Human-Computer Interaction

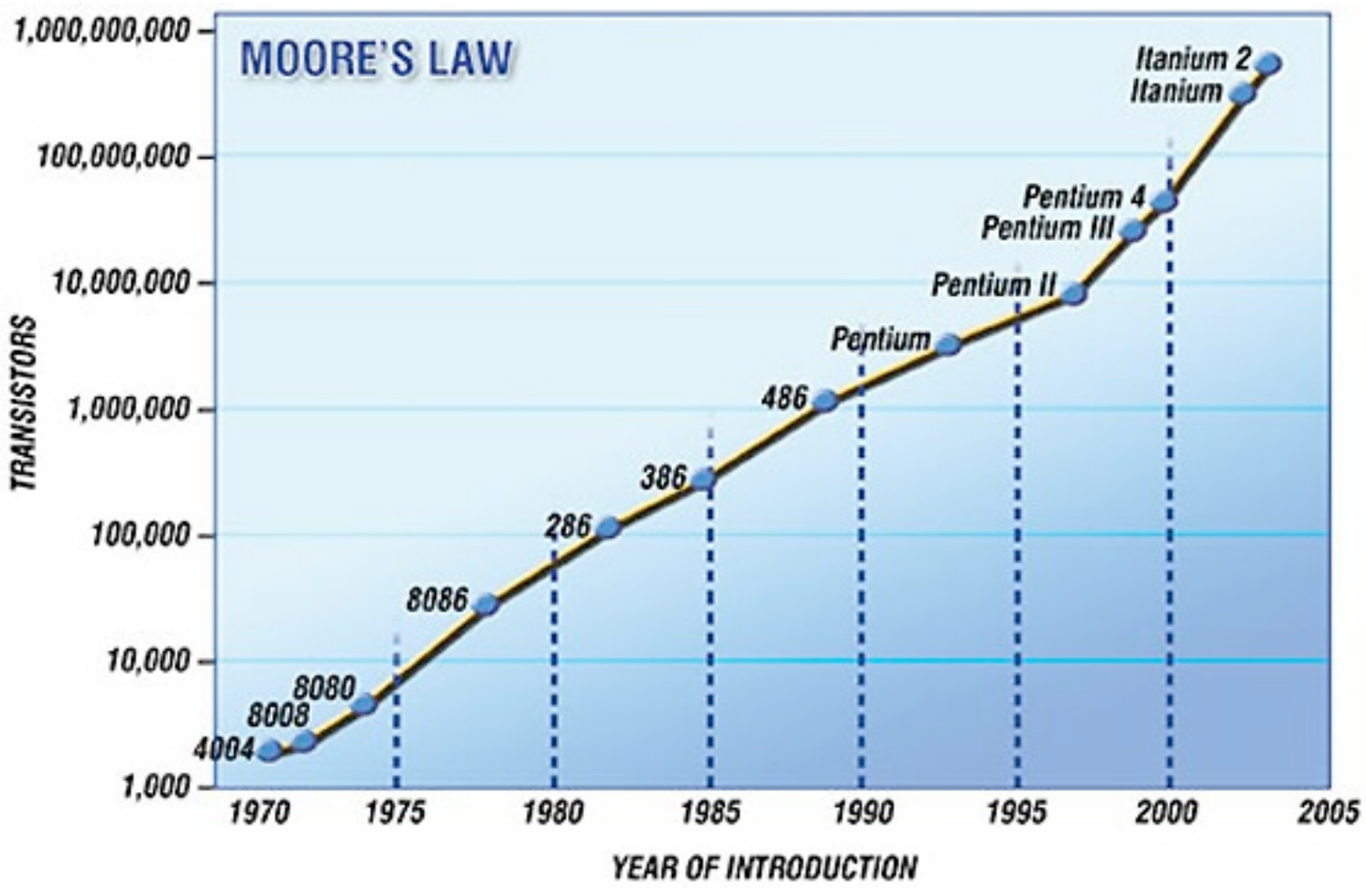
(HCI)

"When the creators of software-based products examine their handiwork, they overlook how bad it is.

Unfortunately, their frame of reference is themselves, so they only make it easy to use for other software engineers, not for normal human beings."

- Alan Cooper, The Inmates are Running the Asylum

Moore's Law


MOORE'S LAW
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TRANSISTORS
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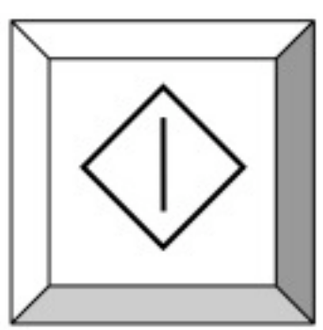
Pentium
Pentium II
Pentium III
Pentium 4
Itanium
Itanium 2
1970
1975
1980
1985
1990
1995
2000
2005
YEAR OF INTRODUCTION

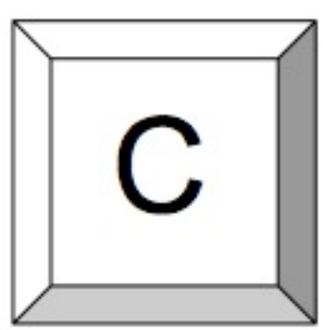
Need for design

- Computers as cognitive prosthetics
- Computers are cheaper and faster but our abilities haven't changed
- Computing time is now much cheaper than human time
- Before, user had to bend to machine's will

Poor design leads to...

- Frustration
- Wasted time
- Errors
- If you've never seen a copier, how do you copy?





HCI is Inter-disciplinary

- Computer science
- Cognitive Psychology
- Social Psychology
- Ergonomics
- Linguistics
- Artificial intelligence
- Philosophy
- Sociology
- Anthropology
- Design
- ...

