UI design principles

Lecture 19

CS 2112 Fall 2014

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Goals and non-goals

- **Goals**:
  - efficient, easy, enjoyable completion of task
- **Non-goals**:
  - Exposing functionality with minimal code
  - Providing any many features as possible
  - Giving users what they think they want

Principle 1:
Know your user

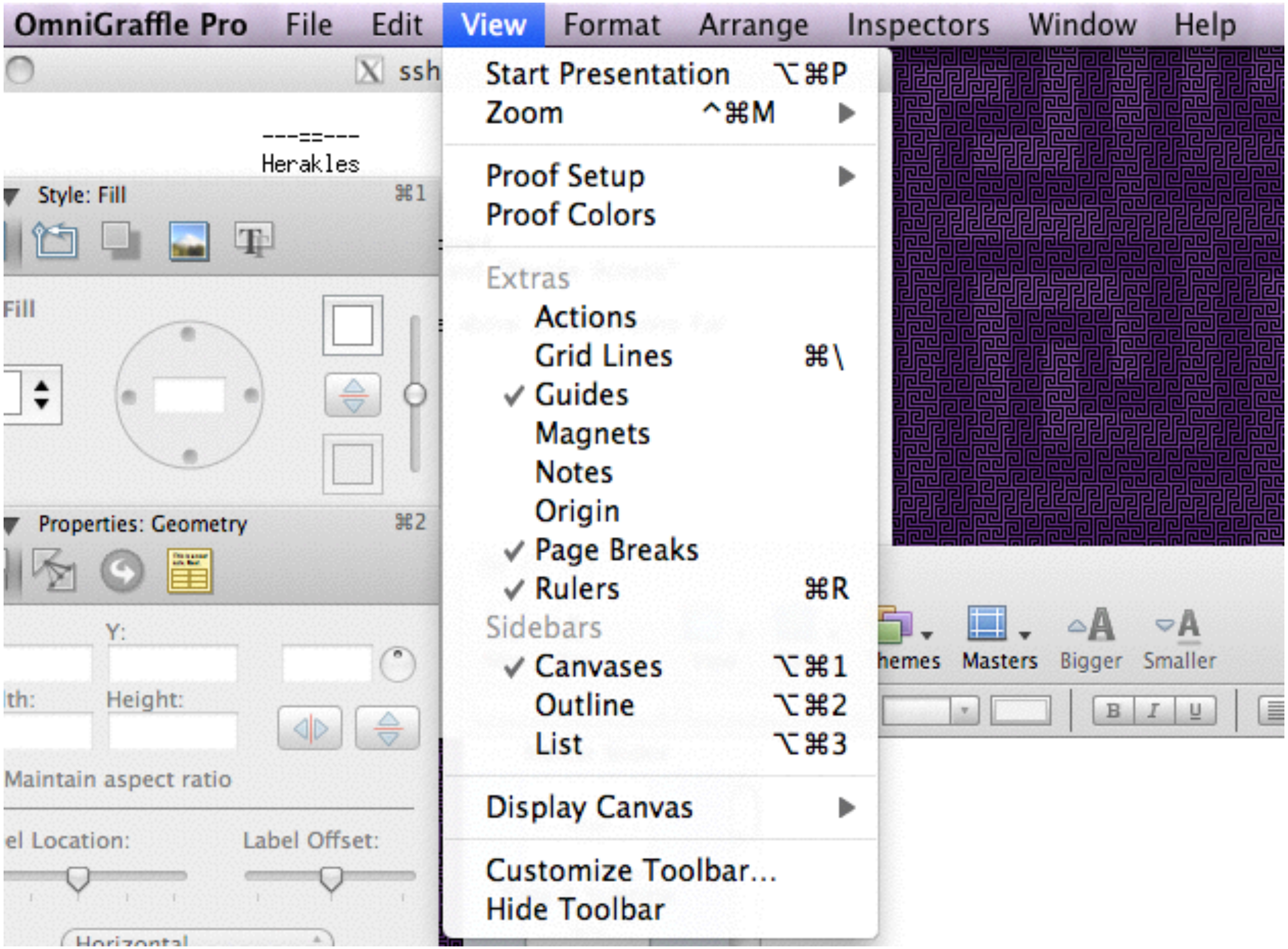
Design to your user

- Frequent or occasional?
- Novice or knowledgeable?
- Training?
- Don’t design for yourself—*you* are not the user

