CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 01:
Introduction and
Personal Informatics

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

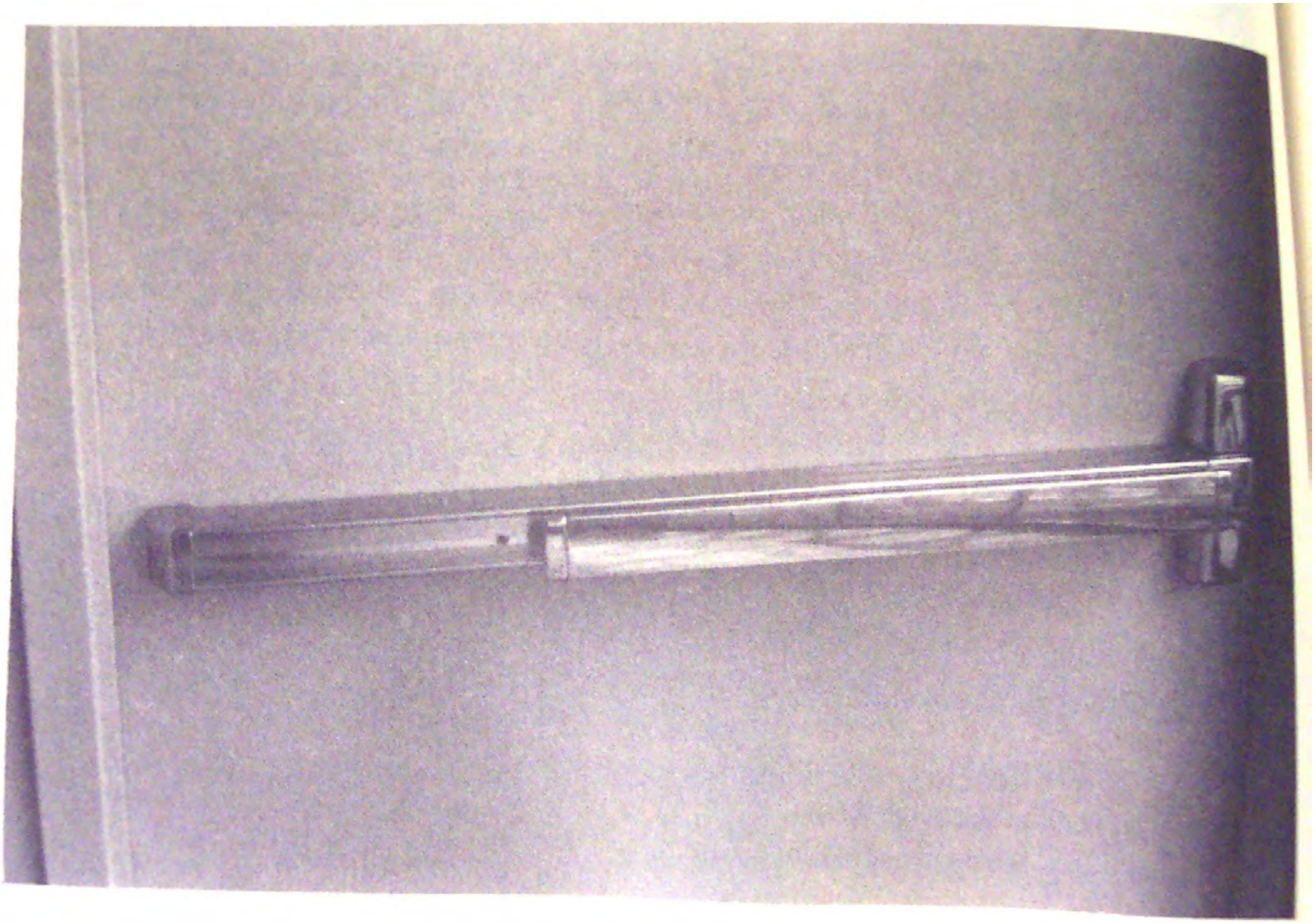
Tuesday/Thursday
10:30 to 11:50
MOR 234

dub design: use: build:

University of Washington

Door Quiz

Door Quiz



Door Quiz

Door Quiz

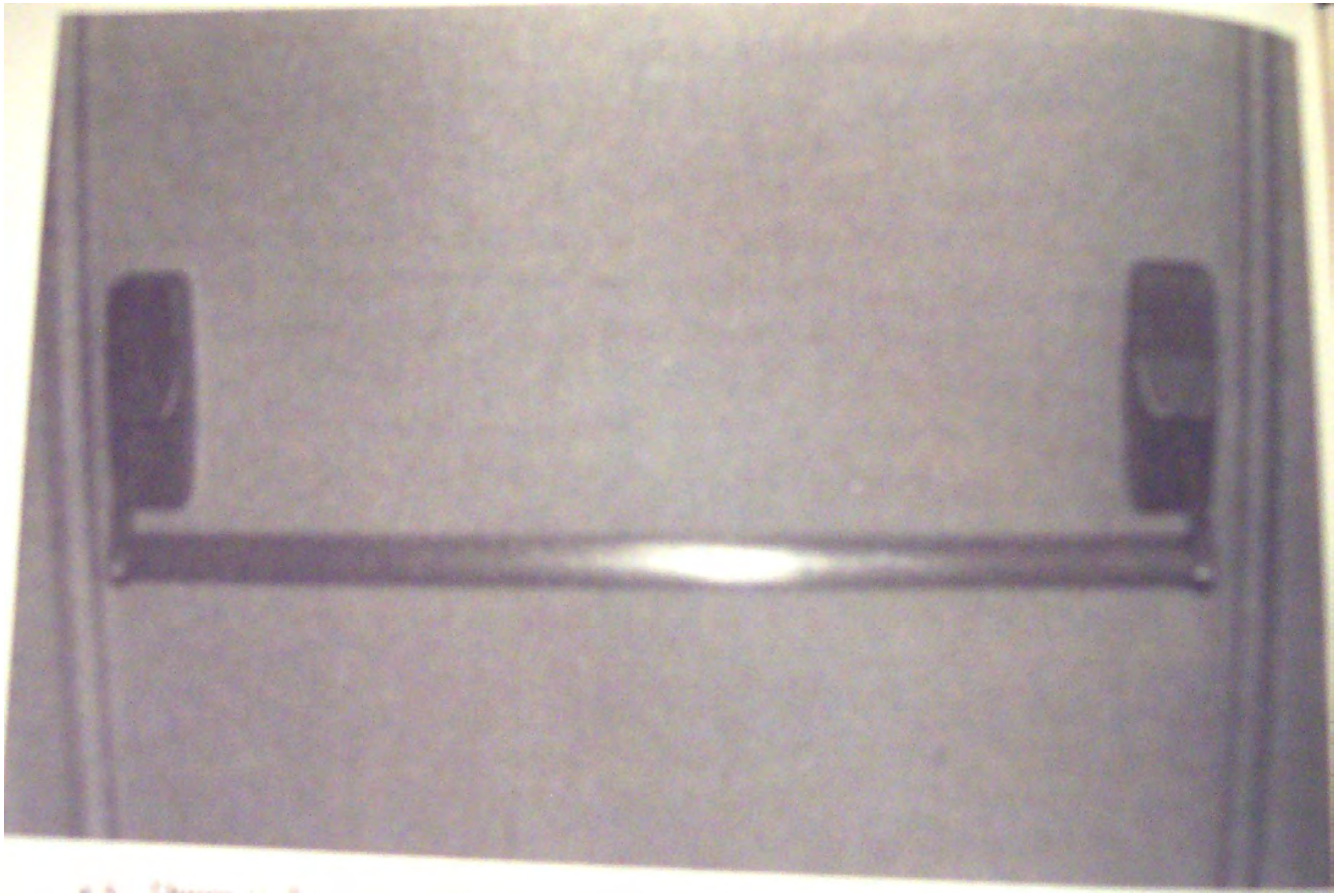
Door Quiz

Door Quiz

Door Quiz


PUSH
You can HAVE IT YOUR WAY® and pull if you want, but this hinge is pretty stubborn.
BURGER KING
AMERICAN EXPRESS
Pull
BURGER KING

Door Quiz

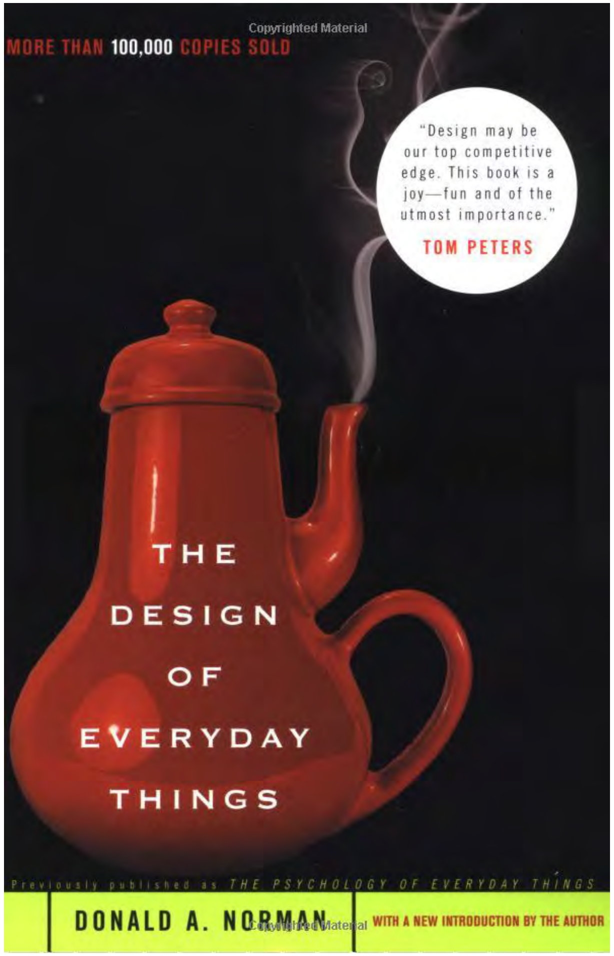


Door Quiz

What is so Special about Computers?

Nothing! It is about good designs and bad designs

- We all make push/pull decisions many times per day
- We all encounter doors that do this badly
- We all see signs that do not change what we do



What is so Special about Computers?

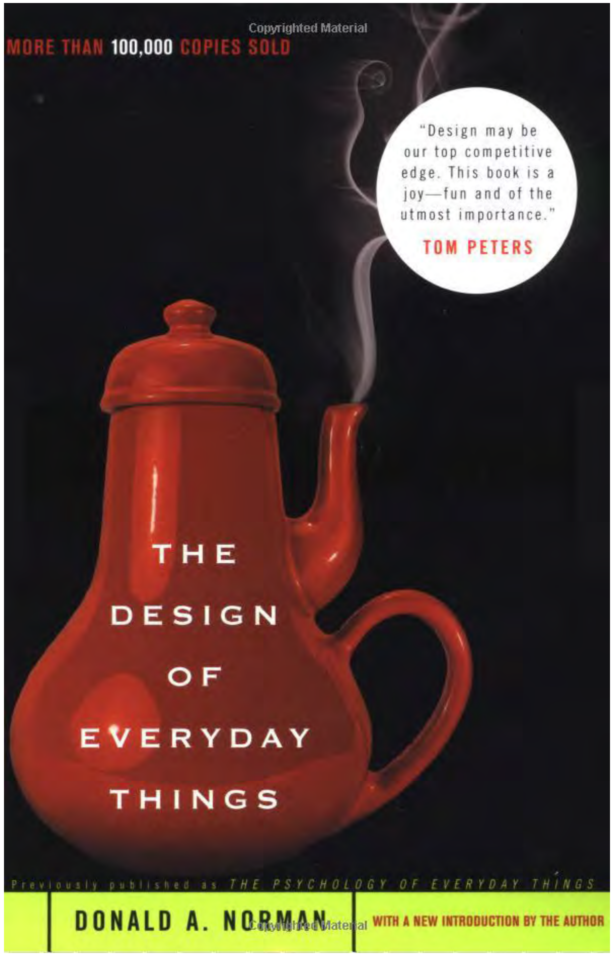
Yet we blame ourselves

Absolutely everything we encounter in the made world was designed

- Too often poorly designed

Read this book

- Be warned you cannot unread it, you become angry



Iterative Human-Centered Design

This is a course about process

This is not a course about ‘good’ interfaces
or rules that you should follow in design

Rapid iteration and exploration is the most
important and effective tool for effective design

A Whole Lot of Administrivia

Today we have a lot to cover

- Course Mechanics and Project Overview
- Some Perspectives
- Assignment 1: Project Proposal

Background in Personal Informatics

GitHub Repository

The website, assignments, and other materials are being run from a GitHub repository

https://github.com/uwcse440/web-cse440-au14

You will contribute when posting your projects

You can and should contribute when you see the opportunity

Project Overview

The core of this course is a group project

Propose and do an intense end-to-end design

- Getting the Right Design
- Getting the Design Right
- Communicating the Design

Not an implementation course

StoneSoup

dub University of Washington

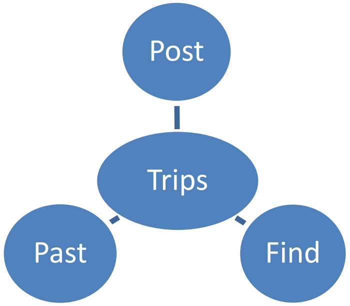
Contextual Inquiry & Task Analysis

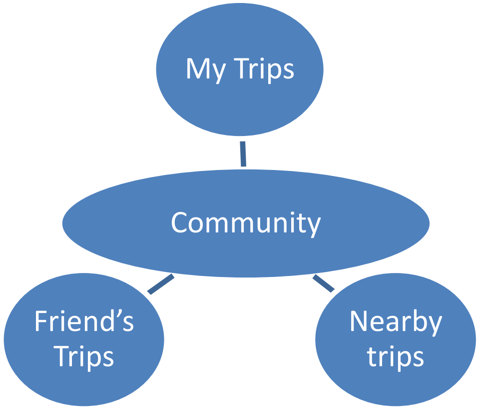
Observe practices and understand needs

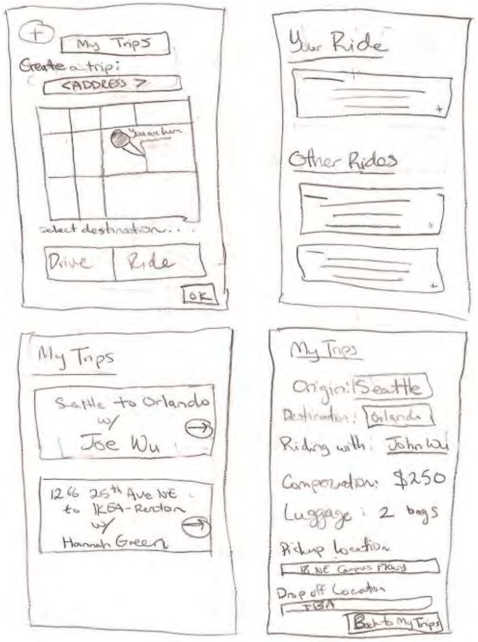
Consumester

FoodWatch

Sketching & Storyboarding

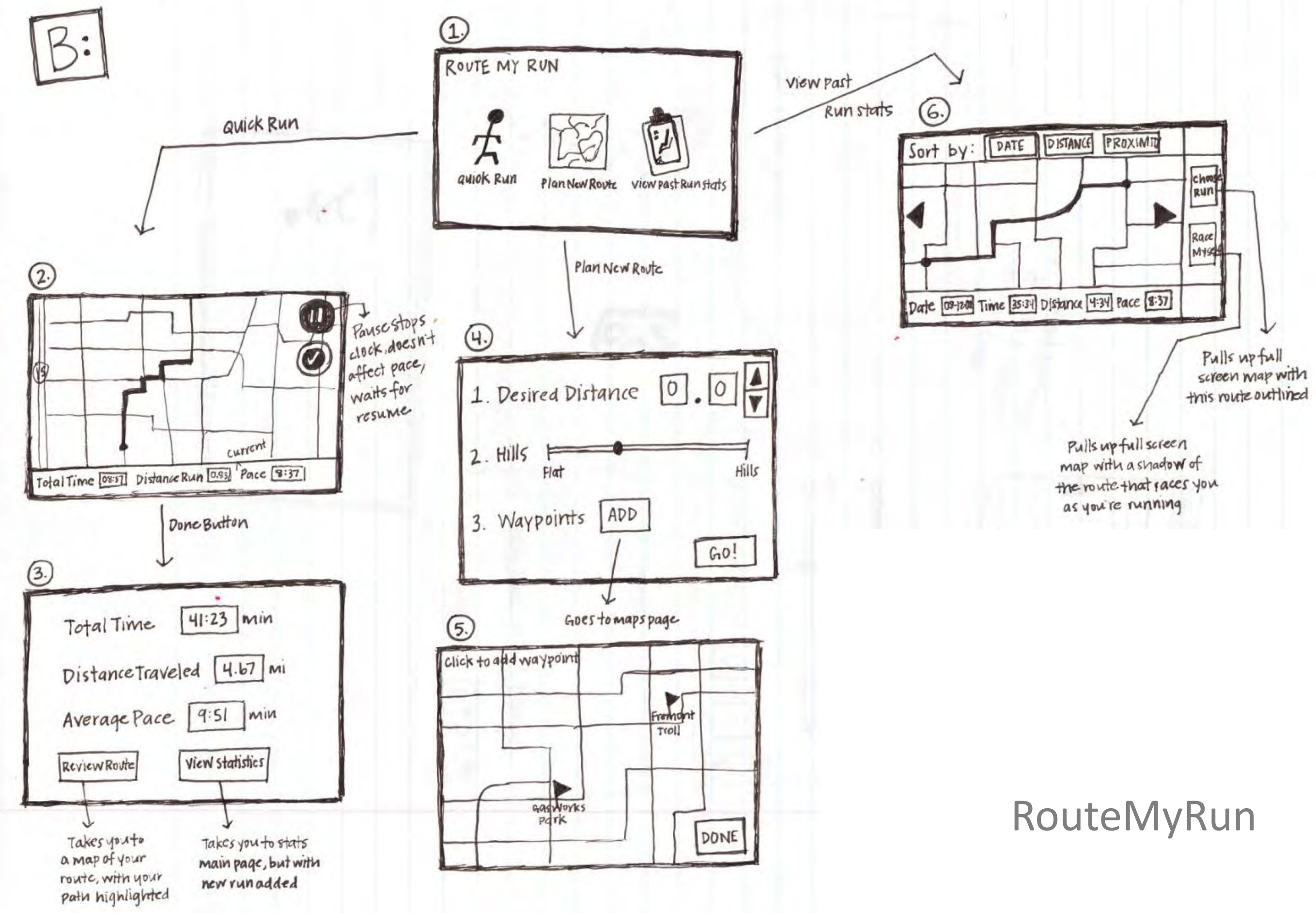






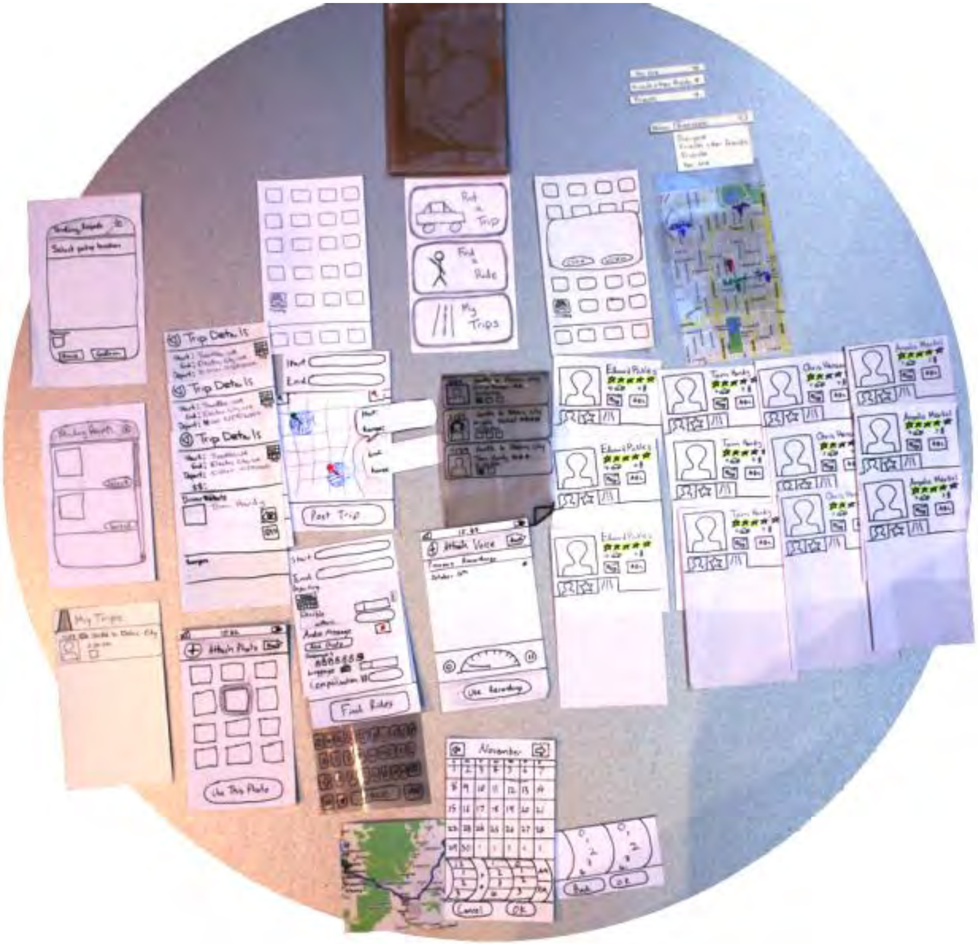
RideAlong

Sketching & Storyboarding



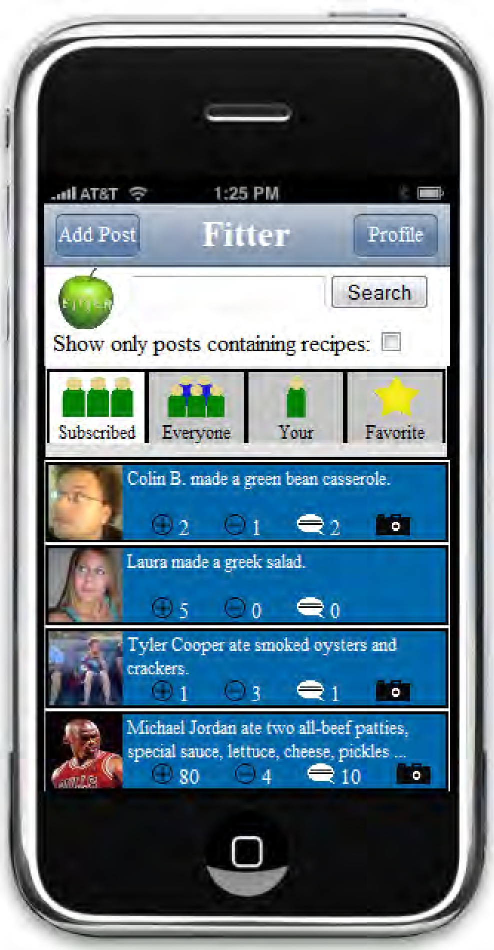
RouteMyRun

Low-Fidelity Prototyping & Testing



RideAlong

Digital Mockup



Show only posts containing recipes: ☐

Colin B. made a green bean casserole. ⊕ 2 ⊖ 1 2

Laura made a greek salad. ⊕ 5 ⊖ 0 0

Tyler Cooper ate smoked oysters and crackers. ⊕ 1 ⊖ 3 1

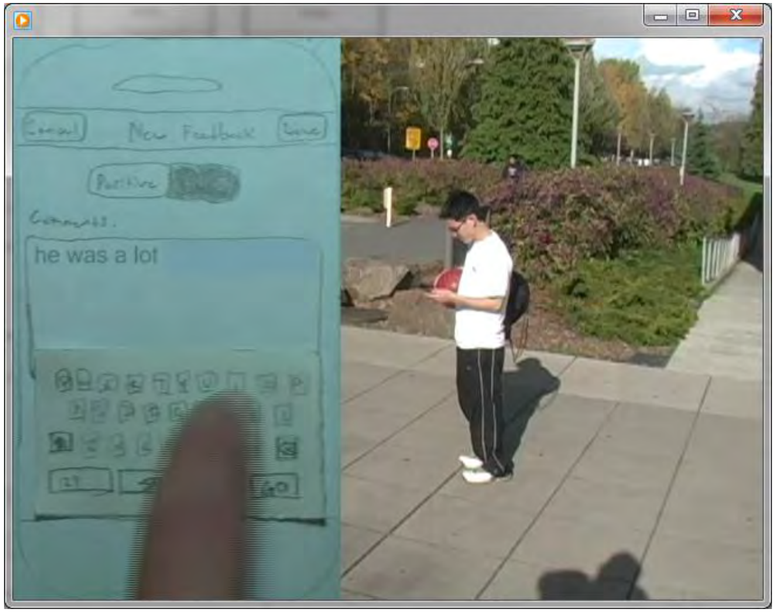
Michael Jordan ate two all-beef patties, special sauce, lettuce, cheese, pickles ... ⊕ 80 ⊖ 4 10

Fitter

.calm

Video Prototypes

GetOut



he was a lot

PickUp

“Now” vs “When You Need It” Content

This course has both, we will try to distinguish

Several assigned readings will be posted

- Intentionally minimal but critical
- May be on exam
- Small reading report required

Additional resources will be made available

- If you find others you want to share, GitHub!

Some Reflection

- This will not be an easy course
  - Students have said this was their most intense course
  - You have two deadlines per week, every week
  - But I believe in everything that is included

- This course challenges aspects of what the CSE curriculum has taught you is important
  - It will be what you make it

Background in Personal Informatics

Some Definitions

What is the Point?

What is the Problem?

QUANTIFIED SELF

YOU ARE JUST A NUMBER

Can you make yourself healthier and happier by logging every snore, step and mood swing? As a Californian trend for obsessional data-tracking makes its way over here, **Tim Chester** covers his body in gadgets to find out if self-knowledge is power. Photograph by Paul Stuart

Today I have climbed the equivalent of a tall giraffe. Coffee is my most frequent food. On average, I walk 11,726 steps a day, burning 3,089 calories, over 2.4 hours of activity. I sleep for 6 hours and 9 minutes a night. This week, my sleep efficiency is 72% and my food is 77% healthy. My BMI of 23.5 is 14 percentage points below the median for men my age, and my average daily Met score is 1.71, although I have no idea what a Met score is.

I am, it seems, nothing more than a bundle of numbers and milestones, spurred on by LEDs and chided by pop-up messages. A wireless accessory for the iPhone: perhaps its most sophisticated yet.

My arms are covered in bands, my pockets augmented with accelerometers, my eyes numb from all the charts, my heart pumping to the beat of a heart-rate monitor and forcing its ventricles to keep up with the national average. My head is about to implode from all the positive affirmation and gentle nudging, but it's OK because my memories are being saved to my hard drive and my mood swings are earning me "hugs" from strangers.

I am producing, analysing and socially sharing personal data. I am becoming fitter, happier, and more productive. I am staying motivated by earning badges. I have become a Quantified Self (QS).

The QS movement that I've temporarily joined began, as these things tend to do, in San Francisco's Bay Area in 2007. Two Wired magazine editors, Gary Wolf and Kevin »

Chester, T. (2013). *The Sunday Times.*
"You Are Just a Number"

What is Personal Informatics

"We define personal informatics systems as those that help people collect personally relevant information for the purpose of self-reflection and gaining self-knowledge. There are two core aspects to every personal informatics system: collection and reflection."

Li I., Dey A., Forlizzi J. *CHI 2010.*
"A Stage-Based Model of Personal Informatics Systems"

What is Quantified Self

“The Quantified Self is an international collaboration of users and makers of self-tracking tools.”

“Our aim is to help people get meaning out of their personal data.”

“Self knowledge through numbers.”

Wolf G. (2009). *Wired Magazine.*
“Know Thyself: Tracking Every Facet of Life, from Sleep to Mood to Pain, 24/7/365”

What is the Point?

Gnothi seauton

“Know thyself”

Leonardo da Vinci

Leonardo da Vinci

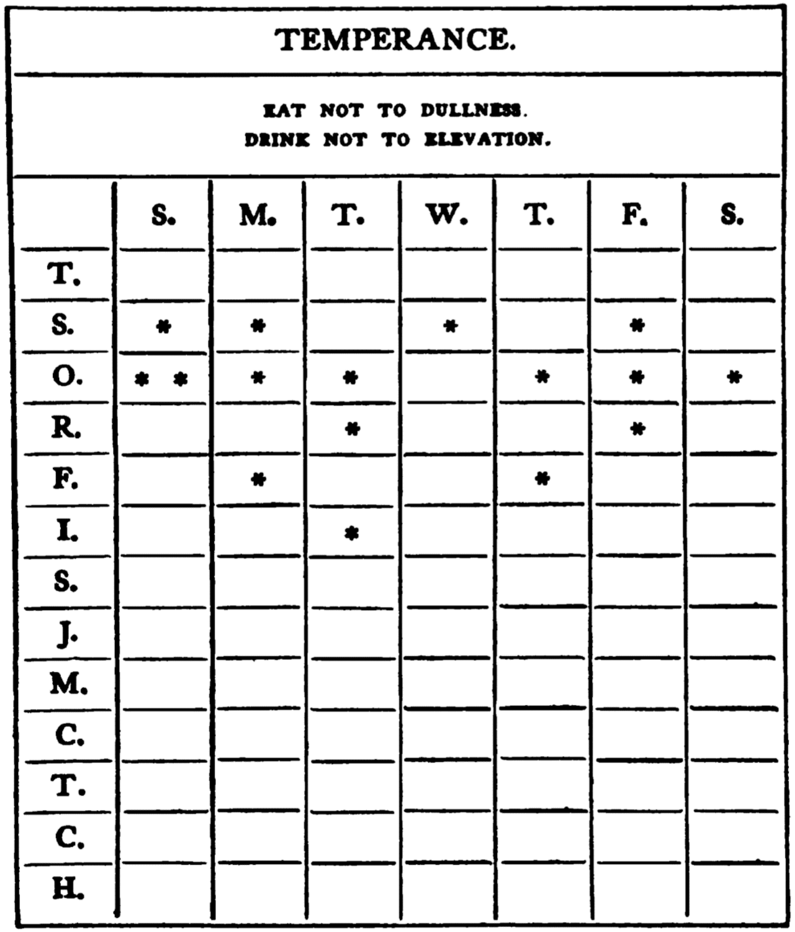
- Odometers on the left
- Pedometer on the right

To track troop activities

Benjamin Franklin

Temperance
Silence
Order
Resolution
Frugality
Industry
Sincerity
Justice
Moderation
Cleanliness
Tranquility
Chastity
Humility

Benjamin Franklin



TEMPERANCE.

EAT NOT TO DULLNESS.
DRINK NOT TO ELEVATION.

	S.	M.	T.	W.	T.	F.	S.
T.							
S.	*	*		*		*	
O.	* *	*	*		*	*	*
R.			*			*	
F.		*			*		
I.			*				
S.							
J.							
M.							
C.							
T.							
C.							
H.							

Manpokei

交通巡査
11260歩＝6.7㌔（8時間）

[redacted]さん（20）＝東京・有楽町のビヤホール　客席は約五百　大体三十人前後でサービスに当る　満員になれば　ちょっと立止る暇もない

ビヤホールのウエートレス
12550歩＝5.5㌔（8時間）

[redacted]さん（22）＝東京―大阪の幹線を二往復　タバコや飲み物のサービスで機内を動き回る　乗客は少なく楽だったという

エアホステス
9000歩＝4.1㌔（6時間半）

万歩計

Thousands of Health Monitoring Apps

Top Paid iPhone Apps

1. Run with Map My Run+ - GPS... Health & Fitness $0.99
2. 7 Minute Workout... Health & Fitness $1.99
3. CARROT Fit - Talking Weight... Health & Fitness $1.99
4. Running for Weight Loss PR... Health & Fitness $3.99
5. Sleep Cycle alarm clock Health & Fitness $0.99
6. Smart Alarm Clock: sleep... Health & Fitness $1.99
7. Map My Ride+ - GPS Cycling,... Health & Fitness $0.99
8. Fitness for women: worko... Health & Fitness $2.99
9. 7 Minute Workout - Quic... Health & Fitness $0.99
10. Map My Fitness+ -... Health & Fitness $0.99
11. Couch- Health & Fit $1.99
13. Fitness Buddy : 1700+ Exercise... Health & Fitness $1.99
14. Tone It Up Health & Fitness $0.99
15. 5K Runner: 0 to 5K run traini... Health & Fitness $2.99
16. Yoga.com Studio: 300 Pos... Health & Fitness $4.99
17. Moves Health & Fitness $2.99
18. Period Tracker Deluxe Health & Fitness $1.99
19. Yoga Studio Health & Fitness $2.99
20. White Noise Health & Fitness $1.99
21. Ultra Fitness Health & Fitness $0.99
22. Sleep Pillow Sounds: white... Health & Fitness $1.99
23. All-in Fi by Sport.co Health & Fit $2.99
25. Instant Heart Rate - Heart Rat... Health & Fitness $1.99
26. Paleo Central Health & Fitness $0.99
27. Calorie Counter PRO b... Health & Fitness $3.99
28. The Wonder Weeks Health & Fitness $2.99
29. Log For P90X3 Workout Health & Fitness $0.99
30. Simply Being - Guided... Health & Fitness $0.99
31. myWOD — All-in-One WOD Lo... Health & Fitness $1.99
32. P90X Health & Fitness $2.99
33. Runtastic PRO GPS Running,... Health & Fitness $4.99
34. Points Calculator for... Health & Fitness $2.99
35. 30 Day Challenges Health & Fit $2.99
37. The Fast Metabolism Die... Health & Fitness $2.99
38. 10K Runner: 0 to 5K to 10K ru... Health & Fitness $3.99
39. Sleep Time+ Alarm Clock an... Health & Fitness $1.99
40. Full Term - Labor... Health & Fitness $0.99
41. Tabata Pro - Tabata Timer Health & Fitness $2.99
42. Diet & Food Tracker -... Health & Fitness $3.99
43. Seconds Pro - Interval Timer Health & Fitness $4.99
44. Sleep Machine Health & Fitness $1.99
45. Relax Melodies... Health & Fitness $2.99
46. 7-Minute Workout (High... Health & Fitness $1.99
47. Ultimate Value Diary Health & Fit $3.99
49. buddhify 2 Health & Fitness $1.99
50. Instant Fitness : 600+... Health & Fitness
51. Sworkit Pro Health & Fitness $0.99
52. Pocket Yoga Health & Fitness $2.99
53. BabyBump Pregnancy Pro... Health & Fitness
54. Situps 0 to 200: Sit Ups... Health & Fitness
55. LIVESTRONG.C... Health & Fitness
56. Insight Timer Deluxe -... Health & Fitness
57. Daily Workouts Health & Fitness
58. Boot Camp Challenge Health & Fitness
59. Pts. Plu Health & Fit $1.99

Activity and Medical Sensing Devices

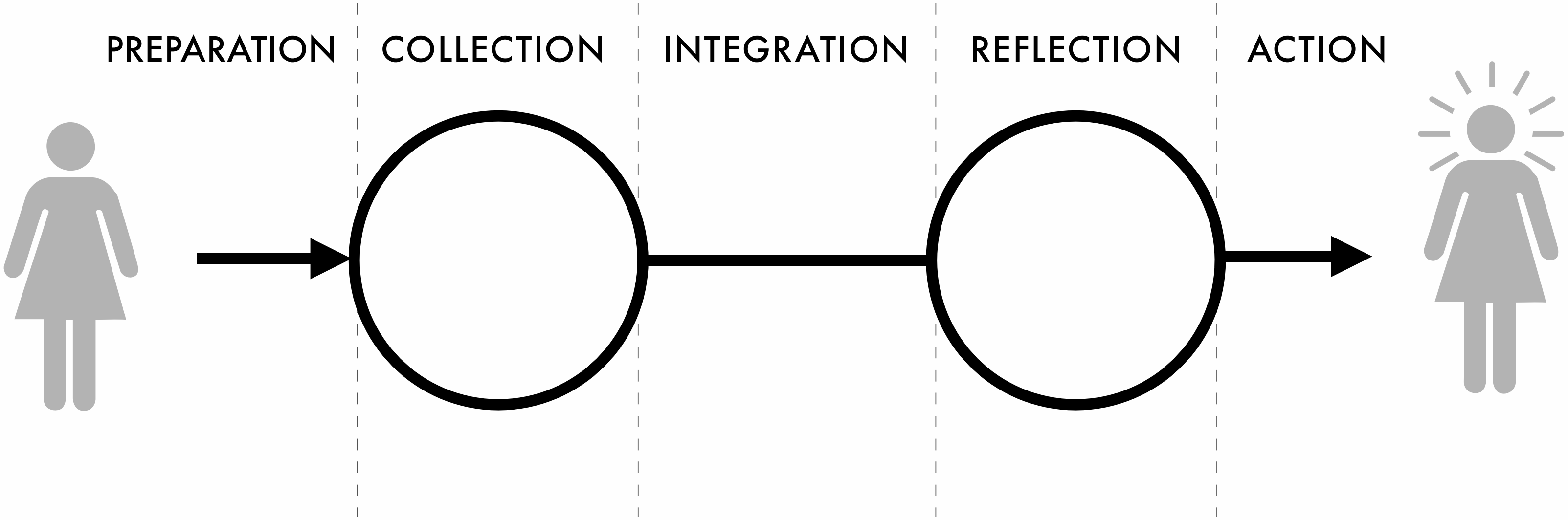
Blood glucose meter

Thermometer

Blood pressure monitor

Heart rate monitor

Five-Stage Model of Personal Informatics



PREPARATION | COLLECTION | INTEGRATION | REFLECTION | ACTION

Li I., Dey A., Forlizzi J. *CHI 2010.*
"A Stage-Based Model of Personal Informatics Systems"

Five-Stage Model of Personal Informatics

Alice

20 years old

Has a family history
of heart disease

Wants to be more active

Does not know how,
because she is busy

Li I., Dey A., Forlizzi J. *CHI 2010.*
"A Stage-Based Model of Personal Informatics Systems"

Preparation

Li I., Dey A., Forlizzi J. *CHI 2010.*
"A Stage-Based Model of Personal Informatics Systems"

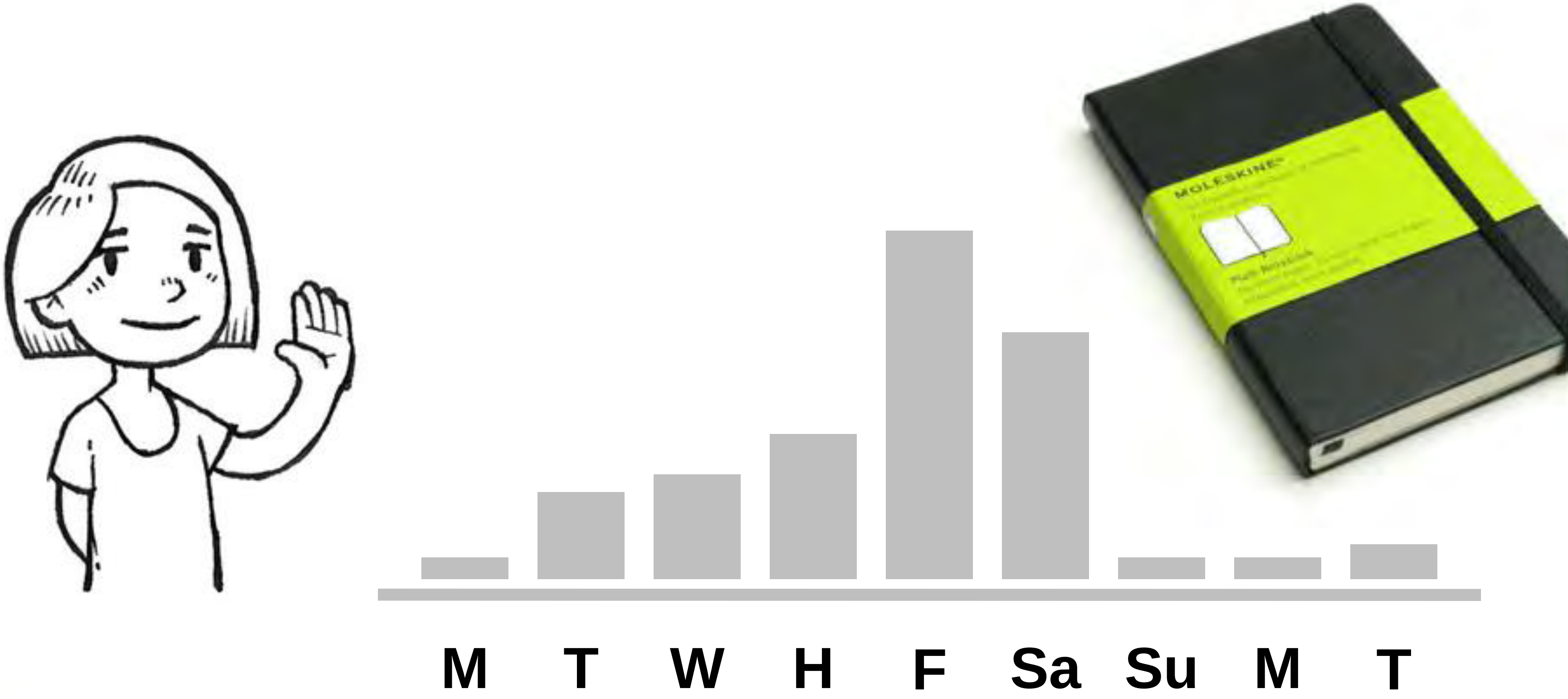
Preparation

Li I., Dey A., Forlizzi J. *CHI 2010.*
"A Stage-Based Model of Personal Informatics Systems"

Collection

Li I., Dey A., Forlizzi J. *CHI 2010.*
"A Stage-Based Model of Personal Informatics Systems"

Integration



Li I., Dey A., Forlizzi J. *CHI 2010.*
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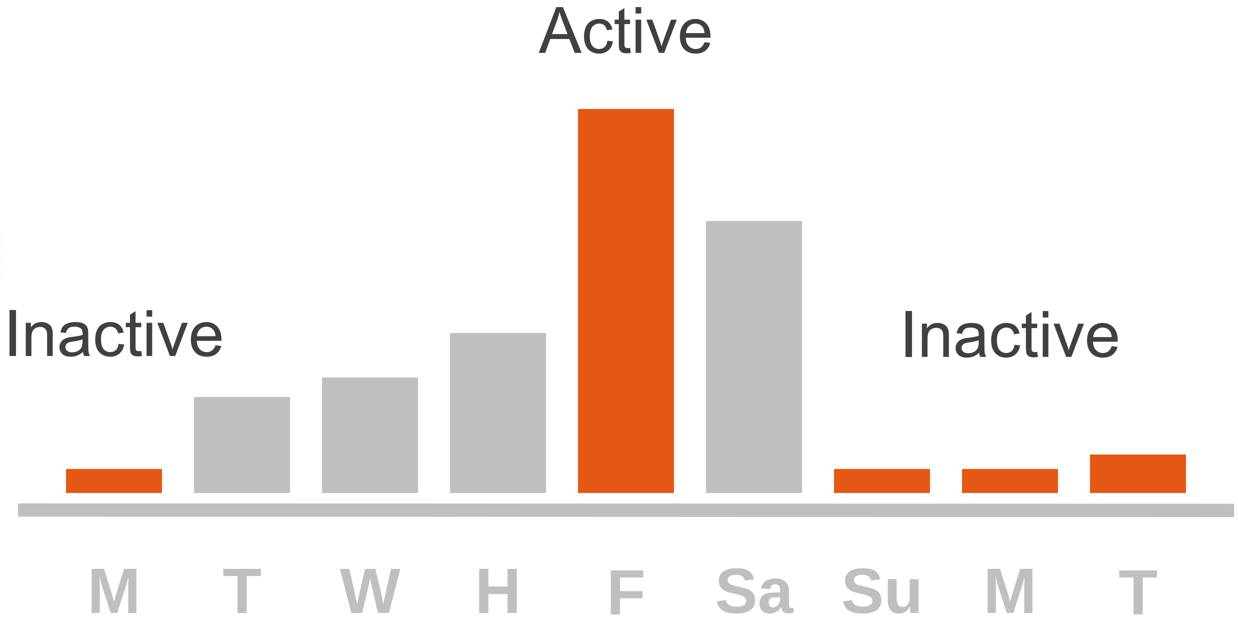
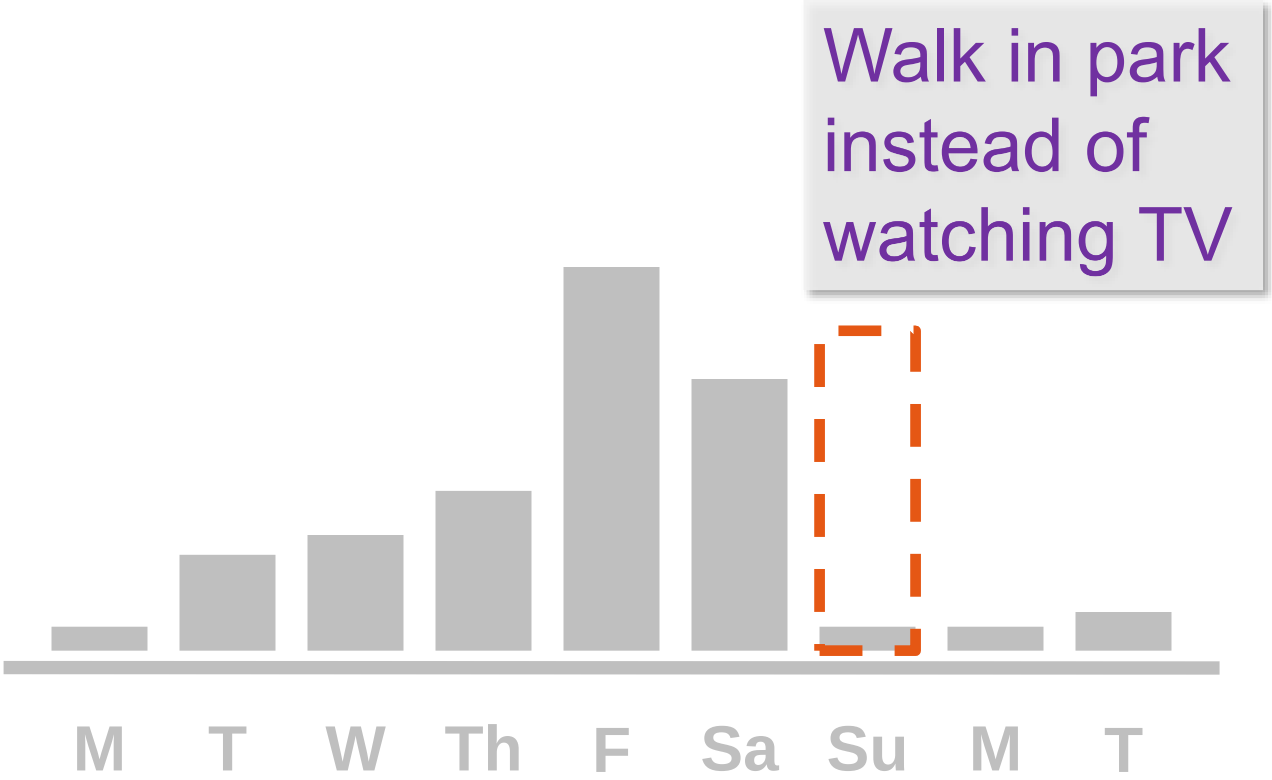
Reflection



Li I., Dey A., Forlizzi J. *CHI 2010.*
"A Stage-Based Model of Personal Informatics Systems"

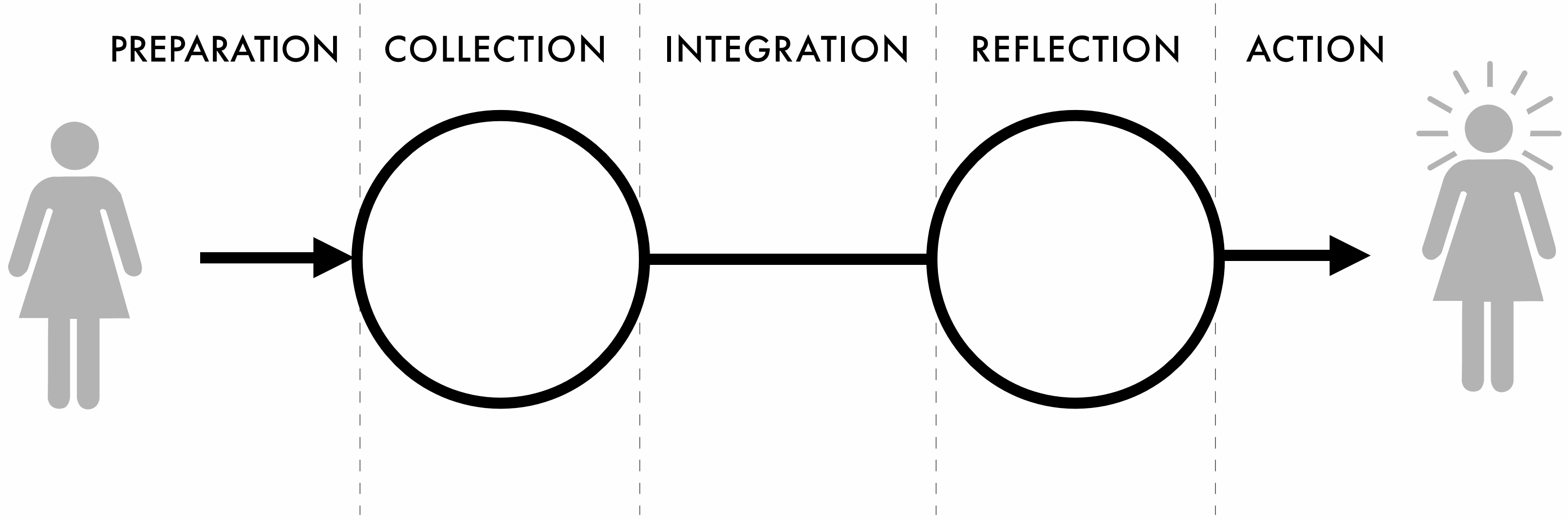
Action



Walk in park instead of watching TV

Li I., Dey A., Forlizzi J. *CHI 2010.*
"A Stage-Based Model of Personal Informatics Systems"

Five-Stage Model of Personal Informatics



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What is the Problem?

Examining serious self-trackers, as they represent the early adopters

Mark Moschel on Tracking and Dunking

Posted on January 30, 2014 by Ernesto Ramirez

Since he was a child Mark Moschel has been a basketball fan. Growing up in Chicago he became a fan of Michael Jordan. What really captured his attention was the act of dunking a basketball. As an adult, and still a basketball fan, Mark decided he wanted to set a new goal for himself – learning to dunk a basketball. In this talk, presented at our 2013 Global Conference, Mark describes how he incorporated self-tracking in his efforts.

Posted in Videos | Tagged basketball, dunking, qstop, strength | Leave a comment

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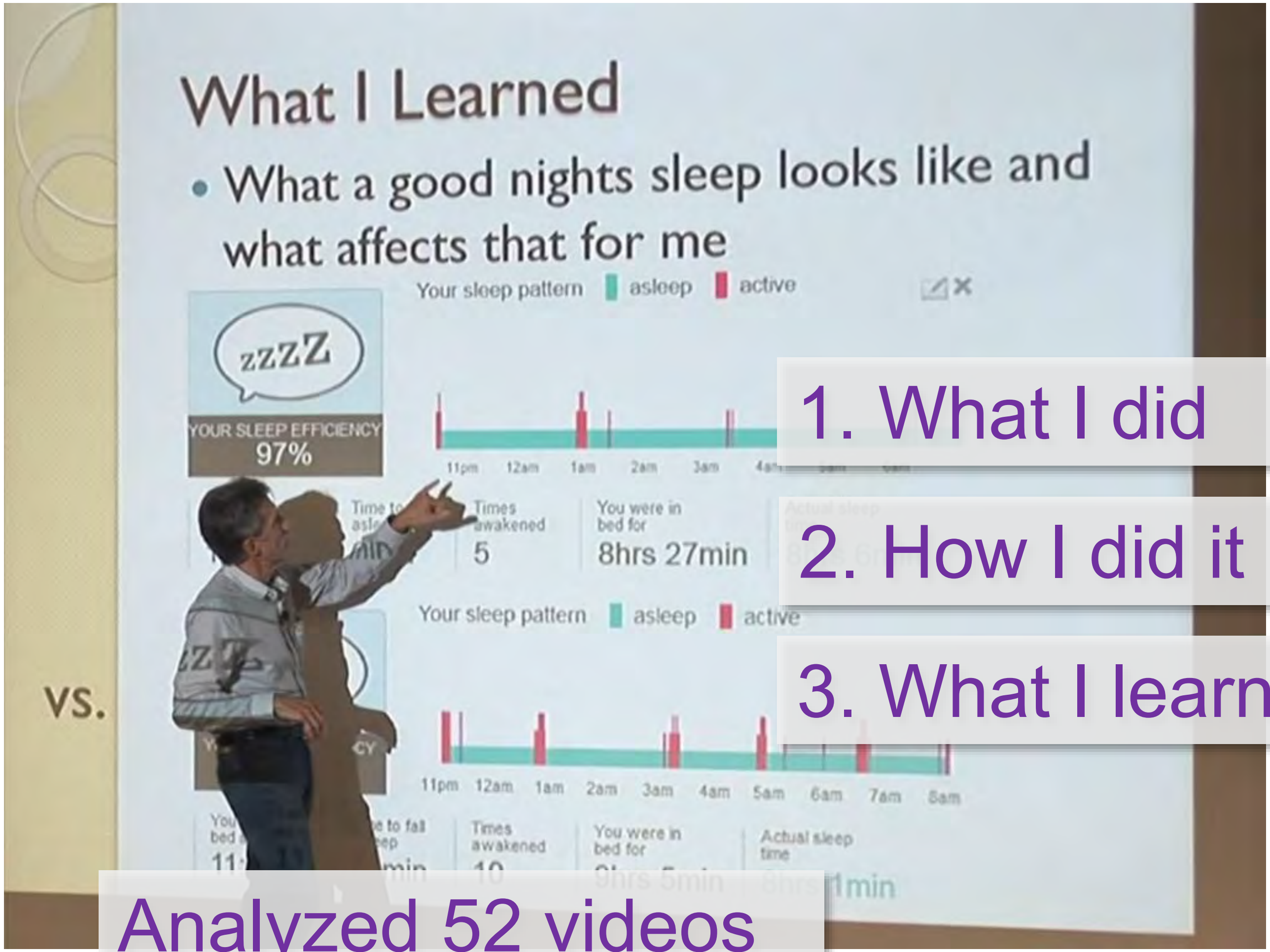
"Understanding Quantified Selfers' Practices in Collecting and Exploring Personal Data"

Quantified Self Talk Format



1. What I did
2. How I did it
3. What I learned

Analyzed 52 videos

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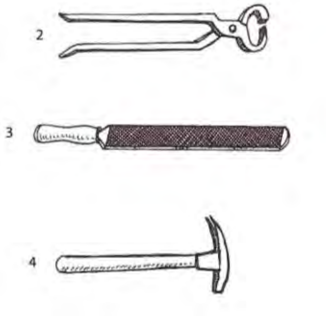
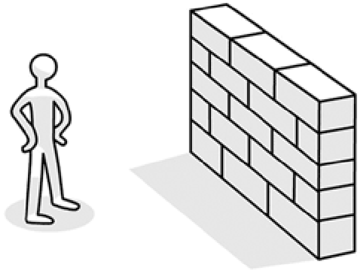
Questions about the Quantified Self

Profile

Motivation



Tools



Challenges

Workarounds

Visualizations

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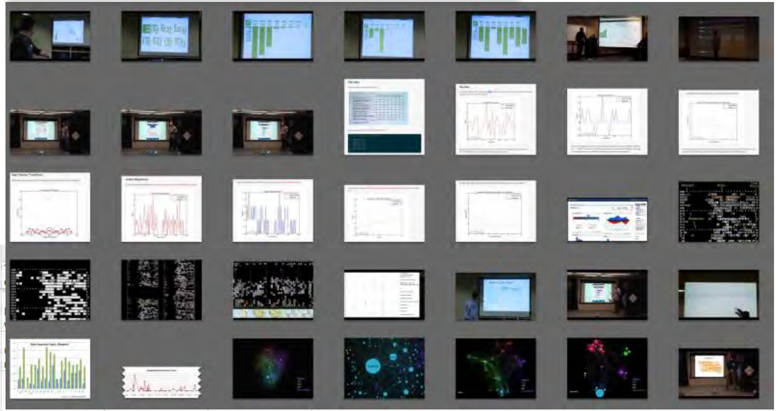
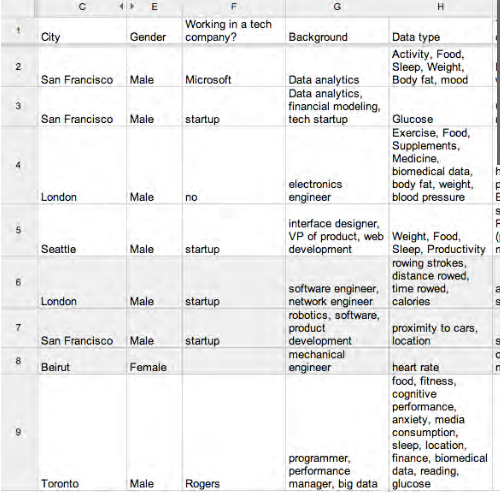
Analysis

Themes

Visualizations





	C	E	F	G	H				
1	City	Gender	Working in a tech company?	Background	Data type				
2	San Francisco	Male	Microsoft	Data analytics	Activity, Food, Sleep, Weight, Body fat, mood				
3	San Francisco	Male	startup	Data analytics, financial modeling, tech startup	Glucose				
4	London	Male	no	electronics engineer	Exercise, Food, Supplements, Medicine, biomedical data, body fat, weight, blood pressure	heart rate monitor, pen and paper, Excel	cancer	6 years	Commercial
5	Seattle	Male	startup	interface designer, VP of product, web development	Weight, Food, Sleep, Productivity	scale, Fitbit, RescueTime (productivity measuring tool)		2 years	Commercial
6	London	Male	startup	software engineer, network engineer	rowing strokes, distance rowed, time rowed, calories	arduino, speadsheet	overweight	5 months	
7	San Francisco	Male	startup	robotics, software, product development	proximity to cars, location	smartphone, sonar		1 year	user-generated
8	Beirut	Female		mechanical engineer	heart rate	custom heart rate monitor			user-generated
9	Toronto	Male	Rogers	programmer, performance manager, big data	food, fitness, cognitive performance, anxiety, media consumption, sleep, location, finance, biomedical data, reading, glucose			20 years	

Profiles

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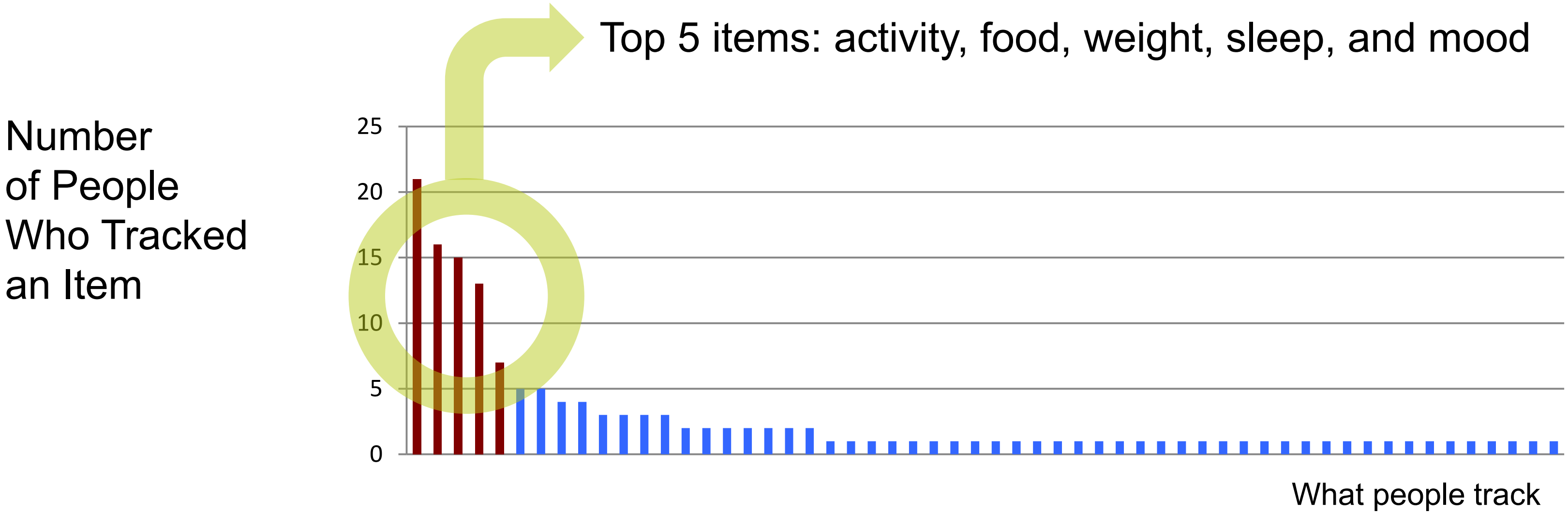
“Understanding Quantified Selfers’ Practices in Collecting and Exploring Personal Data”

University of Washington

What do they track?



Top 5 items: activity, food, weight, sleep, and mood

Other items: cognitive performance, blood glucose, location, heart rate, knowledge, stress, body fat, productivity, snoring, movies, posture, medicine, skin condition, home energy usage, clothes, and public transit usage

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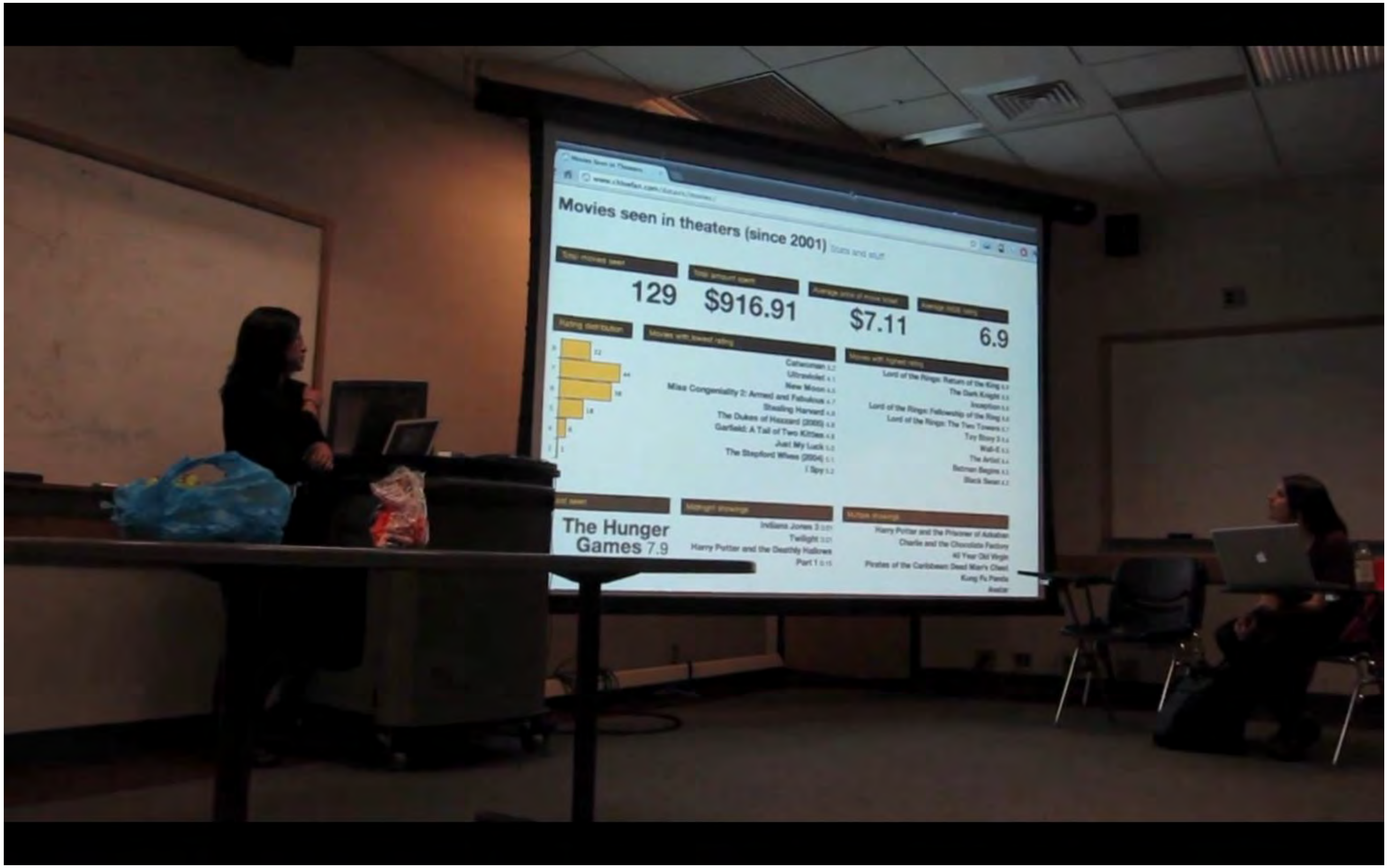
Movies Seen in Theatres Since 2001



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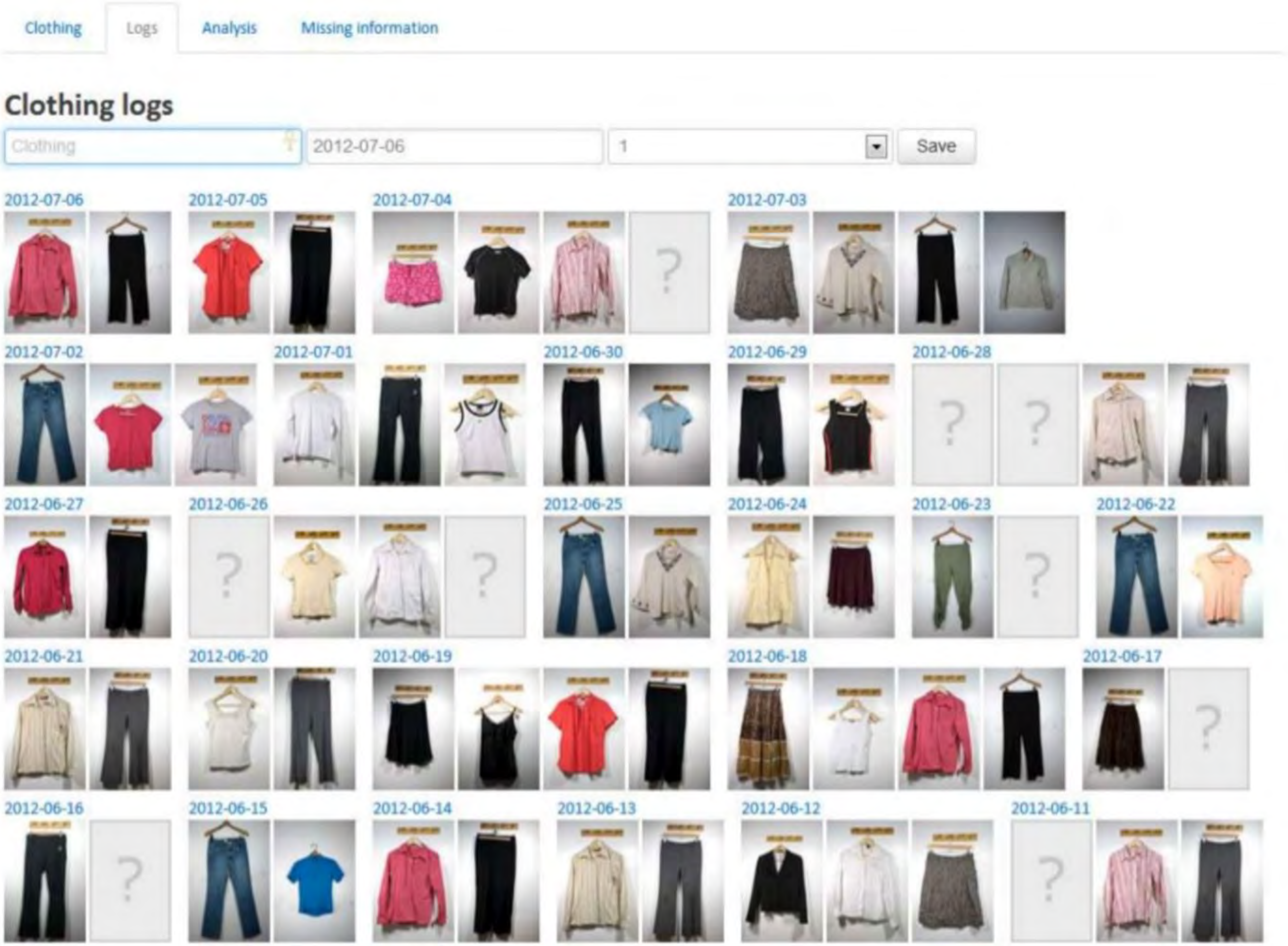
Clothing Log



Clothing logs

Clothing | 2012-07-06 | 1

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What do they Track?

A Diabetic Experience with Self-Quantification

Analyzing My Cancer Data

Going Vegan in December

Improving Skin Health

Cognitive Performance

15 Weeks of Self-Tracking

Diabetes, Exercise, and QS

Experience Sampling of My Stress

Hacking Your Subconscious Mind

Self-tracking is more than just buying a FitBit

Choe E.K., Lee N.B., Lee B., Pratt W., Kientz J.A. CHI 2014.
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Motivations for Tracking

Motivations	Sub-categories
To improve health	To cure or manage a condition
	To achieve a goal
	To find triggers
	To answer a specific question
	To identify relationships
	To execute a treatment plan
	To make better health decisions
	To find balance
To improve other aspects of life	To maximize work performance
	To be mindful
To find new life experiences	To satisfy curiosity and have fun
	To explore new things
	To learn something interesting

Choe E.K., Lee N.B., Lee B., Pratt W., Kientz J.A. CHI 2014.
"Understanding Quantified Selfers' Practices in Collecting and Exploring Personal Data"

Data Collection and Exploration Tools

Data Collection Tool	% (#)
Commercial hardware	56% (29)
Spreadsheet	40% (21)
Custom software	21% (11)
Pen and paper	21% (11)
Commercial software	19% (10)
Commercial website	10% (5)
Camera	6% (3)
Open-source platform	6% (3)
Custom hardware	4% (2)
Other	10% (5)

Data Exploration Tool	% (#)
Spreadsheet	44% (23)
Custom software	35% (18)
Commercial website	27% (14)
Commercial software	12% (6)
Open-source platform	8% (4)
Statistical software	4% (2)
Pen and paper	2% (1)

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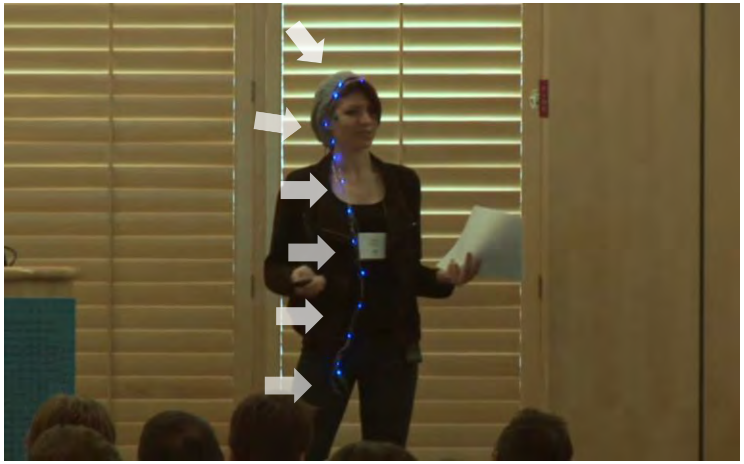
Building Custom Tools



Captures smile via wearable sensing
Provides real-time feedback

Captures snoring via mobile app
Provides data visualization

Choe E.K., Lee N.B., Lee B., Pratt W., Kientz J.A. CHI 2014.
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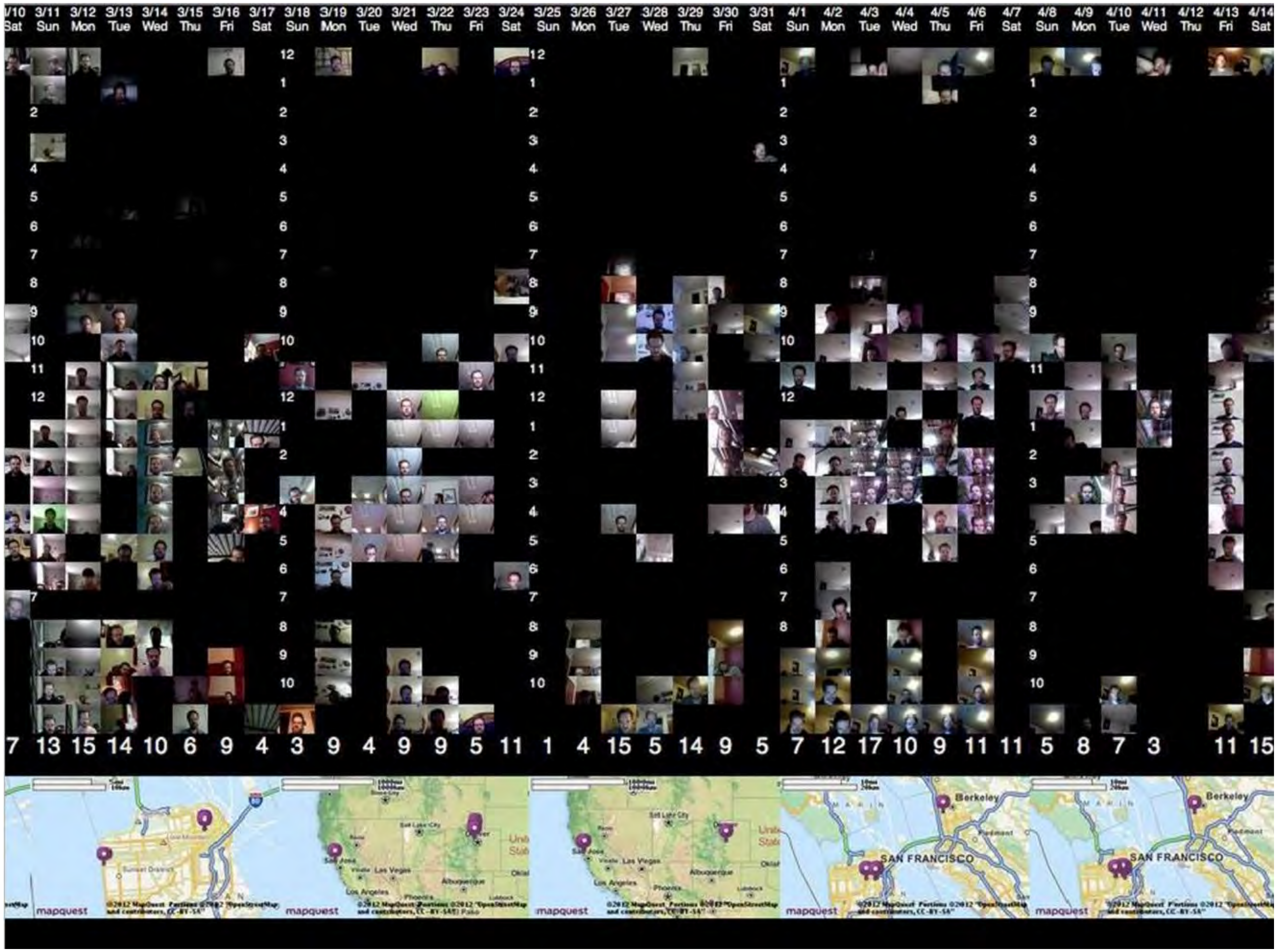
Custom Visualizations

Choe E.K., Lee N.B., Lee B., Pratt W., Kientz J.A. CHI 2014.
"Understanding Quantified Selfers' Practices in Collecting and Exploring Personal Data"

Custom Visualizations



Choe E.K., Lee N.B., Lee B., Pratt W., Kientz J.A. CHI 2014.
“Understanding Quantified Selfers’ Practices in Collecting and Exploring Personal Data”

Why are they Building Custom Tools?

Desirable features are not supported

- Collect and reflect on the data using a single tool
- Perform self-experimentation

Barriers to success

- Tracking too many things
- Not tracking triggers and context
- Lacking scientific rigor

Choe E.K., Lee N.B., Lee B., Pratt W., Kientz J.A. CHI 2014.
"Understanding Quantified Selfers' Practices in Collecting and Exploring Personal Data"

Tracking Too Many Things

"I can honestly say that I've made the classic newbie self-tracking mistake which is that I track everything. I didn't know exactly what to track, so I tracked caffeine, dairy, wheat, sugar, nuts, fruit, vegetables, meat, chicken, fish, alcohol supplements…"

People burn out on self-tracking

Choe E.K., Lee N.B., Lee B., Pratt W., Kientz J.A. CHI 2014.
"Understanding Quantified Selfers' Practices in Collecting and Exploring Personal Data"

Not Tracking Triggers and Context

"I was trying to track all these symptoms and I was completely ignoring the cause…"

People lack clues on what to track

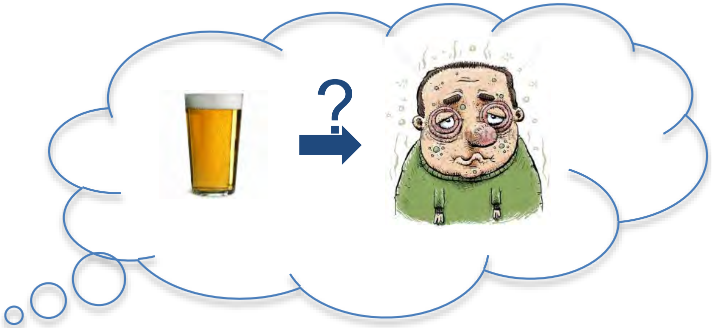
Miss information on how to improve outcome

They track the wrong information

Choe E.K., Lee N.B., Lee B., Pratt W., Kientz J.A. CHI 2014.
"Understanding Quantified Selfers' Practices in Collecting and Exploring Personal Data"

Lacking Scientific Rigor

Conduct self-experimentations without control or without addressing confounding factors



And they conduct flawed experiments

Choe E.K., Lee N.B., Lee B., Pratt W., Kientz J.A. CHI 2014.
“Understanding Quantified Selfers’ Practices in Collecting and Exploring Personal Data”

Your Challenge

People invest tremendous effort for little value

Do better, help people achieve their goals

- These are smart people, these are hard problems

Think big about the opportunities

- Get past the technology fetish
- Understand the problems people face
- Find the role for interactive technology

Some Reflection

We have high expectations

- We want you to do cool stuff

But we are also enthusiastic and we listen

- Email us, point out opportunities, ask questions

If you are not onboard, please drop now

- Please email us so that we know a spot opened

  cse440-instr [at] cs.washington.edu

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 02:
Design of Everyday Things

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

dub
design:
use:
build:

University of Washington

What is Interaction?

Two-Way

- one-way is a reaction

Communicative

- information is sent

Receptive

- information is received

Effective

- the parties are changed as a result

What is Interaction?

Two-Way
Communicative
Receptive
Effective

Knocking over a chair

Clicking a Submit button on a web page

Two televisions, turned on, facing each other

A computer sending data to another via a network

Typing on a computer that is turned off

Picking up a telephone and putting it to your ear

Typing ESC on a screen that does not allow it

Models of Interaction

Models of interaction allow a closer look

- Define and describe an interaction
- Isolate areas where problems occur
- Design new interaction

Two examples at different scales

- Buxton’s 3-State Model
- Norman’s Execution-Evaluation Cycle

Models of Interaction

Models of interaction allow a closer look

- Define and describe an interaction
- Isolate areas where problems occur
- Design new interaction

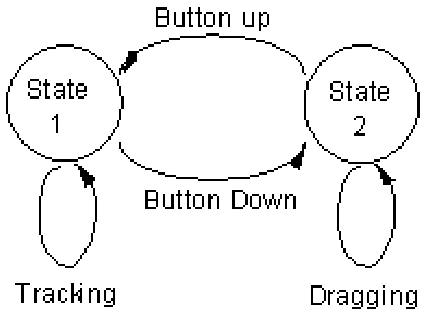
Two examples at different scales

- Buxton’s 3-State Model
- Norman’s Execution-Evaluation Cycle

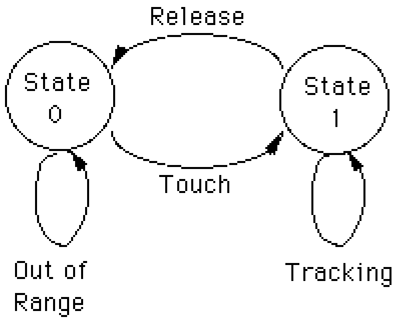
> “All models are wrong, but some are useful”
> George Box

Buxton’s 3-State Model

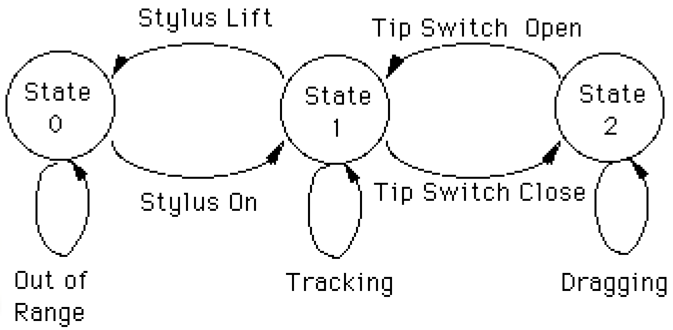
Mouse



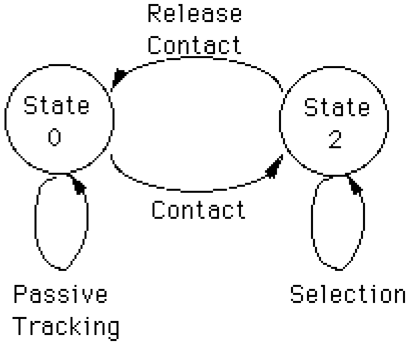
Touchpad



Stylus

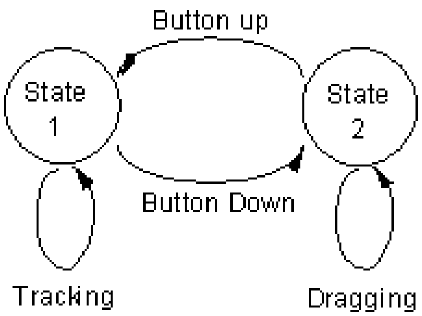


Touch Screen

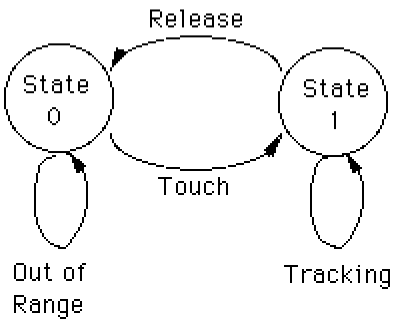


Buxton’s 3-State Model

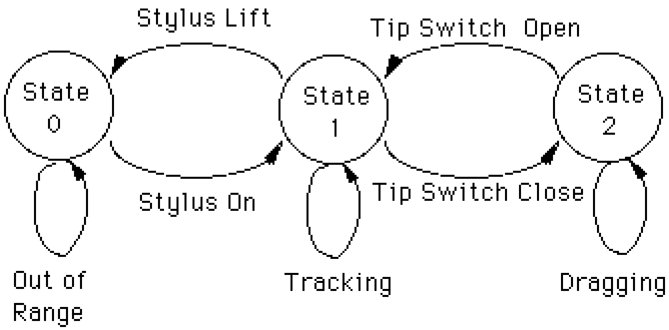
Mouse



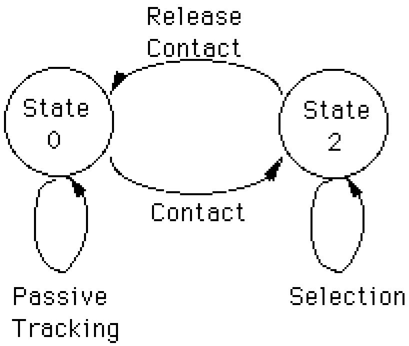
Touchpad



Stylus



Touch Screen



Which can support tooltip previews?

Norman’s Execution-Evaluation Cycle

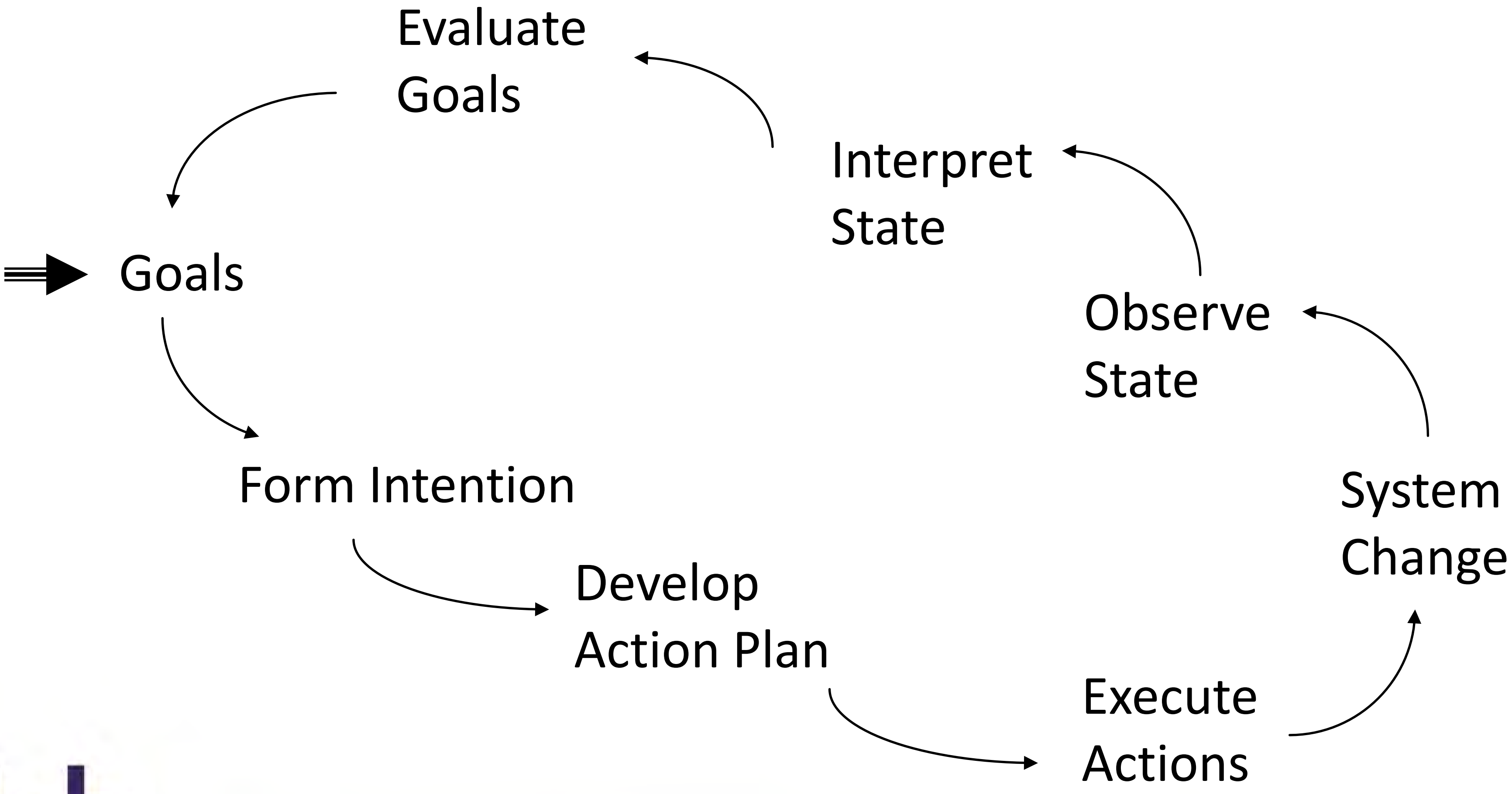
1. Establish the goal.
2. Form the intention.
3. Specify the action sequence.
4. Execute the action sequence.
5. Perceive the system state.
6. Interpret the system state.
7. Evaluate the system state with respect to the goals and intentions.