Factors affecting design

Organisation Factors Training, job design, politics, roles, work organisation		**Environmental Factors** Noise, heating, lighting, ventilation
Health and Safety Factors	**The User** Cognitive processes and capabilities Motivation, enjoyment, satisfaction, personality, experience	**Comfort Factors** Seating, equipment, layout.
User Interface Input devices, output devices, dialogue structures, use of colour, icons, commands, navigation, graphics, natural language, user support, multimedia,		
Task Factors Easy, complex, novel, task allocation, monitoring, skills		
Constraints Cost, timescales, budgets, staff, equipment, buildings		
System Functionality Hardware, software, application		
Productivity Factors Increase output, increase quality, decrease costs, decrease errors, increase innovation		

*hamilton.bell.ac.uk/btech/**hci**/**hciintro**.pdf*

Usability

- Input format
- Feedback
- Visibility
- Perceived potential (is this door push or pull?)

HCI Principles

- Put people first
- Understand how people use technology
- Develop tools to enable building good systems
- Design for efficient, effective and safe interaction
- Quality is contextual (fit to task)
- User reaction is the best test

Steps in HCI

- Observation (what's the problem?)
- **Paper prototype**
- Video prototype
- User tests
- Interation

Paper Prototyping

- Test the design
- Choose between alternatives
- Minimize cost of experimentation

Alarm Clock for world-traveling businesspeople

- Hardware or software? Phone?
- How do you know if the alarm is set?
- What colors do you use?
- How easy is it to set the alarm?
- How many buttons are there?
- How do you change the timezone?
- Differences with kids' alarm clock?

Knowing your users

- Expertise
- Computing habits
- Location
- Social interactions
- Literacy
- Vision

Understanding usability requirements

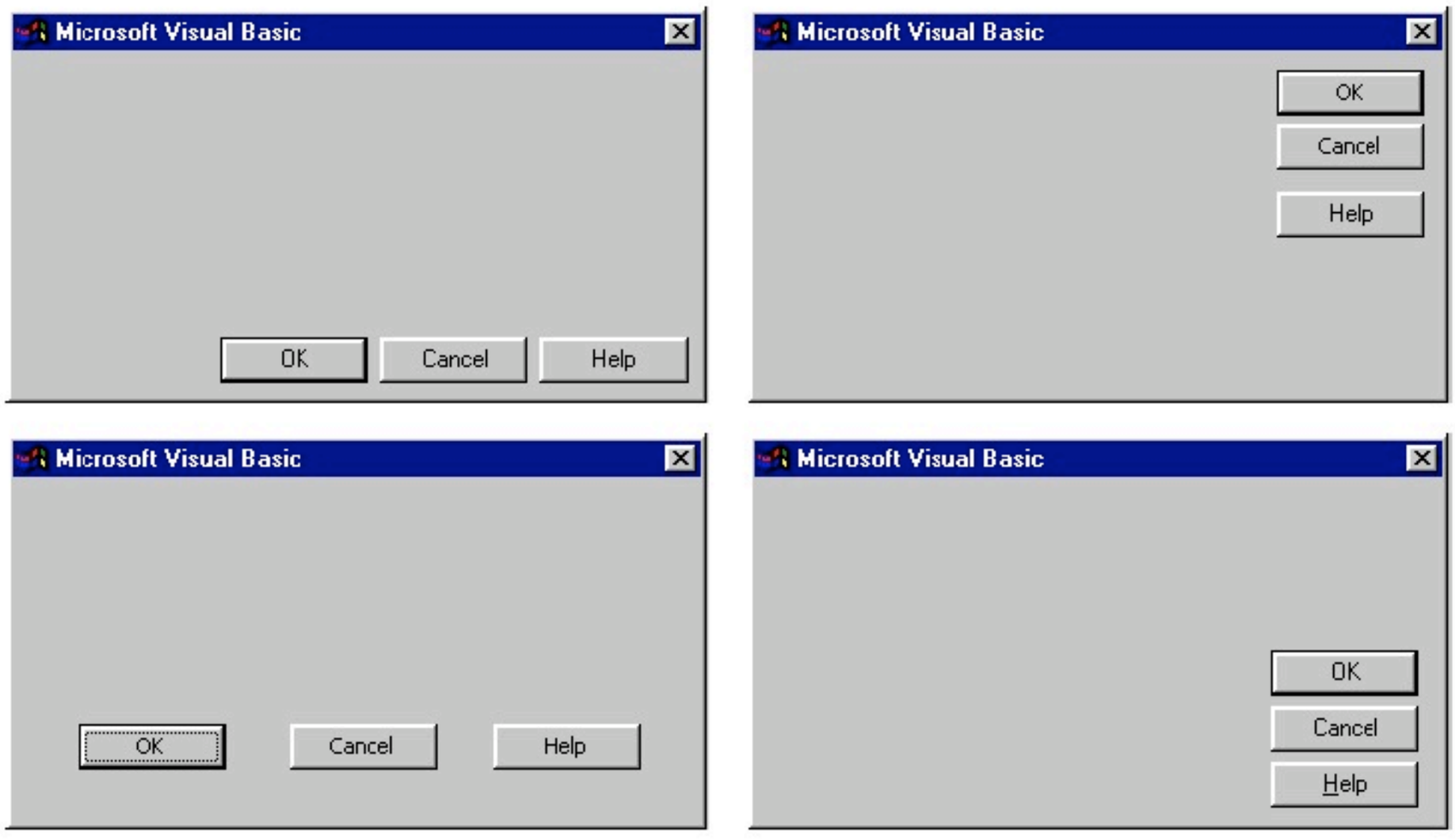
- Learnability
- Speed of performance
- Error rate
- Retention over time
- Subjective satisfaction
- ... often sacrifice one for the other!!

