatic with the closing of the parent
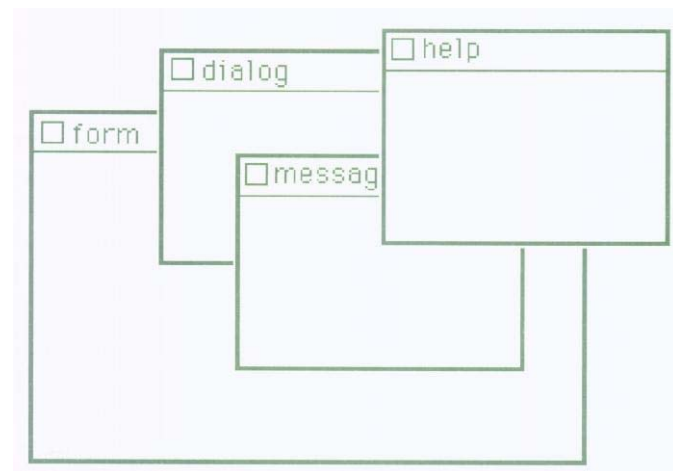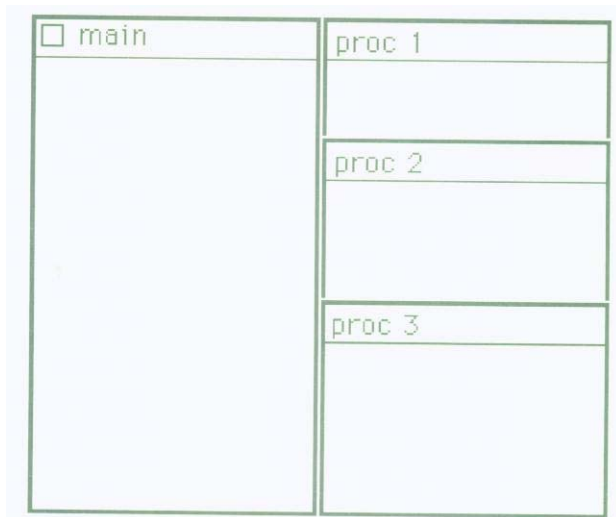
► Window design

- Saving/opening of window state:
  - □ A natural extension of saving a document is to save the current state of the display, with all windows and their contents. This action would create a new icon representing the current state; clicking on the icon would reproduce that state.
  - □ Examples?

► Window design

- Image browsing
  - A two-dimensional cousin of hierarchical browsing
  - Overview in one window (context), detail in another (focus)
  - *Field-of-view* box in the overview; Zoom factor 5-30
  - Panning in the detail view, changes the field-of-view box
  - Matched aspect ratios between field-of-view box and the detail view
  - Side-by-side vs. single view