Revise Goals

Turning on the Light

1. Establish the goal
   Increase light in the room
2. Form the intention
   To turn on the lamp
3. Specify the action sequence
   Walk to the lamp, reach for the knob, twist the knob
4. Execute the action sequence
   [walk, reach, twist]
5. Perceive the system state
   [hear “click” sound, see light from lamp]
6. Interpret the system state
   The knob rotated. The lamp is emitting light. The lamp seems to work
7. Evaluate the system state with respect to the goals and intentions
   The lamp did indeed increase the light in the room [goal satisfied]

Norman’s Execution-Evaluation Cycle



Goals

Form Intention

Develop
Action Plan

Execute
Actions

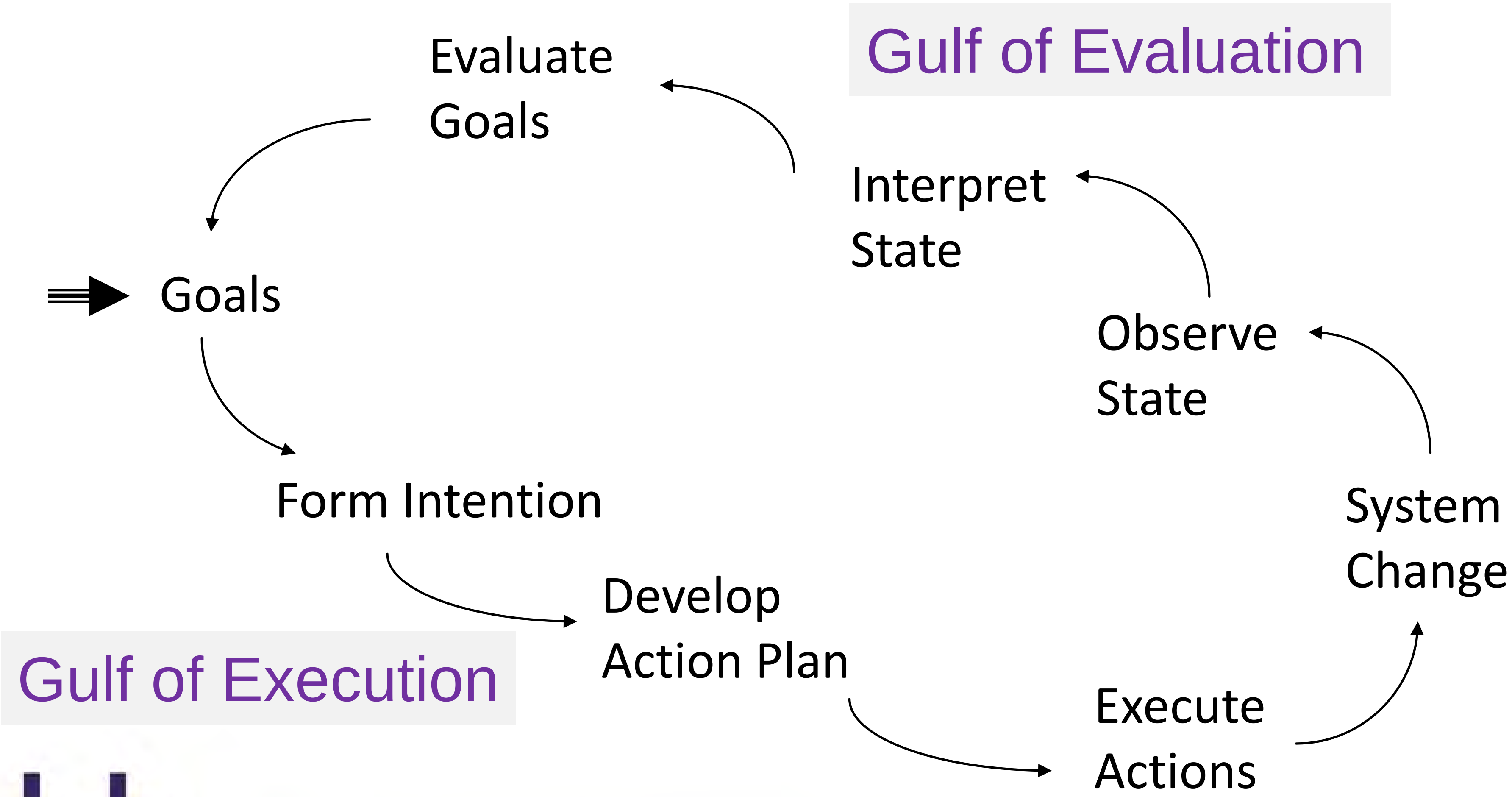
System
Change

Observe
State

Interpret
State

Evaluate
Goals

Norman’s Execution-Evaluation Cycle



Goals

Form Intention

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System
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Observe
State

Interpret
State

Evaluate
Goals

Gulf of Evaluation

Gulf of Execution

Bridging the Gulfs

Gulf of Execution: “How do I do it?”

Commands and mechanisms need to match the goals, thoughts, and expectations of a person

Gulf of Evaluation: “What does it mean?”

Output needs to present a view of the system
that is readily perceived, interpreted, and evaluated

People build mental models to anticipate and interpret system response to their actions

What can I do?	How do I do it?
What result will it have?	What is it telling me?

Cooper’s Mental Model Terminology

Implementation Model

How it works

(aka Design Model, Designer’s Conceptual Model)

Manifest Model

How it presents itself

(aka System Image)

Mental Model

How a person thinks it works

(aka User Model, User’s Conceptual Model)

Cooper's Mental Model Terminology

Implementation Model

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Manifest Model

How it presents itself

(aka System Image)

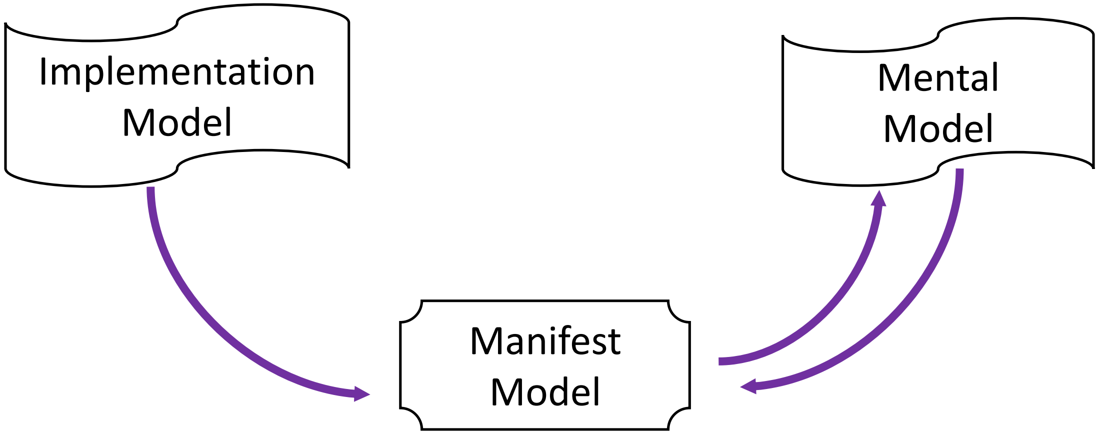
Mental Model

How a person thinks it works

(aka User Model, User's Conceptual Model)

These terms are sloppy and ambiguous out in the world

Manifest and Mental Models



Designer projects their model into an artifact

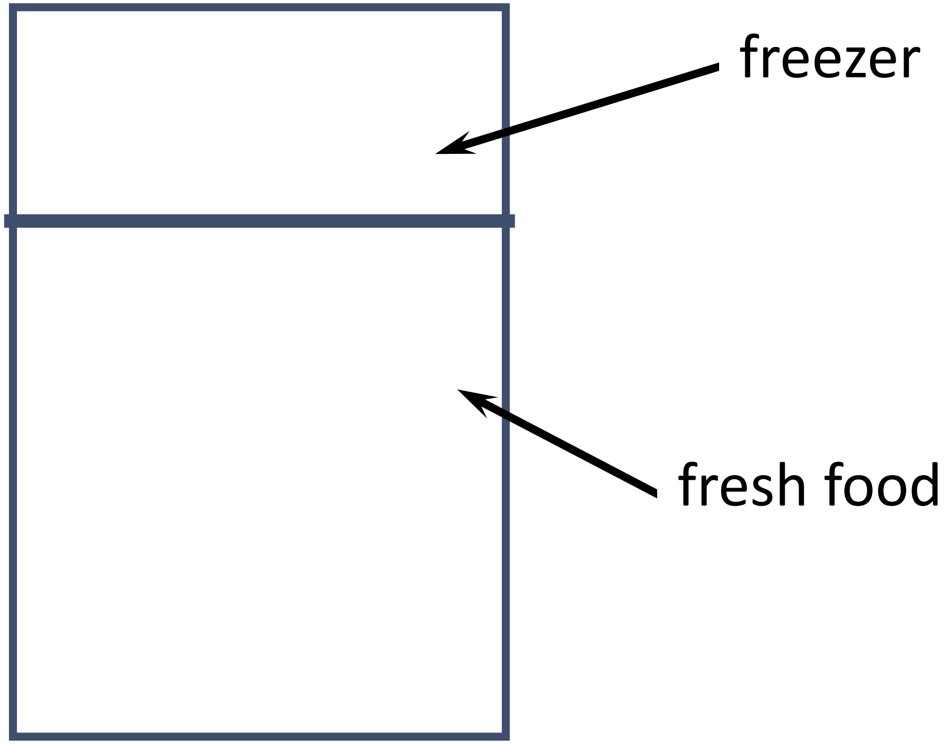
- Person forms their model based on interaction

People struggle until model matches manifest model

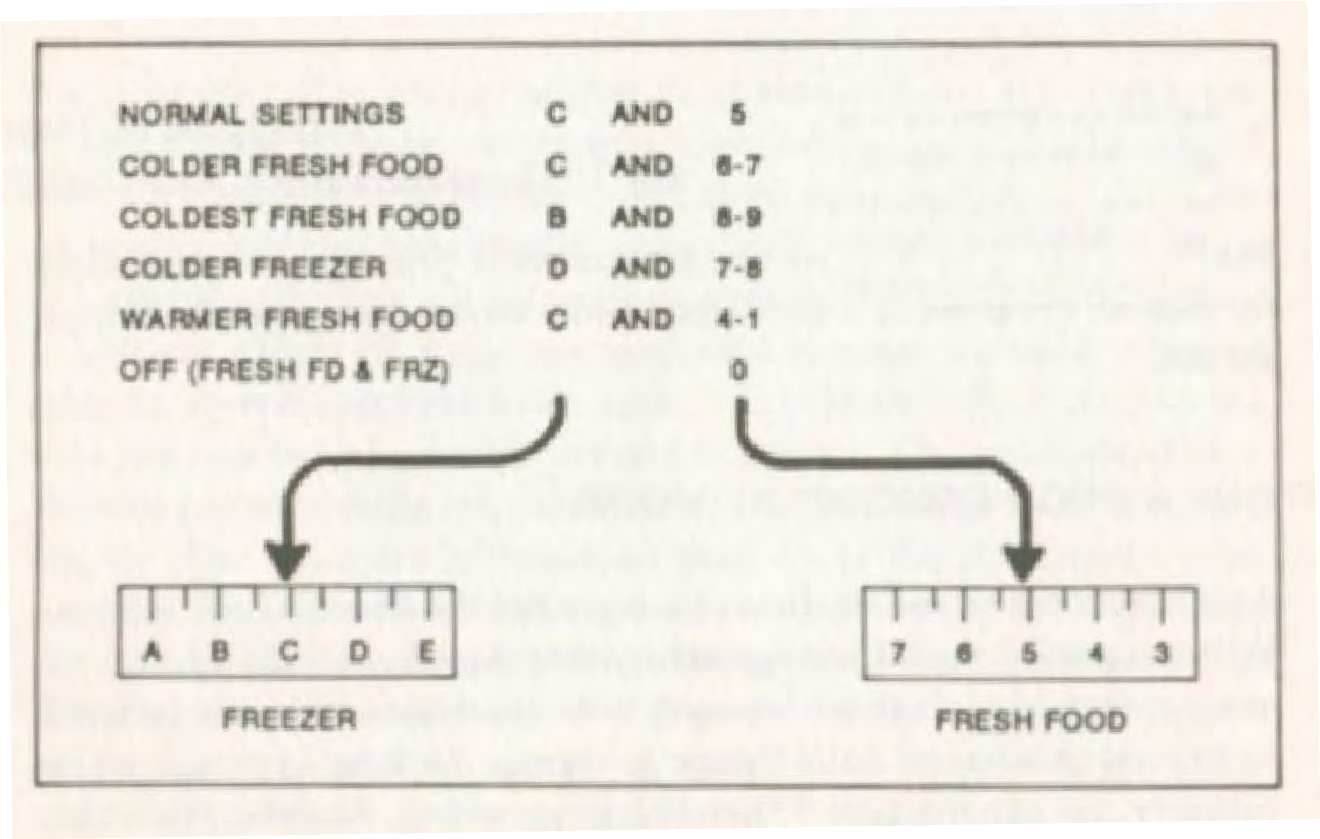
- Update mental model in response to breakdowns
- Not necessarily matching the implementation model

Mental Models

Problem: freezer too cold, fresh food just right



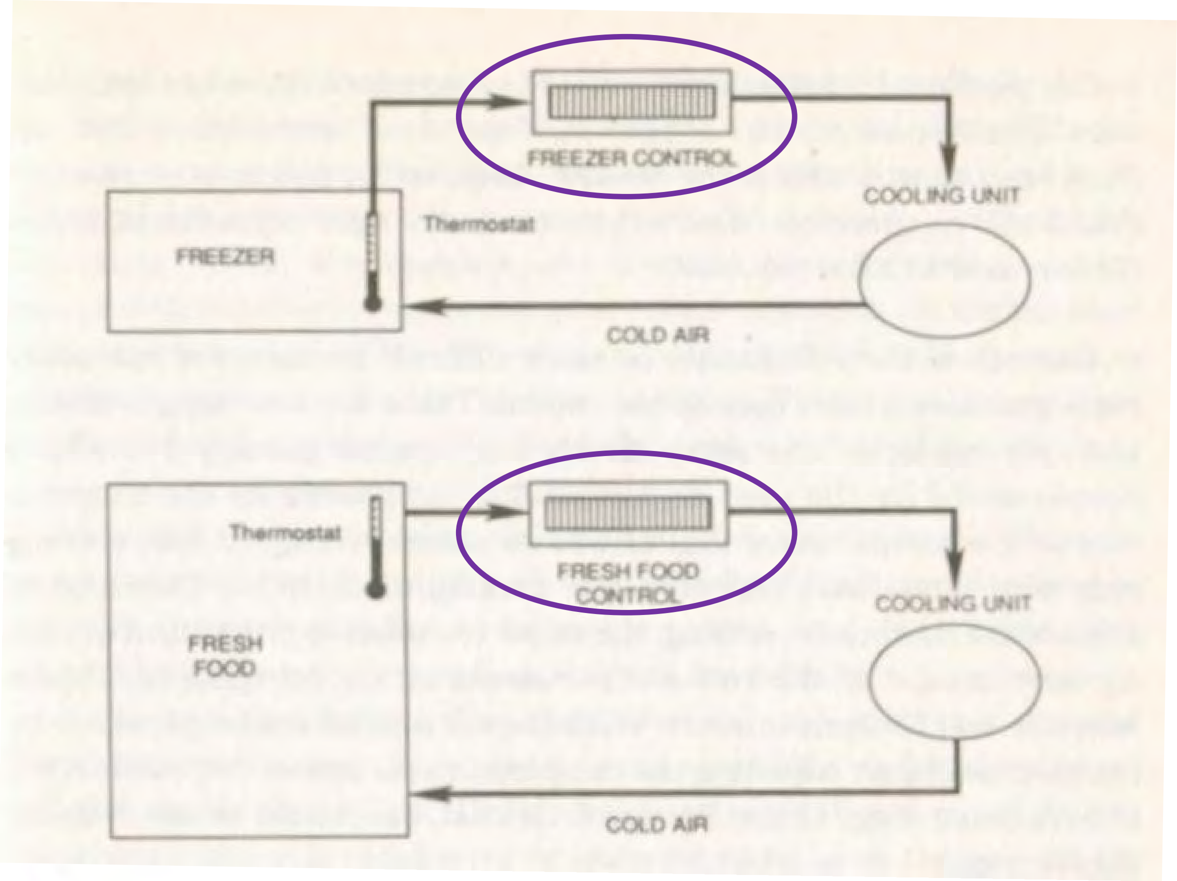
Manifest Model



NORMAL SETTINGS	C	AND	5
COLDER FRESH FOOD	C	AND	6-7
COLDEST FRESH FOOD	B	AND	8-9
COLDER FREEZER	D	AND	7-8
WARMER FRESH FOOD	C	AND	4-1
OFF (FRESH FD & FRZ)			0

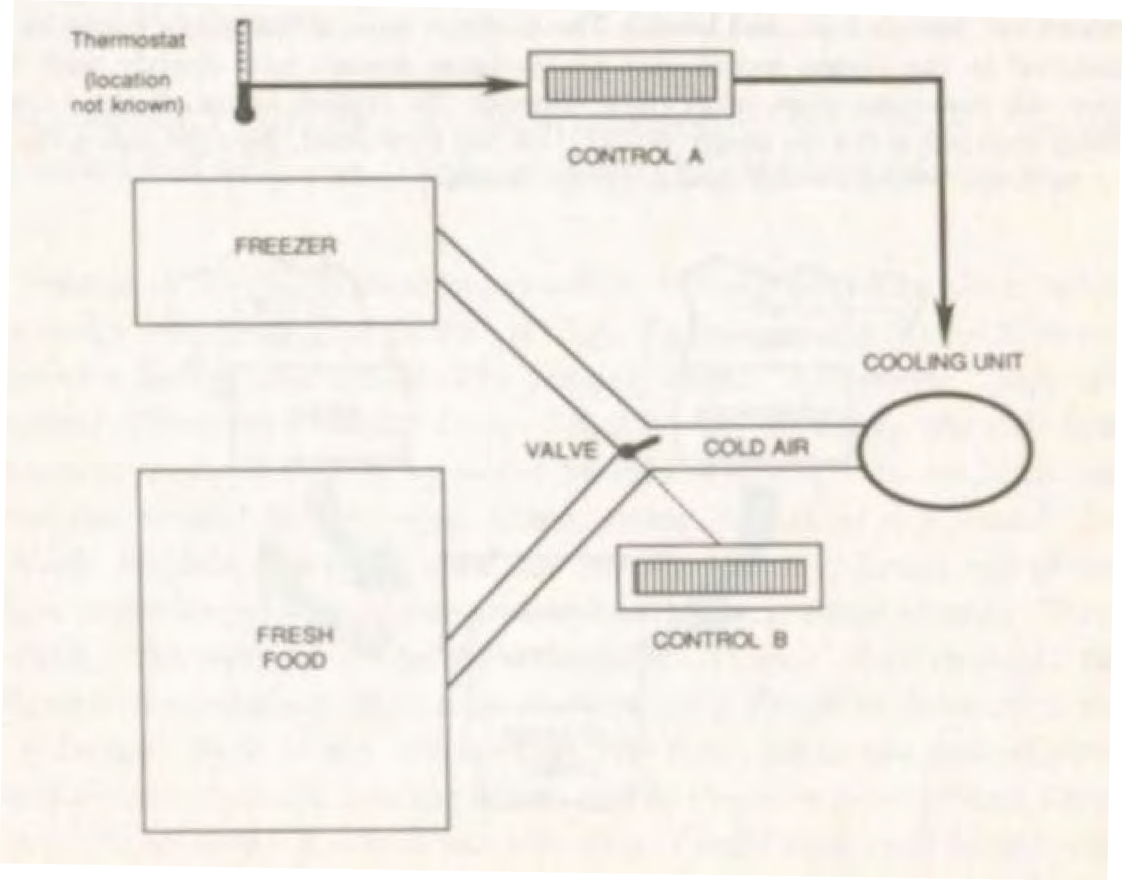
What if I want to make just the freezer warmer?

A Sensible Mental Model

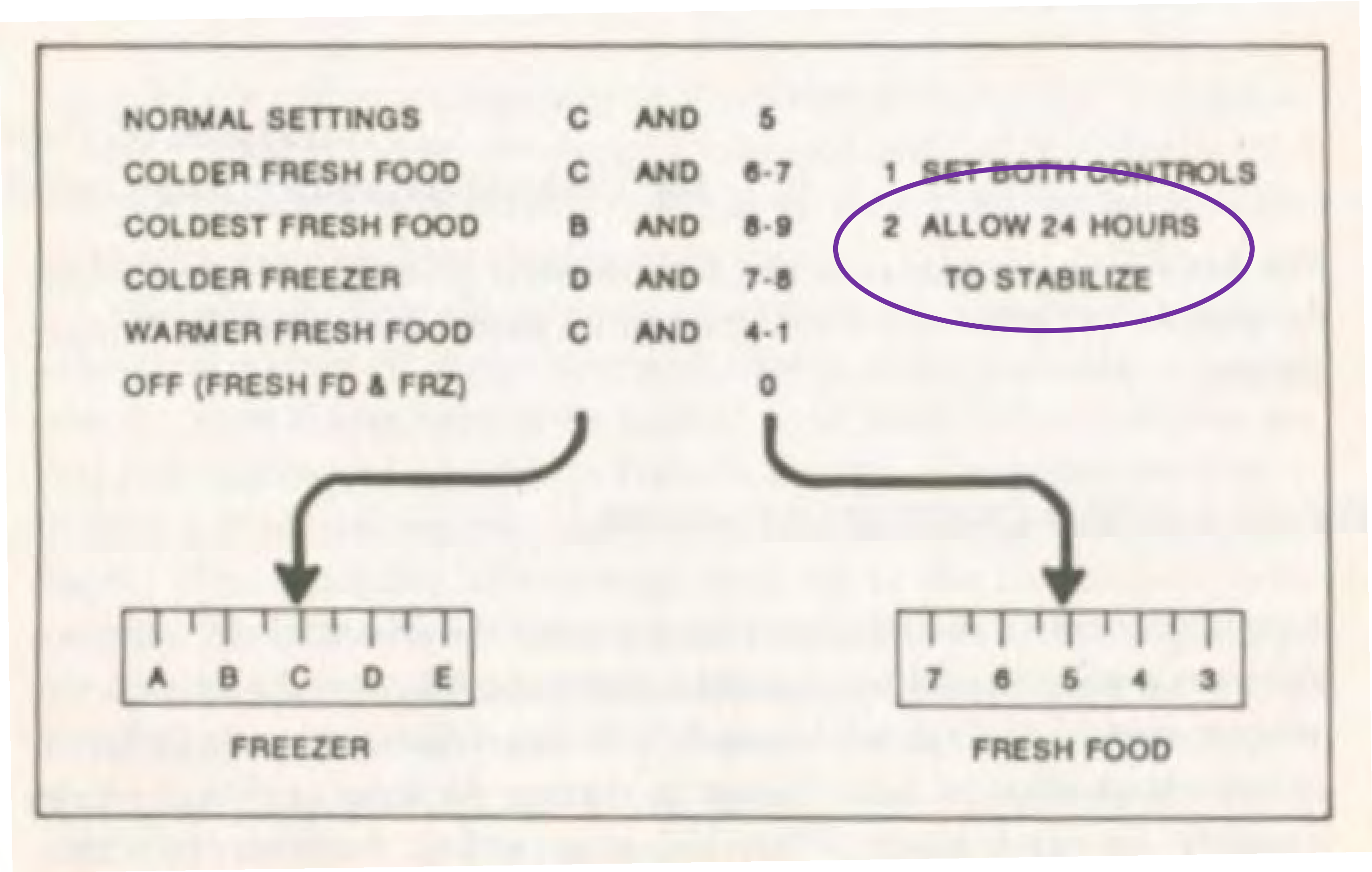


“The Freezer Control controls the freezer temperature and the Fresh Food Control controls the fresh food temperature”

The Implementation Model



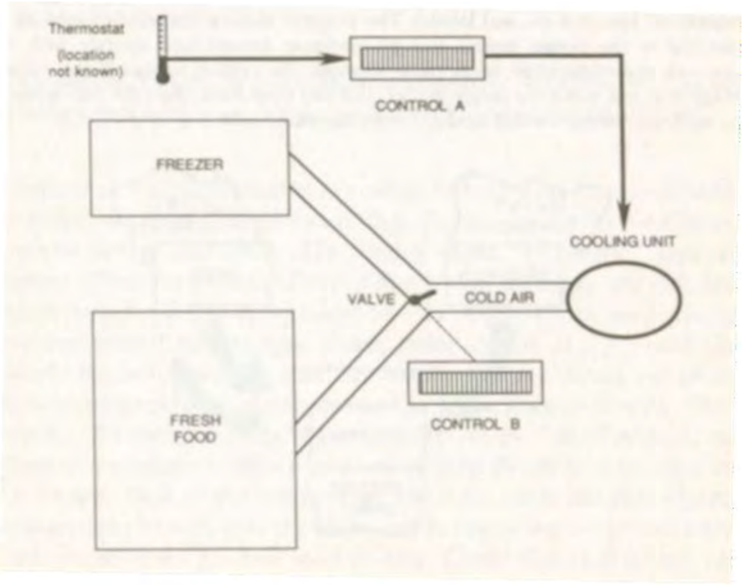
A Problem with Feedback



NORMAL SETTINGS	C	AND	5
COLDER FRESH FOOD	C	AND	6-7
COLDEST FRESH FOOD	B	AND	8-9
COLDER FREEZER	D	AND	7-8
WARMER FRESH FOOD	C	AND	4-1
OFF (FRESH FD & FRZ)			0

1 SET BOTH CONTROLS
2 ALLOW 24 HOURS
TO STABILIZE

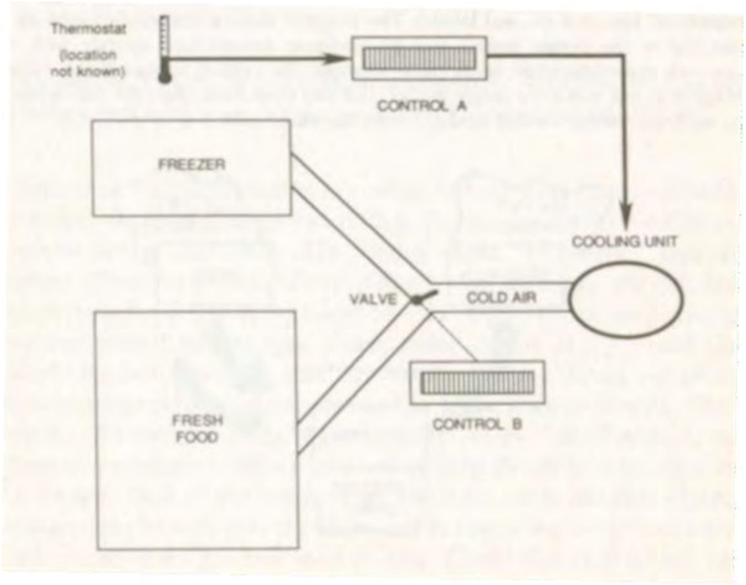
The Implementation Model



Why do we have a problem?

Can you fix the problem?

The Implementation Model



Why do we have a problem?

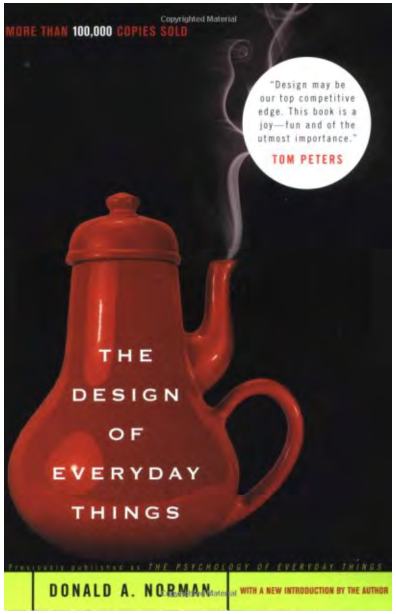
- Cost constraints

Can you fix the problem?

- Make controls correspond to a person’s mental model

- Make controls correspond to the implementation model

Building the Right Model



Having the right model helps people bridge the Gulf of Execution and the Gulf of Evaluation

How can we help people build the right models:

Affordances	Metaphors
Visibility	Knowledge in the World
Constraints	Mapping
Consistency	Modes

Affordances

Visual clue to interaction

knobs afford turning

levers afford moving

buttons afford pushing

Affordances

“The affordances of the environment are what it offers animals, what it provides or furnishes, for good or ill.”

Gibson, part of an ecological approach to psychology

“The term ‘affordance’ refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used.”

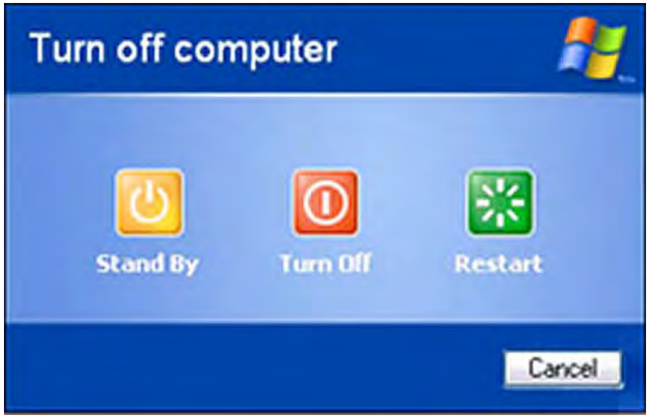
Norman

What’s the Affordance?

Affordances

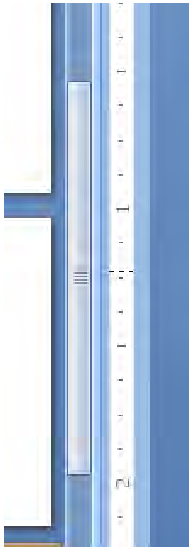
Affordances

Technology affordances are often based in affordances from the physical world



Affordances

What is the affordance here?



Where does it come from?

Affordances

What is the affordance here?

fett

6 items, 5.06 GB available

Apple Extras

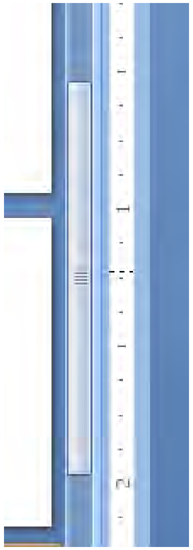
Applications

System Folder

Utilities

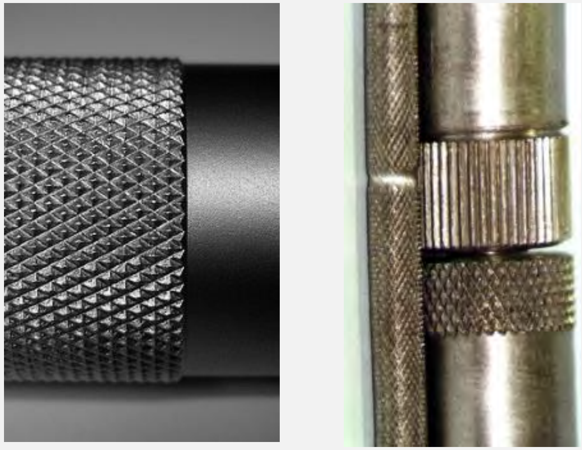
Internet

Demos



Where does it come from?

Knurling



Sequential Affordance

Acting on a perceptible affordance leads to information indicating new affordances

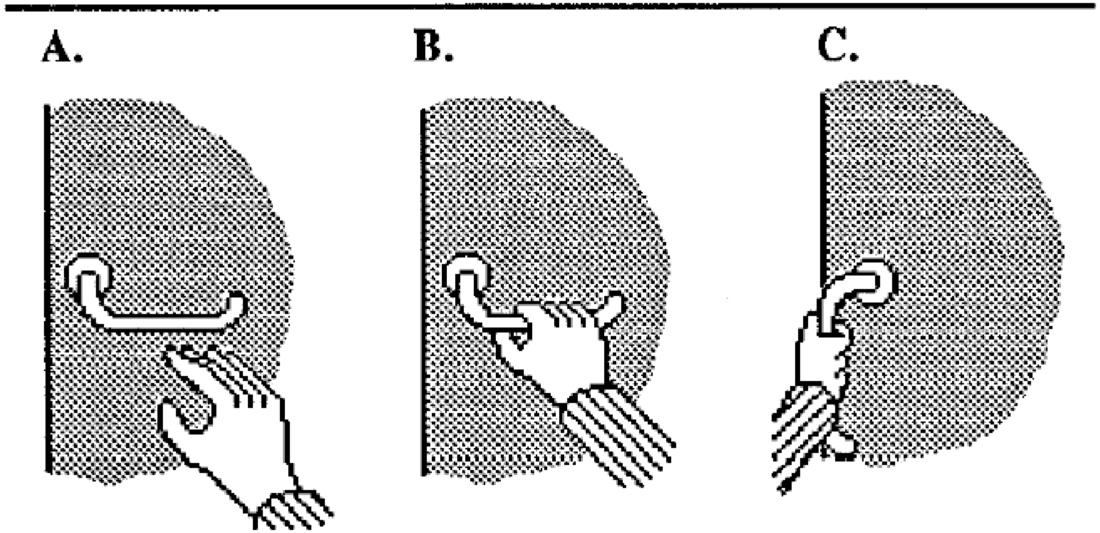
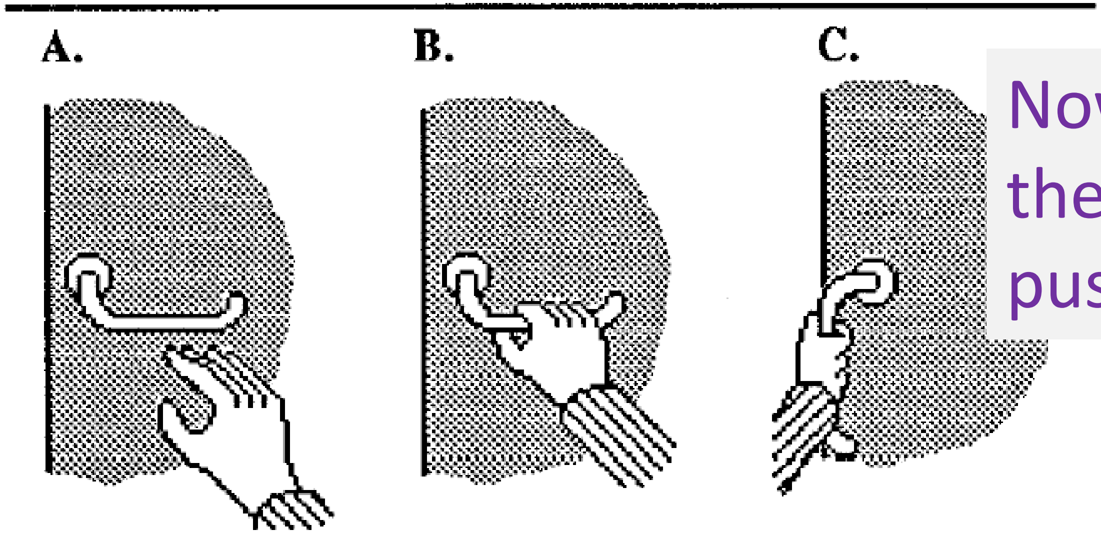


Figure 4. *Sequential affordances: one affordance leads to another. Visual information indicates grasping (A & B); tactile information indicates turning (B & C).*

Sequential Affordance

Acting on a perceptible affordance leads to information indicating new affordances



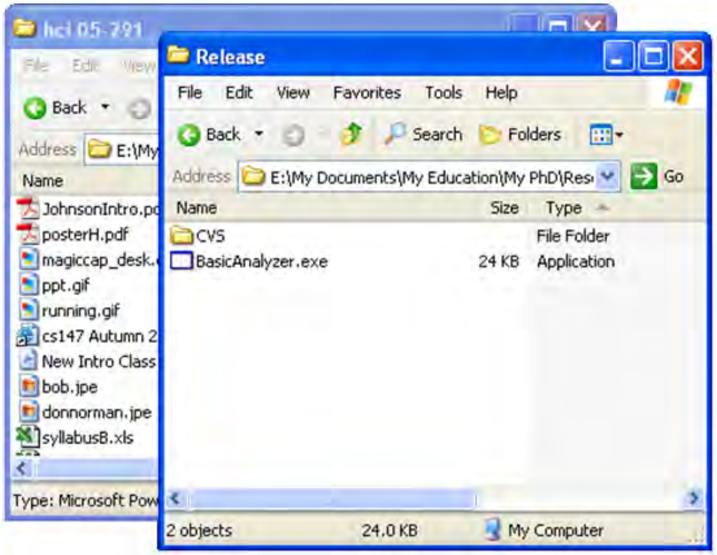
Now does the door push or pull?

Figure 4. *Sequential affordances: one affordance leads to another. Visual information indicates grasping (A & B); tactile information indicates turning (B & C).*

Nested Affordances

Affordances due to spatial relationships revealing what actions can be done

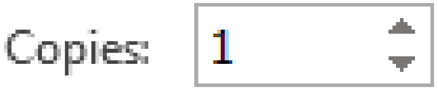
- Proximate to, contained in, part of



Address: E:\My Documents\My Education\My PhD\Res

Name	Size	Type
CVS		File Folder
BasicAnalyzer.exe	24 KB	Application

2 objects 24.0 KB



Copies: 1

In Other Words

An affordance is what a thing communicates about how it can be used, often by its appearance

"In general, when the apparent affordances of an artifact matches its intended use, the artifact is easy to operate. When apparent affordances suggest different actions than those for which the object is designed, errors are common."

Gaver

Challenges arise if there is a mismatch between implied use versus intended use

False Affordances

When there is perceptual information suggesting an implied use that does not exist

(Just an image of a button, not one that responds)

False Affordances

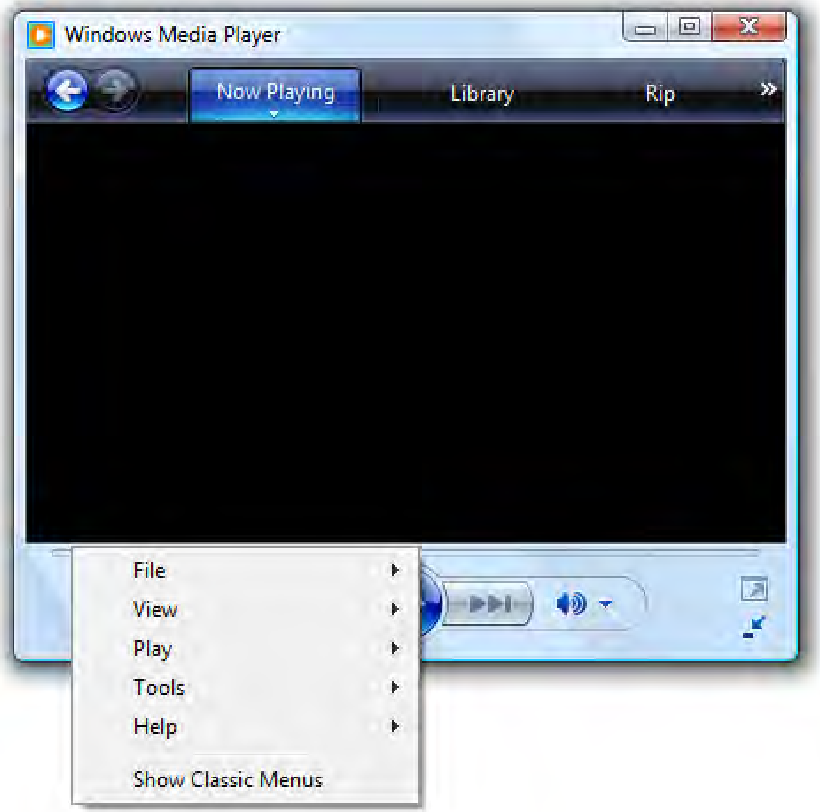
False Affordances

False Affordances

False Affordances

Hidden Affordances

When there is no perceptual information suggesting an actual intended use



Hidden Affordances

ARTS & SCIENCES

Launching in León

Sixty entering freshmen launched their UW careers in León, Spain, through a new study abroad program offered by the College of Arts & Sciences.

A&S PERSPECTIVES

HUSKY FOOTBALL

Huskies fall to Cardinal in nail-biter

No. 16 Stanford took advantage of a poorly timed fake punt to hold off Washington 20-13 on Saturday at Husky Stadium.

ATHLETICS

URRICULUM

Citizenship, taboo language mong UW's new fall class ineup

rom exploring American citizenship to omics to superheroes, the new school ear brings a wealth of new classroom xperiences for UW students.

UW TODAY

Hidden Affordances

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Logos linking to home is a convention, but not afforded by the page

Confusion of the Term

“Note also that affordances are not intrinsic, but depend on the background and culture of users. Most computer-literate user will click on an icon. This is not because they go around pushing pictures in art galleries, but because they have learned that this is an affordance of such objects in a computer domain…”

Dix

Disagree. Icons do not afford “pushability” or “clickability” by their attributes. They do not give an indication of their intended use, except by convention.

Clarification on Convention

"Designers sometimes will say that when they put an icon, cursor, or other target on the screen, they have added an 'affordance' to the system. This is a misuse of the concept. … It is wrong to claim that the design of a graphical object on the screen 'affords clicking.' … Yes, the object provides a target and it helps the user know where to click and maybe even what to expect in return, but those aren't affordances, those are conventions, and feedback, and the like. … Don't confuse affordances with conventions."

Norman

University of Washington

Metaphors

Suggest an existing conceptual model

- “horseless carriages”, “iron horses”, “wireless”

Desktop metaphor

- Not an attempt to simulate a real desktop
- Leverages knowledge of files, folders, trash
- Explains why some windows seem hidden

Metaphors

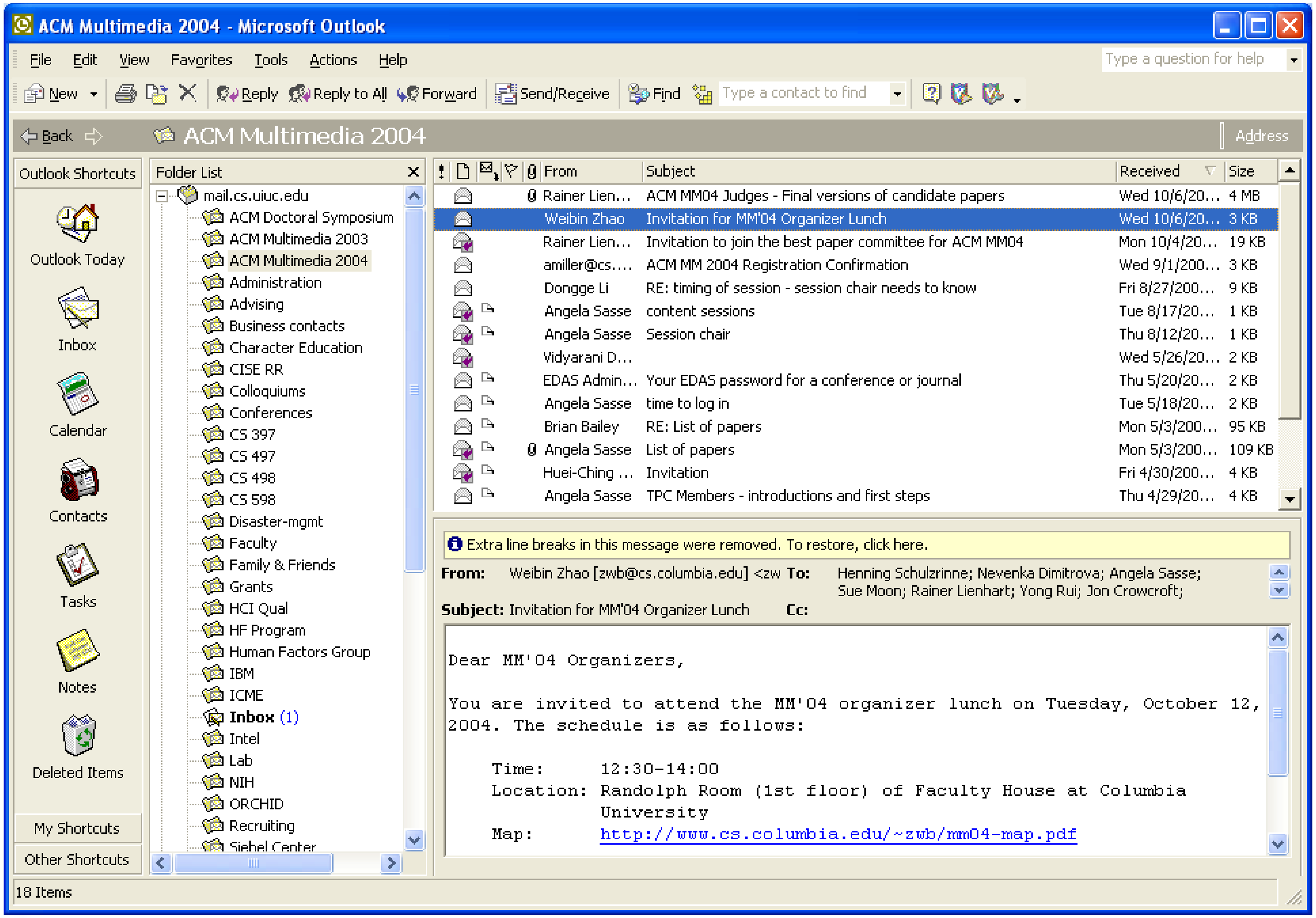
Suggest an existing conceptual model

- “horseless carriages”, “iron horses”, “wireless”

Desktop metaphor

- Not an attempt to simulate a real desktop
- Leverage
- Explains

Mail Metaphor



From	Subject	Received	Size
Rainer Lien…	ACM MM04 Judges - Final versions of candidate papers	Wed 10/6/20…	4 MB
Weibin Zhao	Invitation for MM'04 Organizer Lunch	Wed 10/6/20…	3 KB
Rainer Lien…	Invitation to join the best paper committee for ACM MM04	Mon 10/4/20…	19 KB
amiller@cs.…	ACM MM 2004 Registration Confirmation	Wed 9/1/200…	3 KB
Dongge Li	RE: timing of session - session chair needs to know	Fri 8/27/200…	9 KB
Angela Sasse	content sessions	Tue 8/17/20…	1 KB
Angela Sasse	Session chair	Thu 8/12/20…	1 KB
Vidyarani D…		Wed 5/26/20…	2 KB
EDAS Admin…	Your EDAS password for a conference or journal	Thu 5/20/20…	2 KB
Angela Sasse	time to log in	Tue 5/18/20…	2 KB
Brian Bailey	RE: List of papers	Mon 5/3/200…	95 KB
Angela Sasse	List of papers	Mon 5/3/200…	109 KB
Huei-Ching …	Invitation	Fri 4/30/200…	4 KB
Angela Sasse	TPC Members - introductions and first steps	Thu 4/29/20…	4 KB

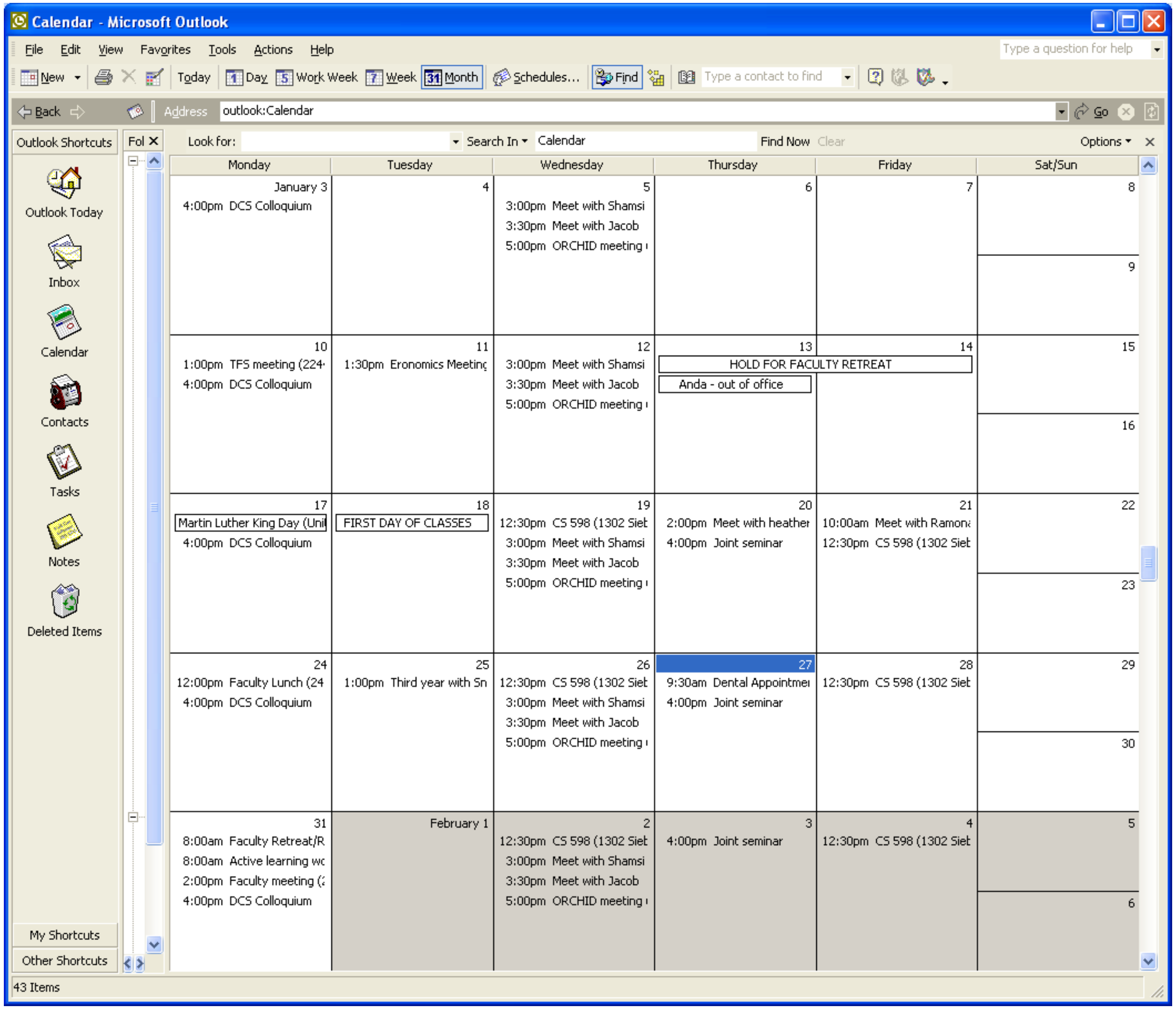
Extra line breaks in this message were removed. To restore, click here.

From: Weibin Zhao [zwb@cs.columbia.edu] <zw **To:** Henning Schulzrinne; Nevenka Dimitrova; Angela Sasse; Sue Moon; Rainer Lienhart; Yong Rui; Jon Crowcroft;

Subject: Invitation for MM'04 Organizer Lunch **Cc:**

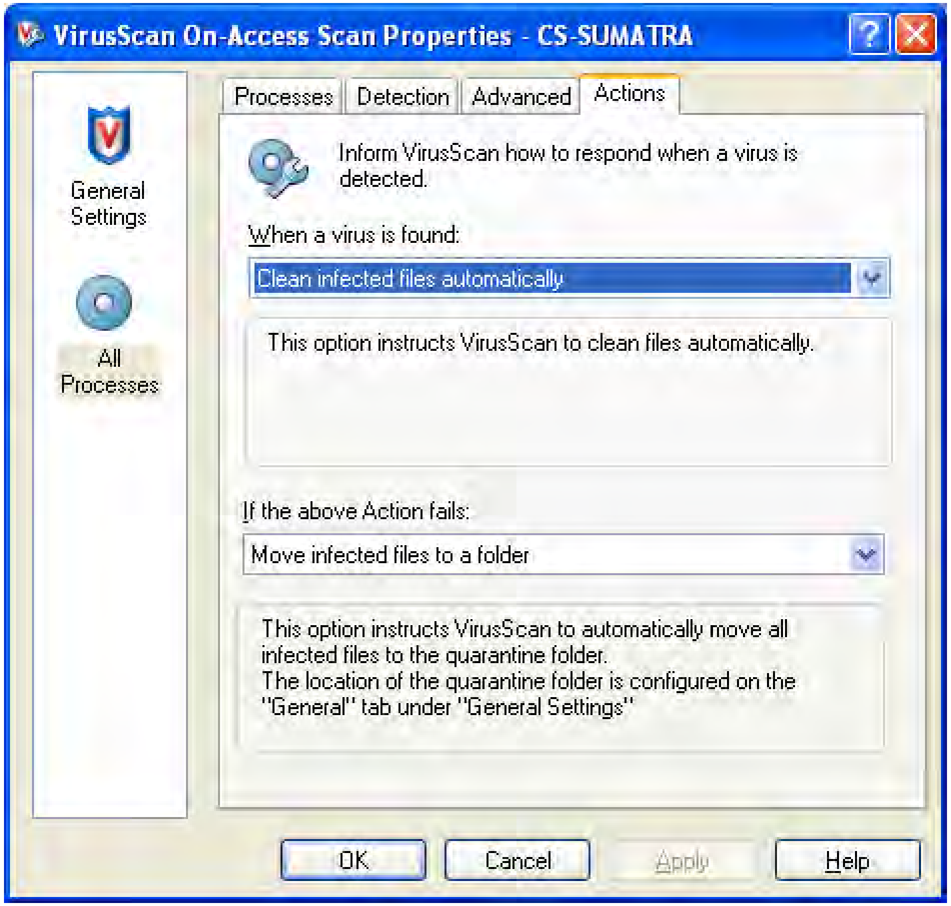
```
Dear MM'04 Organizers,

You are invited to attend the MM'04 organizer lunch on Tuesday, October 12,
2004. The schedule is as follows:

    Time:     12:30-14:00
    Location: Randolph Room (1st floor) of Faculty House at Columbia
              University
    Map:      http://www.cs.columbia.edu/~zwb/mm04-map.pdf
```

Calendar Metaphor



Monday	Tuesday	Wednesday	Thursday	Friday	Sat/Sun
January 3 4:00pm DCS Colloquium	4	5 3:00pm Meet with Shamsi 3:30pm Meet with Jacob 5:00pm ORCHID meeting	6	7	8 9
10 1:00pm TFS meeting (224 4:00pm DCS Colloquium	11 1:30pm Eronomics Meetin	12 3:00pm Meet with Shamsi 3:30pm Meet with Jacob 5:00pm ORCHID meeting	13 HOLD FOR FACULTY RETREAT Anda - out of office	14	15 16
17 Martin Luther King Day (Uni 4:00pm DCS Colloquium	18 FIRST DAY OF CLASSES	19 12:30pm CS 598 (1302 Siet 3:00pm Meet with Shamsi 3:30pm Meet with Jacob 5:00pm ORCHID meeting	20 2:00pm Meet with heather 4:00pm Joint seminar	21 10:00am Meet with Ramon 12:30pm CS 598 (1302 Siet	22 23
24 12:00pm Faculty Lunch (24 4:00pm DCS Colloquium	25 1:00pm Third year with Sn	26 12:30pm CS 598 (1302 Siet 3:00pm Meet with Shamsi 3:30pm Meet with Jacob 5:00pm ORCHID meeting	27 9:30am Dental Appointme 4:00pm Joint seminar	28 12:30pm CS 598 (1302 Siet	29 30
31 8:00am Faculty Retreat/R 8:00am Active learning wc 2:00pm Faculty meeting (4:00pm DCS Colloquium	February 1	2 12:30pm CS 598 (1302 Siet 3:00pm Meet with Shamsi 3:30pm Meet with Jacob 5:00pm ORCHID meeting	3 4:00pm Joint seminar	4 12:30pm CS 598 (1302 Siet	5 6

Health Metaphor



Inform VirusScan how to respond when a virus is detected.

When a virus is found: Clean infected files automatically

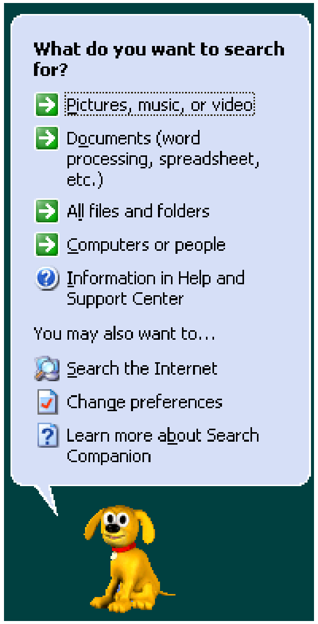
This option instructs VirusScan to clean files automatically.

If the above Action fails: Move infected files to a folder

This option instructs VirusScan to automatically move all infected files to the quarantine folder.
The location of the quarantine folder is configured on the "General" tab under "General Settings"

Shallow or Inappropriate Metaphors

Informs a small range of possibilities, or none at all



What do you want to search for?

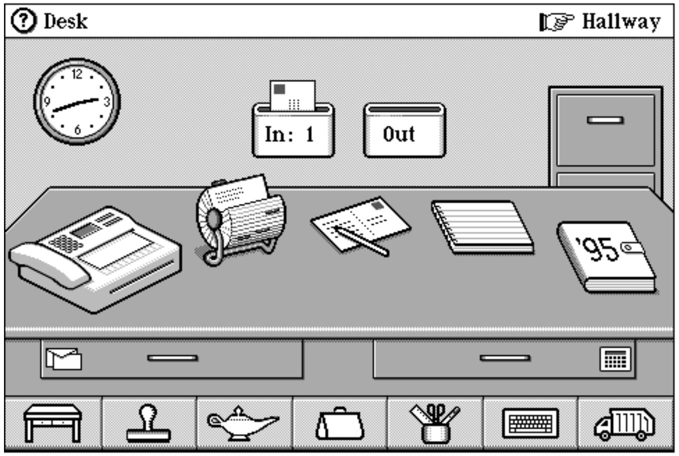
- Pictures, music, or video
- Documents (word processing, spreadsheet, etc.)
- All files and folders
- Computers or people
- Information in Help and Support Center

You may also want to...

- Search the Internet
- Change preferences
- Learn more about Search Companion

It is just a menu and a dialog box?

What does the living room add?



Magic Cap

Microsoft Bob

University of Washington

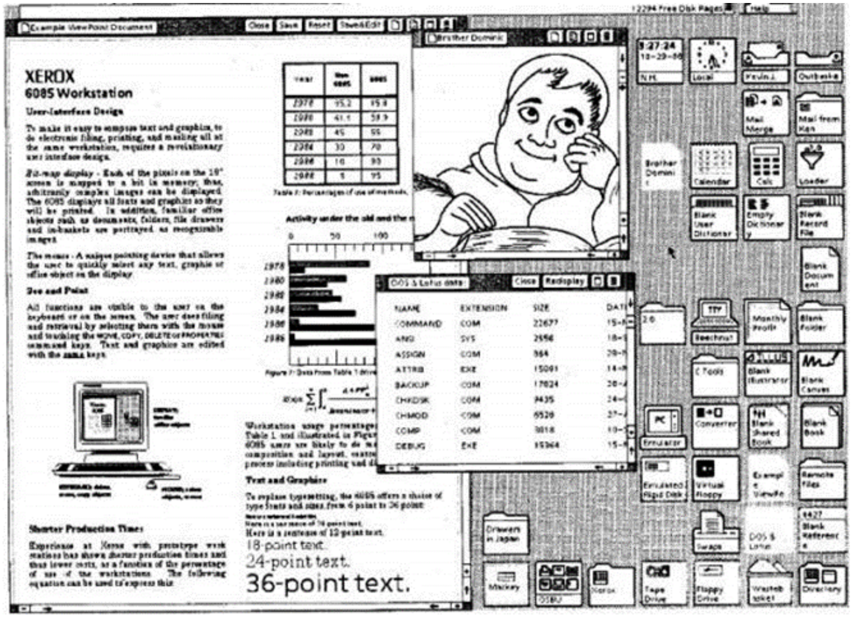
Mixed Metaphors

Two or more different metaphors coexist with some supposed relation

- The desktop metaphor
- Windows into content

Good? Bad?

Neither? Both?

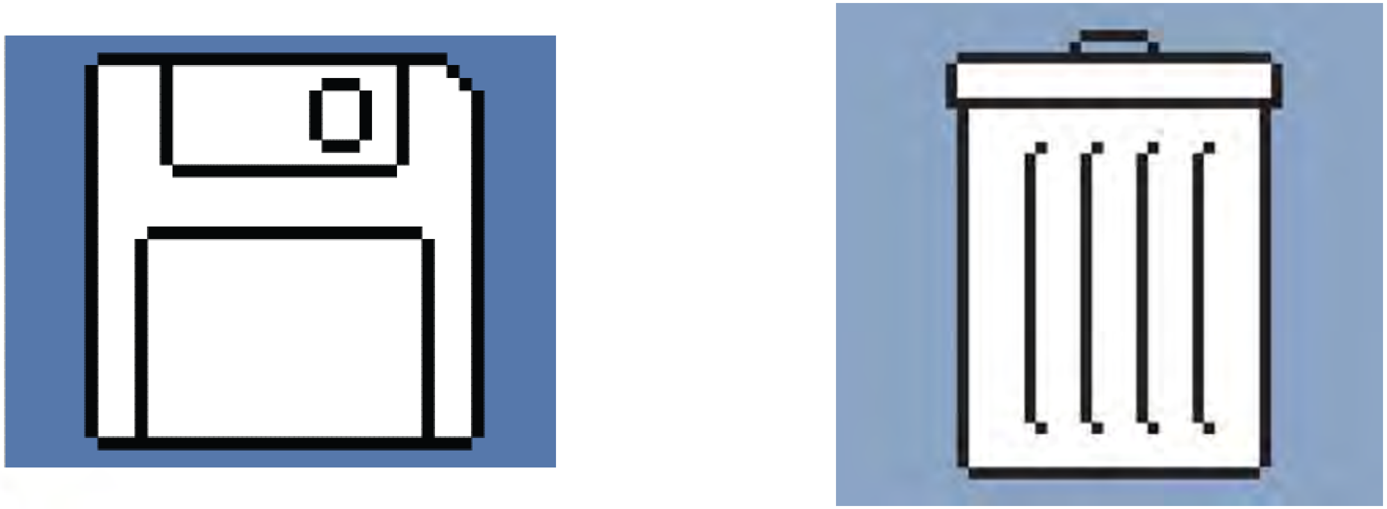


Windows are views into larger content regions

No desktop has windows

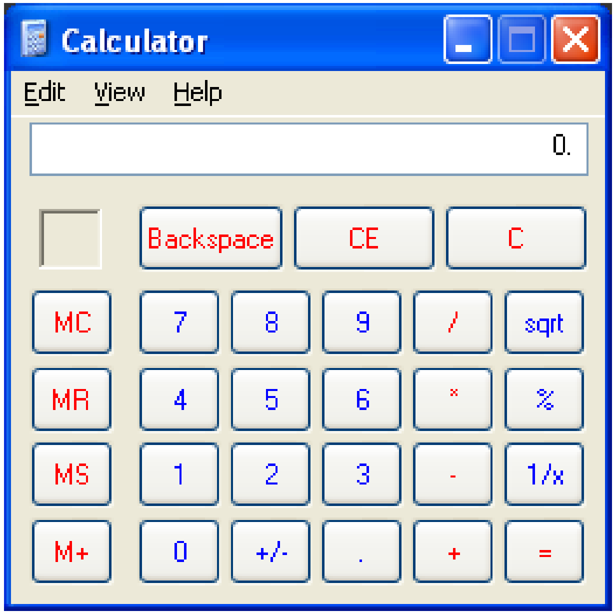
Broken Metaphors

Are not consistent, do not operate in every circumstance, or do not uphold things consistent with what the metaphor would suggest



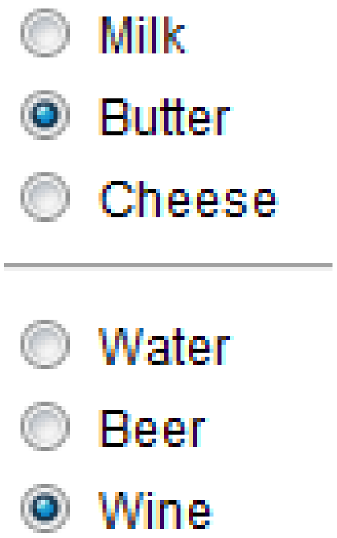
Mechanical-Age Metaphors

Operate as their mechanical-age counterparts did, not taking advantage of the digital domain to escape the limitations of the original



Dead Metaphors

Lost the original imagery of their meaning



○ Milk
● Butter
○ Cheese

○ Water
○ Beer
● Wine

Metaphors versus Idioms

Idioms

- rely on shared experience or custom
- are learned, often early in life
- are supported or revealed by context
- become conventions
- do not rely on metaphors

Idiomatic widgets (e.g., screen splitter, dragable title bar)

Single click to select, double click to open

Hyperlinks

Idioms

Star Trek IV: Scotty Uses a Mouse

Metaphors and Affordances

Affordances “jump start” a model for interaction

Metaphors “jump start” a model of a system

But if designed poorly, both can be damaging

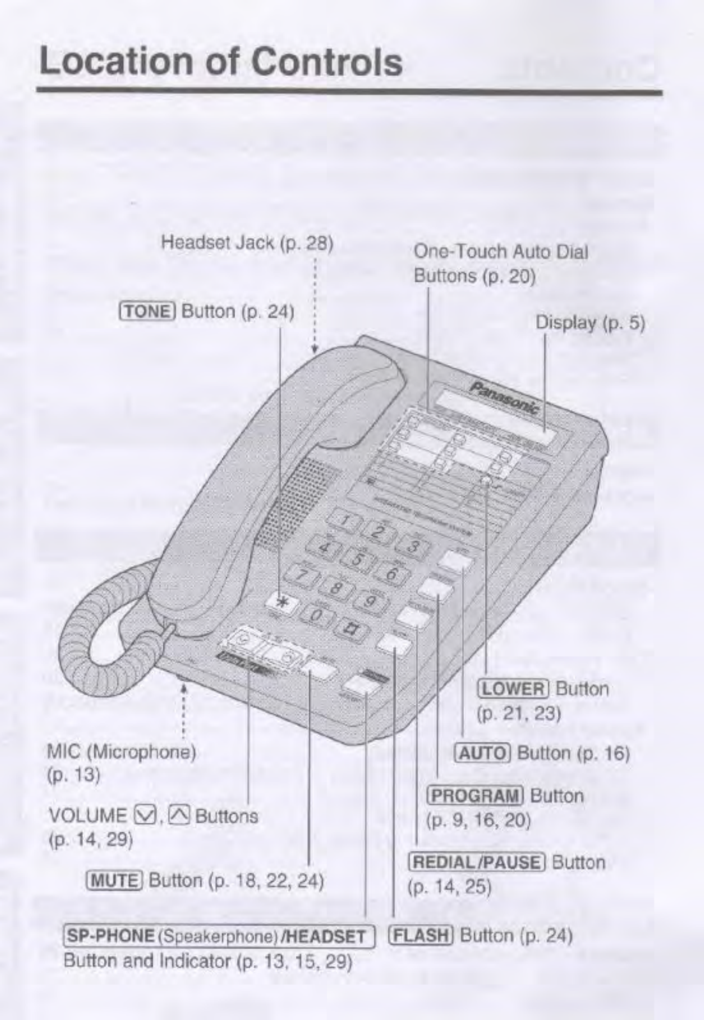
- Lead to an incorrect model, undermining interaction
- Can limit designer creativity
- Can reduce the advantages of software
- Can be “cute” at the expense of functional

Visibility

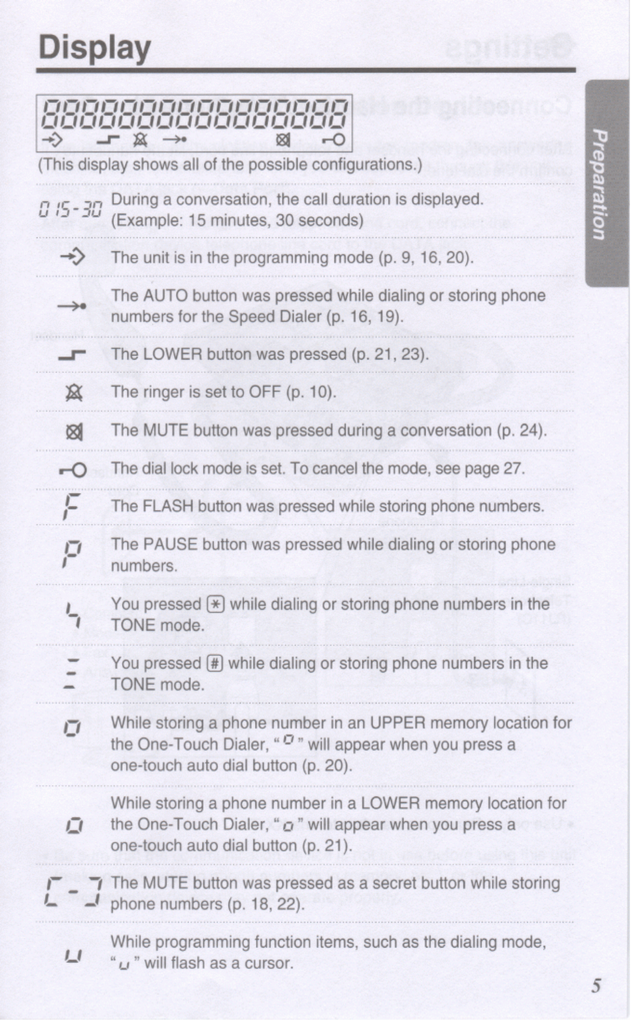
Phones

How do you
  - put somebody on hold
  - change volume

Visibility



Location of Controls



Display

888888888888888
→ ⌐ ⍉ →• ⊠ ⊸

(This display shows all of the possible configurations.)

0 15-30	During a conversation, the call duration is displayed. (Example: 15 minutes, 30 seconds)
→	The unit is in the programming mode (p. 9, 16, 20).
→•	The AUTO button was pressed while dialing or storing phone numbers for the Speed Dialer (p. 16, 19).
⌐	The LOWER button was pressed (p. 21, 23).
⍉	The ringer is set to OFF (p. 10).
⊠	The MUTE button was pressed during a conversation (p. 24).
⊸	The dial lock mode is set. To cancel the mode, see page 27.
F	The FLASH button was pressed while storing phone numbers.
P	The PAUSE button was pressed while dialing or storing phone numbers.
ч	You pressed ⊛ while dialing or storing phone numbers in the TONE mode.
≡	You pressed ⊞ while dialing or storing phone numbers in the TONE mode.
▫	While storing a phone number in an UPPER memory location for the One-Touch Dialer, " ▫ " will appear when you press a one-touch auto dial button (p. 20).
o	While storing a phone number in a LOWER memory location for the One-Touch Dialer, " o " will appear when you press a one-touch auto dial button (p. 21).
[-]	The MUTE button was pressed as a secret button while storing phone numbers (p. 18, 22).
ᴗ	While programming function items, such as the dialing mode, " ᴗ " will flash as a cursor.

5

Visibility

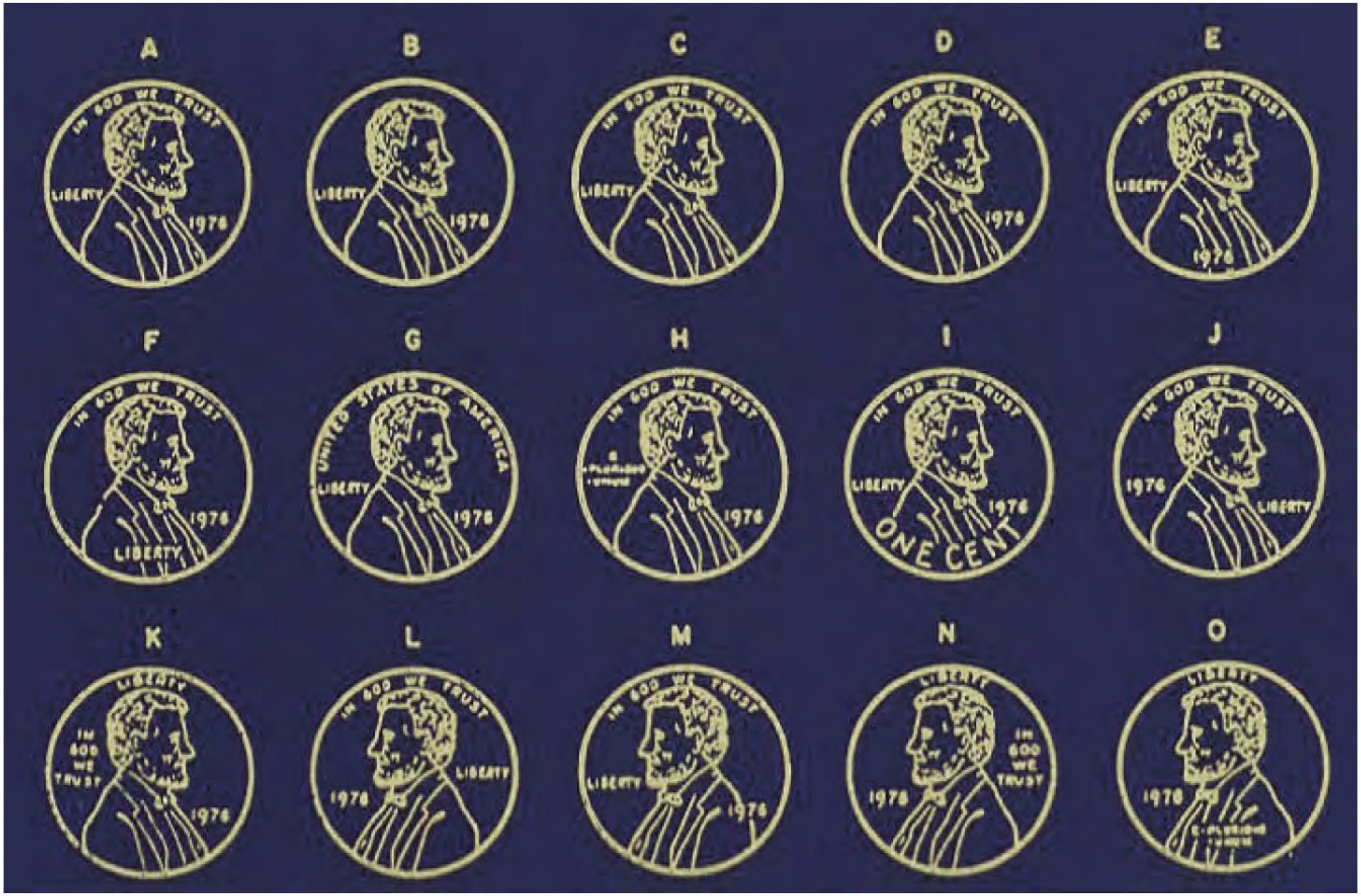
Changing Ringer Volume

- Press “Program”
- Press “6”
- Set Volume
  - Low - Press “1”
  - Medium - Press “2”
  - High - Press “3”
- Press “Program”

Visibility

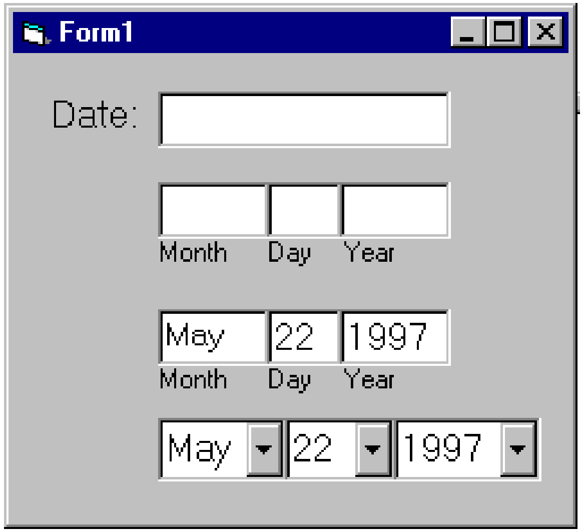
- Controls available on watch with 3 buttons?
  - Too many and they are not visible
- Compare to controls on simple car radio
  - Number of controls ≈ Number of functions
  - Controls are labeled and grouped together

Knowledge in the World



Constraints

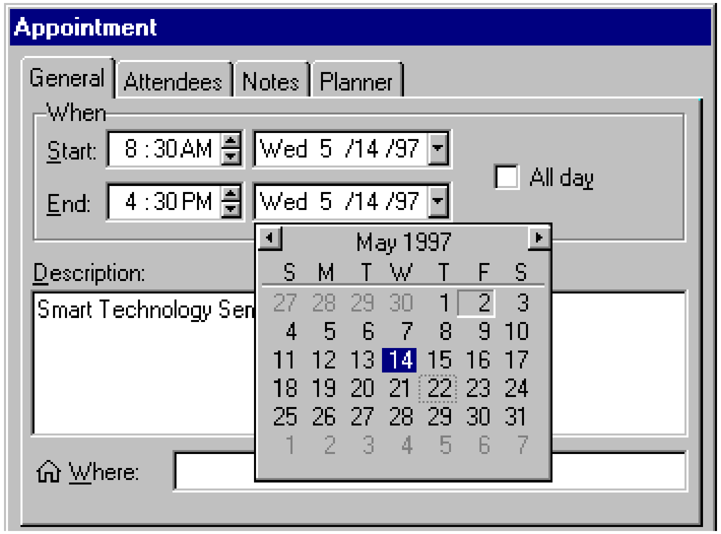
Prevent some actions while allowing others



Date:

May 22 1997

May 22 1997



Start: 8 :30 AM Wed 5 /14 /97

End: 4 :30 PM Wed 5 /14 /97

☐ All day

Description: Smart Technology Sem

May 1997

S	M	T	W	T	F	S
27	28	29	30	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
1	2	3	4	5	6	7

Prevent errors before they can happen

Disruptive error messages are a last resort

Constraints

Constraints

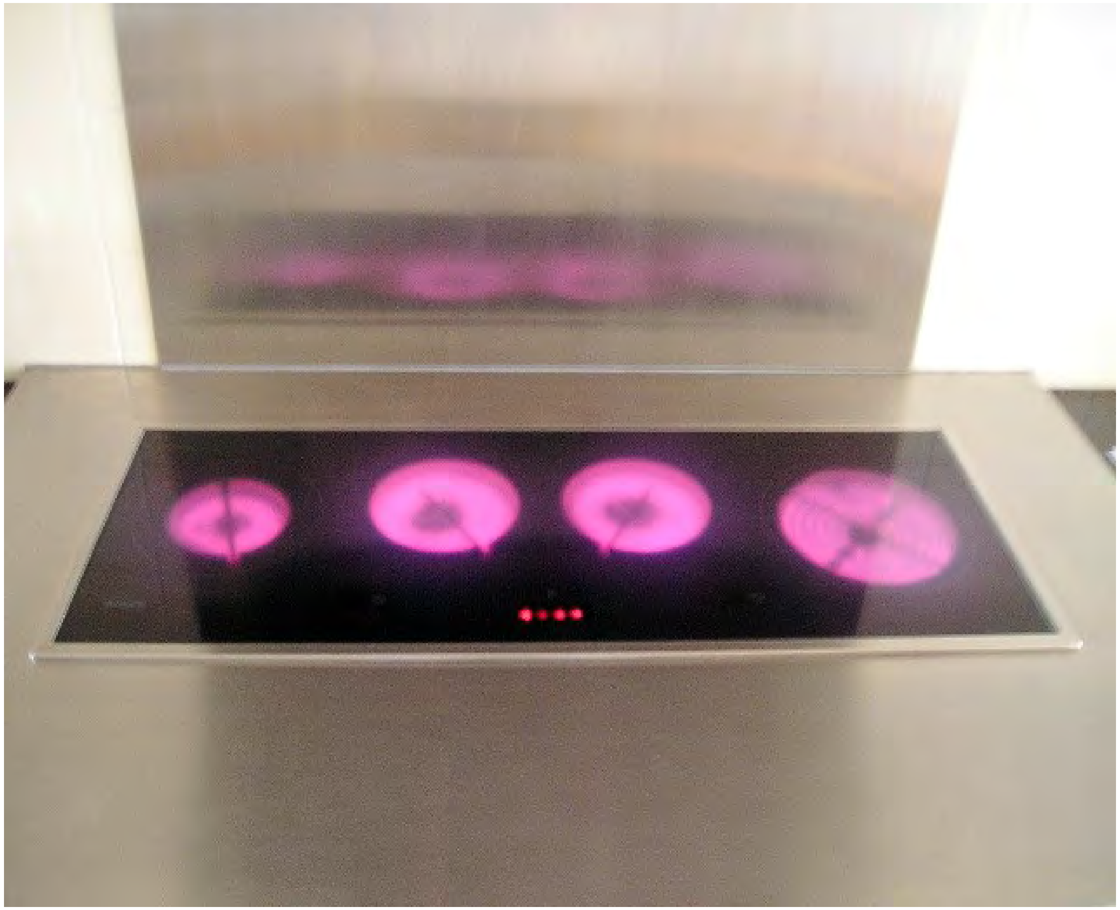
Constraints

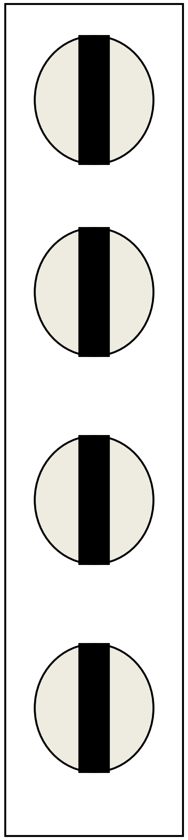
Mapping

Correspondence between an interface and the corresponding action in ‘the world’

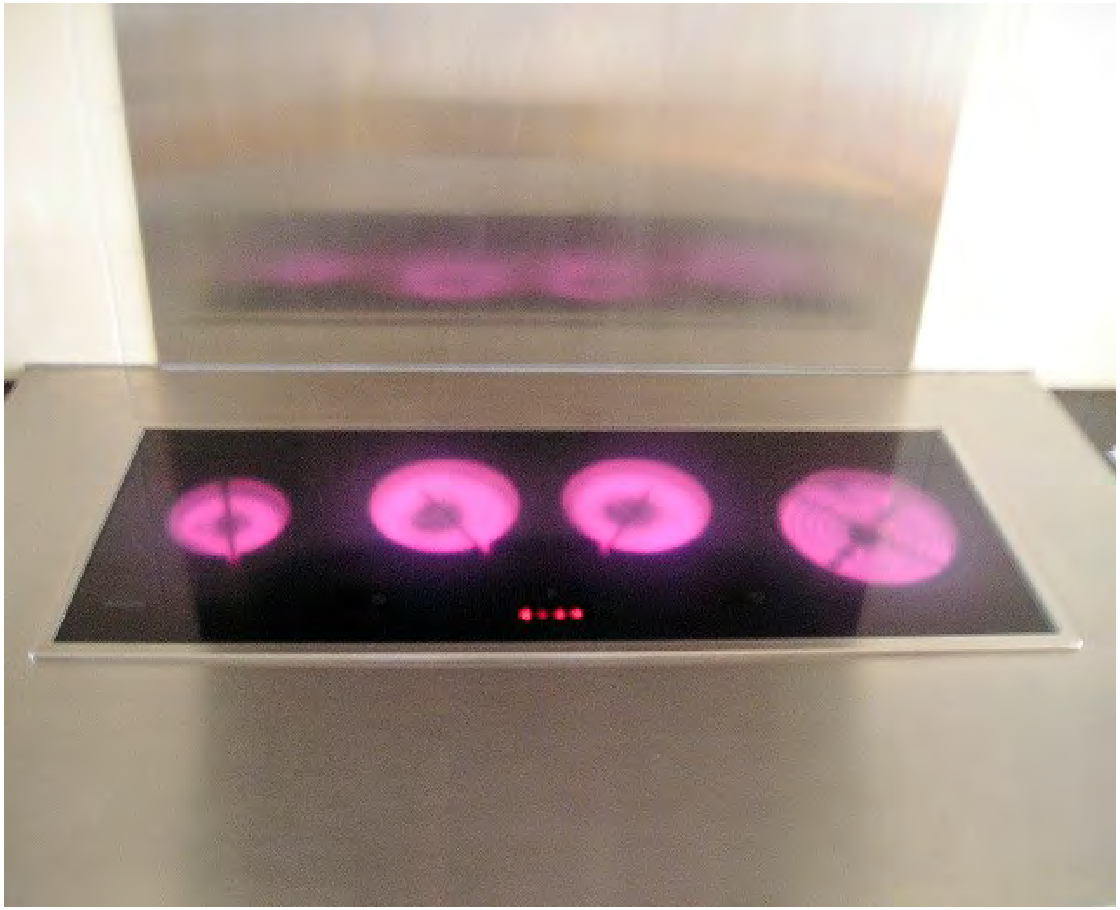
Minimize cognitive steps to transform action into effect, or perception into comprehension (i.e., execution and evaluation)