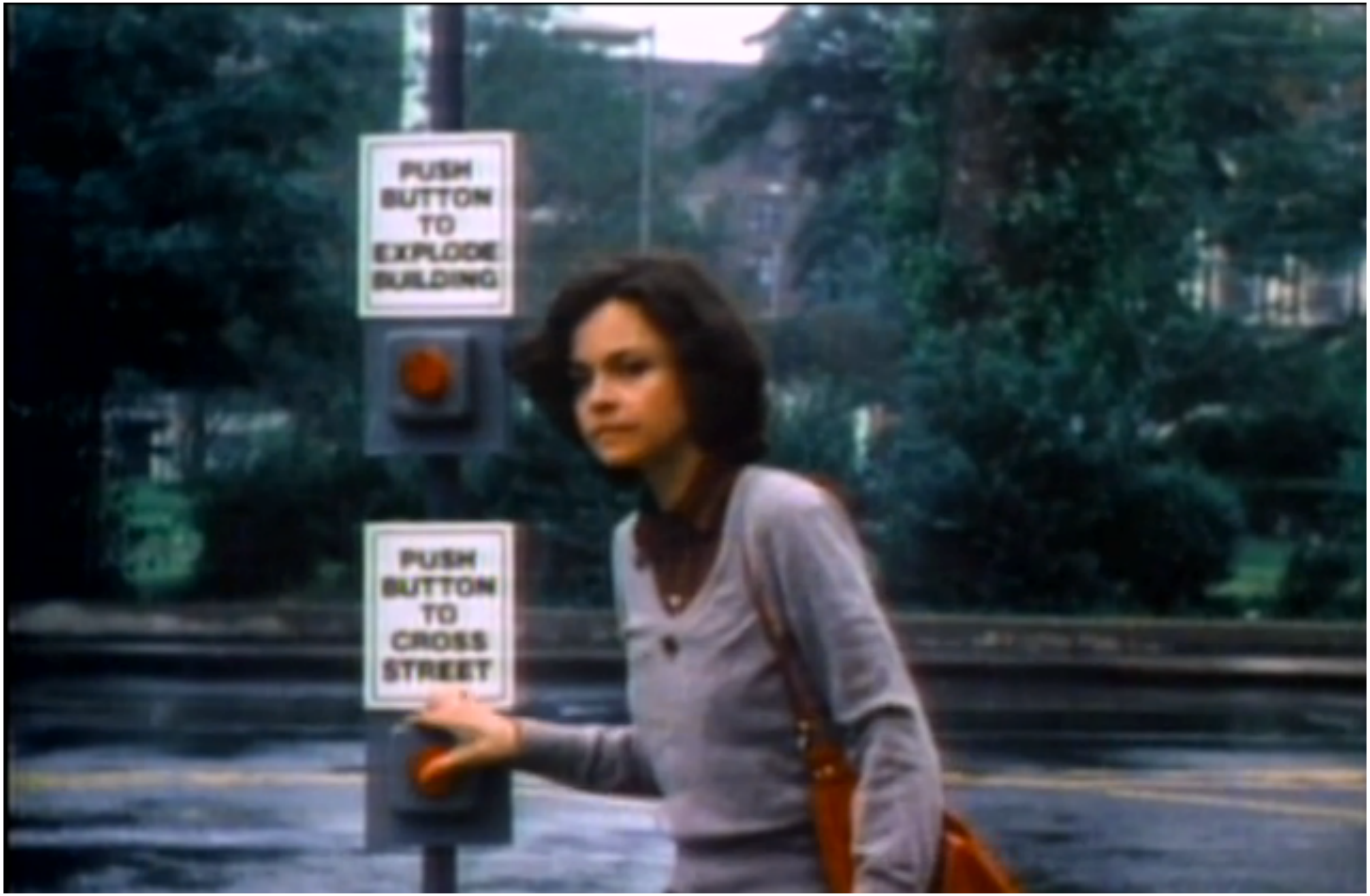
Novice users

- Gentle learning curve: **discoverability**
  - Way for user to find all functionality
- Protection from dangerous actions
- Clarity: simple displays, consistency with other applications and real world
  - E.g., using icons as metaphors