Shneiderman's 8 Golden Rules

- Strive for consistency
- Enable frequent users to use shortcuts
- Offer informative feedback
- Design dialogs to yield closure
- Offer error prevention and simple error handling
- Permit easy reversal of actions
- Support internal locus of control
- Reduce short-term memory load

Consistency

"consistency makes the interface familiar and predictable",
The Windows User Interface Guidelines for Software Design, Microsoft Press

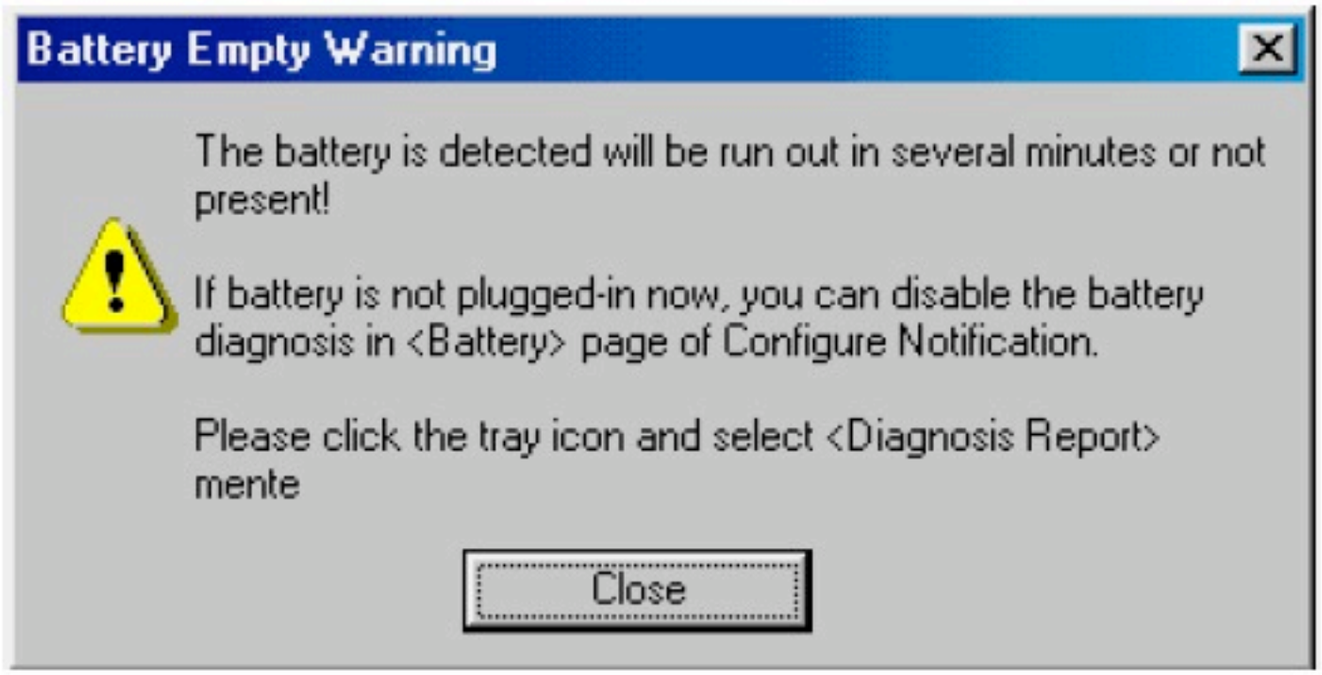


Dialog closure

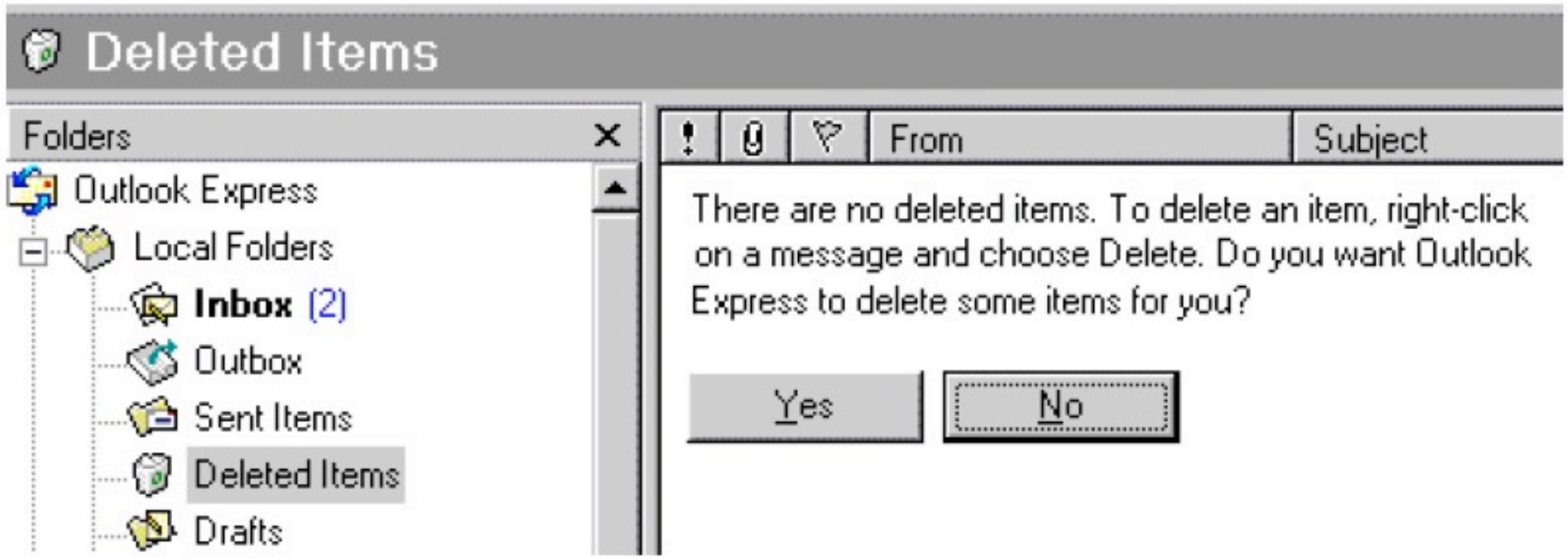
- Users should feel like task is complete for
  - satisfaction
  - relief
  - preparation for next actions