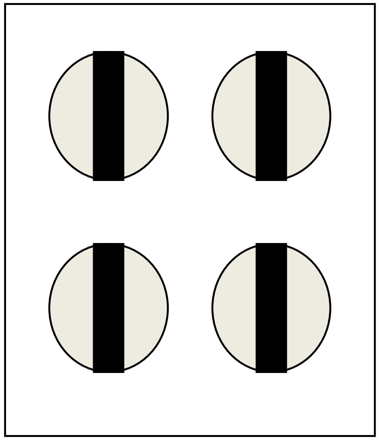
Very Bad Mapping





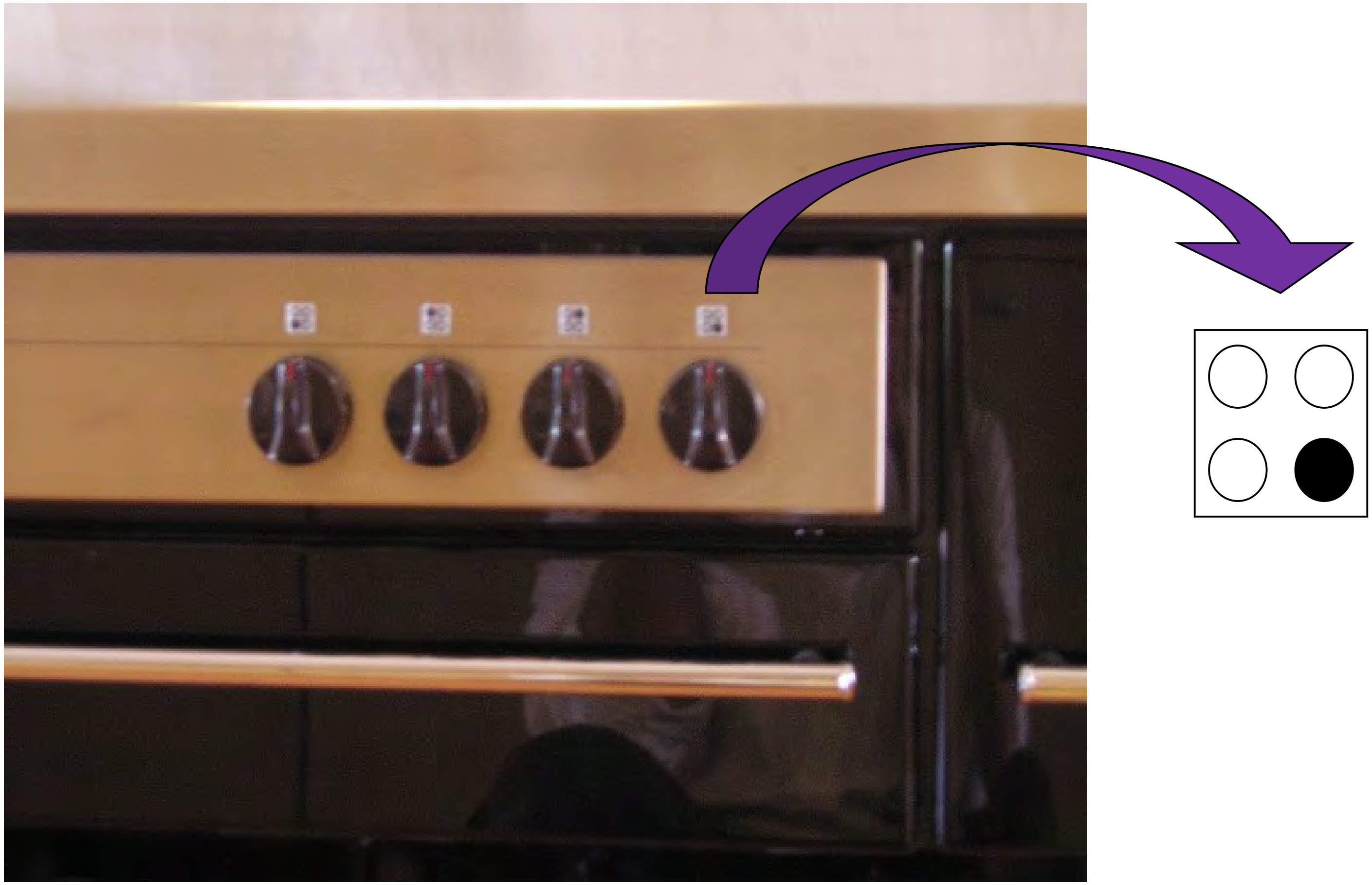
Slightly Better Mapping



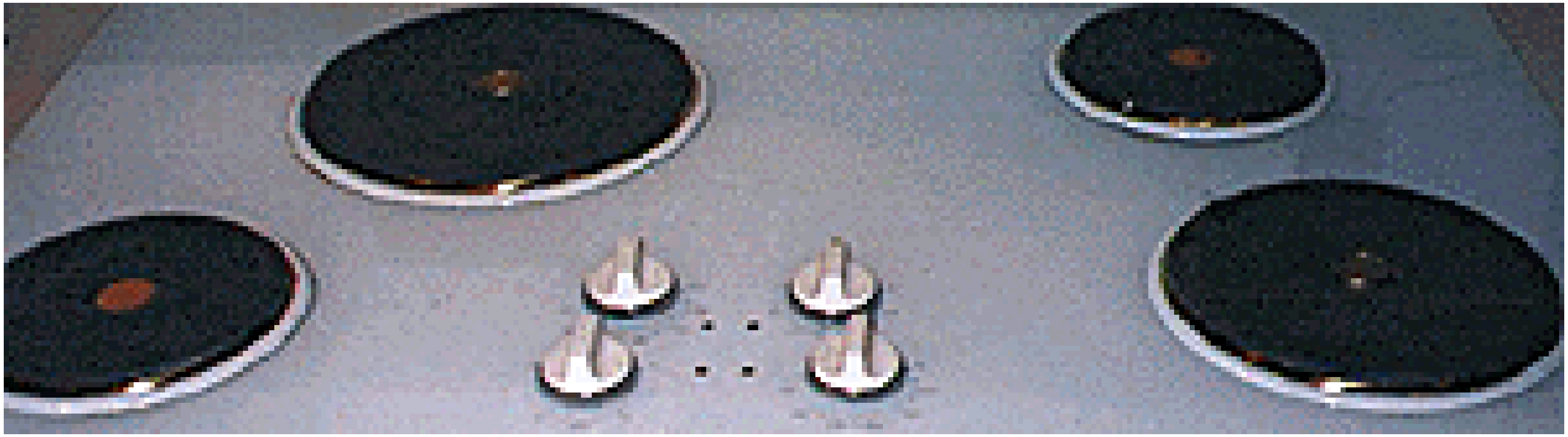


Good Mapping

Not this Stove



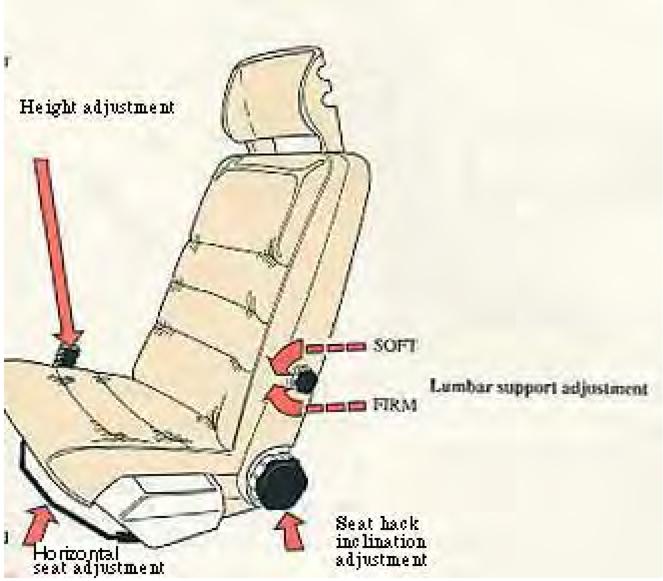
Great Mapping

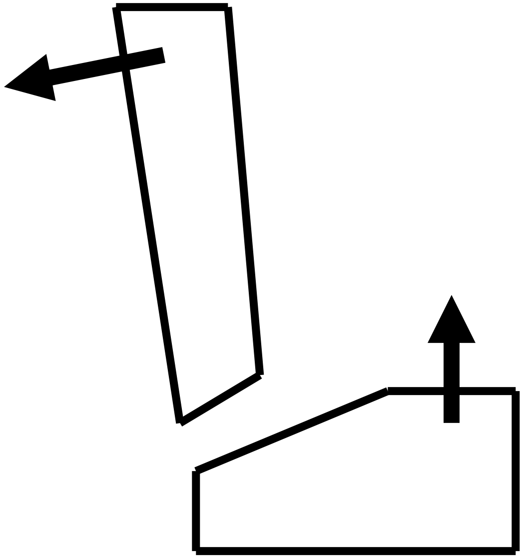


Mapping

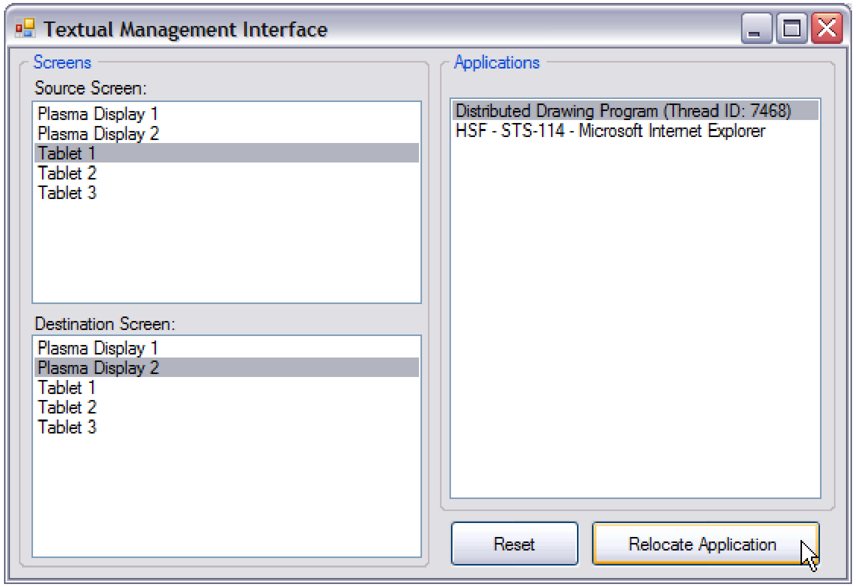

500 EURO
500
200 EURO
200
100 EURO
100
10 EURO
10
50 EURO CENT
20 EURO CENT
10 EURO CENT

Mapping


Height adjustment
SOFT
Lumbar support adjustment
FIRM
Horizontal seat adjustment
Seat back inclination adjustment



Mapping



Textual Management Interface

Screens

Source Screen:

- Plasma Display 1
- Plasma Display 2
- Tablet 1
- Tablet 2
- Tablet 3

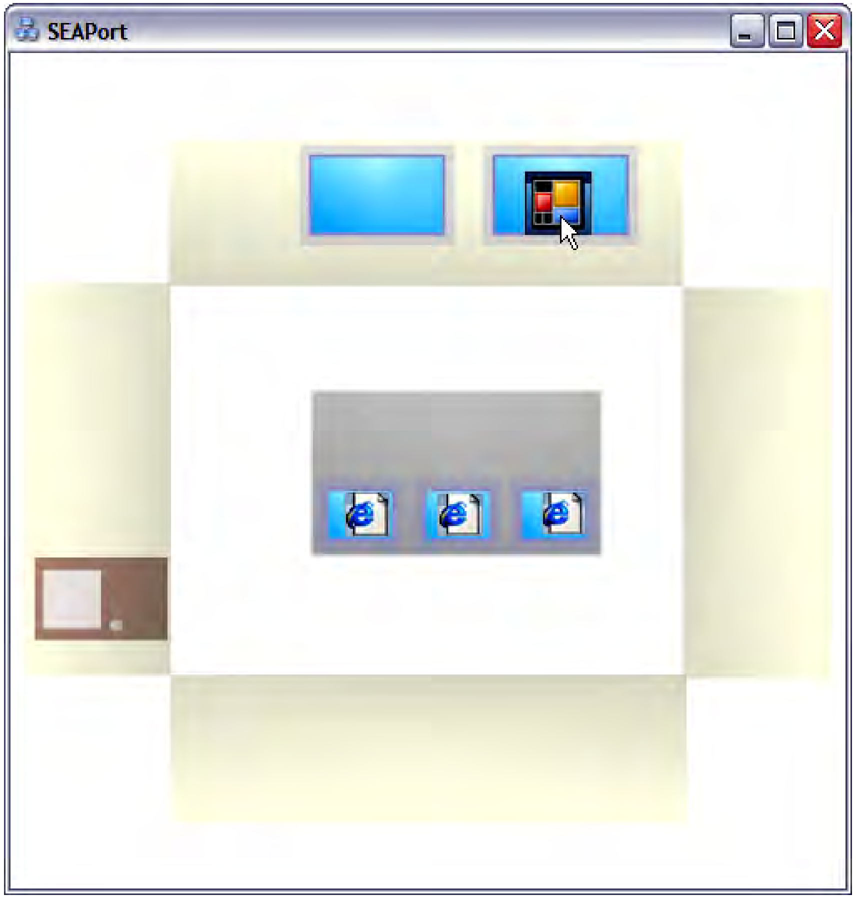
Destination Screen:

- Plasma Display 1
- Plasma Display 2
- Tablet 1
- Tablet 2
- Tablet 3

Applications

- Distributed Drawing Program (Thread ID: 7468)
- HSF - STS-114 - Microsoft Internet Explorer

Mapping



Consistency

Interfaces should be consistent in meaningful ways

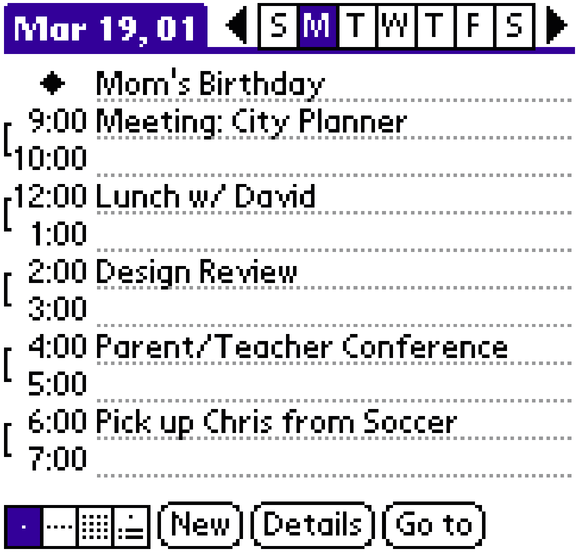
- Ubiquitous use of same keys for cut/copy/ paste

Types of consistency

- Internal (i.e., within itself)
  - e.g., same terminology and layout throughout
- External (i.e., with other applications)
  - e.g., common widget appearance
  - e.g., design patterns common across applications

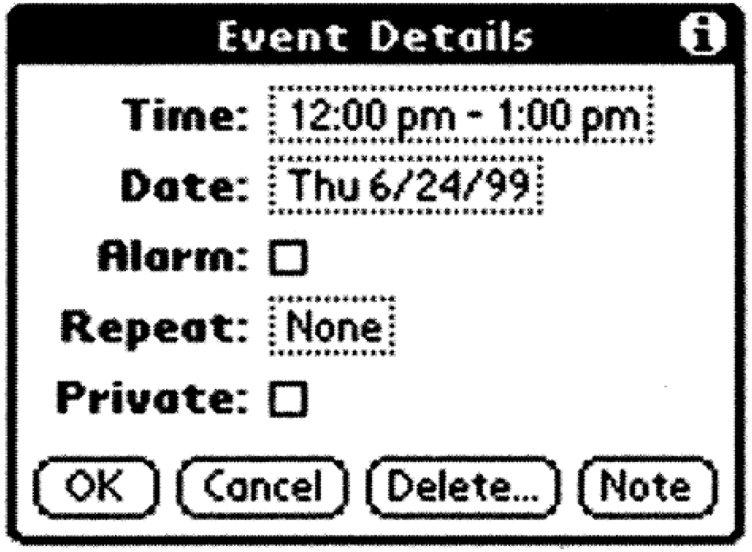
Is Consistent Always Better?

Should “new” & “delete” be in the same place?



Mar 19, 01 ◀ S M T W T F S ▶

◆ Mom's Birthday
9:00 Meeting: City Planner
10:00
12:00 Lunch w/ David
1:00
2:00 Design Review
3:00
4:00 Parent/Teacher Conference
5:00
6:00 Pick up Chris from Soccer
7:00

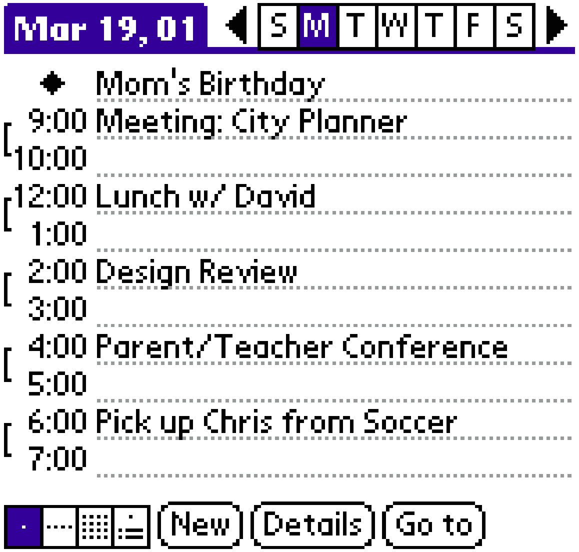


Event Details

Time: 12:00 pm - 1:00 pm
Date: Thu 6/24/99
Alarm: ☐
Repeat: None
Private: ☐

Is Consistent Always Better?

Should “new” & “delete” be in the same place?



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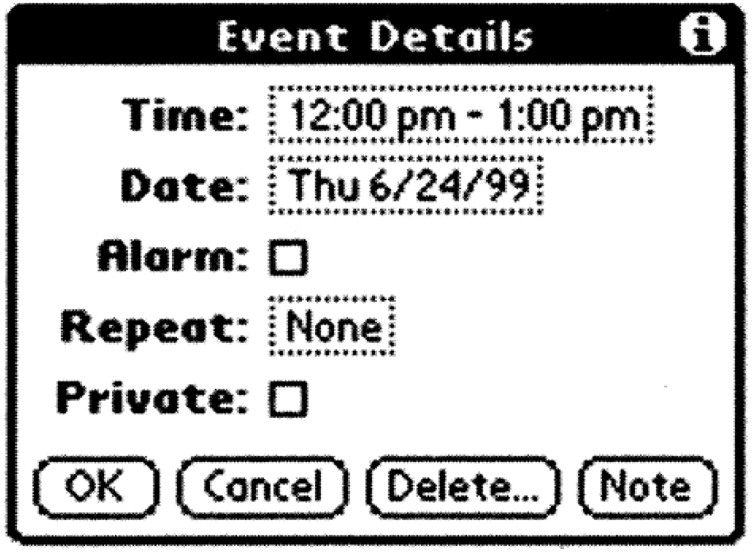


Time: 12:00 pm - 1:00 pm
Date: Thu 6/24/99
Alarm: ☐
Repeat: None
Private: ☐

New is common, delete is not

Is Consistent Always Better?

Event Details

Time: 12:00 pm - 1:00 pm

Date: Thu 6/24/99

Alarm: ☐

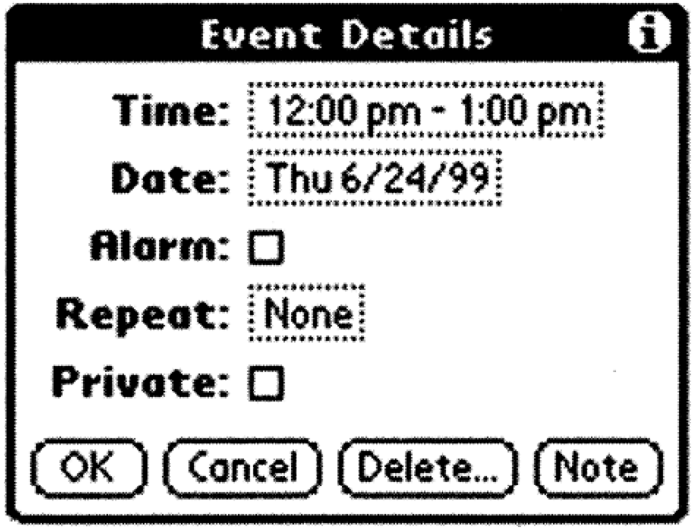
Repeat: None | Day | **Week** | Month | Year

Every: 1 **week(s)**

End on: ▼ No End Date

Repeat on: S | M | T | W | **T** | F | S

Private: ☐



Event Details

Time: 12:00 pm - 1:00 pm

Date: Thu 6/24/99

Alarm: ☐

Repeat: None

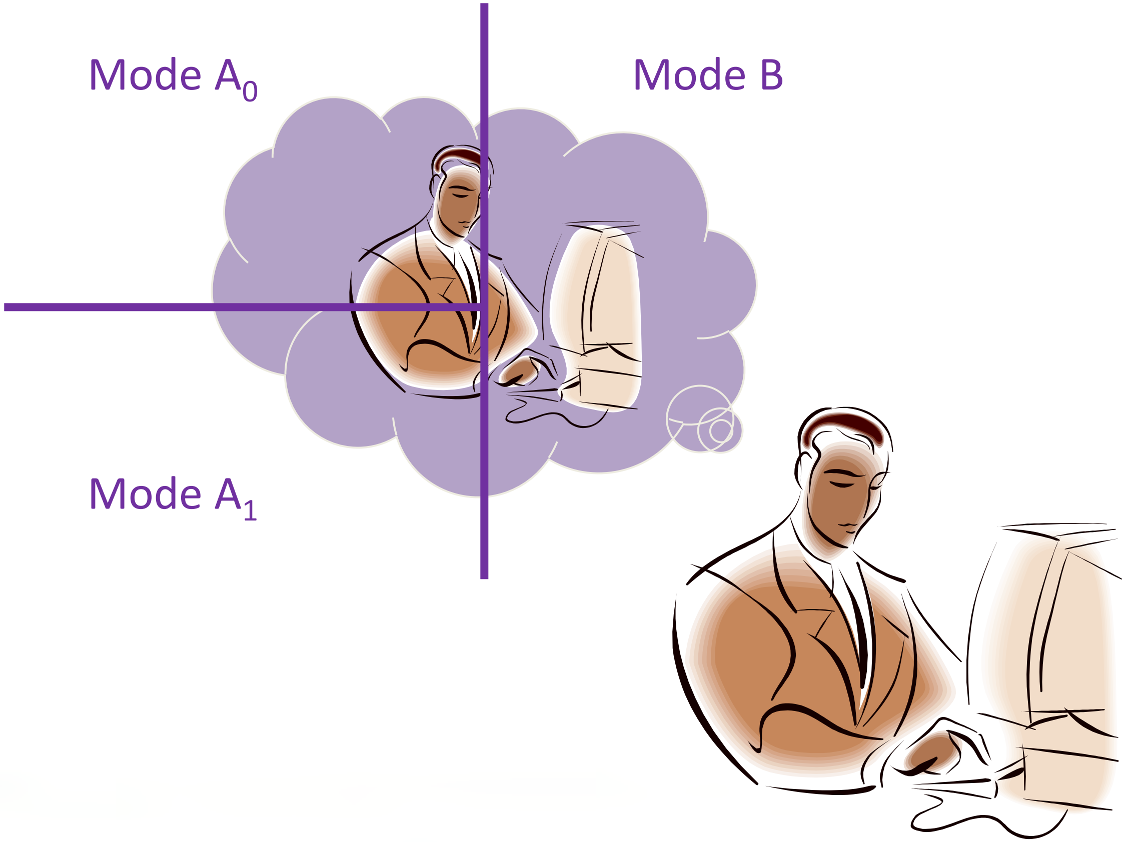
Private: ☐

Is Consistency Always Better?

Is Consistency Always Better?

Modes

Modes force people to divide their model



Active versus Passive Modes

Active modes require constant action to maintain

- Once that action has retired, so does the mode
- e.g., Shift

Passive modes require action to set, and a separate action to unset, or to set again

- e.g., CAPS LOCK

Active modes are generally preferred

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Standardization

If all else fails, standardize

- Fewer things to memorize
- Reduced learning time
- Adapt to new situations faster

e.g., keyboard layout not optimal, but standard

Norman’s Seven Principles for Design

Use knowledge in the head and in the world

Simplify the structure of tasks

Making things visible

Get the mappings right

Exploit the power of constraints

Design for error

When all else fails, standardize

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 02:
Design of Everyday Things

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

dub design: use: build:

University of Washington

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 03:
Contextual Inquiry

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

dub design: use: build:

University of Washington

Amazing Color Changing Card Trick

The colour changing card trick

Why did I show you that?

If we’re focusing on the wrong thing,
we can completely miss other important things

Our assumptions and pre-conceptions play a huge role in how we focus our attention

Today is about this danger when understanding the context for which you design technology

"You Are Not the Customer"

Seems obvious, but…

- You have different experiences
- You have different terminology
- You have different ways of looking at the world

Easy to think of self as typical customer

Easy to make mistaken assumptions

Ethnography

Traditional science attempts to understand a group or individual objectively

Understand the subject of study from the outside
in a way that can be explained to "anyone"

Ethnography attempts to understand a group or individual phenomenologically

Understand the subject of study
as the subject of study understands itself

Ethnography

Emerged in 1920s as a new anthropology method, exploring why groups think and act as they do

Learn local language, record myths, customs, and ceremonies in much greater detail than prior work

You will likely never perform an ethnography

Four ethnographic principles

Natural settings

Holism

Descriptive

Member point-of-view

Four ethnographic principles

Natural Settings

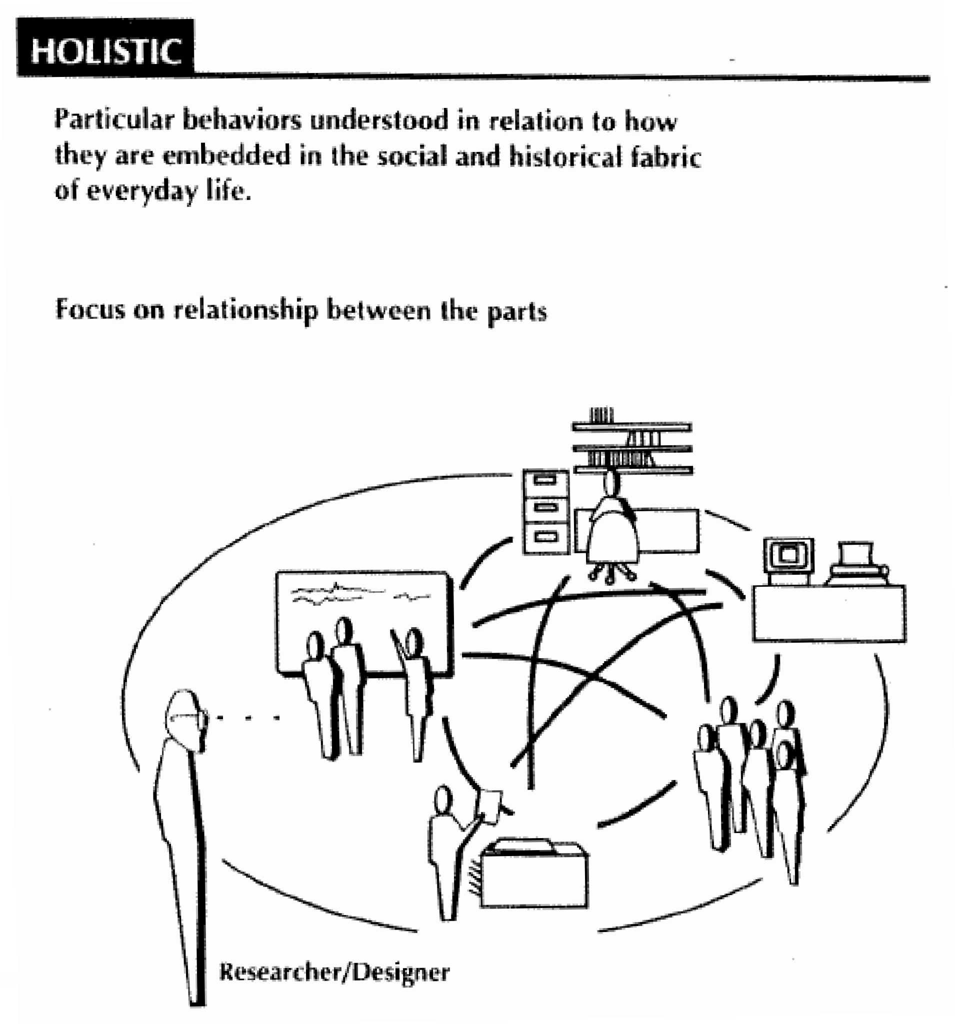
- Conducted in the setting of the participant
- Focus on naturally occurring, everyday action
- Cannot use laboratory or experimental settings to gather this type of data

You really do have to go out there and see it

Four ethnographic principles

Holism

Behavior can only be understood in its larger social context; that is, holistically.



HOLISTIC

Particular behaviors understood in relation to how they are embedded in the social and historical fabric of everyday life.

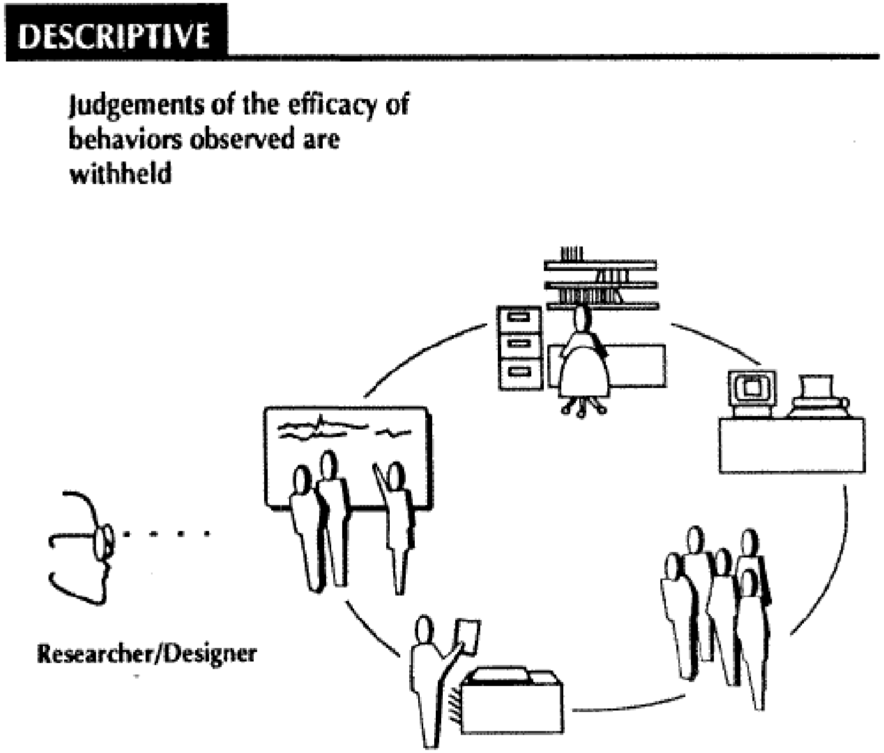
Focus on relationship between the parts

Four ethnographic principles

Descriptive

Study how people actually behave, not how they ought to behave.

Defer judgment.



DESCRIPTIVE

Judgements of the efficacy of behaviors observed are withheld

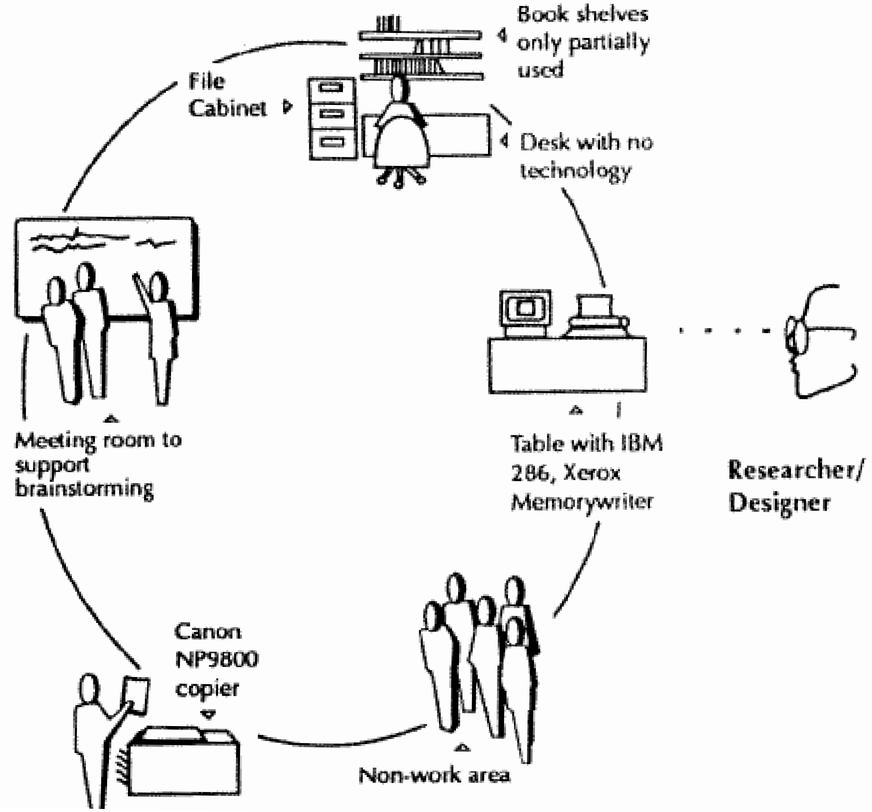
Four ethnographic principles

Member Point-of-View

See through participant eyes in order to grasp how they interpret and act in their world.

Contrasted With

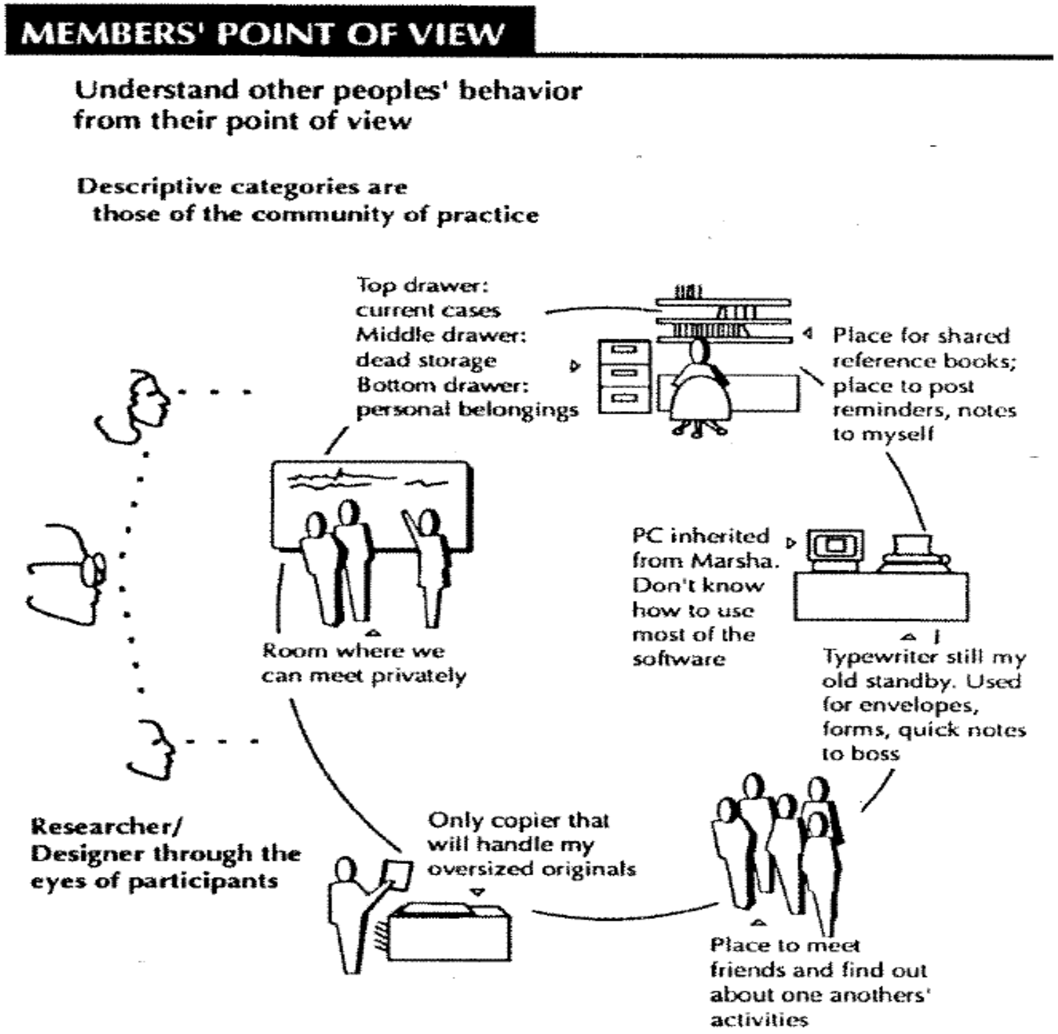
Descriptive categories are those of the researcher



Four ethnographic principles

Member Point-of-View

See through participant eyes in order to grasp how they interpret and act in their world.



MEMBERS' POINT OF VIEW

Understand other peoples' behavior from their point of view

Descriptive categories are those of the community of practice

Design Ethnography

Quicker than traditional ethnography

- Days, weeks, or months, not years

Sometimes “concurrent ethnography”

- The ethnography is being done at the same time that design is under way

Goal is to generate insights informing design

Translating from raw field observation to design ideas can be a difficult process

Contextual Inquiry

Applied design ethnography

“The core premise of Contextual Inquiry is very simple: go where the customer works, observe the customer as he or she works, and talk to the customer about the work. Do that, and you can’t help but gain a better understanding of your customer.”

Hugh Beyer and Karen Holtzblatt

User, Subject, or Participant?

Only two groups refer to their customers as users

In traditional science, “subjects” are “subjected to” experiments as a researcher develops understanding

In ethnographically-oriented design methods, “participants” instead “participate” in helping the researcher develop understanding

This isn’t simple PC, it’s a mindset that matters

What is your relationship?

In a scientist/subject relationship:

- The scientist does stuff
- The subject responds in some way
- The scientist collects data, goes back to their office, and analyzes the data to gain understanding

This is not very appropriate for gaining phenomenological understanding

What is your relationship?

In an interviewer/interviewee relationship:

- The interviewer asks a question
- The interviewee responds immediately
- At a pause, the interviewer asks another question from a list
- When all the questions are answered, the interview is over

This would only be appropriate for gaining phenomenological understanding if you knew what questions to ask in advance

Implying you have phenomenological understanding

What is your relationship?

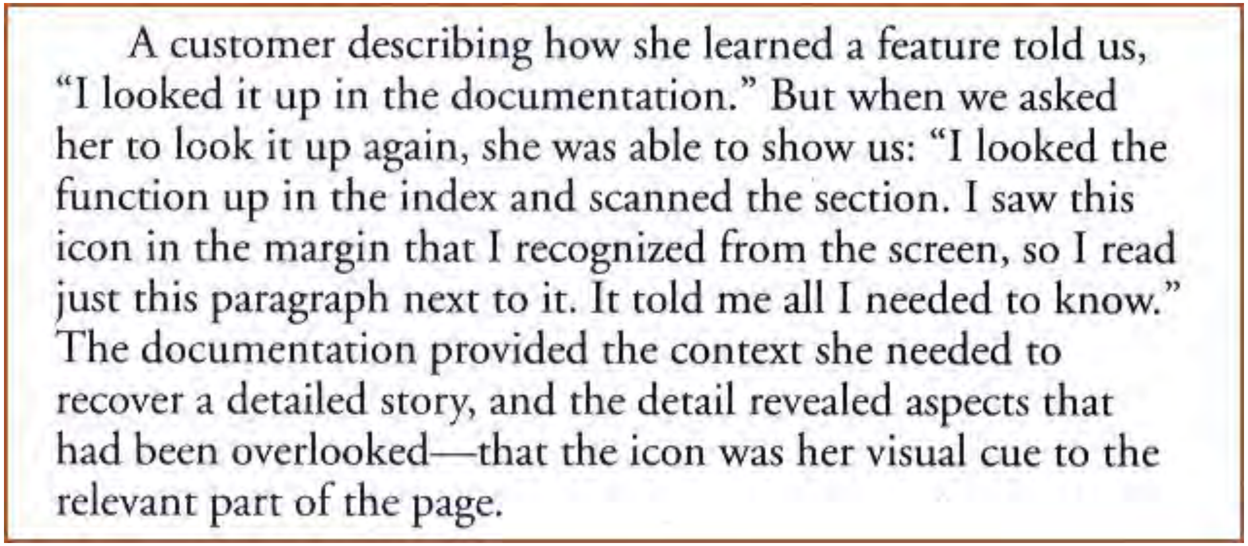
In a master/apprentice relationship:

- The master is doing stuff
- The master explains what they're doing
- The apprentice asks clarification questions
- The master answers

This relationship is at the heart of contextual inquiry

Master/Apprentice Relationship

- Seeing the work reveals structure
  - Many instances and many interviews reveal the picture
- Every current activity recalls past instances



A customer describing how she learned a feature told us, "I looked it up in the documentation." But when we asked her to look it up again, she was able to show us: "I looked the function up in the index and scanned the section. I saw this icon in the margin that I recognized from the screen, so I read just this paragraph next to it. It told me all I needed to know." The documentation provided the context she needed to recover a detailed story, and the detail revealed aspects that had been overlooked—that the icon was her visual cue to the relevant part of the page.

Unique or One of Many?

“Take the attitude that nothing any person does is done for no reason; if you think it’s for no reason, you don’t yet understand the point of view from which it makes sense. Take the attitude that nothing any person does is unique to them, it always represents an important class of customers whose needs will not be met if you don’t figure out what’s going on.”

(p. 63, Contextual Design)

It’s not Quite Master/Apprentice

The goal is not to learn to do the task

Instead, the goal is to learn how the participant does the task in order to learn how to support it

And for the researcher to enlist the participant’s active assistance in understanding the task

Principles of Contextual Inquiry

Context

Must be done in the setting of the participant.

Partnership

Master/apprentice model; investigator is humble.

Interpretation

Observed facts must be regarded for their design implications. Raw facts without interpretation are not very useful.

Focus

Themes that emerge during the inquiry. You cannot pay attention to all facets of someone’s work at all times.

Context

Go to the workplace & see the work as it unfolds

People summarize, but we want details

Keep it concrete when people start to abstract

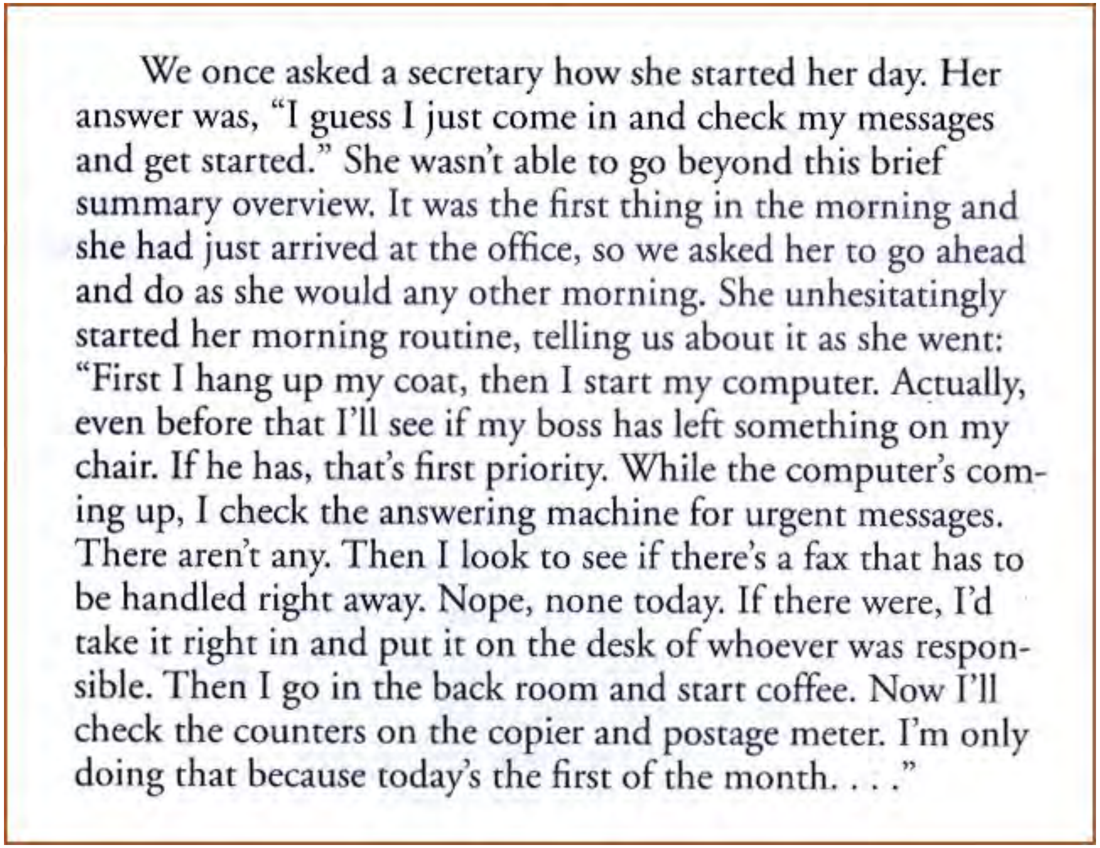
"Do you have one? May I see it?"

6/13/2002

6/13/2002

Context

Avoid summary data by watching work unfold



We once asked a secretary how she started her day. Her answer was, "I guess I just come in and check my messages and get started." She wasn't able to go beyond this brief summary overview. It was the first thing in the morning and she had just arrived at the office, so we asked her to go ahead and do as she would any other morning. She unhesitatingly started her morning routine, telling us about it as she went: "First I hang up my coat, then I start my computer. Actually, even before that I'll see if my boss has left something on my chair. If he has, that's first priority. While the computer's coming up, I check the answering machine for urgent messages. There aren't any. Then I look to see if there's a fax that has to be handled right away. Nope, none today. If there were, I'd take it right in and put it on the desk of whoever was responsible. Then I go in the back room and start coffee. Now I'll check the counters on the copier and postage meter. I'm only doing that because today's the first of the month. . . ."

Have them think aloud..

Context

“One customer said he would not use a manual’s index to find the solution to a problem: ‘It’s never in the index.’ He could not say what led him to this conclusion, what he had looked up and failed to find. All his bad experiences were rolled up into one simple abstraction: it’s not there. But when we watched him looking things up, we could see that he was using terms from his work domain, but the index listed parts of the system.”

Context

“A customer was unable to describe how she made her monthly report. When asked to create it, she pulled out her last report and started filling in the parts.”

Context

Ground in an instance

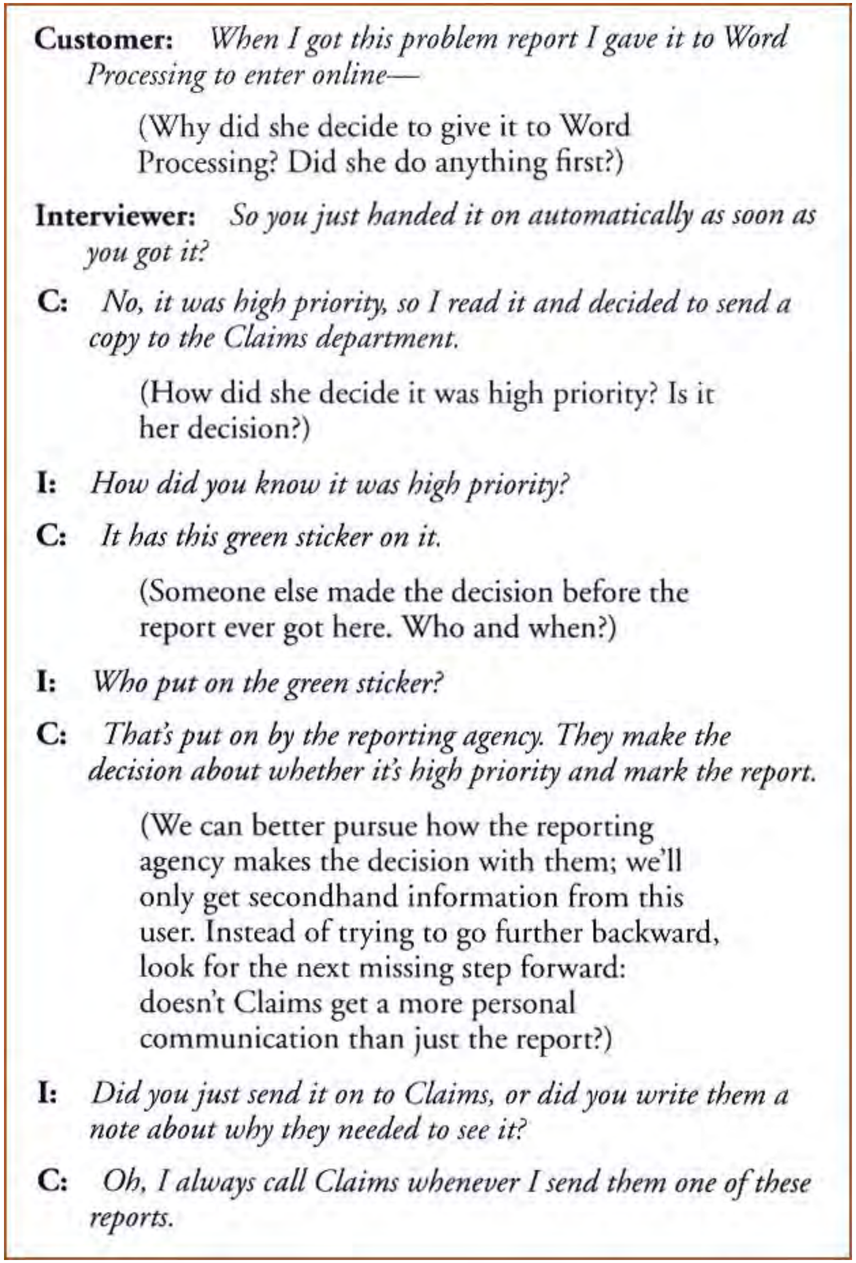
Span time by replaying past events in detail

Look for holes

Ask questions to fill them

Use artifacts for context

If story has not yet ended, go back to a story that did



Customer: *When I got this problem report I gave it to Word Processing to enter online—*

(Why did she decide to give it to Word Processing? Did she do anything first?)

Interviewer: *So you just handed it on automatically as soon as you got it?*

C: *No, it was high priority, so I read it and decided to send a copy to the Claims department.*

(How did she decide it was high priority? Is it her decision?)

I: *How did you know it was high priority?*

C: *It has this green sticker on it.*

(Someone else made the decision before the report ever got here. Who and when?)

I: *Who put on the green sticker?*

C: *That's put on by the reporting agency. They make the decision about whether it's high priority and mark the report.*

(We can better pursue how the reporting agency makes the decision with them; we'll only get secondhand information from this user. Instead of trying to go further backward, look for the next missing step forward: doesn't Claims get a more personal communication than just the report?)

I: *Did you just send it on to Claims, or did you write them a note about why they needed to see it?*

C: *Oh, I always call Claims whenever I send them one of these reports.*

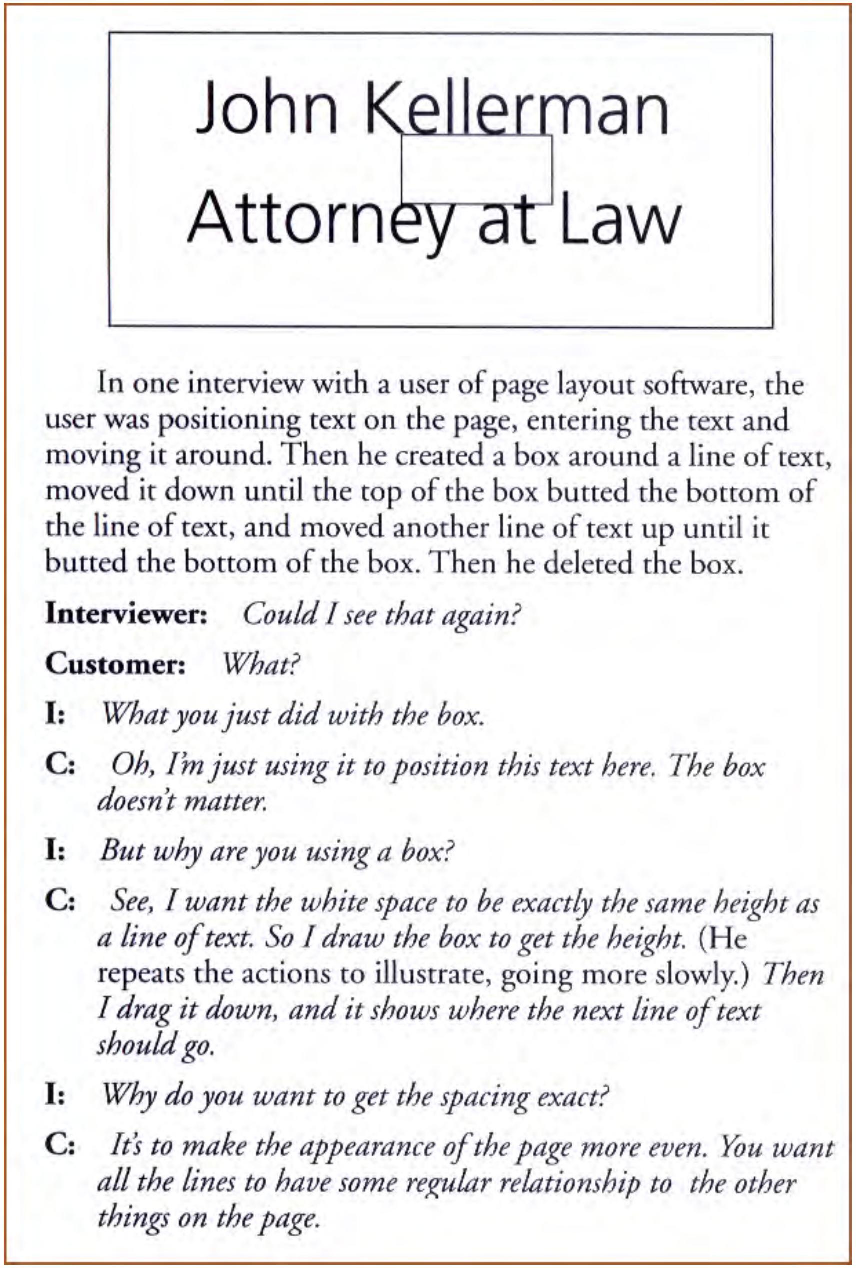
Partnership

- Traditionally, interviewer has too much power
  - You don’t know what will turn out to be important
- Apprenticeship model tilts power back too far
  - You aren’t there to learn the skill
- Interviewer should create a partnership
  - Alternate between watching and probing

Partnership

Withdrawal and return

- Researcher observes action that indicates something meaningful
- The researcher asks about this, and the pair withdraw from the task
- Discuss the question
- Then return to the task



John Kellerman
Attorney at Law

In one interview with a user of page layout software, the user was positioning text on the page, entering the text and moving it around. Then he created a box around a line of text, moved it down until the top of the box butted the bottom of the line of text, and moved another line of text up until it butted the bottom of the box. Then he deleted the box.

Interviewer: *Could I see that again?*

Customer: *What?*

I: *What you just did with the box.*

C: *Oh, I'm just using it to position this text here. The box doesn't matter.*

I: *But why are you using a box?*

C: *See, I want the white space to be exactly the same height as a line of text. So I draw the box to get the height.* (He repeats the actions to illustrate, going more slowly.) *Then I drag it down, and it shows where the next line of text should go.*

I: *Why do you want to get the spacing exact?*

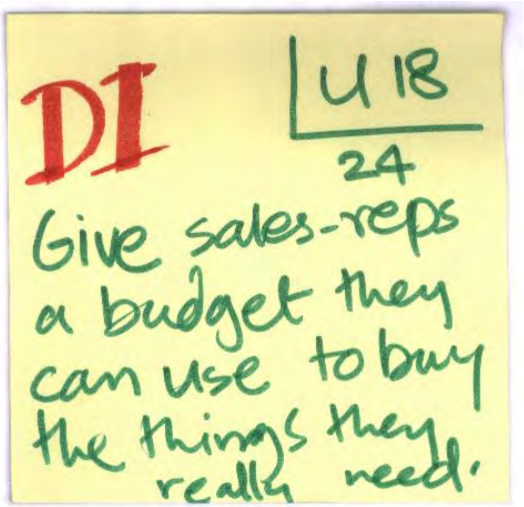
C: *It's to make the appearance of the page more even. You want all the lines to have some regular relationship to the other things on the page.*

Partnership

Don’t squash design ideas if they arise

This is design, not dispassionate science

- Get instant feedback
- If it works, you understand the work practice and have a solution
- If it fails, you can improve your understanding of the work
- Find the issues behind design ideas



DI

U18

24

Give sales-reps a budget they can use to buy the things they really need.

Partnership

Avoiding Other Relationship Models

Interviewer / Interviewee

- You aren’t there to get a list of questions answered

Expert / Novice

- You aren’t there to answer questions

Guest / Host

- Move closer, ask questions, be nosy

Interpretation

Chain of Reasoning

- Fact, Hypothesis, Implication for Design, Design Idea

Design is built upon interpretation of facts

- Design ideas are end products of a chain of reasoning
- So interpretation had better be right

Share interpretations with users to validate

- Will not bias the data
- Teaches participant to see structure in the work

Interpretation

Instead of asking open ended questions…

“Do you have a strategy to start the day?”

“Not particularly.”

… give participants a starting point

“Do you check urgent messages first,
no matter where they are from?

“Actually, things from my boss are important, because they are for me to do. Messages or faxes may be for anybody.”

Participants fine-tune interpretations

Probe contradictions until assumptions fit

Interpretation

Non-verbal cues can confirm or negate

Yes and Nos

- “Huh?” – way off
- “Umm, could be” – usually means no
- “Yes, but…” or “Yes, and” – depends on what follows

Commit to hearing what people actually say

- Most have not ever had people actually pay careful attention to what they are doing

Focus

Everybody has a focus, you cannot prevent it

- Entering focus
- Project focus

Because you will have a focus, be mindful of that focus and use it to your advantage

Focus

Focus defines the point of view

- Clear focus steers the conversation
- Everyone in the team should have an entering focus

Focus lets the interviewer sees more

- Focus reveals detail

Focus conceals the unexpected

- Focus on one, and lose the other

Start with a focus and then expand

Focus

Opportunities to expand focus

Surprises, contradictions, idiosyncrasies

- Nothing any person does is for no reason

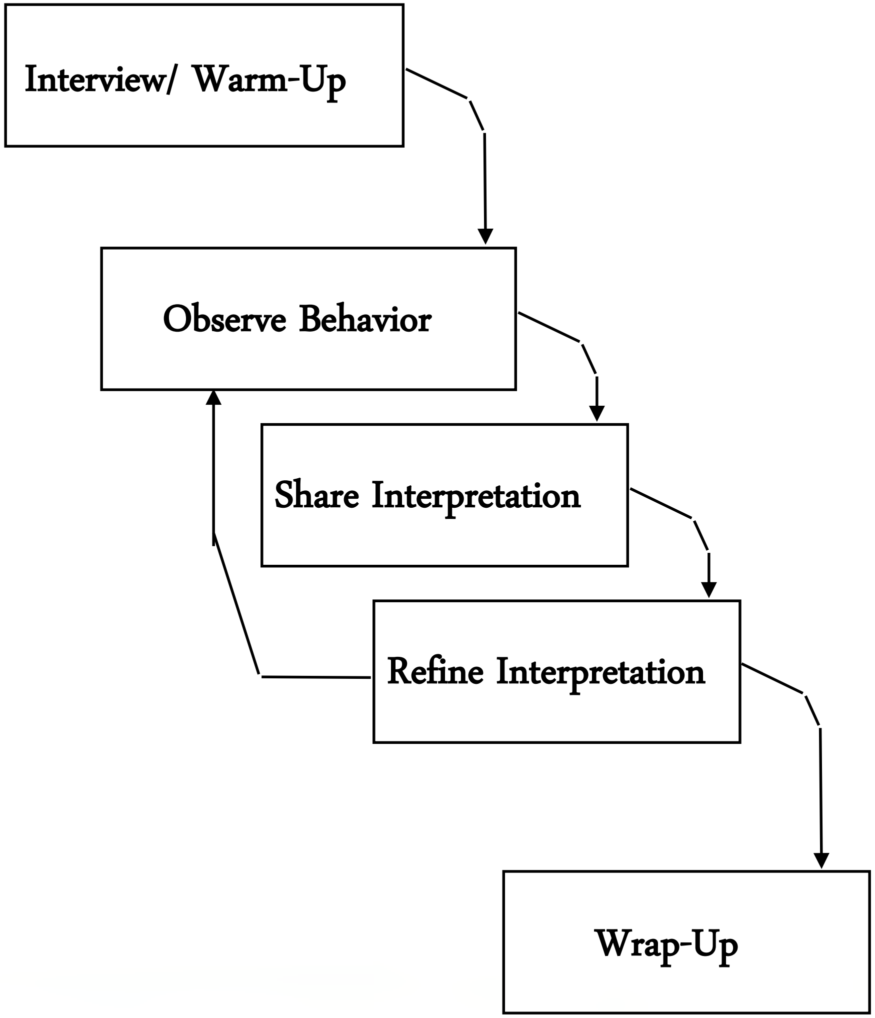
Nods

- Question assumptions even if they match
  “Do they really do that? Why would they do that?”

What you don’t know

- Treat the interview as an opportunity to learn new stuff
- Even if the participant is not knowledgeable, the extent of their knowledge / misinformation will be useful

The Stages of a Contextual Inquiry



Interview/ Warm-Up

Observe Behavior

Share Interpretation

Refine Interpretation

Wrap-Up

Explain the Rules

Be sure you explain “the rules” of how you’ll be interacting during the contextual inquiry

If this isn’t completely clear, the encounter may devolve into a traditional interview (since this relationship is more familiar to people)

How to Screw it Up

Slipping into abstraction

- Keep it concrete, in the work, in the details

Not being inquisitive or nosy enough

- If you have the impulse to ask, do it right away

Overly disrupting the task

- Questions are great, but do not ask so many so fast that the participant stops doing their tasks

Turning it into a regular interview

- If you could have done it in a coffee shop, then you didn’t do a contextual inquiry

When All Else Fails

Remember Master/Apprentice

Remember Context

Remember Withdraw & Return

Developing Models

Contextual inquiry yields a lot of data

- Does not reduce to a statistical test

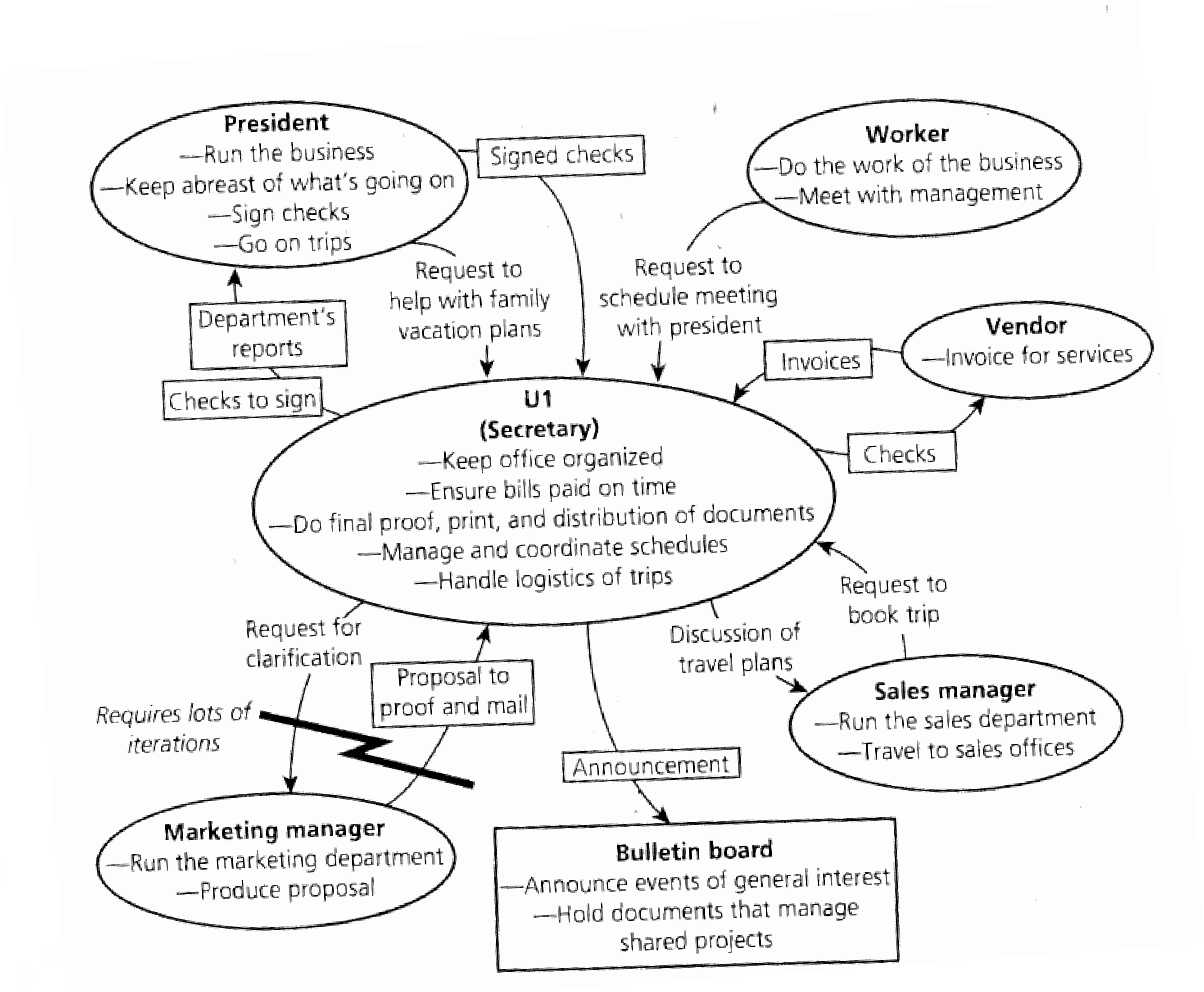
Use it to distill models

- Help to understand the workflow
- Highlights gaps in understanding
- Identify breakdowns and workarounds

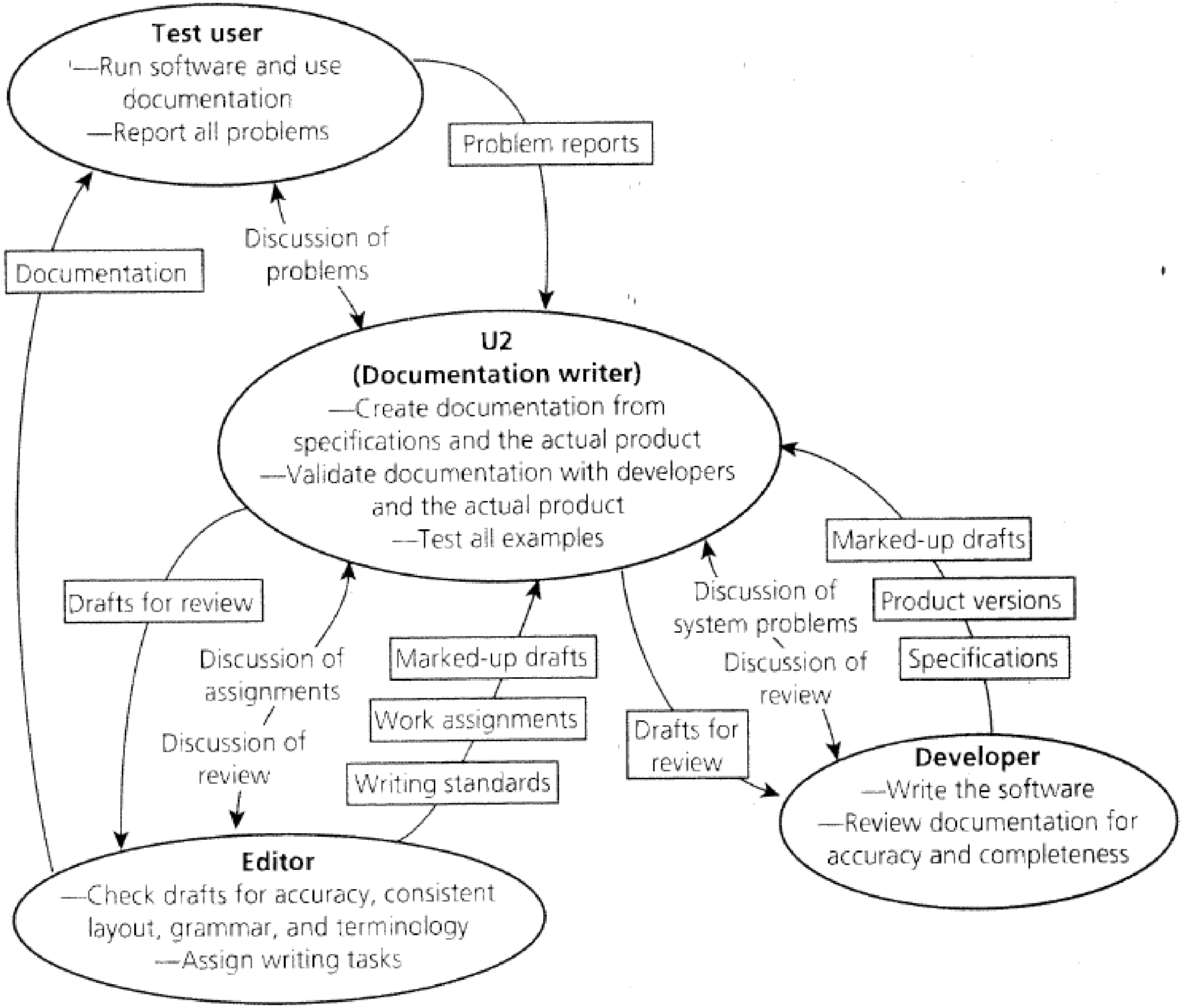
Many types of models

- e.g., Flow, Sequence, Artifact, Cultural, Physical

Flow Model: Secretarial Hub



Flow Model: Creative Work



Test user
—Run software and use documentation
—Report all problems

Problem reports

Documentation

Discussion of problems

U2
(Documentation writer)
—Create documentation from specifications and the actual product
—Validate documentation with developers and the actual product
—Test all examples

Drafts for review

Discussion of assignments / Discussion of review

Marked-up drafts

Work assignments

Writing standards

Discussion of system problems

Discussion of review

Drafts for review

Marked-up drafts

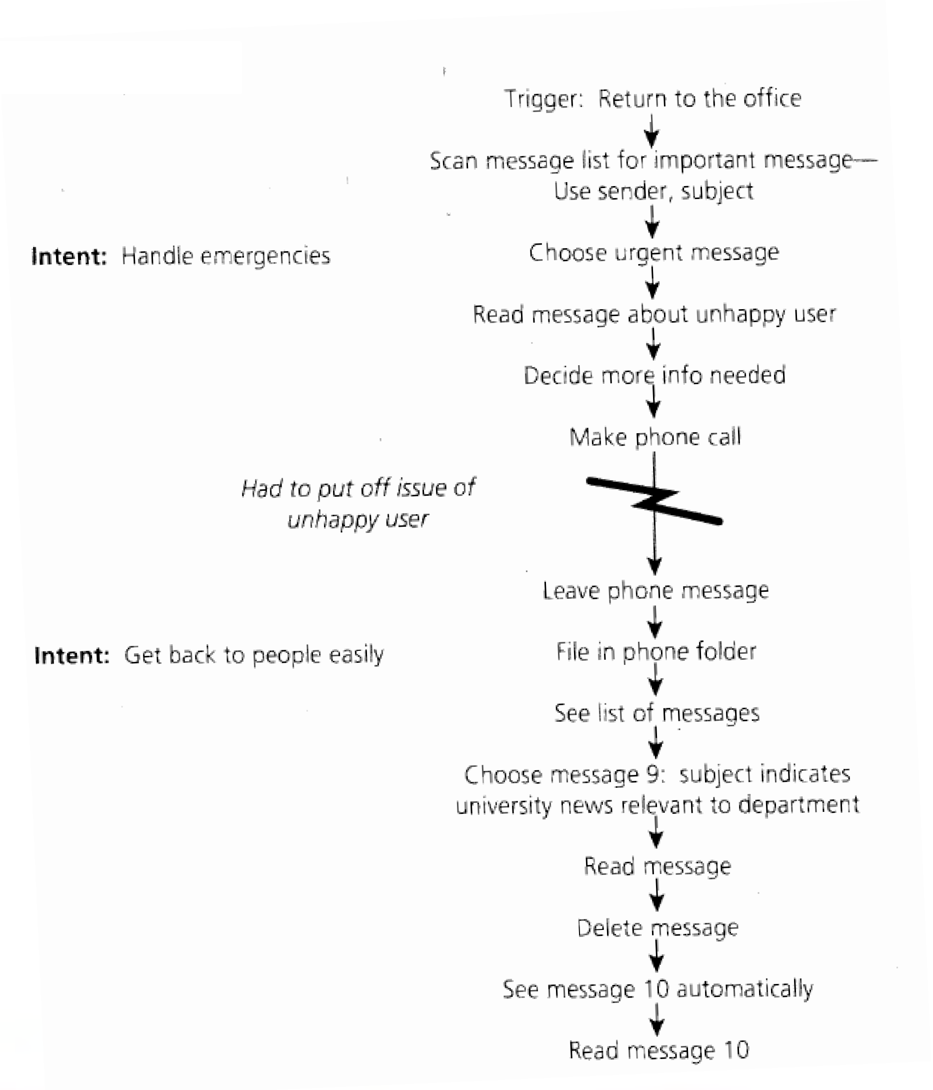
Product versions

Specifications

Developer
—Write the software
—Review documentation for accuracy and completeness

Editor
—Check drafts for accuracy, consistent layout, grammar, and terminology
—Assign writing tasks

Sequence Model: Doing Email



Trigger: Return to the office

Scan message list for important message—
Use sender, subject

Intent: Handle emergencies

Choose urgent message

Read message about unhappy user

Decide more info needed

Make phone call

Had to put off issue of unhappy user

Leave phone message

Intent: Get back to people easily

File in phone folder

See list of messages

Choose message 9: subject indicates university news relevant to department

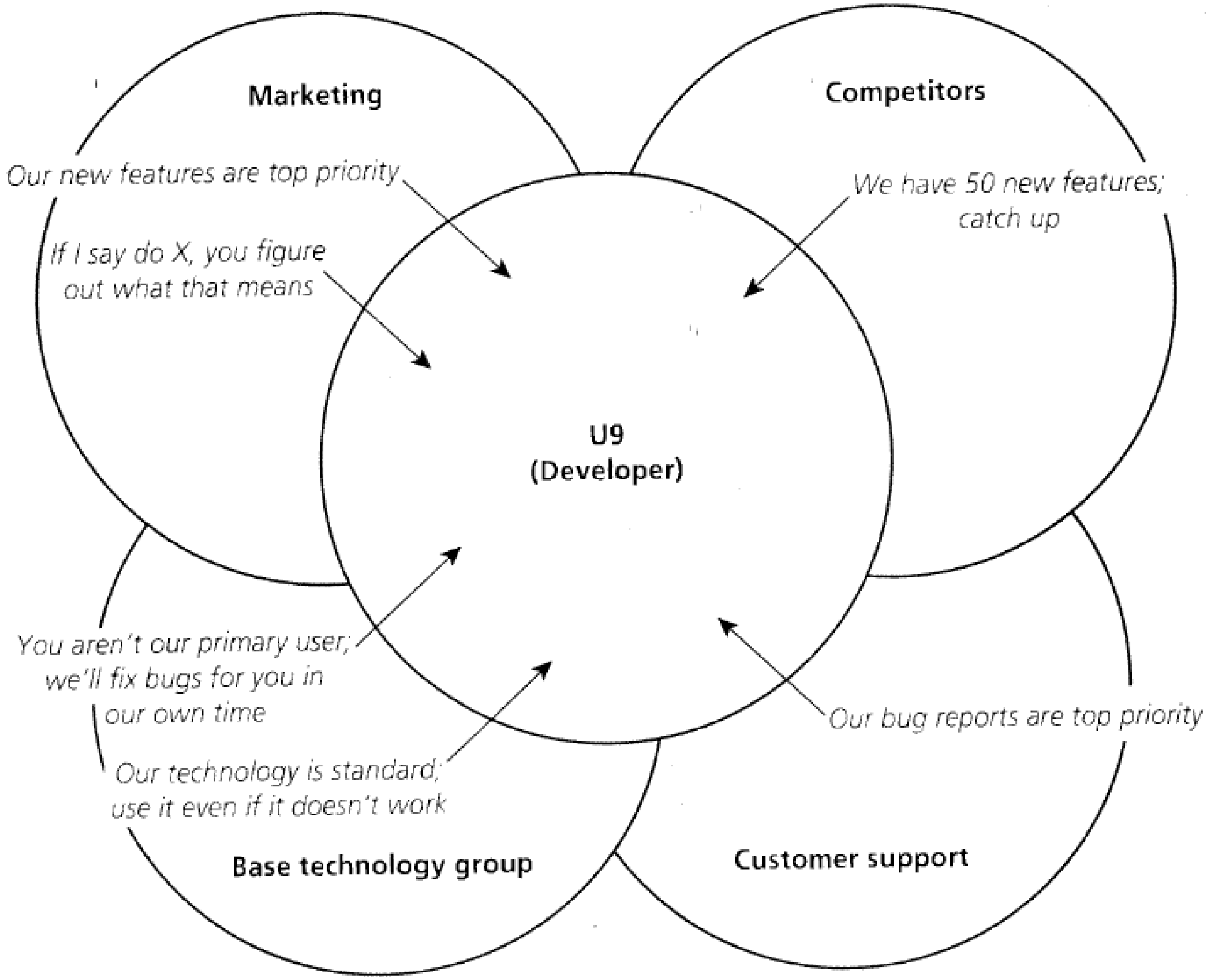
Read message

Delete message

See message 10 automatically

Read message 10

Cultural Model: Developer



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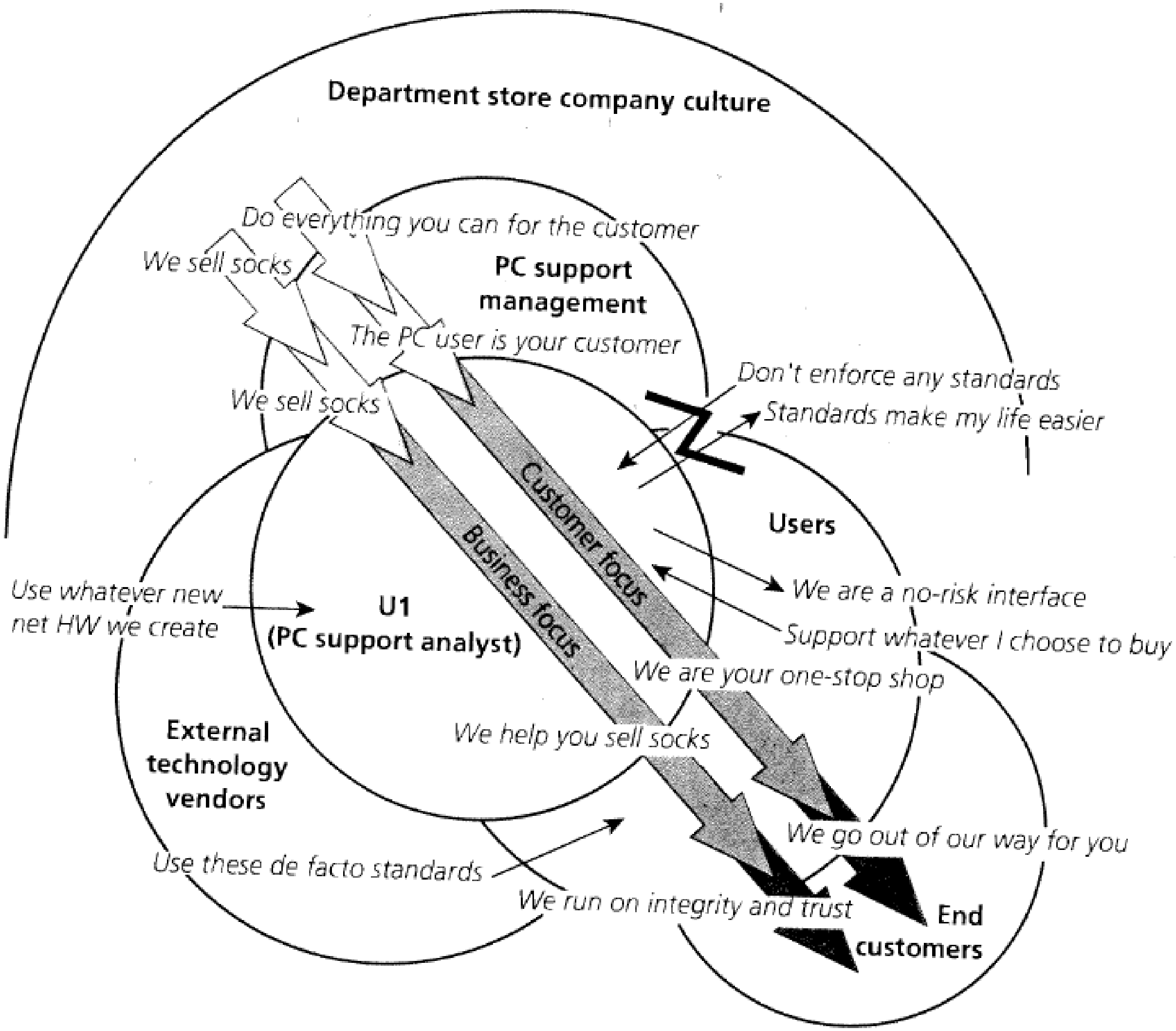
Cultural Model: Department Store



Department store company culture

Do everything you can for the customer

We sell socks

PC support management

The PC user is your customer

We sell socks

Don't enforce any standards

Standards make my life easier

Customer focus

Business focus

Users

Use whatever new net HW we create

U1 (PC support analyst)

We are a no-risk interface

Support whatever I choose to buy

We are your one-stop shop

External technology vendors

We help you sell socks

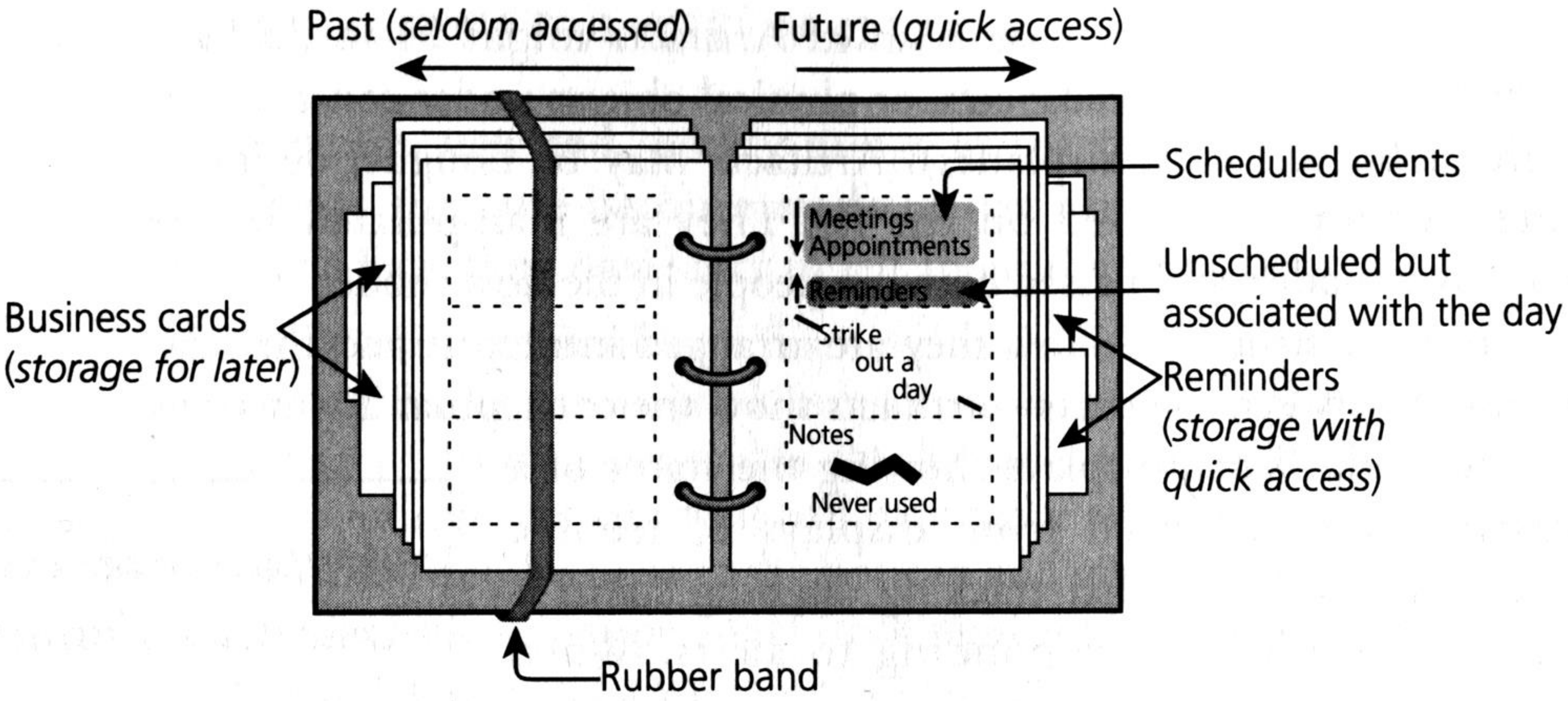
We go out of our way for you

Use these de facto standards

We run on integrity and trust

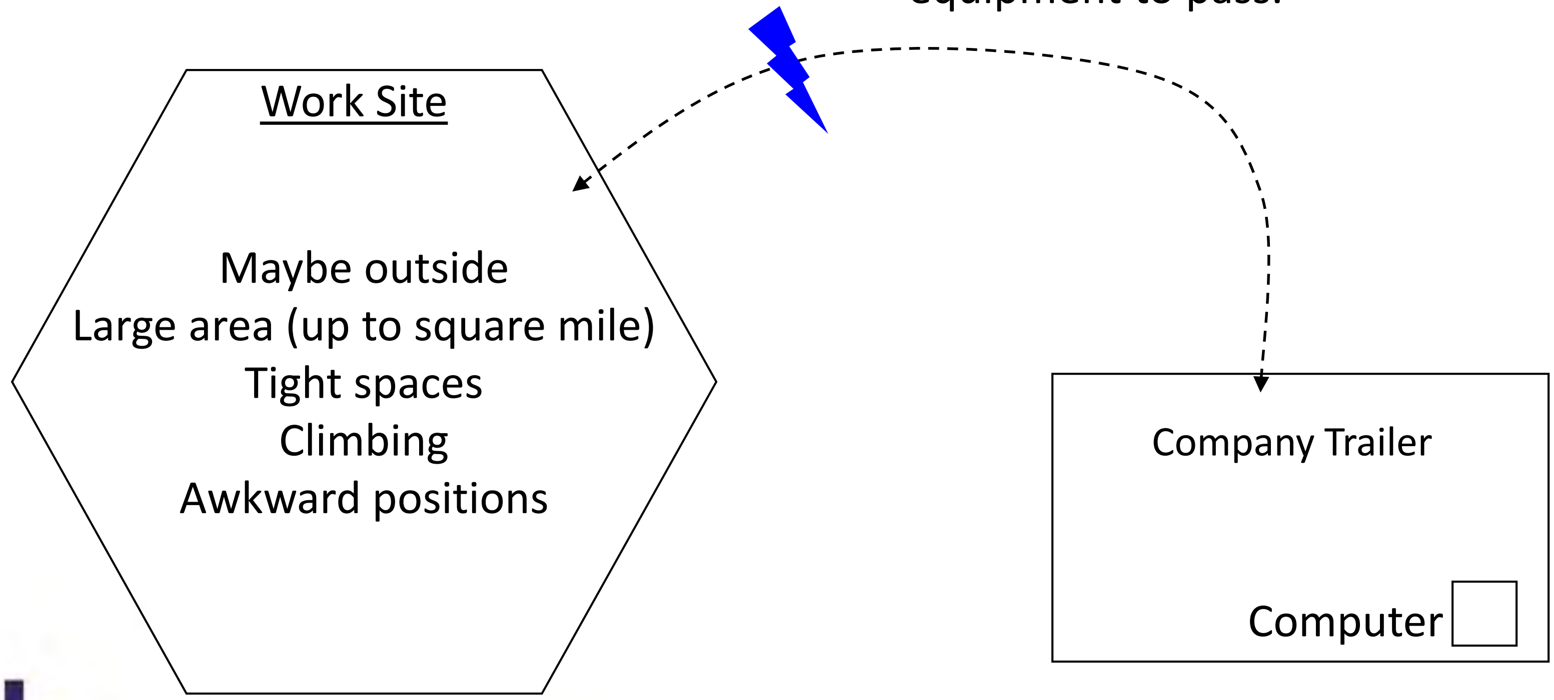
End customers

Artifact Model: Calendar



Physical Model: Work Site

Approximately a 5 minute walk. If doing an audit at a site under construction, then safe path frequently changes and may need to wait for construction equipment to pass.