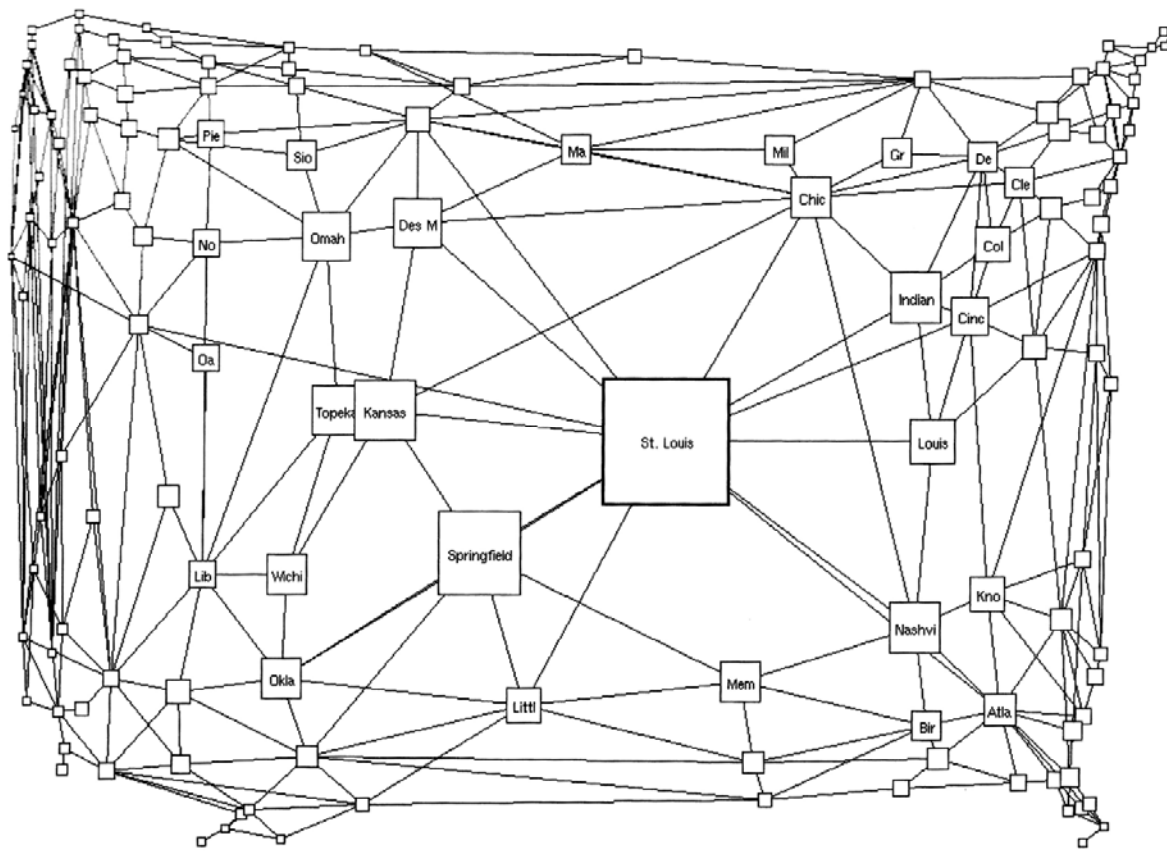GLOBAL VIEW   INTERMEDIATE VIEWS   DETAIL VIEW

COORDINATED PAIRS

► Window design

- Image browsing (cont.)
  - Fisheye view
    - Zoom factor up to 5 only ☹
    - disorienting ☹

Color

- Color displays are attractive to users and can improve task performance, *but the danger of misuse is high*.

- Color can:
  - Add accents to an uninteresting display
  - Facilitate subtle discriminations in complex displays
  - Emphasize the logical organization of information
  - Draw attention to warnings
  - Evoke strong emotional reactions of joy, excitement, fear, or anger

- Good to be used for video games, diagrams, images, sceneries, or 3D objects

- There is a controversy on its use for alphanumeric displays, spreadsheets, graphs, and user-interface components.

Color guidelines

- Use color conservatively
- Limit the number of colors
- Recognize the power of color as a coding technique
- Color coding should support the task
- Color coding should appear with minimal user effort
- Color coding should be under user control
- Design for monochrome first
- Consider the needs of color-deficient users
- Color can help in formatting
- Be consistent in color coding
- Be alert to common expectations about color codes
- Be alert to problems with color pairings
  - Bad: blue/red, yellow/purple, magenta/green, yellow/white, brown/black, …
  - Good: blue/white, black/light blue, …
- Use color changes to indicate status changes
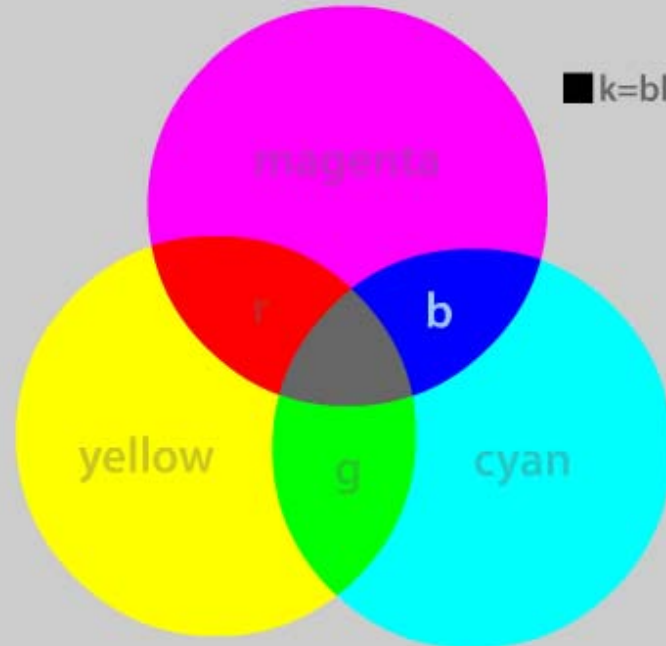- Use color in graphic displays for greater information density