Errors

- What happened?
- W
- Hc
- Hc
- Prevent by using menus instead of fill-ins, etc



Locus of Control



Memory Load

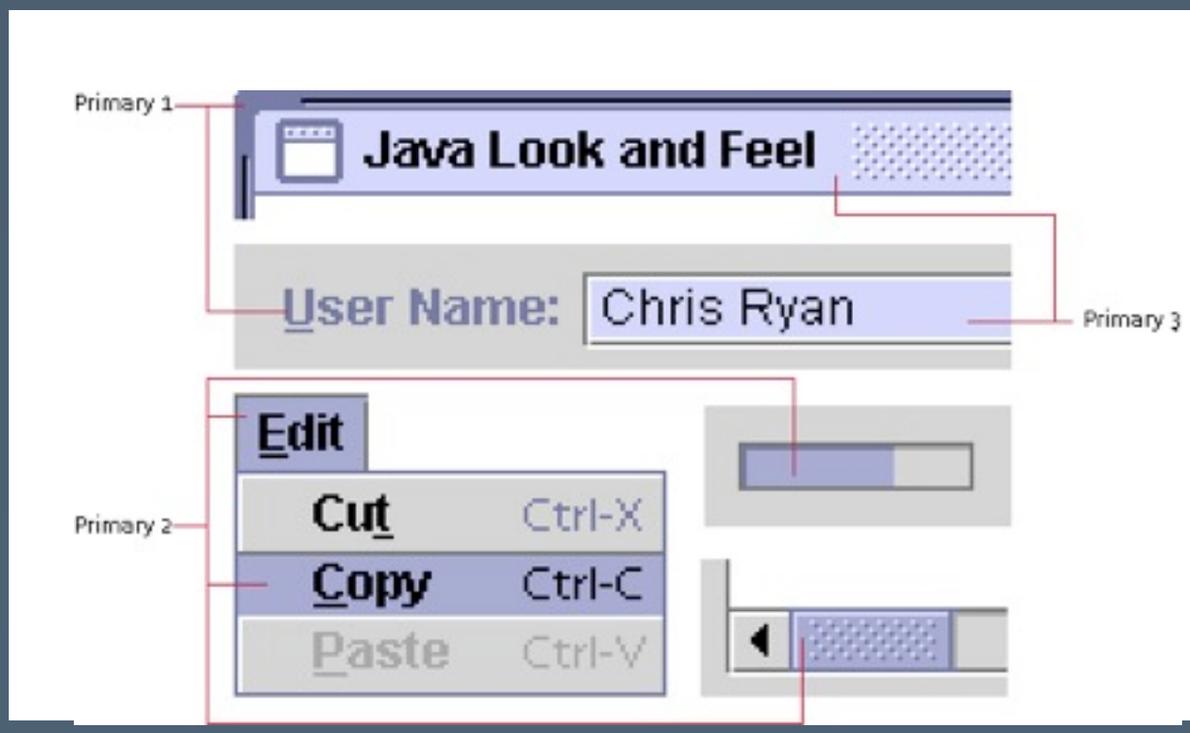
- Humans remember seven plus or minus two chunks
- Consolidate multiple page displays
- Don’t make users note down codes
- Allow for training