Discoverability



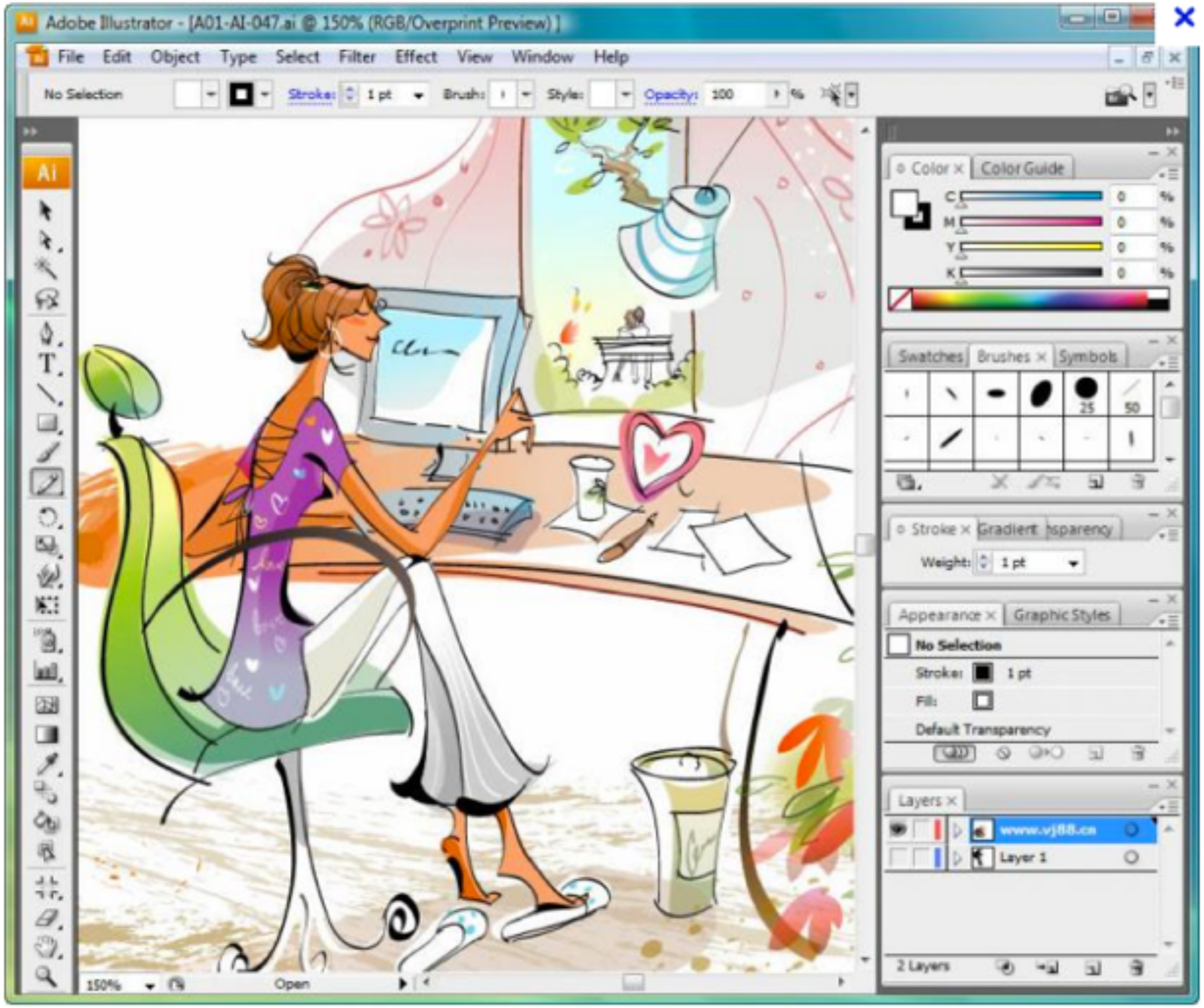
No loaded guns



Frequent/power users

- Optimize for *efficient interaction*
- Powerful actions, short interaction sequences (e.g., hotkeys)
- Rapid response times
- Rich controls, shortcuts for common actions
- Exploit muscle memory

Expert UI



No Selection Stroke: 1 pt Brush: Style: Opacity: 100 %

C 0 %
M 0 %
Y 0 %
K 0 %

Weight: 1 pt

No Selection
Stroke: 1 pt
Fill:
Default Transparency

www.vj88.cn
Layer 1

150%

Principle 2:
UI is a dialogue

UI: good conversation partner?