Color Theory

2b. additive & subtractive color
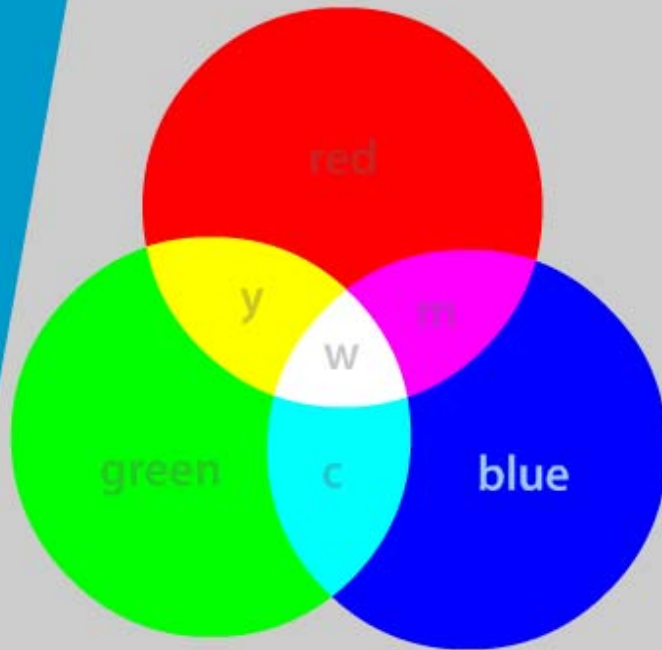
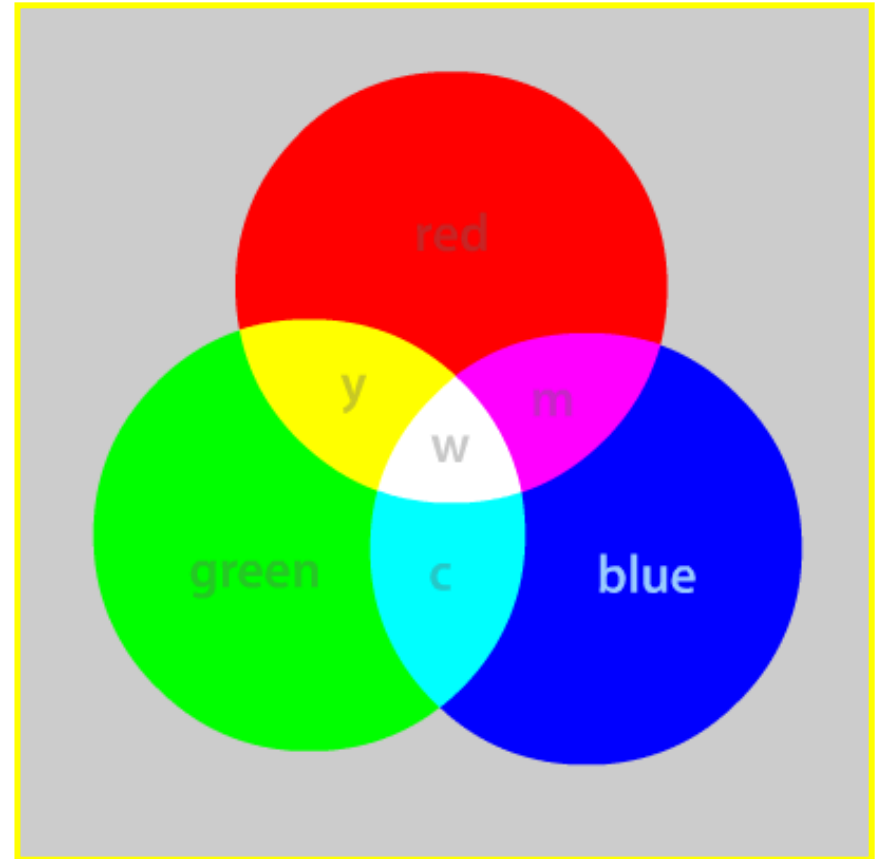the additive model
used by screen displays
mixes colors with light

