

Review

SWE 432, Fall 2018

Web Application Development

Checkpoint - HW5

Go to:

b.socrative.com, Click student login

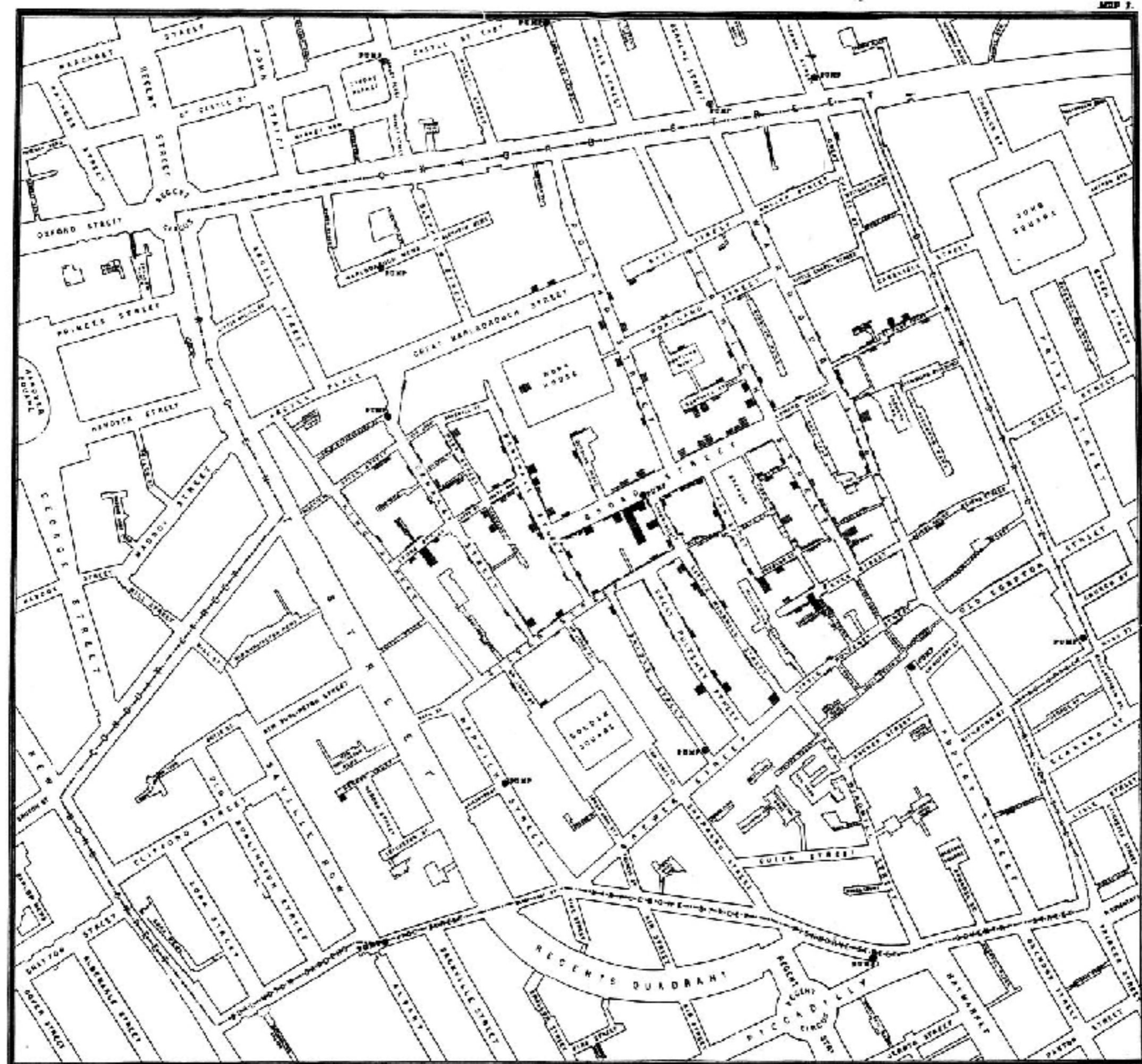
Room name: SWE432

Student ID: Your G-number (Including the G)

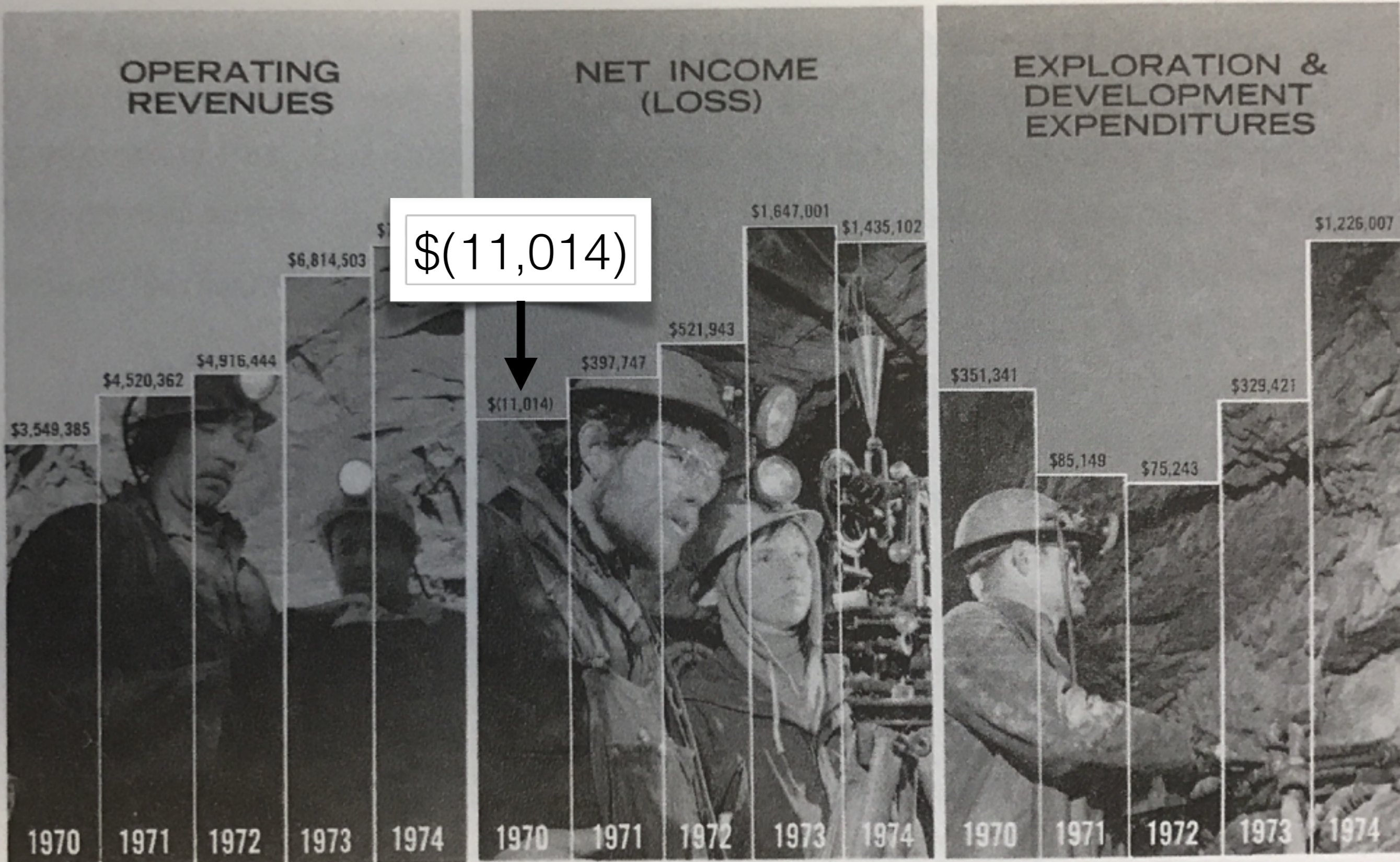
Reminder: Survey can only be completed if you are in class. If you are not in class and do it you will be referred directly to the honor code board, no questions asked, no warning.

Information visualization

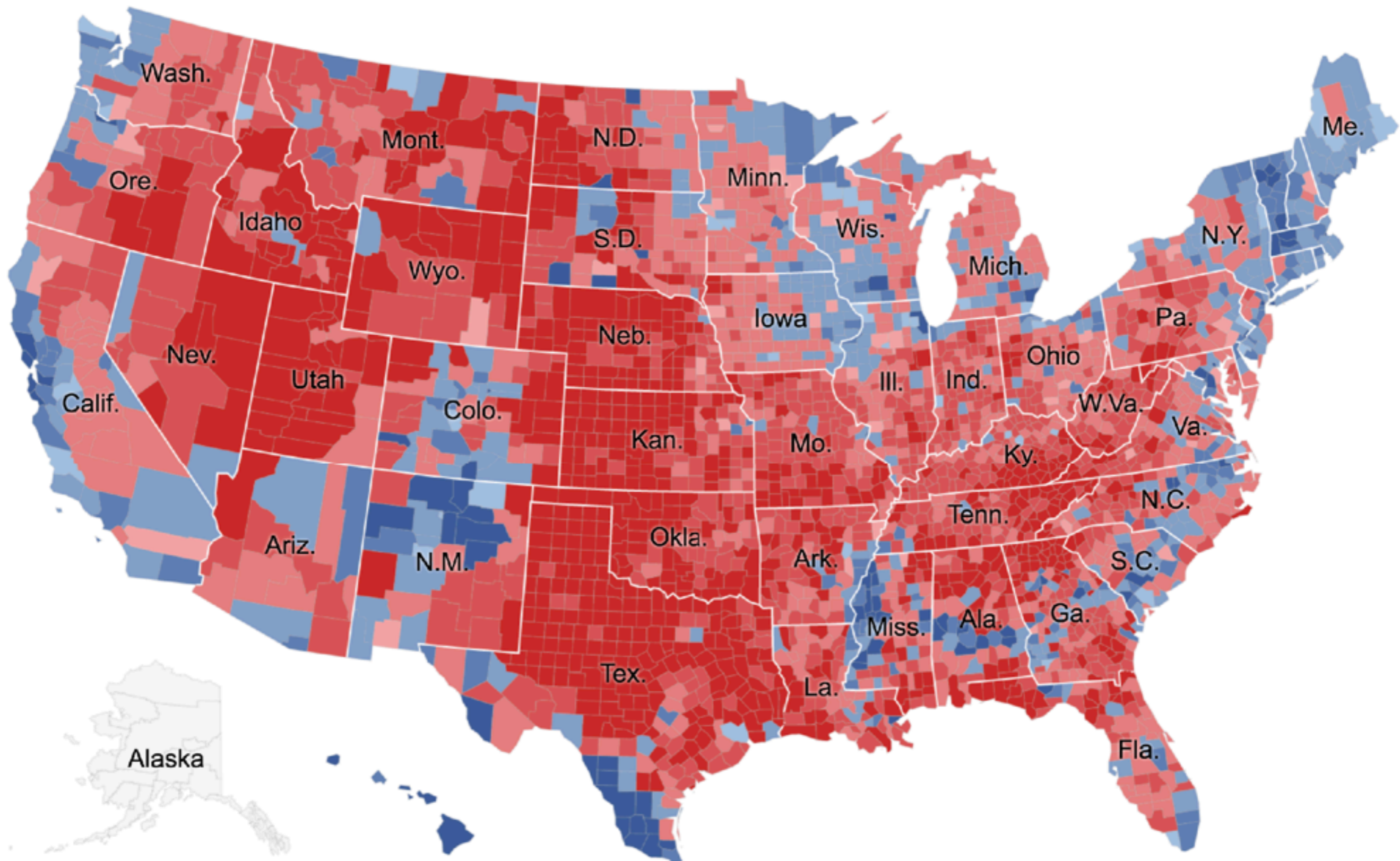
- Technology has made data pervasive
 - health, finance, commerce, customer, travel, demographics, communications, ...
 - some of it “big”
- Information visualization: the use of interactive visual representations to amplify cognition
 - e.g., discover insights, answer questions