- Ratify actions quickly
- Be responsive (e.g., highlighting affordances)
- Show progress on longer actions

Conversations

- Identify **use cases** to figure out what users will have to do.
- Eliminate unnecessary user actions.
- Aim for short interactions with clear progress: intermediate goal satisfaction
- User testing to find your blind spots (as developer).
- May need testing scripts for human testers to achieve coverage.

Interaction paradigms

- Direct manipulation: the UI *is* the underlying data/system model
  - User view: Model = View = Controller
  - Implementation: Model ≠ View ≠ Controller
- I/O: UI generates output when input provided (UI ≠ model)
  - e.g., menus, submitted forms, command shells

Direct manipulation vs. I/O

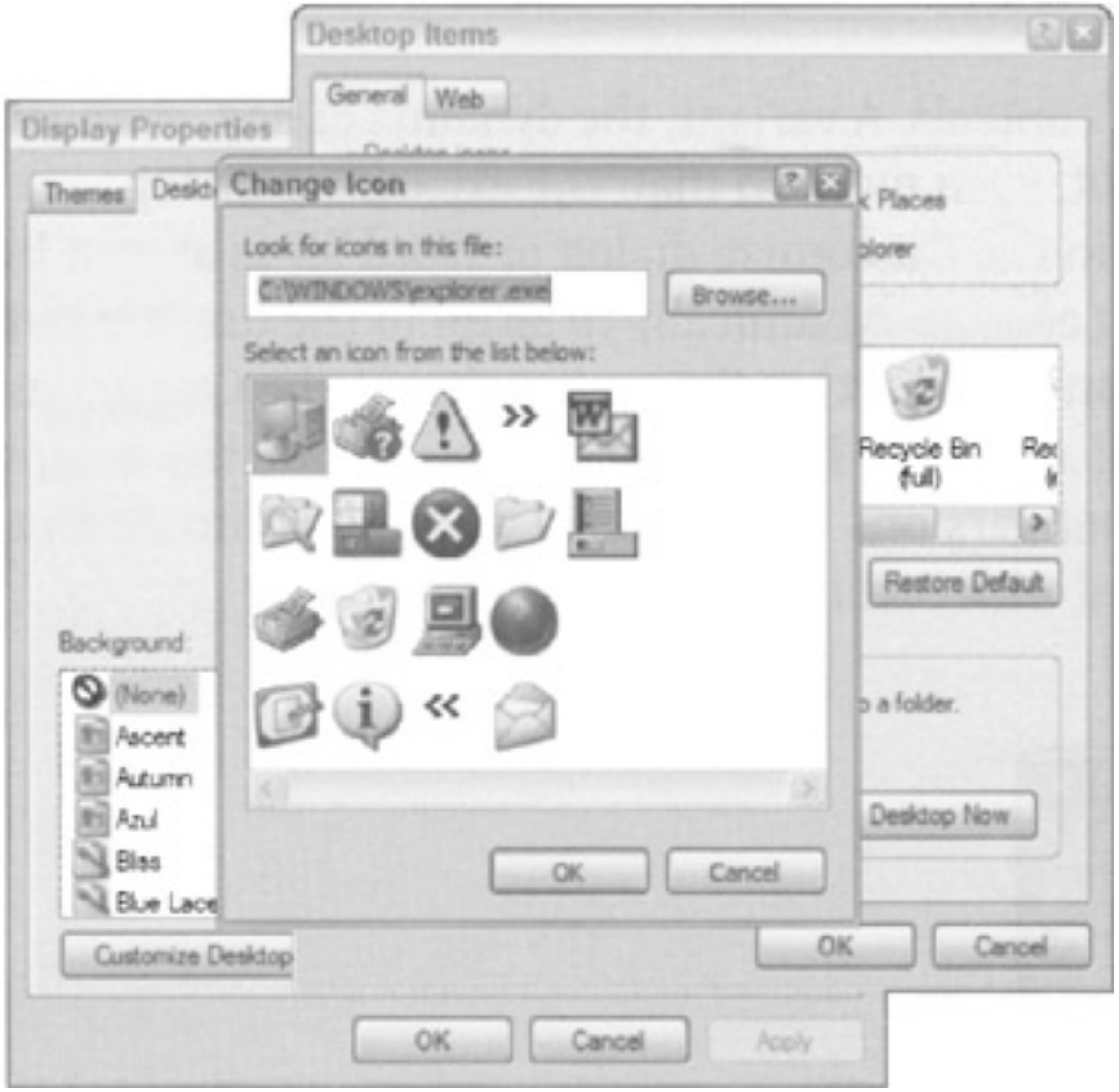