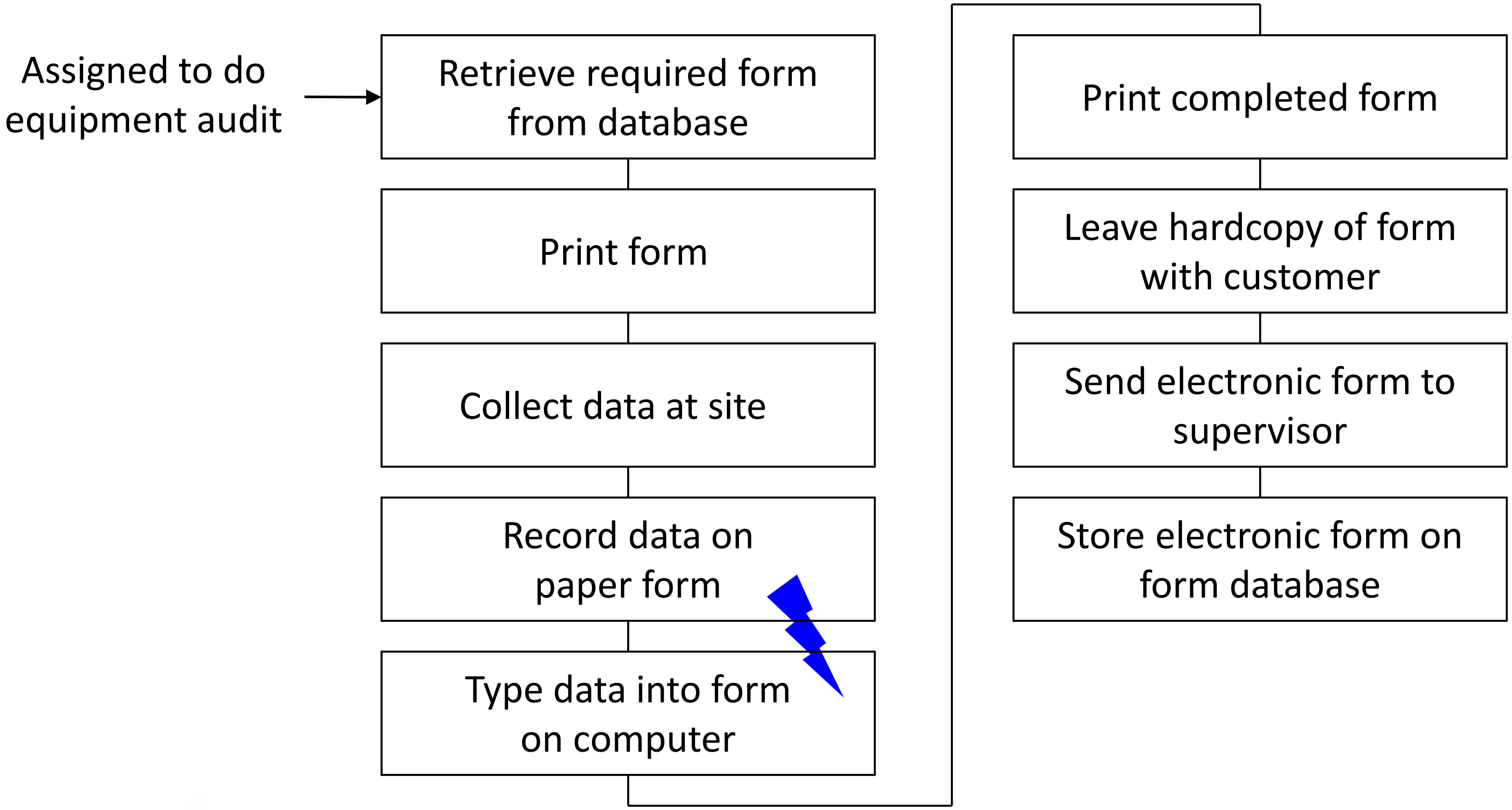
Work Site

Maybe outside
Large area (up to square mile)
Tight spaces
Climbing
Awkward positions

Company Trailer

Computer

Sequence Model: Equipment Audit



Assigned to do equipment audit

Retrieve required form from database

Print form

Collect data at site

Record data on paper form

Type data into form on computer

Print completed form

Leave hardcopy of form with customer

Send electronic form to supervisor

Store electronic form on form database

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 03:
Contextual Inquiry

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

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University of Washington

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 04:
Critique

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

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use:
build:

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Guest lecture

Hi, I’m Matt

I’m a PhD student in Computer Science & Engineering. I do research in personal informatics.

But! I also have some background in visual art.

This Quarter

- You will learn how to both give and receive critique
  - Each skill is important and takes practice
- Many sections will consist of group critiques
  - Each group will present an artifact
  - Other class members and TA will offer critique
- Starting today!
  - Critique of CI Plan

Why do Critique?

Critique helps us evaluate early, often, and cheaply

- Applicable to artifacts of many types
- Compare to other expert methods covered later, like heuristic evaluation

You are not your own worst critic!

- The room has more collective knowledge than any one of us
- It is *very* hard to see past your own decisions (see also: mental models, etc)
- See past your infatuation

Why do Critique?

Critique is not just for design

- It applies to many artifacts and domains: visual art, writing, design, code (i.e. code review), …

Over time, you should gather people who can give you high-quality critique in everything you do

- You may meet some of those people in this class

What is Critique?

Critique is a method of peer & expert feedback

It is not just a list of complaints

1. **Presenters** sit down with peers/experts (the **critics**)
2. Quickly explain their artifacts (< 2 min)
3. Critics ask questions
4. Presenters respond, also write down everything that is discussed

Critique is not Criticism

Again, it is not just a list of complaints!

Critics offer honest feedback

- Presenters should be able to learn what works well and what is problematic about their artifact

Both positive and negative

- Presenters should be able to learn what works well and what is problematic about their artifact

It is the presenter's responsibility to sort through feedback and decide what is important

- Take notes!

Tips for Presenters

Critique can be hard, especially at first

Try to avoid being defensive

- You are not your work: separate yourself

Remember the expertise you bring

- Even if “the room” knows more about design, you know more about your problem / artifact (or you should)

Tips for Presenters

Taking advice is not giving up authorship

- You still make the final decisions
- A half-baked suggestion does not contain all the details of a finished solution

Design your critique

- The artifact you show invites different forms of feedback
- Indicate what kind of feedback you want verbally, but also in form (this course will guide you heavily here)

Tips for Presenters

Keep an eye out for design rationale

- You probably made some decisions without good reasons at the time
- Critique can help give a rationalization for past decisions in explaining to others

Exploit failure!

- A “failed” artifact (plan, design, …) should teach you a lot about the design space: what won’t work, and *why*

Tips for Critics

There are many strategies for giving critique

- Hamburger method
- I like, I wish, what if
- Socratic method

These provide ways to give critique that help the conversation go smoothly

- They may sound silly, but they can give you a question to ask when you don’t have one and a way to ask it that doesn’t hurt others’ feelings

Tips for Critics: Hamburger method

"Bun, meat, bun"

Bun:

- Something fluffy and nice

Meat:

- The real criticism

Bun:

- Something fluffy and nice

Tips for Critics: I like, I wish, what if

I like:

- Lead with something nice

I wish:

- Some criticism (often leading off what you like)

What if:

- An idea to spark further conversation
- Better than “I think you should have done …” or “Why didn’t you …”: gives the presenter benefit of the doubt if they *did* already think of your idea

Tips for Critics: Socratic method

When all else fails, point to something and ask "why?"

- Good when you don't know what to say
- Forces presenter to give (or make up) explanations for things, which can help build design rationale
- Not fundamentally negative and hard to get defensive about

Summary

Fall *out* of love with the things you build

Let us help you see past the infatuation

Get quick, cheap feedback from experts

Refine ideas

In brainstorming, we were not *criticizing*

In critique, we are not *defending*

You will learn to both give and receive critique

Each are skills that take practice. If you are having difficulty, please come talk to us

Let’s do it!

In sets of 2-3 groups

15 minutes per group

- 1-2 minutes: present your plan
- The rest of the time: critique

Remember hamburger method, I like/I wish/what if, Socratic method

Try not to get defensive

Take notes!

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 05:
Task Analysis

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

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Where we came from

System will fail if:

- It is inappropriate for the customer
- It does not meet customer needs

Your contextual inquiries have emphasized getting to know your customers and their needs

… So we know what to build now, right?

Can’t we now just make ‘good’ interfaces?

Why Task Analysis?

- 'Good' has to be interpreted in the context of use
  - Might be acceptable for office work, but not for play
  - Infinite variety of tasks and customers

- Guidelines are too vague to be generative
  - e.g., "give adequate feedback"

- Design is often about tradeoffs
  - Examples?

Why Task Analysis?

Task analysis complements the information you obtain through methods like contextual inquiry

> Use what you learned in your inquiry to answer the questions in the task analysis

Your assignments order the two, but in practice you should iteratively decide how to best draw upon all relevant methods throughout a process

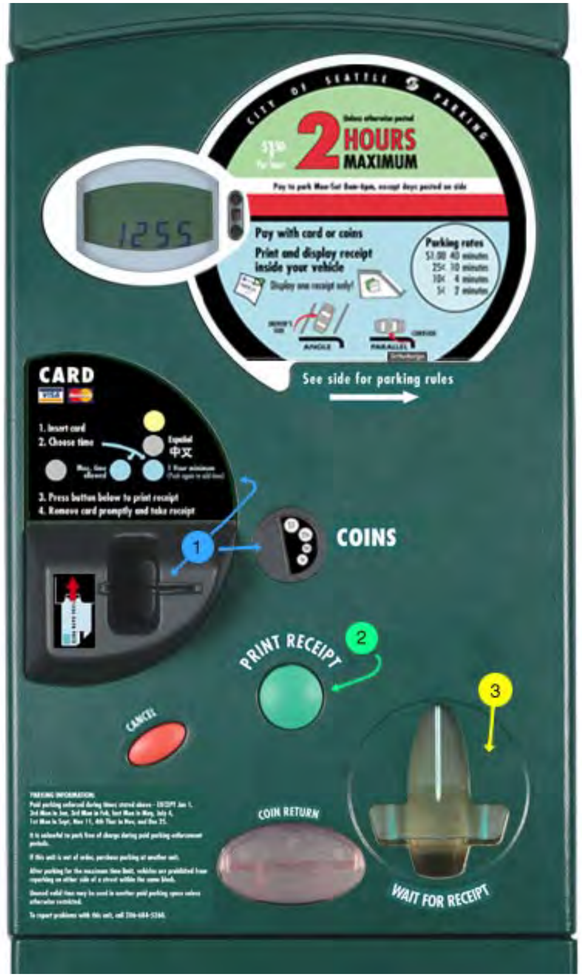
11 Task Analysis Questions

Who is going to use the system?
What tasks do they now perform?
What tasks are desired?
How are the tasks learned?
Where are the tasks performed?
What is the relationship between customers & data?
What other tools does the customer have?
How do customers communicate with each other?
How often are the tasks performed?
What are the time constraints on the tasks?
What happens when things go wrong?

Question 1

Who is going to use the system?

- Identity
  - In-house or specific customer is easy
  - Broad products need several typical consumers
- Background
- Skills
- Work habits and preferences
- Physical characteristics


CITY OF SEATTLE PARKING
2 HOURS MAXIMUM
1255
Pay with card or coins
Print and display receipt inside your vehicle
Display one receipt only!
Parking rates
$1.00 40 minutes
25¢ 10 minutes
10¢ 4 minutes
5¢ 2 minutes
ANGLE
PARALLEL
See side for parking rules
CARD
1. Insert card
2. Choose time
Español
中文
3. Press button below to print receipt
4. Remove card promptly and take receipt
COINS
1
PRINT RECEIPT
2
3
CANCEL
COIN RETURN
WAIT FOR RECEIPT

Seattle Parking Meter

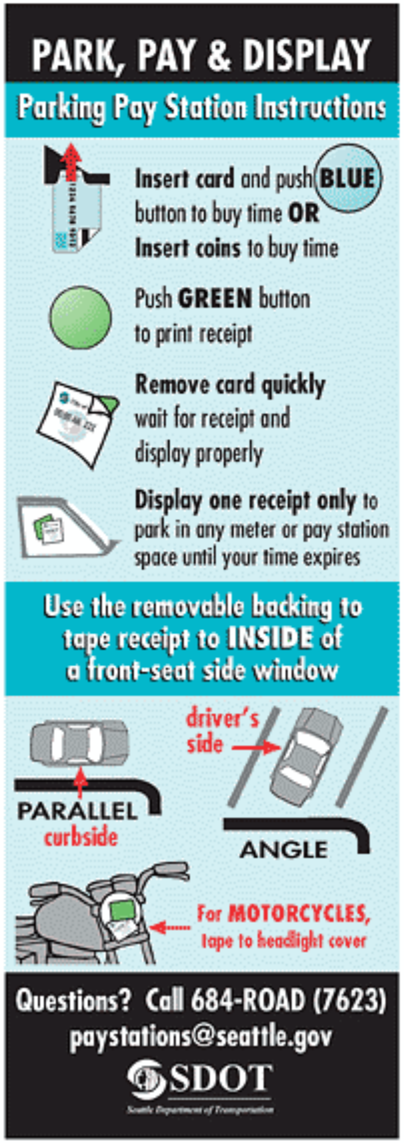
Who is going to use the system?

- Identity?
  - People who park in Seattle
    - business people, students, elderly, tourists
- Background?
  - Have used parking meters before
  - May have an ATM or credit card
  - Have used other fare machines before
- Skills?
  - may know how to put cards into ATM

Seattle Parking Meter

Who is going to use the system?

- Work habits and preferences?
  - Park several times a week, a month, a year?
- Physical characteristics?
  - Varying heights, don't make it too high or too low
  - Anything else?



PARK, PAY & DISPLAY

Parking Pay Station Instructions

Insert card and push **BLUE** button to buy time **OR**
Insert coins to buy time

Push **GREEN** button to print receipt

Remove card quickly wait for receipt and display properly

Display one receipt only to park in any meter or pay station space until your time expires

Use the removable backing to tape receipt to INSIDE of a front-seat side window

For **MOTORCYCLES**, tape to headlight cover

Questions? Call 684-ROAD (7623)
paystations@seattle.gov
SDOT
Seattle Department of Transportation

泊車、付款並顯示

泊車付費站使用說明

插入卡並按**藍色**按鈕購買時間，
或投入硬幣購買時間

按**綠色**按鈕打印收據

迅速將卡取出
等候收據並適當顯示

僅限顯示一張收據，
以便在任何咪表或付費站的車位泊車，直到您的時間到期

**請使用可剝離的背面，
將收據貼在
前座側車窗內側**

如果是摩托車，
請貼在車頭燈罩上

有問題嗎？請致電 684-ROAD (7623)
paystations@seattle.gov
SDOT
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ĐẬU XE, TRẢ TIỀN & DÁN BIÊN NHẬN

Hướng Dẫn về Trạm Trả Tiền Đậu Xe

Đút thẻ vào và bấm nút **XANH** để mua giờ **HOẶC**
Bỏ tiền cắc để mua giờ

Bấm nút **XANH** để in biên nhận

Rút nhanh thẻ ra
chờ biên nhận và dán đúng cách

Chỉ dán một biên nhận
để đậu xe tại bất cứ chỗ nào có đồng hồ hoặc trạm trả tiền cho đến khi hết giờ đậu

Dùng miếng dán mặt sau có thể gỡ ra để dán biên nhận vào MẶT TRONG cửa kính băng trước

Đối với **XE GẮN MÁY**, dán vào chụp đèn trước

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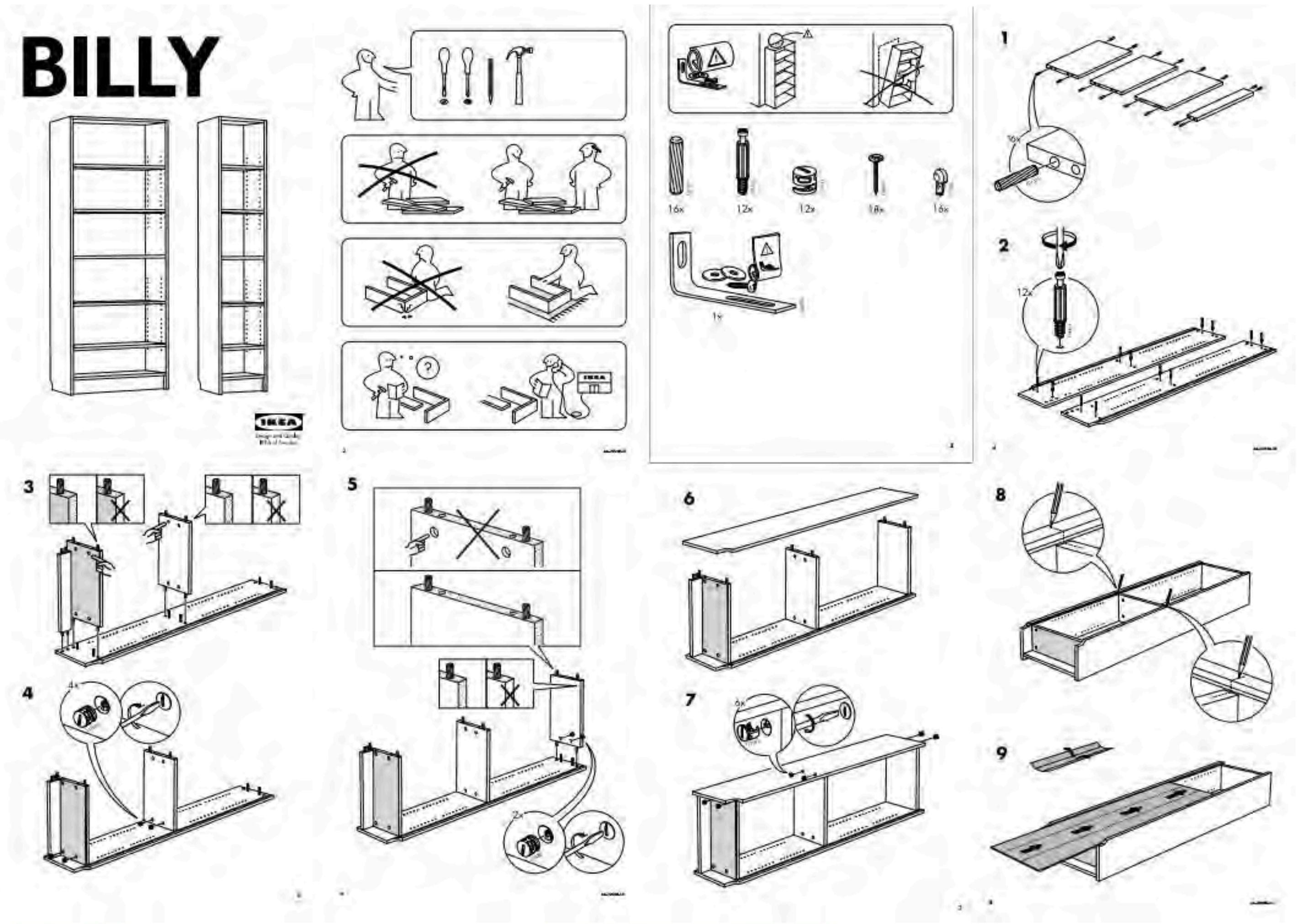
BILLY
IKEA
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16x
2
12x
16x
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18x
16x
1x
3
4
4x
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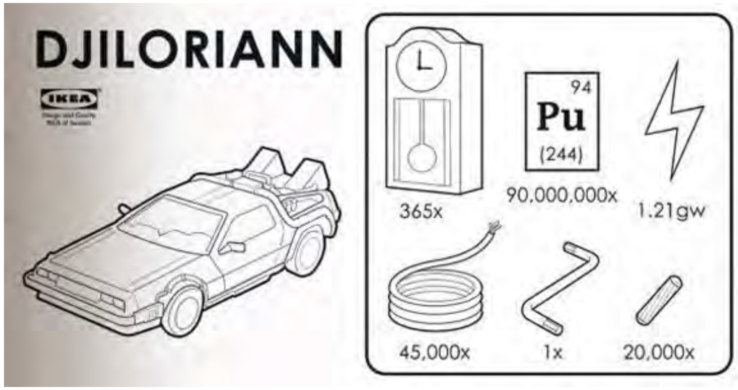
2x
6
7
4x
8
9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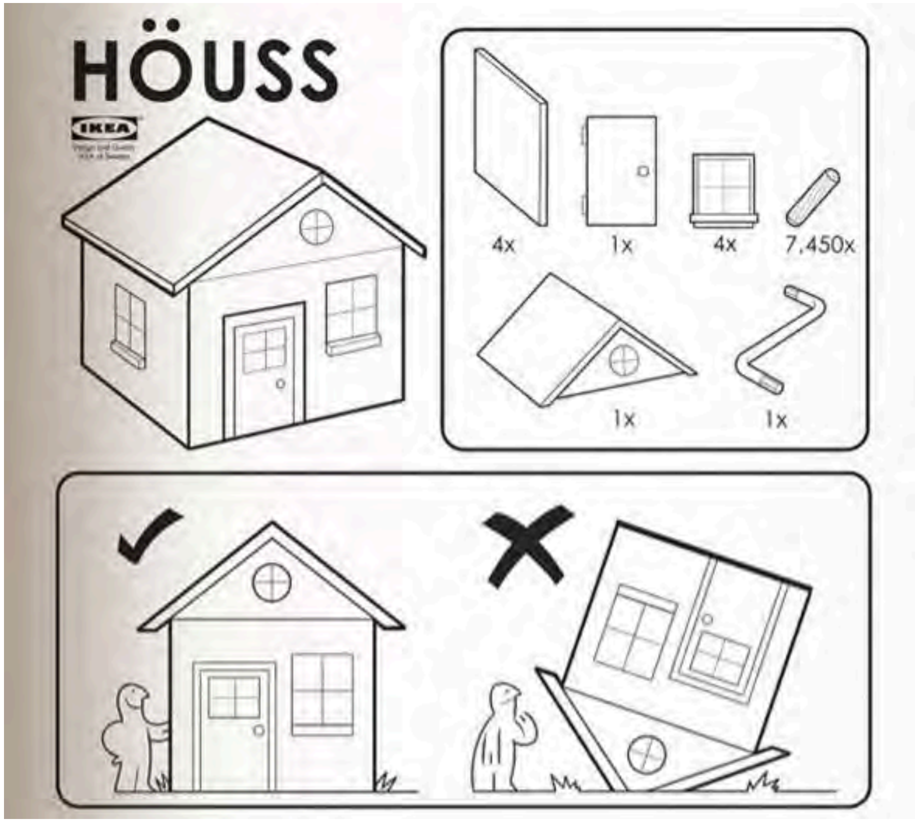
20,000x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4x
7,450x
1x
1x

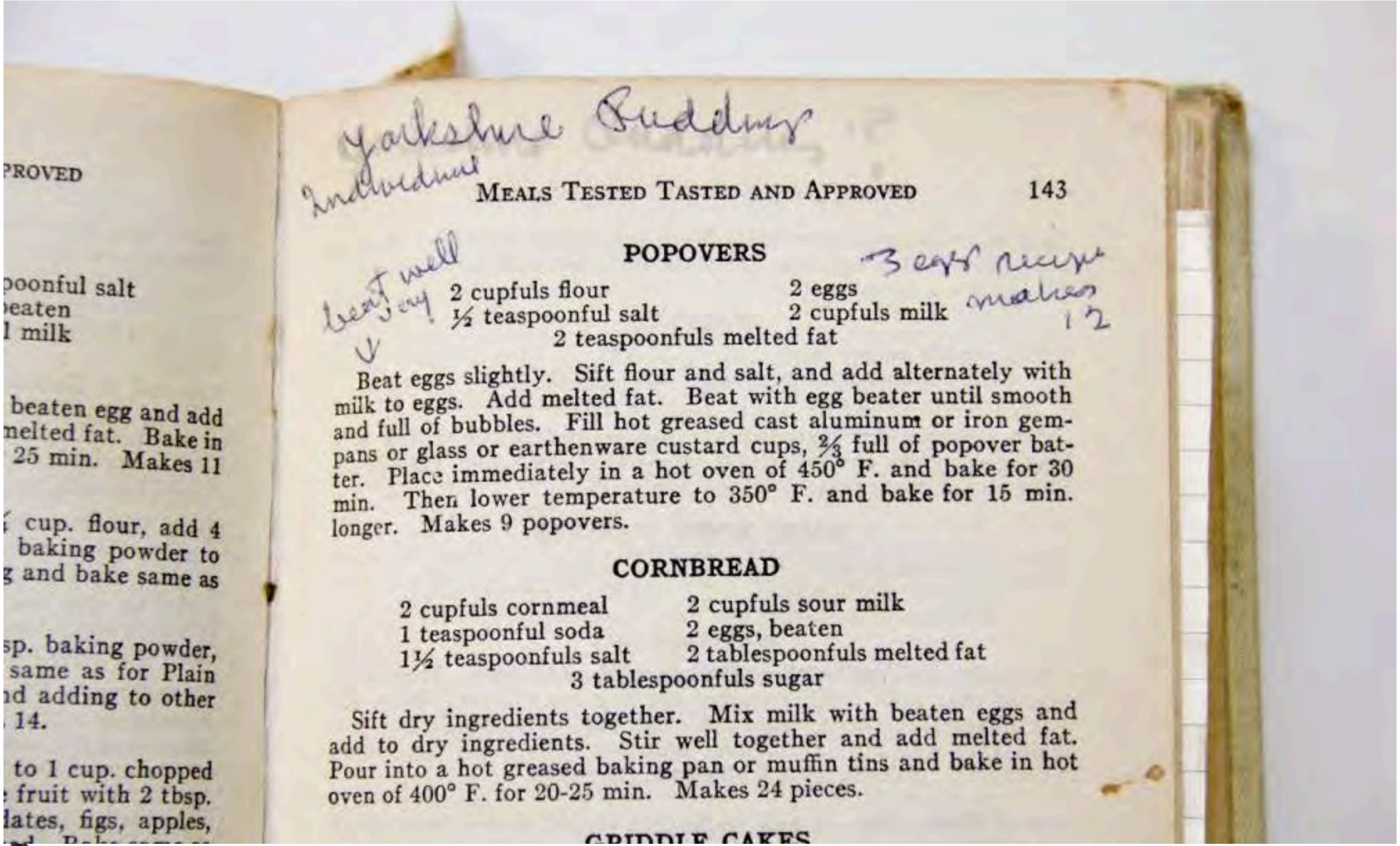
Question 2 and Question 3

What tasks do they now perform?

What tasks are desired?

- Important for both automation and new functionality
- Relative importance of tasks?
- Observe customers, see it from their perspective

- Automated Billing Example
  - small dentists office had billing automated
  - assistants were unhappy with new system
  - old forms contained hand-written margin notes
    - e.g., patient A’s insurance takes longer than most



PROVED

poonful salt
eaten
l milk

beaten egg and add
melted fat. Bake in
25 min. Makes 11

cup. flour, add 4
baking powder to
and bake same as

sp. baking powder,
same as for Plain
nd adding to other
14.

to 1 cup. chopped
fruit with 2 tbsp.
lates, figs, apples,

Yorkshire Pudding
Individual

MEALS TESTED TASTED AND APPROVED 143

POPOVERS

3 eggs recipe makes 12

beat well very

2 cupfuls flour
½ teaspoonful salt
2 eggs
2 cupfuls milk
2 teaspoonfuls melted fat

Beat eggs slightly. Sift flour and salt, and add alternately with milk to eggs. Add melted fat. Beat with egg beater until smooth and full of bubbles. Fill hot greased cast aluminum or iron gem-pans or glass or earthenware custard cups, ⅔ full of popover batter. Place immediately in a hot oven of 450° F. and bake for 30 min. Then lower temperature to 350° F. and bake for 15 min. longer. Makes 9 popovers.

CORNBREAD

2 cupfuls cornmeal
1 teaspoonful soda
1½ teaspoonfuls salt
2 cupfuls sour milk
2 eggs, beaten
2 tablespoonfuls melted fat
3 tablespoonfuls sugar

Sift dry ingredients together. Mix milk with beaten eggs and add to dry ingredients. Stir well together and add melted fat. Pour into a hot greased baking pan or muffin tins and bake in hot oven of 400° F. for 20-25 min. Makes 24 pieces.

GRIDDLE CAKES

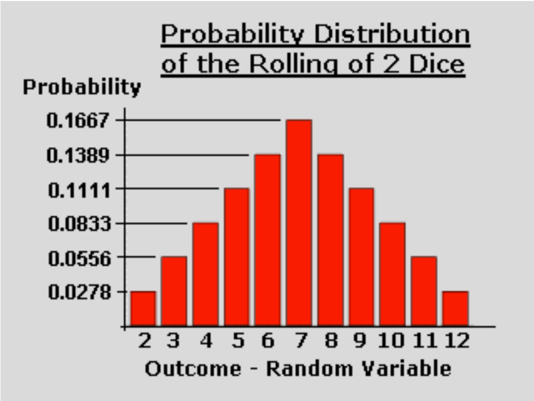
Question 4

How are the tasks learned?

What does the customer need to know?

Do they need training?

- academic
- general knowledge / skills
- special instruction / training


Probability Distribution
of the Rolling of 2 Dice
Probability
0.1667
0.1389
0.1111
0.0833
0.0556
0.0278
2 3 4 5 6 7 8 9 10 11 12
Outcome - Random Variable

Question 5

Where are the Tasks Performed?

- Office, laboratory, point of sale?
- Effects of environment on customers?
- Are people under stress?
- Confidentiality required?
- Do they have wet, dirty, or slippery hands?
- Soft drinks?
- Lighting?
- Noise?

Question 6

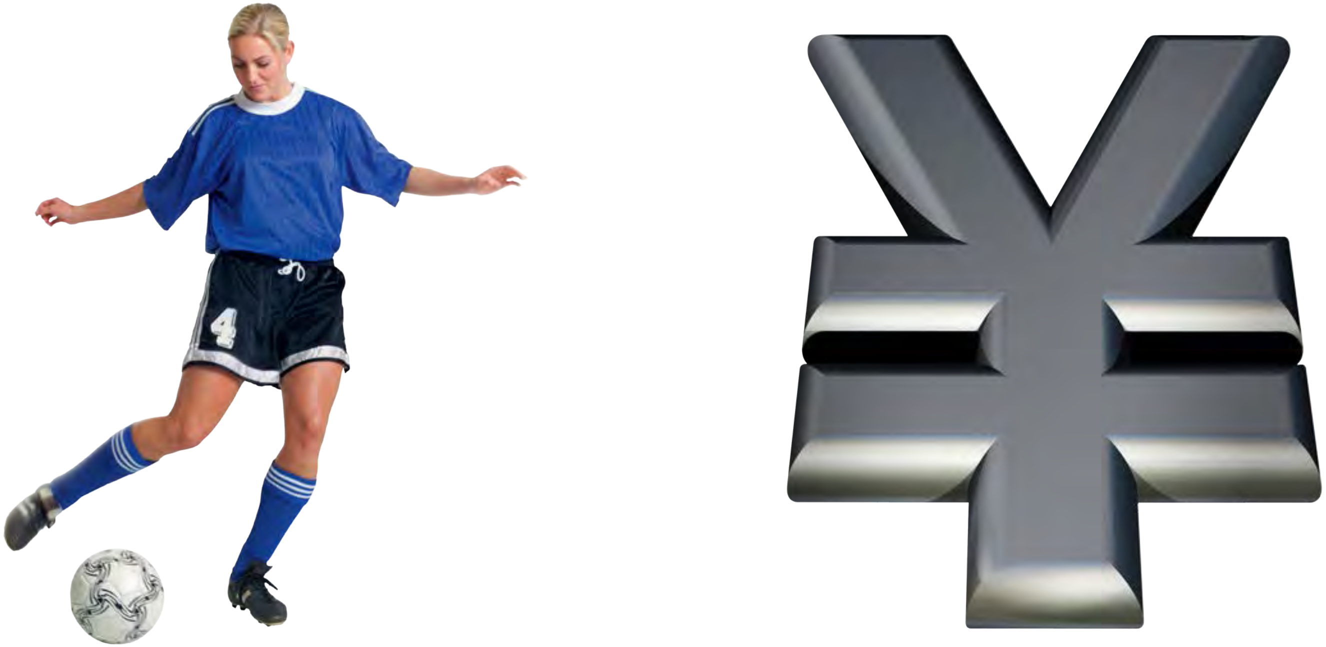
What is the relationship between customers & data?

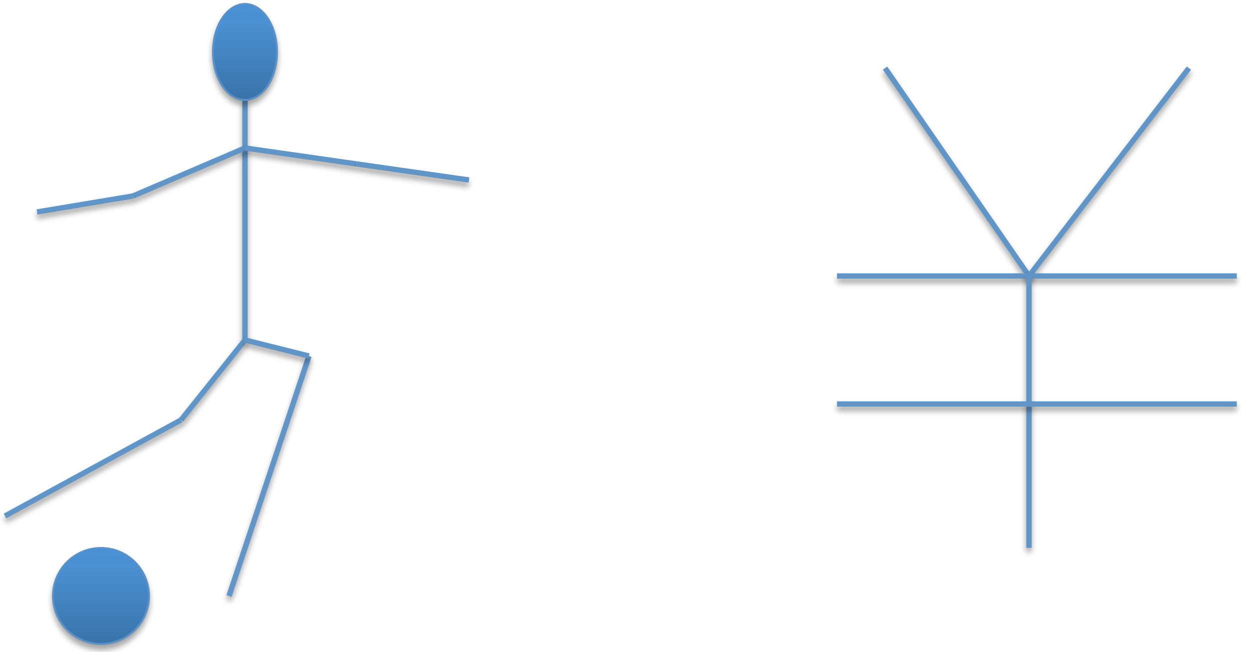
- Personal data
  - Always accessed at same machine?
  - Do people move between machines?
- Common data
  - Used concurrently?
  - Passed sequentially between customers?
- Remote access required?
- Access to data restricted?

Question 7

What other tools does the customer have?

- More than just compatibility
- How customer works with collection of tools
  - Automating lab data collection example:
  - how is data collected now?
  - by what instruments and manual procedures?
  - how is the information analyzed?
  - are the results transcribed for records or publication?
  - what media/forms are used and how are they handled?

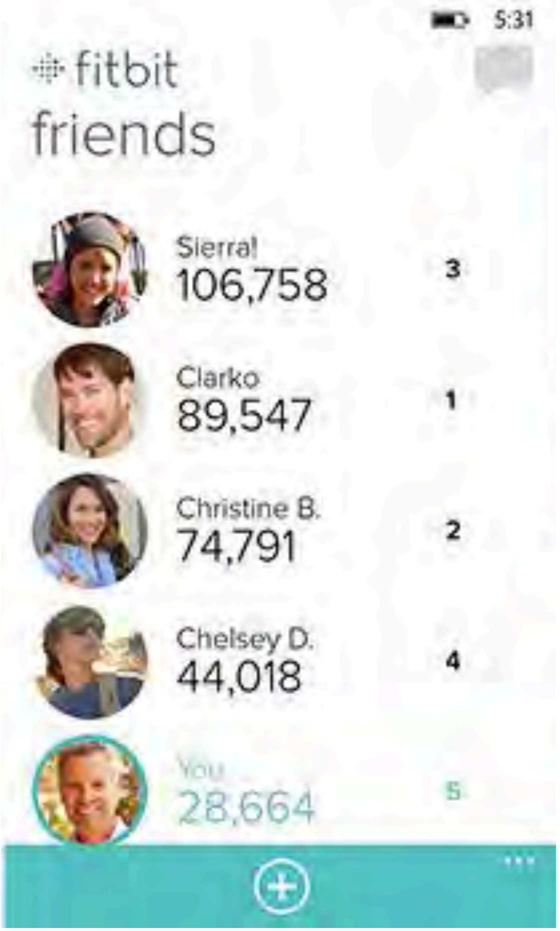





DO
ALL THE THINGS!!!
memegenerator.net

© 2013 CBS Interactive

© 2013 CBS Interactive



5:31

fitbit

friends

Sierra!
106,758
3

Clarko
89,547
1

Christine B.
74,791
2

Chelsey D.
44,018
4

You
28,664
5

Question 8

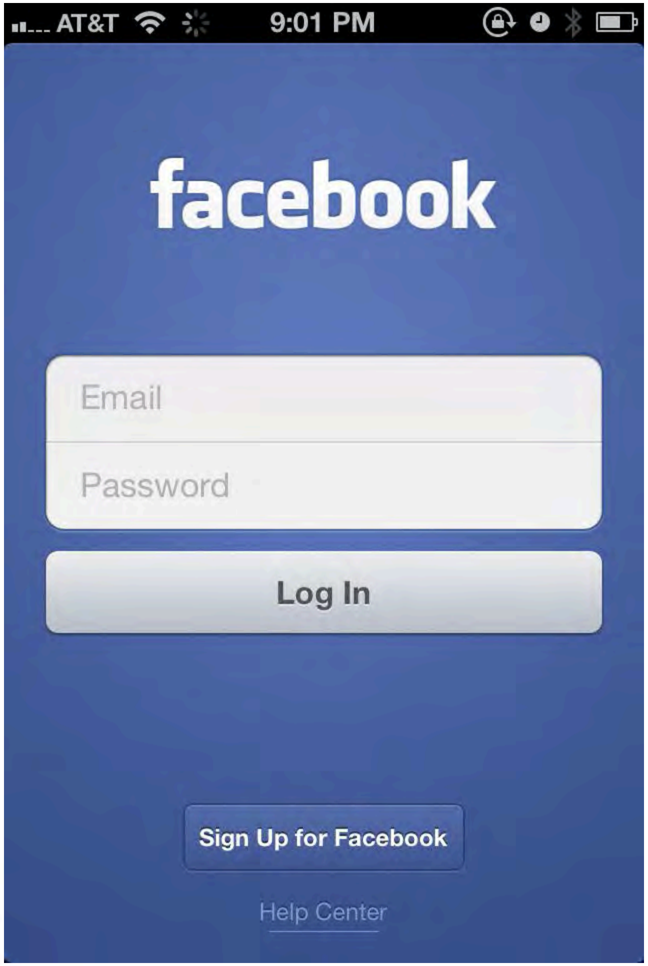
How do customers communicate with each other?

- Who communicates with whom?
- About what?
- Follow lines of the organization? Against it?

Question 9

How often are the tasks performed?

- Frequent customers likely remember more details
- Infrequent customers may need more help
  - Even for simple operations
  - Make these tasks possible to accomplish
- Which function is performed
  - Most frequently?
  - By which customers?
  - Optimizing for these will improve perception of performance
  - Careful about initial use though



Tao Xie was at Sightglass Coffee.
Today at 9:44am

Keito Uchiyama with Drew Hamlin.
Today at 9:42am

Question 10

What are the time constraints on the tasks?

What functions will customers be in a hurry for?

Which can wait?

Is there a timing relationship between tasks?

Question 11

What happens when things go wrong?

- How do people deal with
  - task-related errors?
  - practical difficulties?
  - catastrophes?
- Is there a backup strategy?
- What are the consequences?

Selecting Tasks

Real tasks customers have faced or requested

- collect any necessary materials

Should provide reasonable coverage

- compare check list of functions to tasks

Mixture of simple & complex tasks

- easy task (common or introductory)
- moderate task
- difficult task (infrequent or for power customers)

What Should Tasks Look Like?

- Say what customer wants to do, but not how
  - allows comparing different design alternatives
- Be very specific – stories based on facts!
  - say who customers are (use personas or profiles)
    - design can really differ depending on who
    - give names (allows referring back with more info later)
    - characteristics of customers (job, expertise, etc.)
  - story forces us to fill out description w/ relevant details
- Sometimes should describe a complete "job"
  - forces us to consider how features work together

Using Tasks in Design

Write up a description of tasks

- formally or informally
- run by customers and rest of the design team
- get more information where needed

Manny is in the city at a bar and would like to call his girlfriend, Sherry, to see when she will be arriving at the bar. She called from a friend's house while he in the Paul Allen Center basement, so he missed her call. He would like to check his missed calls and find the number so that he can call her back.

Using Tasks in Design

- Rough out an interface design
  - discard features that don't support your tasks
    - or add a real task that exercises that feature
  - major screens & functions (not too detailed)
  - hand sketched
- Produce scenarios for each task
  - what customer has to do & what they would see
  - step-by-step performance of task
  - illustrate using storyboards

Scenarios

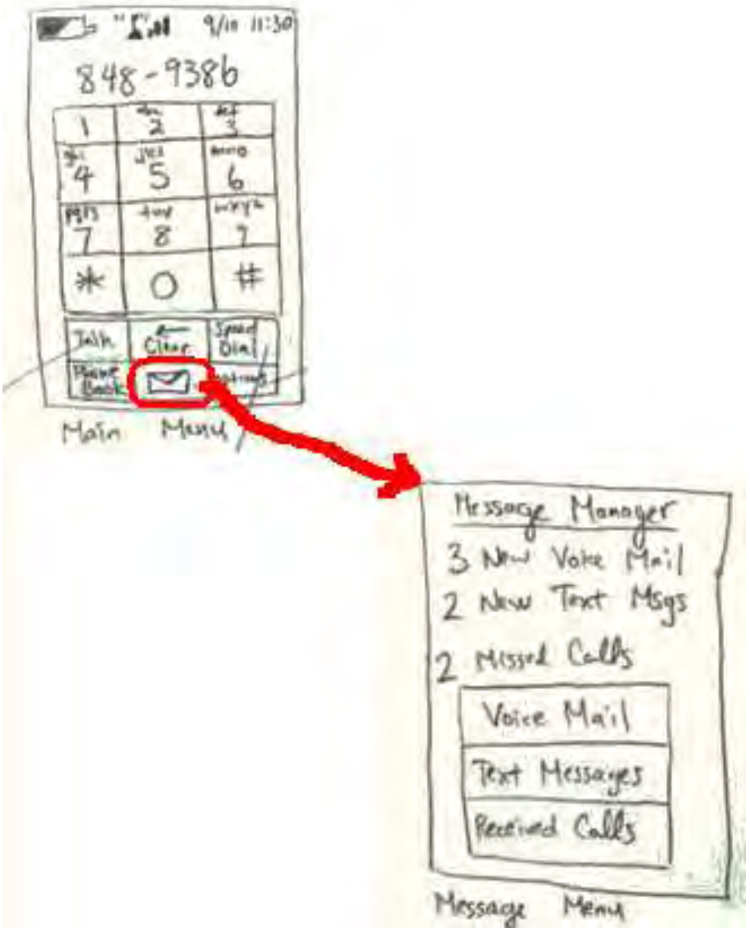
Scenarios are design specific, tasks are not

Scenarios force us to

- show how features will work together
- settle design arguments by seeing examples
  - but these are only examples, and sometimes need to look beyond flaws

Show users storyboards

- get feedback



Caveats of User-Centered Design

- Politics
  - "agents of change" can cause controversy
  - get a sense of organization & bond w/ interviewee
  - important to get buy-in from all those involved
- Customers are not always right
  - cannot anticipate new technology accurately
  - job is to build system customers will want
    - not system customers say they want
    - be very careful about this (you are outsider)
    - if you can't get customers interested, you're probably missing something
- Design/observe forever without prototyping
  - rapid prototyping, evaluation, & iteration is key

Summary

Task Analysis questions

- Who is going to use the system?
- What tasks do they now perform?
- What tasks are desired?
- How are the tasks learned?
- Where are the tasks performed?
- What's the relationship between customer & data?
- What other tools does the customer have?
- How do users communicate with each other?
- How often are the tasks performed?
- What are the time constraints on the tasks?
- What happens when things go wrong?

Selecting tasks

- Real tasks with reasonable functionality coverage
- Complete, specific tasks of what customer wants to do

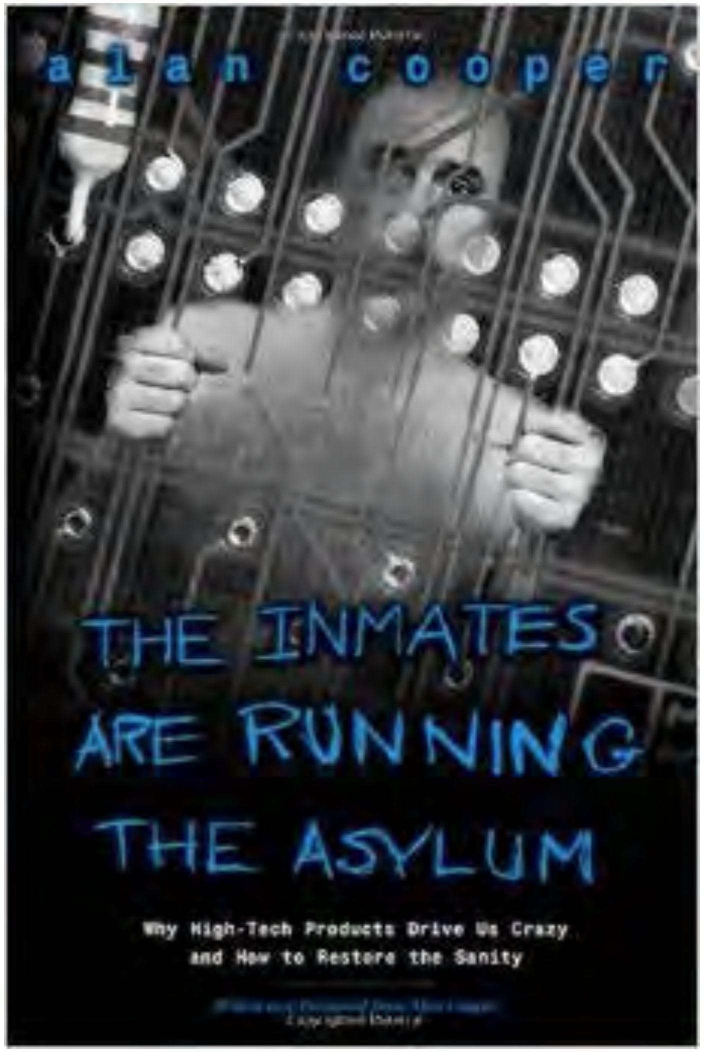
Personas

Question 1

Who is going to use the system?

- Identity
    - In-house or specific customer is easy
    - Broad products need several typical consumers
- Background
- Skills
- Work habits and preferences
- Physical characteristics

"If you want to create a product that satisfies a broad audience of users, logic will tell you to make it as broad in its functionality as possible to accommodate the most people. **Logic is Wrong**."



3 types of people

- Parent concerned about safety
- Carpenter who needs to transport tools
- Executive looking for a fast & sporty car

Principles of Personas

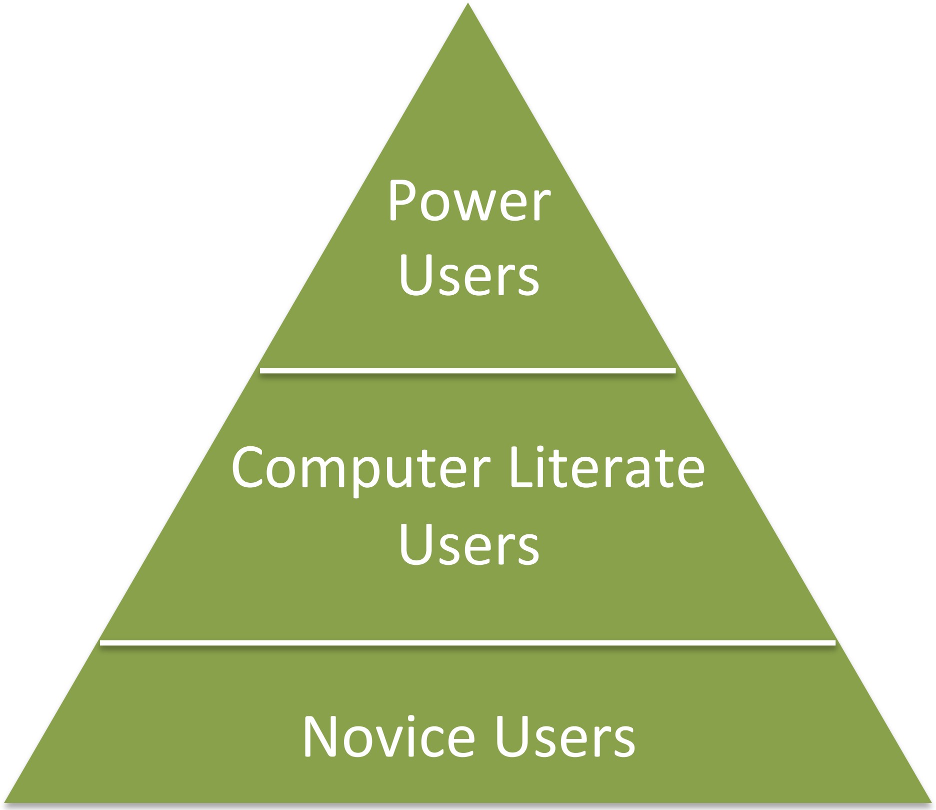
- More specific, more effective
- Give the person detail
- Give them a name
- Make it believable

Microsoft Kin

“Tia always wants to know what cool things her friends are up to”

- 16 years old
- From La Jolla, CA
- Loves all things pink
- 2 sisters, Diana & Ashley
- Was Juliet in last year’s school performance of “Romeo & Juliet”

Types of users



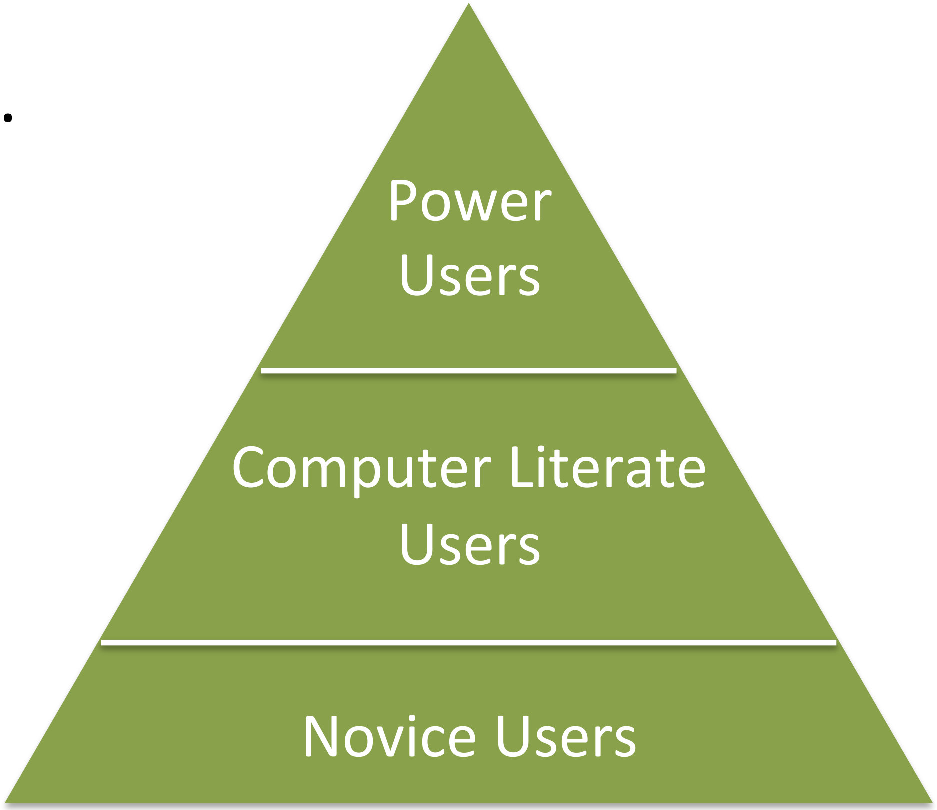
Power Users

Computer Literate Users

Novice Users

Types of users

"Elise is a 33-year-old accountant who uses Microsoft Excel every day. She likes to watch 'House of Cards' on her iPhone before bed, but has had trouble connecting her email to her phone. She goes hiking nearly every weekend."



Power Users

Computer Literate Users

Novice Users

Designing with Personas

- Design to make the “primary” persona(s) happy

- Avoid design choices that make personas unhappy

Why use Personas?

Thoroughly think about who is using your product

- Ensure the design is effective for those people

- Make the product and its impacts "real"

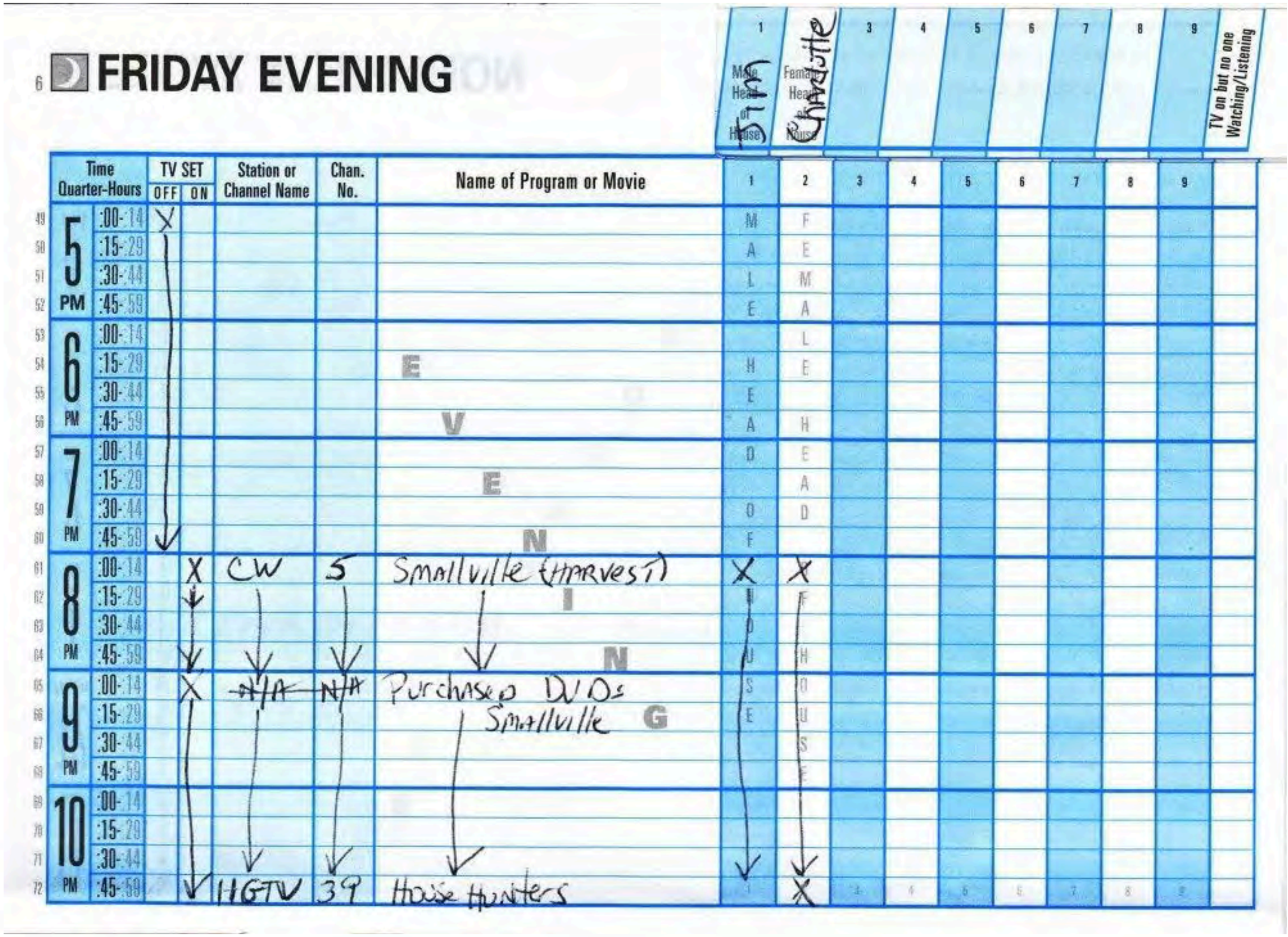
Cultural Probes & Diary Studies

Self-Report Data

Minimal influence on actions

Event takes place over a long period of time

Diary Study



6 **FRIDAY EVENING**

	Time Quarter-Hours		TV SET OFF	TV SET ON	Station or Channel Name	Chan. No.	Name of Program or Movie	1 Male Head of House Jim	2 Female Head of House Charlotte	3	4	5	6	7	8	9	TV on but no one Watching/Listening
49	5 PM	:00-:14	X					M	F								
50		:15-:29						A	E								
51		:30-:44						L	M								
52		:45-:59						E	A								
53	6 PM	:00-:14							L								
54		:15-:29					E	H	E								
55		:30-:44						E									
56		:45-:59					V	A	H								
57	7 PM	:00-:14						D	E								
58		:15-:29					E		A								
59		:30-:44						O	D								
60		:45-:59	↓				N	F									
61	8 PM	:00-:14		X	CW	5	Smallville (HARVEST)	X	X								
62		:15-:29		↓			I	H	F								
63		:30-:44						O									
64		:45-:59		↓	↓	↓	↓ N	U	H								
65	9 PM	:00-:14		X	~~N/A~~	~~N/A~~	Purchased DVDs	S	O								
66		:15-:29					Smallville G	E	U								
67		:30-:44							S								
68		:45-:59							E								
69	10 PM	:00-:14															
70		:15-:29															
71		:30-:44			↓	↓	↓	↓	↓								
72		:45-:59		↓	HGTV	39	House Hunters	1	X	3	4	5	6	7	8	9	

Cultural Probe

Kaye et al. *Money Talks: Tracking Personal Finanaces*, CHI 2014

Why use Diary Studies & Cultural Probes?

Learn about your [potential] user’s habits

Artifacts reflect how people currently do something

- Contextual Inquiry with a record

Experience Sampling Method

Carrier 3:21 AM

How do you feel right now? – Track Your Happ...

trackyourhappiness.org

Google

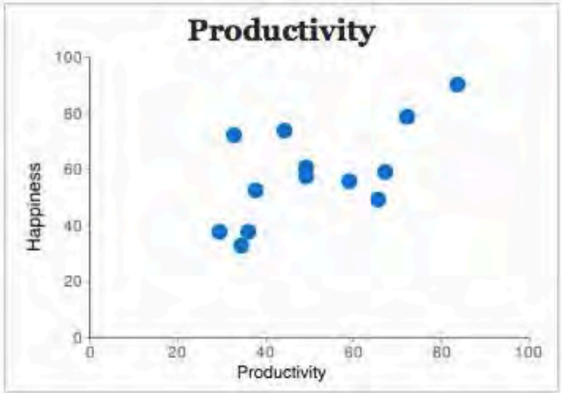
Track Your Happiness

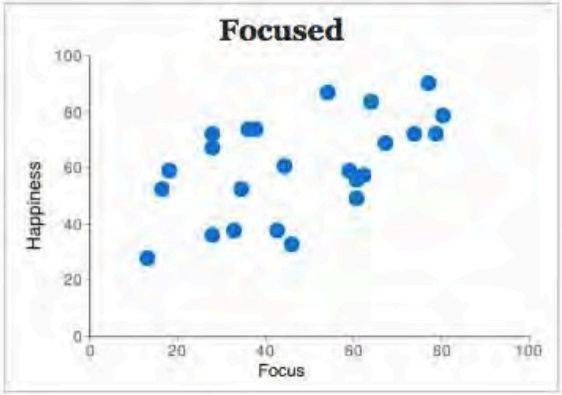
How do you feel right now?

Very bad

Very good

Next





Why use Experience Sampling?

Learn about your [potential] user's habits

Learn what influences these habits

Diary studies with prompting

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 06:
Human Performance

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

design:
use:
build:

University of Washington

These are Examples of What?

Popsicle-stick bridge

$x = x0 + v0t + \frac{1}{2} at2$

ACT-R

Goffman’s Negotiated Approach

Norman’s Execution-Evaluation Cycle

Models

We have said models describe phenomena, isolating components and allowing a closer look

Today is a closer look at modeling humans

- Capture essential pieces
  - Model should have what it needs but no more
  - Thus avoid underfitting or overfitting model
- Allow us to measure
  - Collect data, put in model, compare model terms
- Allow us to predict
  - The better the model, the better the predictions

Creating a Model

How would you go about creating a model?

Creating a Model

How would you go about creating a model?

One approach:

Observe, Collect Data, Find Patterns,
Draw Analogies, Devise Model,
Test Fit to Data, Test Predictions, Revise

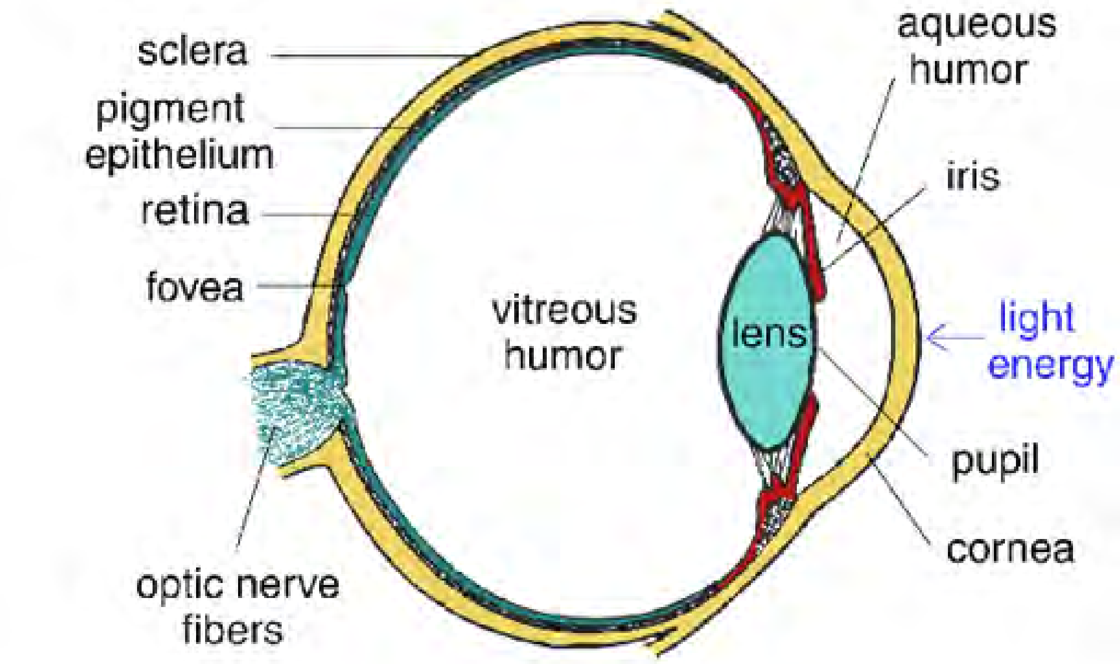
Fundamentally an inductive process

Today

Some example models of human performance

Visual System	Biological Model
Model Human Processor	Higher-Level Model
Fitts's Law	Model by Analogy
Gestalt Principles	Predict Interpretation

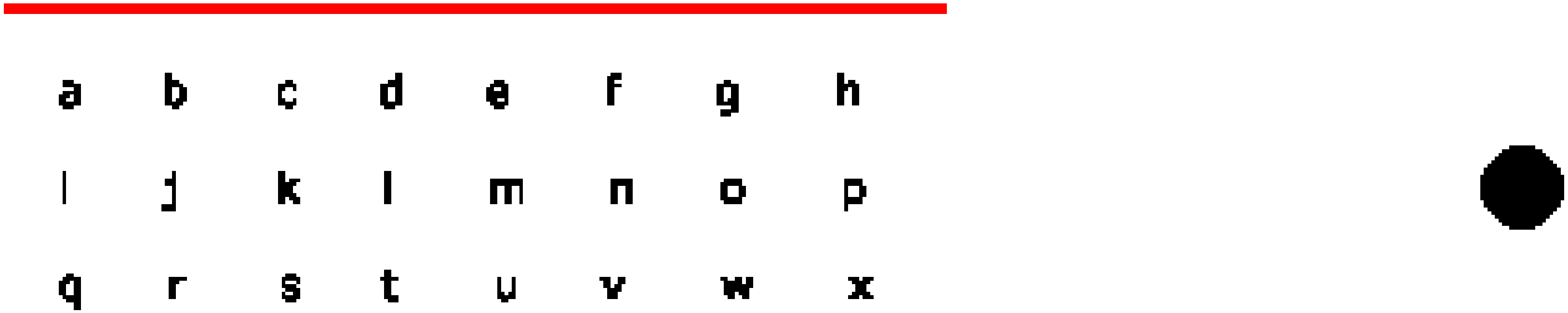
Human Visual System



Light passes through lens, focused on retina

Blind Spot?

Blind Spot

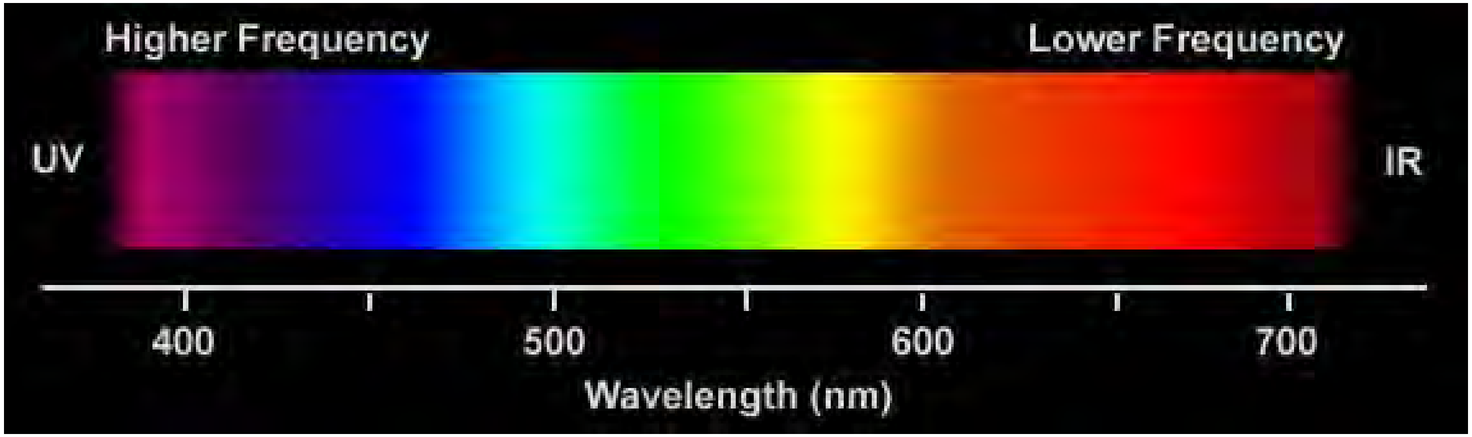


a b c d e f g h

i j k l m n o p

q r s t u v w x

Visible Spectrum



Retina

- Covered with light-sensitive receptors
  - Rods (120 million)
    - Sensitive to broad spectrum of light
    - Sensitive to small amounts of light
    - Cannot discriminate between colors
    - Sense intensity or shades of gray
    - Primarily for night vision & perceiving movement
  - Cones (6 million)
    - Used to sense color

Retina

Center of retina has most of the cones

- Allows for high acuity of objects focused at center

Edge of retina is dominated by rods

- Allows detecting motion of threats in periphery

What does that mean for you?

- Peripheral movement is easily distracting

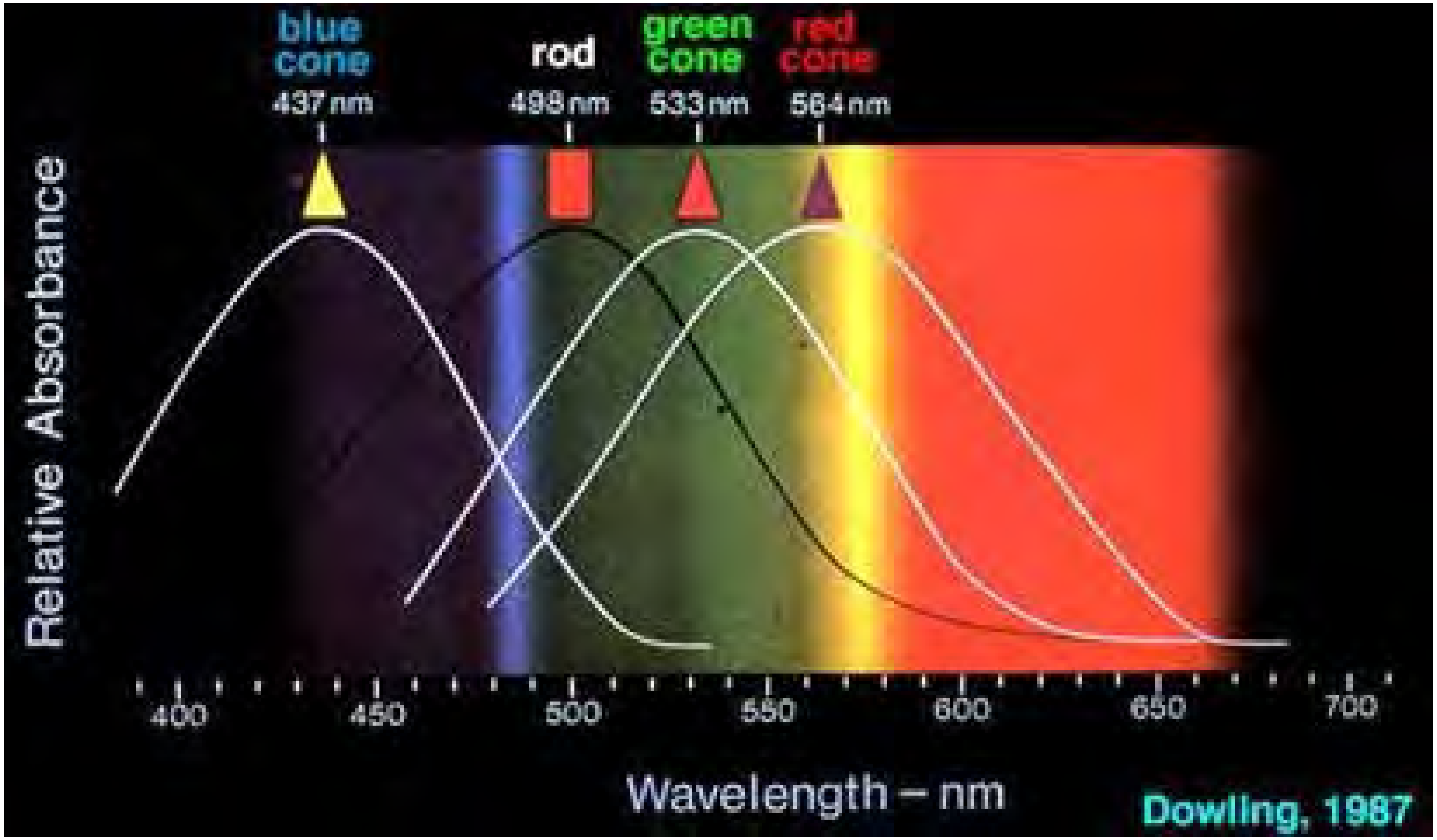
Color Perception via Cones

Photopigments used to sense color

3 types: blue, green, “red” (actually yellow)

- Each sensitive to different band of spectrum
- Ratio of neural activity stimulation for the three types of gives us a continuous perception of color

Color Sensitivity



University of Washington

Distribution of Photopigments

- Not distributed evenly
  - Mainly reds (64%), Very few blues (4%)
  - Insensitivity to short wavelengths (i.e., blue)
- No blue cones in retina center
  - Fixation on small blue object yields “disappearance”
- Lens yellows with age, absorbs short wavelengths
  - Sensitivity to blue is reduced even further

Color Sensitivity & Image Detection

Most sensitive to center of spectrum

- To be perceived as the same, blues and reds must be brighter than greens and yellows

Brightness determined mainly by red and green

- $Y = 0.3\,\text{Red} + 0.59\,\text{Green} + 0.11\,\text{Blue}$

Shapes detected by finding edges

- We use brightness and color difference

Implication

- Blue edges and shapes are hard

Color Sensitivity & Image Detection

Most sensitive to center of spectrum

- To be perceived as the same, blues and reds must be brighter than greens and yellows

Brightness determined mainly by red and green

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Shapes detected by finding edges

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Implication

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Focus

Different wavelengths of light focused at different distances behind eye’s lens

- Constant refocusing causes fatigue

Saturated colors (i.e., pure colors) require more focusing than desaturated (i.e., pastels)

Focus

Different wavelengths of light focused at different distances behind eye's lens

- Constant refocusing causes fatigue

Saturated colors (i.e., pure colors) require more focusing than desaturated (i.e., pastels)

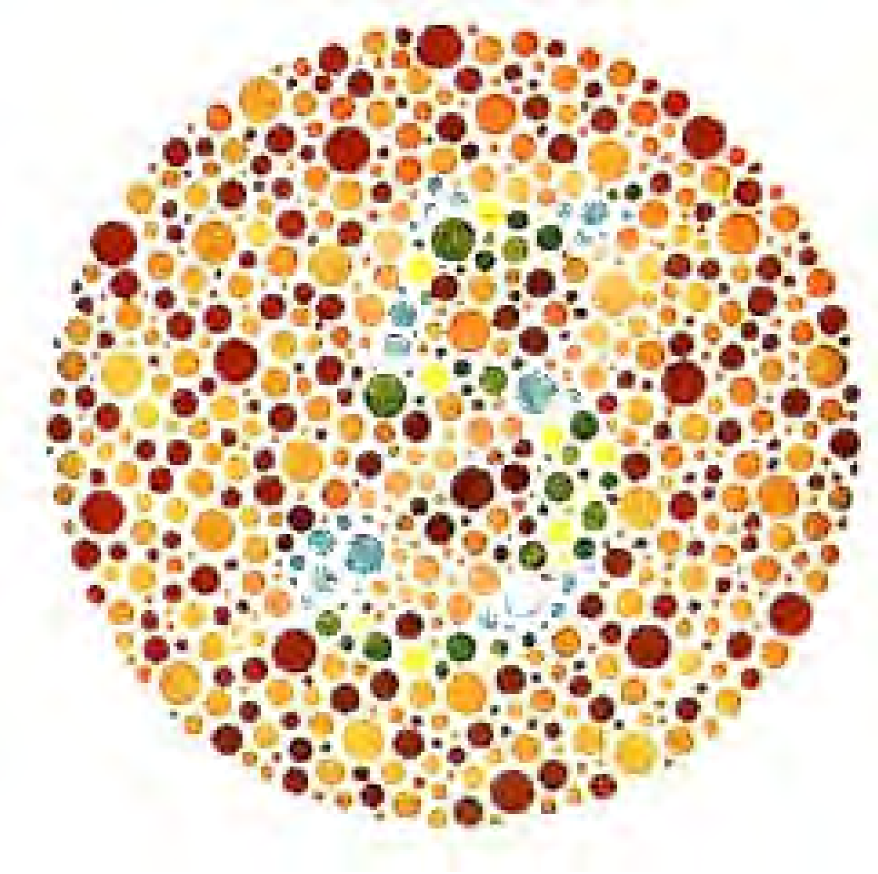
The Falklands Society

This hurts, why?

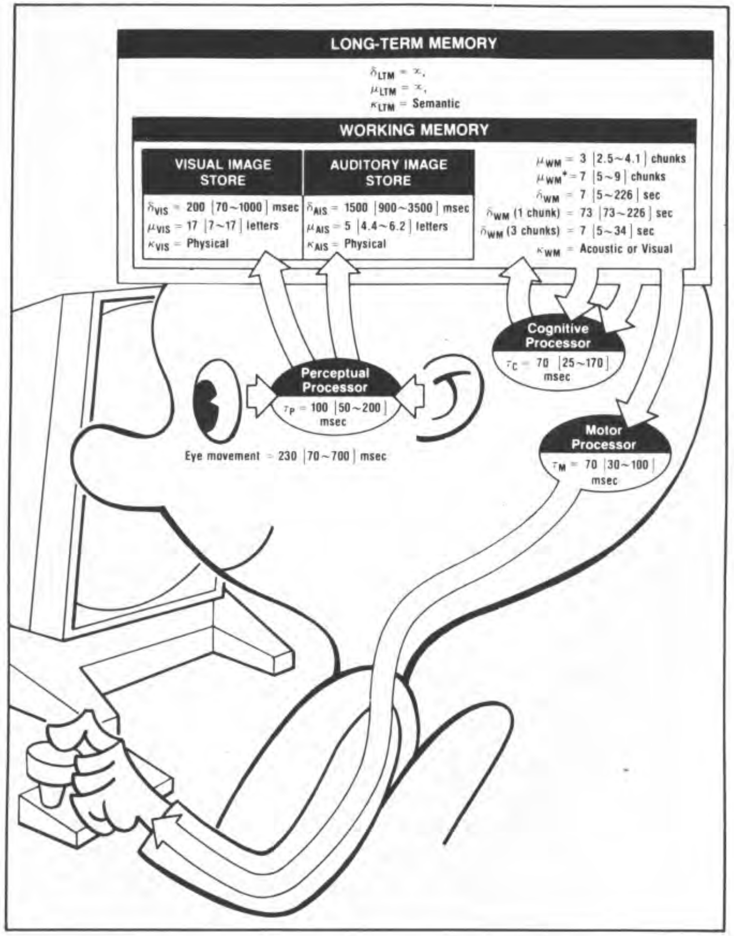
Color Deficiency

- Trouble discriminating colors
  - Affects about 9% of population
- Two main types
  - Different photopigment response most common
    - Reduces capability to discern small color differences
  - Red-Green deficiency is best known
    - Lack of either green or red photopigment, cannot discriminate colors dependent on red and green
- Also known as color blindness

Red-Green Deficiency Test



The Model Human Processor



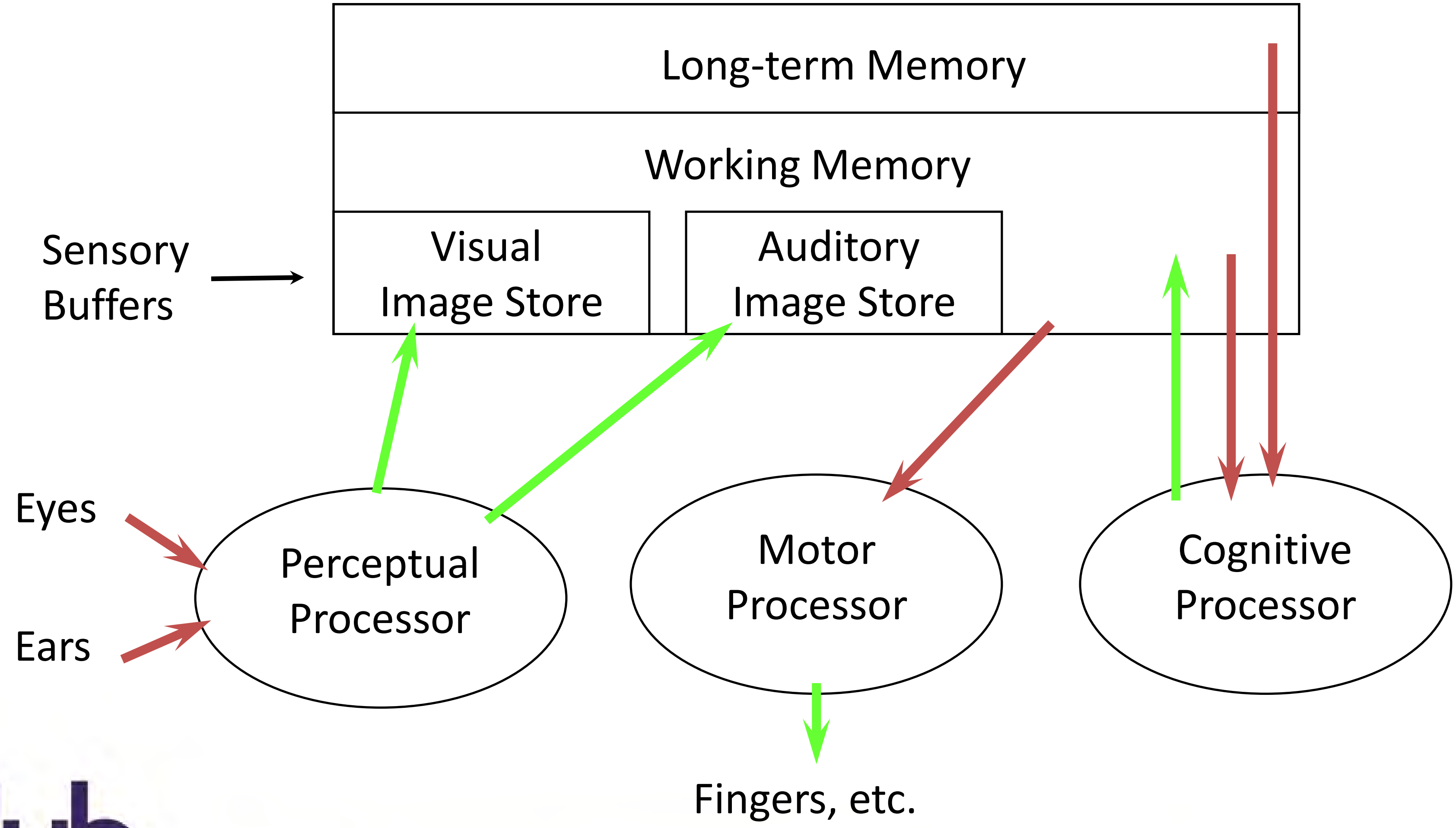
Developed by Card, Moran, & Newell (1983)

Based on empirical data

- Summarizing human behavior in a manner easy to consume and act upon

Same book that named human computer interaction

The Model Human Processor



Long-term Memory

Working Memory

Visual Image Store

Auditory Image Store

Sensory Buffers

Eyes

Ears

Perceptual Processor

Motor Processor

Cognitive Processor

Fingers, etc.