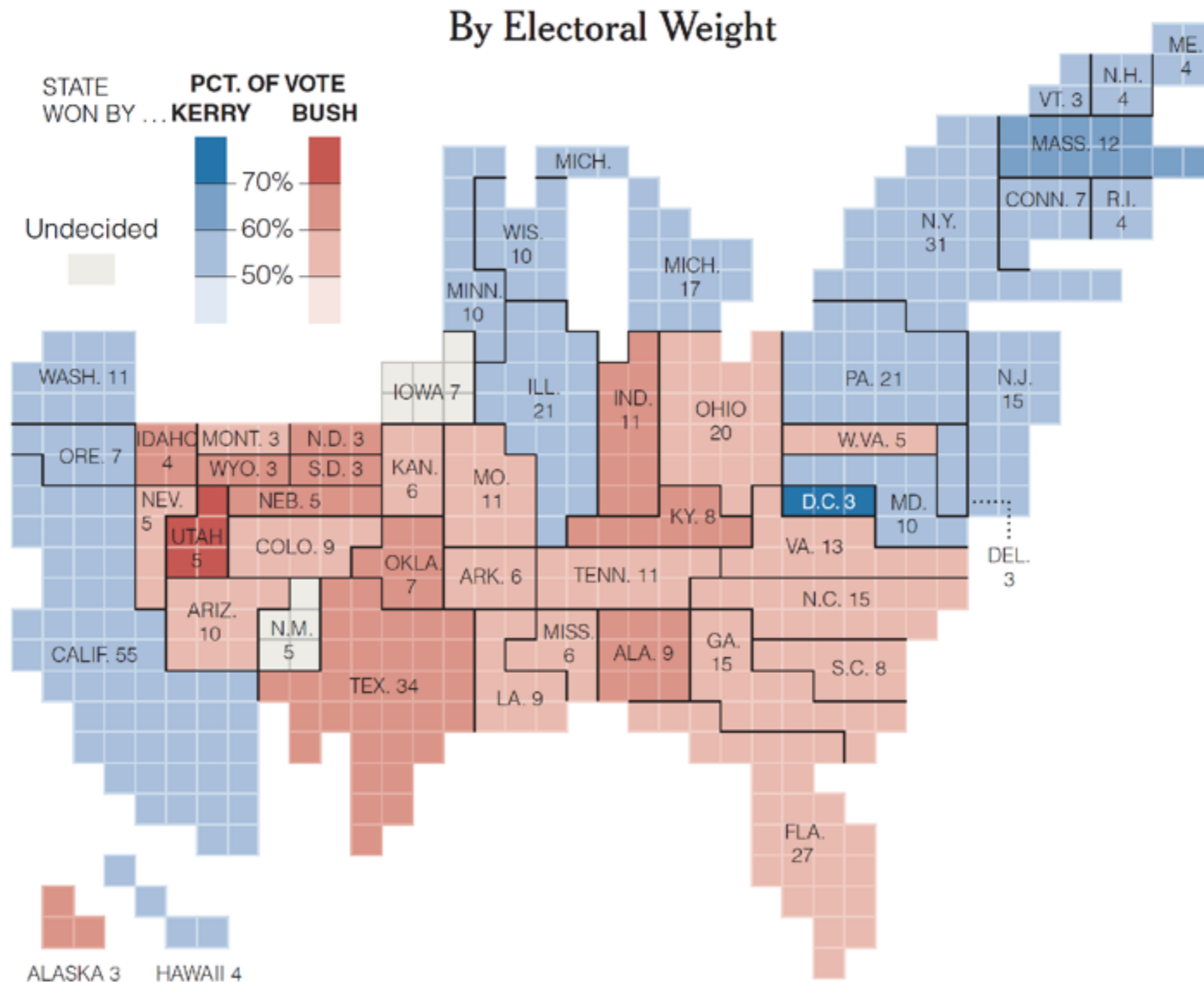
Example



Traditional Electoral Map



Weighted Electoral Map



System 1 vs System 2

System 1

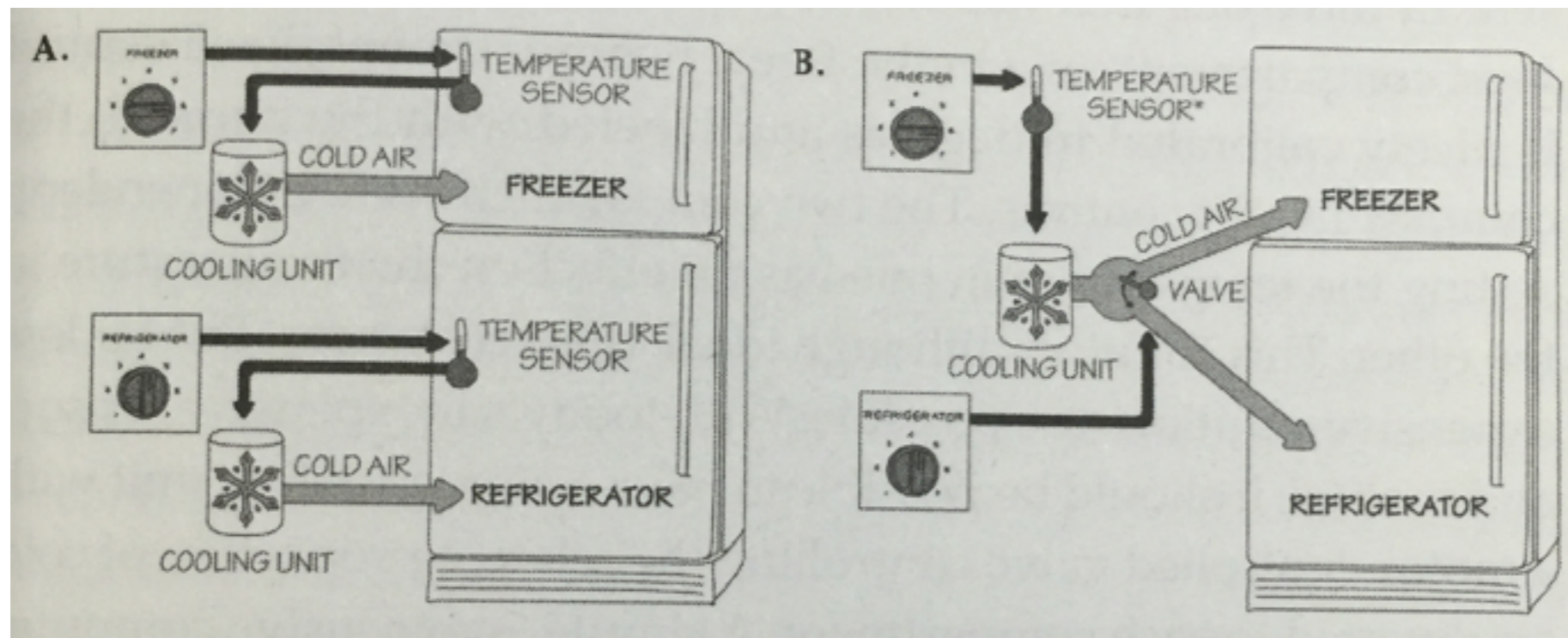
- Automatic (unconscious)
- Effortless
- “Fast” thinking
- Associative
- Heuristic
- Gullible
- Can’t be turned off

System 2

- Voluntary (conscious)
- Effortful
- “Slow” thinking
- Planning
- Logical
- Lazy
- Usually only partly on

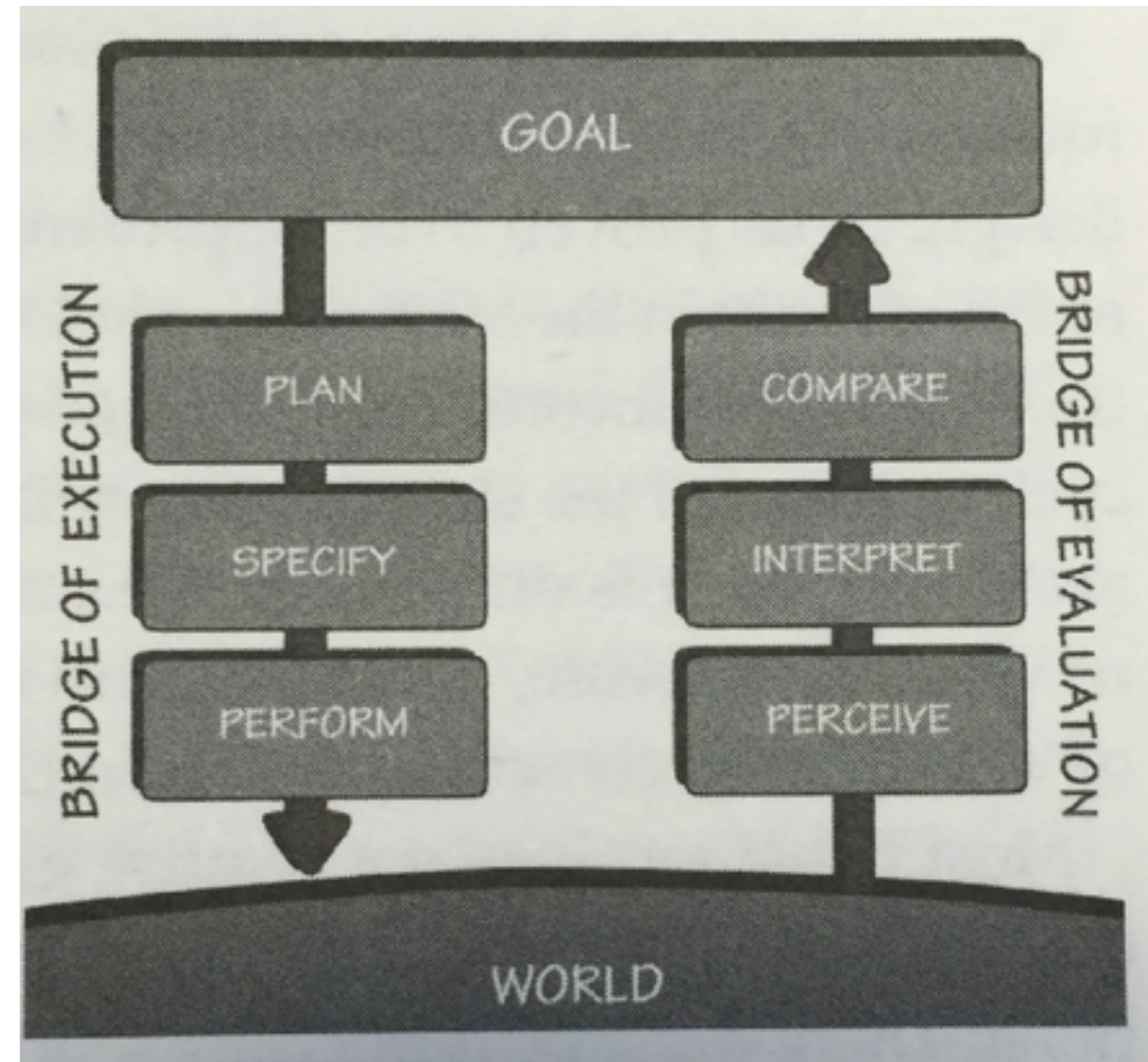
Mental models

- Only single temperature sensor.
- Controls not independent, need to adjust both.
- (also delayed feedback)