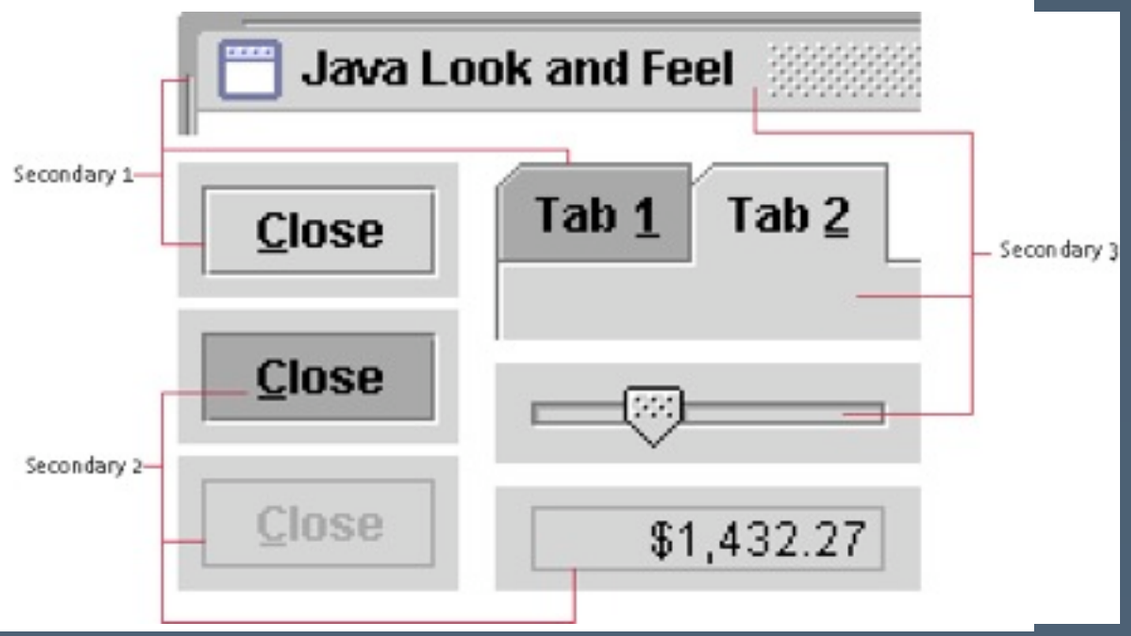
Desktop applications

- Must fit existing metaphors (windows, open, etc)
- Must integrate into operating system
- Must be consistent between screens
- Less and less relevant!

Color (Java L&F)

- Six color semantic scheme
- Clean, consistent look
- Easy on eyes (mostly gray)





Mobile

- Swiss army knife
- Multiple interaction models (speech recognition?)
- Integration
- Social
- Ubiquitous

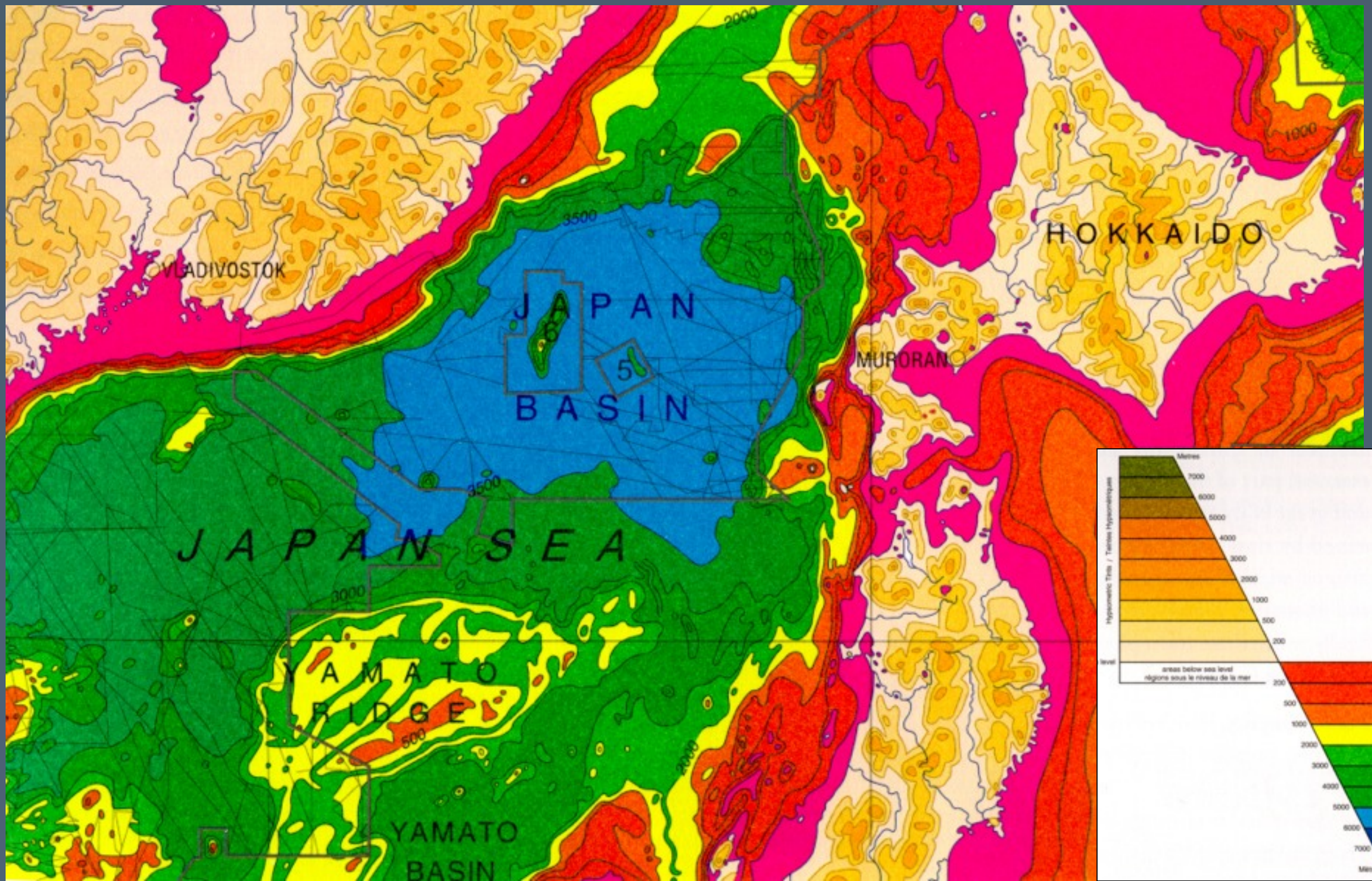
Interaction styles

- Direct manipulation (gesture)
- Type in form
- Menu selection (touch vs keyboard)
- Command language
- Natural language
- Combination for different users