Interaction time scales

- 1/60s: biologically imperceptible: faster than neurons
- 1/30s: fast enough for continuous-feedback tasks (e.g., mouse tracking)
- 1/10s: imperceptible delay for discrete actions, e.g. button clicks.
- 1/2s: fast but noticeable (ok for command-response interaction)
- 1/2s–5s: increasingly annoying but user stays focused
- 5s–10s: User starts to lose attention.
- 10s–1 min: User becomes distracted and productivity declines. App needs to support parallel activities.
- >1 min: Significant loss of productivity. User leaves for coffee.

Modes

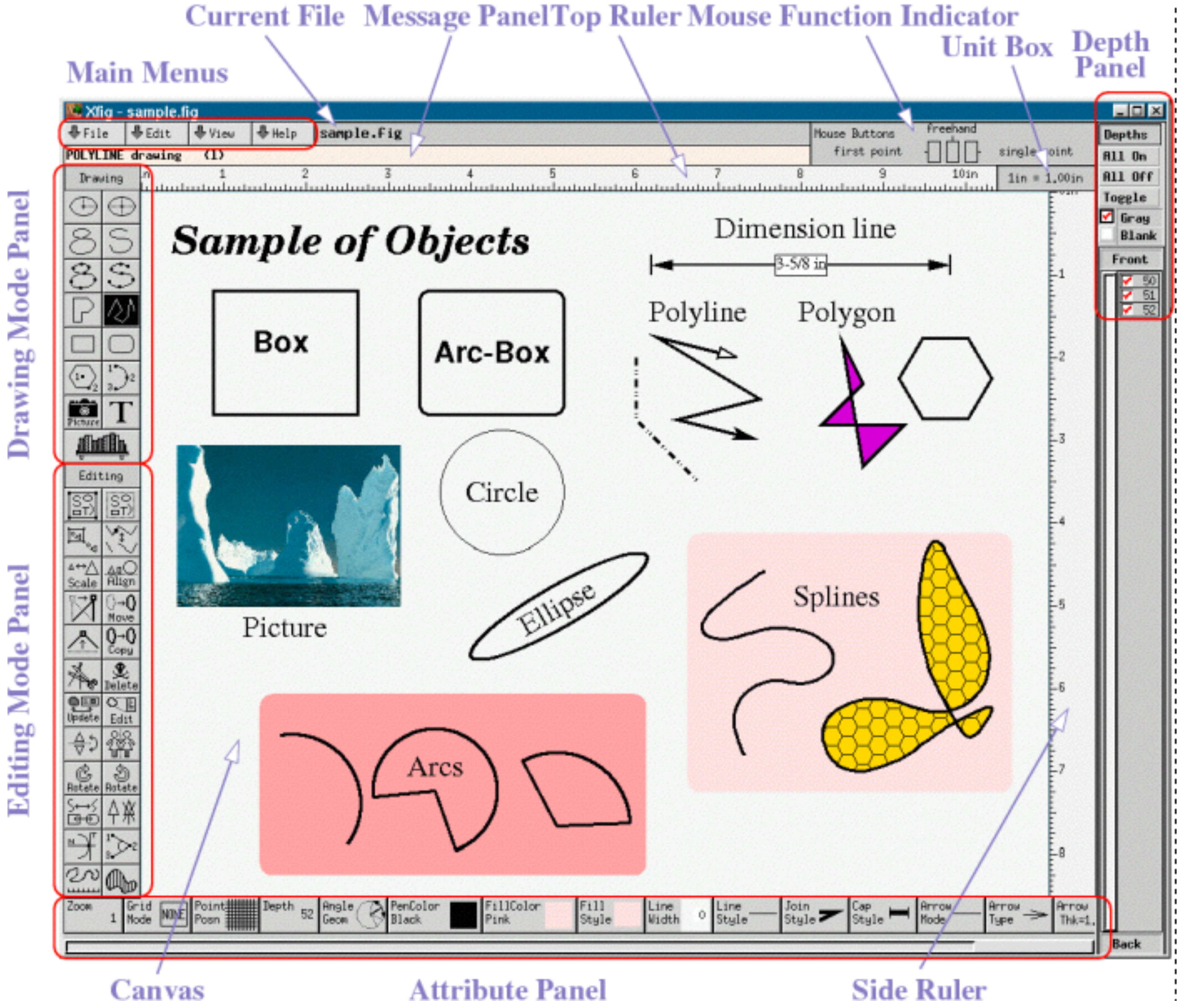
- Modes: states of UI that restrict interactions.
  - Good: restricted context-sensitive vocabulary simplifies user interaction
  - Bad: can be confusing and can trap users
- Moral: use judiciously