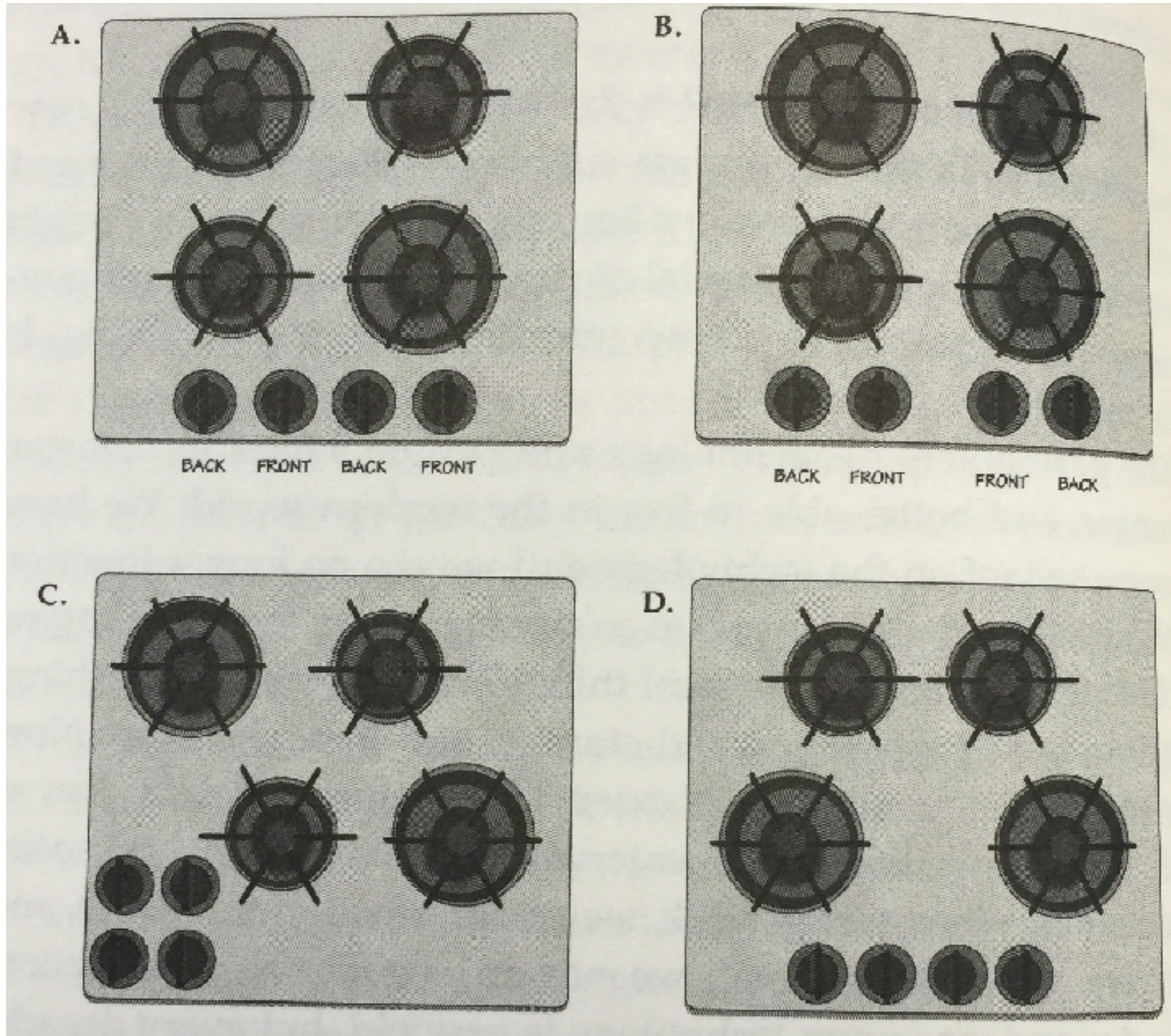


Norman's 7 stages of action

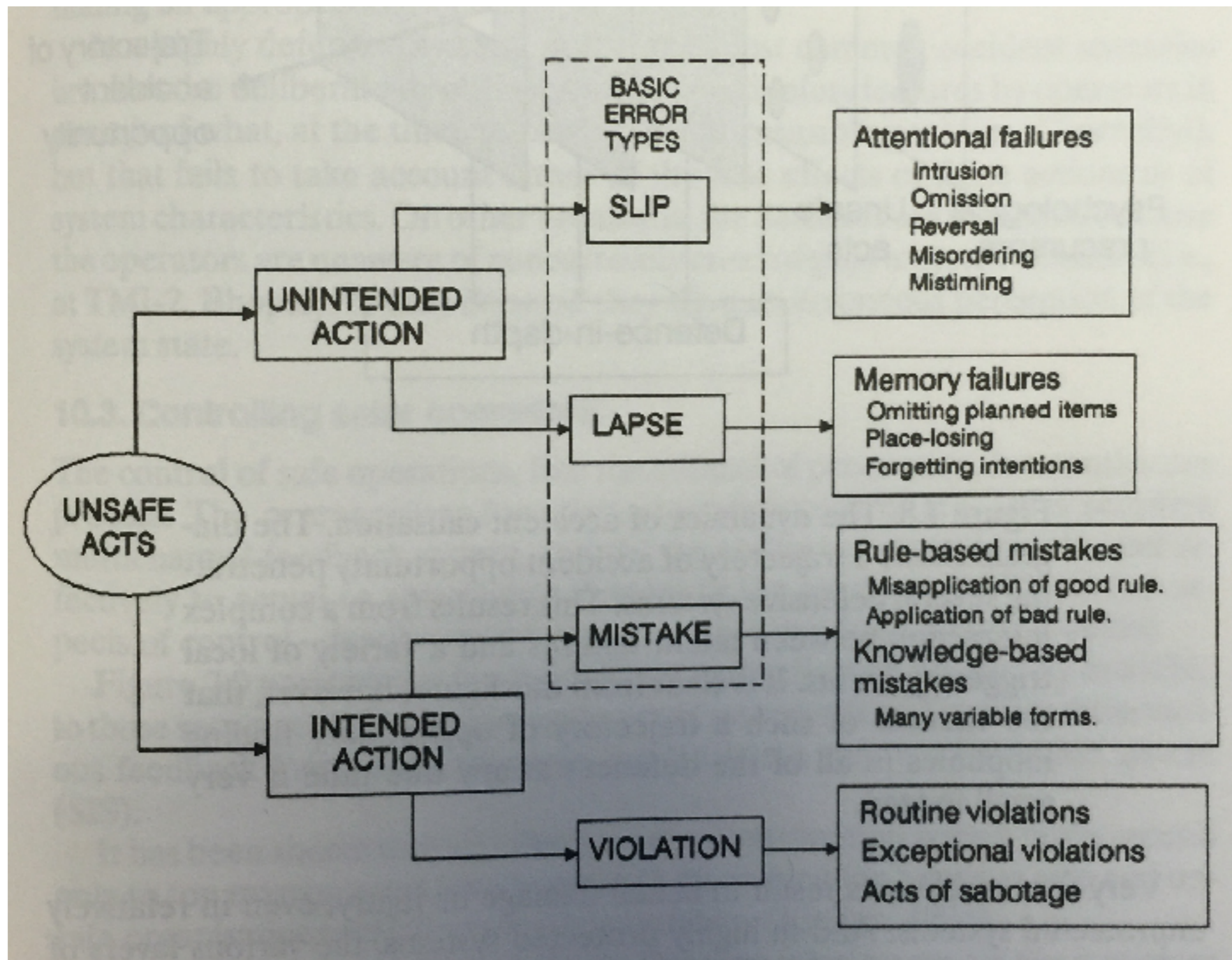
1. Goal (form the goal)
2. Plan (the action)
3. Specify (action sequence)
4. Perform (action sequence)
5. Perceive (the state of the world)
6. Interpret (the perception)
7. Compare (outcome w/ goal)



Designing For Action



Reasons's Model of Unsafe Acts



Affordances, Constraints, Conventions



Usability

- A property of the relationship between
 - humans with goal-driven tasks
 - an artifact
- The speed and success with which the goals can be accomplished (task **performance**)

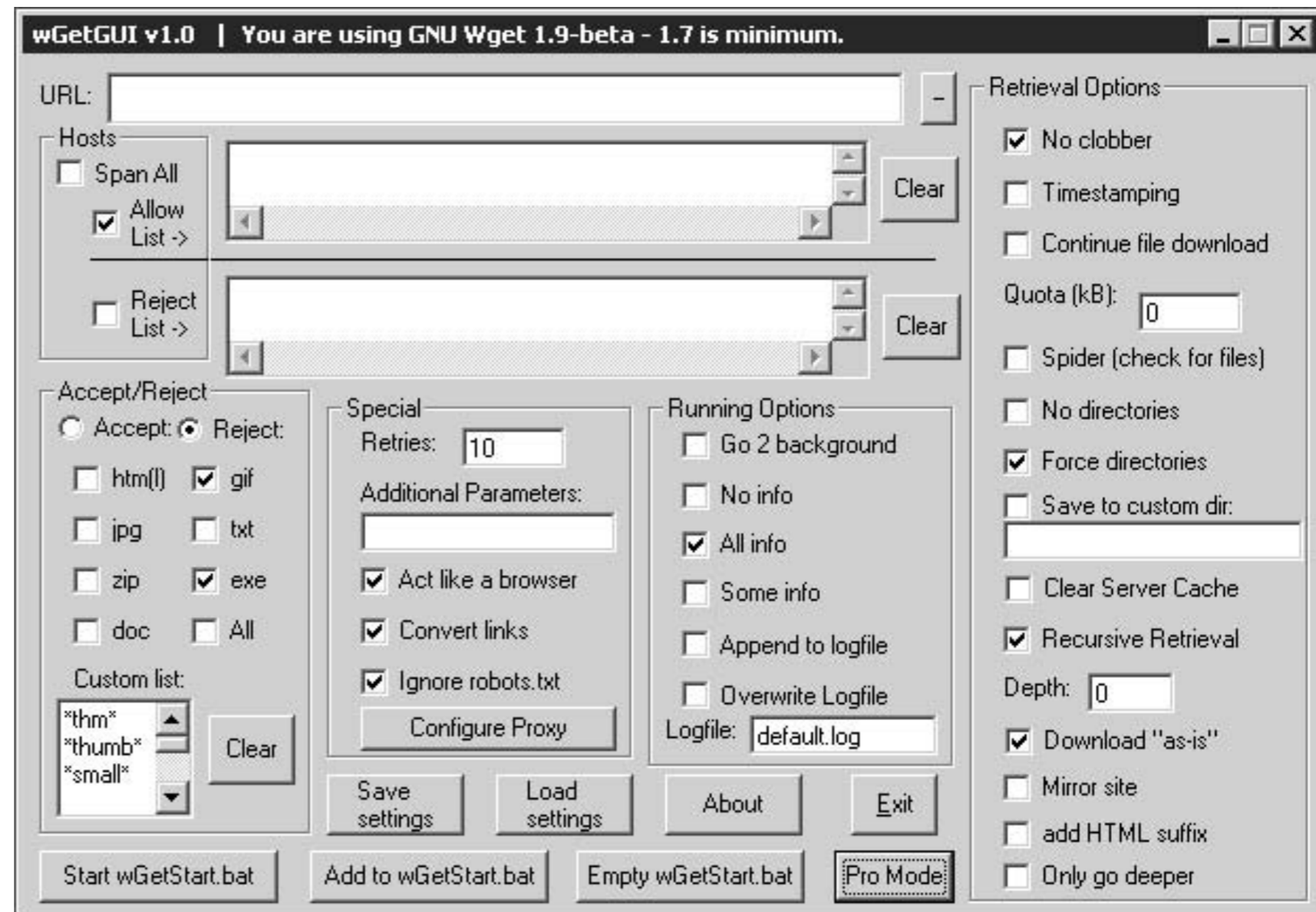
Life Threatening Errors

- Pilot typed in “R” and system **completed** full name of airport to Romeo
- Guidance system executed turn at low altitude to head for Romeo airport
- 9 seconds later plane struck canyon wall
- Is the pilot to blame?
- http://en.wikipedia.org/wiki/American_Airlines_Flight_965

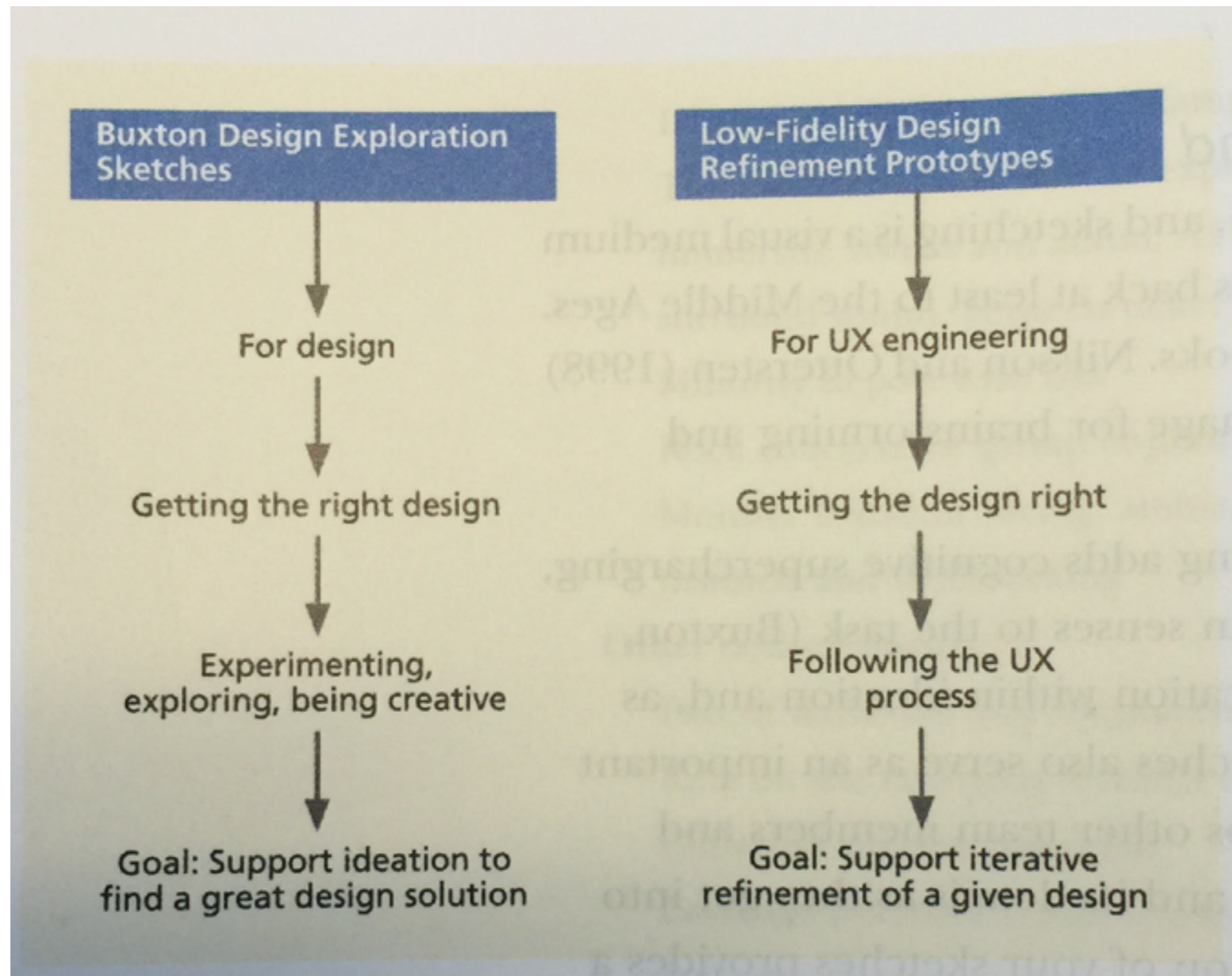


Heuristic Evaluation

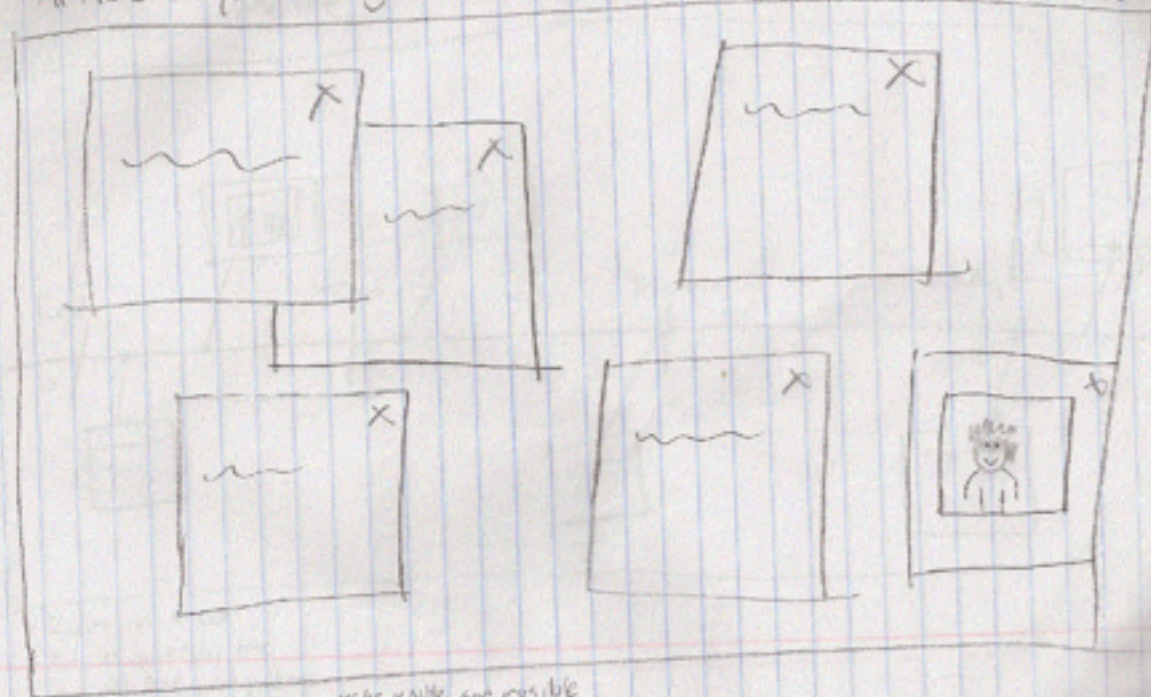
1. Visibility of system status
2. Match between system and the real world
3. User control and freedom
4. Consistency and standards
5. Error prevention
6. Recognition vs. recall
7. Flexibility and efficiency of use
8. Aesthetic and minimalist design
9. Help users recognize, diagnose, and recover from errors
10. Help and documentation