Basics of Model Human Processor

Sometimes serial, sometimes parallel

- Serial in action and parallel in recognition
  - Pressing key in response to light
  - Driving, reading signs, hearing all simultaneously

Parameters

- Processors have cycle time, approximately 100-200ms
- Memories have capacity, decay time, and type

A Working Memory Experiment

BMCIACSEI

BM CIA CSE I

IBM CIA CSE

Memory

- Working memory (also known as short-term)
  - Small capacity (7 ± 2 “chunks”)
    - 6174591765 vs. (617) 459-1765
    - IBMCIACSE vs. IBM CIA CSE
  - Rapid access (~ 70ms) and decay (~200 ms)
    - Pass to LTM after a few seconds of continued storage
- Long-term memory
  - Huge (if not “unlimited”)
  - Slower access time (~100 ms) with little decay

Activation Experiment

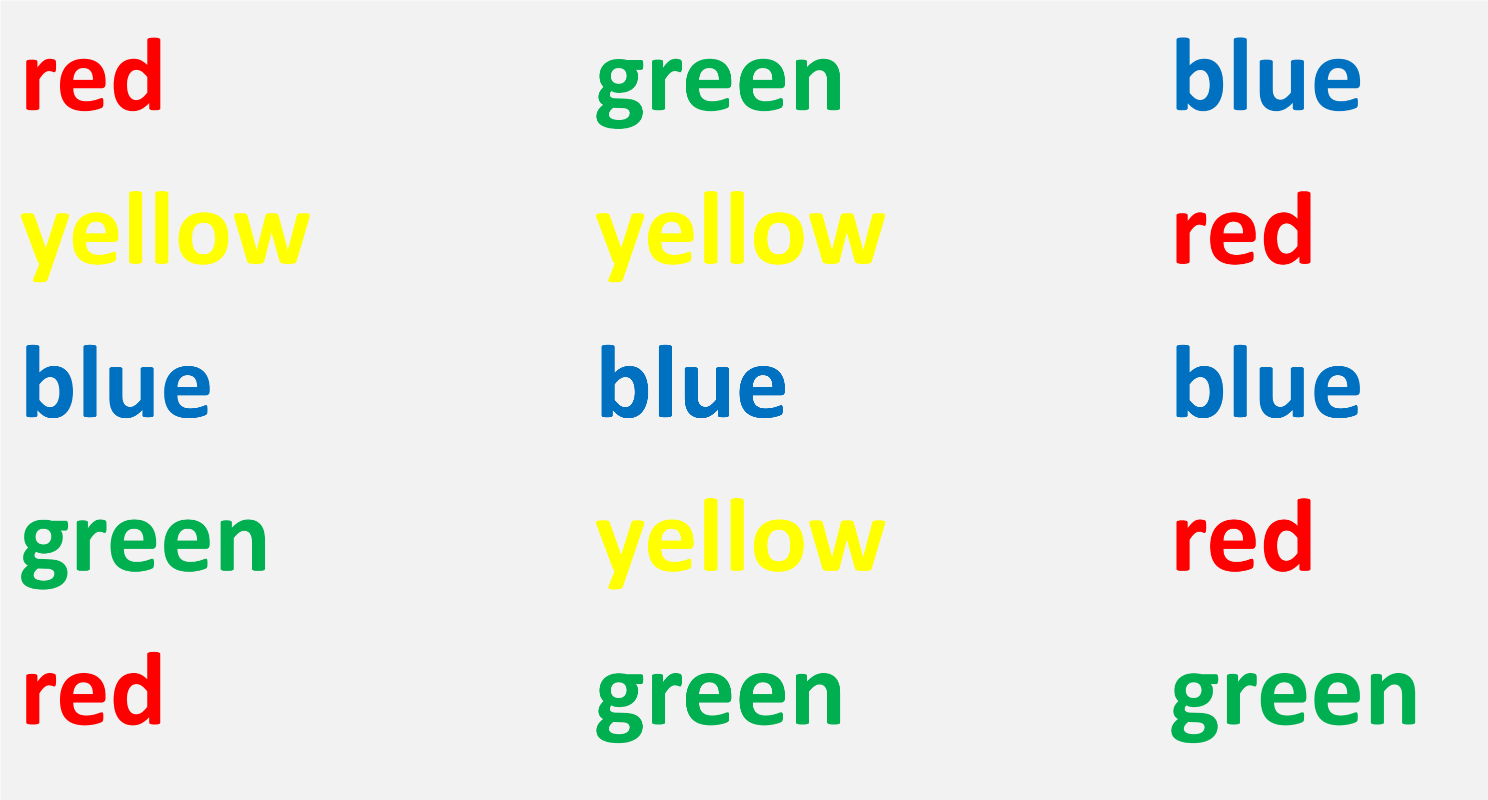
Volunteer

Start saying colors you see in list of words

- When slide comes up, as fast as you can
- There will be three columns of words

Say “done” when finished

- Everyone else time how long it takes



red	green	blue
yellow	yellow	red
blue	blue	blue
green	yellow	red
red	green	green

Activation Experiment

Do it again

Say “done” when finished

ivd
ncudgt
mkbh
bhfe
cnofgt

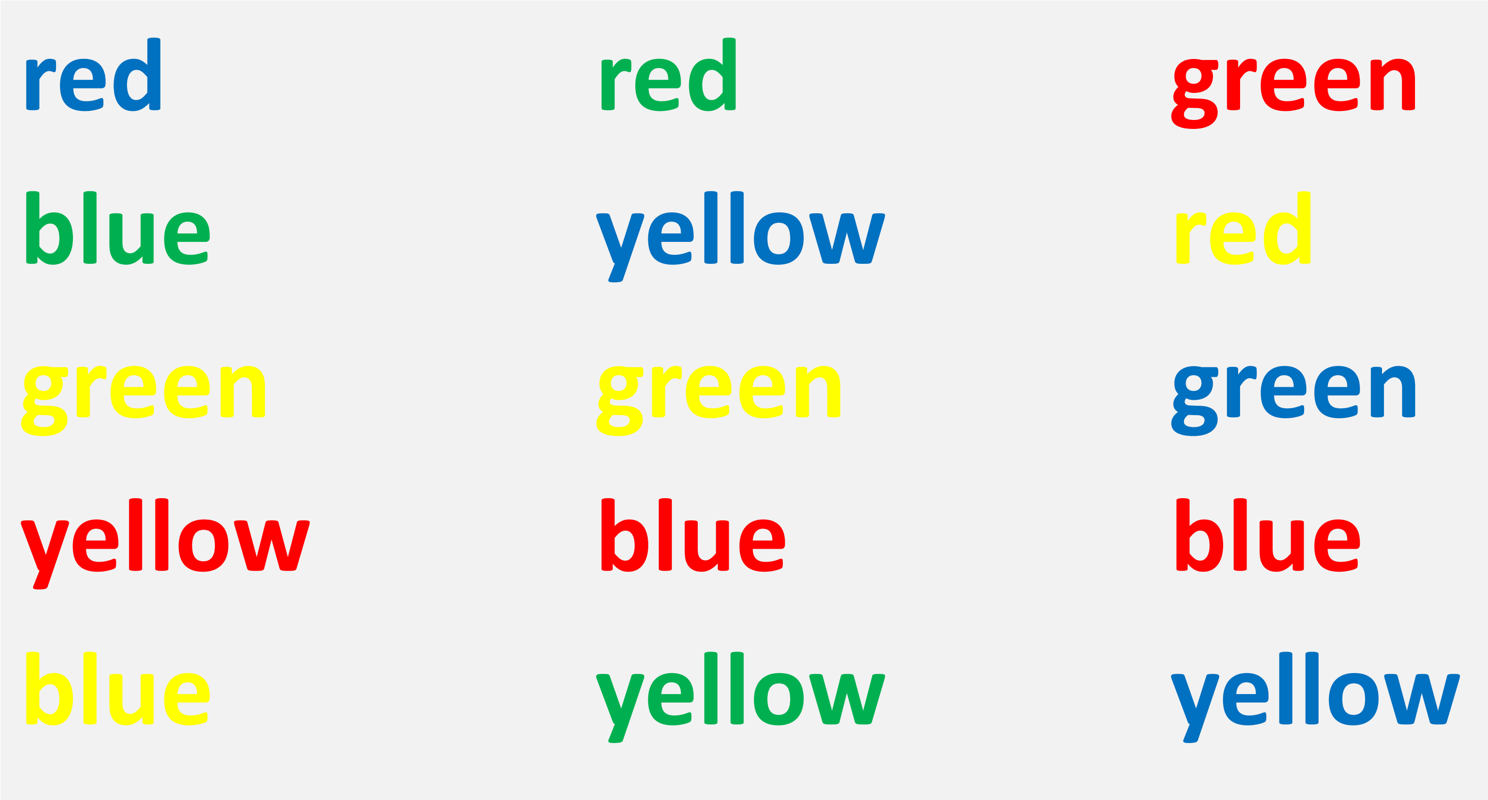
olftcs
zjdcv
xbts
cnhdes
uhths

fwax
lxngyt
cfto
fwa
dalcrd

Activation Experiment

Do it again

Say “done” when finished



red	red	green
blue	yellow	red
green	green	green
yellow	blue	blue
blue	yellow	yellow

Model Human Processor Operation

Recognize-Act Cycle of the Cognitive Processor

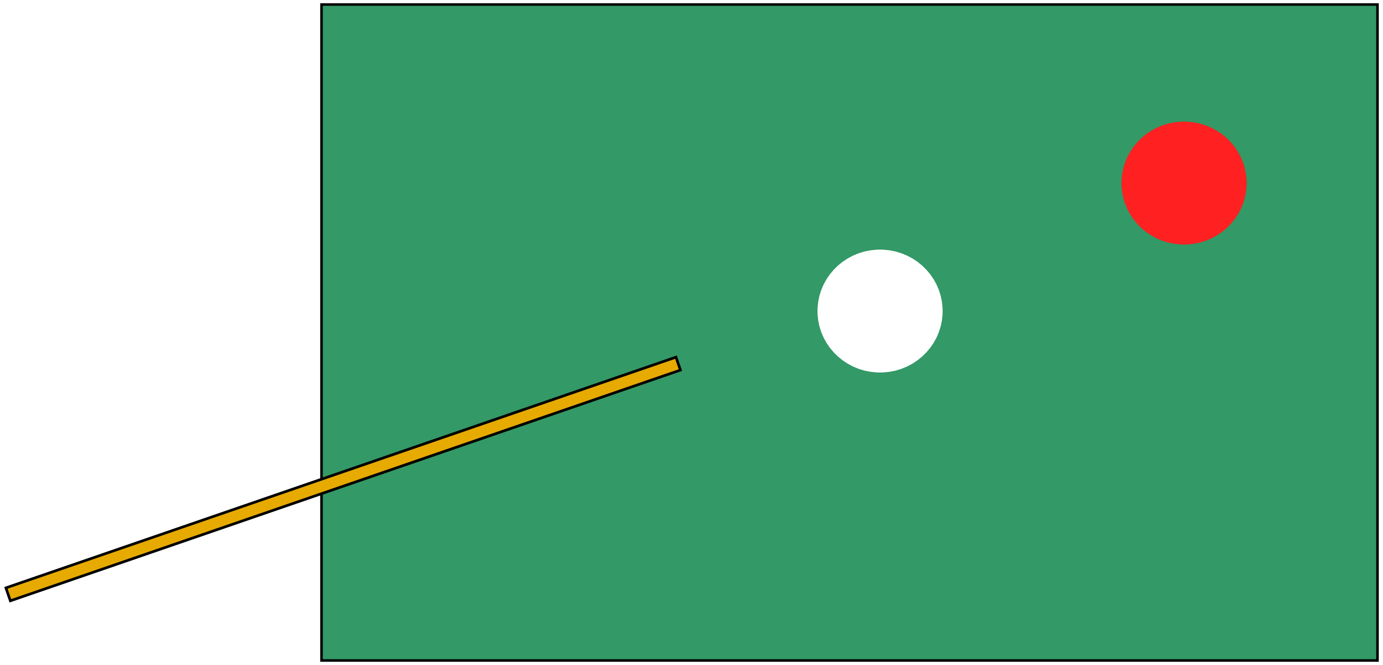
- On each cycle, contents in working memory initiate actions associatively linked in long-term memory
- Actions modify the contents of working memory

Discrimination Principle

- Retrieval is determined by candidates that exist in memory relative to retrieval cues
- Interference created by strongly activated chunks

See also Freudian slips

Perceptual Causality



How soon must the red ball move after cue ball collides with it?

Perceptual Causality

Stimuli that occur within one cycle of the perceptual processor fuse into a single concept

Requirement

- If you want to create the perception of causality, then you need to be sufficiently responsive

Caution

- Two stimuli intended to be distinct can fuse if the first event appears to cause the other

Fitts's Law (1954)

- Models time to acquire targets in aimed movement
  - Reaching for a control in a cockpit
  - Moving across a dashboard
  - Pulling defective items from a conveyor belt
  - Clicking on icons using a mouse
- Very powerful, widely used
  - Holds for many circumstances (e.g., under water)
  - Allows for comparison among different experiments
  - Used both to measure and to predict

Fitts’s Law (1954)

James’s use of ’s is correct, but others may say Fitts’ Law

Models time to acquire targets in aimed movement

- Reaching for a control in a cockpit
- Moving across a dashboard
- Pulling defective items from a conveyor belt
- Clicking on icons using a mouse

Very powerful, widely used

- Holds for many circumstances (e.g., under water)
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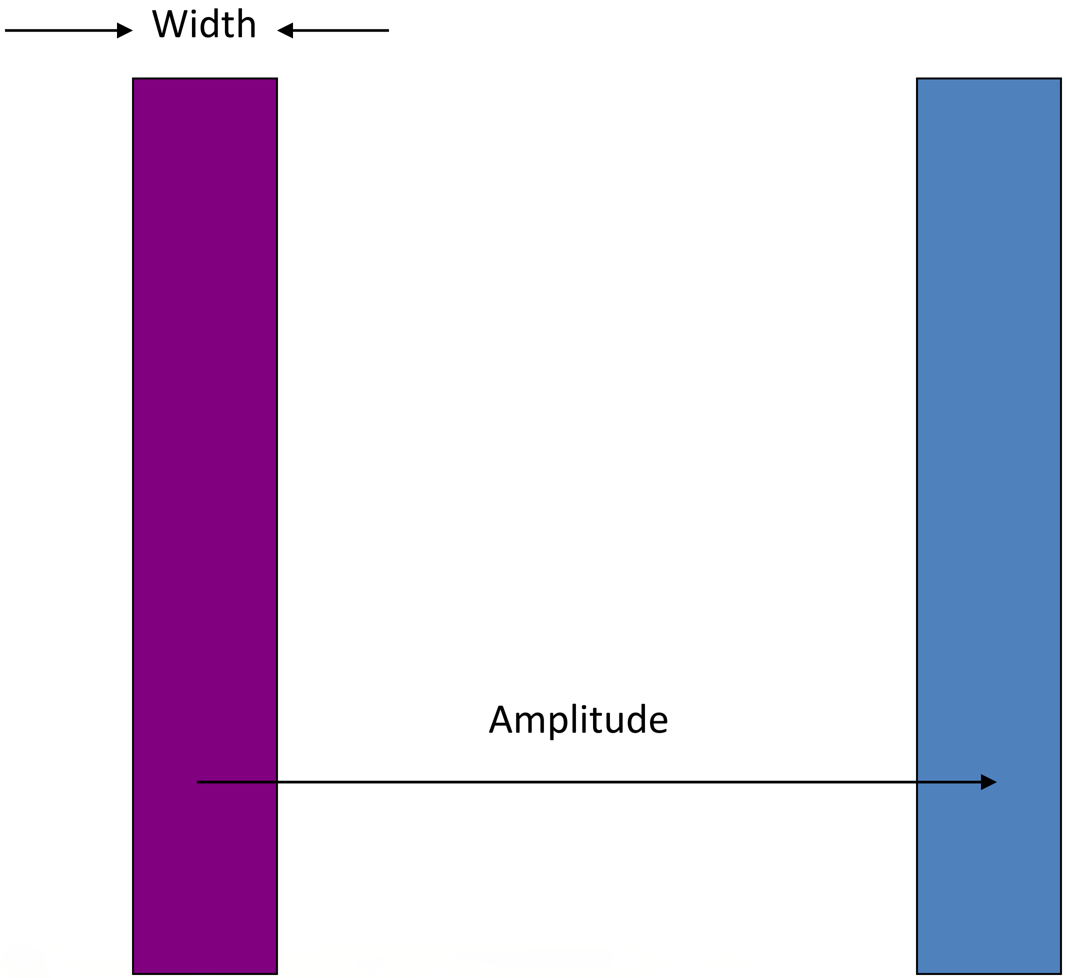
Reciprocal Point-Select Task



Width

Amplitude

Closed Loop versus Open Loop

What is closed loop motion?

What is open loop motion?

Closed Loop versus Open Loop

What is closed loop motion?

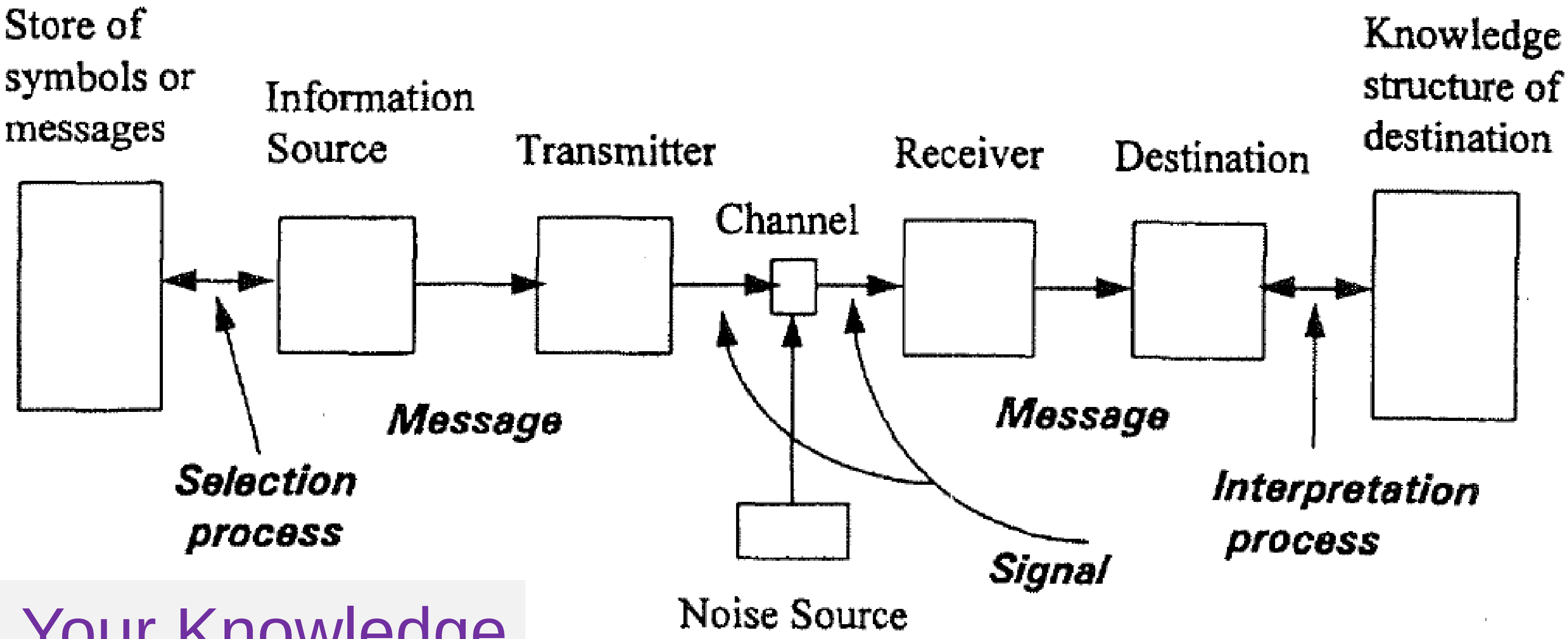
- Rapid aimed movements with feedback correction
- Fitts’s law models this

What is open loop motion?

- Ballistic movements without feedback correction
- Example: Throwing a dart
- See Schmidt’s Law (1979)

Model by Analogy

The Interface



Your Knowledge

Analogy to Information Transmission
Shannon and Weaver, 1959

Fitts's Law

$MT = a + b \log2(A / W + 1)$

What kind of equation does this remind you of?

Fitts's Law

MT = a + b log2(A / W + 1)

- What kind of equation does this remind you of?

y = mx + b

MT = a + bx, where x = log2(A / W + 1)

- x is called the Index of Difficulty (ID)
- As "A" goes up, ID goes up
- As "W" goes up, ID goes down

Index of Difficulty (ID)

log2(A / W + 1)

Fitts’s Law claims that the time to acquire a target increases linearly with the log of the ratio of the movement distance (A) to target width (W)

Why is it significant that it is a ratio?

Index of Difficulty (ID)

log2(A / W + 1)

- Fitts's Law claims that the time to acquire a target increases linearly with the log of the ratio of the movement distance (A) to target width (W)

Why is it significant that it is a ratio?

- Units of A and W don't matter
- Allows comparison across experiments

Index of Difficulty (ID)

- log2(A / W + 1)
  - Fitts's Law claims that the time to acquire a target increases linearly with the log of the ratio of the movement distance (A) to target width (W)
- ID units typically in "bits"
  - Because of association with information capacity and somewhat arbitrary use of base-2 logarithm

Index of Performance (IP)

$MT = a + b \log2(A / W + 1)$

- b is slope

1/b is called Index of Performance (IP)

- If MT is in seconds, IP is in bits/second

Also called “throughput” or “bandwidth”

- Consistent with analogy of the interaction as an information channel from human to target

A Fitts’s Law Experiment

“Beating” Fitts’s law

It is the law, right?

$MT = a + b \log_2(A / W + 1)$

So how can we reduce movement time?

Reduce A

Increase W

Fitts’s Law Related Techniques

Put targets closer together

Make targets bigger

Make cursor bigger

- Area cursors
- Bubble cursor

Use impenetrable edges

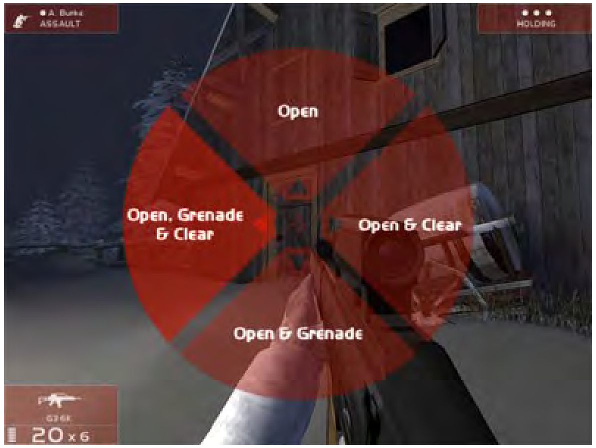
Fitts’s Law Examples

Which will be faster on average?

Pop-up Linear Menu

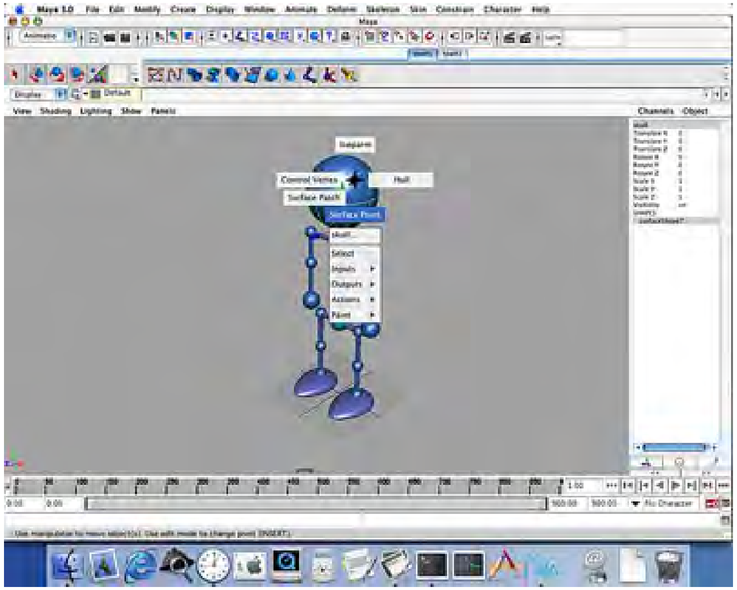
Pop-up Pie Menu

Pie Menus in Use



Rainbow 6

The Sims



Maya

Fitts's Law Examples

Which will be faster on average?

Pop-up Linear Menu

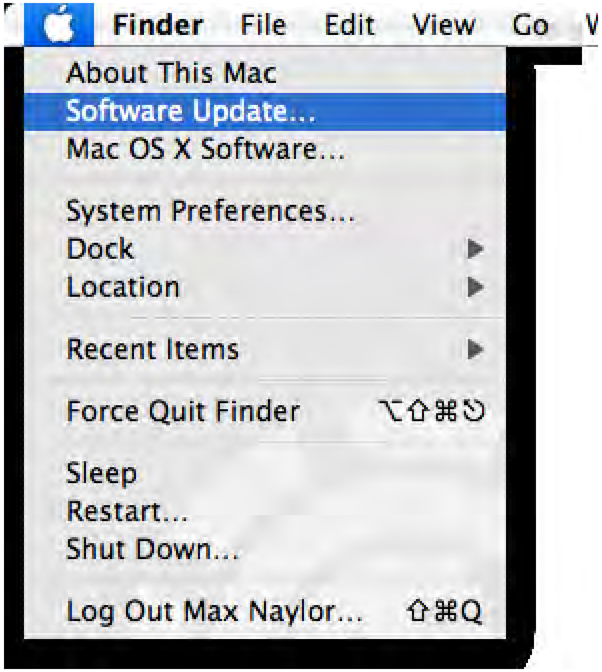
Today
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday

Pop-up Pie Menu

What about adaptive menus?

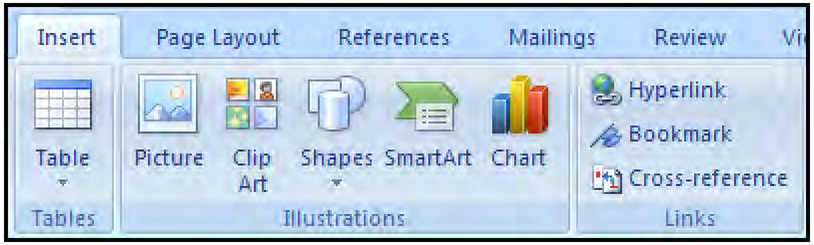
Fitts's Law in Windowing

Windows 95: Missed by a pixel
Windows XP: Good to the last drop

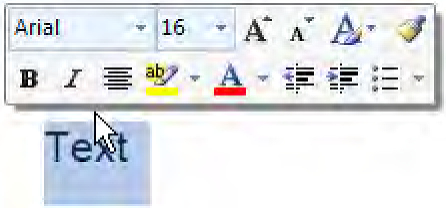


Macintosh Menu

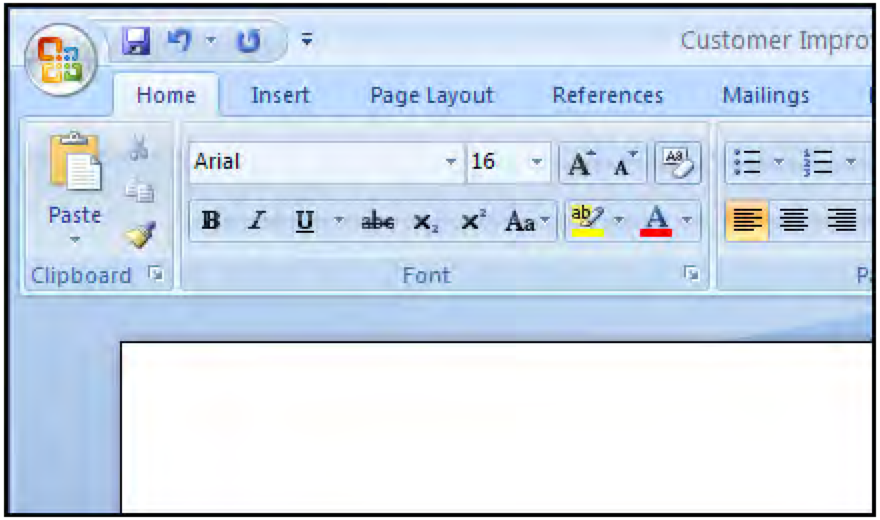
Fitts’s Law in MS Office 2007



Larger, labeled controls
can be clicked more quickly



Mini toolbar is close to the cursor



Magic Corner:
Office Button in the upper-left corner

Bubble Cursor

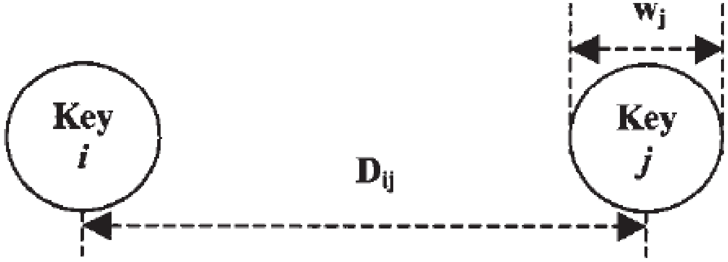
Grossman and Balakrishnan, 2005

Bubble Cursor with Prefab

Dixon et al, 2012

dub
University of
Washington

Fitts's Law and Keyboard Layout



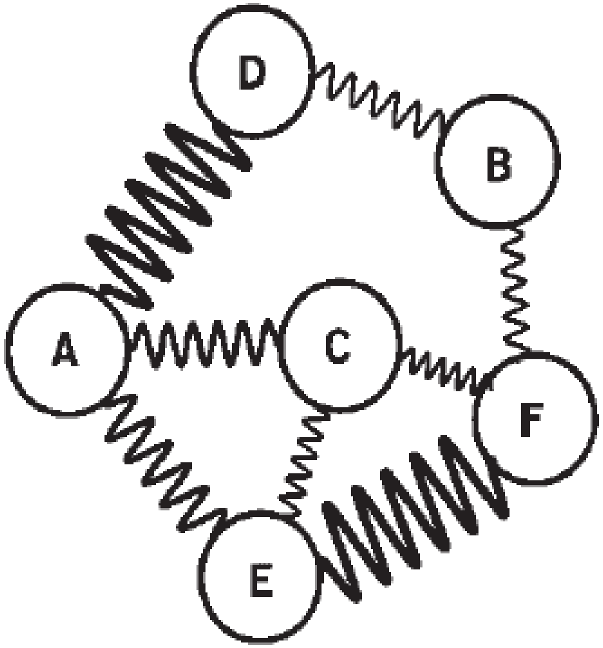
$$MT = a + b\log_2\left(\frac{D_{ij}}{W_j} + 1\right),$$

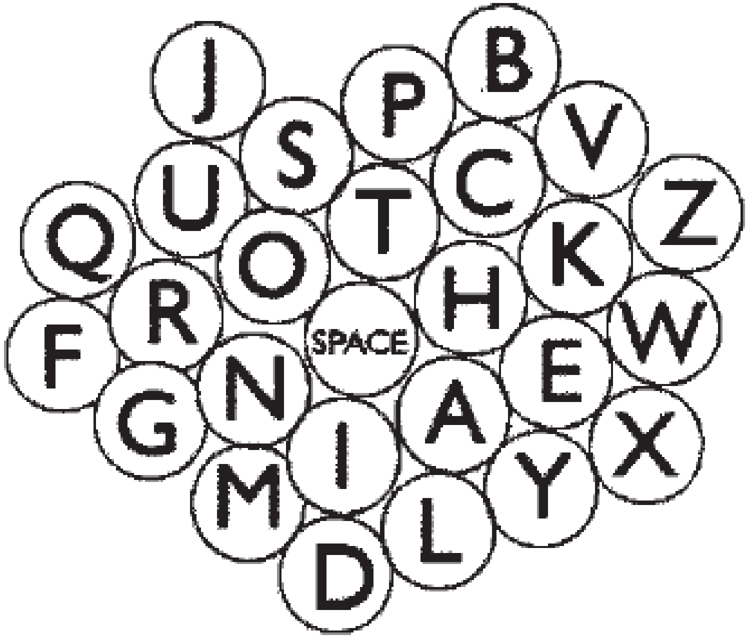
$$t = \sum_{i=1}^{27}\sum_{j=1}^{27}\frac{P_{ij}}{IP}\left[log_2\left(\frac{D_{ij}}{W_j} + 1\right)\right],$$

Zhai et. al (2002) pose stylus keyboard layout as an optimization of all key pairs, weighted by language frequency

Hooke’s Keyboard

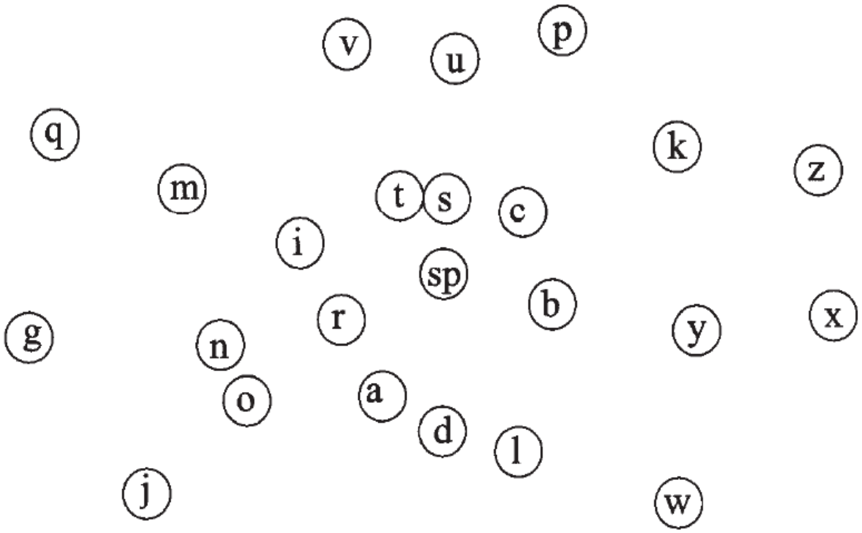
Optimizes a system of springs

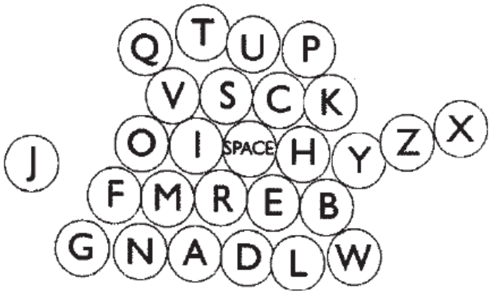


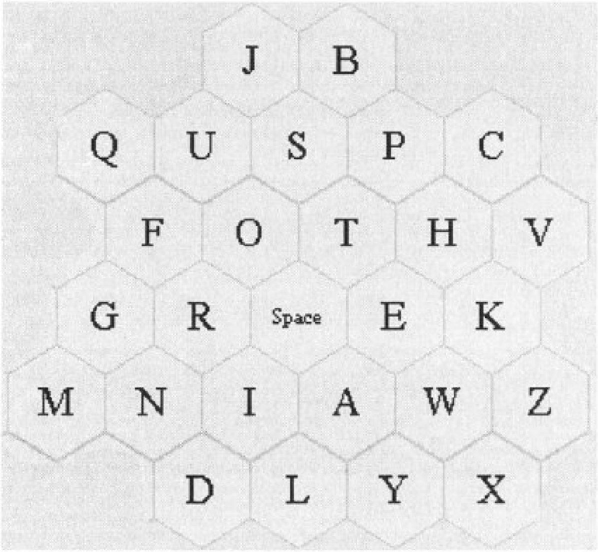


Metropolis Keyboard

Random walk minimizing scoring function



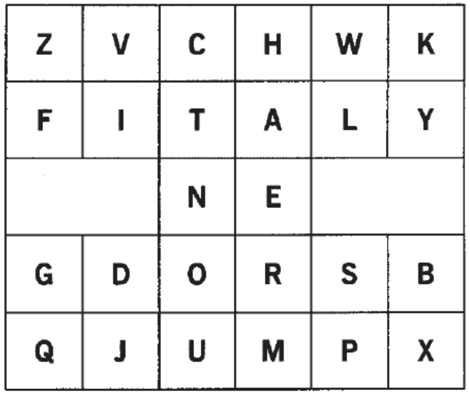




Considering Multiple Space Keys

FITALY Keyboard

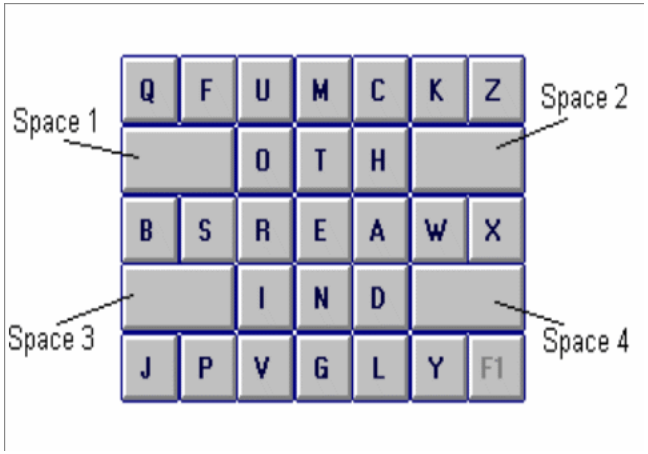
Textware Solutions



Z	V	C	H	W	K
F	I	T	A	L	Y
		N	E		
G	D	O	R	S	B
Q	J	U	M	P	X

OPTI Keyboard

MacKenzie and Zhang 1999

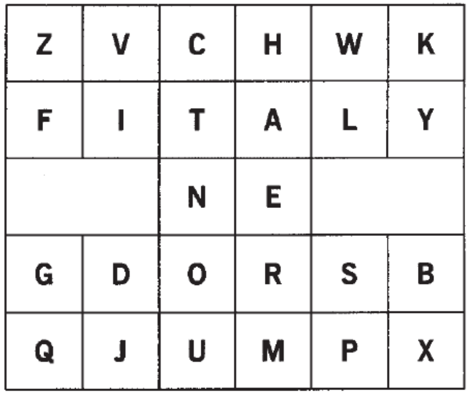


Q	F	U	M	C	K	Z
		O	T	H		
B	S	R	E	A	W	X
		I	N	D		
J	P	V	G	L	Y	F1

Considering Multiple Space Keys

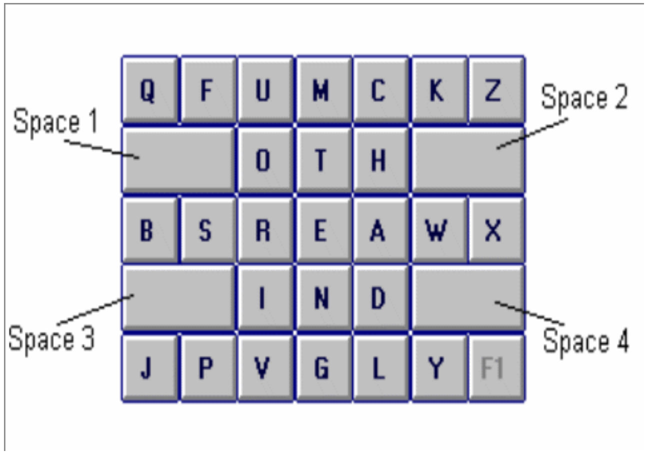
FITALY Keyboard

Textware Solutions



OPTI Keyboard

MacKenzie and Zhang 1999

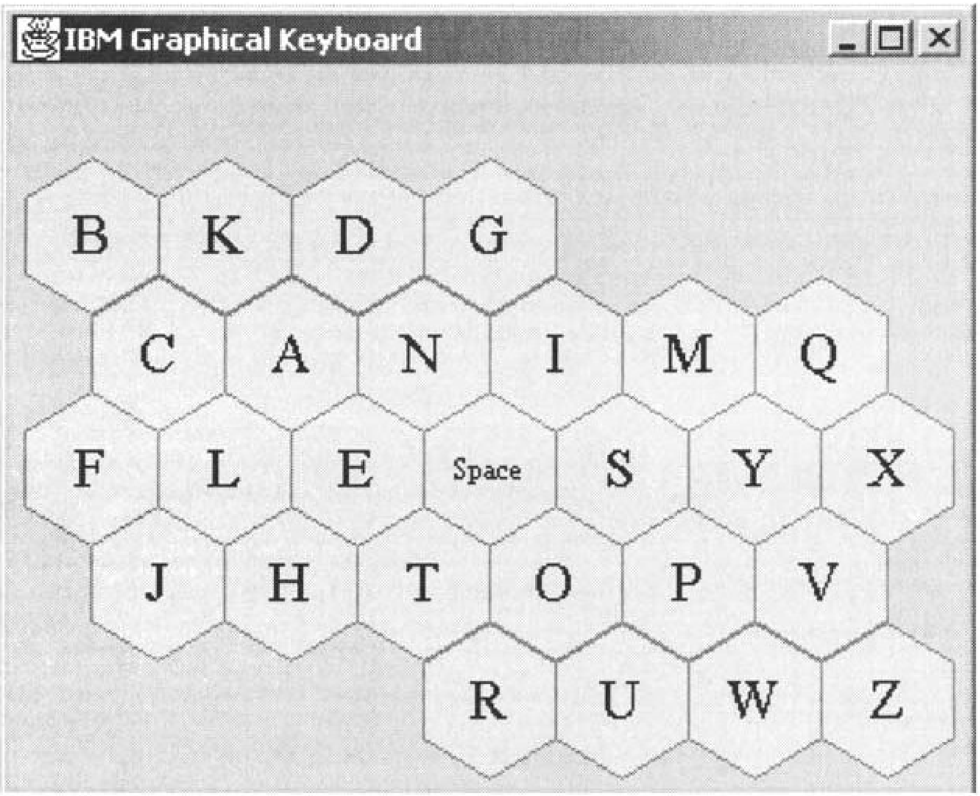


Correct choice of space key becomes important

Requires planning head to be optimal

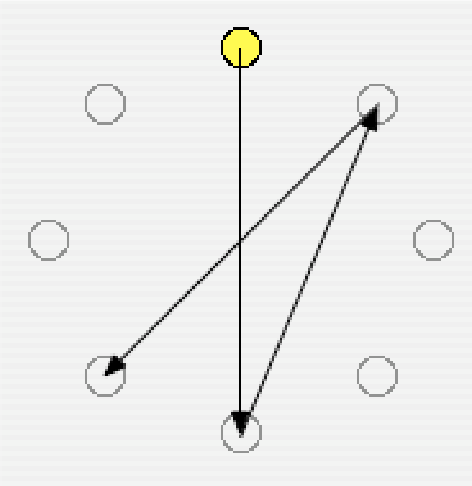
ATOMIK Keyboard

Optimized keyboard, adjusted for early letters in upper left and later letters in lower right

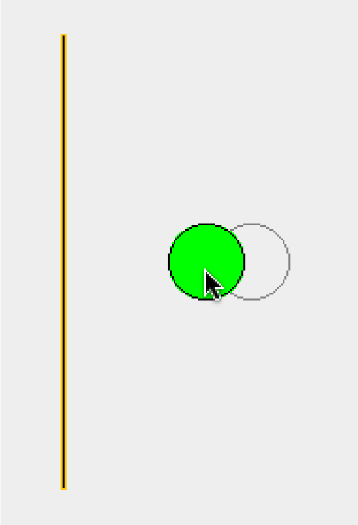


Using Motor Ability in Design

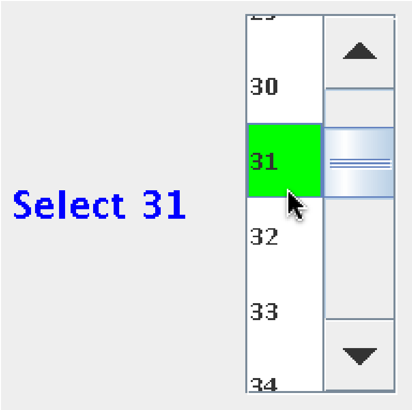
Pointing



Dragging



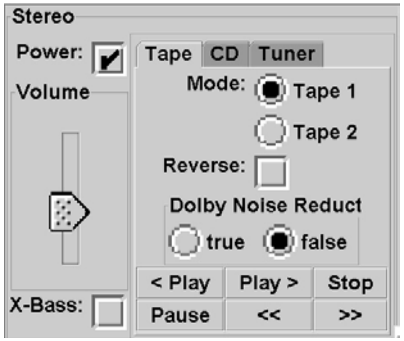
List Selection



Gajos et al 2007

Interface Generation As Optimization

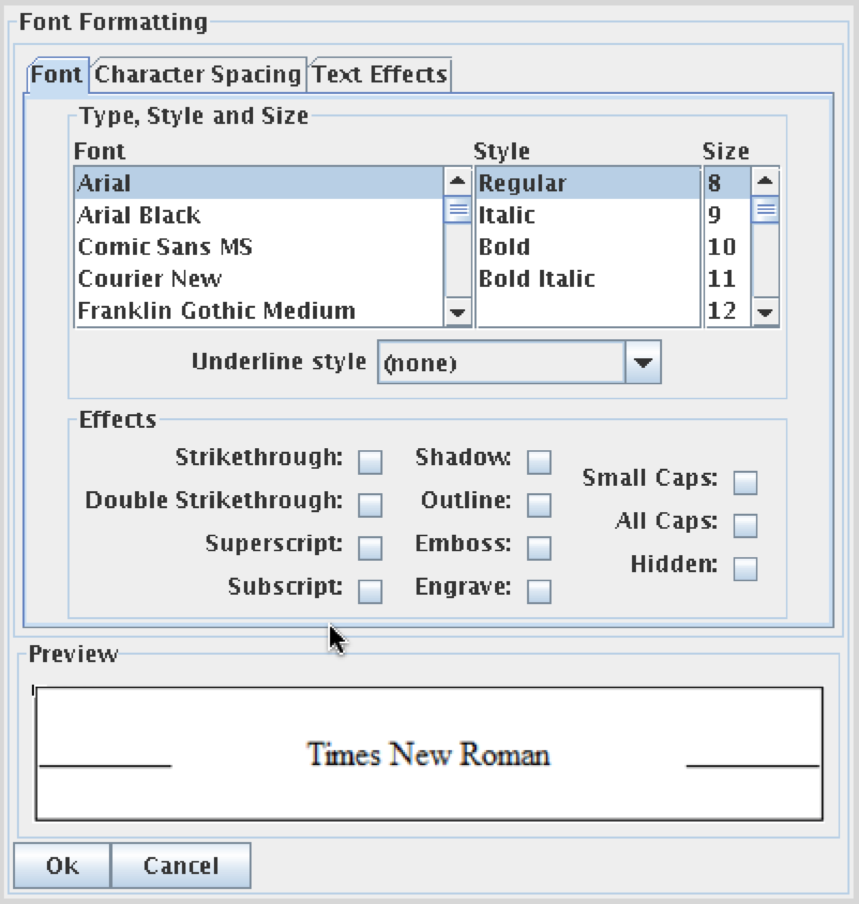
$(



)=

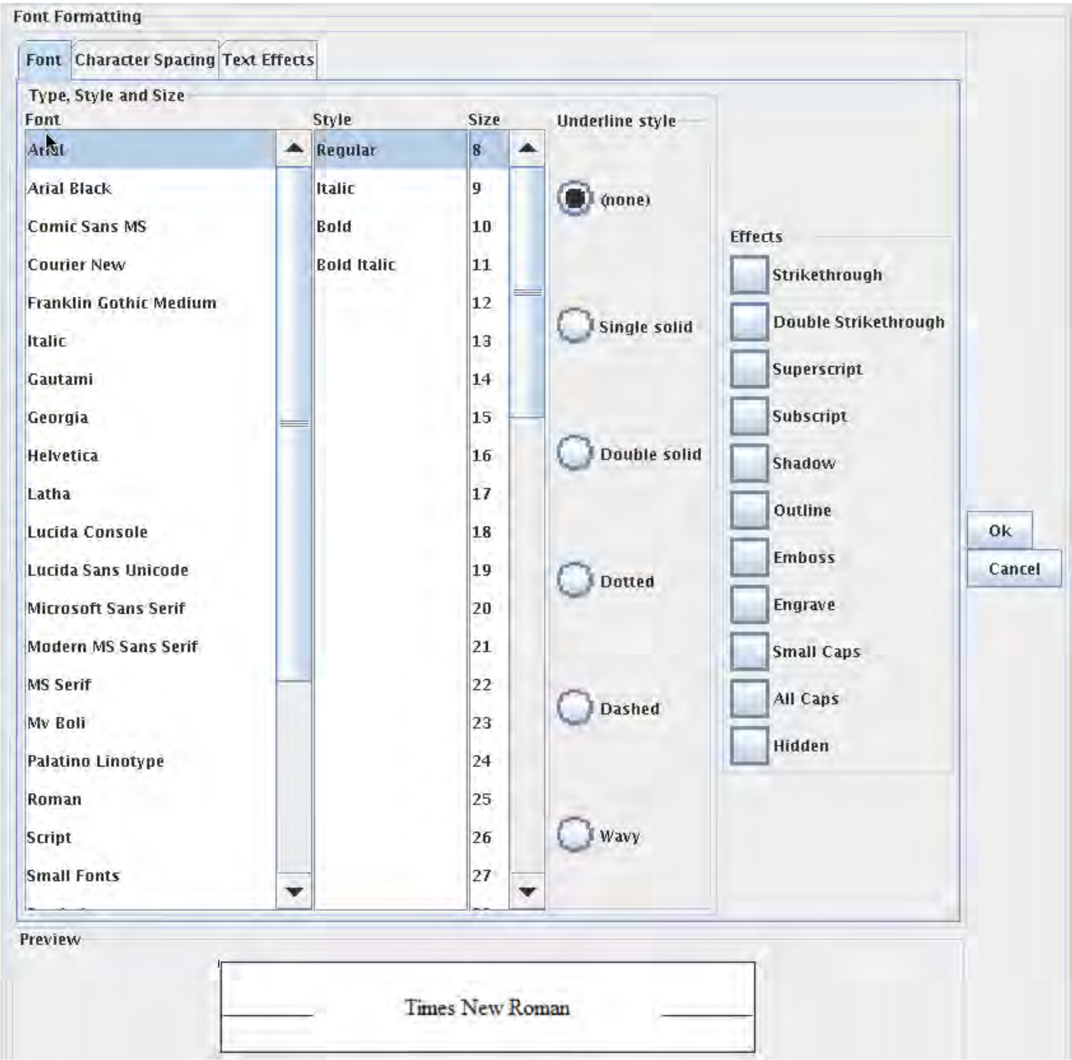
Estimated task completion time

Manufacturer Interface

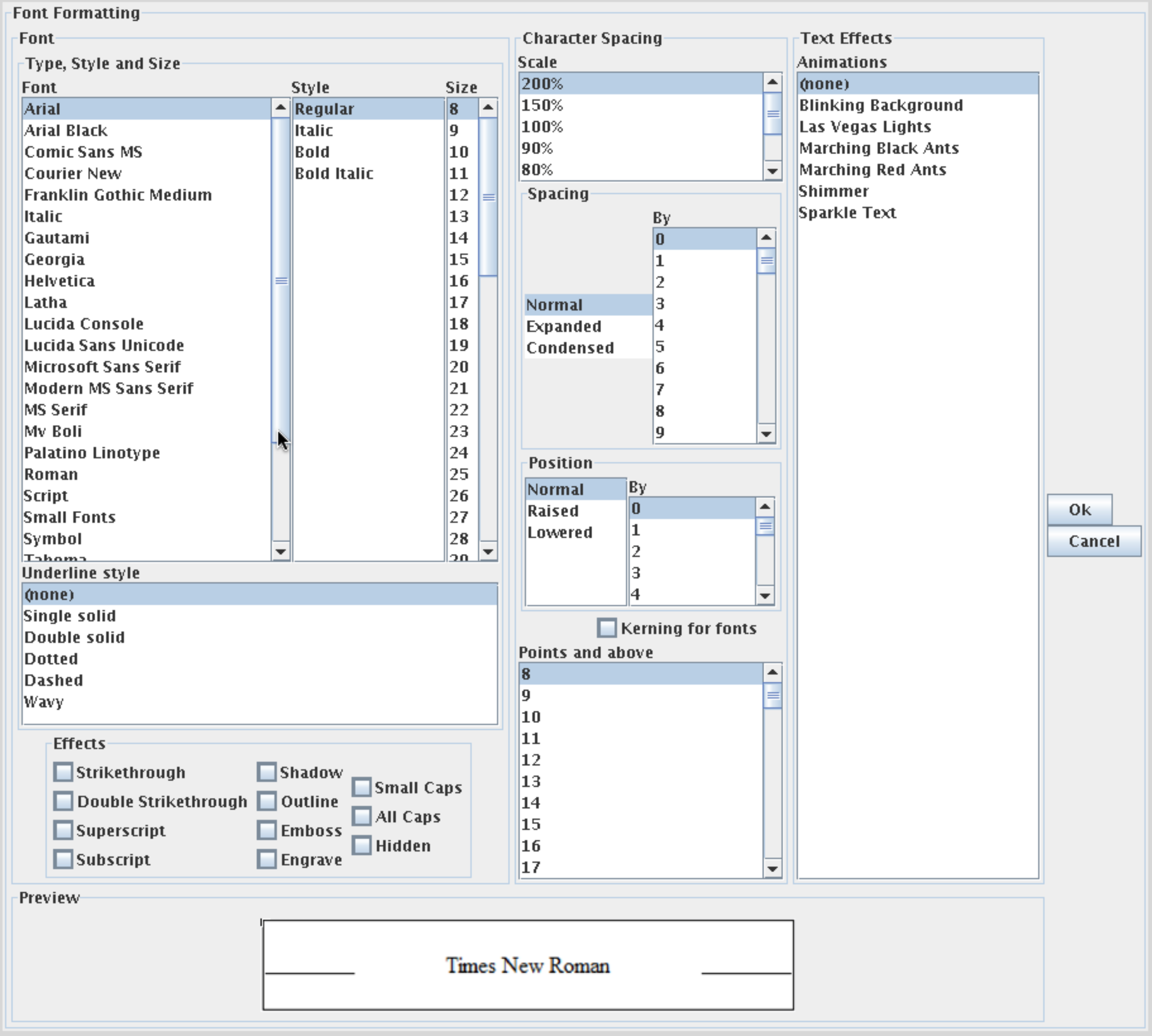


Font: Arial
Style: Regular
Size: 8
Underline style: (none)

Person with Cerebral Palsy



Person with Muscular Dystrophy



Font Formatting

Font

Type, Style and Size

Font
- Arial
- Arial Black
- Comic Sans MS
- Courier New
- Franklin Gothic Medium
- Italic
- Gautami
- Georgia
- Helvetica
- Latha
- Lucida Console
- Lucida Sans Unicode
- Microsoft Sans Serif
- Modern MS Sans Serif
- MS Serif
- Mv Boli
- Palatino Linotype
- Roman
- Script
- Small Fonts
- Symbol

Style
- Regular
- Italic
- Bold
- Bold Italic

Size
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28

Underline style
- (none)
- Single solid
- Double solid
- Dotted
- Dashed
- Wavy

Effects
- ☐ Strikethrough
- ☐ Double Strikethrough
- ☐ Superscript
- ☐ Subscript
- ☐ Shadow
- ☐ Outline
- ☐ Emboss
- ☐ Engrave
- ☐ Small Caps
- ☐ All Caps
- ☐ Hidden

Character Spacing

Scale
- 200%
- 150%
- 100%
- 90%
- 80%

Spacing
- Normal
- Expanded
- Condensed

By
0 1 2 3 4 5 6 7 8 9

Position
- Normal
- Raised
- Lowered

By
0 1 2 3 4

☐ Kerning for fonts

Points and above
8 9 10 11 12 13 14 15 16 17

Text Effects

Animations
- (none)
- Blinking Background
- Las Vegas Lights
- Marching Black Ants
- Marching Red Ants
- Shimmer
- Sparkle Text

Preview

Times New Roman

Interface Generation As Optimization

In a study with 11 participants with diverse motor impairments:

Consistently faster using generated interfaces (26%)

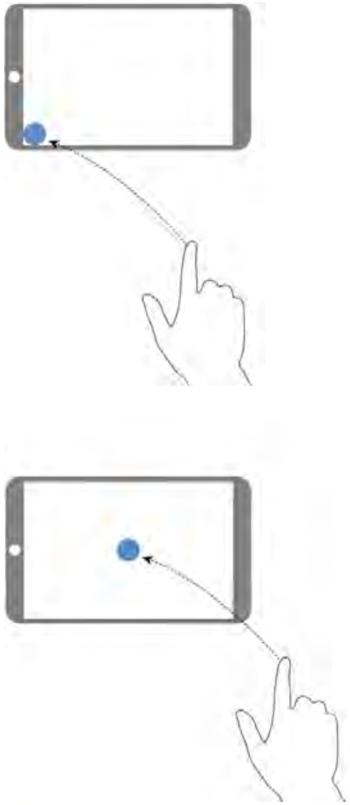
Fewer errors using generated interfaces (73% fewer)

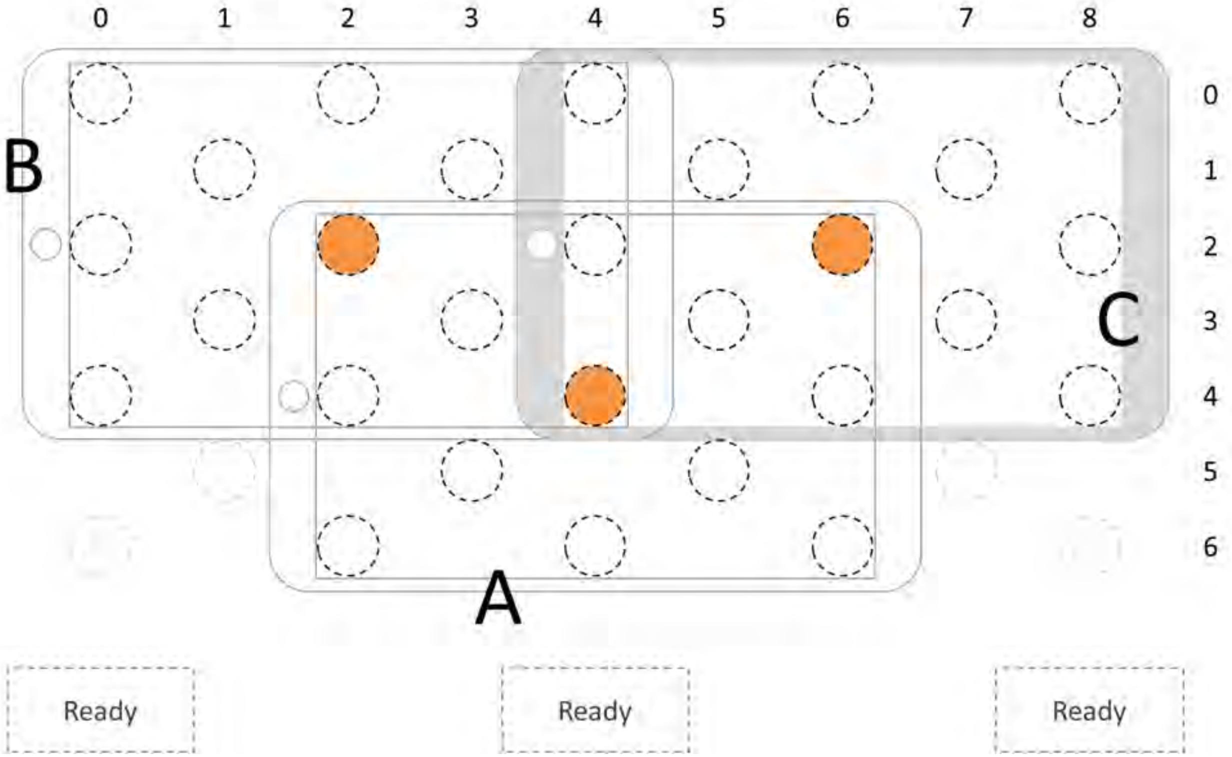
Strongly preferred generated interfaces

Fitts’s Law Related Techniques

- Gravity Fields
  - Pointer gets close, gets “sucked in” to target
- Sticky Icons
  - When within target, pointer “sticks”
- Constrained Motion
  - Snapping, holding Shift to limit degrees of movement
- Target Prediction
  - Determine likely target, move it nearer or expand it

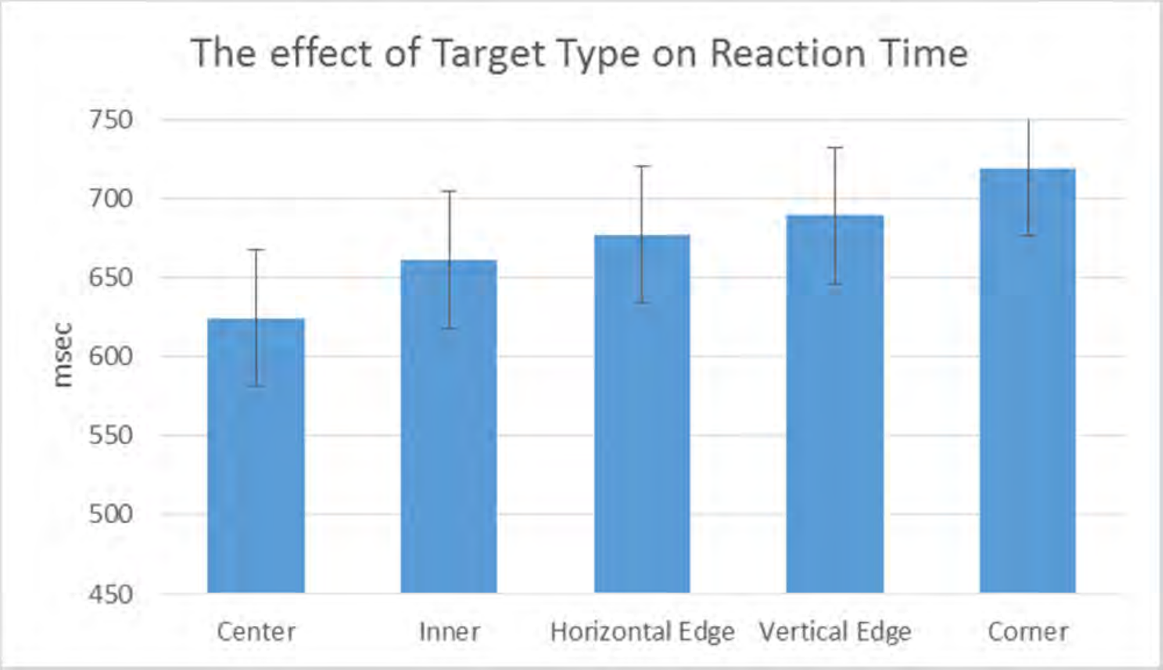
Fitts's Law, Edge Targets, and Touch





Fitts's Law, Edge Targets, and Touch

Avrahami finds edge targets are actually slower with touch devices, at same physical location

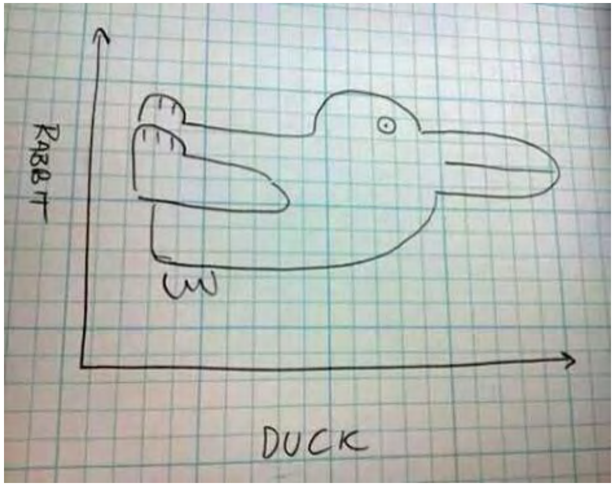


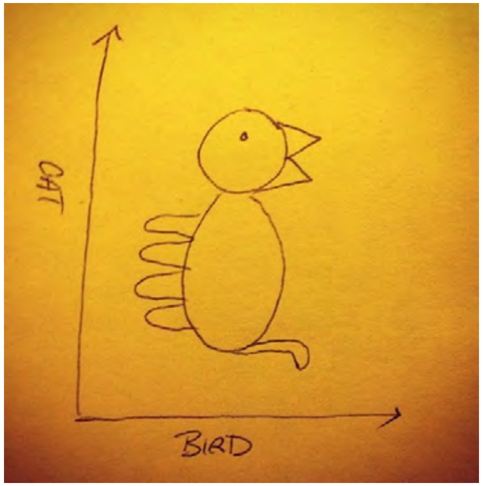
Are people border cautious?

Gestalt Psychology

Described loosely in the context of this lecture and associated work, not a real definition

Perception is neither bottom-up nor top-down, rather both inform the other as a whole





Gestalt Psychology

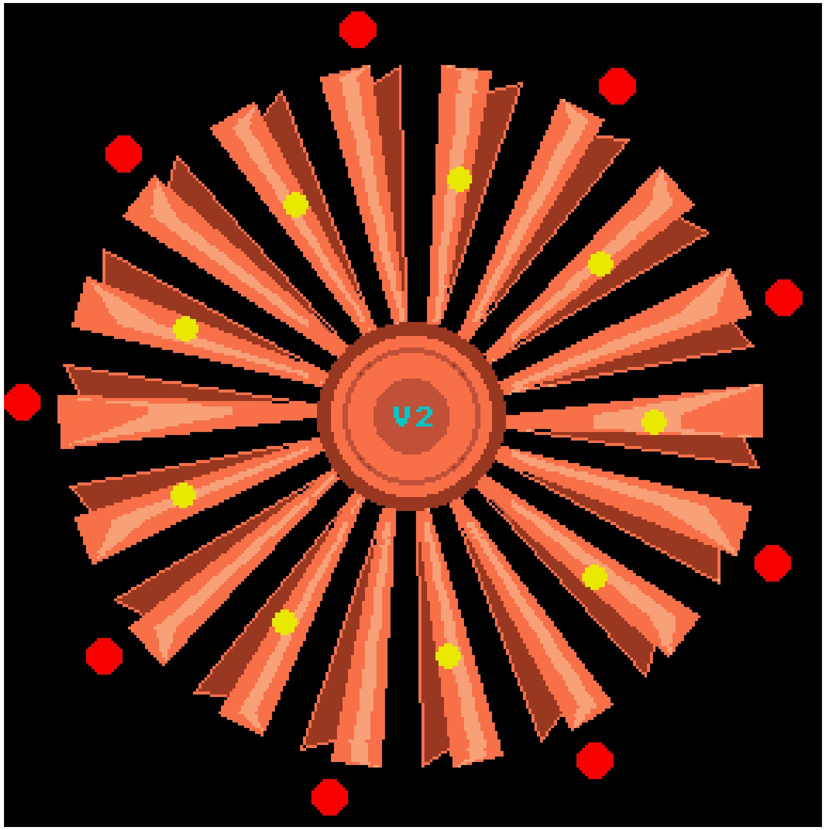
You can still see the dog…

University of Washington

Gestalt Psychology

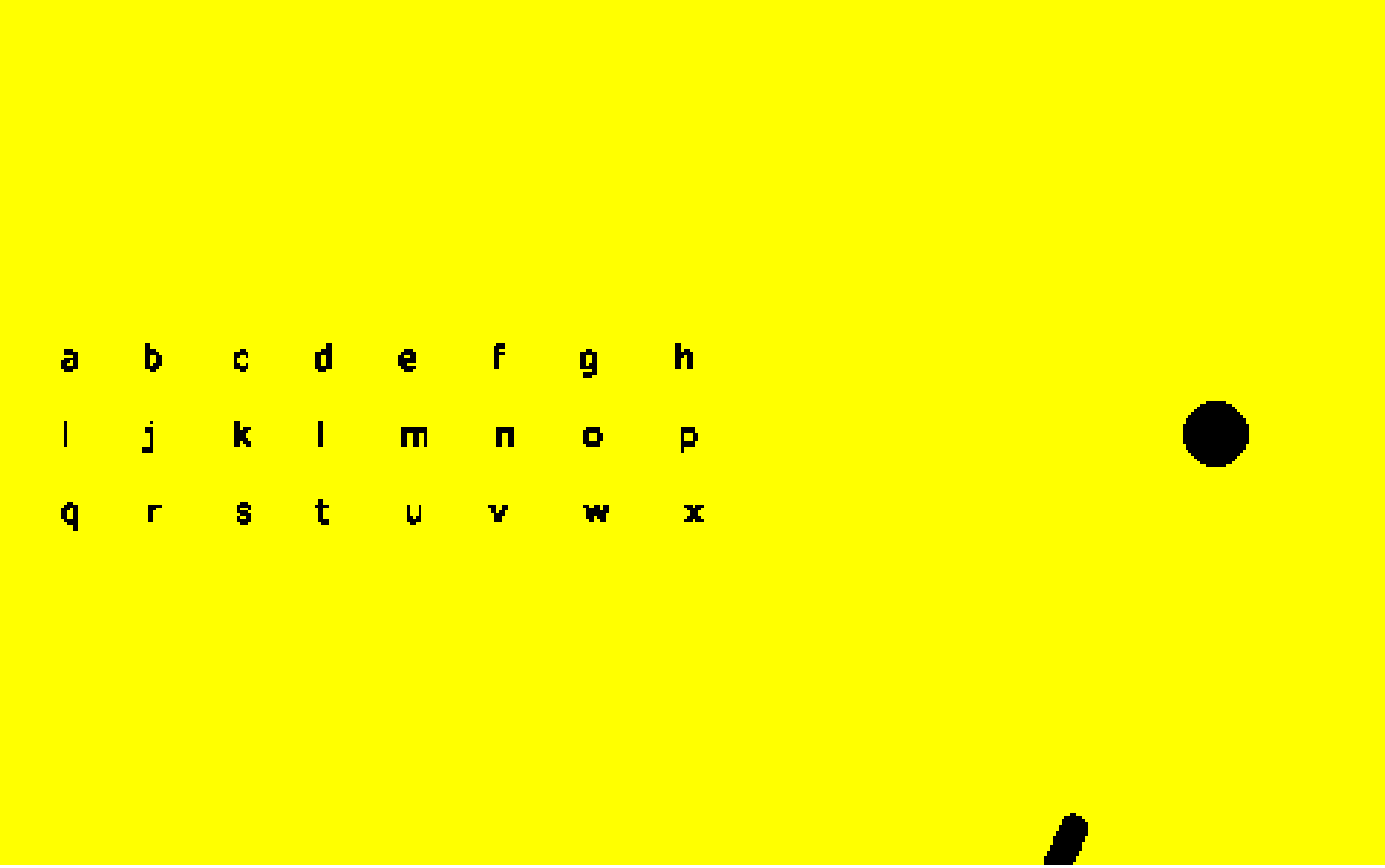
You can still see the dog…

Spinning Wheel



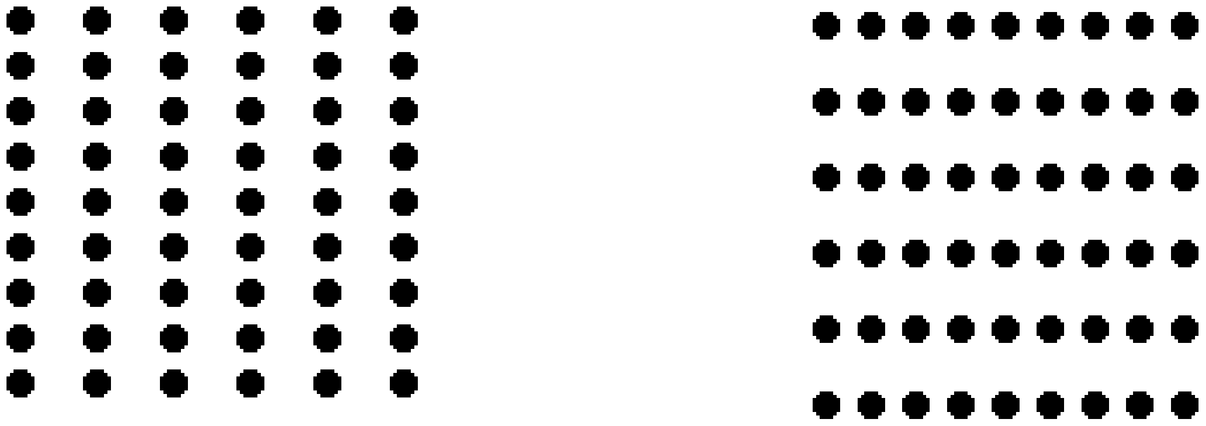
Follow the red dots vs follow the yellow dots

Blind Spot Interpolation

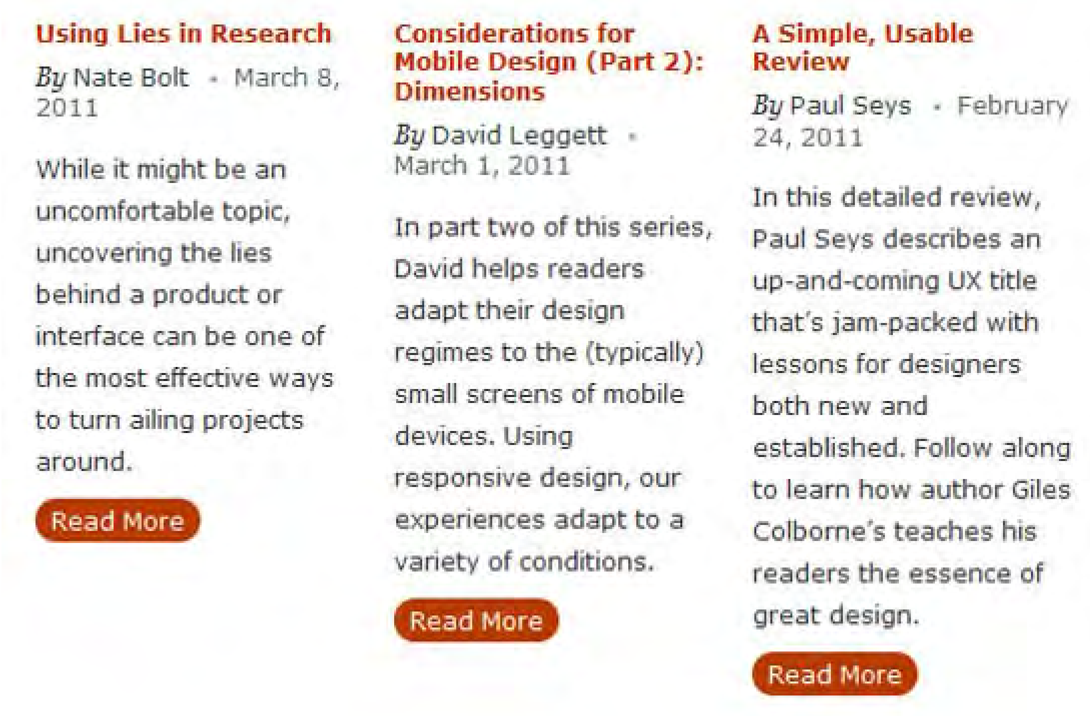


Proximity

Objects close to each other form a group



Proximity



Using Lies in Research

By Nate Bolt · March 8, 2011

While it might be an uncomfortable topic, uncovering the lies behind a product or interface can be one of the most effective ways to turn ailing projects around.

Read More

Considerations for Mobile Design (Part 2): Dimensions

By David Leggett · March 1, 2011

In part two of this series, David helps readers adapt their design regimes to the (typically) small screens of mobile devices. Using responsive design, our experiences adapt to a variety of conditions.

Read More

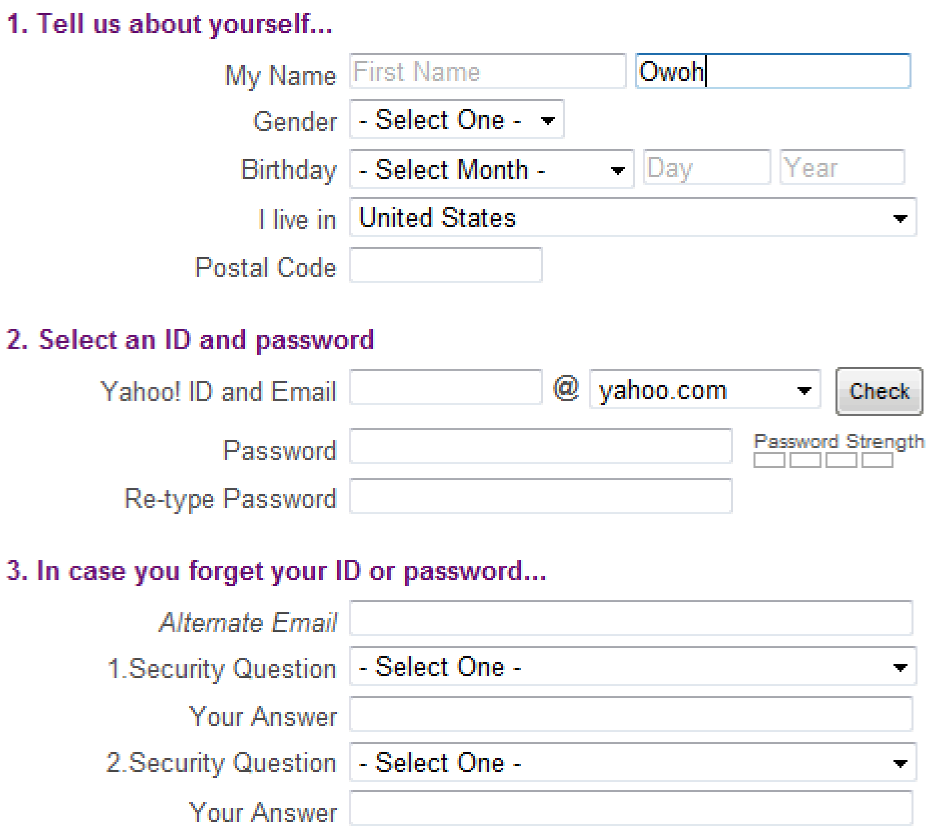
A Simple, Usable Review

By Paul Seys · February 24, 2011

In this detailed review, Paul Seys describes an up-and-coming UX title that's jam-packed with lessons for designers both new and established. Follow along to learn how author Giles Colborne's teaches his readers the essence of great design.

Read More

Proximity



1. Tell us about yourself...

My Name: First Name | Owoh

Gender: - Select One -

Birthday: - Select Month - | Day | Year

I live in: United States

Postal Code:

2. Select an ID and password

Yahoo! ID and Email: @ yahoo.com

Password:

Re-type Password:

3. In case you forget your ID or password...

Alternate Email:

1.Security Question: - Select One -

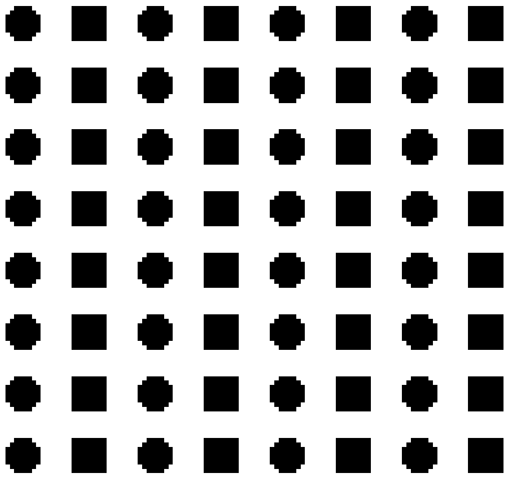
Your Answer:

2.Security Question: - Select One -

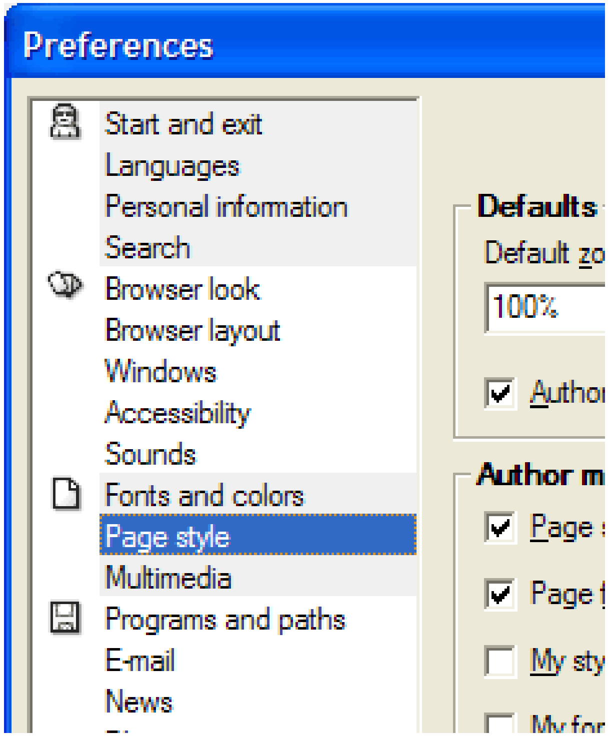
Your Answer:

Similarity

Objects that are similar form a group



Similarity


Preferences
Start and exit
Languages
Personal information
Search
Browser look
Browser layout
Windows
Accessibility
Sounds
Fonts and colors
Page style
Multimedia
Programs and paths
E-mail
News
Defaults
Default zo
100%
☑ Autho
Author m
☑ Page
☑ Page
☐ My sty
☐ My for

Proximity and Similarity

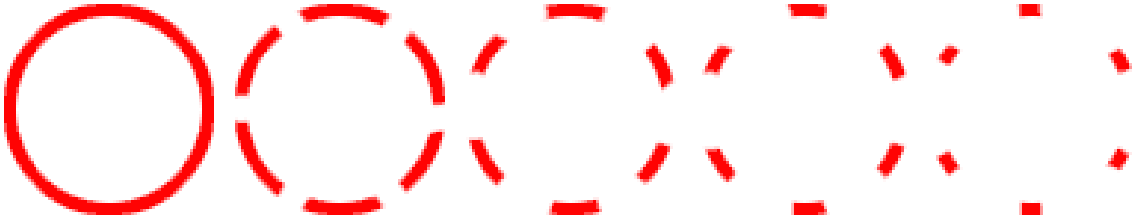
Proximity and Similarity

After discovering that one of these accesses a menu, people will expect they all access a menu. They are the same.

Closure

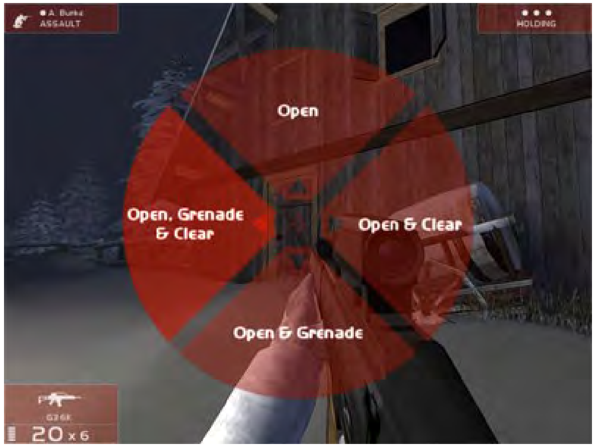
Even incomplete objects are perceived as whole

- Increases regularity of stimuli



Closure

The Sims



Rainbow 6

Symmetry

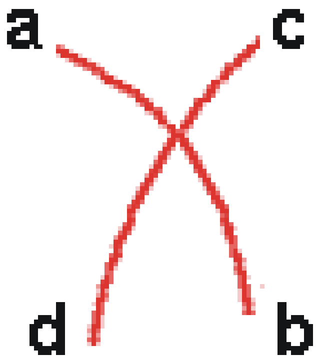
Objects are perceived as symmetrical and forming around a center point

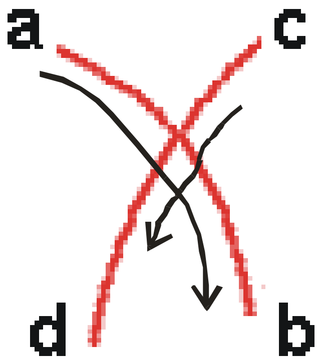
If you fight symmetry,
be sure you
have a reason

Continuity

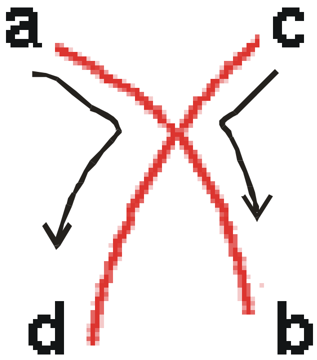
Objects are perceived as grouped when they align

- Remain distinct even with overlap
- Preferred over abrupt directional changes





what most
people see



not this

Continuity

Met Concept7 realiseert Anderzorg toppositie in klanttevredenheid

Models from Different Perspectives

Some example models of human performance

Visual System	Biological Model
Model Human Processor	Higher-Level Model
Fitts's Law	Model by Analogy
Gestalt Principles	Predict Interpretation

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 06:
Human Performance

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

dub design: use: build:

University of Washington

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 07:
Design Diamond

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

dub design: use: build:

University of Washington

Today

Reminder on Tasks

Reminder on Designs and Page Limit

Reminder on Teams

Design Diamond

Tasks, Personas, and Scenarios

Task: a design-agnostic objective

Persona: a fictional person with a backstory

Scenario: narrative that demonstrates a persona completing a task using a particular design

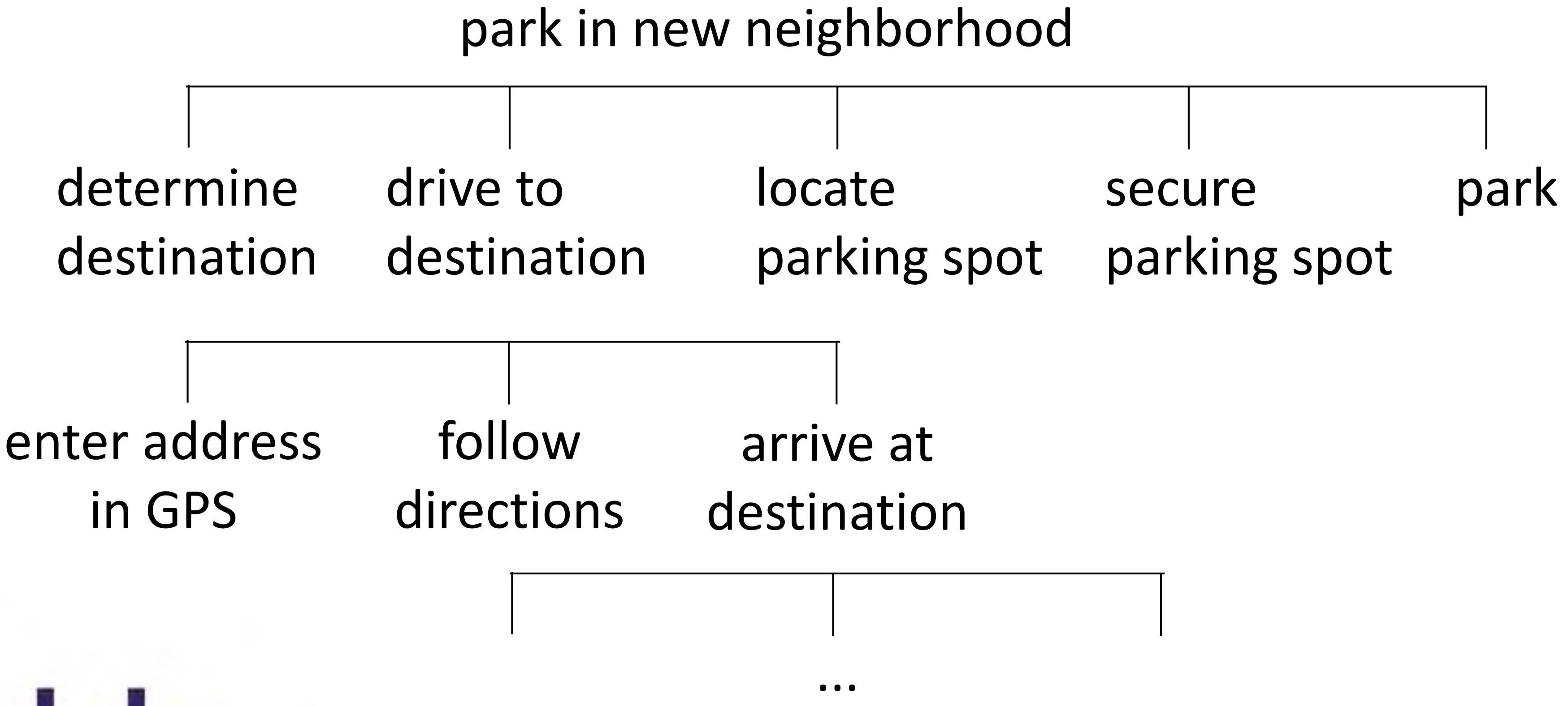
Use Case: in software engineering, describes requirements using one or more scenarios

Task: Park in a New Neighborhood

Peter is going to brunch on a Sunday with his roommates. He is trying a new place he found on Yelp. He has the address for the place and he is using a smartphone GPS for directions. He leaves the apartment with his roommates at around 8:30am and he wants to beat the crowd so they won’t have to wait in line. He is driving a Toyota Corolla that he has owned for five years. It is a rainy day and he doesn’t have an umbrella.

Hierarchical Task Analysis

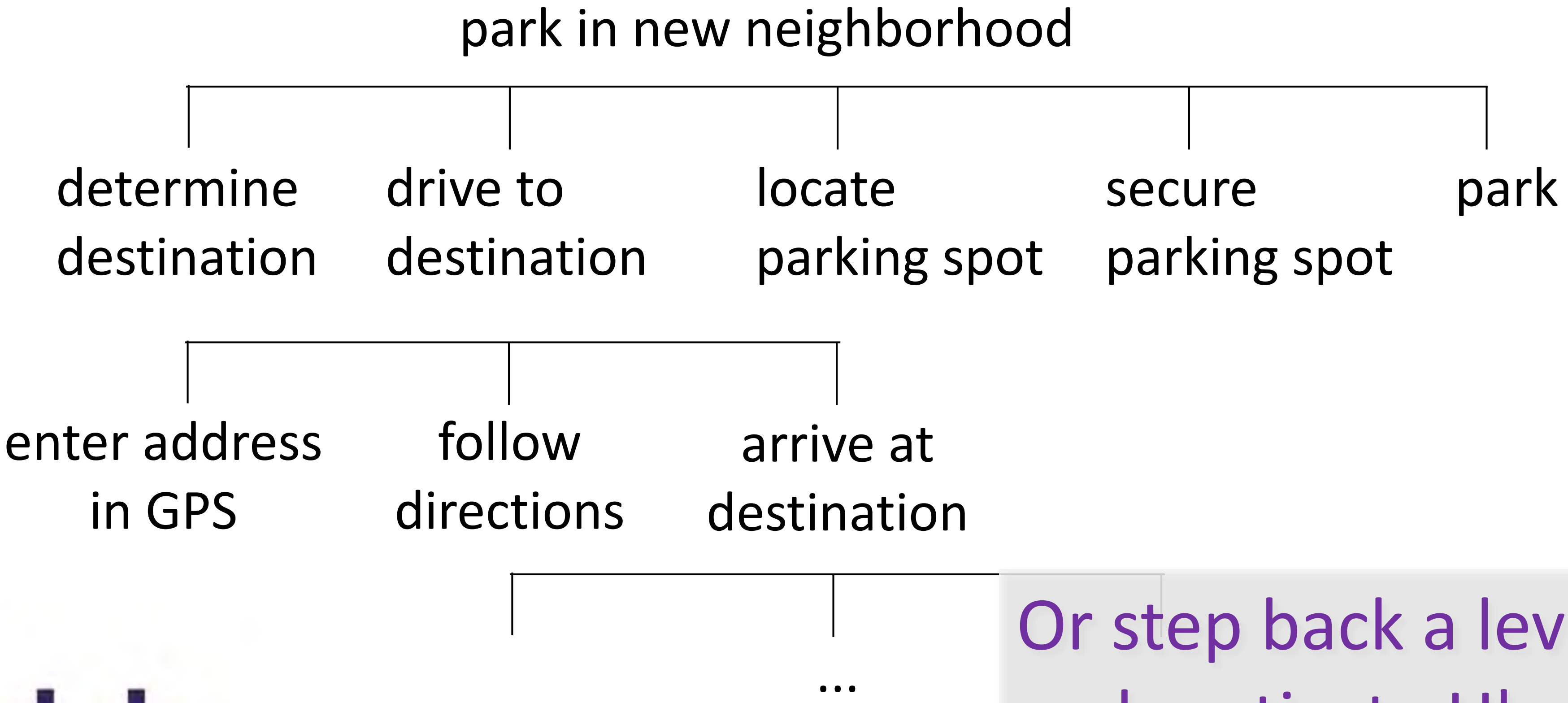
Steps of the task execution (detailed in a hierarchy)



- park in new neighborhood
  - determine destination
    - enter address in GPS
    - follow directions
      - ...
    - arrive at destination
  - drive to destination
  - locate parking spot
  - secure parking spot
  - park

Hierarchical Task Analysis

Steps of the task execution (detailed in a hierarchy)



- park in new neighborhood
  - determine destination
  - drive to destination
    - enter address in GPS
    - follow directions
      - …
    - arrive at destination
  - locate parking spot
  - secure parking spot
  - park

Or step back a level and motivate Uber

Tasks in Your Projects

Say what is accomplished, not how

Real tasks that people currently encounter,
or new tasks your design will enable

Reasonable coverage of the interesting aspects
of your problem and your design space

Range of difficulty and complexity

Park at the zoo, Friday night in Ballard, at the airport

Today

Reminder on Tasks

Reminder on Designs and Page Limit

Reminder on Teams

Design Diamond

Working as Teams

We have had some absences in critiques

- It is absolutely good to stay home sick

But some have been unexpected by teams

- Revealed incomplete project knowledge

Highlights you working as groups instead of teams

Teams vs. Groups

There is a place for groups:

> Working groups are both prevalent and effective in large organizations where individual accountability is most important. The best working groups come together to share information, perspectives, and insights; to make decisions that help each person do his or her job better; and to reinforce individual performance standards. But the focus is always on individual goals and accountabilities.