When modes go bad: cascading dialogs



Look for icons in this file: C:\WINDOWS\explorer.exe

xfig: context-sensitive mouse



Principle 3:
Aid Memory

"The advantage of a bad memory is that one enjoys several times the same good things for the first time."
— Friedrich Nietzsche

Rule of 7

- Humans can only hold about 7 things in their head at once
- Avoid long menus, lots of buttons

Spatial memory

- Human spatial memory is amazingly good (e.g., memory palaces
  - Good UIs exploit this
- Each window or dialogue or mode is a “place” for interaction
  - make it a good place to be
  - avoid unnecessary places/modes
  - make navigation easy, obvious
- Big-picture views strengthen spatial sense

Muscle memory

- Frequent users don’t need to look – UI is programmed into their muscles

⇒ action needs to activate functionality should be consistent

  - e.g., gray out menu items instead of removing them

Context-sensitive help

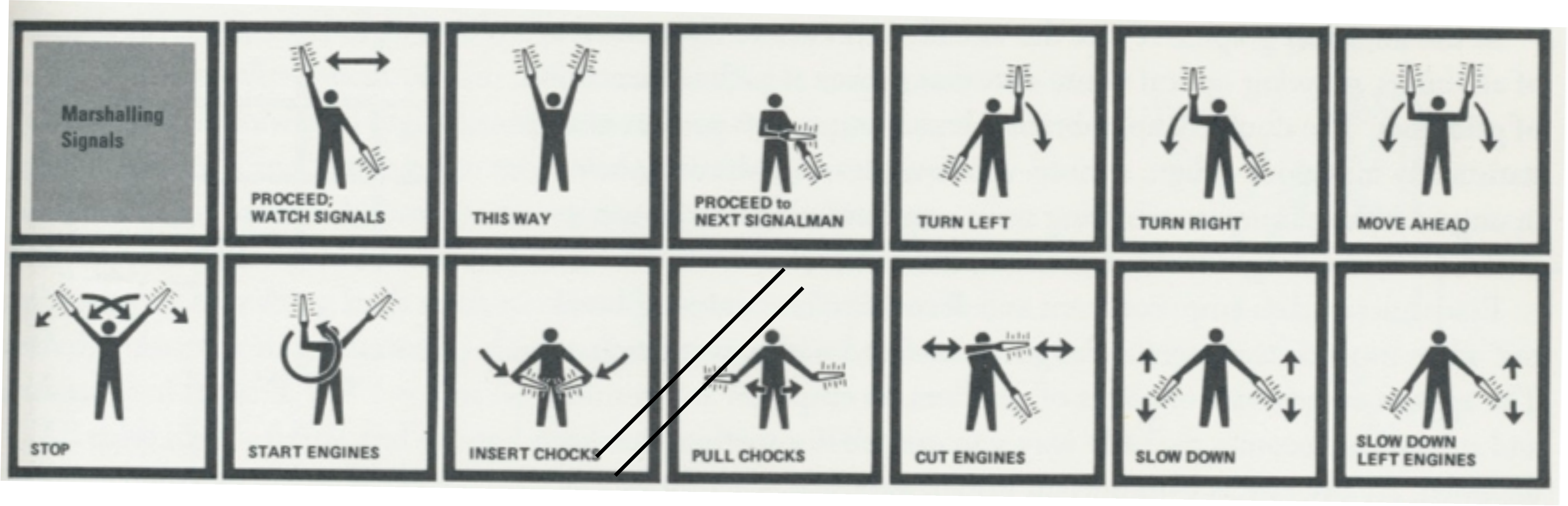
- Help should be about what user is doing.