Presenting information

- Color
- Fonts
- Size

Color: Edward Tufte



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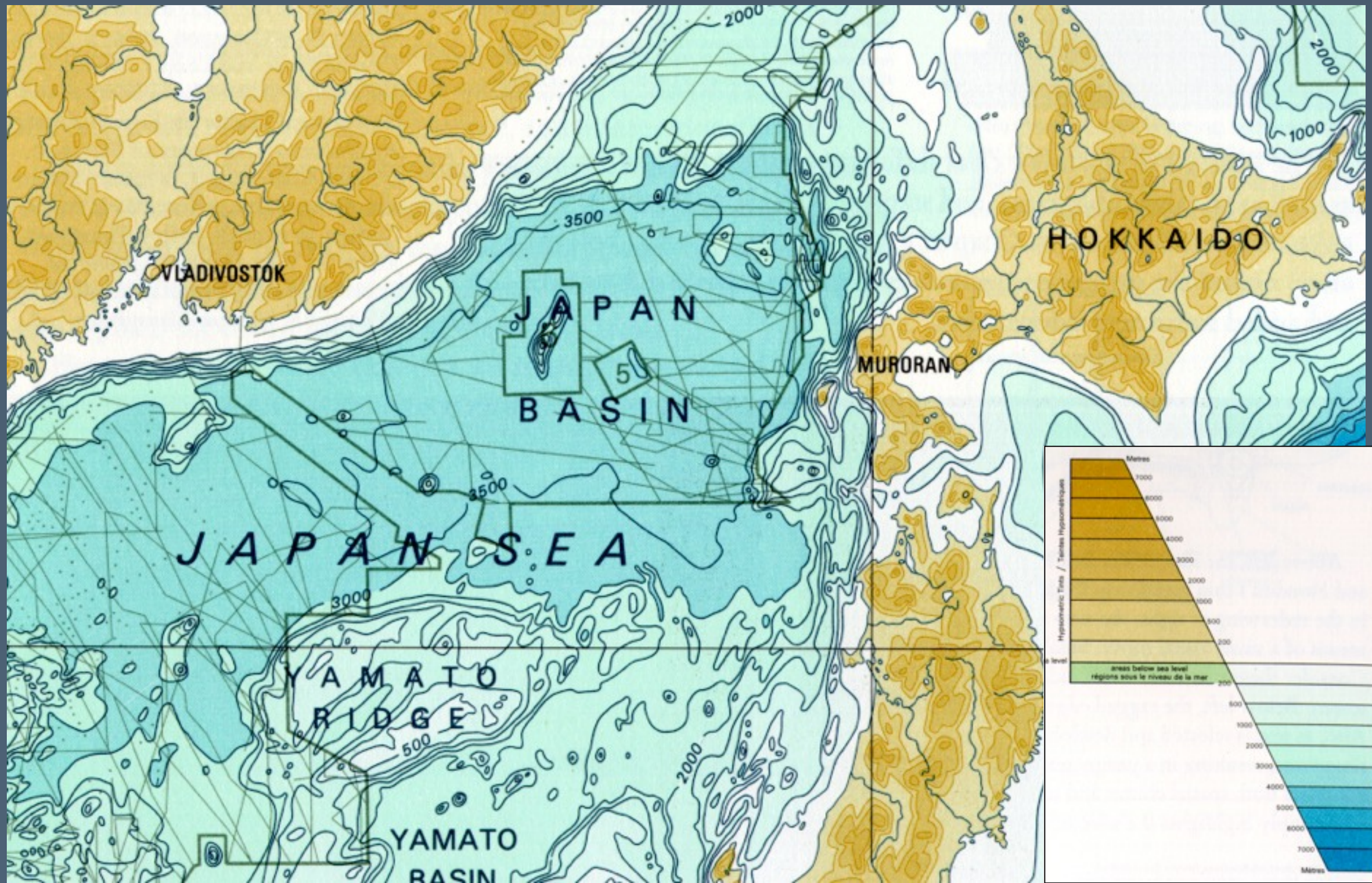

Marks of Typographic Style

What to do with CAPITALS in your text? SMALL CAPITALS are the best solution. If they aren't available, reduce the point size of the full-size CAPITALS slightly and letterspace so they aren't crashing into each other.
capitals attract too much attention and break up the text

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small caps are designed to work with lowercase letters

What to do with CAPITALS in your text? SMALL CAPITALS are the best solution. If they aren't available, reduce the point size of the full-size CAPITALS slightly and letterspace so they aren't crashing into each other.
if you don't have small caps, set full-size caps smaller