Sketching vs. Prototyping

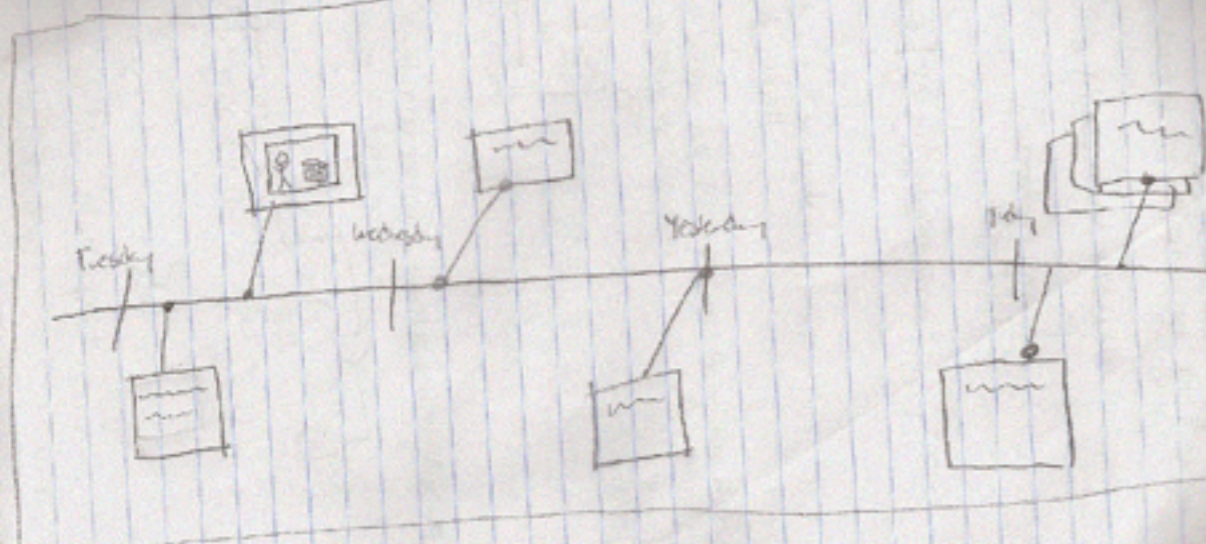


Article Layout through macable windows (DADA) - drag and drop articles



- Macable windows
- resize
- layout by importance
- make visible and visible

News Timeline



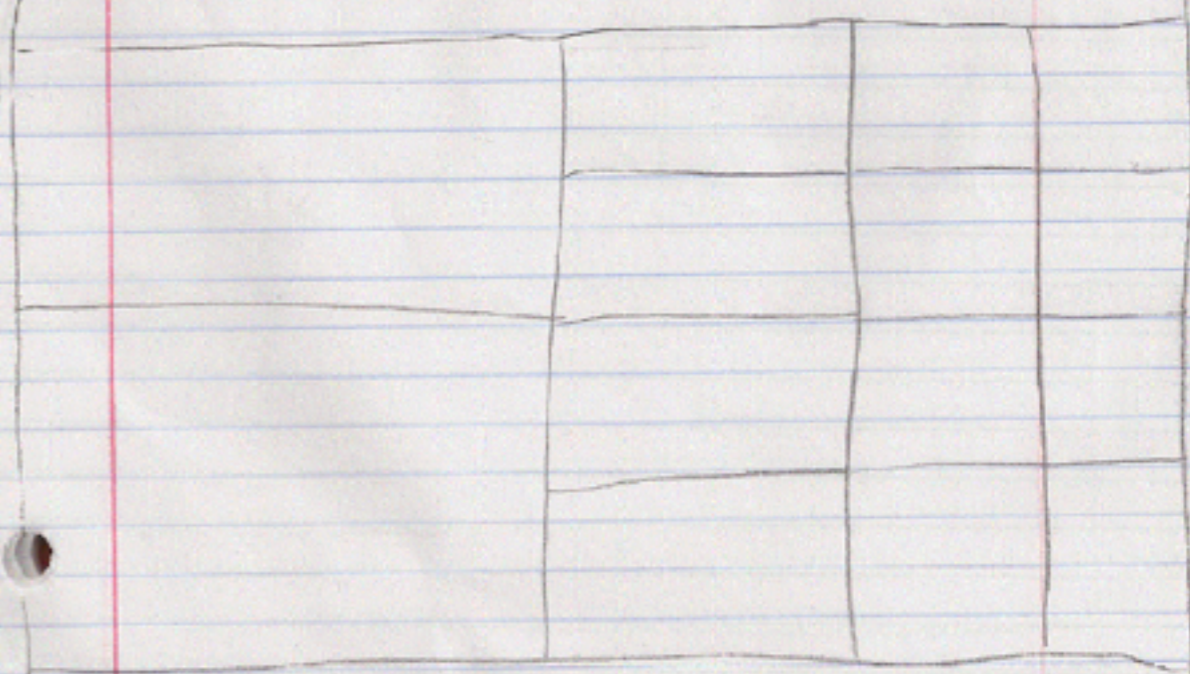
- Zoom in & out
- Articles sorted by time
- Could have just pictures

UID Wireframe

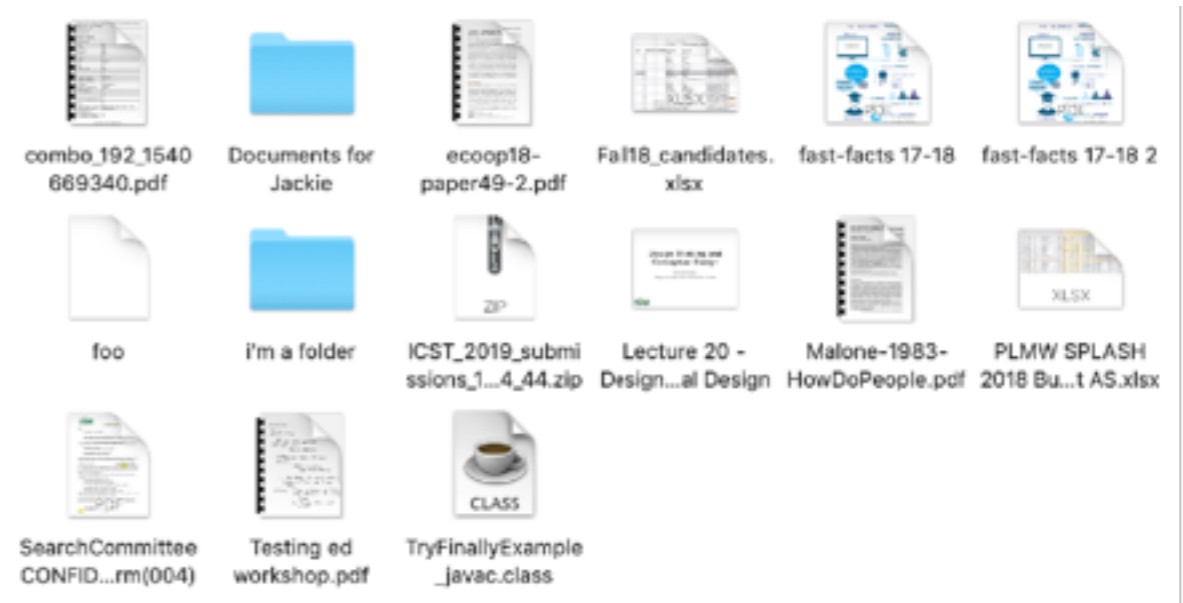
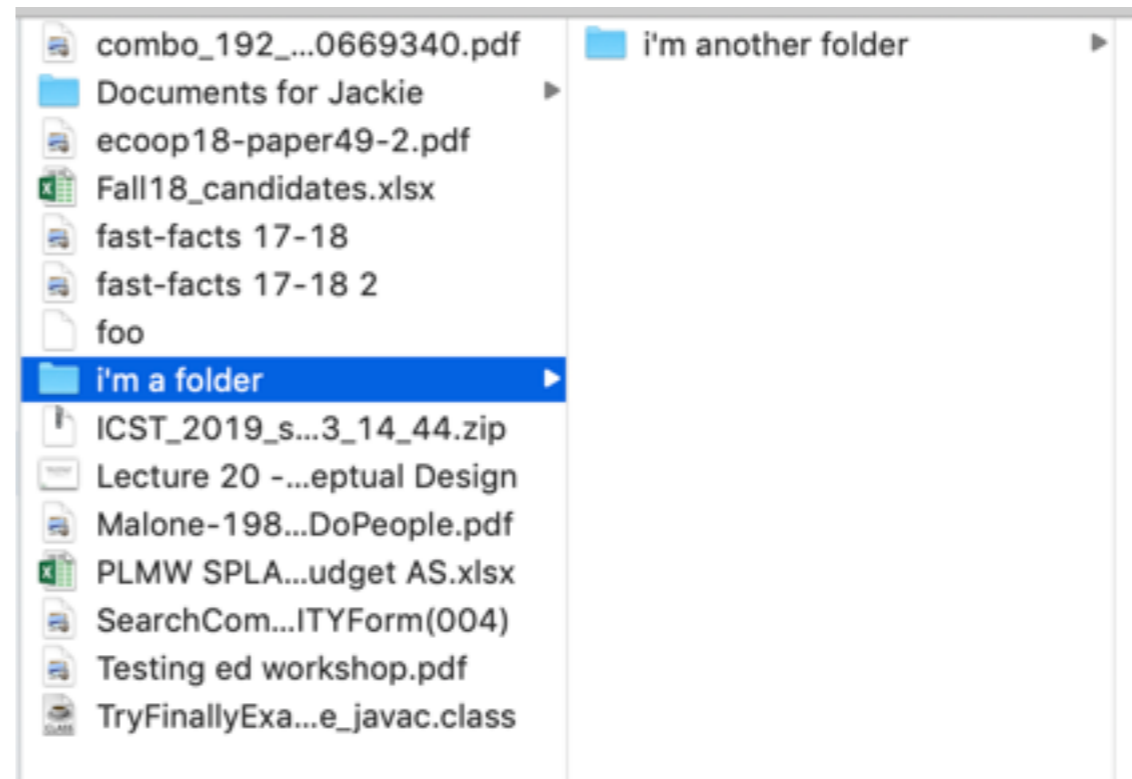
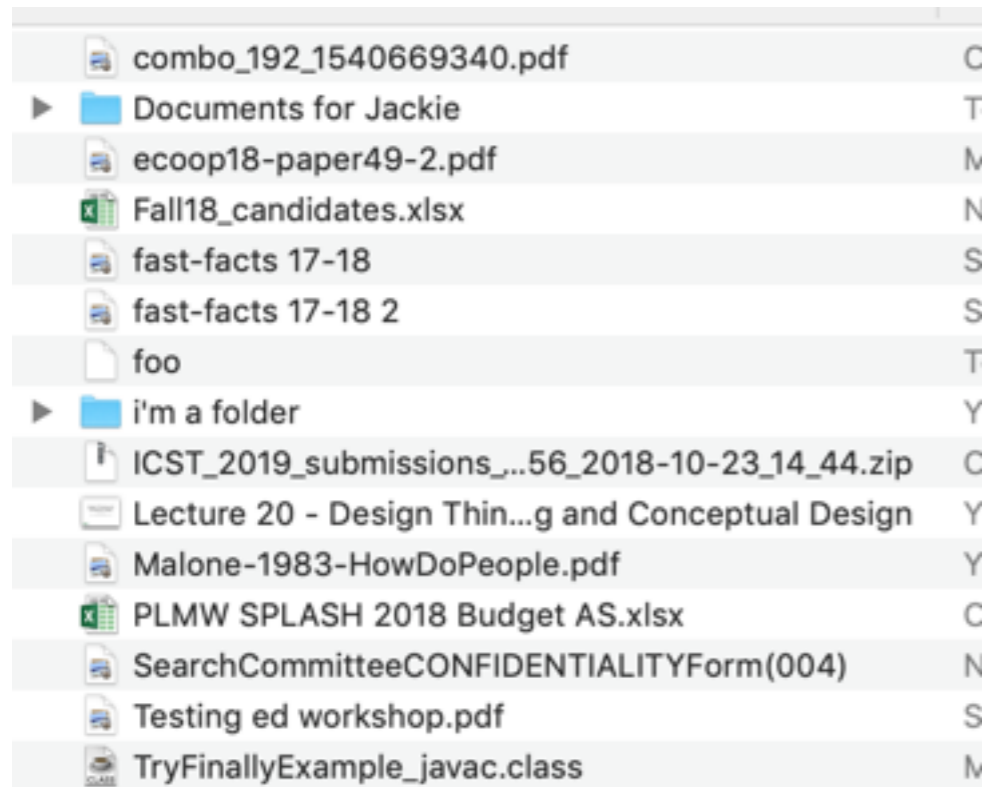


- Even boxes?
- Different size boxes with same format every time?

FLEXible News



Exploring Design Space with Sketching



Interviews

- May include both current users and potential users w/ related needs
- Questions
 - context of how product fits into lives or work
 - when, why, how is or will product be used
 - what do users need to know to do jobs?
 - current tasks and activities, including those not currently supported
 - goals and motivations of using product
 - problems and frustrations with current products or systems

Observations

- Most incapable of accurately assessing own behaviors
- May avoid talking about problems to avoid feeling dumb
- Observing yields more accurate data
- Capture behaviors: notes, pictures, video (if possible)

Design Thinking Case Study - Piles

- The context: Apple Computer, 1992, 3 researchers (Richard Mander, Gitta Salomon and Yin Yin Wang)
- The design problem: How should computers help users organize and file information?
- The method: How do users organize and file information best *without* computers?

Computer users are confronted with large amounts of information, but **currently are only provided with a hierarchical filing system for managing it [folders]**.