Teams vs. Groups

Teams differ fundamentally from working groups

> … they require both individual and mutual accountability. Teams rely on more than group discussion, debate, and decision; on more than sharing information and best practice performance standards. Teams produce discrete work-products through the joint contributions of their members. This is what makes possible performance levels greater than the sum of all the individual bests of team members.

A team is more than the sum of its parts.

Teams vs. Groups

Groups	Teams
strong leader	shared leadership
individual accountability	individual & mutual accountability
organizational purpose	specific team purpose
individual work products	collective work products
efficient meetings	open-ended meetings
measures performance by influence on others	measures performance from work products
delegates work	does real work together

Keys to Team Success

Common commitment

- requires a purpose in which team members believe

Specific performance goals

- comes directly from the common purpose
- helps maintain focus – start w/ something achievable

A right mix of skills

- technical/functional expertise (programming/design/writing)
- problem-solving & decision-making skills
- interpersonal skills

Agreement and mutual accountability

- who will do particular jobs, when to meet & work, schedules

Working as Teams

School has taught you to succeed as an individual

Too many projects are done in groups

- Drawing boundaries between code responsibilities

This class requires you to work as teams

- You can split up, but you have to come back together
- Use complementary skills, be mutually accountable

The “real world” requires this too

Working as Teams

- Get to know each other
- Figure out strengths of team members
- Assign each person a role
    - responsible for seeing work is organized and done
    - not responsible for doing it themselves
- Names/roles listed on major reports
    - Group Manager (coordinate team)
    - Documentation (coordinate writing)
    - Design (coordinate visual/interaction design)
    - Fieldwork and Testing (coordinate fieldwork and testing)

Today

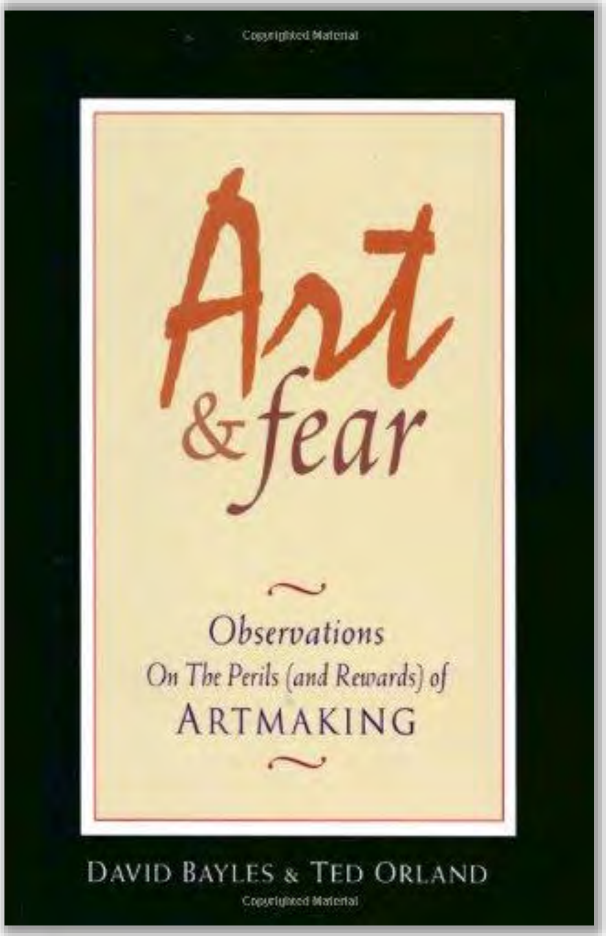
Reminder on Tasks

Reminder on Designs and Page Limit

Reminder on Teams

Design Diamond

Quantity over Quality



One class told they will be graded on quality, another on quantity

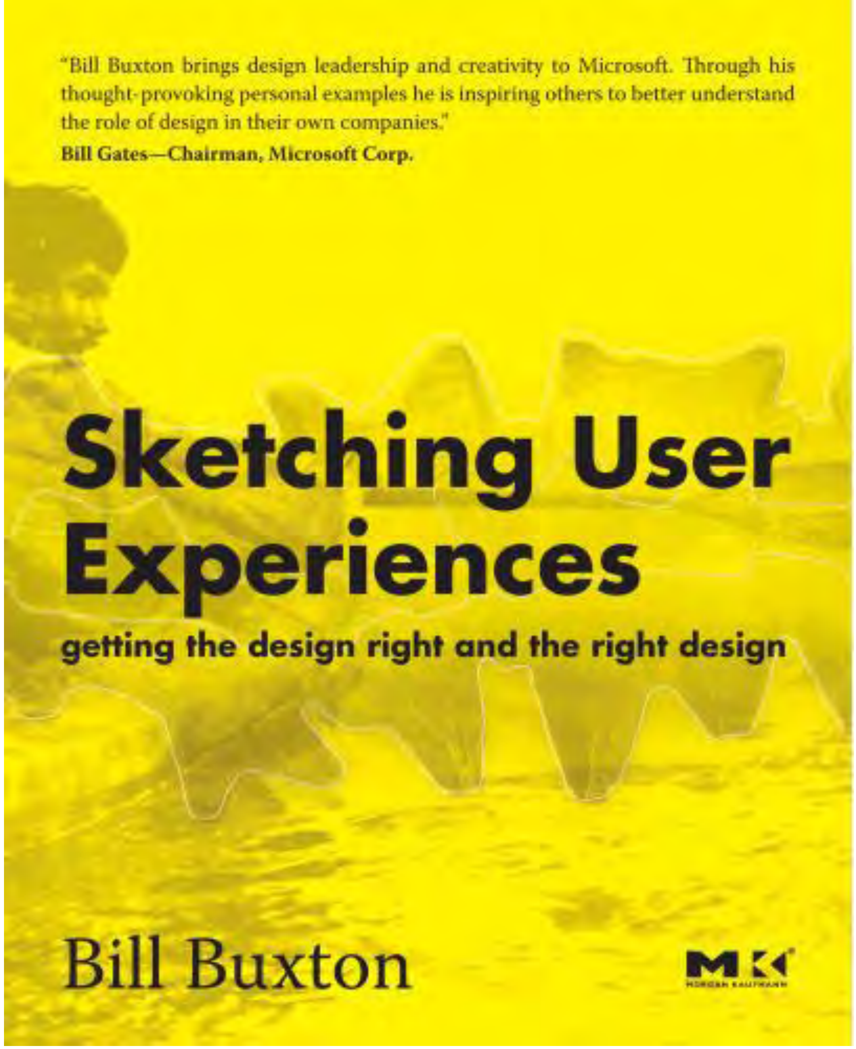
Bayles and Orland, 2001

Quantity v. Quality?

“While the quantity group was busily churning out piles of work—and learning from their mistakes—the quality group had sat theorizing about perfection, and in the end had little more to show for their efforts than grandiose theories and a pile of dead clay”

Bayles and Orland, 2001

Sketching User Experiences



"Bill Buxton brings design leadership and creativity to Microsoft. Through his thought-provoking personal examples he is inspiring others to better understand the role of design in their own companies."

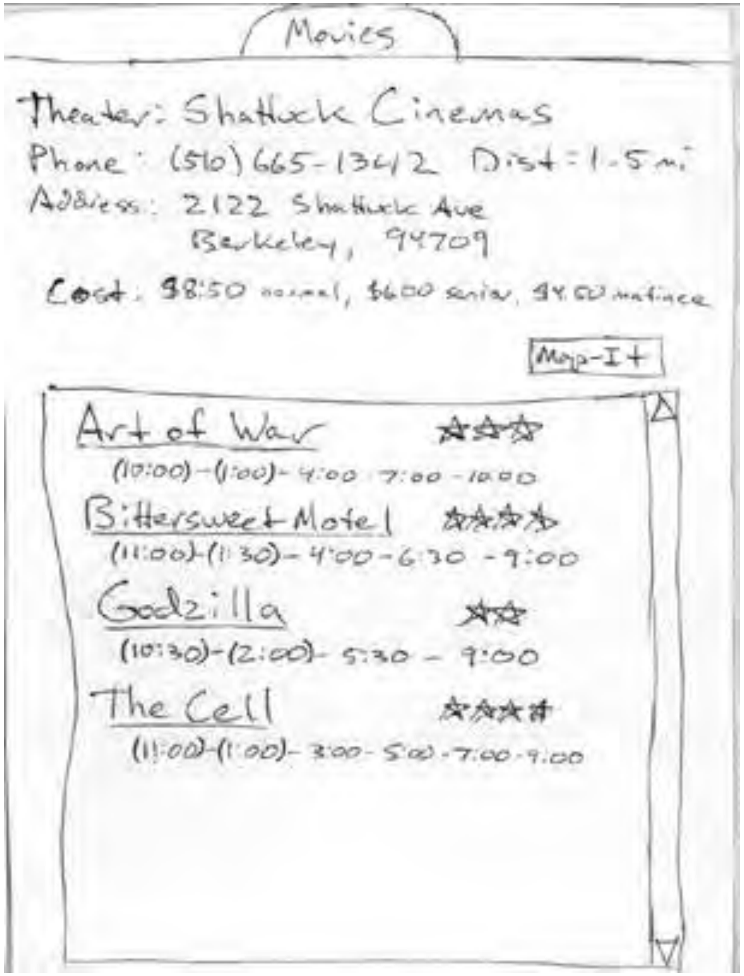
Bill Gates—Chairman, Microsoft Corp.

Sketching User Experiences

getting the design right and the right design

Bill Buxton

Sketching



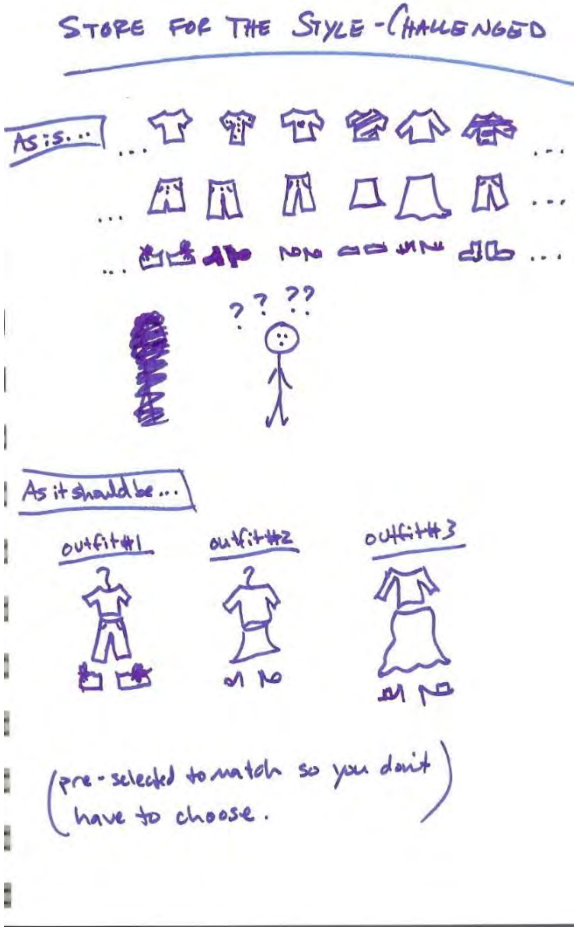
Theater: Shattuck Cinemas
Phone: (510) 665-1342 Dist = 1.5 mi
Address: 2122 Shattuck Ave
Berkeley, 94709
Cost: $8:50 normal, $6.00 senior, $4.50 matinee

Art of War ☆☆☆
(10:00) - (1:00) - 4:00 7:00 - 10:00

Bittersweet Motel ☆☆☆☆
(11:00) - (1:30) - 4:00 - 6:30 - 9:00

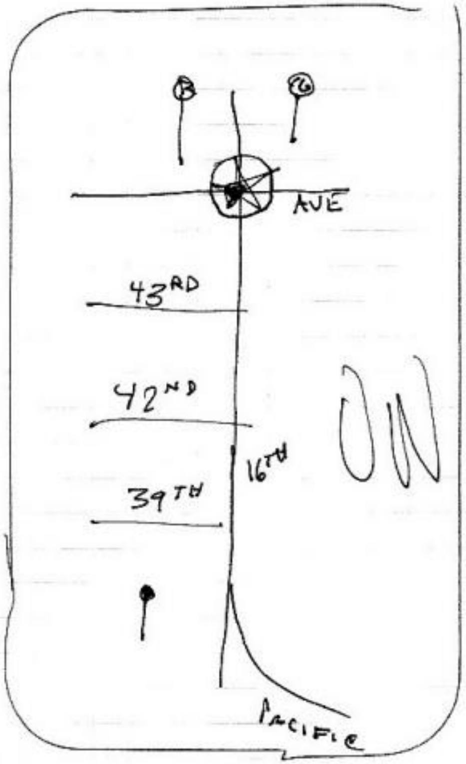
Godzilla ☆☆
(10:30) - (2:00) - 5:30 - 9:00

The Cell ☆☆☆☆
(11:00) - (1:00) - 3:00 - 5:00 - 7:00 - 9:00

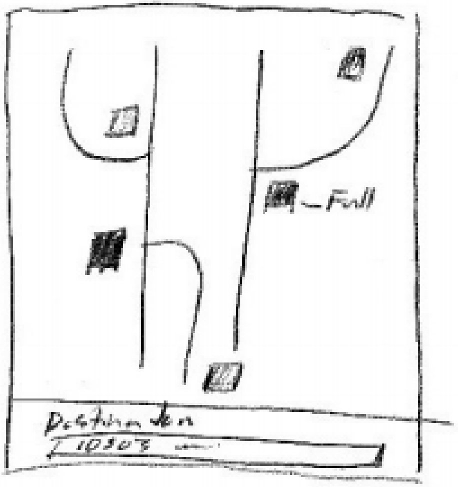


(pre-selected to match so you don't have to choose.)

Sketching

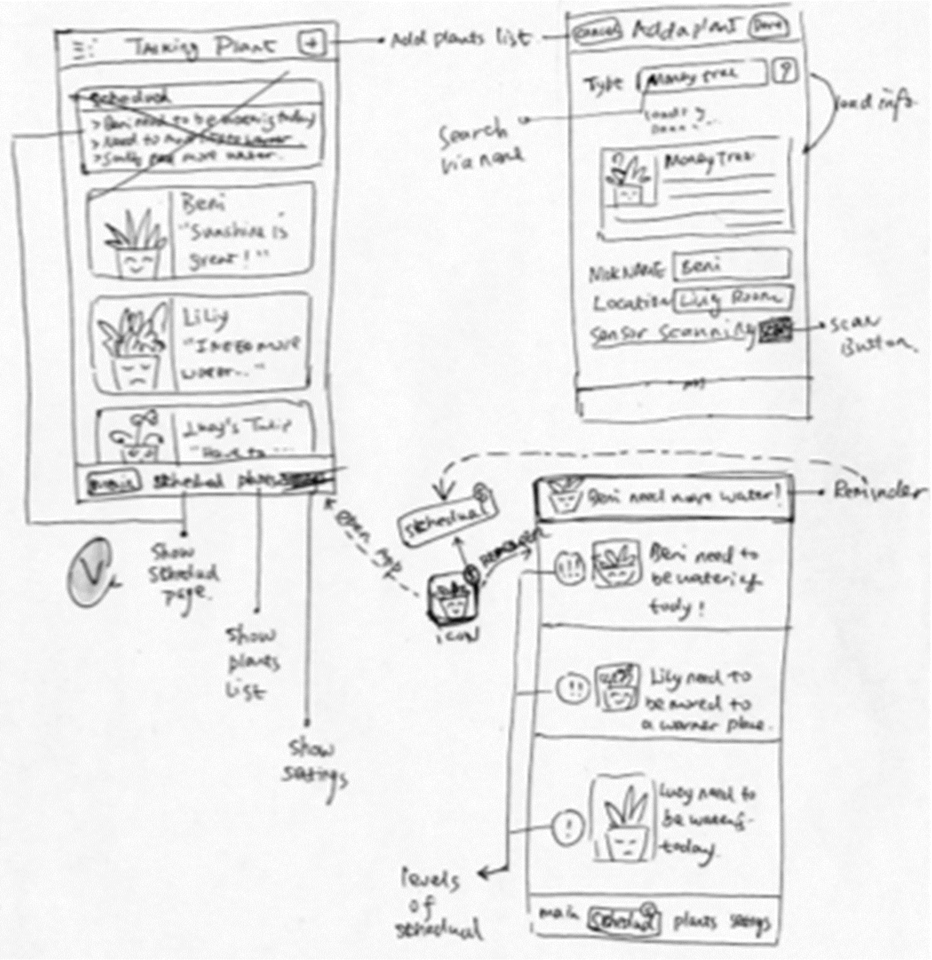


MAP SHOWING PARKING AVAILIBILITY BASED ON INPUTTED DATA, INPUTTED ON MAP

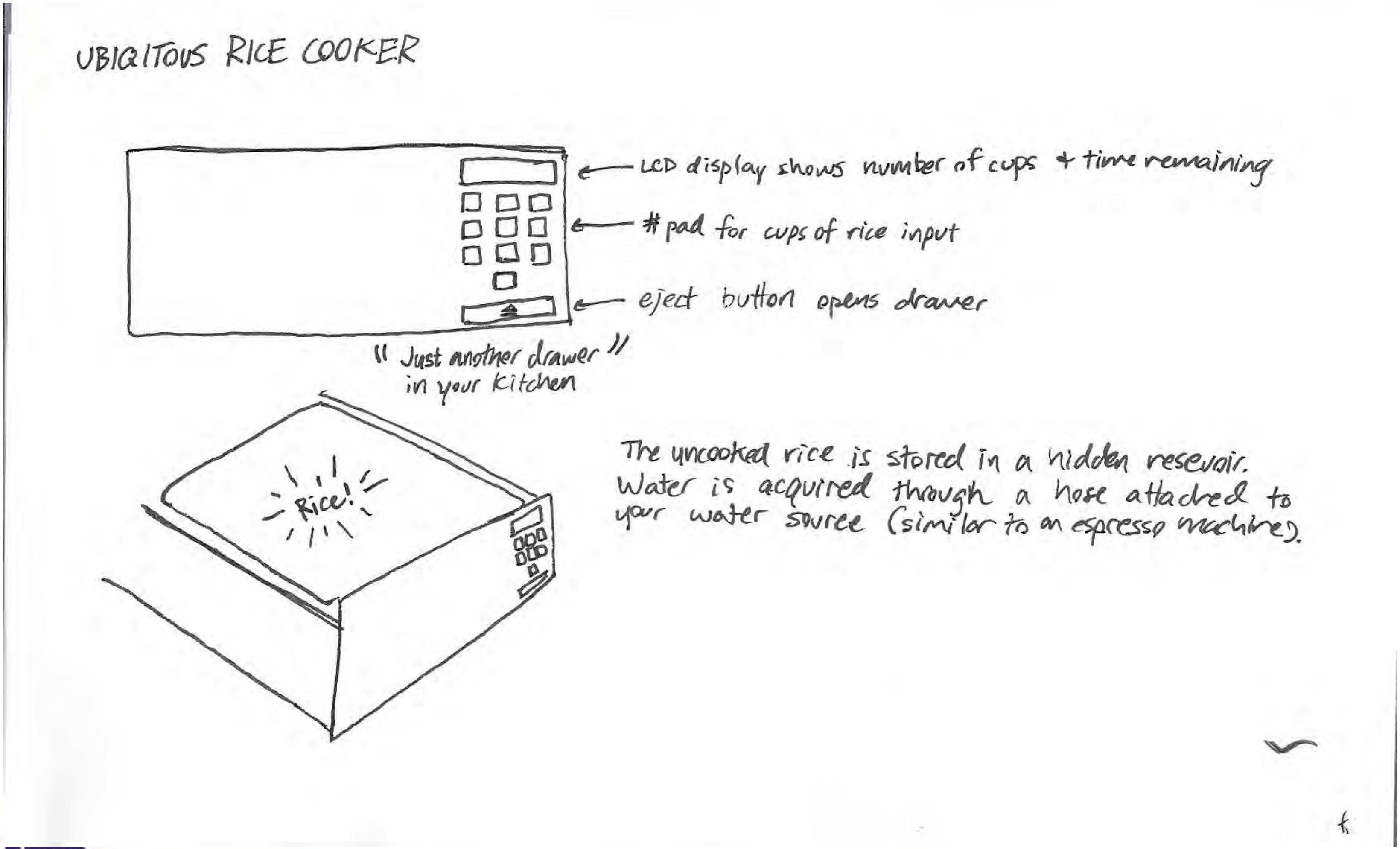


- Different colors
- highlights availability
-

Sketching


Taking Plant
Add plants list
Schedual
> Beni need to be watering today
> Need to move warmer
> Smily need more water.
Beni
"Sunshine is great!"
Lily
"I need more water..."
Lucy's Tulip
"Have to ..."
main
schedual
plants
settings
Show schedual page.
Show plants list
Show settings
Open app
schedual
reminder
icon
Cancel
Add a plant
Done
Type
Money tree
?
loading
Search via name
load info
Money Tree
Nick Name
Beni
Location
Living Room
Sensor Scanning
Scan Button
Beni need more water!
Reminder
Beni need to be watering today!
Lily need to be moved to a warmer place.
Lucy need to be watering today.
levels of schedual
main
schedual
plants
settings

Sketching



UBIQITOUS RICE COOKER

← LCD display shows number of cups + time remaining

← # pad for cups of rice input

← eject button opens drawer

" Just another drawer "
in your kitchen

The uncooked rice is stored in a hidden resevoir. Water is acquired through a hose attached to your water source (similar to an espresso machine).

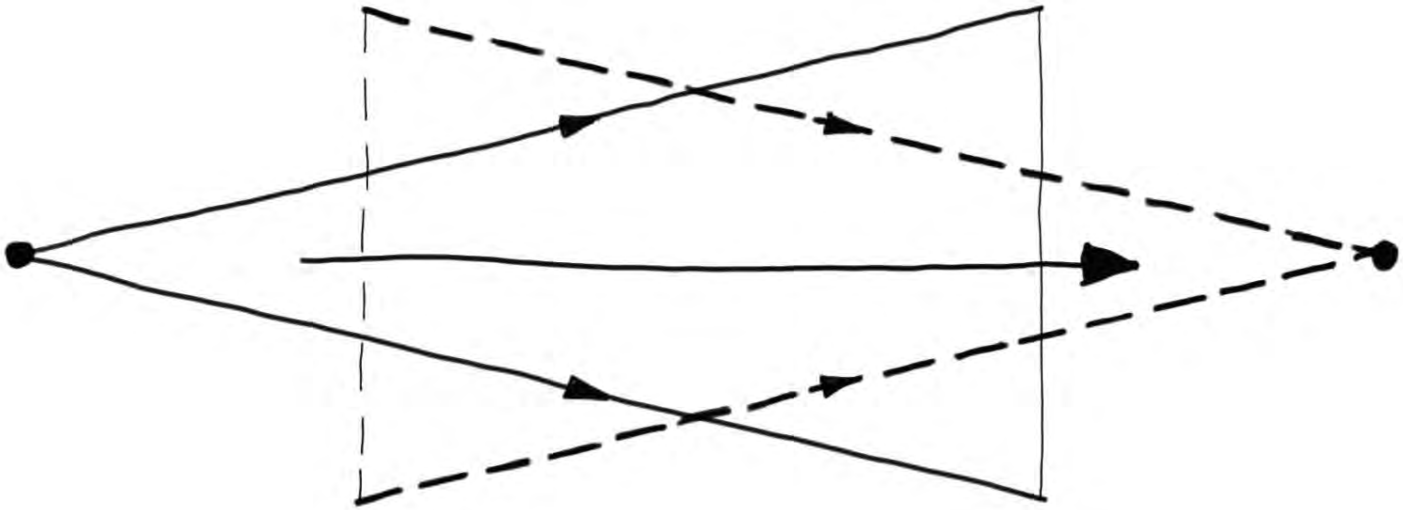
Design as Choice

Elaboration

palette of choices

Reduction

heuristics to choose



Design as Choice

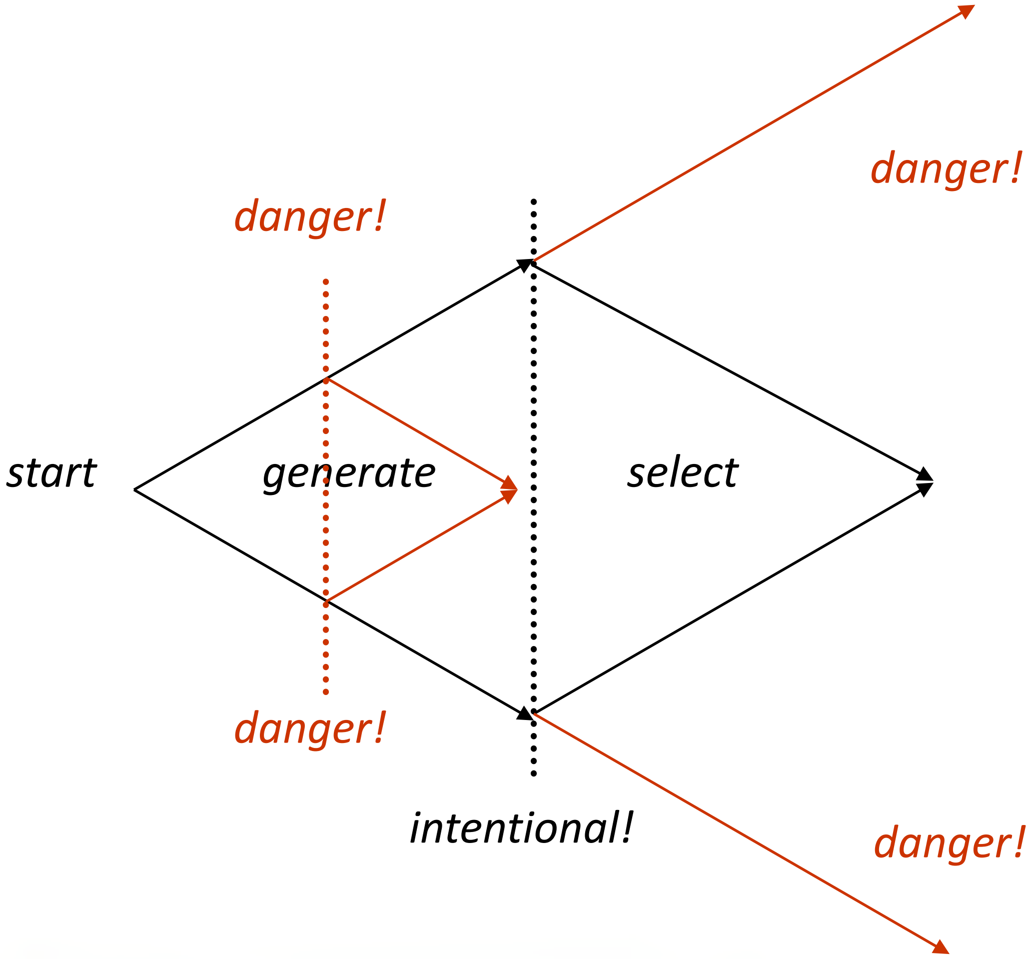
Two openings for creativity

- Palette of choices
- Heuristics used to choose

Why is your contextual inquiry so important?

- What you learn directly informs both of these, shaping everything you do this entire quarter

The Design Diamond



Sketching

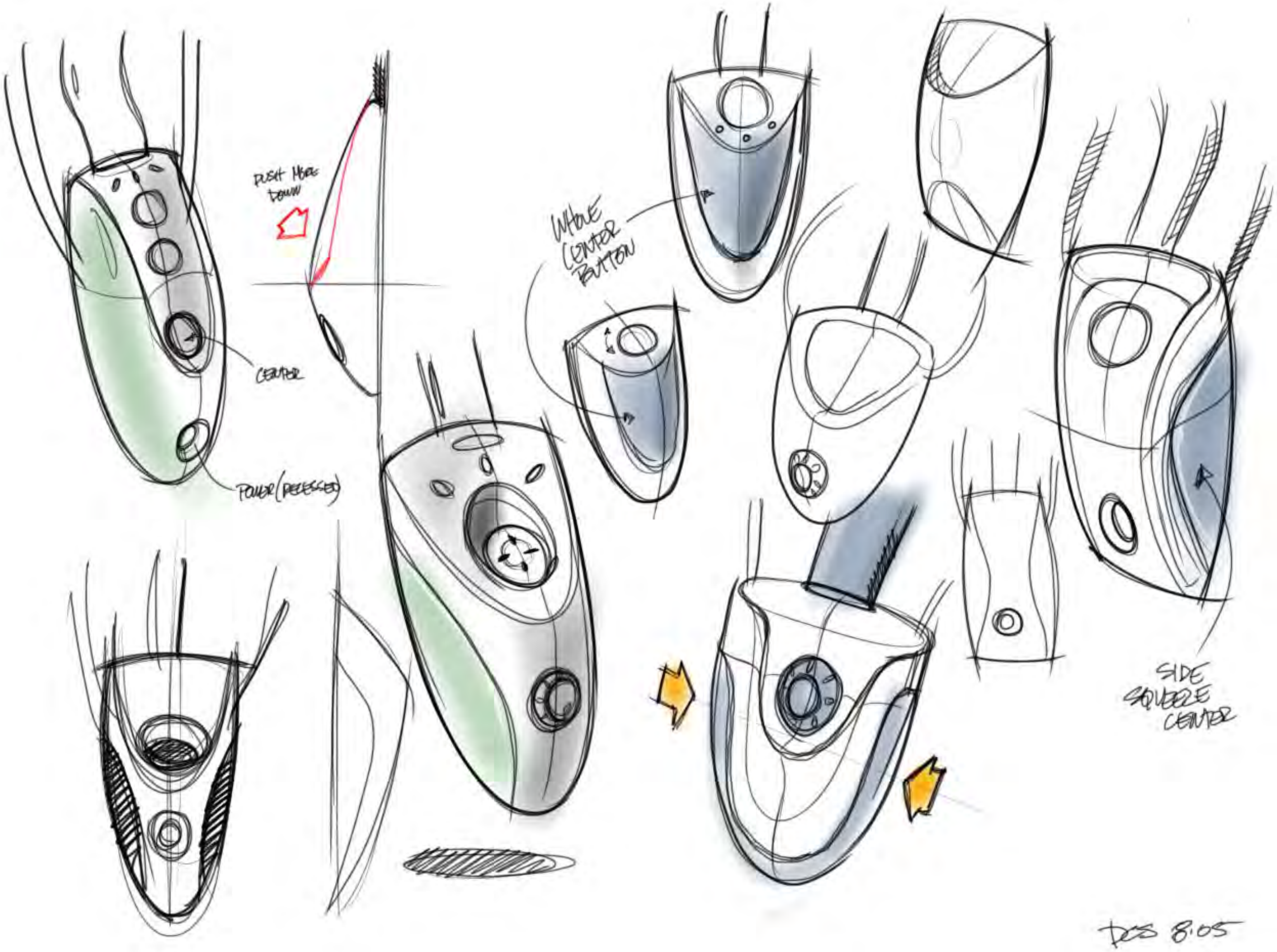
A process that enables you to

think through ideas and

convey design ideas to others

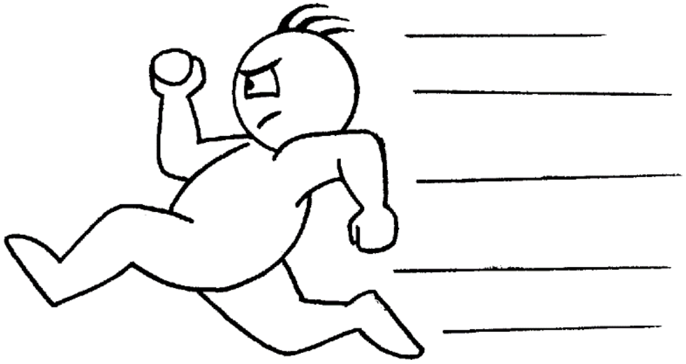
very early in the design phase

A Quintessential Activity of Design



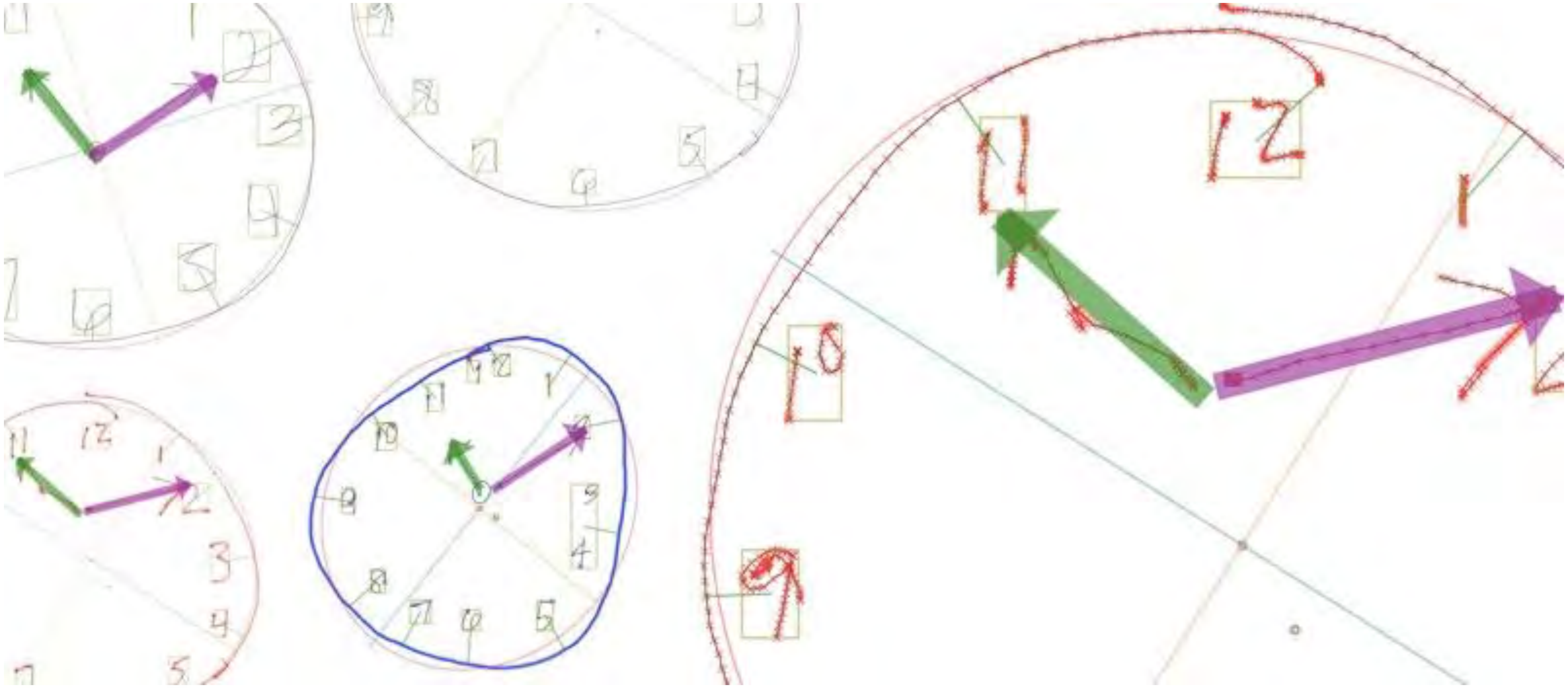
Quick

A sketch is quick to make,
or at least gives that impression



Timely

A sketch can be provided when needed



Inexpensive

Cost must not inhibit the ability to explore a concept, especially early in design

Disposable

If you cannot afford to throw it away, then it is not a sketch

Investment is in the process, not the physical sketch

But they are not "worthless"

Plentiful

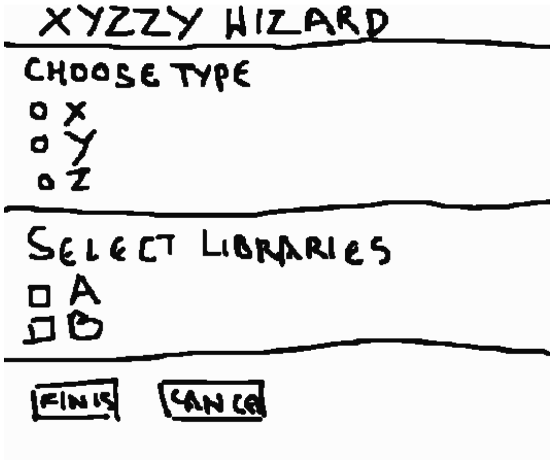
Sketches do not exist in isolation

Meaning and relevance is in the context of a collection or series

Clear Vocabulary

The way it is rendered makes it distinctive that it is a sketch (e.g., style, form, signals)

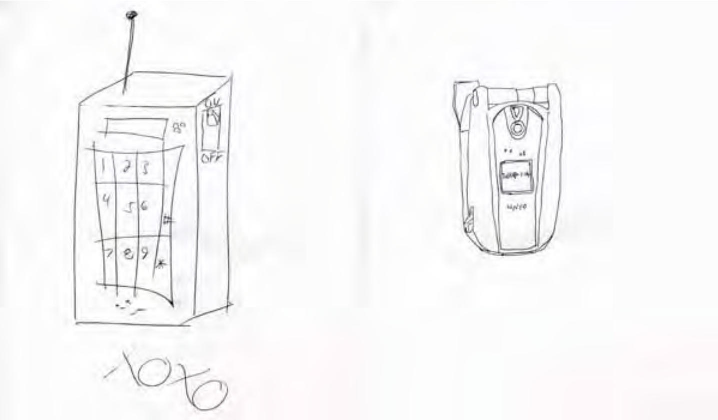
Could be how a line extends through endpoints



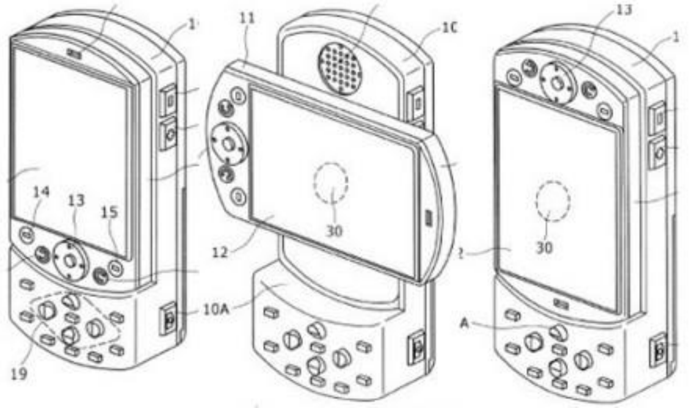
Distinct Gesture

Fluidity of sketches gives them a sense of openness and freedom

Opposite of engineering drawing, which is tight and precise

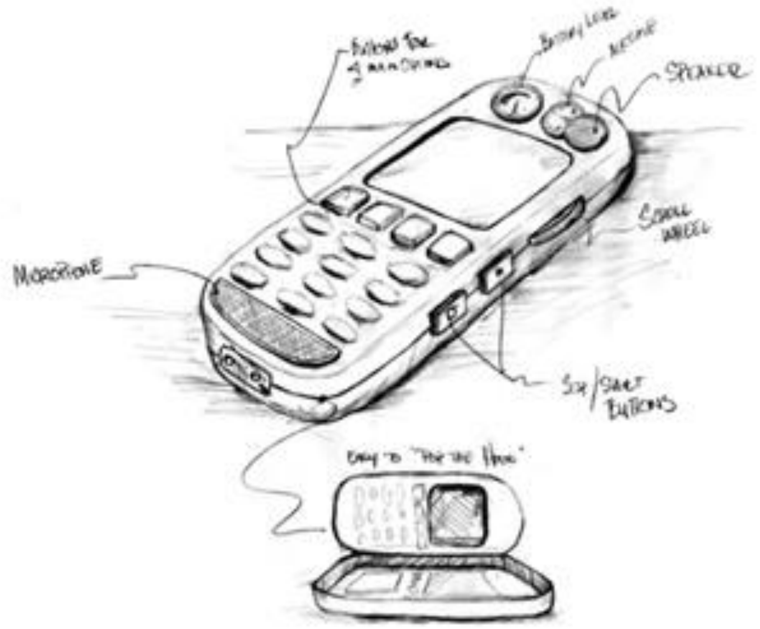


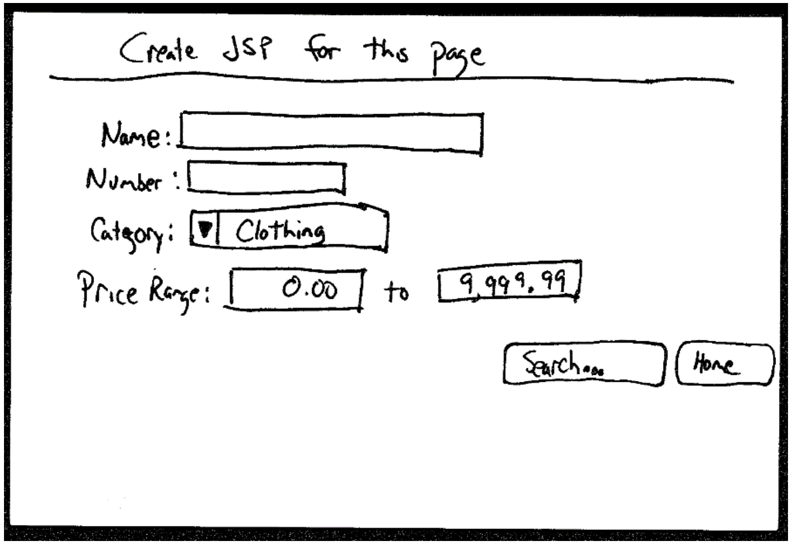
vs.



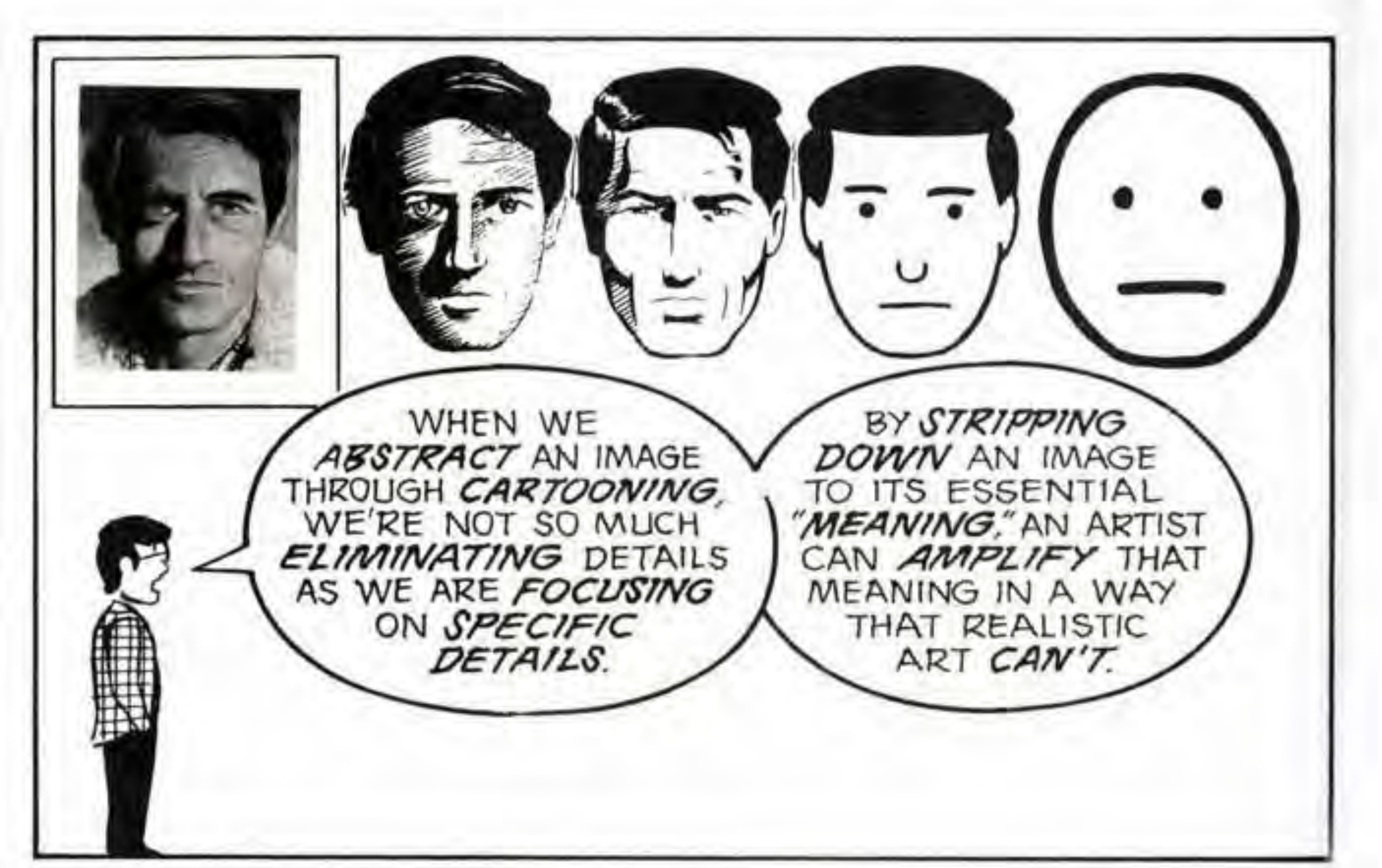
Minimal Detail

Include only what is required
to render the intended purpose or concept





Minimal Detail

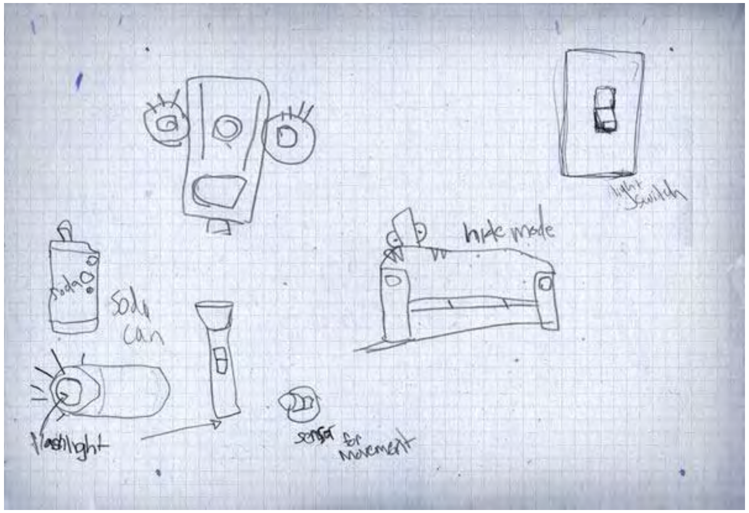


Appropriate Degree of Refinement

Make the sketch as refined as the idea

If you have a solid idea, make the sketch look more defined

If you have a hazy idea, the sketch will look much rougher and less defined



Suggest and Explore Rather than Confirm

Sketch should act as a catalyst
to the desired and appropriate behaviors,
conversations, and interactions

Ambiguity

Intentionally ambiguous

Value comes from being able to be interpreted in different ways, even by the person who created them

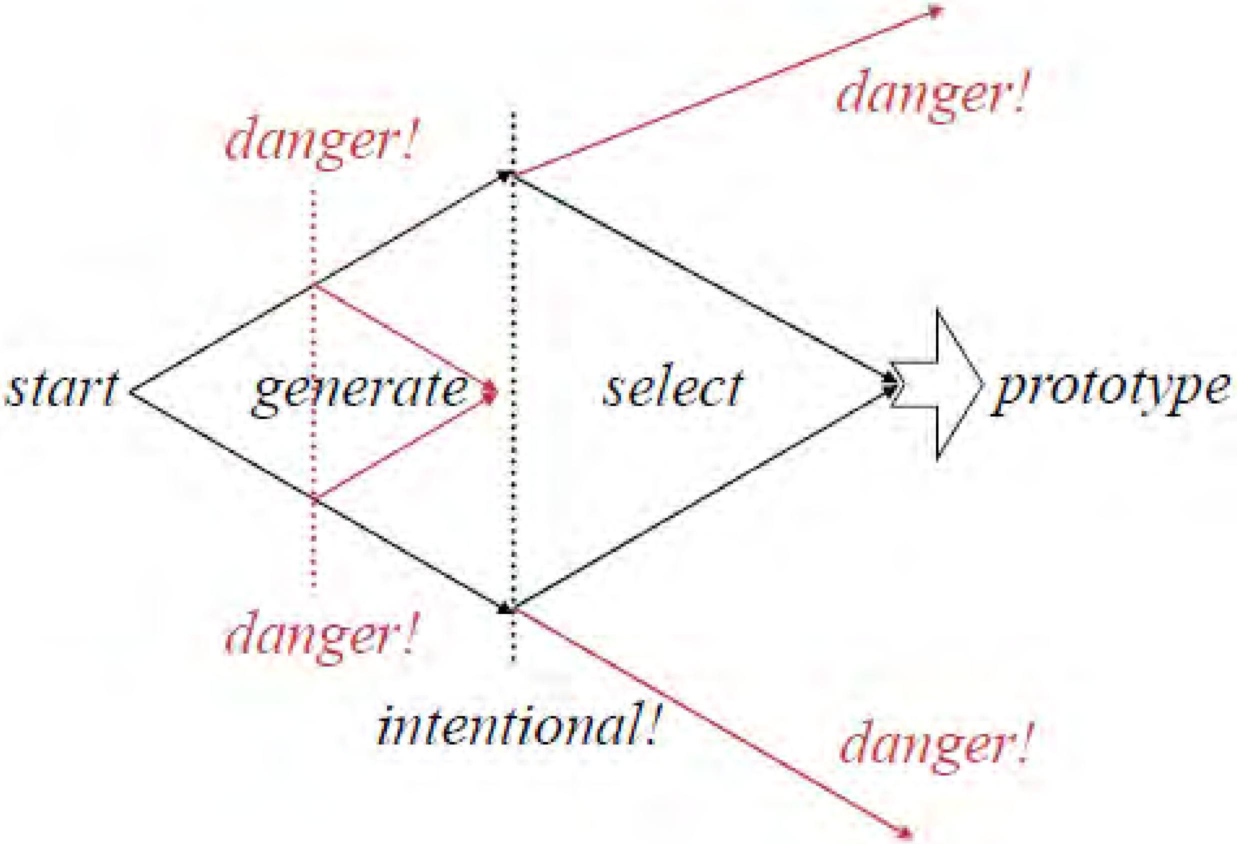
Sketches have holes

Sketch vs. Prototype

Sketch	**Prototype**
Invite	Attend
Suggest	Describe
Explore	Refine
Question	Answer
Propose	Test
Provoke	Resolve
Tentative, non committal	Specific Depiction

The primary differences are in the intent

Idea Oscillation



Critiquing Sketches is Important

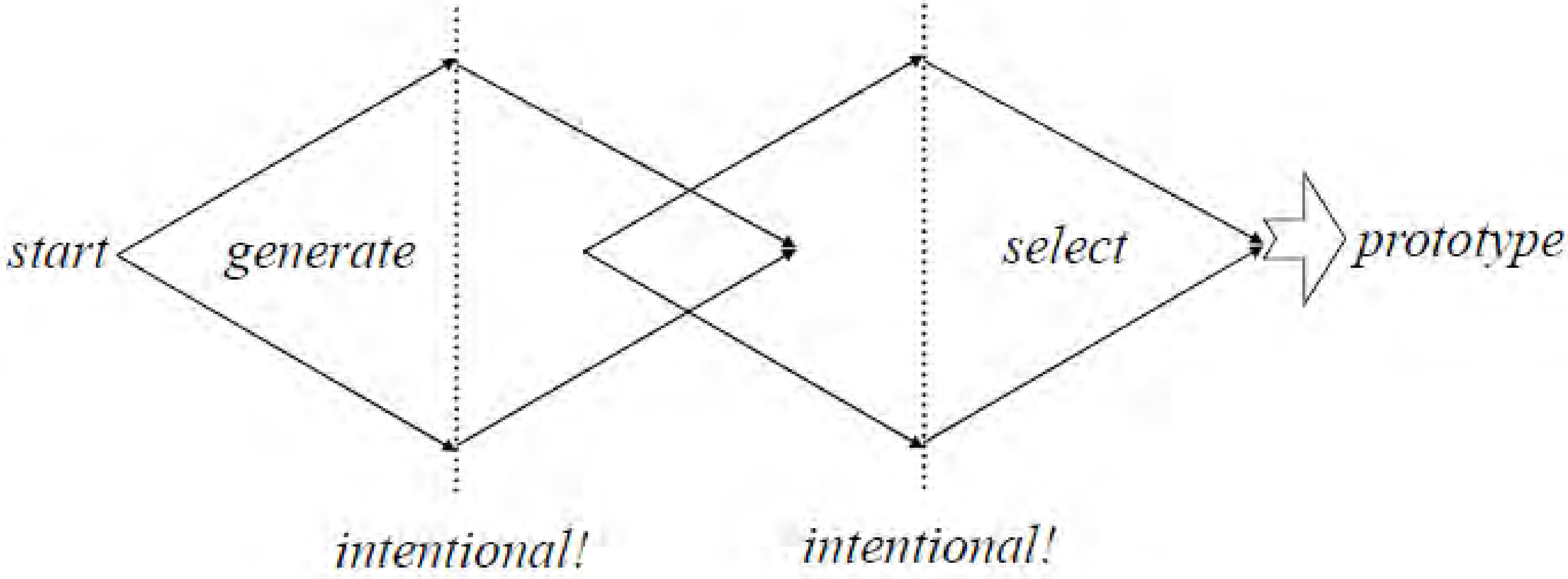
Ideas are both good and bad

- Both are useful in design
- By making clear what is a bad design,
  we can avoid actually implementing it
- Bad ideas help you justify your good ideas

Feedback can turn a good idea into a great idea

Sketching generates too many ideas to implement

Idea Oscillation



ABC News and IDEO's Deep Dive

http://courses.cs.washington.edu/courses/cse440/videos/designdiamond/IDEO-DeepDive.mp4

Sketching the Mouse

Making the Macintosh:
http://www-sul.stanford.edu/mac/index.html

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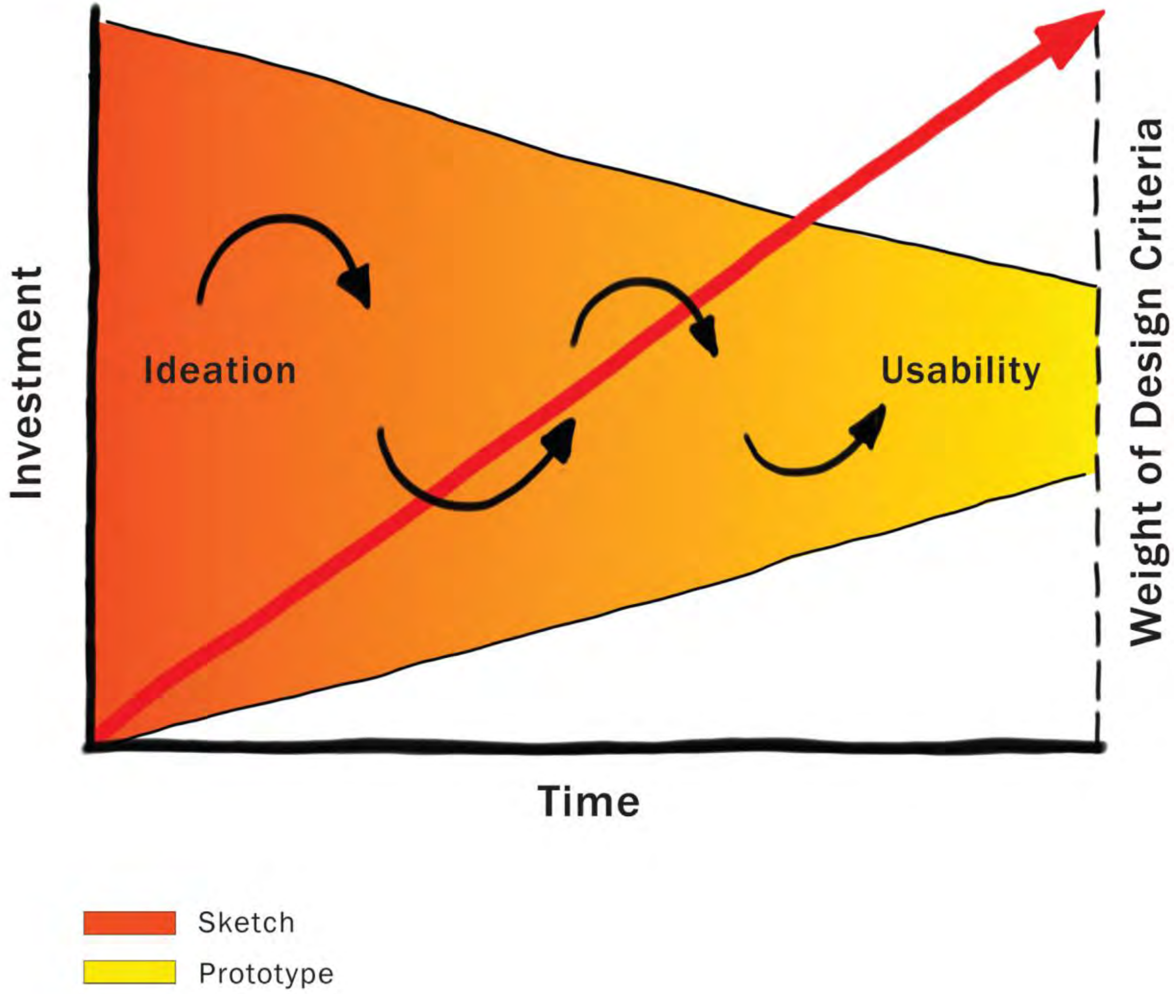
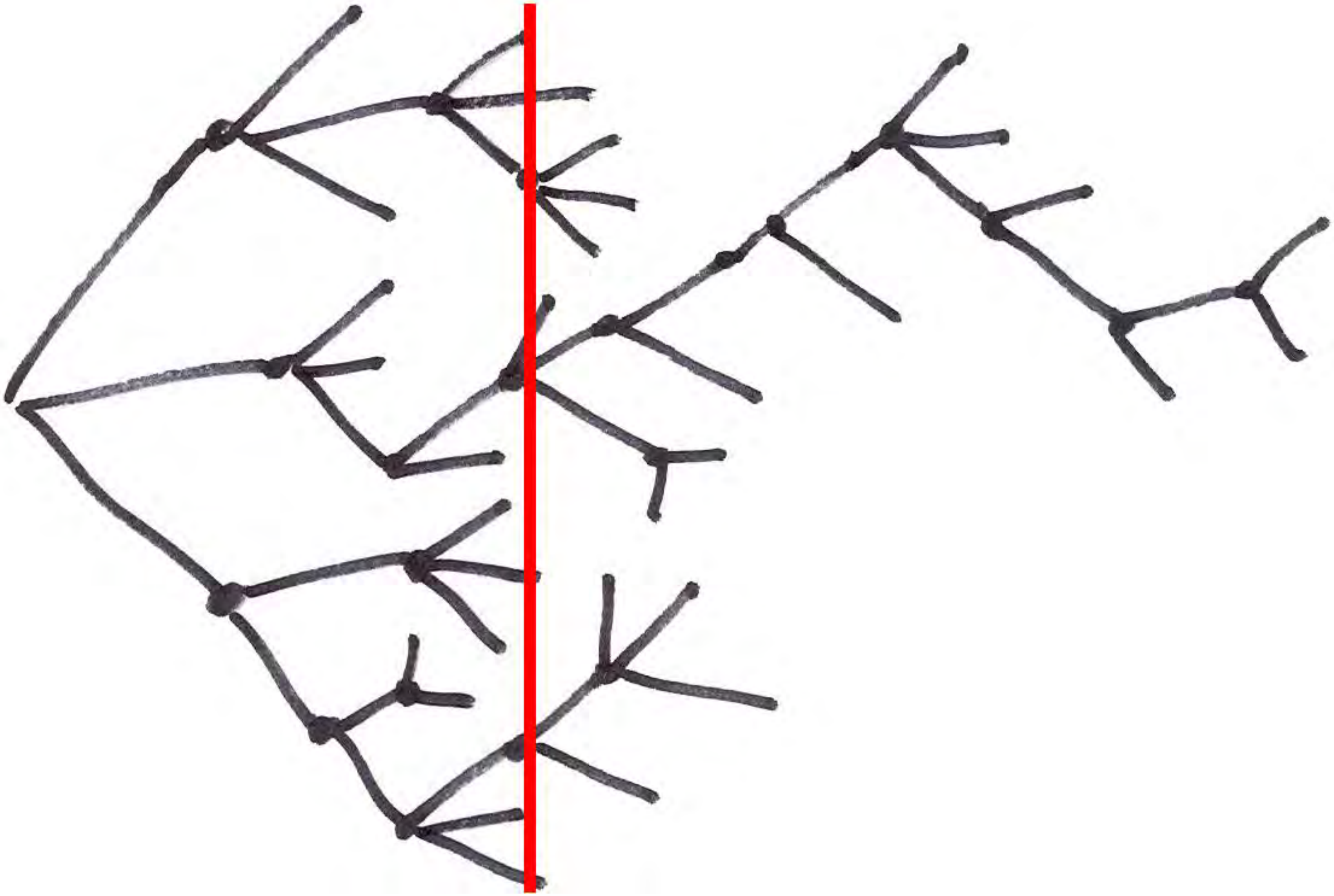
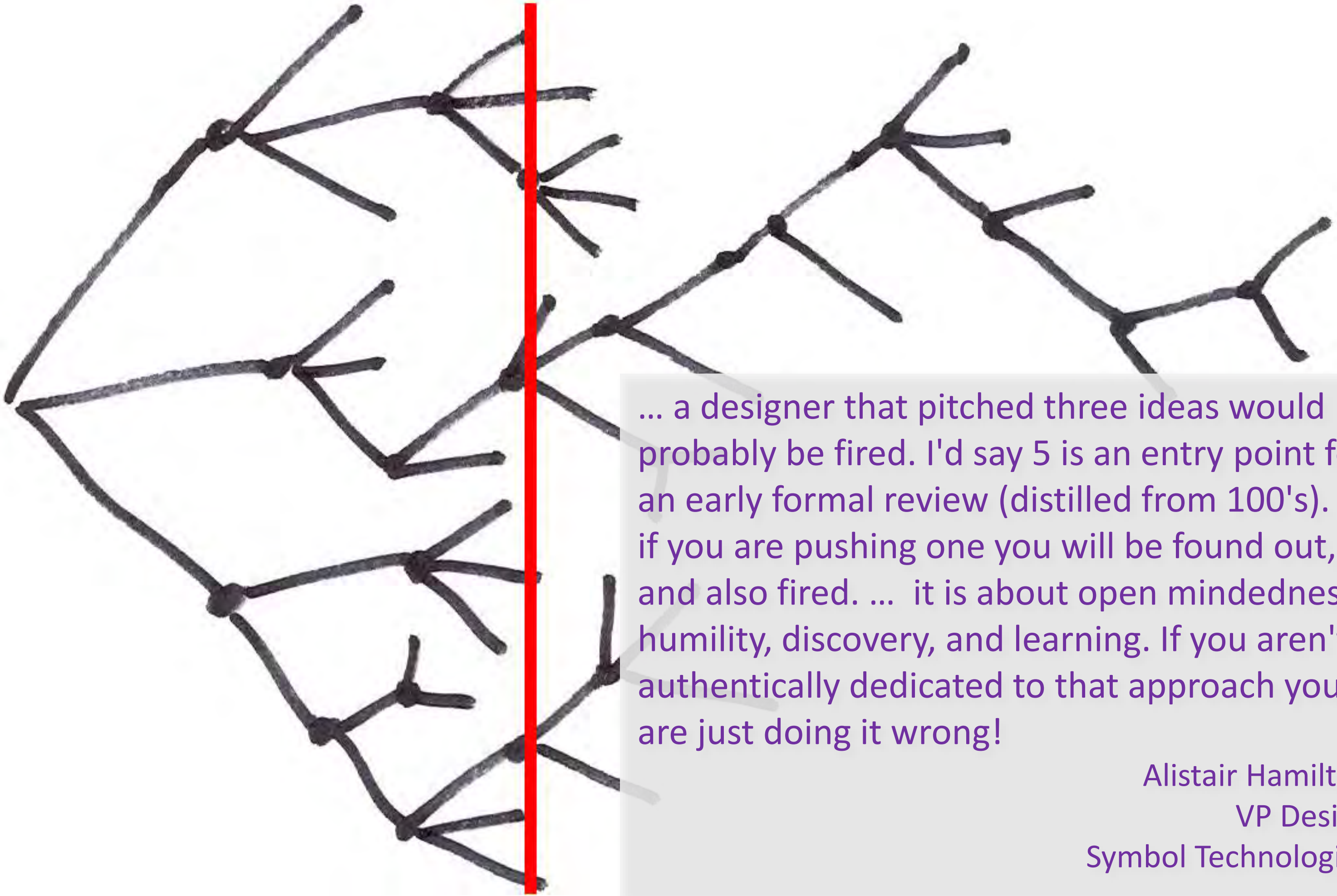

Investment
Ideation
Usability
Weight of Design Criteria
Time
🟥 Sketch
🟨 Prototype

Exploration of Alternatives



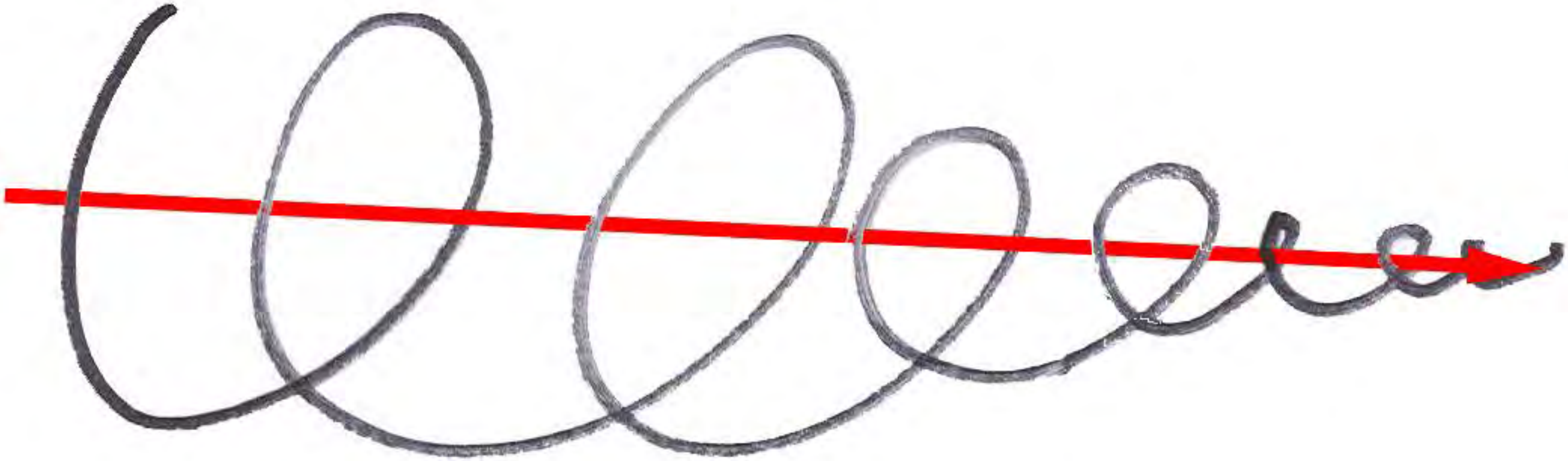
Exploration of Alternatives



… a designer that pitched three ideas would probably be fired. I'd say 5 is an entry point for an early formal review (distilled from 100's). … if you are pushing one you will be found out, and also fired. … it is about open mindedness, humility, discovery, and learning. If you aren't authentically dedicated to that approach you are just doing it wrong!

Alistair Hamilton
VP Design
Symbol Technologies

The Converging Path



Some Evidence

Task:

Create a web banner ad for Ambidextrous magazine.

about us

Ambidextrous illuminates the people and processes involved in design. It is a forum for the cross-disciplinary, cross-market community of people with an academic, professional and personal interest in design.

The magazine is written and staffed by an all-volunteer collective.

A note to our community

We know it's been a while and you've maybe wondered what has been going on with us. The global financial crisis, revolutions, *The New York Times* now charging online...a lot has happened. And with the downturn and the state of publishing, it has been tough. We fought as long as we could and unfortunately must now close *Ambidextrous*. The magazine has been a labor of love, but it has unfortunately not been organizationally and financially sustainable.

Since 2005, we've done our best to help designers share their stories and to build a movement around that. The process of making *Ambidextrous* has been so rewarding for us to take part in, and the best part has always been the people, our contributors and our subscribers. We would like to thank you so much for your support and for sharing your work, passions, and lives with us. It's been a joy and an honor.

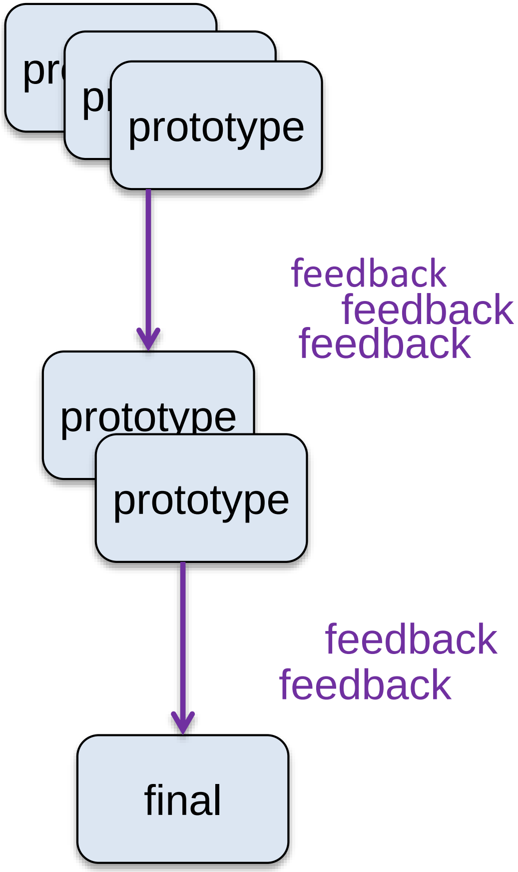
As a movement, *Ambidextrous* will live on, and we should have conversations about what great next steps are for fostering intellectual discussion and sharing in the design community. It's the community that makes us hopeful and pushes us to find the next outlet, the next forum, the next thing for us to collaborate on. So keep in touch. Share your ideas. Let's meet again soon.

Until then,

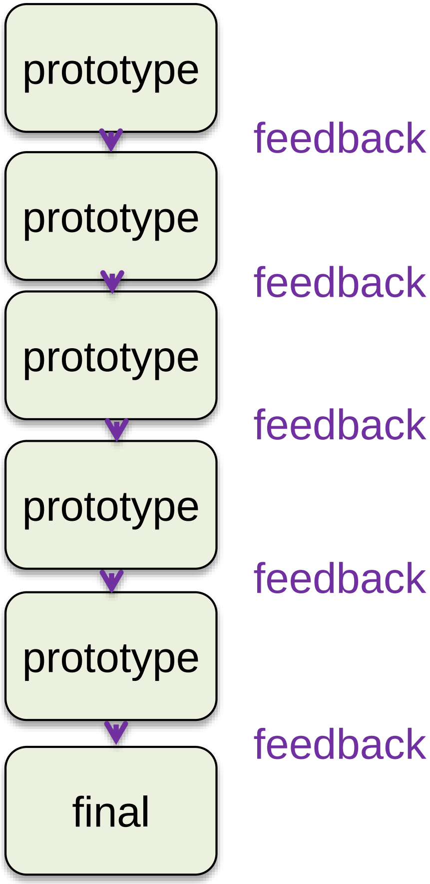
–Wendy Ju & the Ambidextrous Editorial team

Dow et al. TOCHI 2010.

Feedback in Parallel or Serial


pr
pr
prototype
feedback
feedback
feedback
prototype
prototype
feedback
feedback
final

Parallel condition


prototype
feedback
prototype
feedback
prototype
feedback
prototype
feedback
prototype
feedback
final

Serial condition

Dow et al. TOCHI 2010.

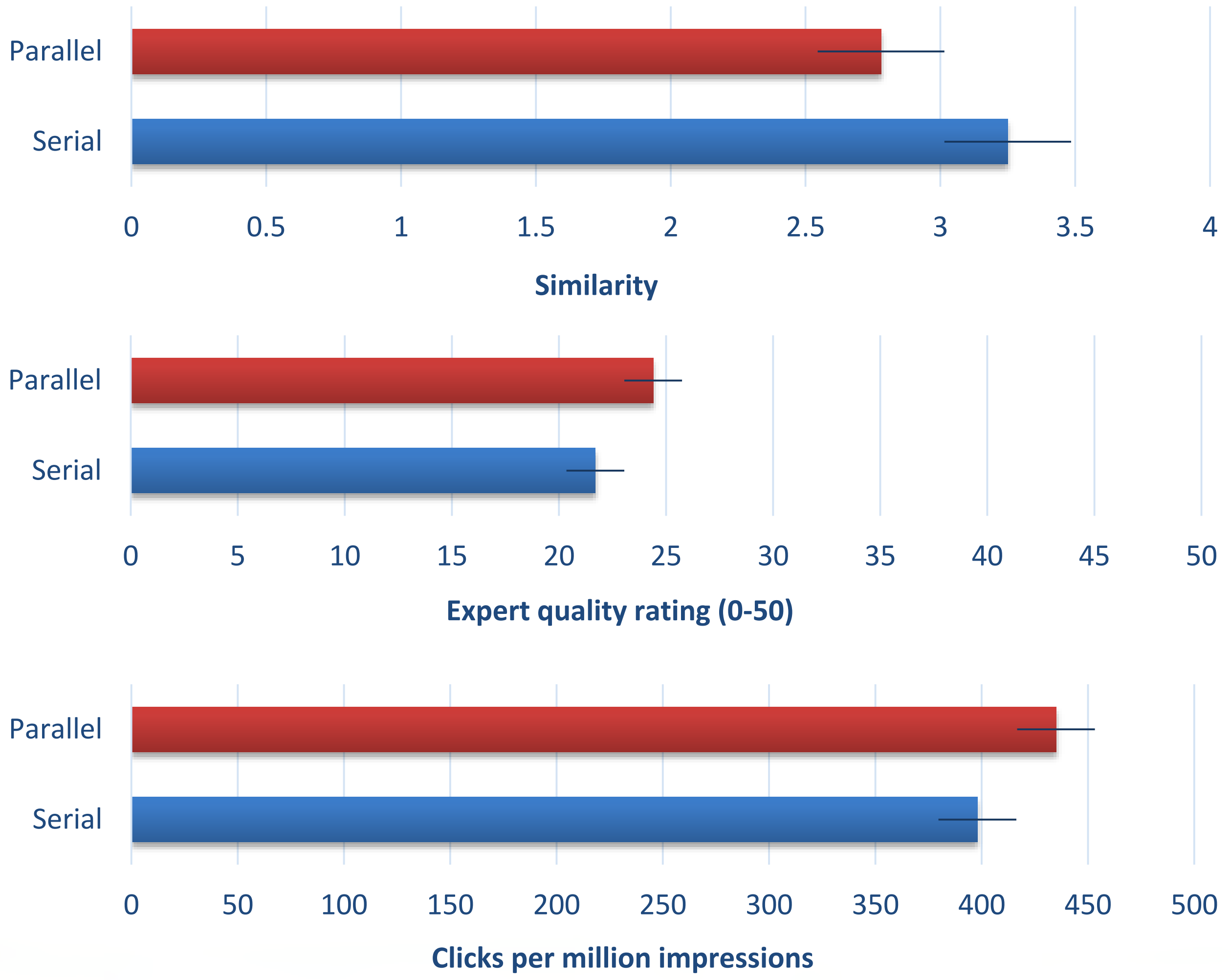
Procedure

serial prototyping condition

parallel prototyping condition

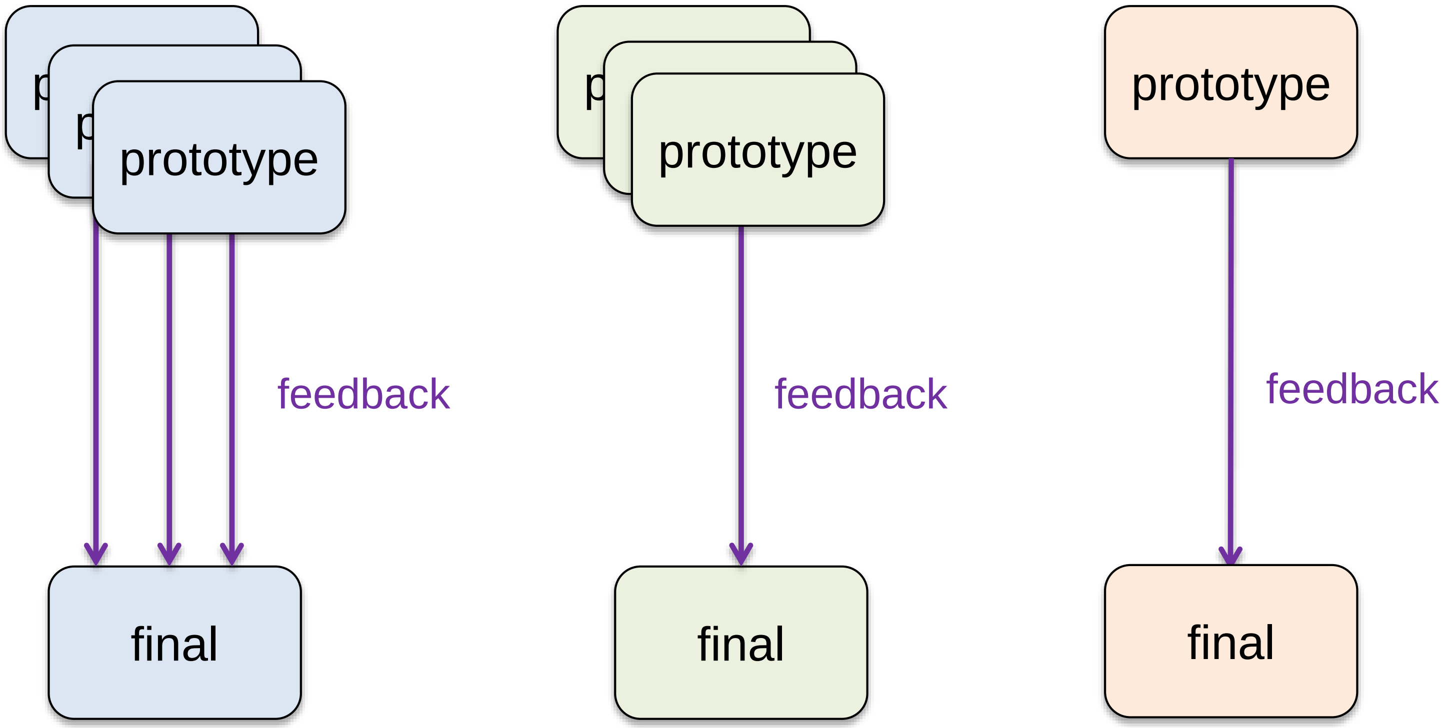
Dow et al. TOCHI 2010.

Parallel: more diverse, better, more clicks



Dow et al. TOCHI 2010.

Share one or share your best?



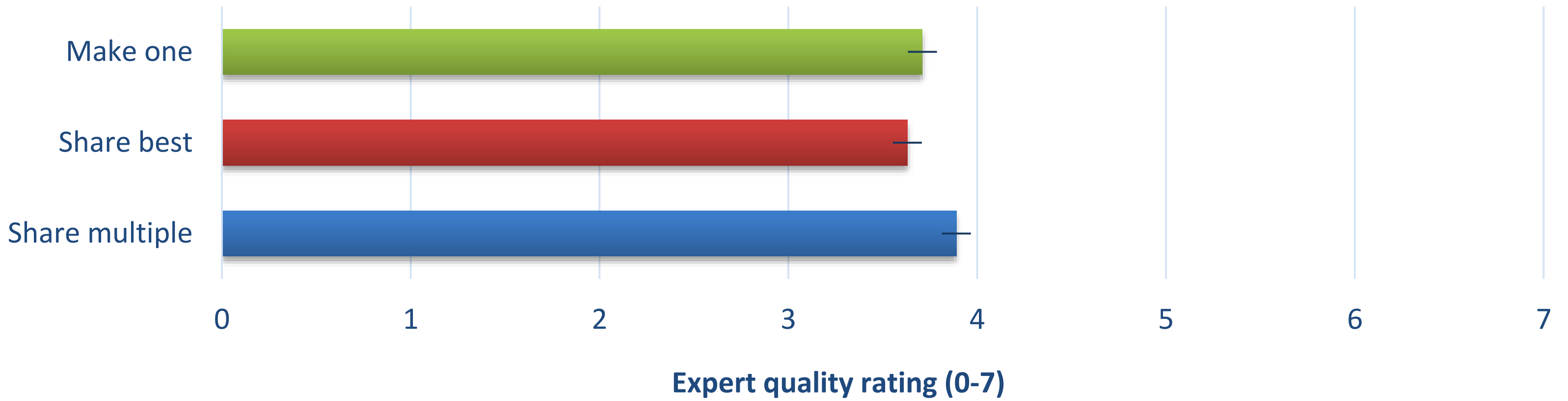
Share multiple condition

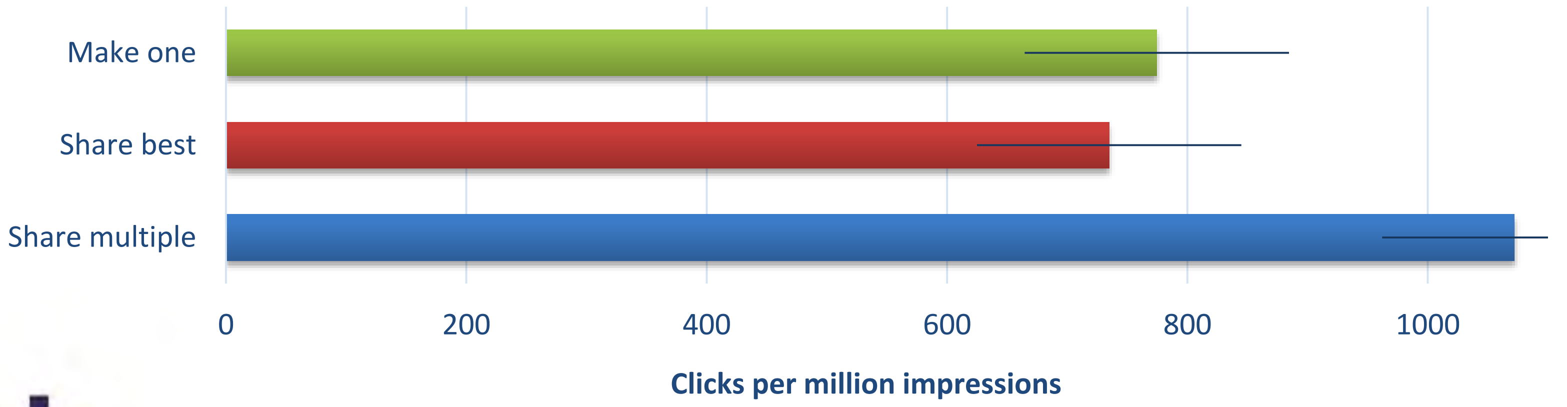
Share best condition

Make one condition

Dow et al. TOCHI 2010.

share multiple: better, more clicks

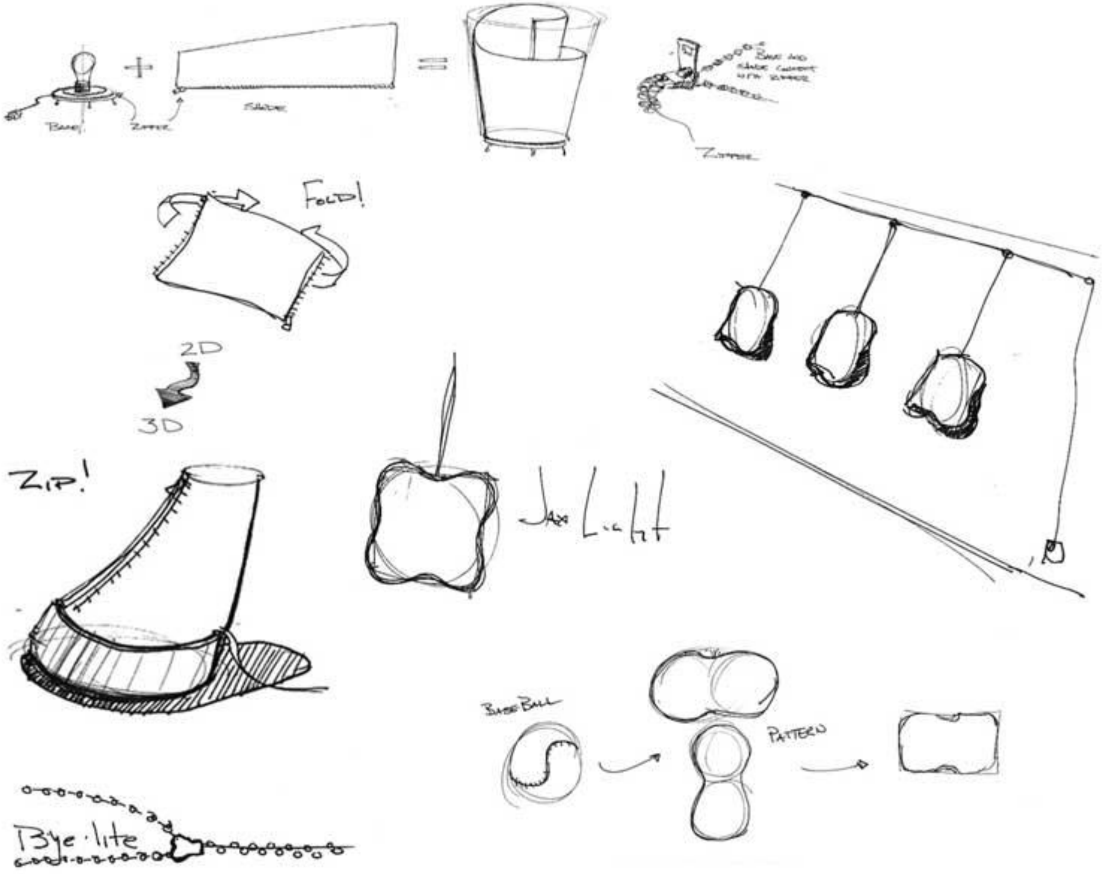




University of Washington

Dow et al. TOCHI 2010.