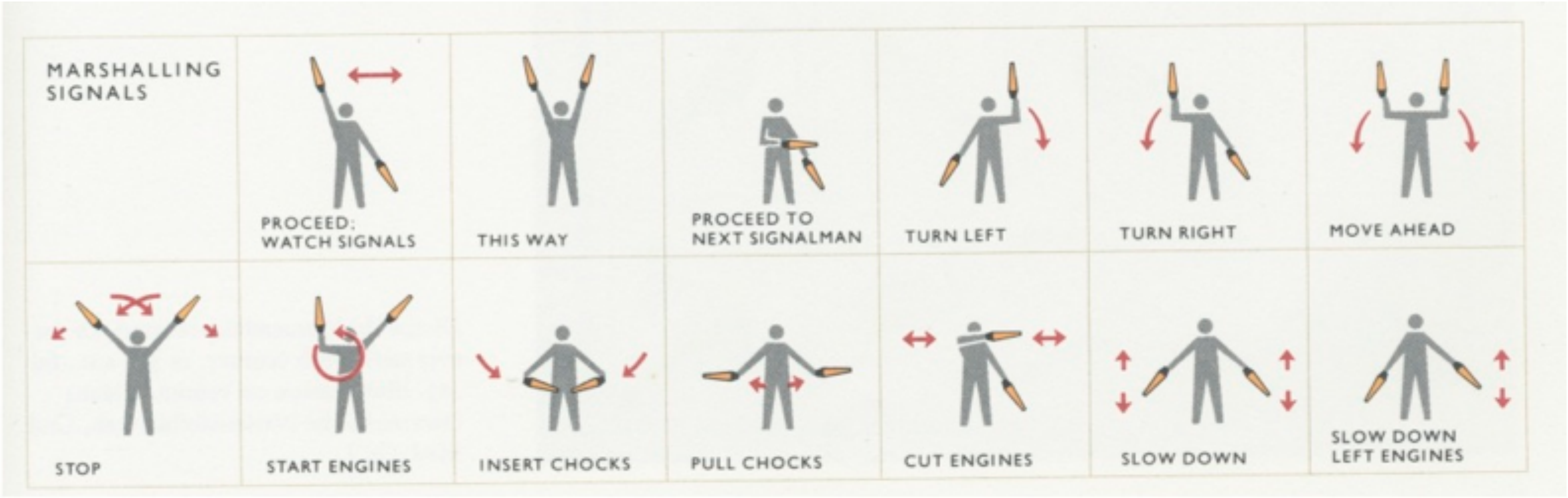
⇒ task-focused rather than feature-focused (unlike most modern apps!)