Ligatures

office flirt file afflict effect

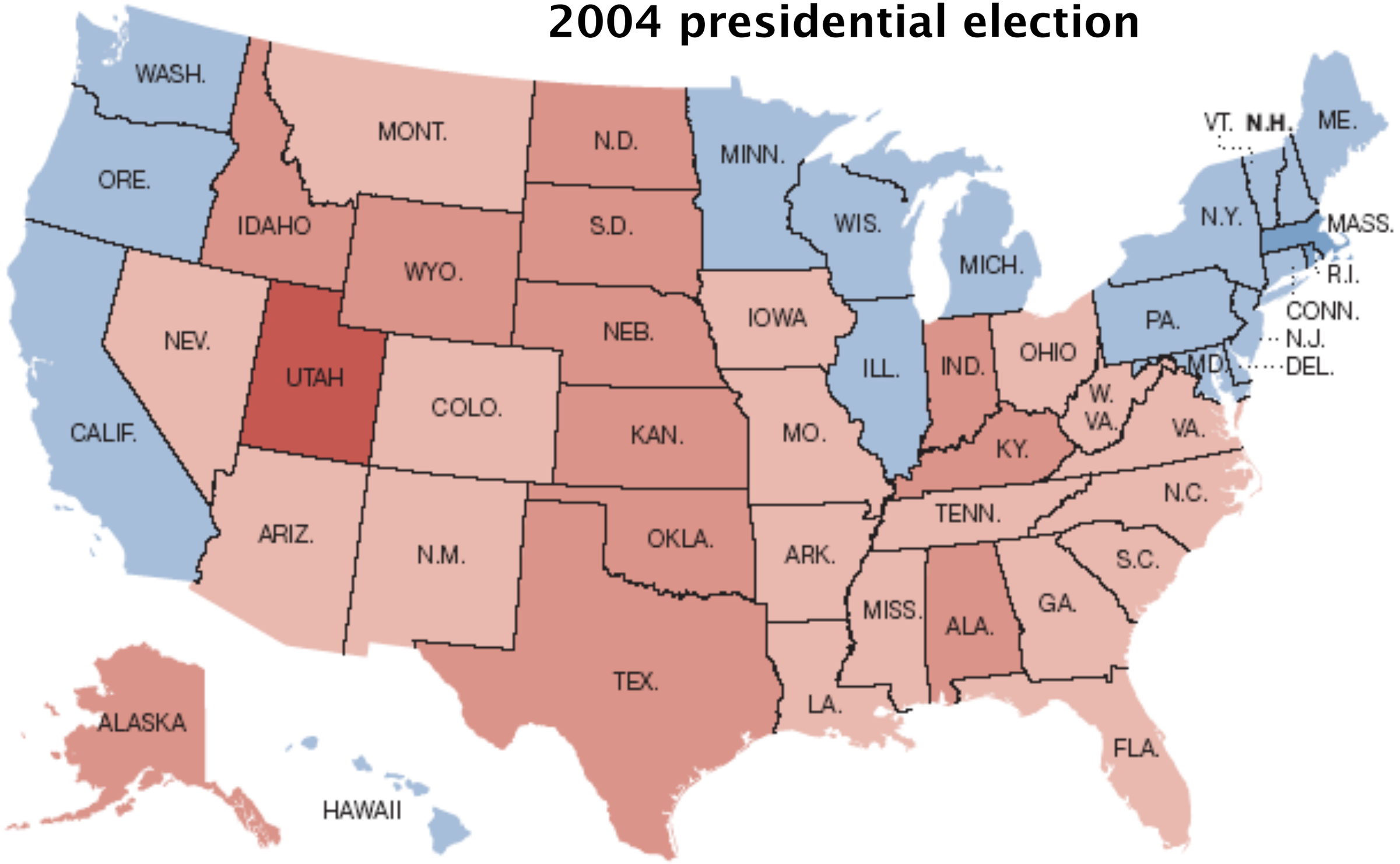
office flirt file afflict effect

Upper and lower case numbers

0123456789 0123456789

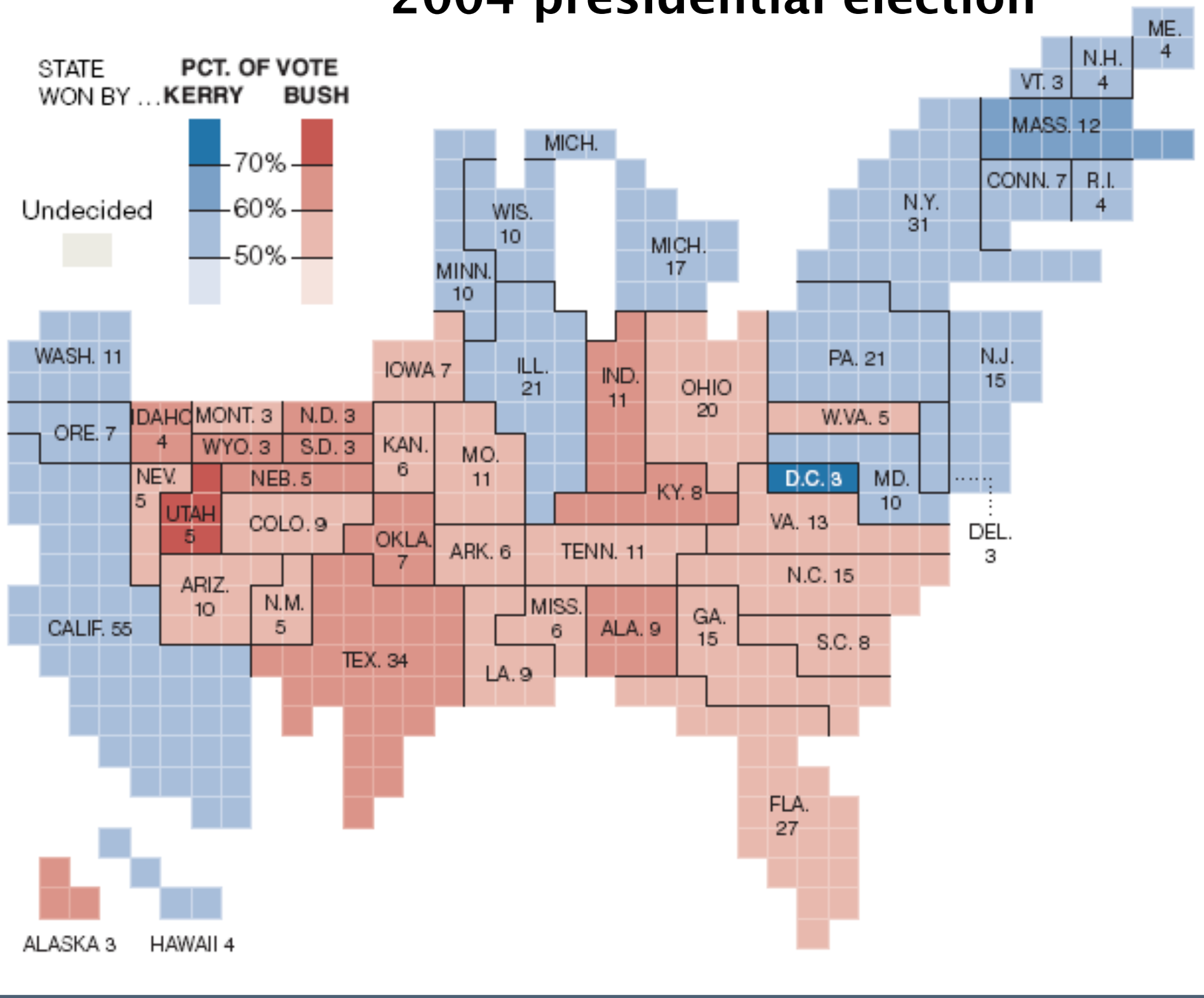
http://www.adobe.com/type/topics/info5.html