the subtractive model
used by print media
mixes colors with ink

Color Theory RGB Mode

- Red, Green, Blue

- Additive synthesis

- Color monitors, Projectors

- Perceived color is white when each component has full intensity, perceived color is black when each component has no intensity

Color Theory CMYK Mode

- Cyan, Magenta, Yellow Black

- Subtractive synthesis

- Color printers

- Perceived color is white when each component has no intensity, perceived color is black when each component has full intensity

- Printing press use four-color printing
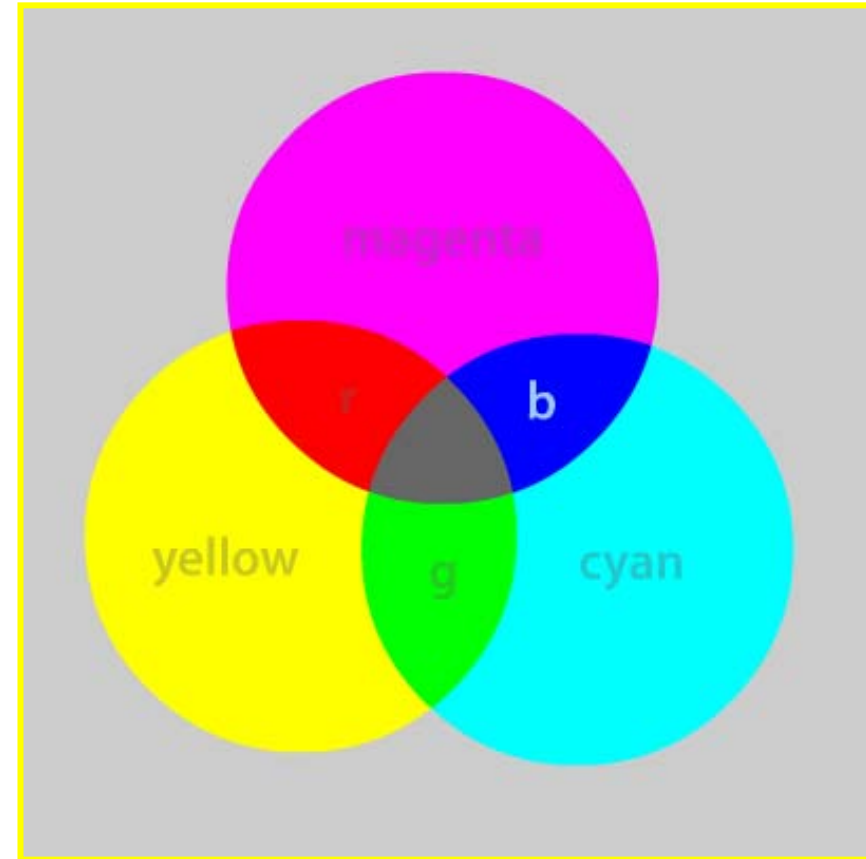
Color Theory HSV mode