⇒can exploit modes

Principle 4:
Good visual design

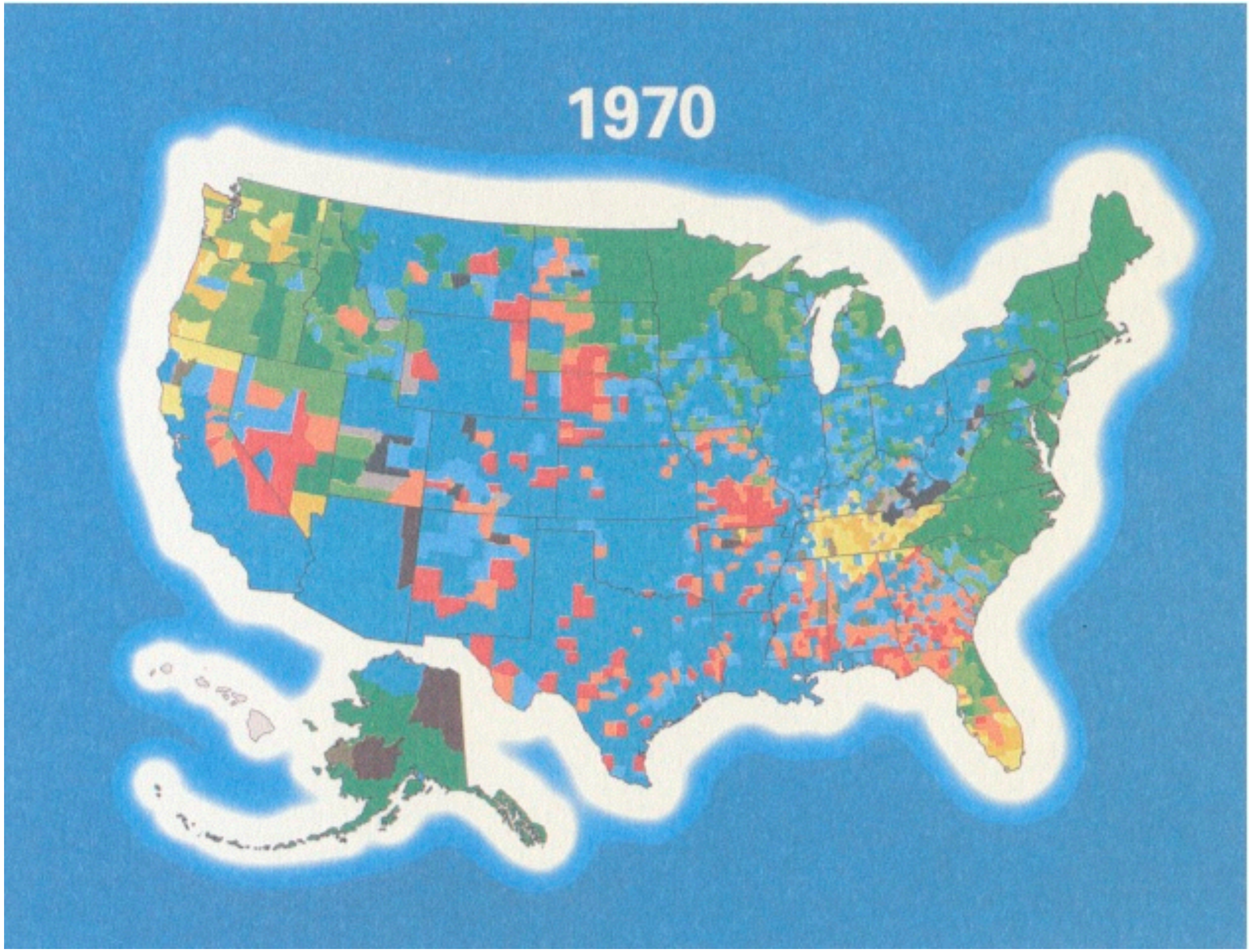
Avoid visual clutter





Avoid visual clutter

- Use space shading, color instead of lines to organize
- Use low-contrast separators
- Maximize information/ink ratio


1970

Contrast and chromatic aberration

This text is probably not very pleasant to read.

And it gets harder if the font size is small.

Visual consistency

- For novice users, be consistent with existing apps and real world
- For expert users, be internally consistent
  - e.g. buttons that navigate vs. buttons that change state vs. buttons that expose new information
  - write **style guide** to guide developers

COLORS

ON-SCREEN

Computers, televisions and other electronic displays use combinations of red, green and blue to simulate a large gamut of colors. Many displays are able to show millions of colors and can often display colors more vivid than printers.

ON-PRESS

Standard printing process, from desktop ink-jets to industrial offset lithography use combinations of cyan, magenta, yellow and black inks to simulate a large gamut of colors. This method is not able to produce the full color spectrum and lacks strongly-saturated green and orange.

CUSTOM INKS

The Pantone Matching System by Pantone, Inc. is a proprietary method of mixing inks to exacting standards. It allows highly accurate color reproduction and is key in unifying corporate communications. PMS numbers, as listed at right, are to be used when designing and printing materials.

PRIMARY COLOR

The primary color is an off-black that screens to a subtle brownish color. It is to be used in one of the four manners shown at left.

This color allows for adequate contrast in type and photography while retaining approachability and warmth.

PMS [illegible]

C [illegible]
M [illegible]
Y [illegible]
K [illegible]

100%

60%

15%

MONOTONE IMAGERY

DO NOT

- Mix with other colors
- Screen at percentages other than sixty or fifteen.

ACCENT COLOR

The bold and warm accent color provides variation to printed materials that builds hierarchy, captures attention and evokes the bold nature of GIRAFFE HEROES.

PMS [illegible]

C 0
M 100
Y [illegible]
K [illegible]

100%

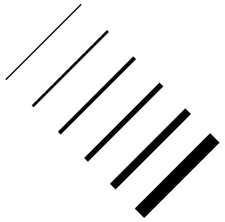
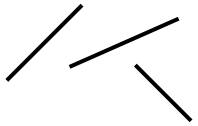
DO NOT

- Mix with other colors
- Use anything but 100%

giraffe project

COLOR

Visual features

- Shape (up to 15) ■ ■ ● ◣ ★
- Color (up to 24) 🟥 🟧 🟨 🟨 🟩 🟩 🟦
- Size, length, thickness: up to 6. 
- Orientation: up to 24 
- Texture
- Differing color perception
  ⇒ can only complement other forms of

  information