Is this a sketch? Why or why not?



University of Washington

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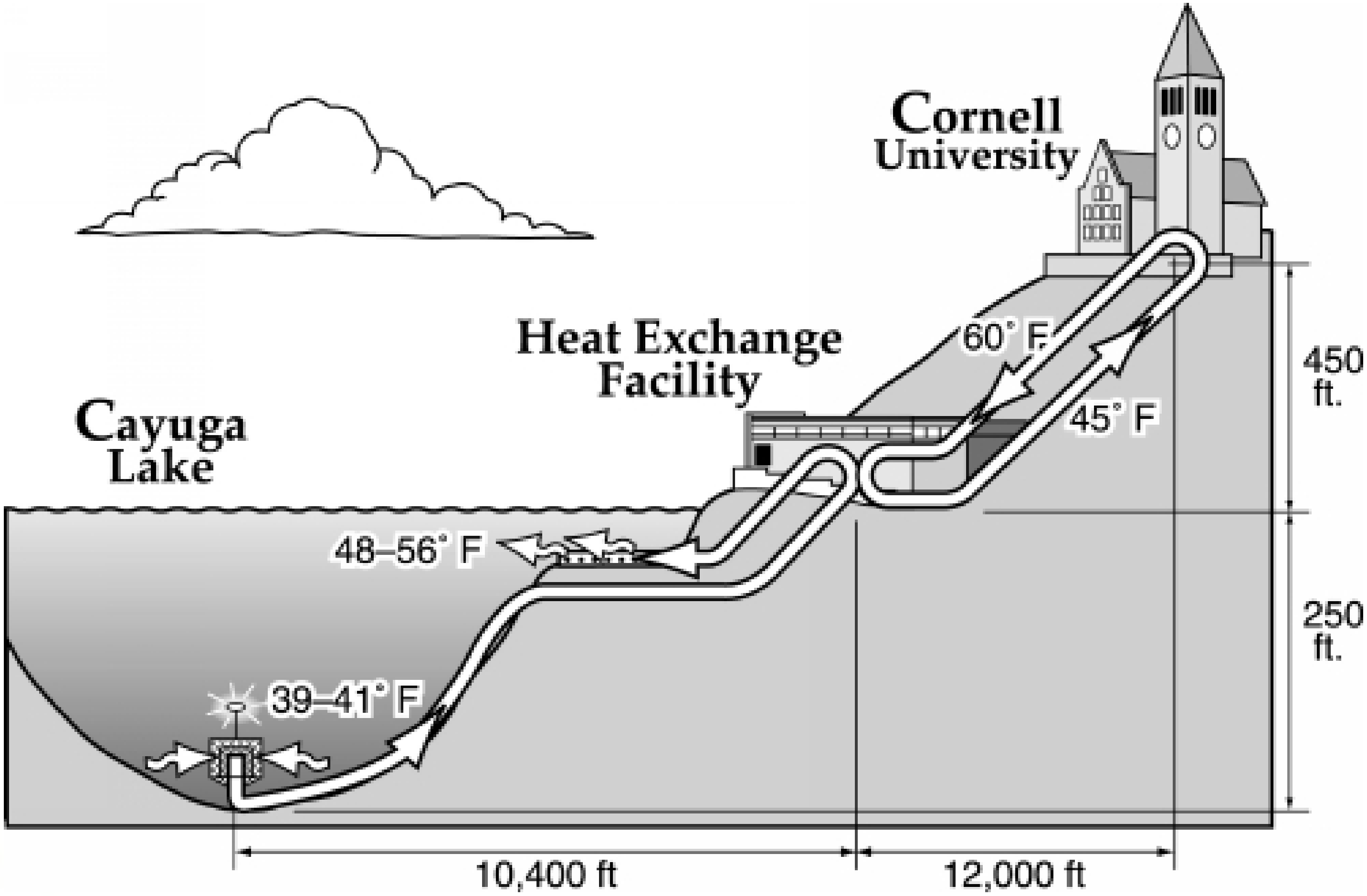

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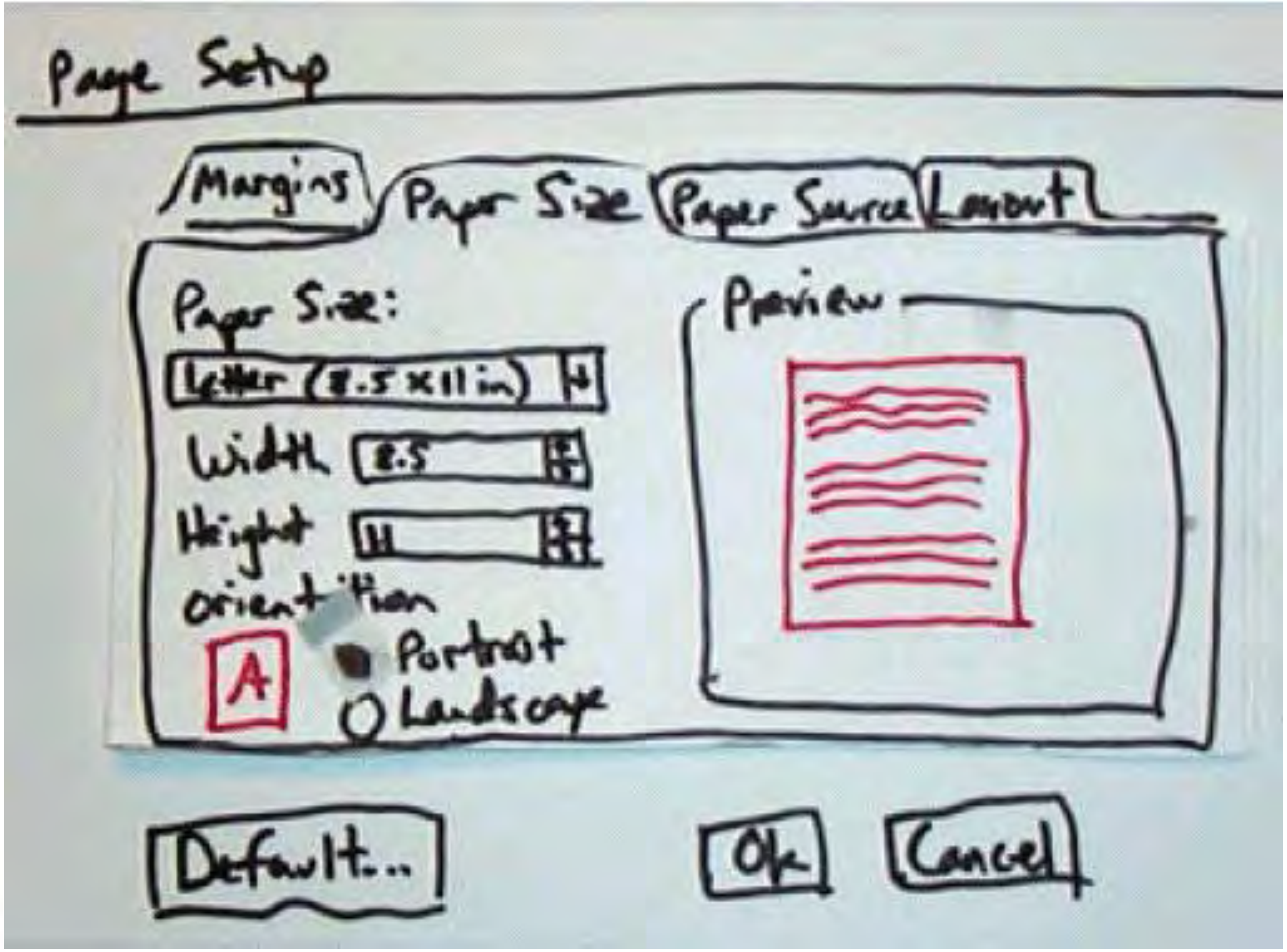

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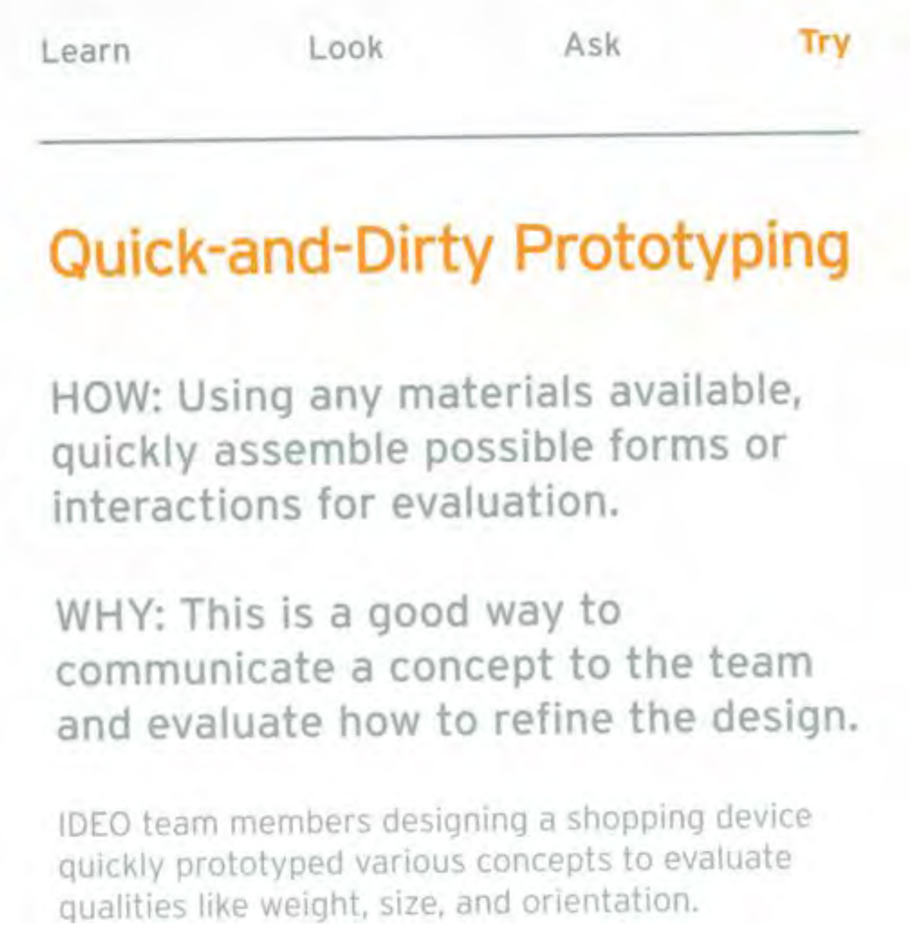


Learn Look Ask **Try**

Quick-and-Dirty Prototyping

HOW: Using any materials available, quickly assemble possible forms or interactions for evaluation.

WHY: This is a good way to communicate a concept to the team and evaluate how to refine the design.

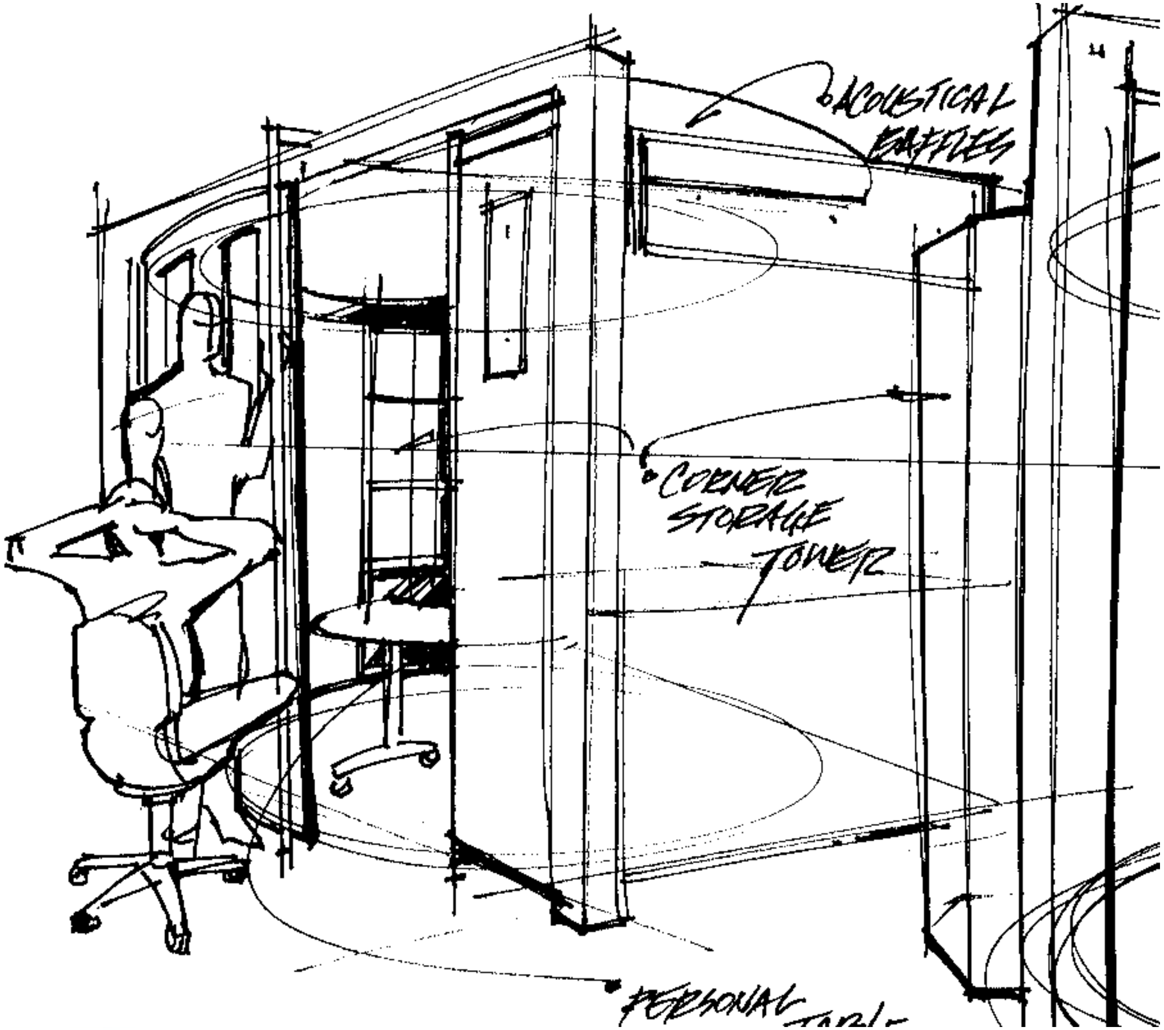
IDEO team members designing a shopping device quickly prototyped various concepts to evaluate qualities like weight, size, and orientation.

Is this a sketch? Why or why not?

Is this a sketch? Why or why not?

Is this a sketch? Why or why not?

Is this a sketch? Why or why not?



Is this a sketch? Why or why not?

Sketching and the Design Diamond

The design diamond is fundamental to understanding what you are doing here

- Much of your education, including in CSE, has taught you to focus on having the right answer

- Here it matters what you do long before the end

Most ideas get thrown out, including yours

- Better ideas are great criticism, and frequently would never have come about otherwise

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 07:
Design Diamond

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

design:
use:
build:

University of Washington

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 08:
Storyboarding

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

design:
use:
build:

Today

Milestones

- Design Review (“1x2”) Due Friday
- Getting the Right Design Due Tuesday
- Presentations Start Thursday

Class

- Storyboarding
- Design Check-In (“3x4”) Critique

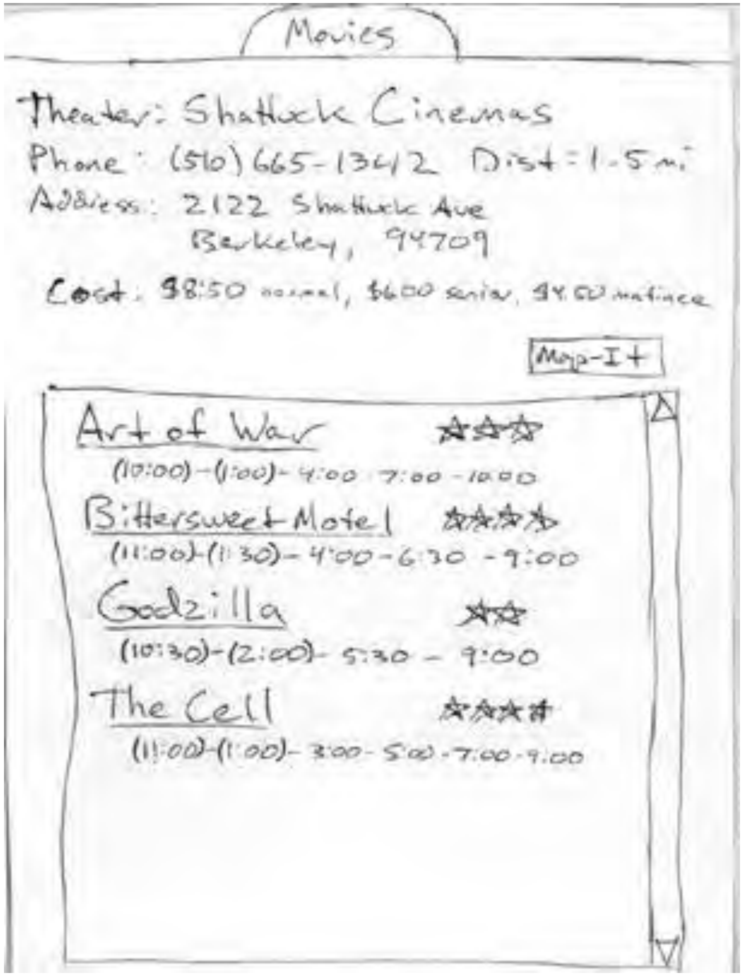
Tasks in Design

Tasks guide your exploration of a design

Creating scenarios for each task illustrates

- what a person does
- what they see
- step-by-step performance of task

Sketching



Movies

Theater: Shattuck Cinemas
Phone: (510) 665-1342 Dist: 1.5 mi
Address: 2122 Shattuck Ave
Berkeley, 94709

Cost: $8.50 normal, $6.00 senior, $4.50 matinee

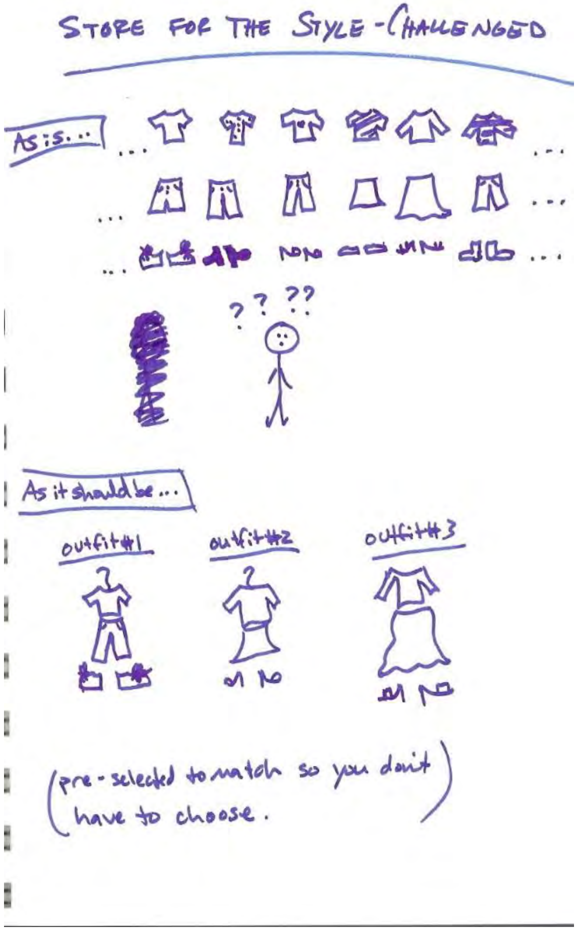
Map-It

Art of War ★★★
(10:00)-(1:00)-4:00-7:00-10:00

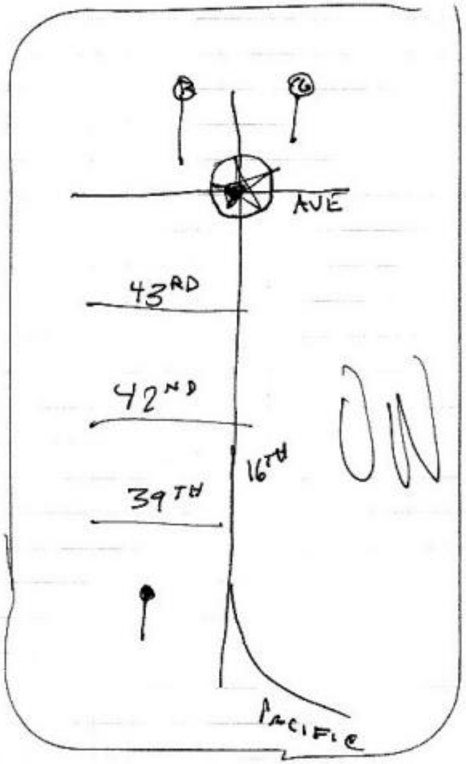
Bittersweet Motel ★★★★
(11:00)-(1:30)-4:00-6:30-9:00

Godzilla ★★
(10:30)-(2:00)-5:30-9:00

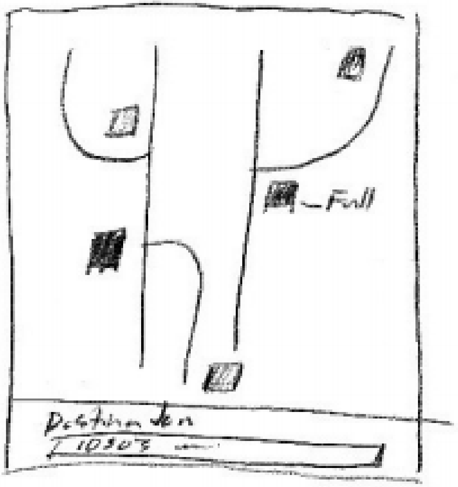
The Cell ★★★★
(11:00)-(1:00)-3:00-5:00-7:00-9:00



Sketching

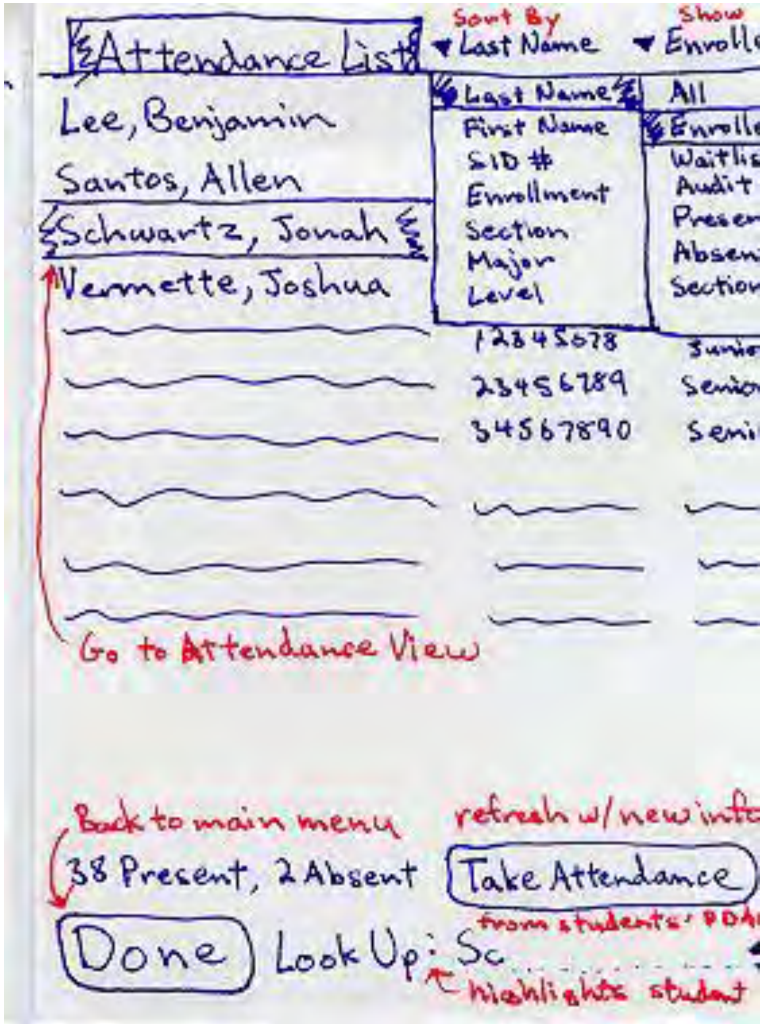


MAP SHOWING PARKING AVAILIBILITY BASED ON INPUTTED DATA, INPUTTED ON MAP



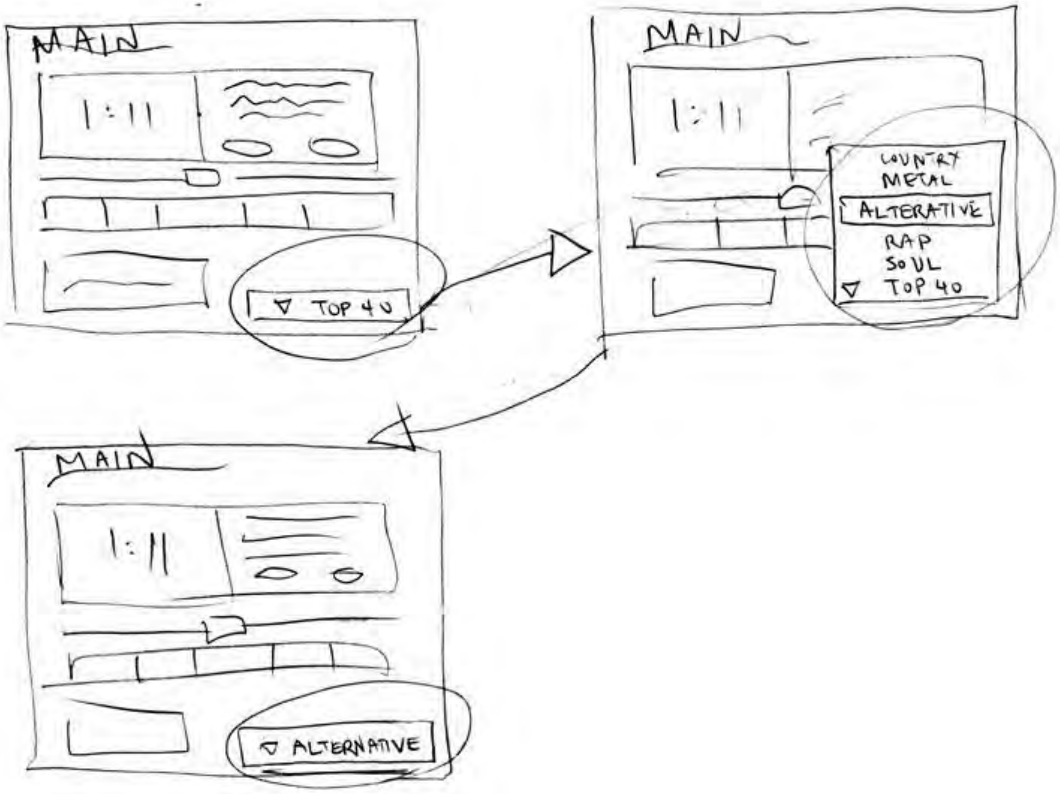
- Different colors
- highlights availability
-

Sketching and Storyboards

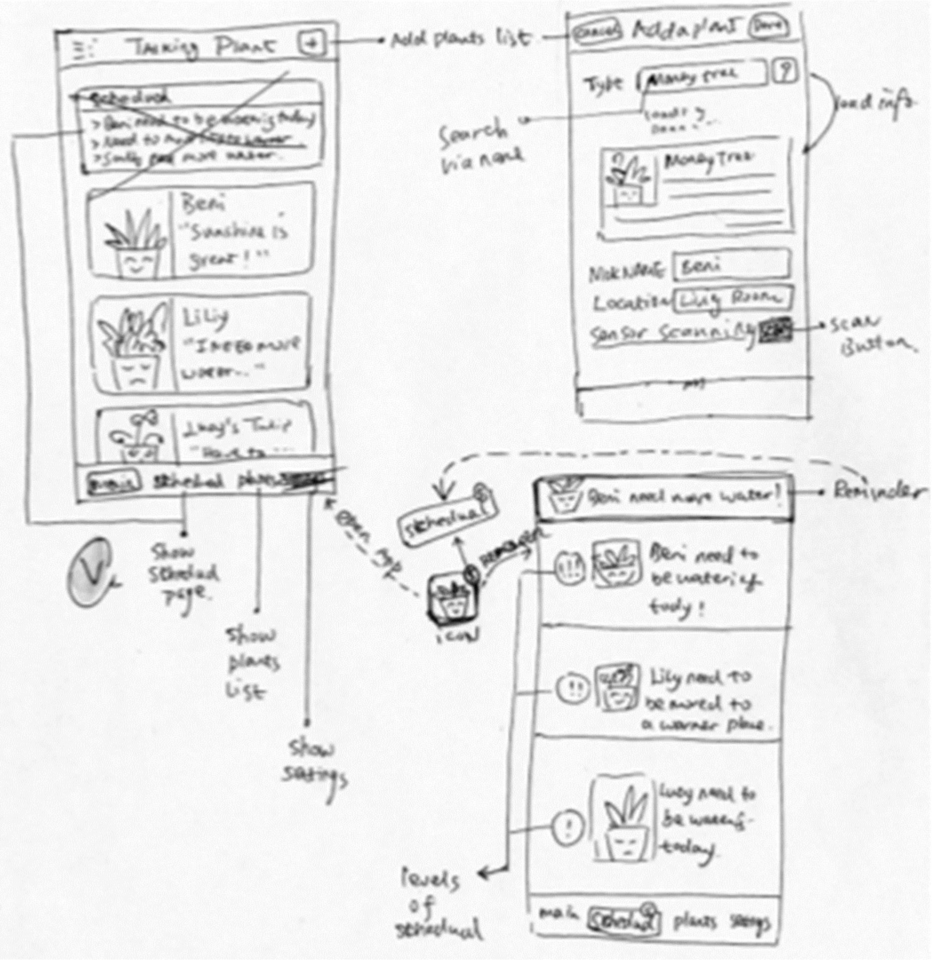


Sketching and Storyboards

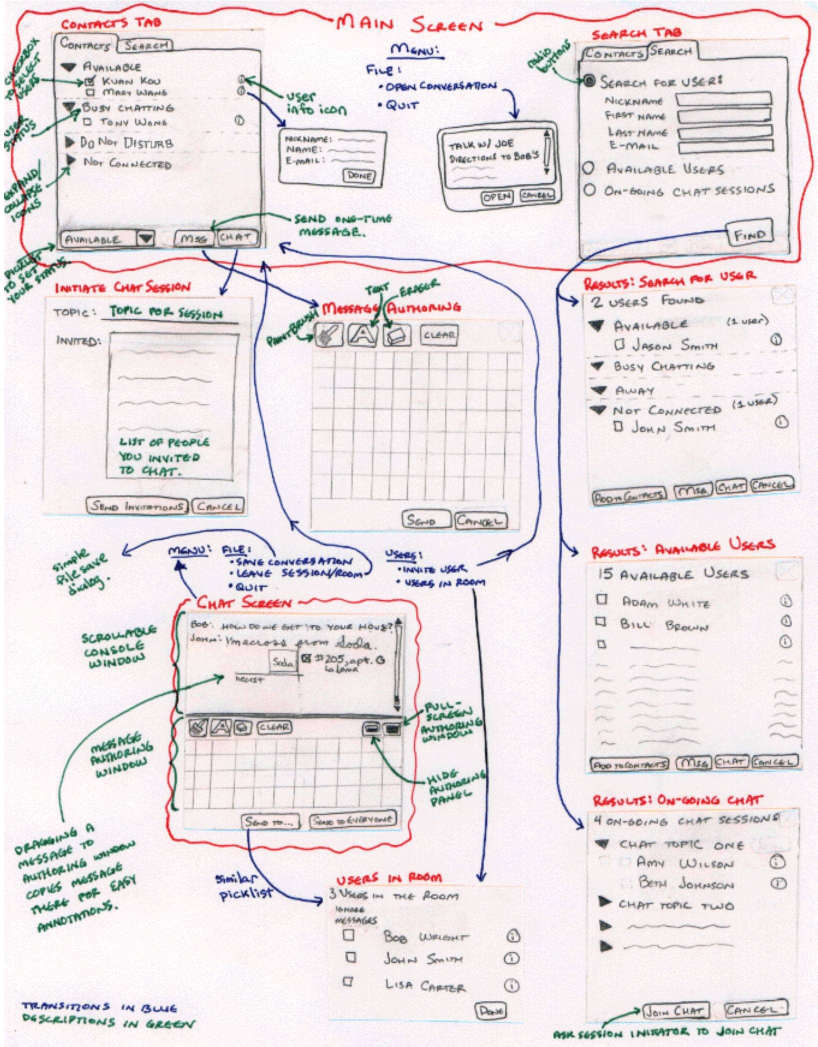
SCENARIO 1 "I want to listen to alternative music"



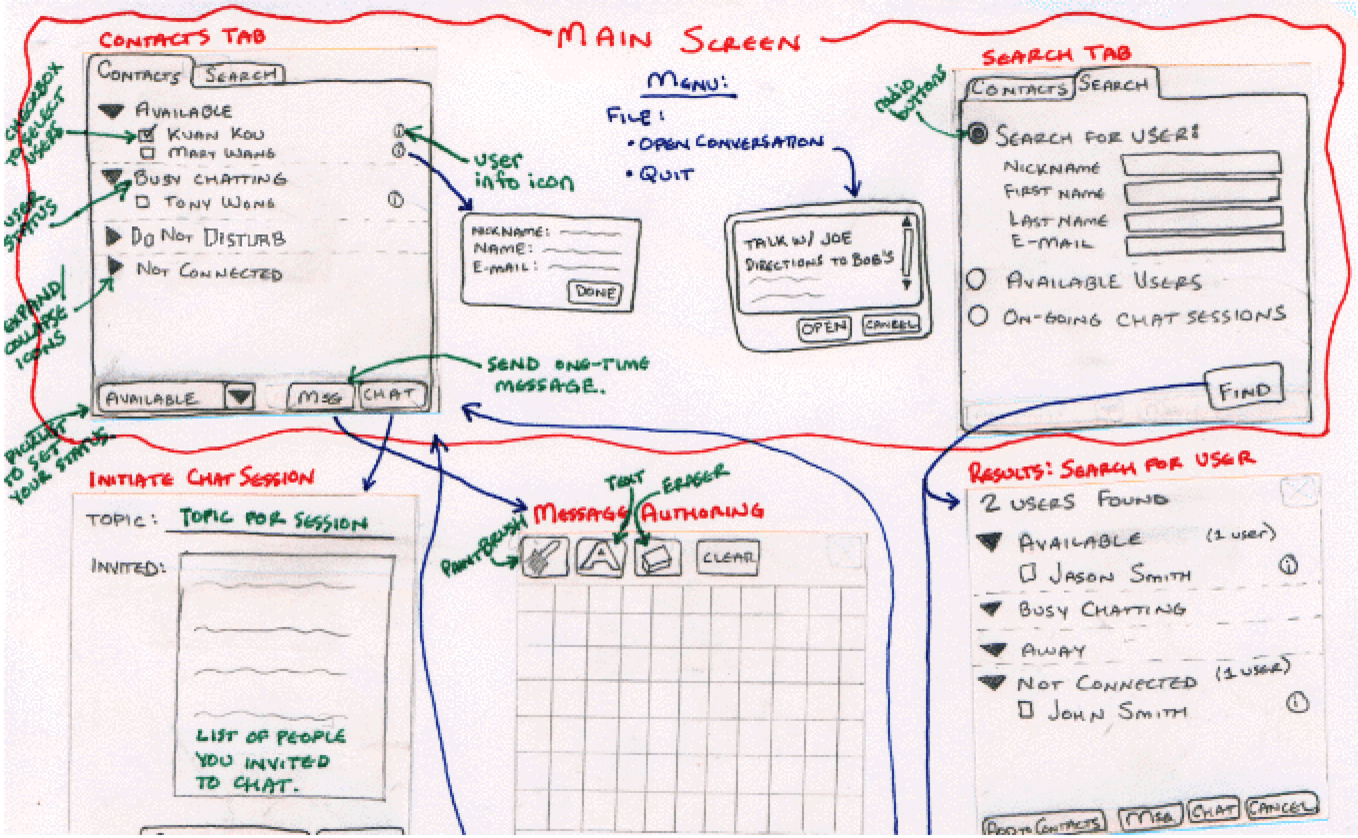
Sketching and Storyboards



Sketching and Storyboards



Sketching and Storyboards



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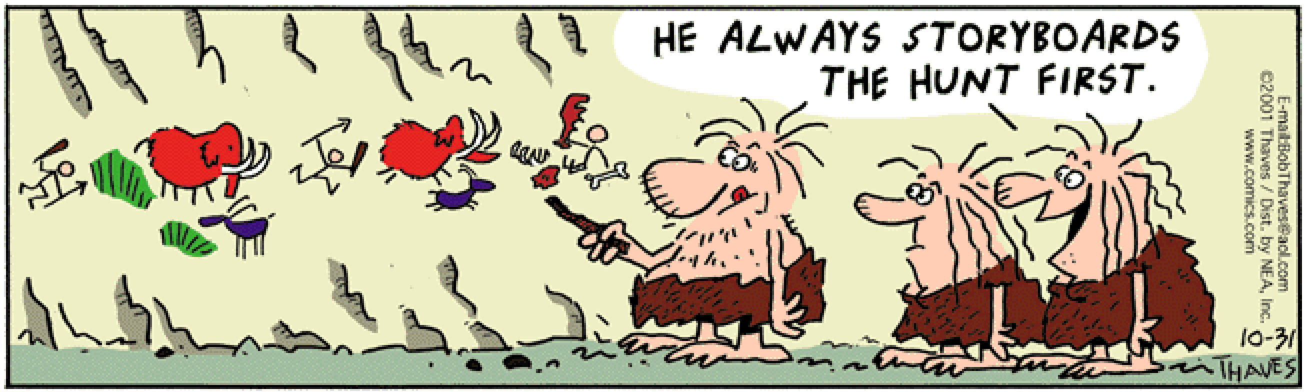
Illustrating Time

Storyboards come from film and animation

Give a “script” of important events

- leave out the details
- concentrate on the important interactions



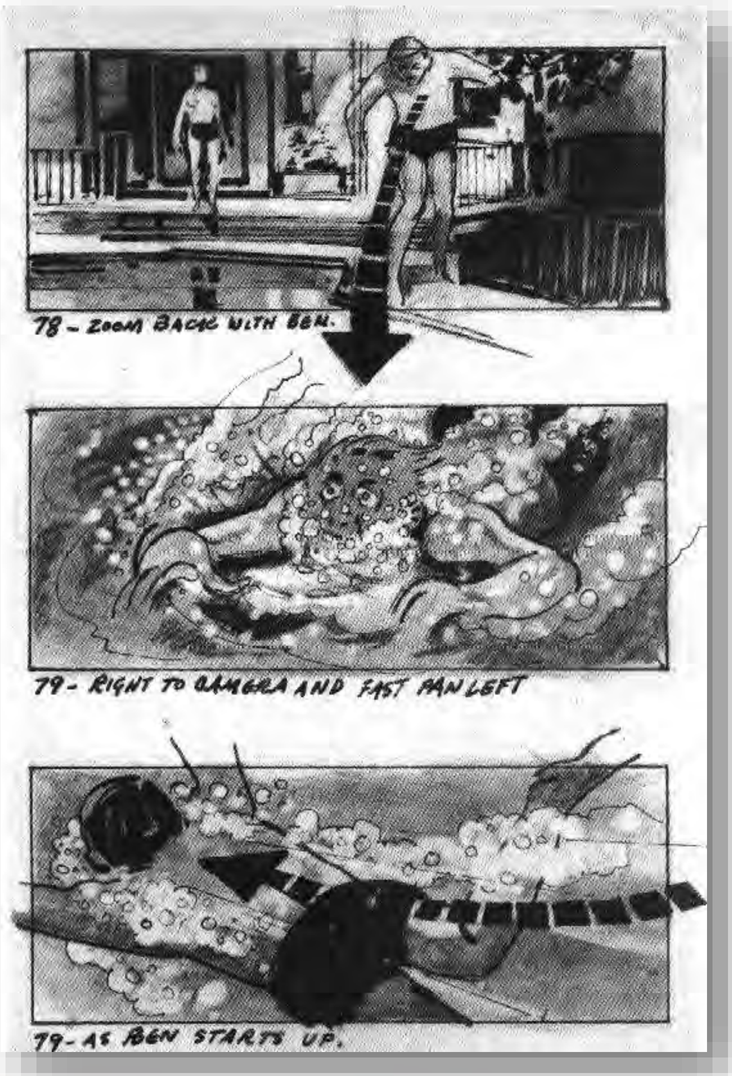
Storyboards

Can be used to explore

Much faster and less expensive to produce

- Can therefore explore more potential approaches

Notes help fill in missing pieces of the proposal



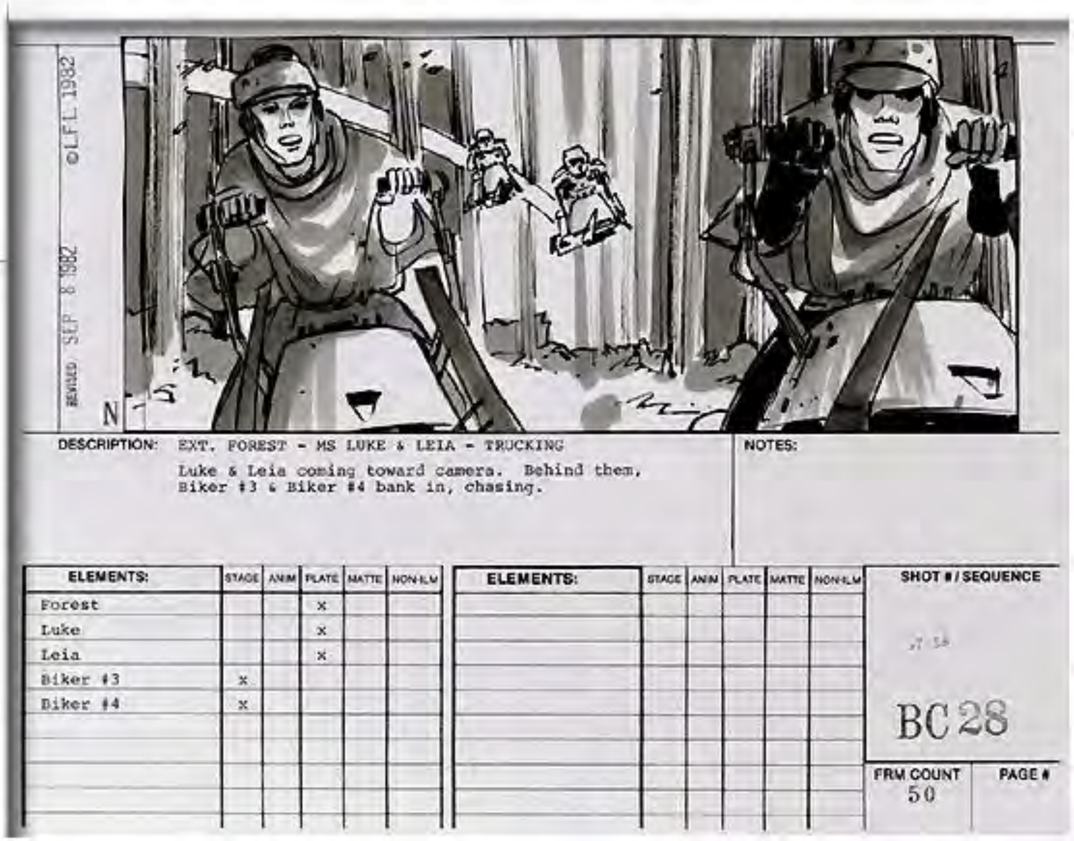
Storyboards

Can be used to convey

Effective storyboards can quickly convey information that would be difficult to understand in text

Storyboards

Can illustrate
key requirements
and leave open
less important
details of design



REVISED SEP 8 1982 ©LFL 1982

N

DESCRIPTION: EXT. FOREST - MS LUKE & LEIA - TRUCKING

Luke & Leia coming toward camera. Behind them, Biker #3 & Biker #4 bank in, chasing.

NOTES:

ELEMENTS:	STAGE	ANIM	PLATE	MATTE	NON-ILM
Forest			x		
Luke			x		
Leia			x		
Biker #3	x				
Biker #4	x				

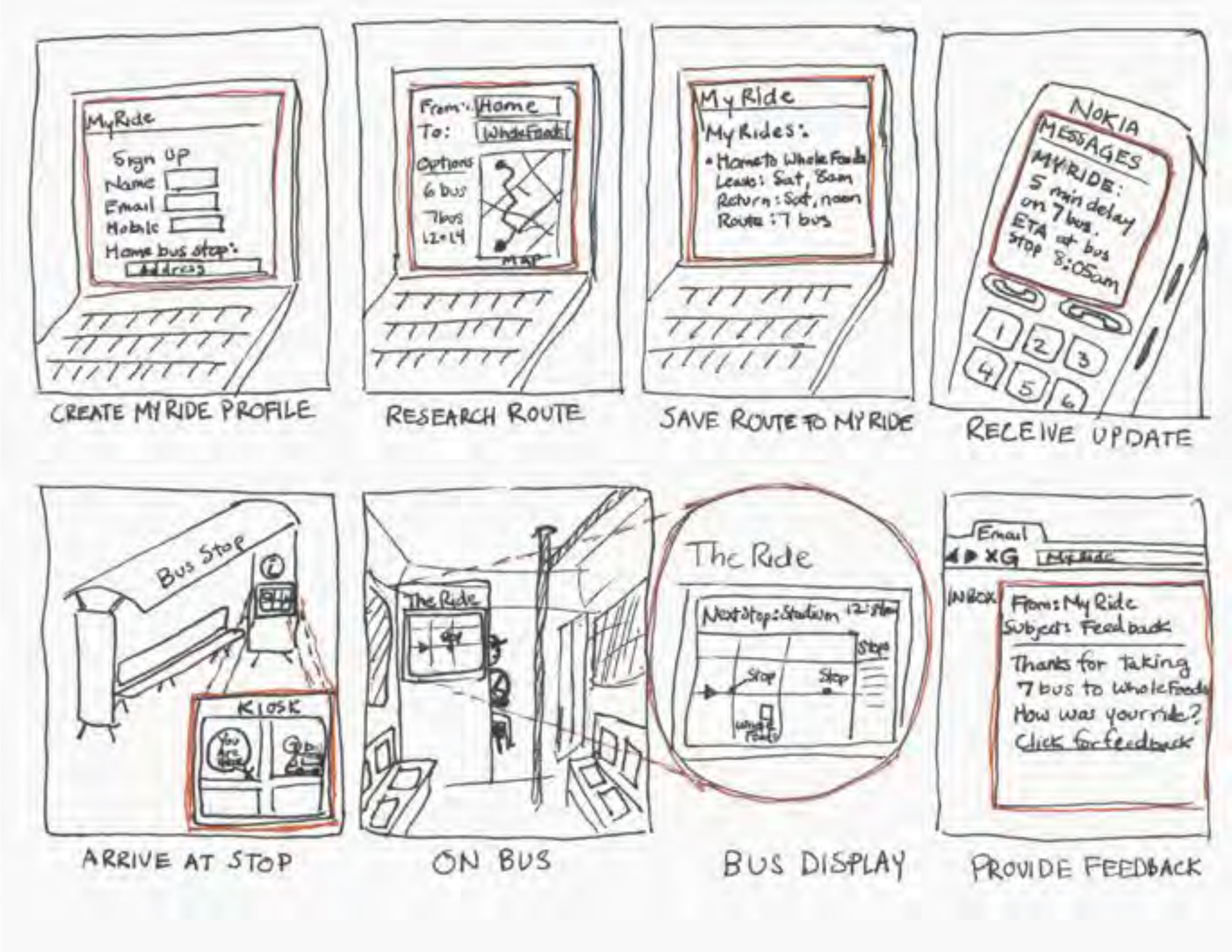
ELEMENTS:	STAGE	ANIM	PLATE	MATTE	NON-ILM

SHOT # / SEQUENCE BC 28

FRM COUNT 50

PAGE #

Basic Storyboard



Storytelling

Stories have an audience

- Other designers, clients, stakeholders, managers, funding agencies, potential end-users

Stories have a purpose

- Gather and share information about people, tasks, goals
- Put a human face on analytic data
- Spark new design concepts and encourage innovation
- Share ideas and create a sense of history and purpose
- Giving insight into people who are not like us
- Persuade others of the value of contribution

dub
University of Washington

Quesenberg and Brooks

Stories Provide Context

Characters
- Who is involved

Setting
- Environment

Sequence
- What task is illustrated
- What leads a person to use a design
- What steps are involved

Satisfaction
- What is the motivation
- What is the end result
- What need is satisified

Details of interface features and components are not necessarily surfaced, they can often be developed and conveyed more effectively with other methods

Can help surface details that might otherwise be ignored

Grocery store application:
- use with one hand while pushing a shopping cart
- privacy of speech input
- split attention

Storytelling

Good stories

- Understand audience
- Provide context of use
- Are well-motivated
- Memorable
- Evokes a reaction
- Evokes empathy
- Illustrate experience
- Convey emotions
- Short and to-the-point

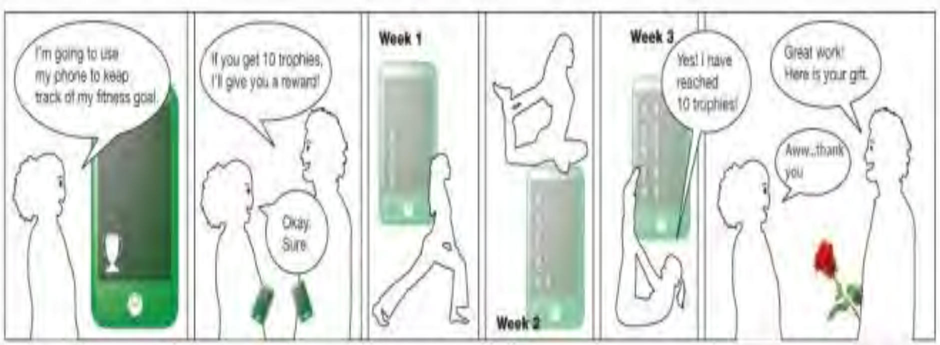
Bad stories

- Do not account for audience
- Boring or un-engaging
- Fantastical or unrealistic
- Wrong story for purpose
- Too long to hold attention

tl;dr

Elements of a Storyboard

Visual storytelling



5 visual elements

- Level of detail
- Inclusion of text
- Inclusion of people and emotions
- Number of frames
- Portrayal of time

University of Washington

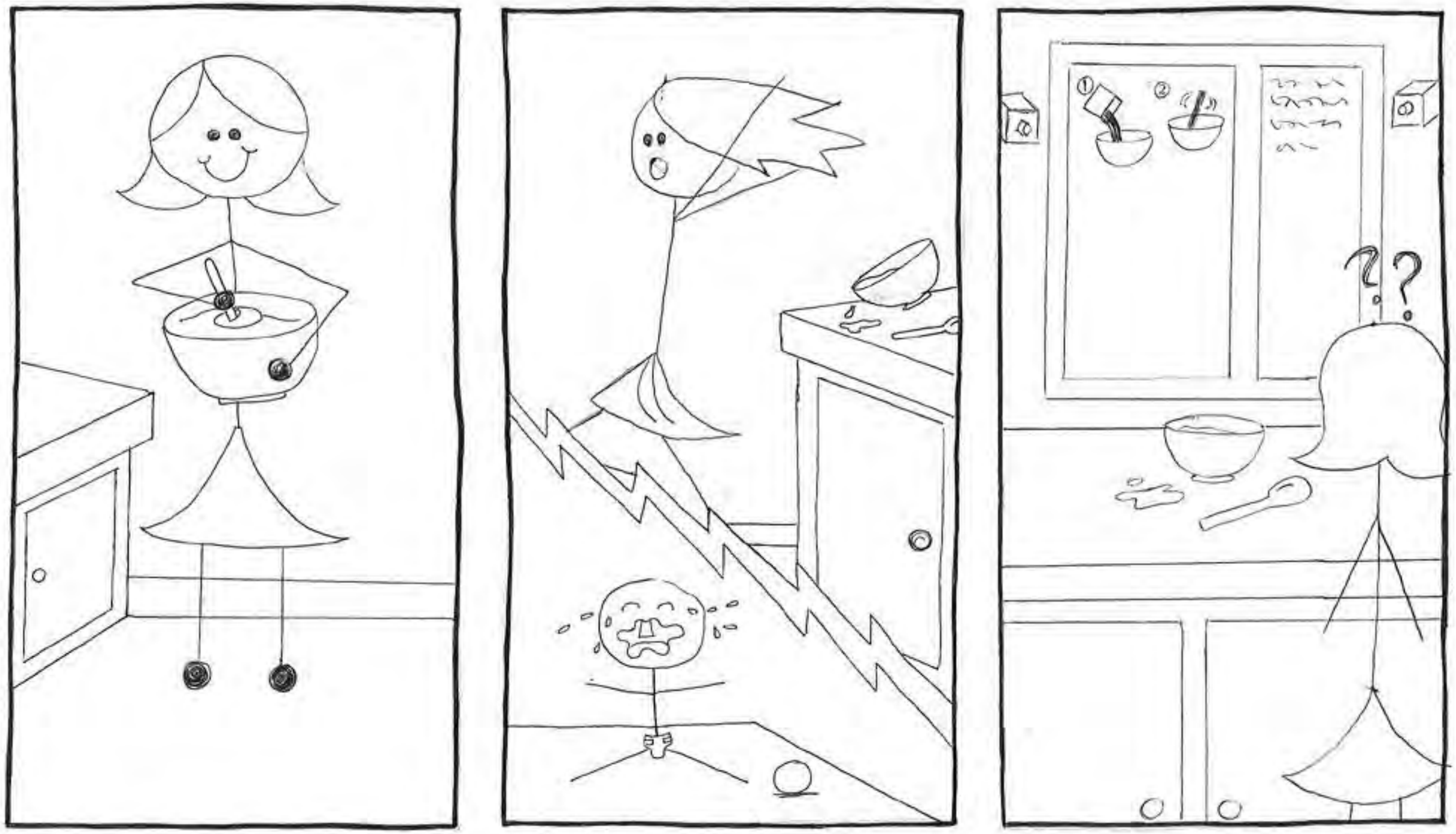
Truong et al, 2006

1. How Much Detail?

Guideline: too much detail can lose universality

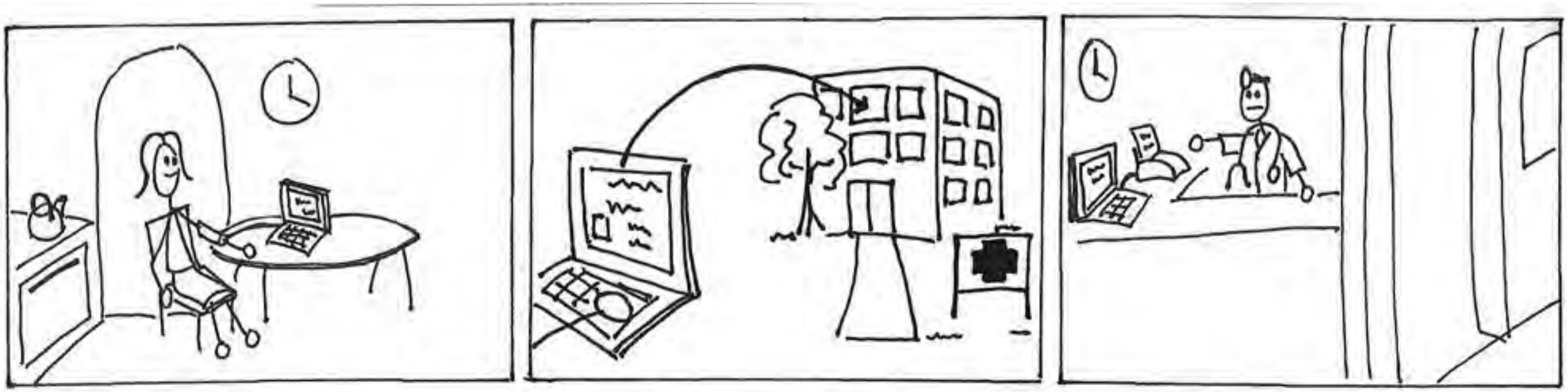
Scott McCloud

1. How Much Detail?



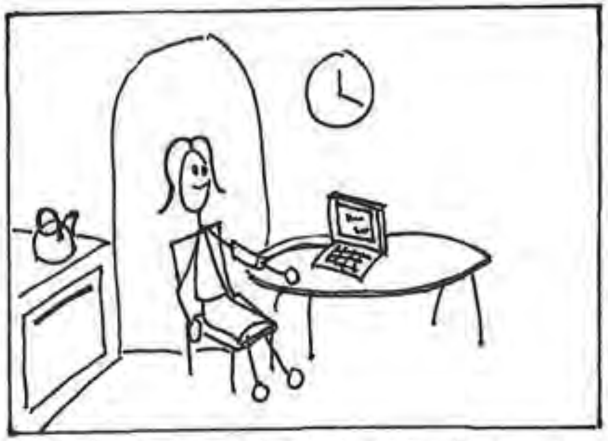
2. Use of Text

Guideline: It is often necessary, but keep it short

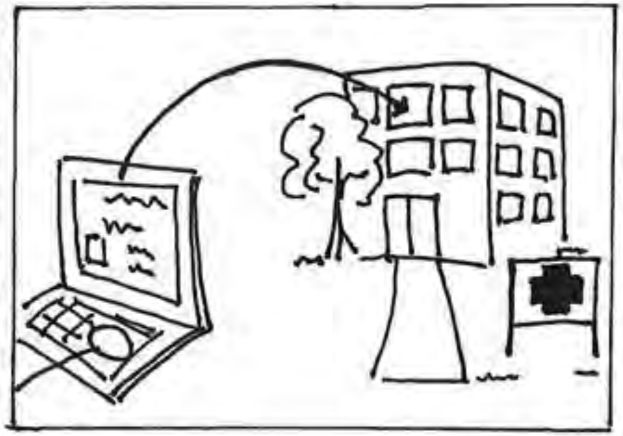


2. Use of Text

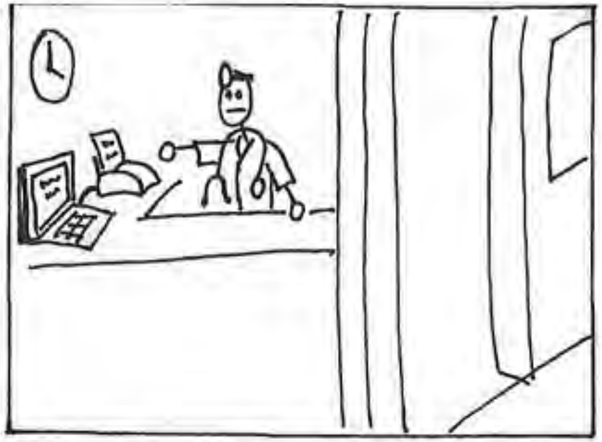
Guideline: It is often necessary, but keep it short



1. At home, Mary checks her blood pressure.



2. After a few simple key presses, her blood pressure readings get sent to a clinic.



3. The information is made available to her doctor.

3. Include People and Emotions

Guideline: Include people experiencing the design and their reactions to it (good or bad)

Remember, the point of storyboards is to convey the experience of using the system

4. How Many Frames?

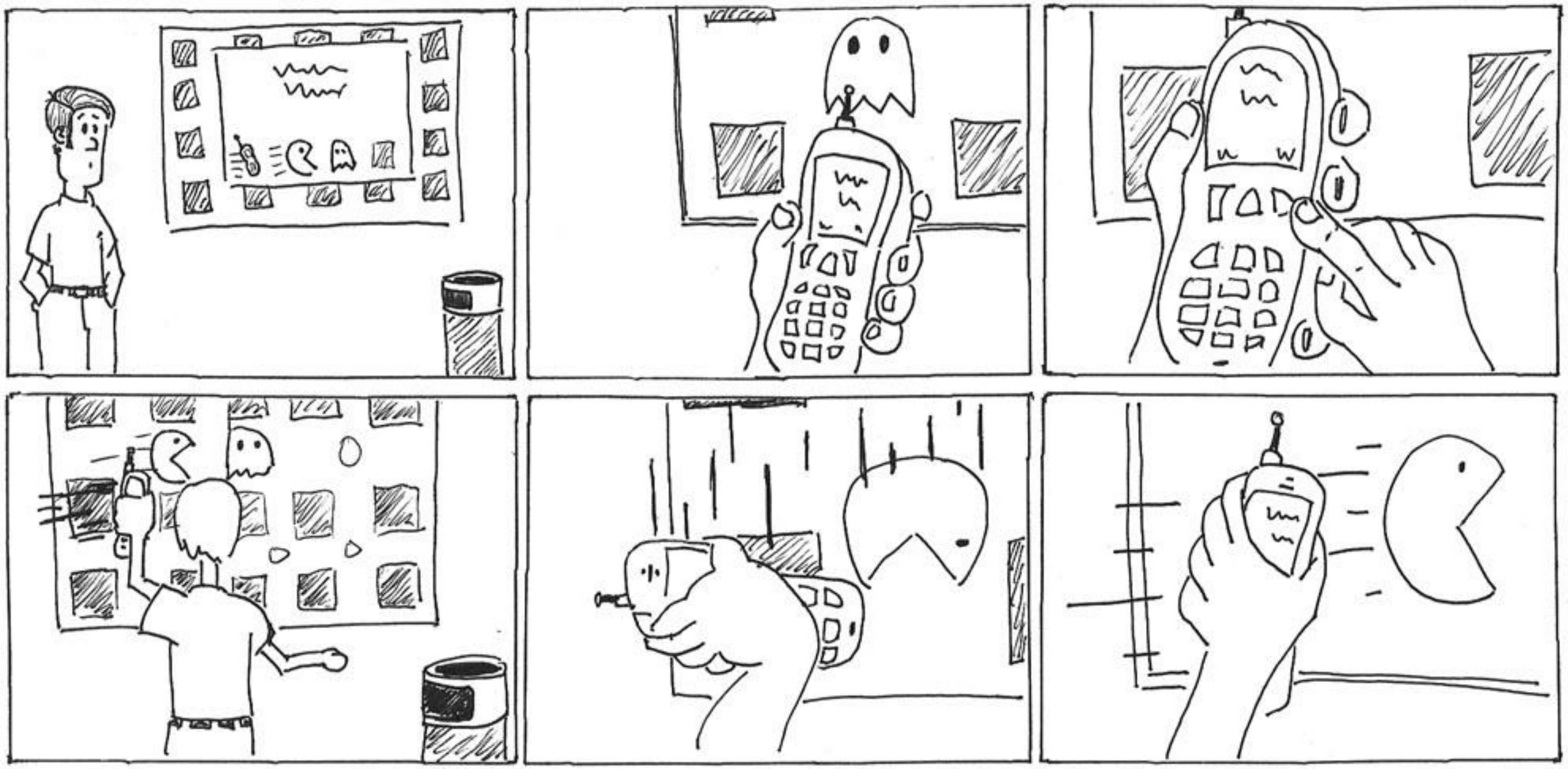
Guideline: 4-6 frames is ideal for end-users

- Less work to illustrate
- Must be able to succinctly tell story
- Potentially longer for design clients

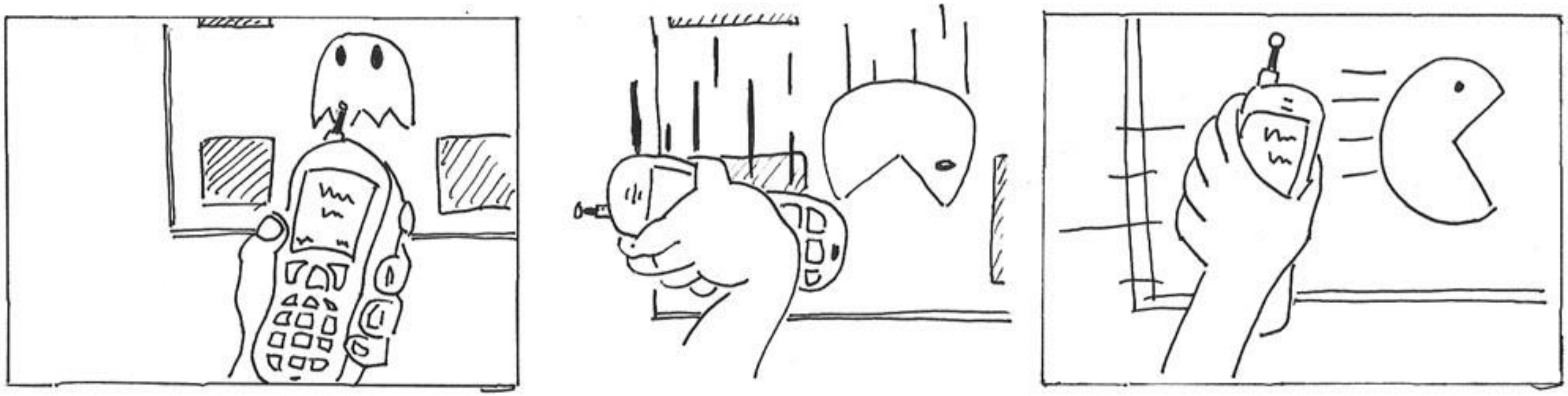
More is not always better

- May lose focus of story
- May lose attention

4. How many frames?



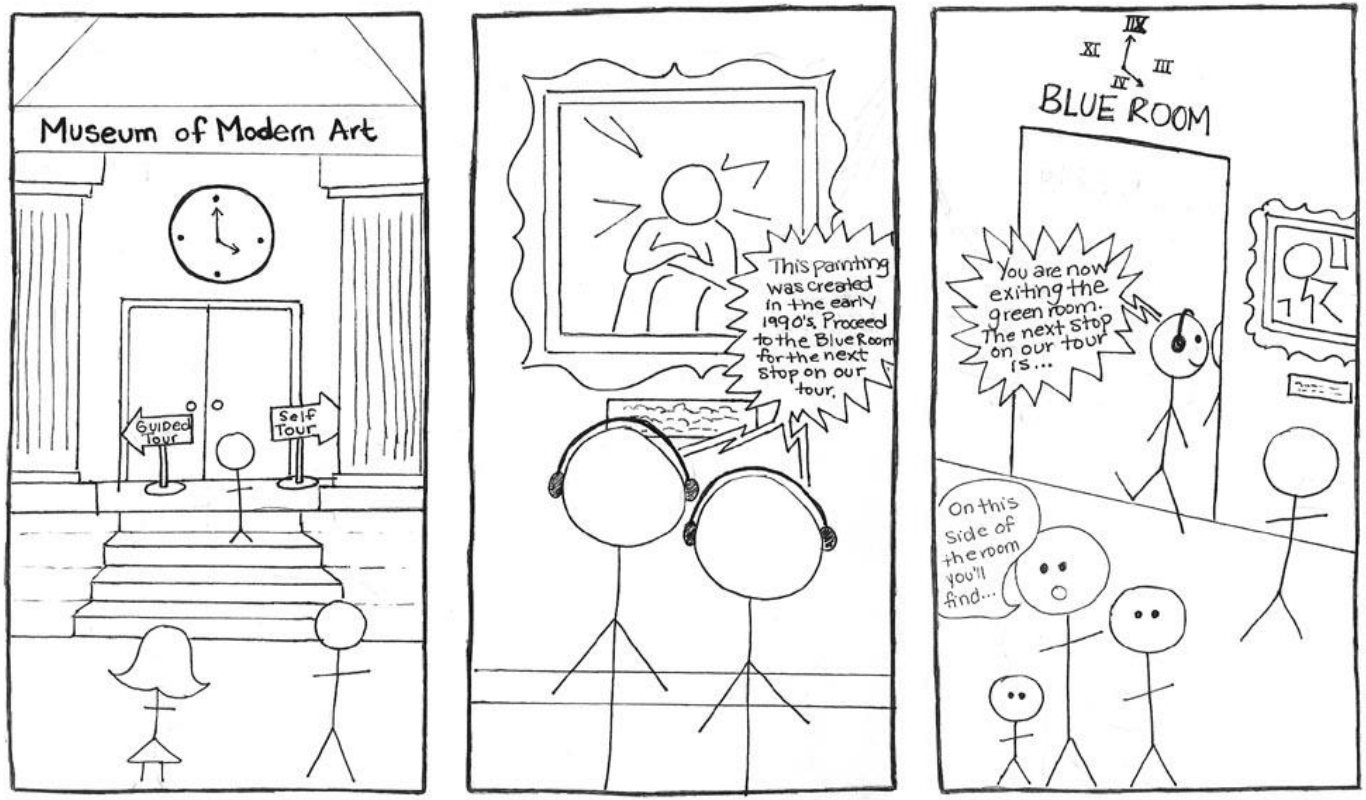
4. How many frames?



University of Washington

5. Passage of Time

Guideline: Only use if necessary to understand

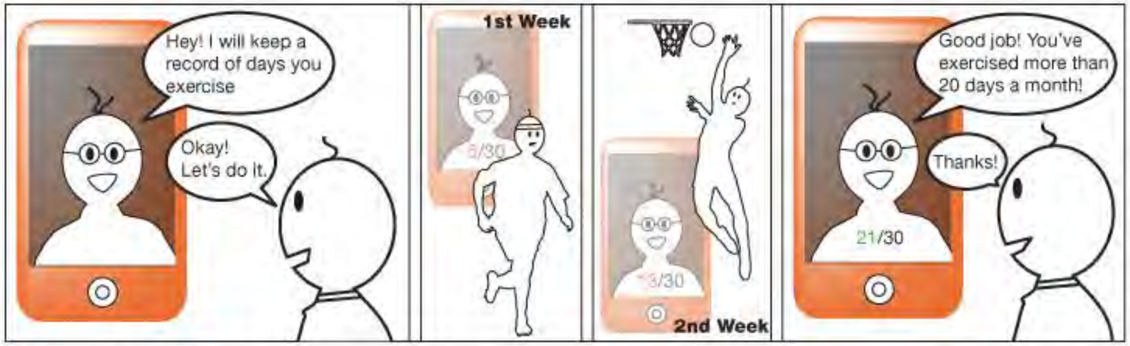


Storyboards for Comparing Ideas

Authoritative

Cell phone is used to
keep track of one's fitness goal.

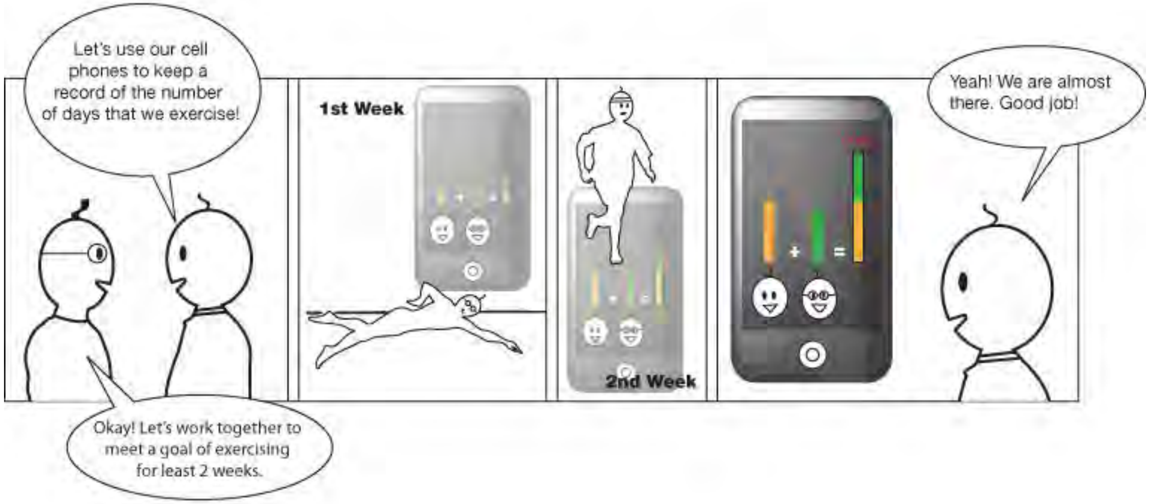
Supportive



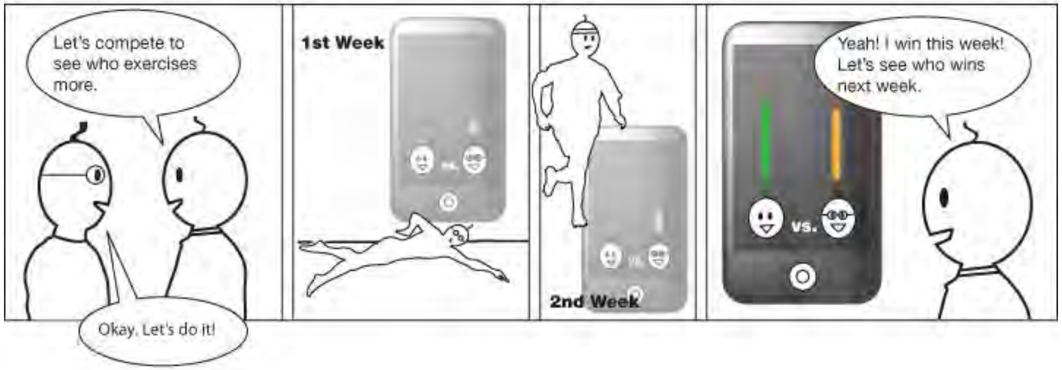
Cell phone is used to
keep track of one's fitness goal.

Storyboards for Comparing Ideas

Cooperative

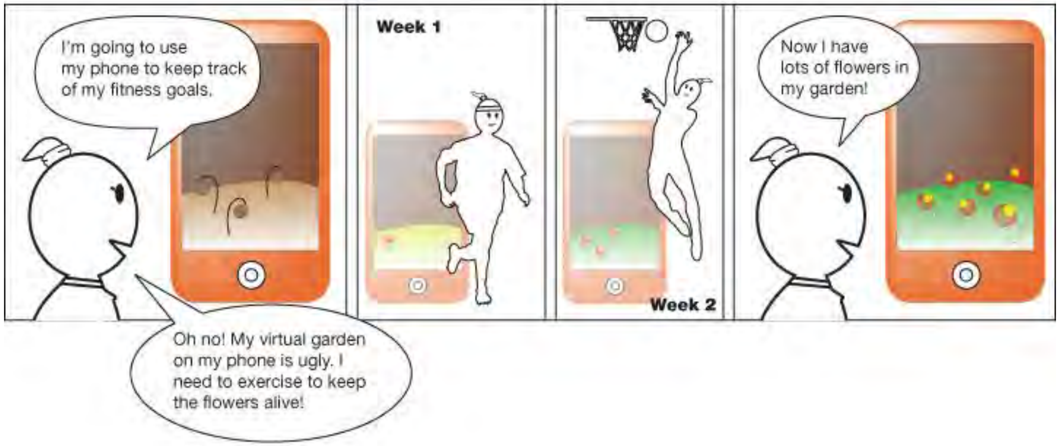


Competitive

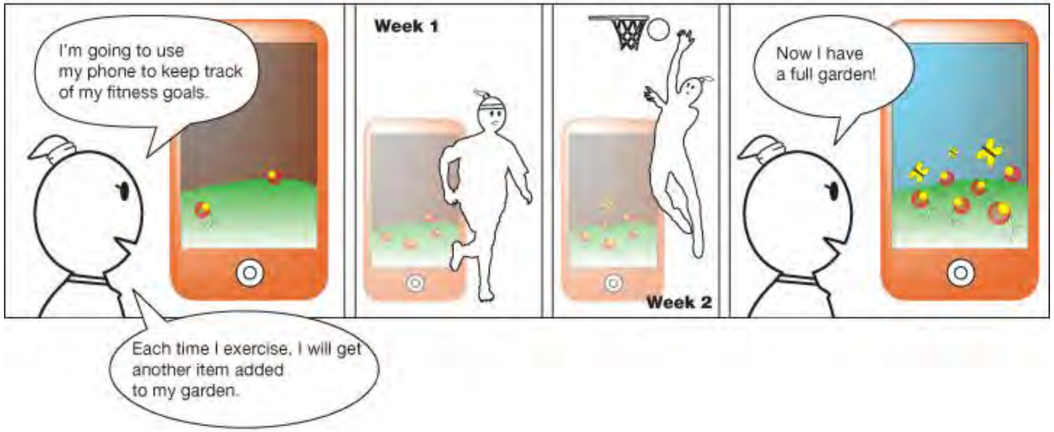


Storyboards for Comparing Ideas

Negative Reinforcement



Positive Reinforcement



Examples and Tricks in Storyboarding

Drawing is Hard

Will a picture work instead?

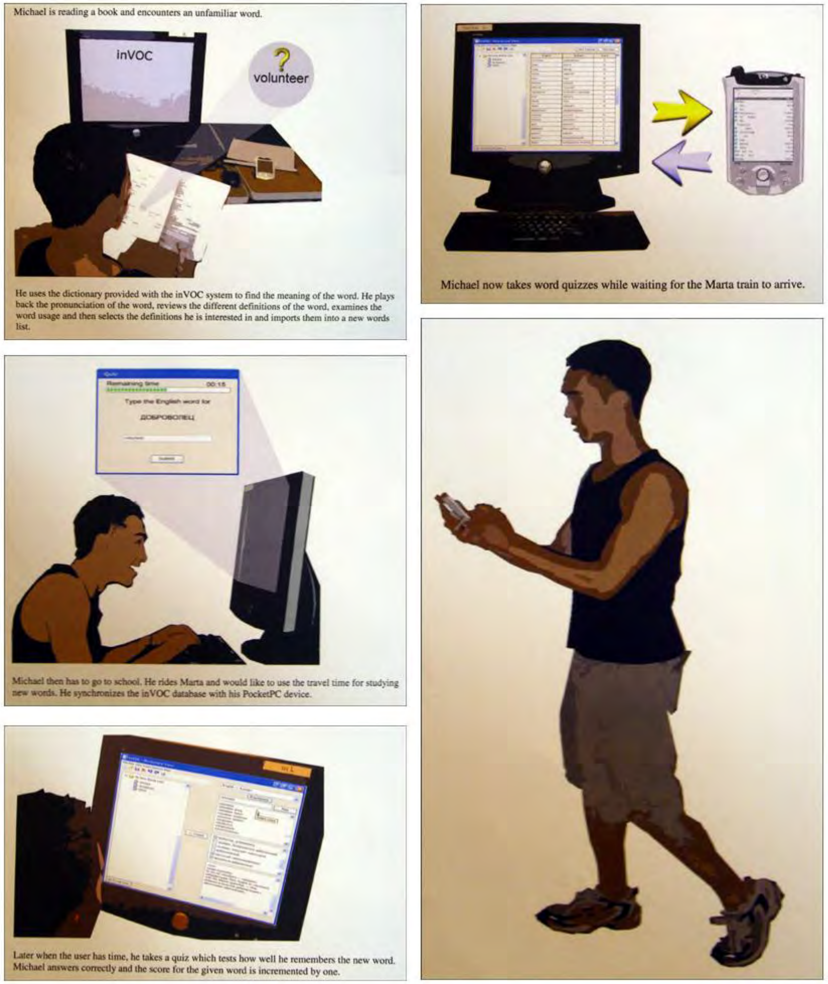
Existing Images from Other Sources

http://designcomics.org/

http://www.pdclipart.org/

Blur Out Unnecessary Detail

Using image editing software to simplify photos into sketches



Michael is reading a book and encounters an unfamiliar word.

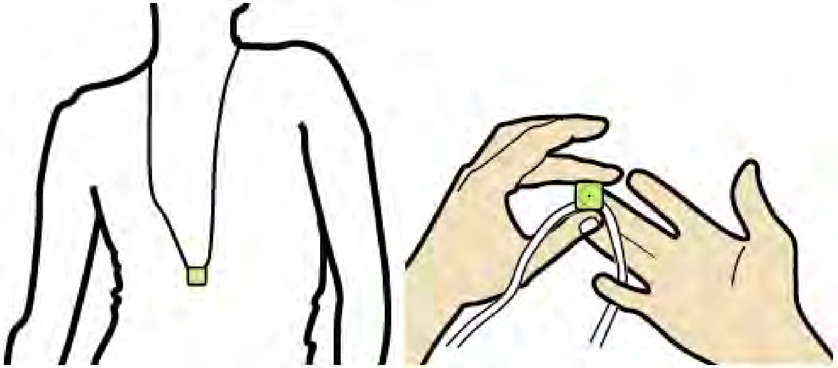
He uses the dictionary provided with the inVOC system to find the meaning of the word. He plays back the pronunciation of the word, reviews the different definitions of the word, examines the word usage and then selects the definitions he is interested in and imports them into a new words list.

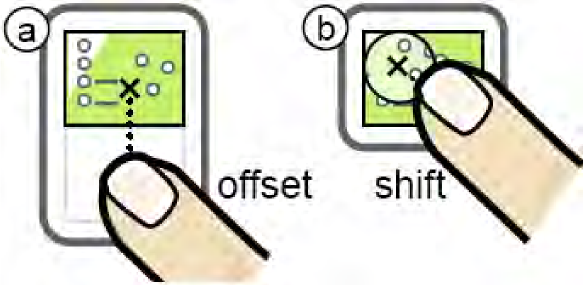
Michael then has to go to school. He rides Marta and would like to use the travel time for studying new words. He synchronizes the inVOC database with his PocketPC device.

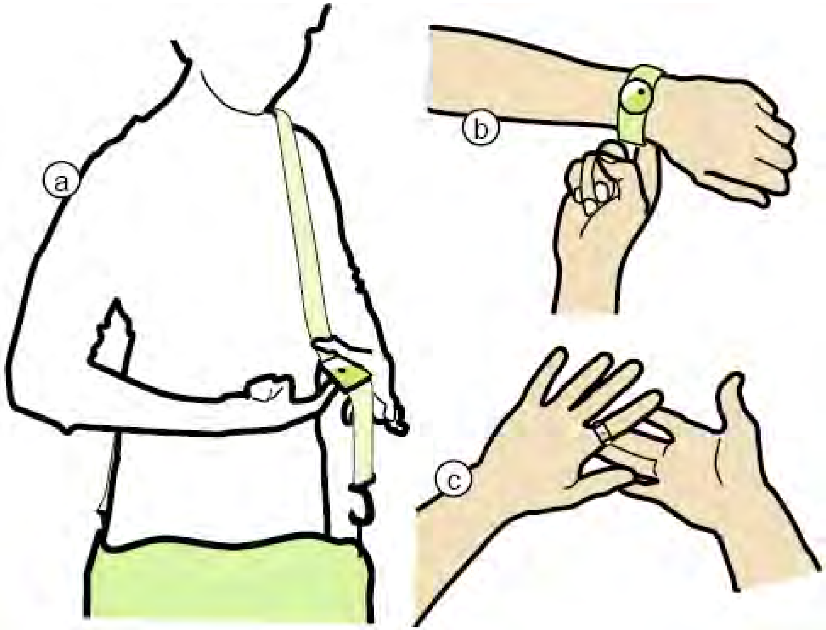
Later when the user has time, he takes a quiz which tests how well he remembers the new word. Michael answers correctly and the score for the given word is incremented by one.

Michael now takes word quizzes while waiting for the Marta train to arrive.