2004 presidential election



Matthew Ericson, NY Times

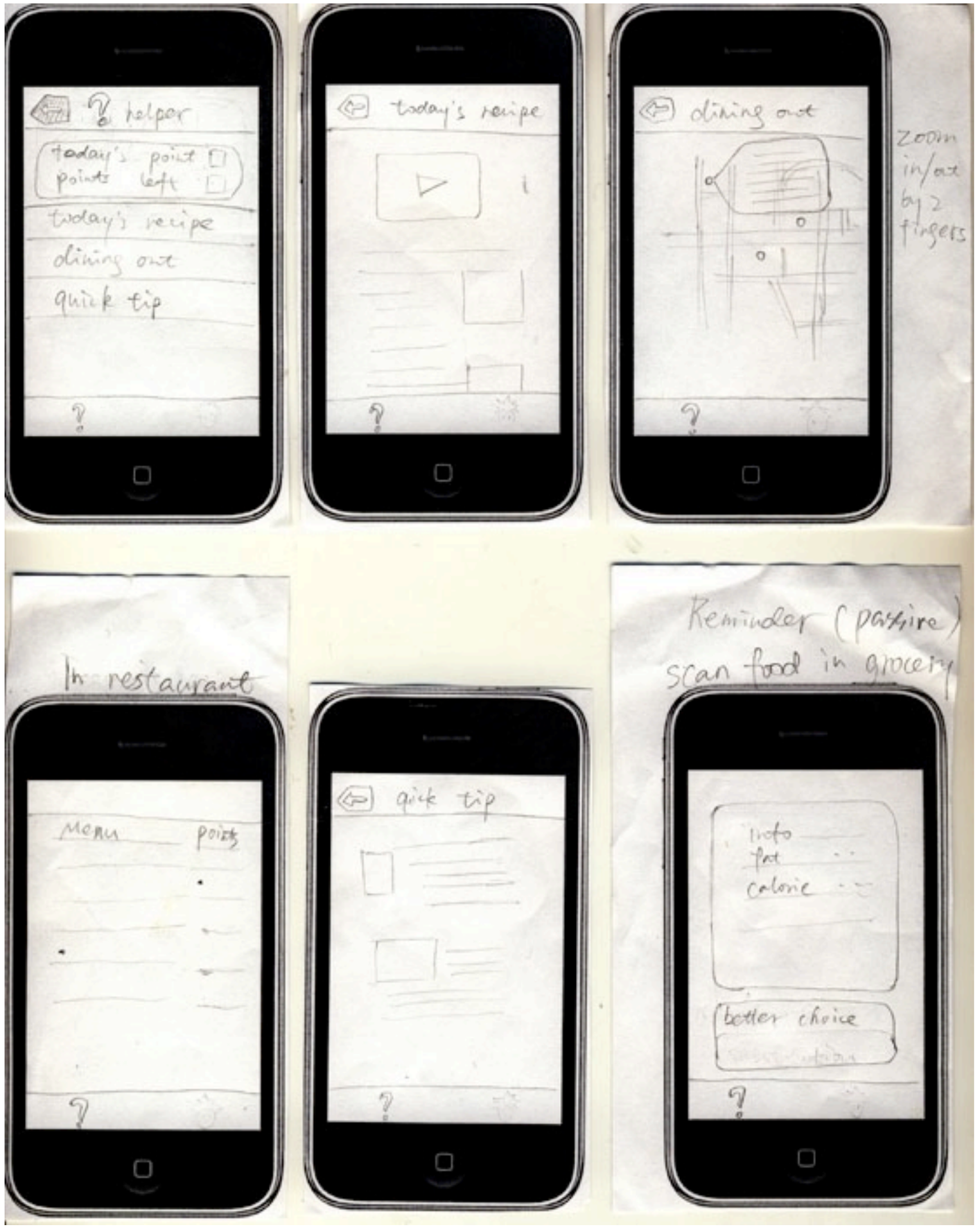
2004 presidential election



Matthew Ericson, NY Times

Creating usable designs

- Most important: solve a real problem!
- Know your users
- Choose the right interaction model
- Try a lot of things early
- Get a lot of user feedback


helper
today's point
points left
today's recipe
dining out
quick tip
today's recipe
dining out
zoom in/out by 2 fingers
In restaurant
menu
points
quick tip
Reminder (passive)
scan food in grocery
info
fat
calorie
better choice

Problem statement

- You want to know where your friends are
- You want to show off how many places you go to
- Design a cellphone app that lets you
  - Tell your friends where you are (and ONLY your friends!)
  - Get points for going to new locations
  - See where your friends are
  - Discover new places and get tips about them from the community
  - Add friends