Wizard of Oz

- Goal: **simulate** actual system w/ out building it
 - Want user to interact **as if** they were interacting w/ real system
 - Helps explore how users would interact w/ novel interaction if it were to exist
- Example: natural command line (Good et al 1984)
 - Users typed in commands to interact w/ computer
 - Commands intercepted by hidden human who interpreted commands & executed them

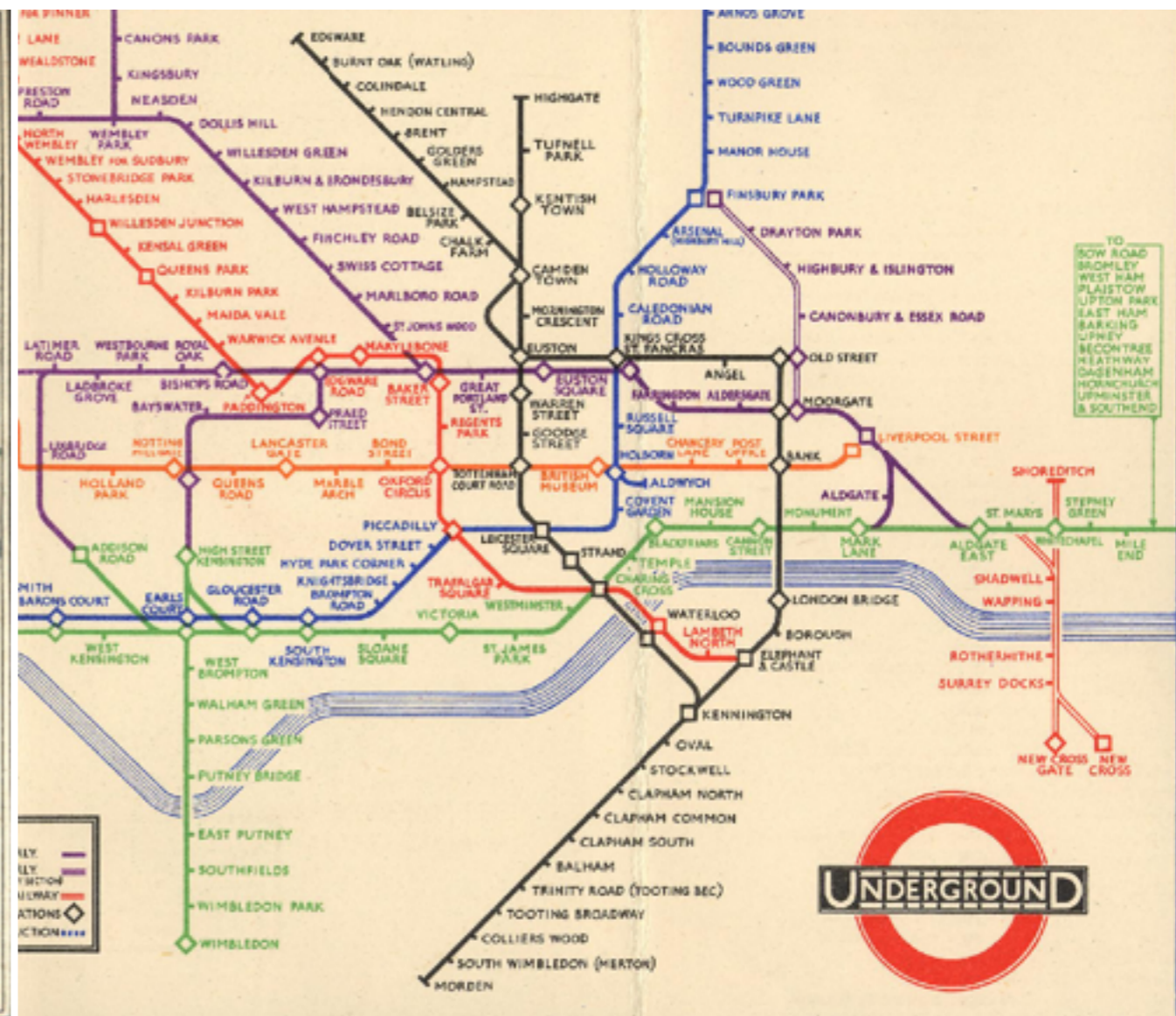
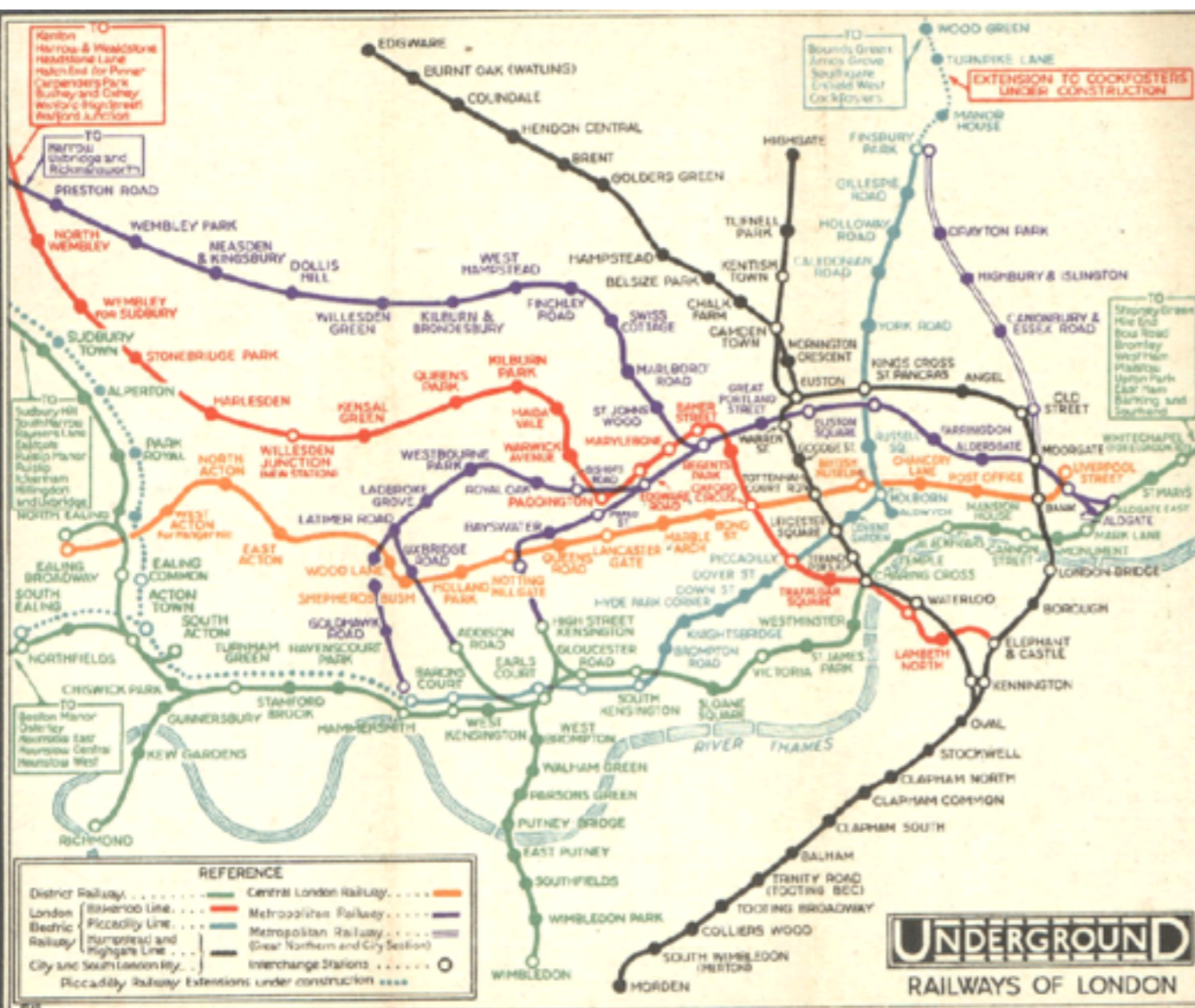
Advantages of prototyping

- Offers concrete baseline for communication between users & designers
- Provides conversation “prop” to communicate concepts
- Allows user to “take design for a spin”
- Give project visibility & buy-in with customers
- Encourage early user participation and involvement
- Give impression that design is easy to change
- Afford designers immediate observation of user performance & consequences of design decisions

Disadvantages of Lo-Fi Prototypes

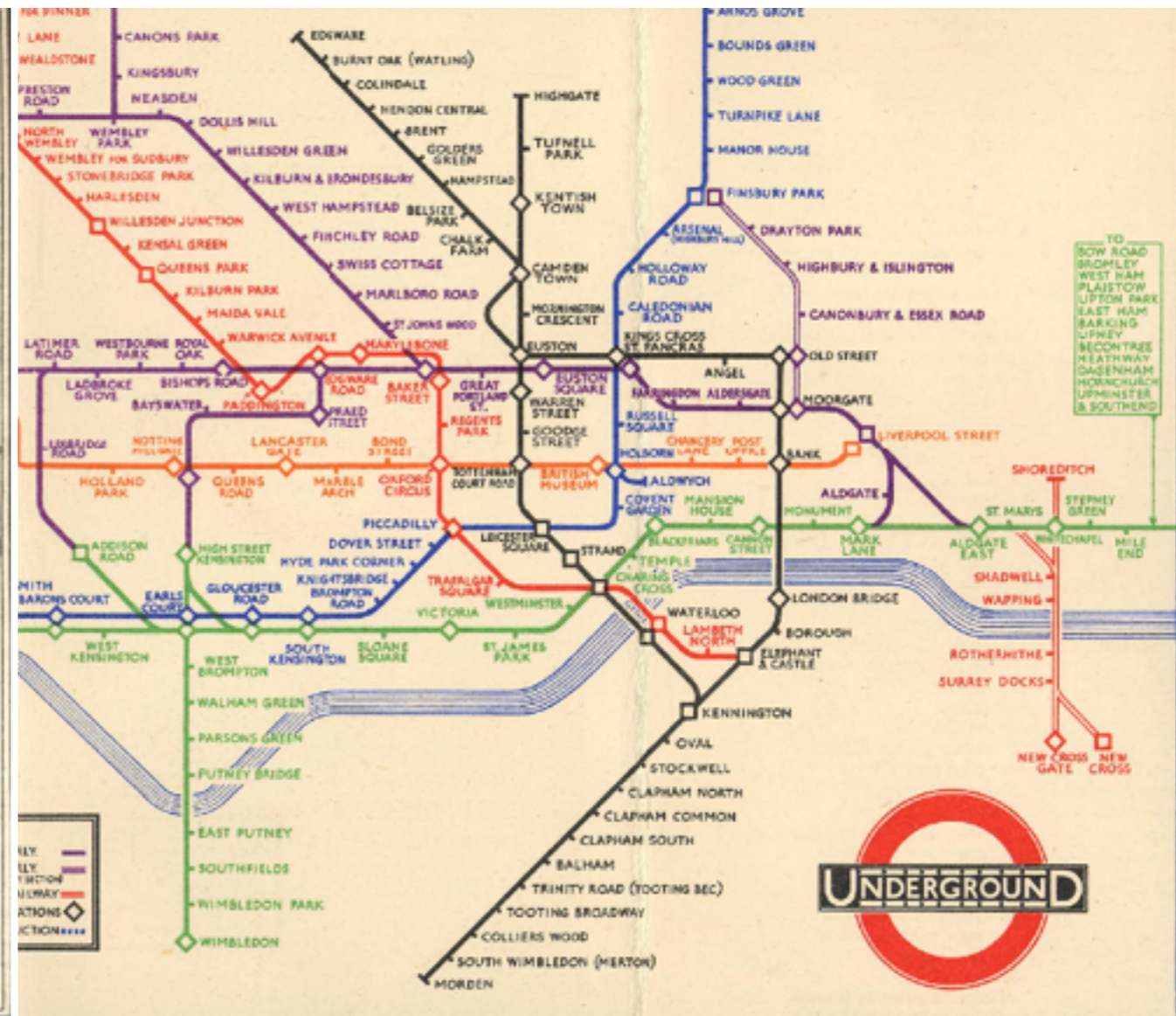
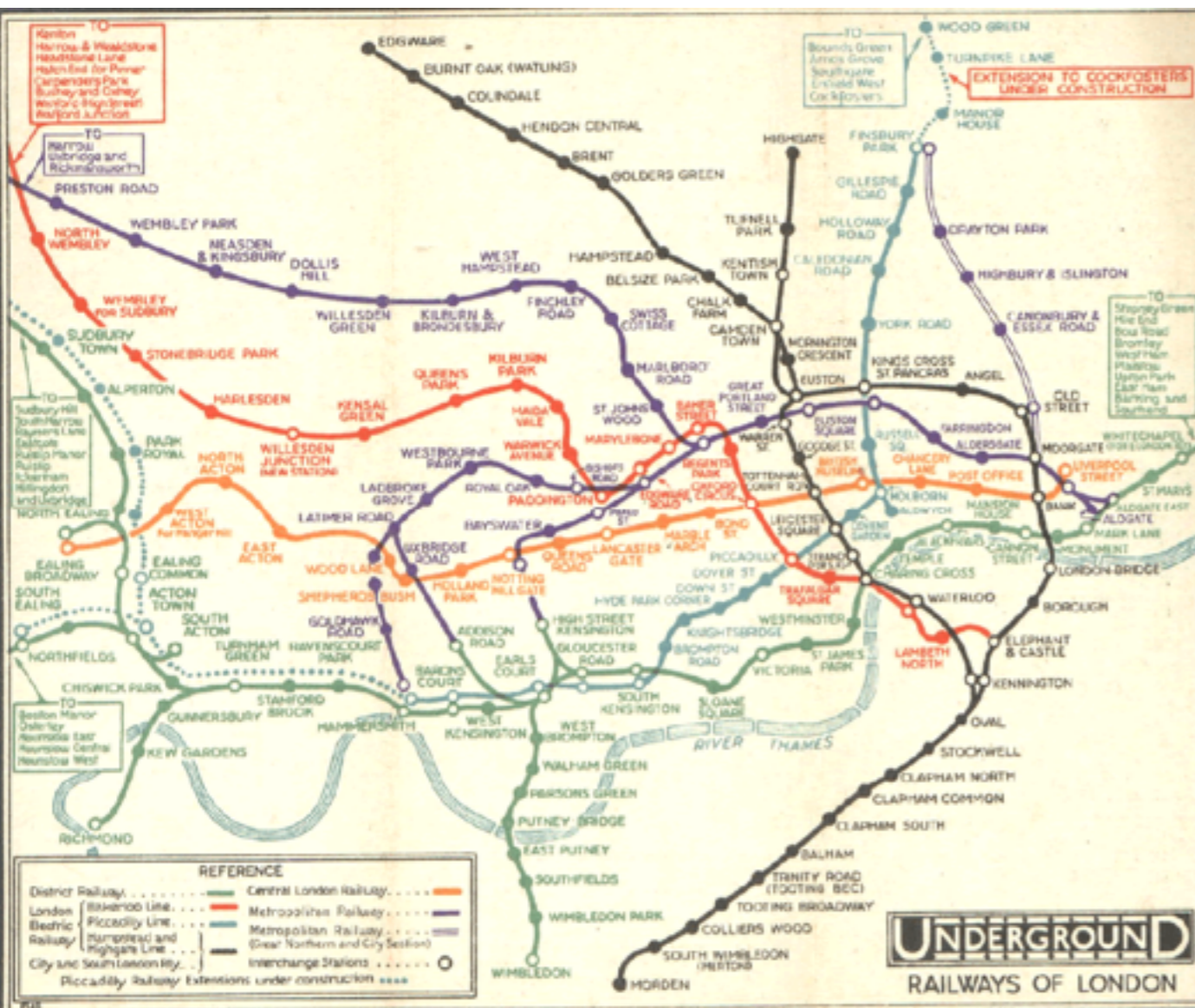
- Very rough appearance - can't be used to find detailed layout/design issues
- Does not reflect the actual speed of your system (and responsiveness)
- Human computer's logic may be difficult to capture in code
- Limited scenarios