- Hue, Saturation, Value
- User oriented, previous ones were hardware oriented
- Use color perception quantities: hue, saturation and value

  - Hue defines color
  - Saturation refers how far color is from a gray of equal intensity (purity)
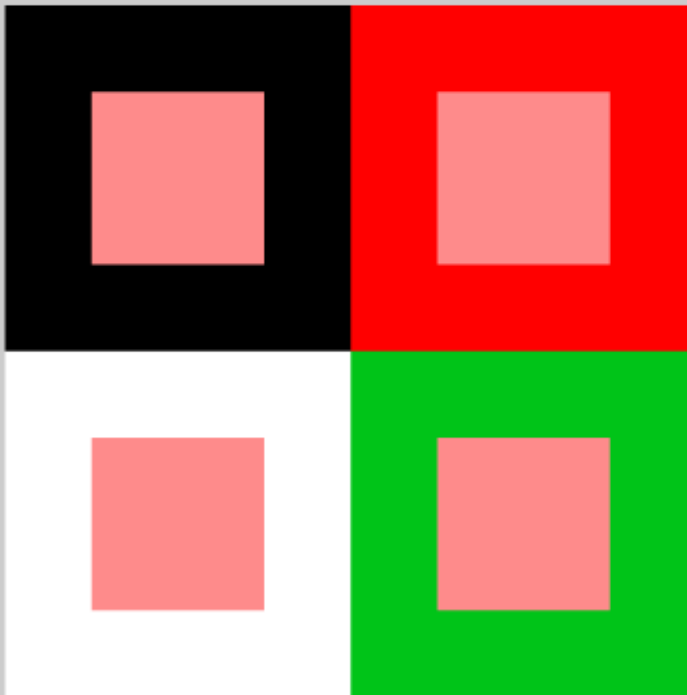 - Value defines the lightness/brightness of the color
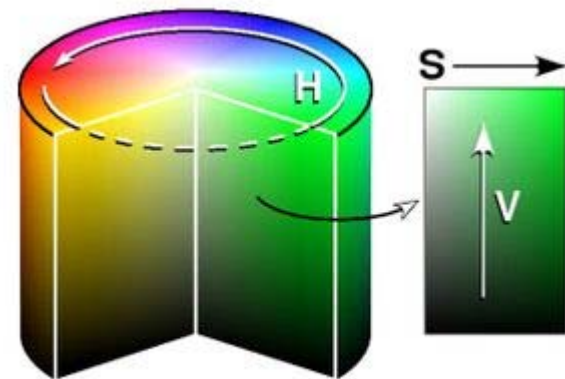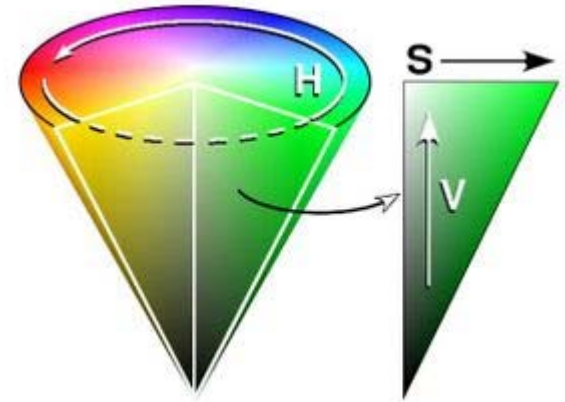
Color Theory

2d. color contrasts

simultaneous contrast

All of the center box colors are identical. Compare the differences in perception due to color contrasts. Notice that sometimes the center box will appear lighter or darker depending on the field it is on.

hsv contrasts

Skipped sections

- The following sections have been skipped

  - ☐ 12.2.5 Development of effective messages
  - ☐ 12.4.3 Display-complexity metrics
  - ☐ 12.5.3 Personal role management