Guidelines for Visual Design



Reduction in new map: relative distances don't matter

Guidelines for Visual Design



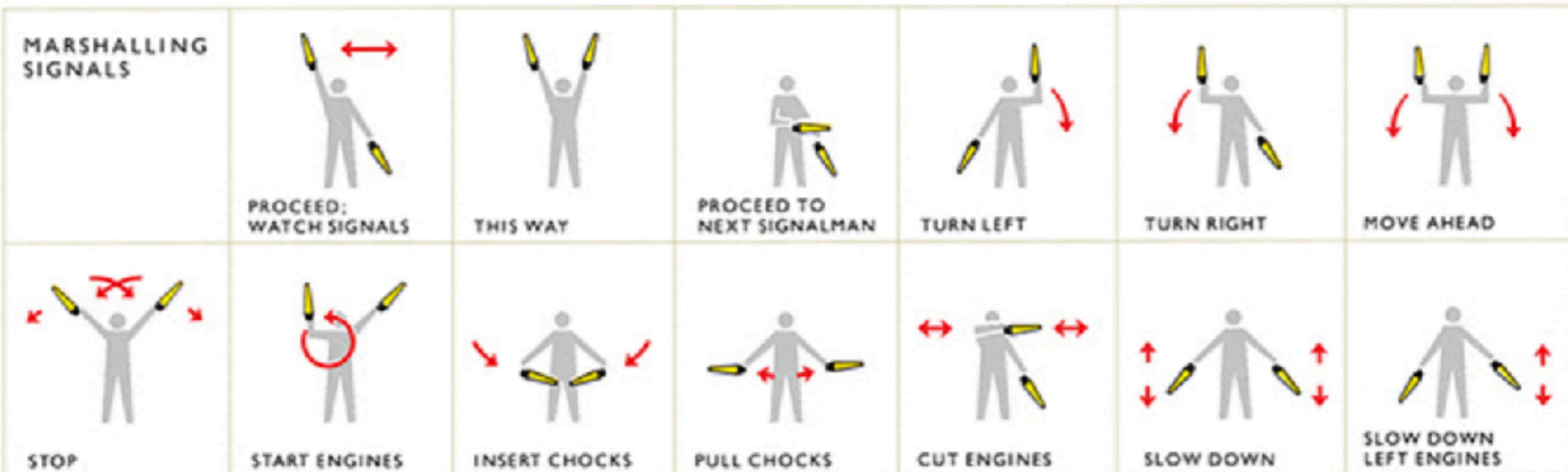
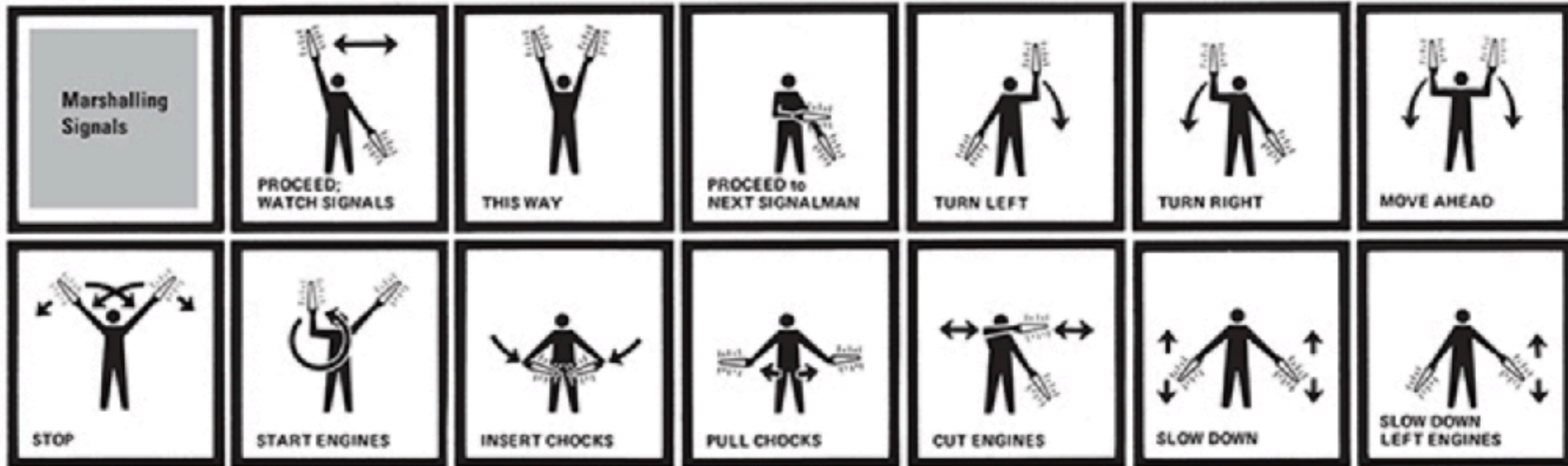
Regularization in new map: Straight lines result in station names laid out in a line, rather than bouncing around

Train Tables: Which is Better?

Train No.	3701	3301	3801	A 67	3 3803	3 3201	A3 51	3 3703	3 3807	3 3203	A3 61	3 3809	A3 47	3 3901	3 3811	3 3903	3 3813	3205	3815	3817	3819	3207	3821	3823	3825	3209	3827	3829	3831
New York, N.Y.	A.M. 12.10	A.M. 12.40	A.M. 1.30	A.M. 3.52	A.M. 4.50	A.M. 6.10	A.M. 6.25	A.M. 6.35	A.M. 6.50	A.M. 7.10	A.M. 7.30	A.M. 7.33	A.M. 7.45	A.M. 7.50	A.M. 8.05	A.M. 8.25	A.M. 8.40	A.M. 8.50	A.M. 9.10	A.M. 9.40	A.M. 10.10	A.M. 10.25	A.M. 10.40	A.M. 11.10	A.M. 11.40	A.M. 11.50	P.M. 12.10	P.M. 12.40	P.M. 1.10
Newark, N.J. P	12.24	12.55	1.44	4.07	5.04	6.24	6.38	6.49	7.04	7.24	7.45	7.47	7.59	8.04	8.19	8.39	8.54	9.04	9.24	9.54	10.24	10.39	10.54	11.24	11.54	12.04	12.24	12.54	1.24
North Elizabeth	.....	.....	.....	.....	.....	.....	.....	.....	.....	7.30	.....	.....	.....	8.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Elizabeth	12.31	1.03	1.51	.....	5.11	6.31	.....	6.56	7.11	7.32	.....	7.54	.....	8.13	8.26	8.46	9.01	9.11	9.31	10.01	10.31	10.46	11.01	11.31	12.01	12.11	12.31	1.01	1.31
Linden	12.36	.....	1.56	.....	5.16	6.36	.....	7.01	7.15	7.37	.....	7.59	.....	8.18	8.31	8.51	9.06	.....	9.36	10.06	10.36	.....	11.06	11.36	12.06	.....	12.36	1.06	1.36
North Rahway	.....	.....	.....	.....	.....	.....	.....	7.03	.....	7.39	.....	.....	.....	8.20	8.33	8.54	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rahway	12.40	1.11	2.00	.....	5.20	6.40	.....	7.06	7.20	7.42	.....	8.03	.....	8.24	8.36	8.57	9.10	9.18	9.40	10.10	10.40	10.53	11.10	11.40	12.10	12.18	12.40	1.10	1.40
Metro Park (Iselin)	12.44	.....	2.04	4.26	5.24	.....	6.56	7.10	7.25	.....	8.04	8.07	8.15	.....	8.40	.....	9.14	.....	9.44	10.14	10.44	.....	11.14	11.44	12.14	.....	12.44	1.14	1.44
Metuchen	12.48	.....	2.08	.....	5.28	.....	.....	7.14	7.29	.....	.....	8.11	.....	.....	8.44	.....	9.18	.....	9.48	10.18	10.48	.....	11.18	11.48	12.18	.....	12.48	1.18	1.48
Edison	12.51	.....	2.11	.....	.....	.....	.....	7.17	7.32	.....	.....	8.14	.....	.....	8.47	.....	9.21	.....	.....	10.21	.....	.....	11.21	.....	12.21	.....	.....	1.21	.....
New Brunswick	12.55	.....	2.15	.....	5.35	.....	7.05	7.21	7.35	.....	.....	8.18	8.25	.....	8.50	.....	9.25	.....	9.54	10.25	10.54	.....	11.25	11.54	12.25	.....	12.54	1.25	1.54
Jersey Avenue	1.02	.....	2.18	.....	.....	.....	.....	7.28	.....	.....	.....	8.21	.....	.....	.....	.....	9.28	.....	.....	10.28	.....	.....	11.28	.....	12.28	.....	.....	1.28	.....
Princeton Jct. S	.....	.....	2.31	.....	5.50	.....	7.19	.....	7.50	.....	.....	8.34	8.41	.....	9.05	.....	9.41	.....	10.09	10.41	11.09	.....	11.41	12.09	12.41	.....	1.09	1.41	2.09
Trenton, N.J.	.....	.....	2.42	4.58	6.03	.....	7.28	.....	8.01	.....	8.31	8.44	8.52	.....	9.16	.....	9.52	.....	10.16	10.52	11.19	.....	11.52	12.19	12.52	.....	1.22	1.52	2.20

	am																											
New York, NY	12.10	12.40	1.30	3.52	4.50	6.10	6.25	6.35	6.50	7.10	7.30	7.33	7.45	7.50	8.05	8.25	8.40	8.50	9.10	9.40	10.10	10.25	10.40	11.10	11.40			
Newark, NJ ^P	12.24	12.55	1.44	4.07	5.04	6.24	6.38	6.49	7.04	7.24	7.45	7.47	7.59	8.04	8.19	8.39	8.54	9.04	9.24	9.54	10.24	10.39	10.54	11.24	11.54			
North Elizabeth										7.30				8.10														
Elizabeth	12.31	1.03	1.51		5.11	6.31		6.56	7.11	7.32		7.54		8.13	8.26	8.46	9.01	9.11	9.31	10.01	10.31	10.46	11.01	11.31	12.01			
Linden	12.36		1.56		5.16	6.36		7.01	7.15	7.37		7.59		8.18	8.31	8.51	9.06		9.36	10.06	10.36		11.06	11.36	12.06			
North Rahway								7.03		7.39				8.20	8.33	8.54												
Rahway	12.40	1.11	2.00		5.20	6.40		7.06	7.20	7.42		8.03		8.24	8.36	8.57	9.10	9.18	9.40	10.10	10.40	10.53	11.10	11.40	12.10			
Metro Park (Iselin)	12.44		2.04	4.26	5.24		6.56	7.10	7.25		8.04	8.07	8.15		8.40		9.14		9.44	10.14	10.44		11.14	11.44	12.14			
Metuchen	12.48		2.08		5.28			7.14	7.29			8.11			8.44		9.18		9.48	10.18	10.48		11.18	11.48	12.18			
Edison	12.51		2.11					7.17	7.32			8.14			8.47		9.21			10.21			11.21		12.21			
New Brunswick	12.55		2.15		5.35		7.05	7.21	7.35			8.18	8.25		8.50		9.25		9.54	10.25	10.54		11.25	11.54	12.25			
Jersey Avenue	1.02		2.18					7.28				8.21					9.28			10.28			11.28		12.28			
Princeton Junction ^S			2.31		5.50		7.19		7.50			8.34	8.41		9.05		9.41		10.09	10.41	11.09		11.41	12.09	12.41			
Trenton, NJ			2.42	4.58	6.03		7.28		8.01		8.31	8.44	8.52		9.16		9.52		10.19	10.52	11.19		11.52	12.19	12.52			
TRAIN NUMBER	3701	3301	3801	67	3803	3201	51	3703	3807	3203	61	3809	47	3901	3811	3903	3813	3205	3815	3817	3819	3207	3821	3823	3825			
NOTES		XM		→	3	3	→3	3	3	3	→3	3	→3	3	3	3	3											

Layers

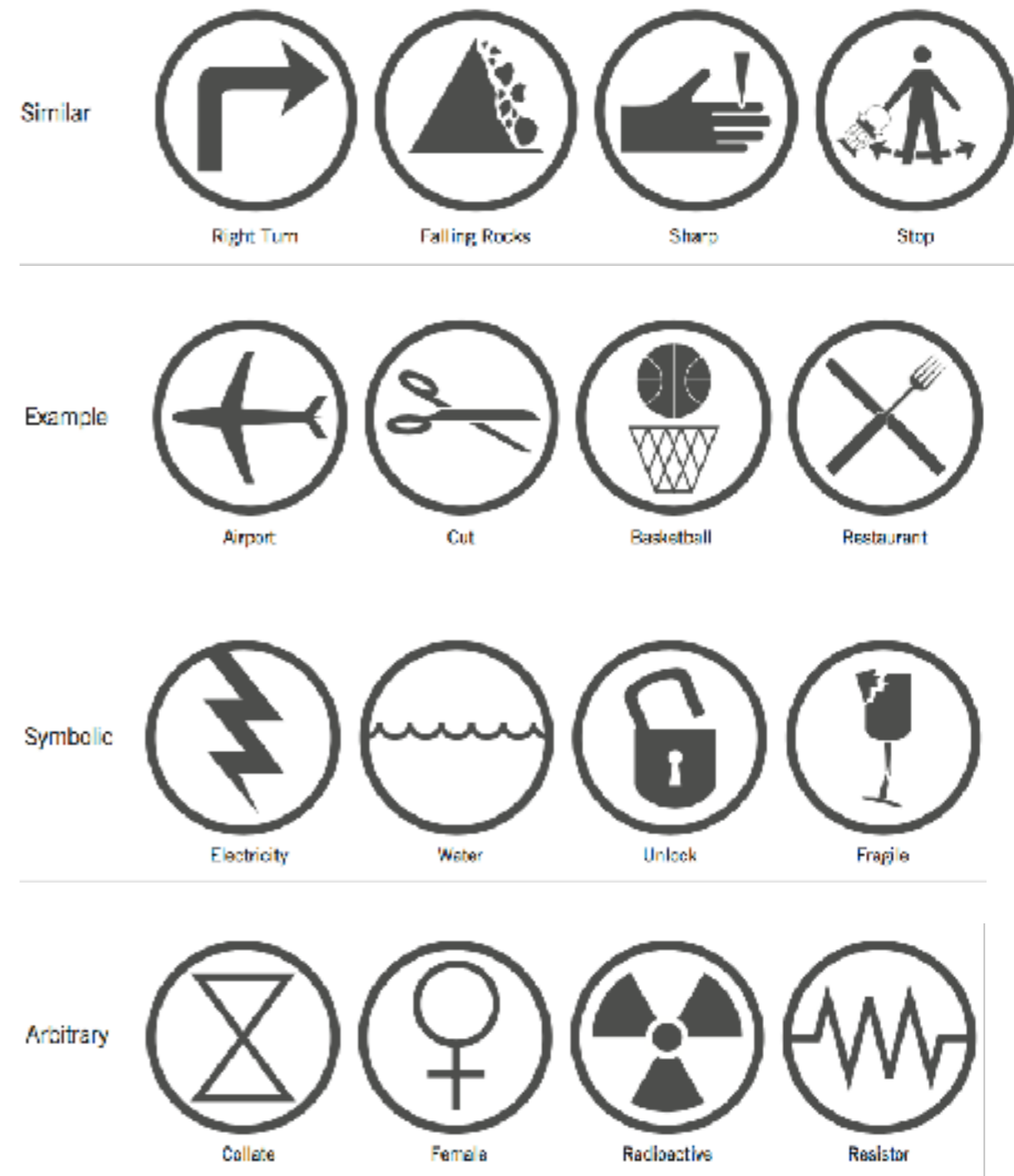


Organization & structure

- Organization needs to be **designed**
- Benefits
 - Unity - ties together related elements so that they work **together**
 - Integrity & readability - offers structure that helps user to easily scan & make comparisons
 - Control - determines where user will focus **attention** in the design
- Gestalt -> psychology of perception

Types of iconic representation

- Similar - visually **analogous** to action, object, concept
- Example - things that exemplify or are commonly associated
- Symbolic - represent concept at higher level of **abstraction**
- Arbitrary - little or no relationship to concept, must be learned through **standard**

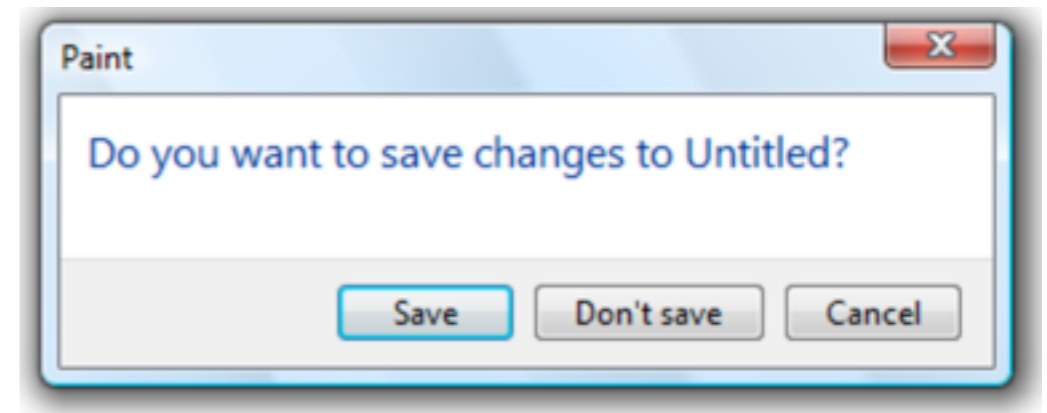
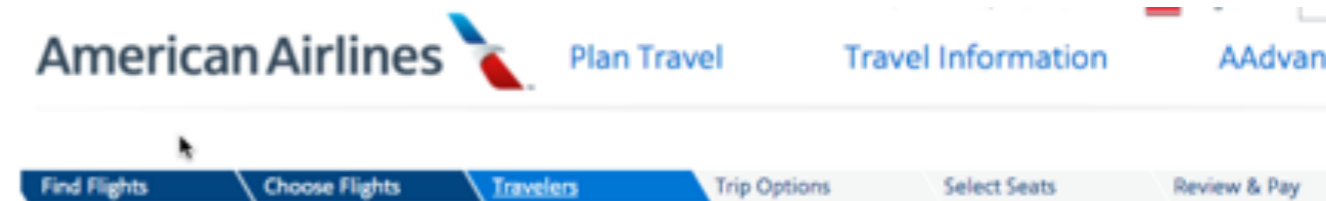


Site Design vs Real World

- Challenges (differences from physical world):
 - No spatial sense of scale. 50 pages? 500 pages? 50,000 pages?
 - No sense of direction. Which way did I just go?
 - No sense of location. No spatial anchoring of where I am now and how that relates to where I could go.

Effective planning

- Help users plan most efficient ways to complete tasks
- Keep users aware of task progress, what has been done and what is left to do
- Provide constraints to avoid transaction completion slips
 - e.g., prevent users from starting task and accidentally throwing away work mid-task



Metaphors - disadvantages

- Tyranny of metaphor: ties interactions closely to workings of physical world
- Adds useless overhead in extra steps, wastes visual bandwidth
- Taken literally, becomes non-sensical
 - e.g., nesting folders 10 levels deep



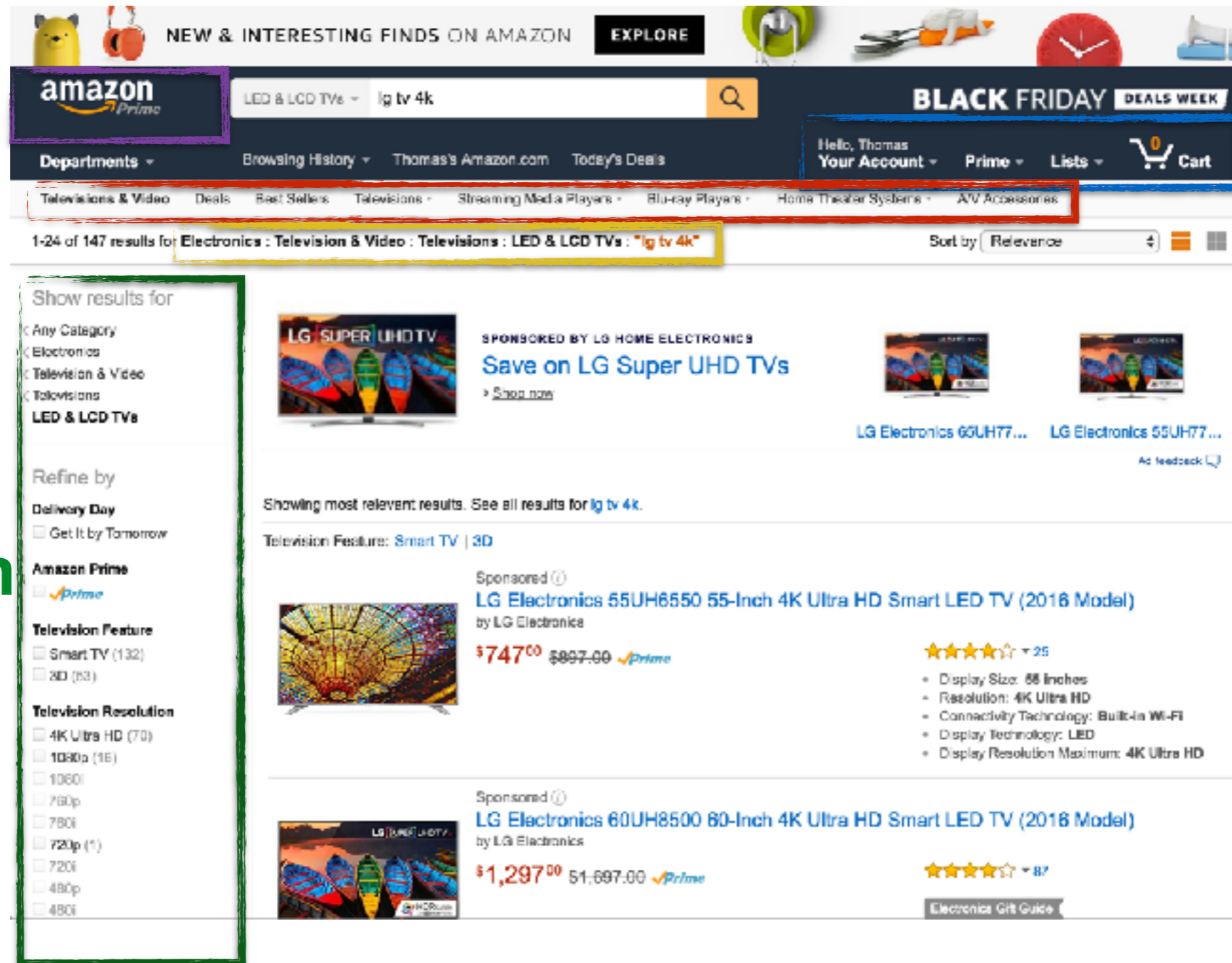
Web navigation conventions

Site ID

You are here

Local navigation

Footer navigation



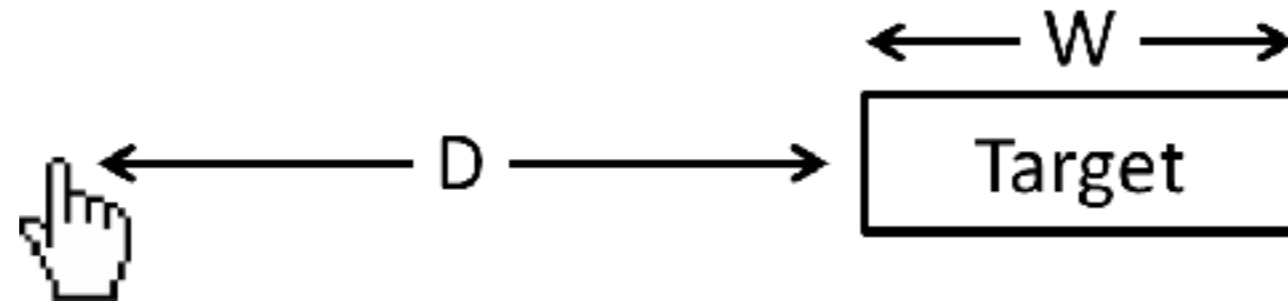
Utilities
Sections

...

Steps in a usability evaluation study

- Formulate **goals** of study
- Design study protocol, tasks, materials, data collection, ...
 - Pilot study design
- **Conduct** study
- **Analyze** data to assess task performance and identify usability issues

Review: Fitt's law



- Time required to move to a target **decreases** with target **size** & **increases** with **distance** to the target
- Movements typical consist of
 - one large quick movement to target (**ballistic** movement)
 - fine-adjustment movement (**homing** movements)
- Homing movements generally responsible for most of movement time & errors
- Applies to rapid pointing movements, not slow continuous movements

Review: Design Details - Marking Menus

Principle

Maintain visual context

Hide unnecessary information

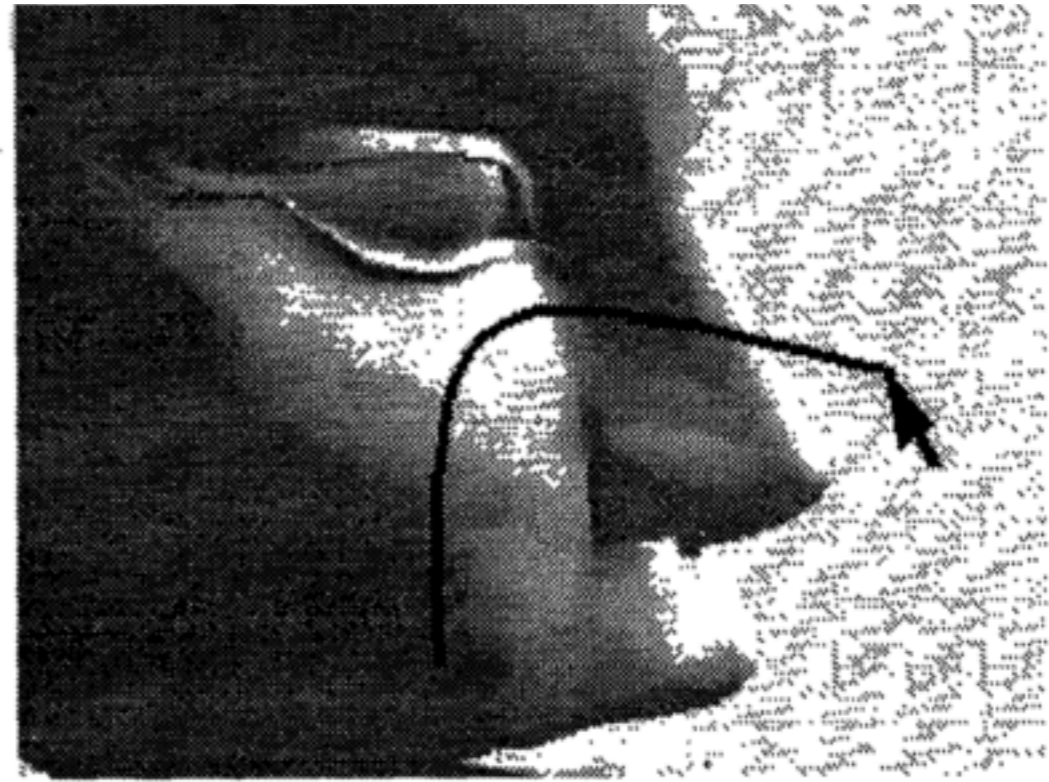
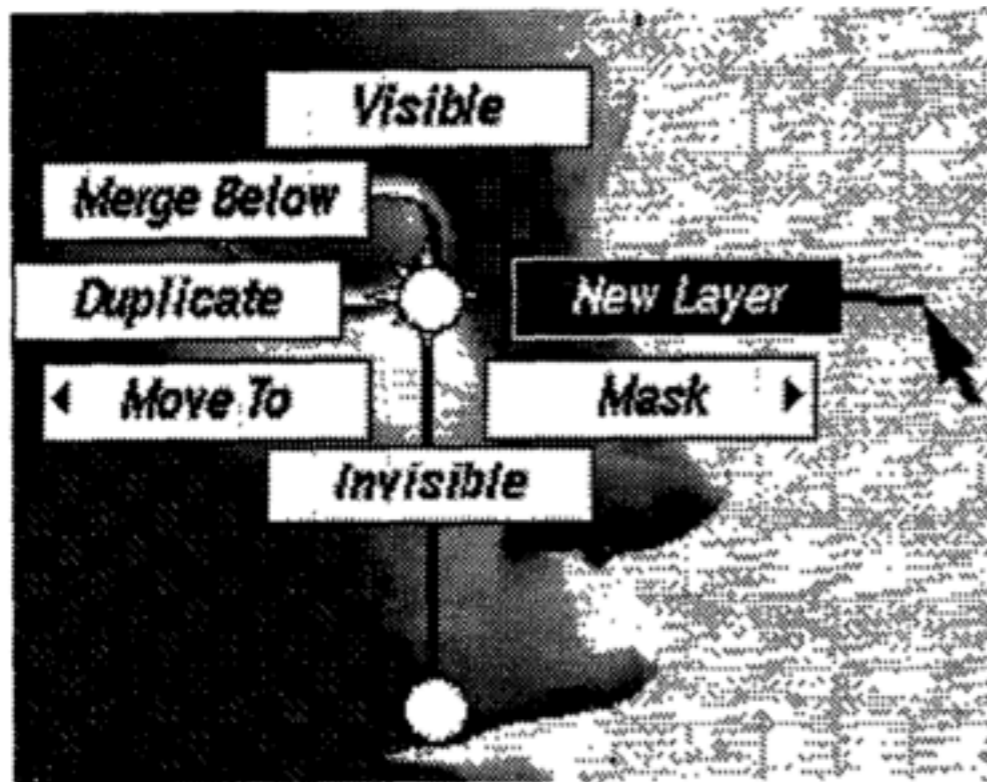
Support skill development using graphical feedback

Refinement

Display only labels
Ignore pie wedges
Make labels symmetric

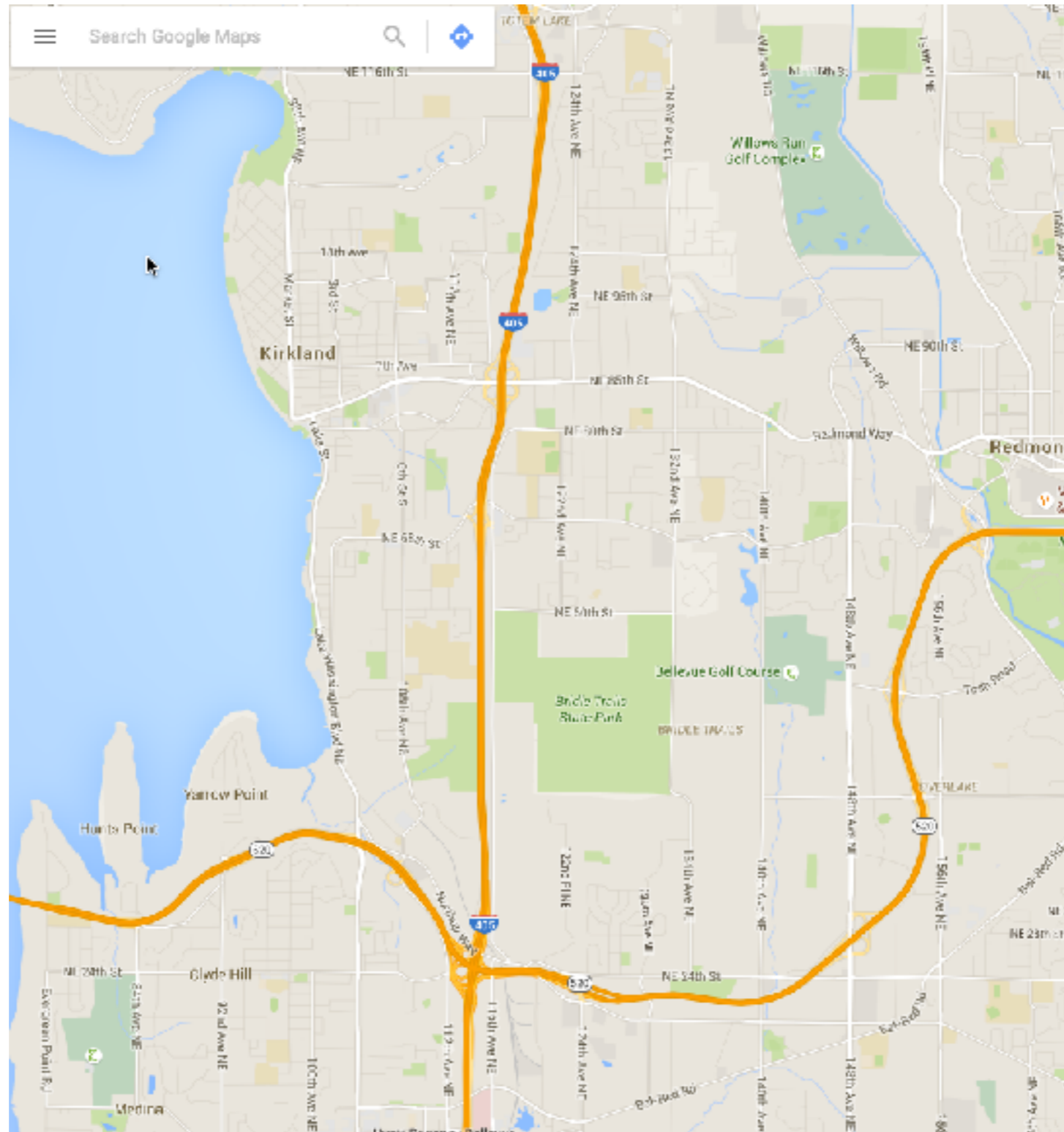
Hide parent menus

Use eight item menus
Use compass star around menu center
Show idealized marks



Tapia & Kurtenbach '95

Review: Direct Manipulation

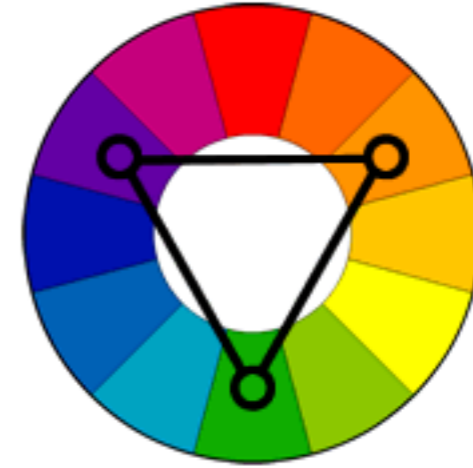


Color combinations

- Analogous color combinations - adjacent in color wheel
- Triadic color combinations - at corner of



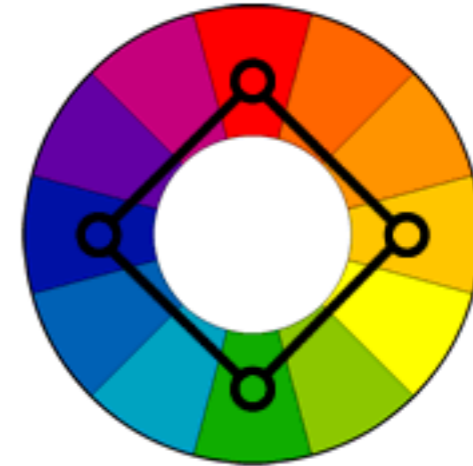
Analogous
Serene, harmonious



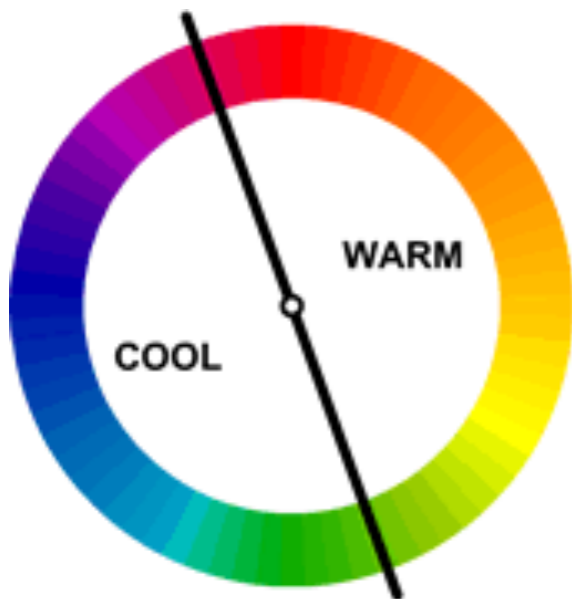
Triadic
Vibrant



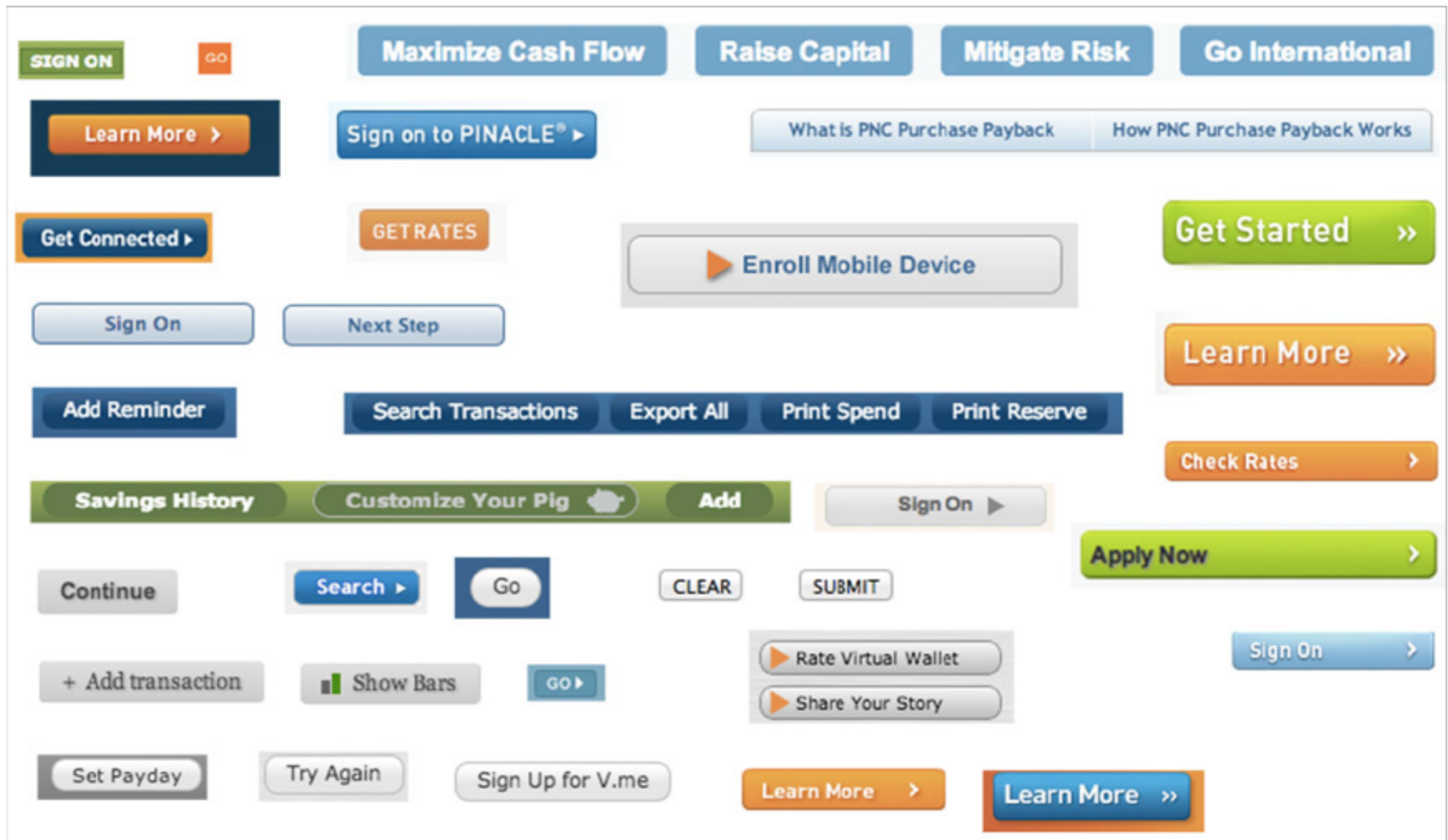
Complementary
High contrast, vibrant



Quadratic
Two sets of complementary



Design Languages - Counter Example



Why it matters

- Users will have idioms they expect to see, particularly if suggested by other related elements
- Branding: Users will see your website and have particular associations based on what it exemplifies



Next Steps

- Interested in deploying your React app online?
 - GitHub pages is a relatively easy free choice: <https://codeburst.io/deploy-react-to-github-pages-to-create-an-amazing-website-42d8b09cd4d>
- Interested in learning more web development?
 - Check out React tutorials: <https://reactjs.org>
- Interested in getting a job?
 - Update your resume with all of the great new marketable skills you have, like: React, NoSQL, Firebase, NodeJS, CSS, Event-oriented programming, JSON, Devops, User-centered design, prototyping
- Interested in learning more, generally?
 - Stay for an MS? **It is FREE AND you get a stipend if you TA (and if you do it full time you can likely do it in 2 semesters).**
- Interested in advanced topics?
 - Research opportunities available at all levels for credit and for \$\$\$