Tracing Photos

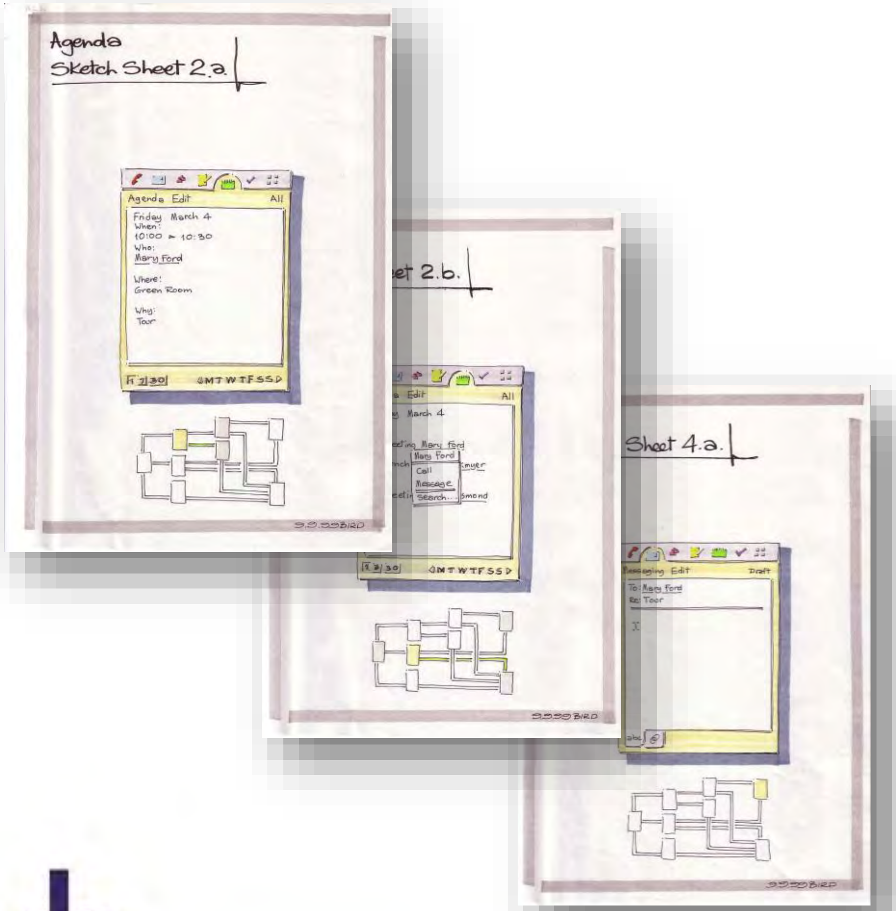


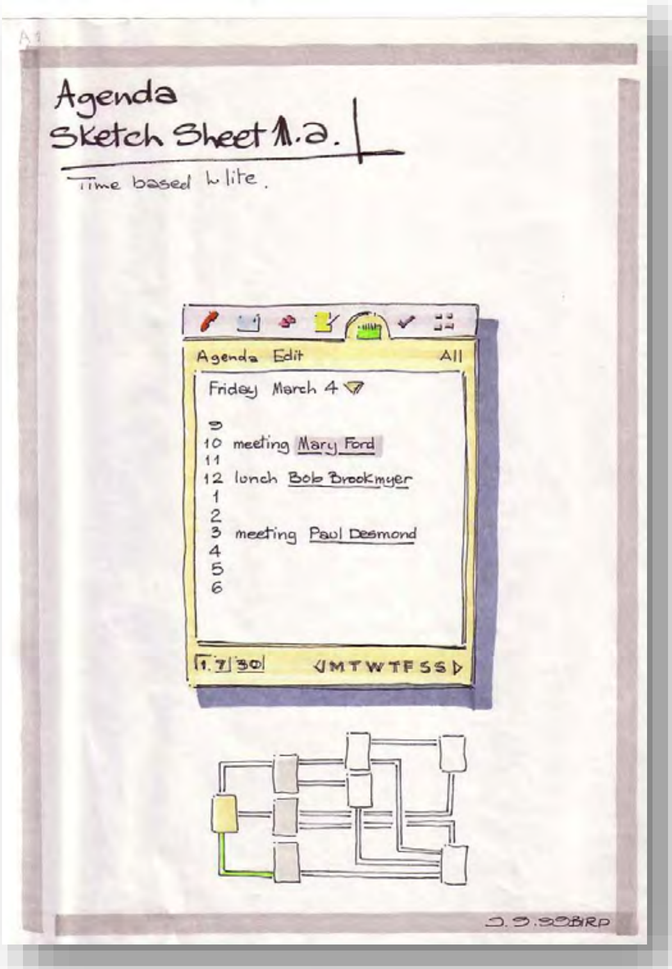




Baudisch and Chu, 2009

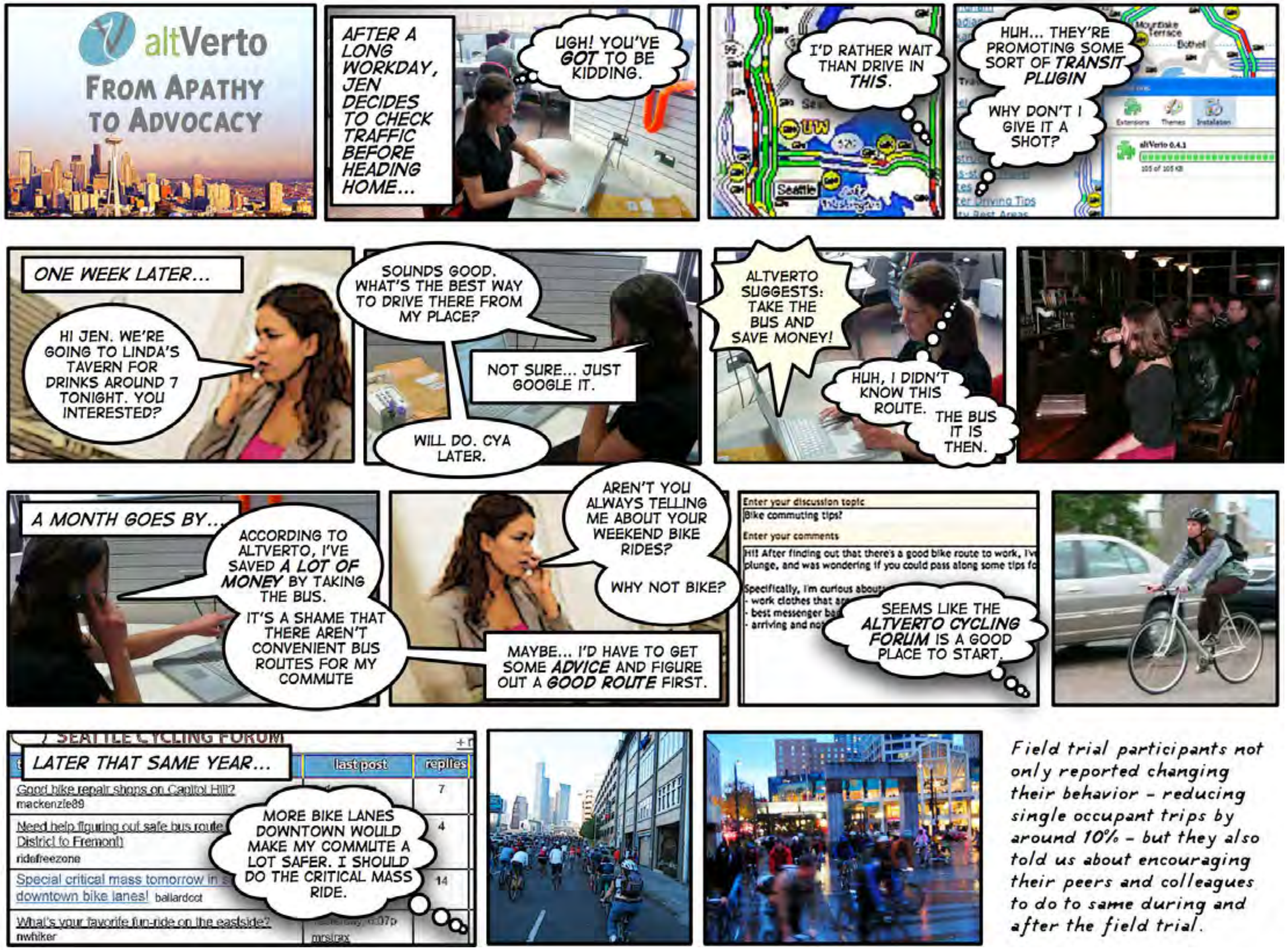
Mapping the Space of Interaction





Comic Presentation

Thought bubbles argue for the design



Field trial participants not only reported changing their behavior – reducing single occupant trips by around 10% – but they also told us about encouraging their peers and colleagues to do to same during and after the field trial.

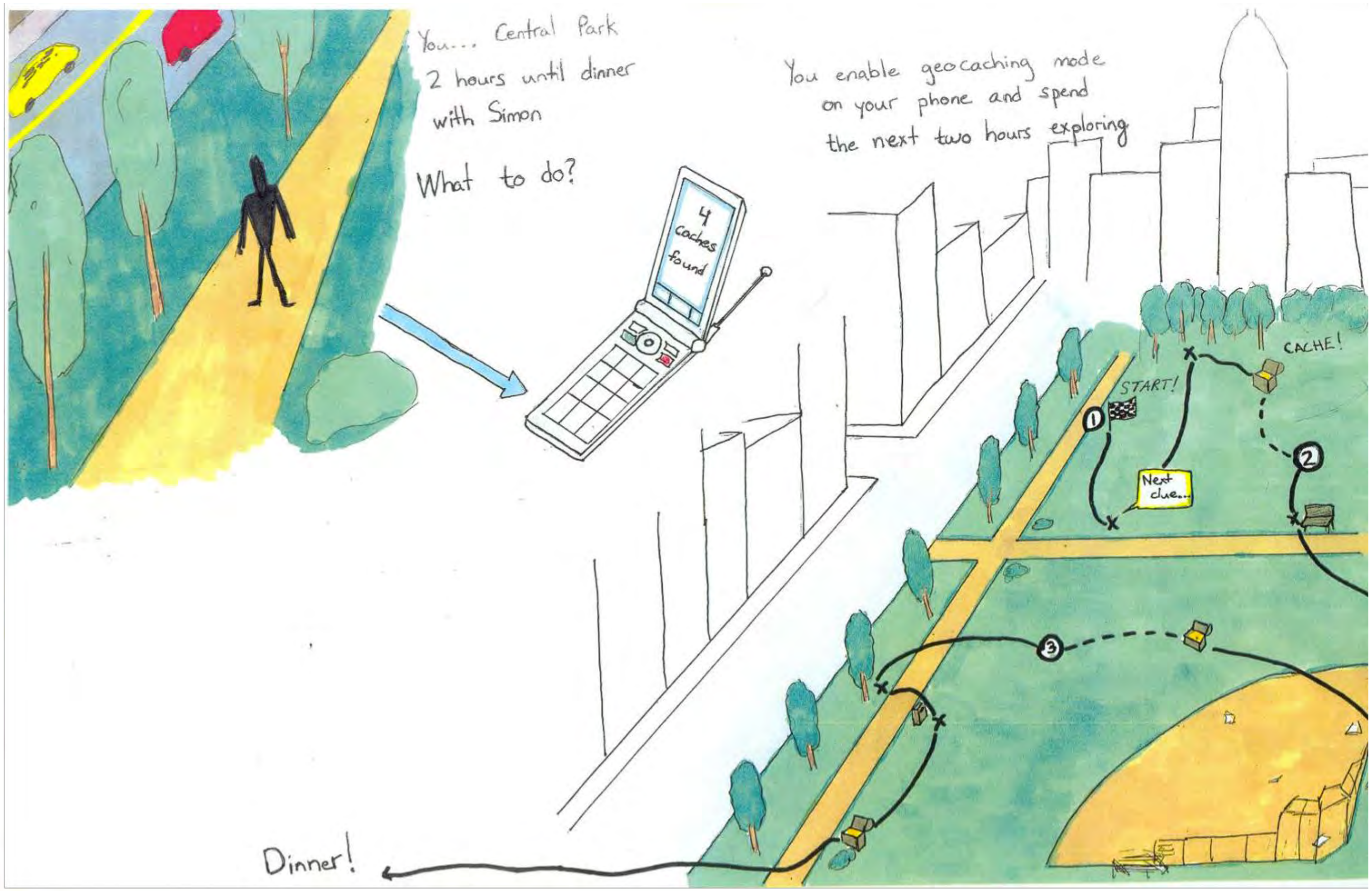
Gukeisen et al, 2007

University of Washington

Route Maps


THE FAMILY CIRCUS
By Bil Keane
WILL YOU GO GATHER SOME FIRE-WOOD, BILLY?
OKAY, MOMMY!
TAKES OFF IN A HURRY
PICKS SOME BLACKBERRIES FOR MOMMY
SURVEYS LANDSCAPE FROM "LOOKOUT TREE"
HEADS FOR "CLIMBING ROCKS"
SPIES RABBIT. GIVES CHASE.
RABBIT ESCAPES INTO HOLE
DISCOVERS SMALL CAVE.
MIGHT BE BEAR'S LAIR! DEPARTS!
HEARS WATER-FALL
COOLS OFF IN SPRAY
VENTURES INTO THICK GROVE OF TREES.
DEEPER INTO "BLACK FOREST"
HEARS DINOSAUR ROAR!
EXITS QUICKLY!
ESCAPES ACROSS OLD LOG.
RESTS ON LOG
EATS THE BLACK-BERRIES
SEES CAMPFIRE REMAINS (LEFT BY INDIANS?)
SUDDENLY REMEMBERS PURPOSE OF HIS MISSION!
SPOTS TURTLE ON ROCK BUT CAN'T REACH IT.
SKIPS FLAT STONE ACROSS WATER.
HURRIEDLY GRABS A FEW STICKS
IS THIS ENOUGH FIREWOOD, MOMMY?
8-2
Jeff and Bil Keane

Route Maps

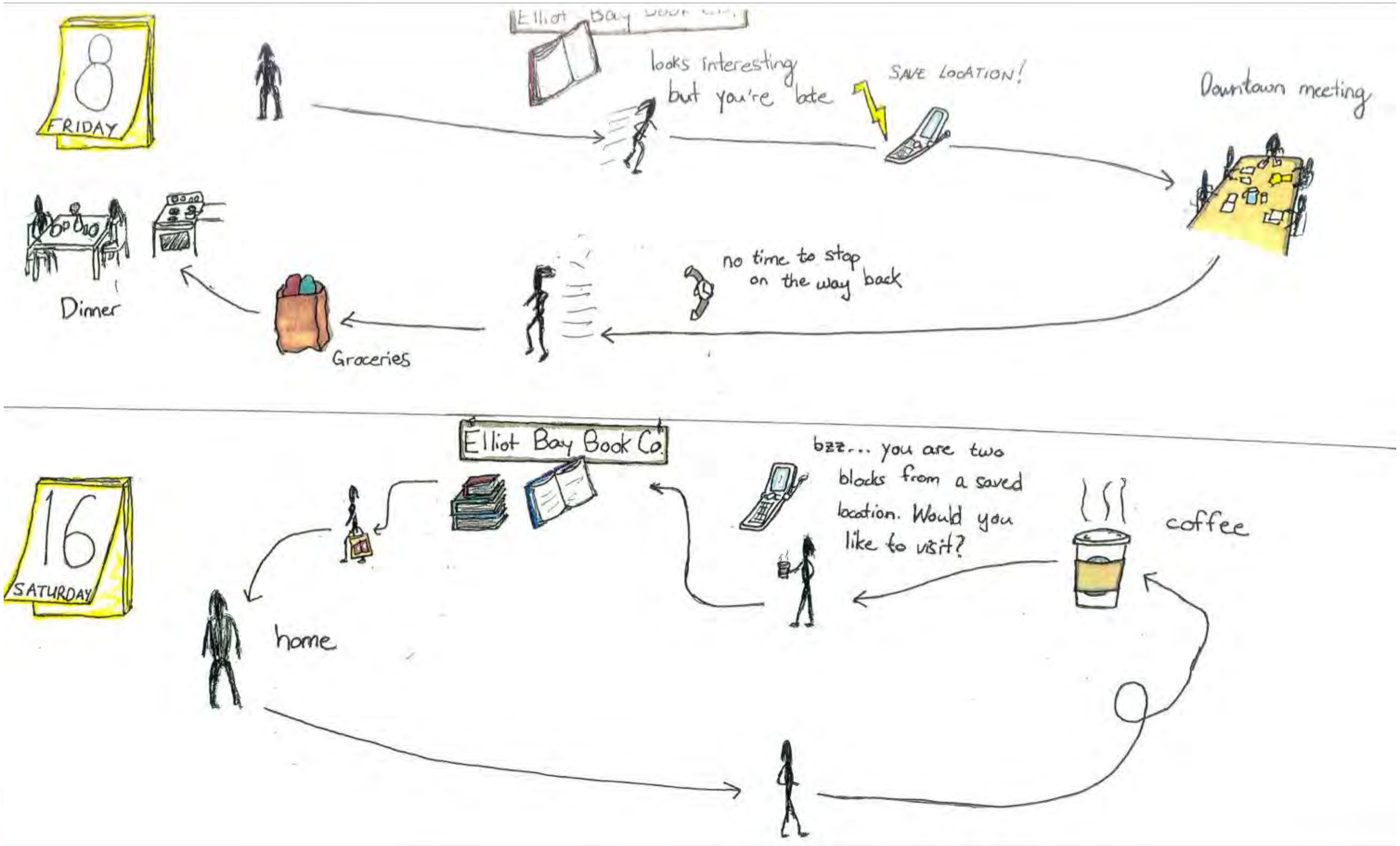


You... Central Park
2 hours until dinner
with Simon

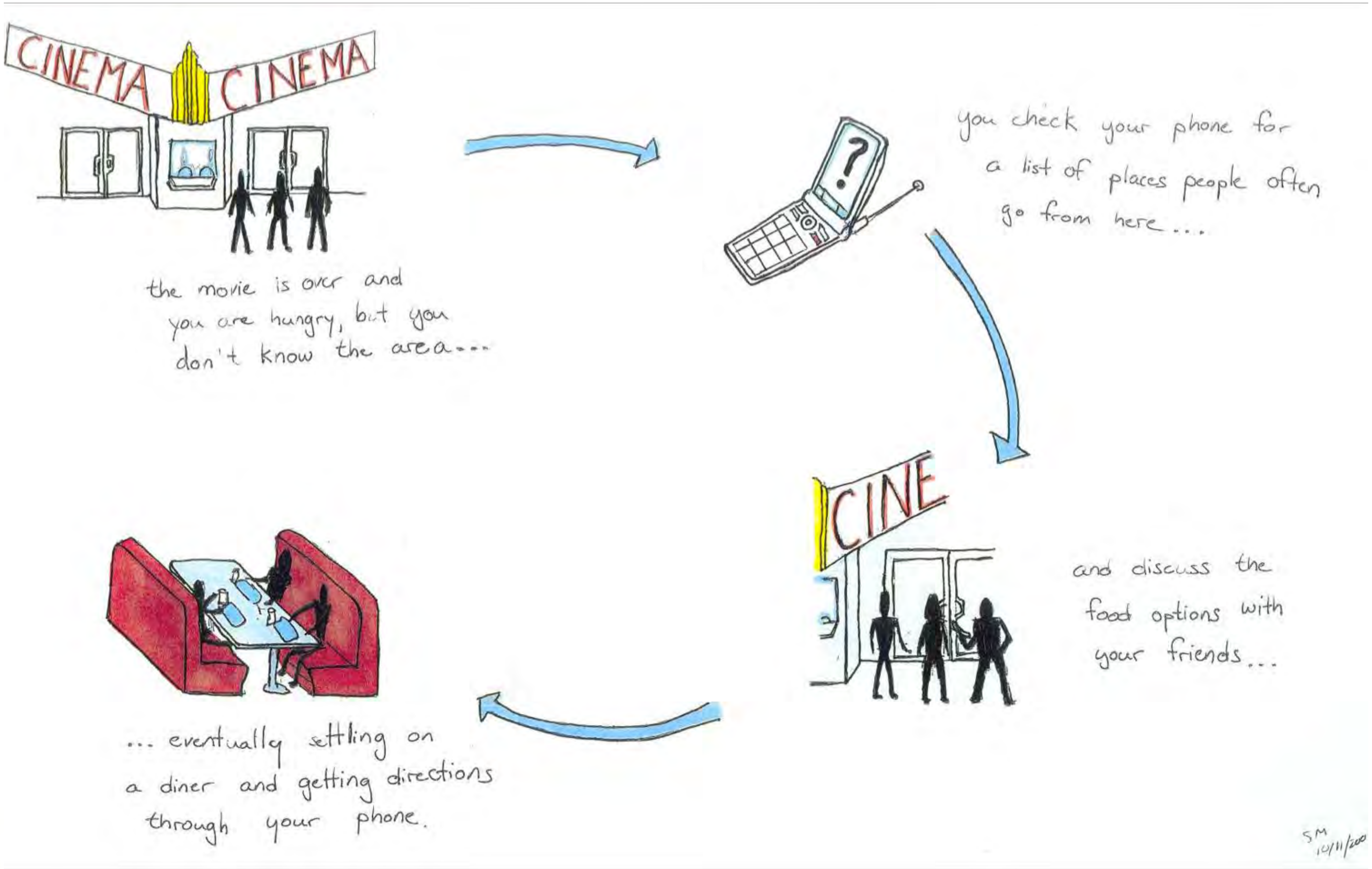
What to do?

You enable geocaching mode on your phone and spend the next two hours exploring

Route Maps


8
FRIDAY
Elliot Bay
looks interesting but you're late
SAVE LOCATION!
Downtown meeting
no time to stop on the way back
Dinner
Groceries
16
SATURDAY
Elliot Bay Book Co.
bzz... you are two blocks from a saved location. Would you like to visit?
coffee
home

Route Maps



the movie is over and you are hungry, but you don't know the area...

you check your phone for a list of places people often go from here...

and discuss the food options with your friends...

... eventually settling on a diner and getting directions through your phone.

SM 10/11/200

Value of Animation or Video

Can illustrate critical timing

Can be more engaging than written or storyboard

Can more easily convey emotion (e.g., voice, music)

Can show interactive elements more clearly

Can be self-explanatory

- If done well, can be an effective pitch

Most Important Trick: Stop Motion

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Mackay-StopAction.mp4

Mackay

Most Important Trick: Stop Motion

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Mackay-StopActionResult.mp4

Mackay

Video Prototypes

May build upon paper prototypes, existing software, and images of real settings

Narration optional

- Narrator explains, actors move or illustrate interaction
- Actors perform movements and viewer expected to understand without voice-over

Steps to Create a Video Prototype

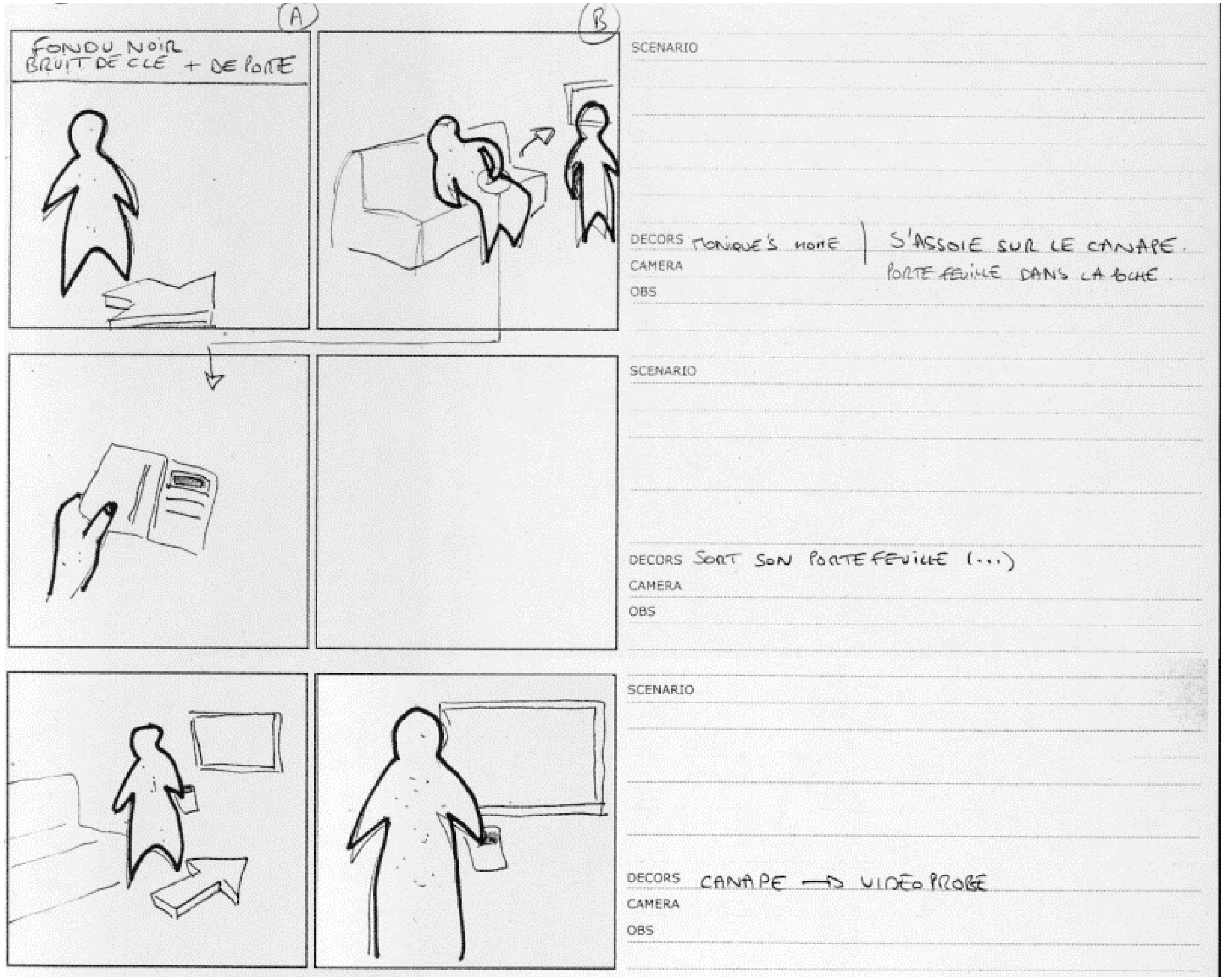
Review field data

Review ideas from brainstorm

Create text for usage scenarios

Develop storyboard, with each scene on a card, illustrating each action/event with annotations explaining what is happening

Steps to Create a Video Prototype



SCENARIO

DECORS MONIQUE'S HOME | S'ASSOIE SUR LE CANAPE.
CAMERA PORTE FEUILLE DANS LA POCHE.
OBS

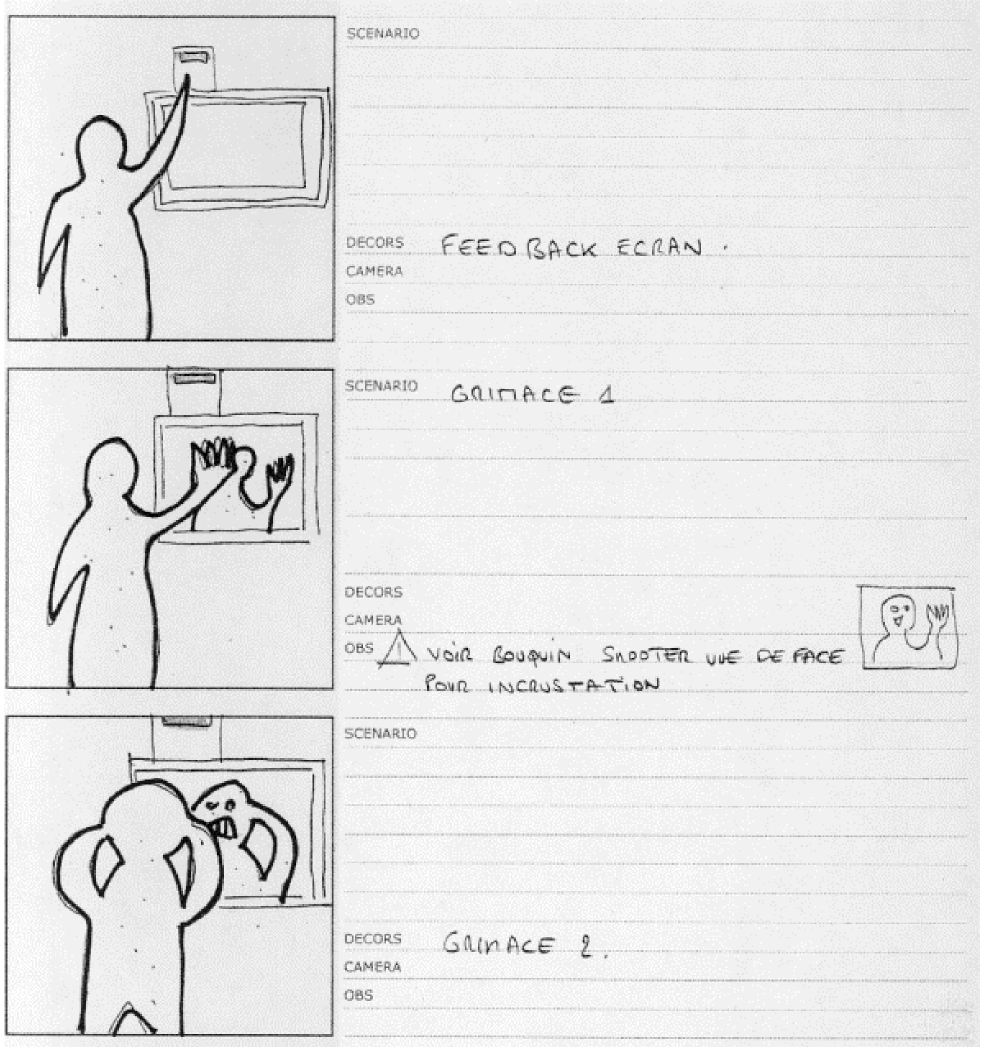
SCENARIO

DECORS SORT SON PORTEFEUILLE (...)
CAMERA
OBS

SCENARIO

DECORS CANAPE → VIDEO PROBE
CAMERA
OBS

Steps to Create a Video Prototype



SCENARIO

DECORS FEEDBACK ECRAN.

CAMERA

OBS

SCENARIO GRIMACE 1

DECORS

CAMERA

OBS ⚠ VOIR BOUQUIN SHOOTER VUE DE FACE POUR INCRUSTATION

SCENARIO

DECORS GRIMACE 2.

CAMERA

OBS

Steps to Create a Video Prototype

Shoot a video clip for each storyboard card

- Avoid editing in the camera, just shoot your scenes

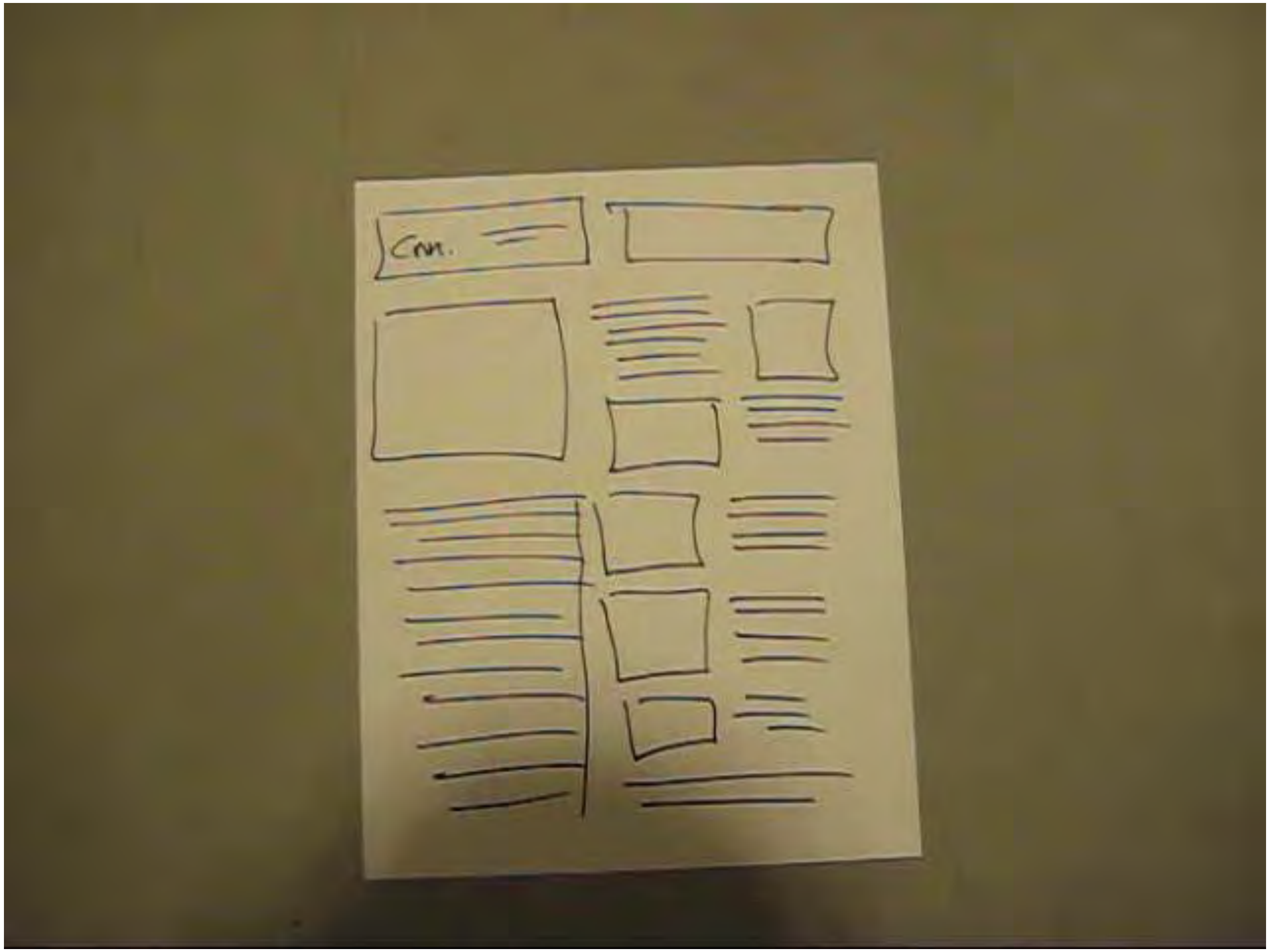
Use titles to separate clips

- Like a silent movie

Digital changes these tradeoffs a little, but respect the spirit of doing this quickly to get point across

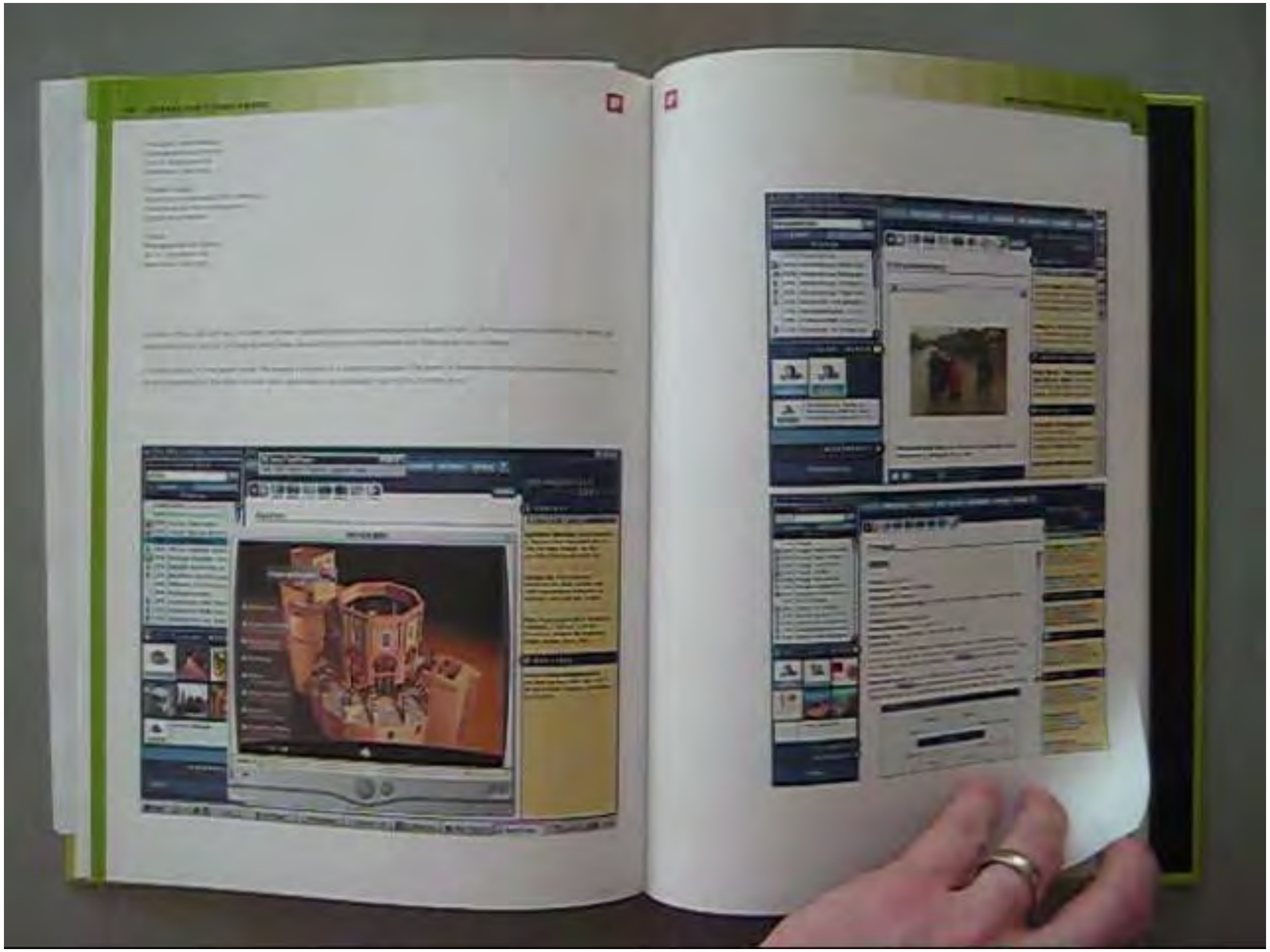
- If you make an error, just reshoot it

Prototyping Microsoft Surface



http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Surface-Document-Interaction.mp4

Prototyping Microsoft Surface



http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Surface-Context-Lens.mp4

Lessons from Prior Video Prototypes

Narration, Pace, and Flair

Three versions of "Don't Forget"

Using Projectors and Simple Props

"Buddy Map"

Watch for Pace and Scene Relevance

"Consumester"

Narration, Pace, and Flair

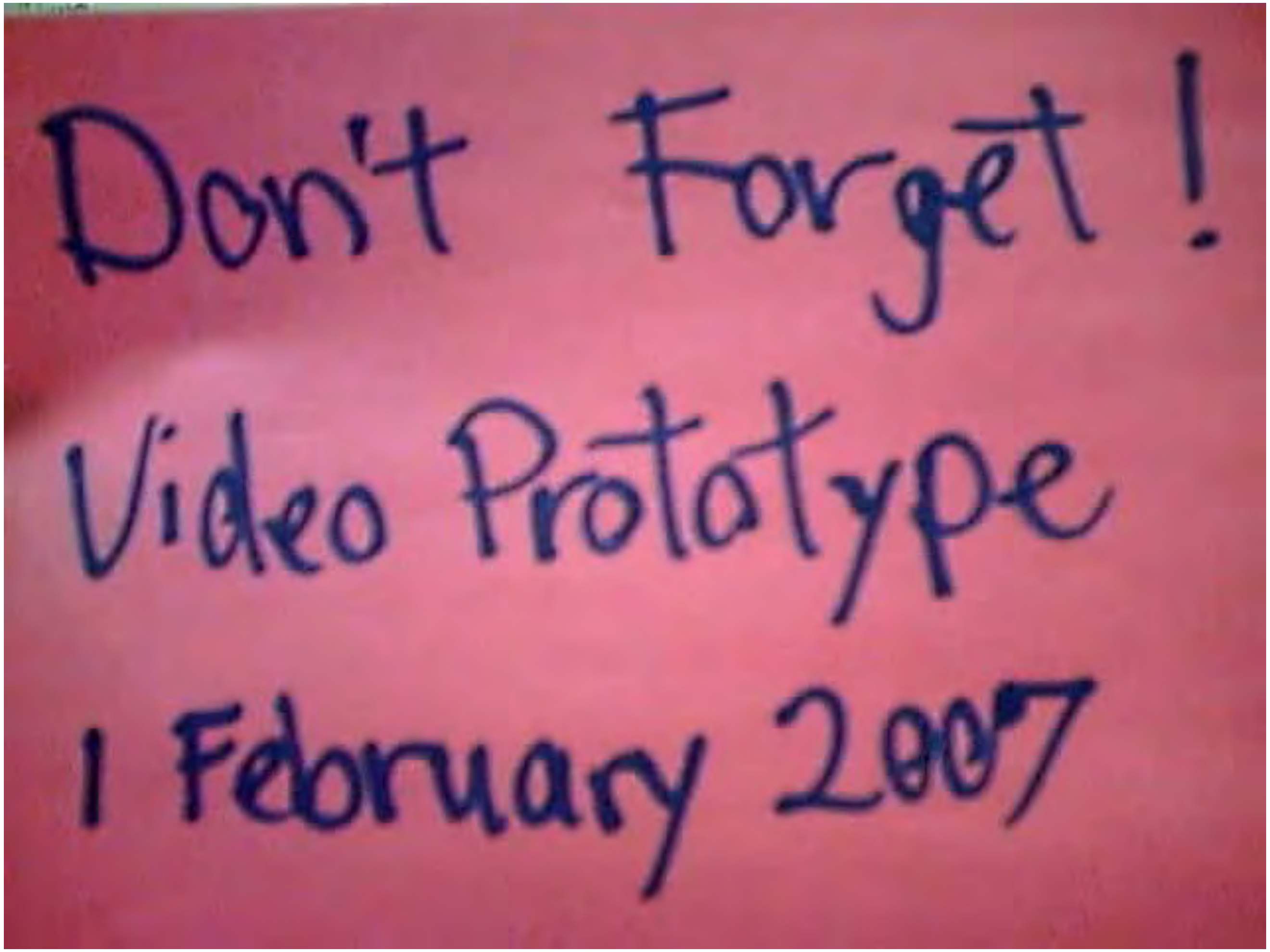
Don't Forget

by Carolyn Holmes and Fred Potter

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Don't-Forget-1.mp4

Don’t Forget Version 1

Narration, Pace, and Flair



http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Don't-Forget-2.mp4

Don't Forget Version 2

Narration, Pace, and Flair

"Don't Forget" Video Prototype

Chris Govella - Peter Woodman

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Don't-Forget-3.mp4

Don't Forget Version 3

Using Projectors and Simple Props

Team Buddy Map

Backcountry Savior

Craig Panthen : Philip Kuo : Heidi Tanamulia : Christopher White
CSE 440F : Professor Landay

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Buddy-Map-Backcountry.mp4

dub
University of Washington

Buddy Map

Watch for Pace and Scene Relevance

Consumester

Video Prototype

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Consumester.mp4

Consumester

Lessons from Prior Video Prototypes

Split Presentation, Simple Effects

“PickUp”

Still-Frame, More Effects

“Graffiti Karma”

Split Presentation, Simple Effects

Daniel Swisher
Ian Crofoot

Mitchell Ishimitsu
Sunil Garg

CSE 440 Video Prototype

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Pickup.mp4

Pickup

Still-Frame, More Effects

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Graffiti.mp4

Graffiti Karma

Lessons from Prior Video Prototypes

Scenario with a Contrast

“ParkSmart” (note that screens are static images)

Playful while Keeping Pace

“Plantr”

Scenario with a Contrast

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Parksmart.mp4

But watch for pace and scene relevance

ParkSmart

Playful while Keeping Pace

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Plantr.mp4

Plantr

Range of Purposes

- Illustrating Low-Level Techniques
  - Microsoft Surface examples convey timing
- Illustrate Designs
  - Focus in this course
- High-Level Visions
  - StarFire, Knowledge Navigator, A Day Made of Glass

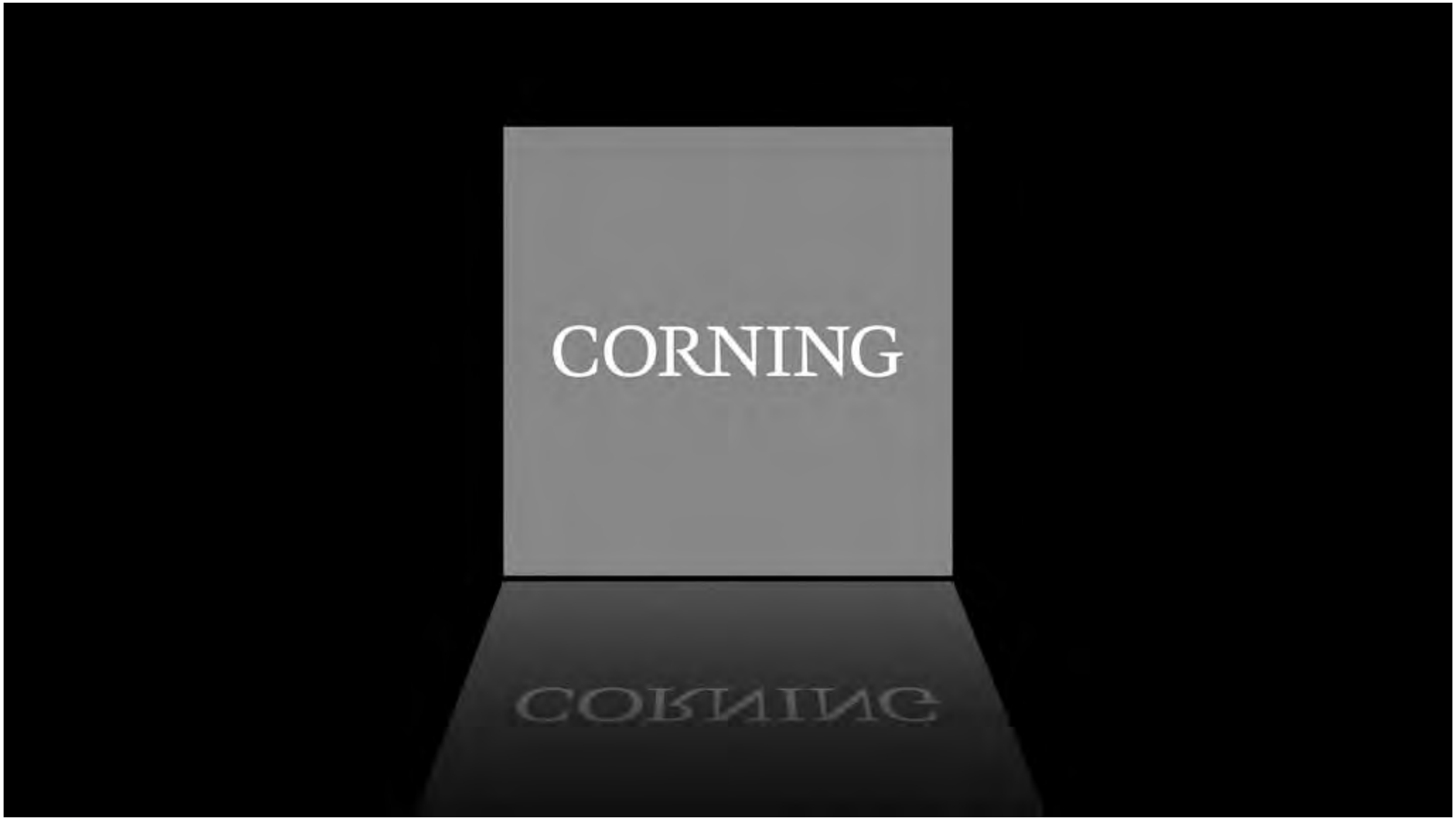
Sun's "Starfire" (1994)

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Vision-Sun-Starfire.mp4

Apple's "Knowledge Navigator" (1987)

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Vision-Apple-Knowledge-Navigator.mp4

Corning's "A Day Made of Glass" (2011)



http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Vision-Corning-A-Day-Made-Of-Glass.mp4

LuciaMug Sketch: A Contrast

The Mug Metaphor Interface

Lucia Terrenghi

FLUIDUM

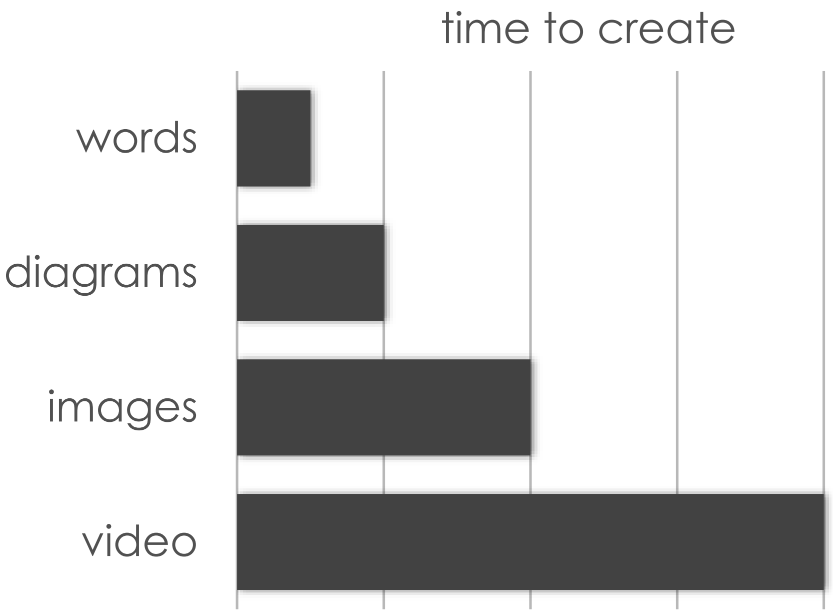
The Mug Metaphor Interface

Lucia Terrenghi

FLUIDUM

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Mug-Sketch.mp4
http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Mug-HiFi.mp4

Fidelity Takes Times: Stay Low Fidelity



If you need a video, do you really need footage?

If you need an animation, do you really need Flash?

If you need a photo, do you really need to shoot?

Summary

Think about your audience

Think about your time constraints

Think about how much you want to tell

Think about options for presenting your story

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 08:
Storyboarding

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

design:
use:
build:

University of Washington

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 09:
History

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

dub design: use: build:

University of Washington

Today

Milestones

- Design Review ("1x2") Due Tonight
- Getting the Right Design Due Tuesday
- Presentations Start Thursday

Class

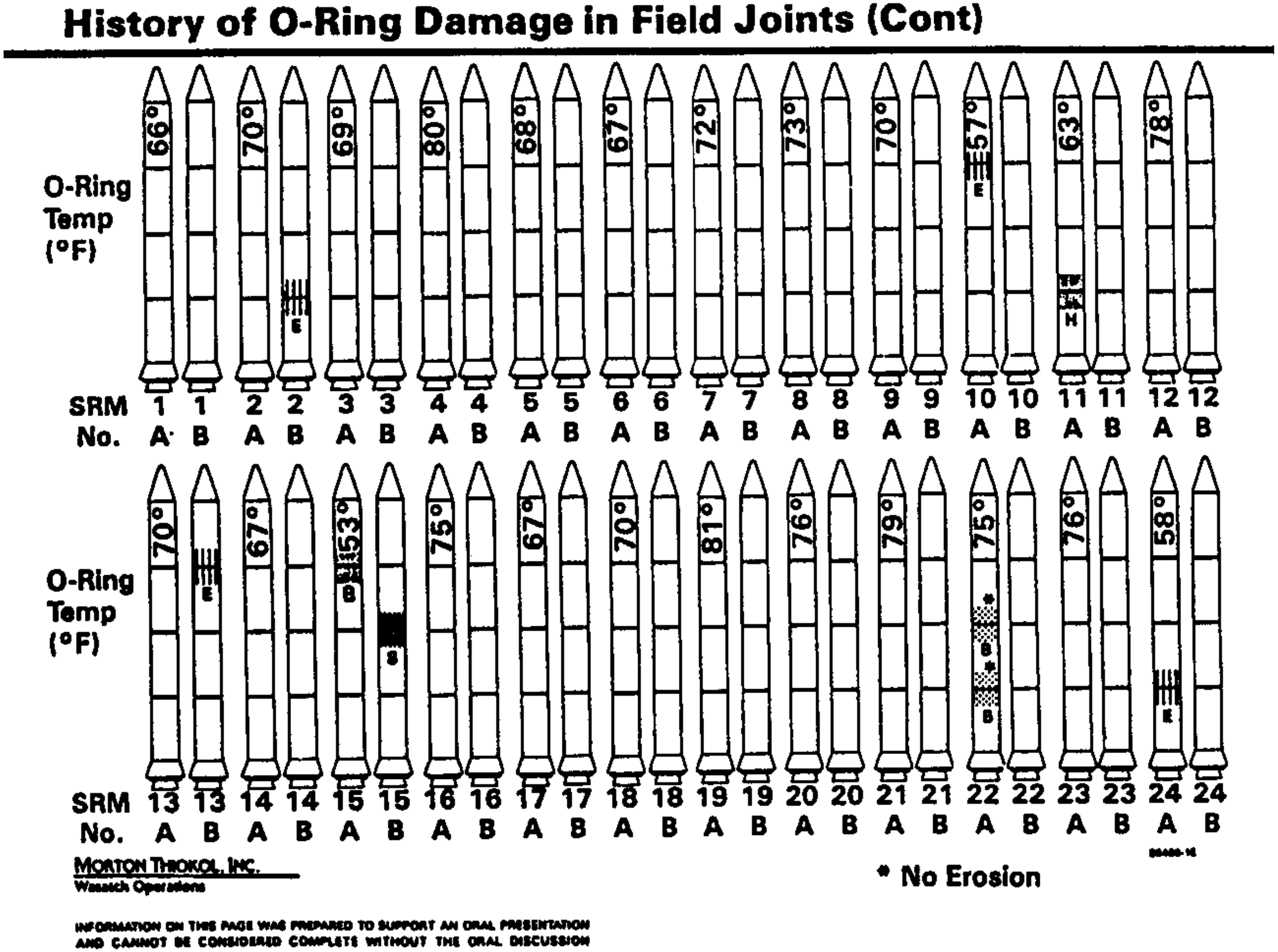
- HCI History
- Design Feedback

Why do we do HCI in CSE?

Every engineering discipline includes the study of breakdowns and the design of improved solutions that address those breakdowns

Tacoma Narrows

O-Rings



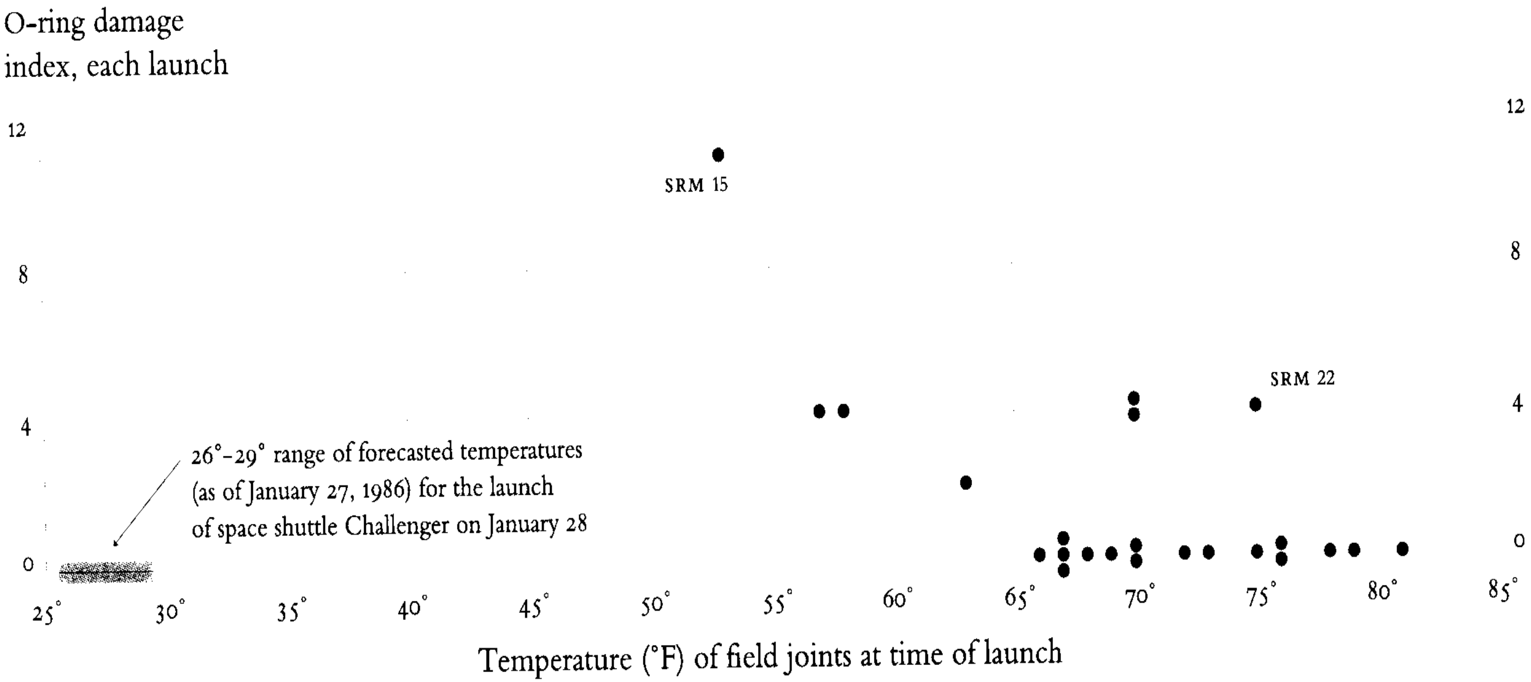
History of O-Ring Damage in Field Joints (Cont)

* No Erosion

MORTON THIOKOL, INC.
Wasatch Operations

INFORMATION ON THIS PAGE WAS PREPARED TO SUPPORT AN ORAL PRESENTATION AND CANNOT BE CONSIDERED COMPLETE WITHOUT THE ORAL DISCUSSION

O-Rings



University of Washington

Tractors

•Slide Saul Greenberg

Tractors

Tractors

National Agricultural Safety Database Quotes

Older tractors with narrow front ends are easily upset

Tractor upsets cause more fatalities than other farm accidents

Injuries often include a broken or crushed pelvis

•Slide Saul Greenberg

Tractors

Tractor upsets used to be dismissed as driver error

But such accidents are less frequent because modern designs have:

- roll cage
- low center of gravity
- wider wheel bases

Human Factors Tradition

Emerges during and after WWII, as highly trained people are failing to effectively control the machinery they operate

(pilots are crashing planes)

The phrase “human factors” now often has a connotation of studying factory workers, ergonomics, or other physical tasks

(ask me about Grudin article if you’re interested)

1988: Iran Air Flight 655

In 1987, *USS Stark* was struck by two missiles launched by an Iraqi Mirage F-1, killing 37 with no weapons fired in self-defense during the attack.

In 1988, the crew of the *USS Vincennes* Combat Information Center confusingly reported the plane as ascending and descending at the same time (there were two "camps").

1988: Iran Air Flight 655

The Airbus's original track, number 4474, had been replaced by the *Sides* track, number 4131, when the computer briefly recognized them as one and the same. Shortly thereafter, track 4474 was re-assigned by the system to an American A-6, several hundred miles away, following a descending course at the time. Apparently not all the crew in the CIC realized the track number had been switched on them.

Why do we do HCI in CSE?

Every engineering discipline includes the study of breakdowns and the design of improved solutions that address those breakdowns

Understanding how and why human interaction breaks down is fundamental to designing better computing systems

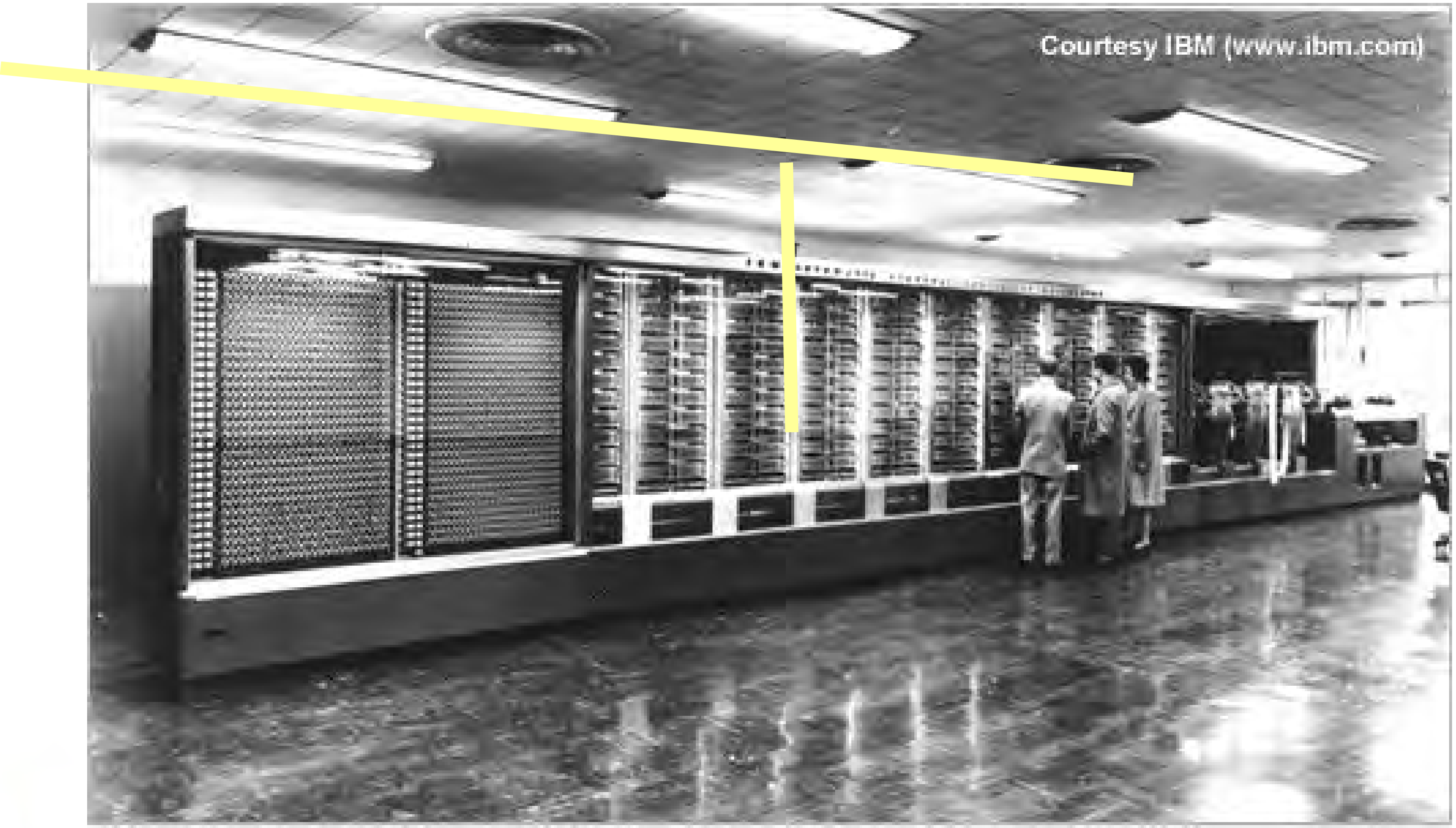
This study must include computer scientists, as we are the ones creating the technology

A History Question

Who invented hypertext? When?

Computing in 1945

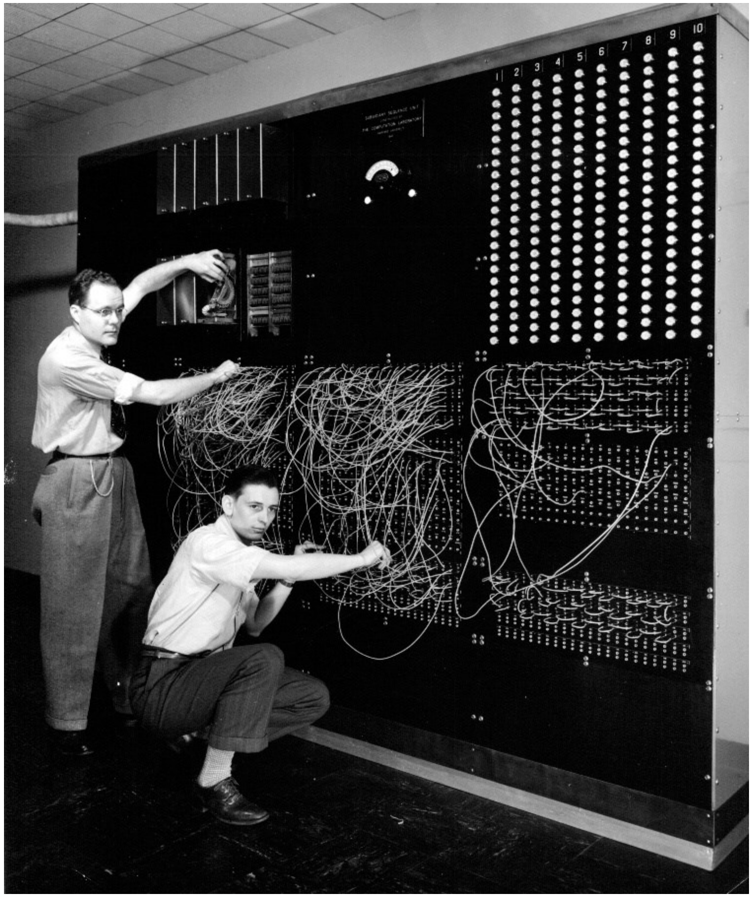
Harvard Mark I, 55 feet long, 8 feet high, 5 tons


Courtesy IBM (www.ibm.com)

The Harvard Mark I

Computing in 1945

Harvard Mark I, 55 feet long, 8 feet high, 5 tons



Computing in 1945

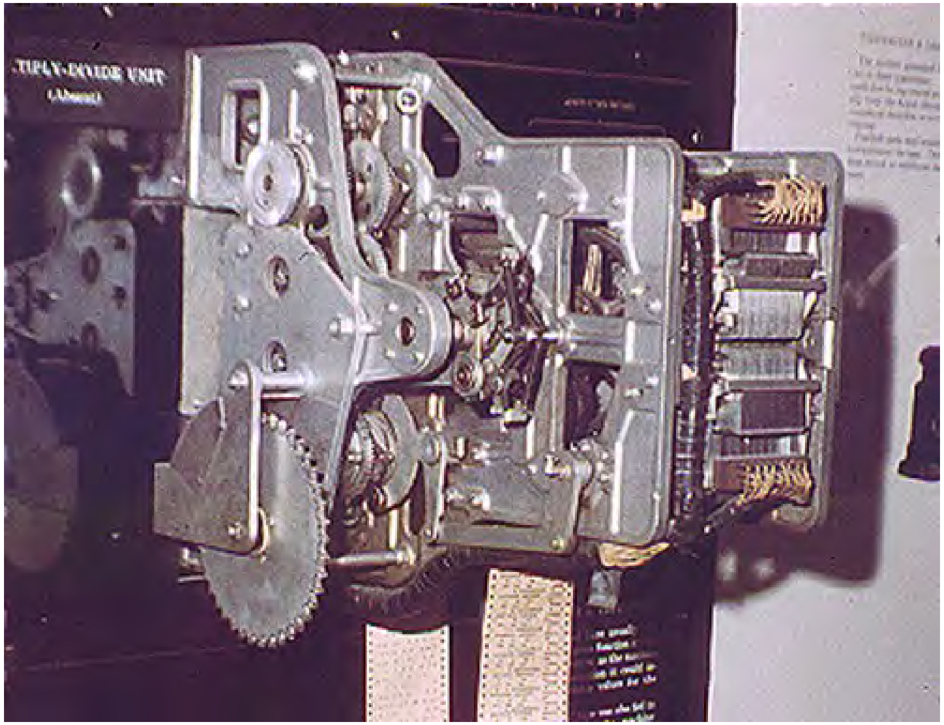
Ballistics calculations

Physical switches
(no microprocessor)

Paper tape

Simple arithmetic
& fixed calculations
(before programs)

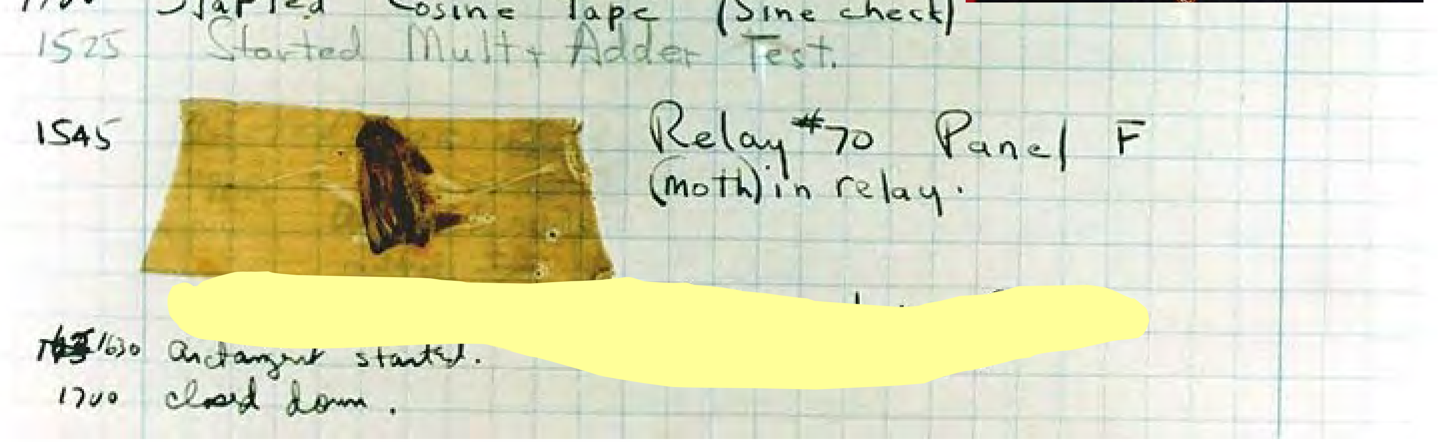
3 sec. to multiply



Computing in 1945

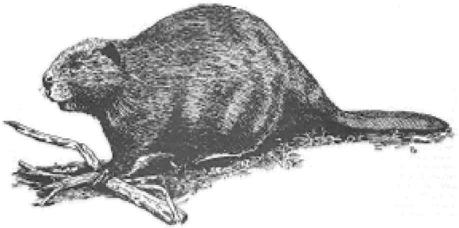
First computer bug
(Harvard Mark II)

Adm. Grace Murray Hopper



1100 Started Cosine Tape (Sine check)
1525 Started Mult + Adder Test.
1545 Relay #70 Panel F
(moth) in relay.
[redacted]
1630 Arctangent started.
1700 closed down.

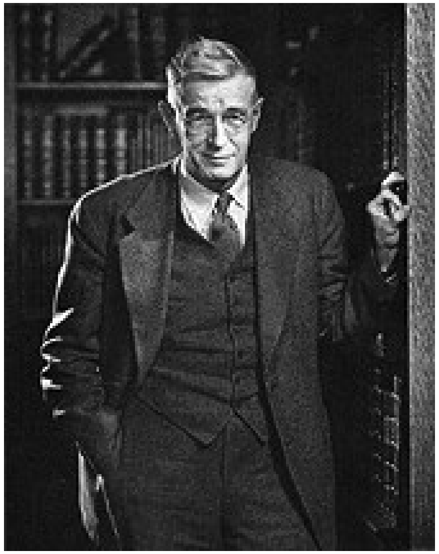
A Little About Vannevar Bush



Name rhymes with “Beaver”

Faculty member at MIT

Coordinated WWII effort
with 6000 US scientists



Social contract for science

- Federal government funds universities
- Universities do basic research
- Research helps economy and defense

As We May Think

Published in the Atlantic Monthly in 1945

http://www.theatlantic.com/magazine/print/1945/07/as-we-may-think/3881/

Motivated in part by defining a scientific grand challenge as WWII was ending

As We May Think

“There is a growing mountain of research. … The investigator is staggered by the findings and conclusions of thousands of other workers—conclusions which he cannot find time to grasp, much less to remember, as they appear. Yet specialization becomes increasingly necessary for progress, and the effort to bridge between disciplines is correspondingly superficial.”

As We May Think

“The world has arrived at an age of cheap complex devices of great reliability; and something is bound to come of it.”

“Had a Pharaoh been given detailed and explicit designs of an automobile, and had he understood them completely, it would have taxed the resources of his kingdom to have fashioned the thousands of parts for a single car, and that car would have broken down on the first trip to Giza.”

MicroPhotography

Describes a combination of photocells, facsimile transmission, and electron beam technology

Enables capturing a photograph into micro form

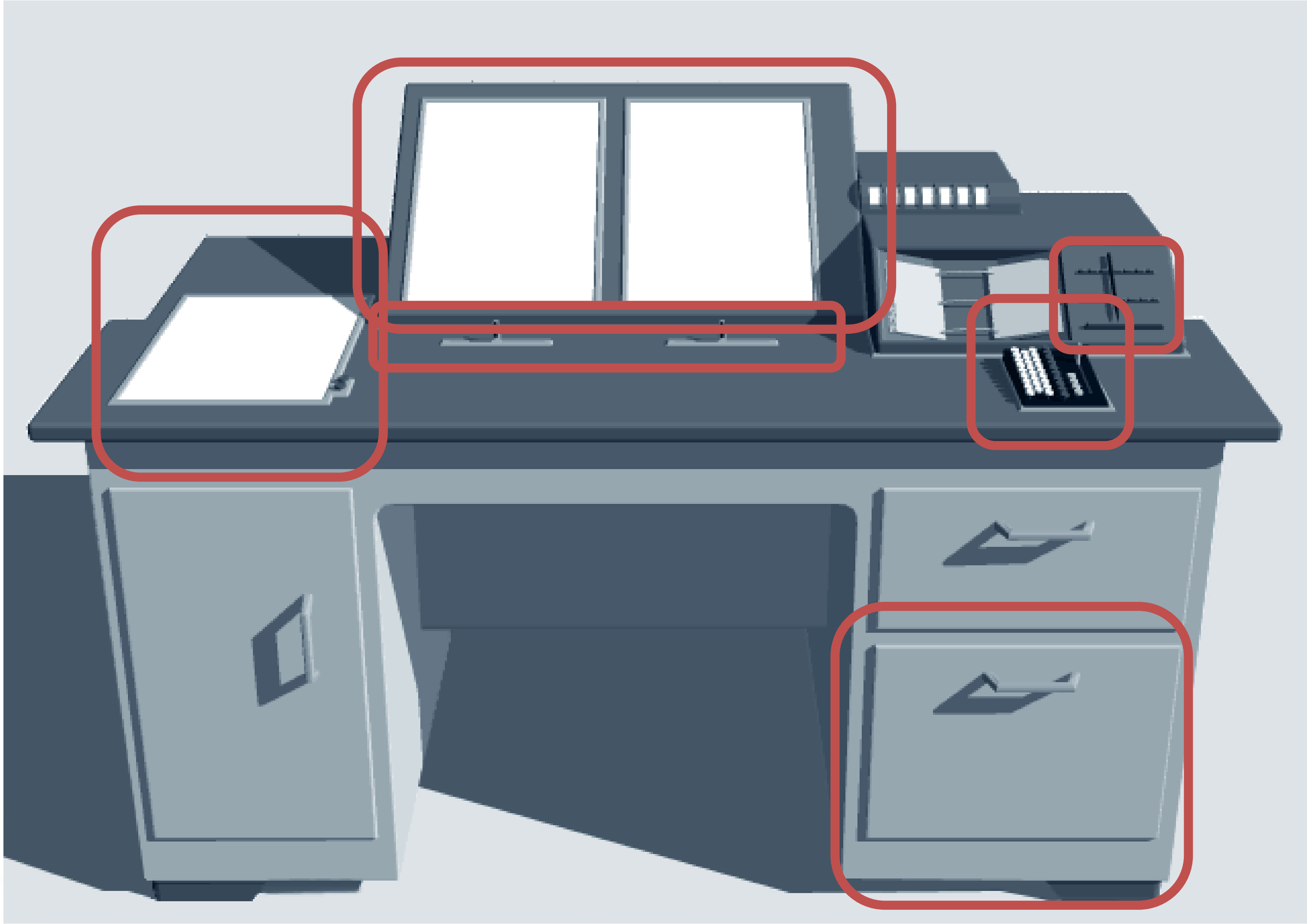
“It would be a brave man who would predict that such a process will always remain clumsy, slow, and faulty in detail.”

MicroPhotography

“Assume a linear ratio of 100 for future use. Consider film of the same thickness as paper, although thinner film will certainly be usable. Even under these conditions there would be a total factor of 10,000 between the bulk of the ordinary record on books, and its microfilm replica. The Encyclopedia Britannica could be reduced to the volume of a matchbox. A library of a million volumes could be compressed into one end of a desk.”


FREE
ENCYCLOPEDIA
CD
ROM
plus 100
FREE
HOURS
See Back for Details.
AMERICA Online
GROLIER
Multimedia Encyclopedia
SPECIAL EDITION
Complete from A to Z
#1 in Schools
GOOD CALCIUM
KRAFT
Singles
MADE FROM WHOLESOME MILK
AMERICAN
24 SLICES

Memex



Memex

“If the user wishes to consult a certain book, he taps its code on the keyboard…”

“Frequently-used codes are mnemonic, so that he seldom consults his code book;”

“He can add marginal notes and comments … even … by a stylus scheme”

“All this is conventional…”

Memex

“It affords an immediate step, however,
to associative indexing”

“tying two items together is the important thing”

“Before him are the two items to be joined, projected onto adjacent viewing positions. At the bottom of each there are a number of blank code spaces, and a pointer is set to indicate one of these on each item. The user taps a single key, and the items are permanently joined.”

Memex

"Thereafter, at any time, when one of these items is in view, the other can be instantly recalled merely by tapping a button below the corresponding code space. Moreover, when numerous items have been thus joined together to form a trail, they can be reviewed in turn, rapidly or slowly, by deflecting a lever like that used for turning the pages of a book."

Memex

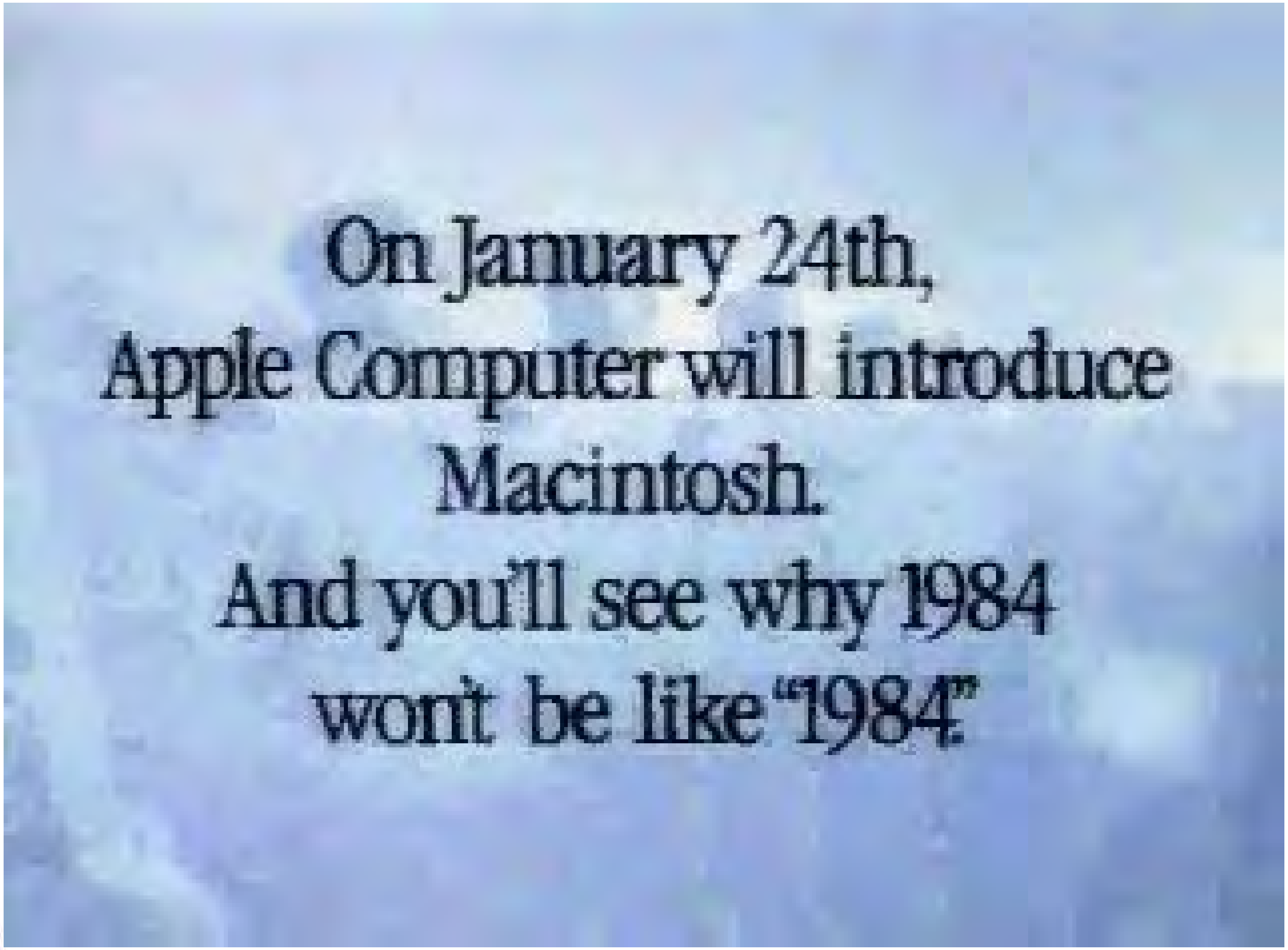
“Wholly new forms of encyclopedias will appear, ready made with a mesh of associative trails running through them, ready to be dropped into the memex and there amplified.”

Memex is the first proposed hypertext system

A History Question

Who invented desktop computing? When?

Macintosh in 1984 is well known



On January 24th,
Apple Computer will introduce
Macintosh.
And you'll see why 1984
won't be like “1984.”

http://courses.cs.washington.edu/courses/cse440/videos/history/Apple1984.mp4

Alan Kay on Early Interface Work

Narrator is Alan Kay, speaking in 1987

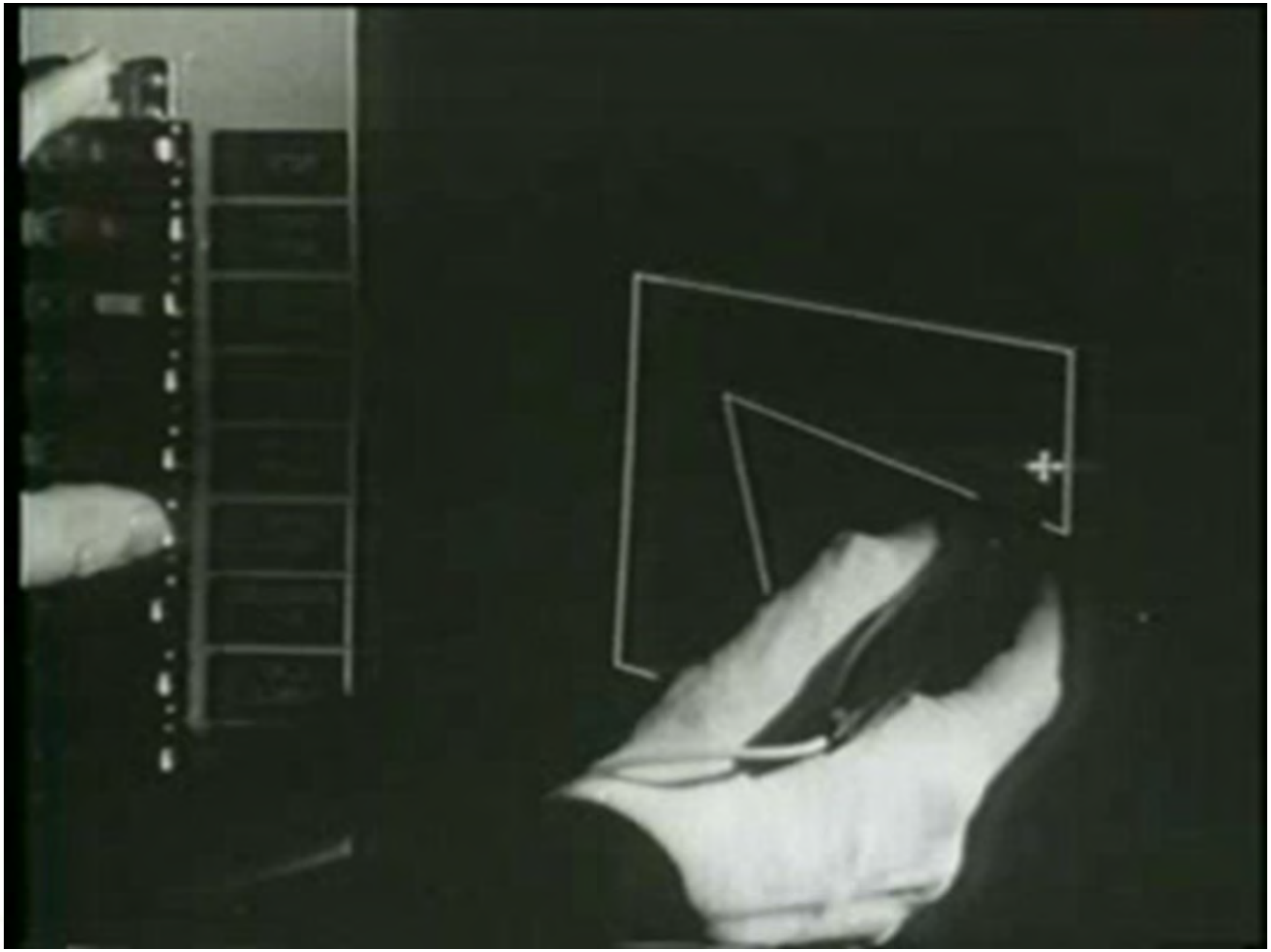
- This video is almost 20 years old
- It was a historical account when it was filmed

Speaks to four sytems

- Sketchpad
- NLS
- GRAIL
- Dynabook

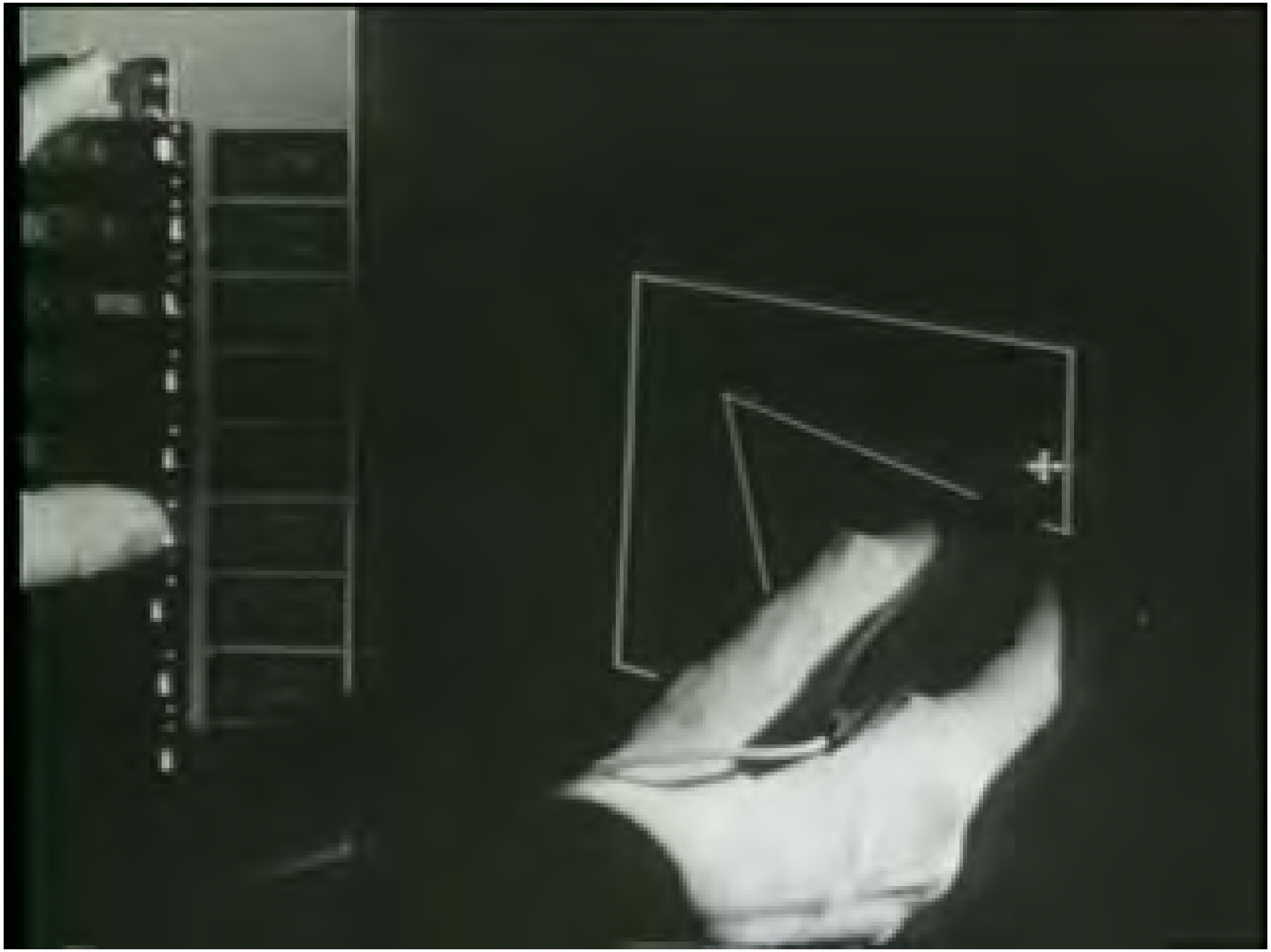
http://courses.cs.washington.edu/courses/cse440/videos/history/AlanKay1987.m4v

Ivan Sutherland's Sketchpad



http://courses.cs.washington.edu/courses/cse440/videos/history/AlanKay1987-Sketchpad.m4v

Ivan Sutherland’s Sketchpad



http://courses.cs.washington.edu/courses/cse440/videos/history/AlanKay1987-Sketchpad.m4v

Ivan Sutherland’s Sketchpad

When do we think this was done?

Ivan Sutherland's Sketchpad

When do we think this was done?

Ivan Sutherland's Sketchpad

When do we think this was done?

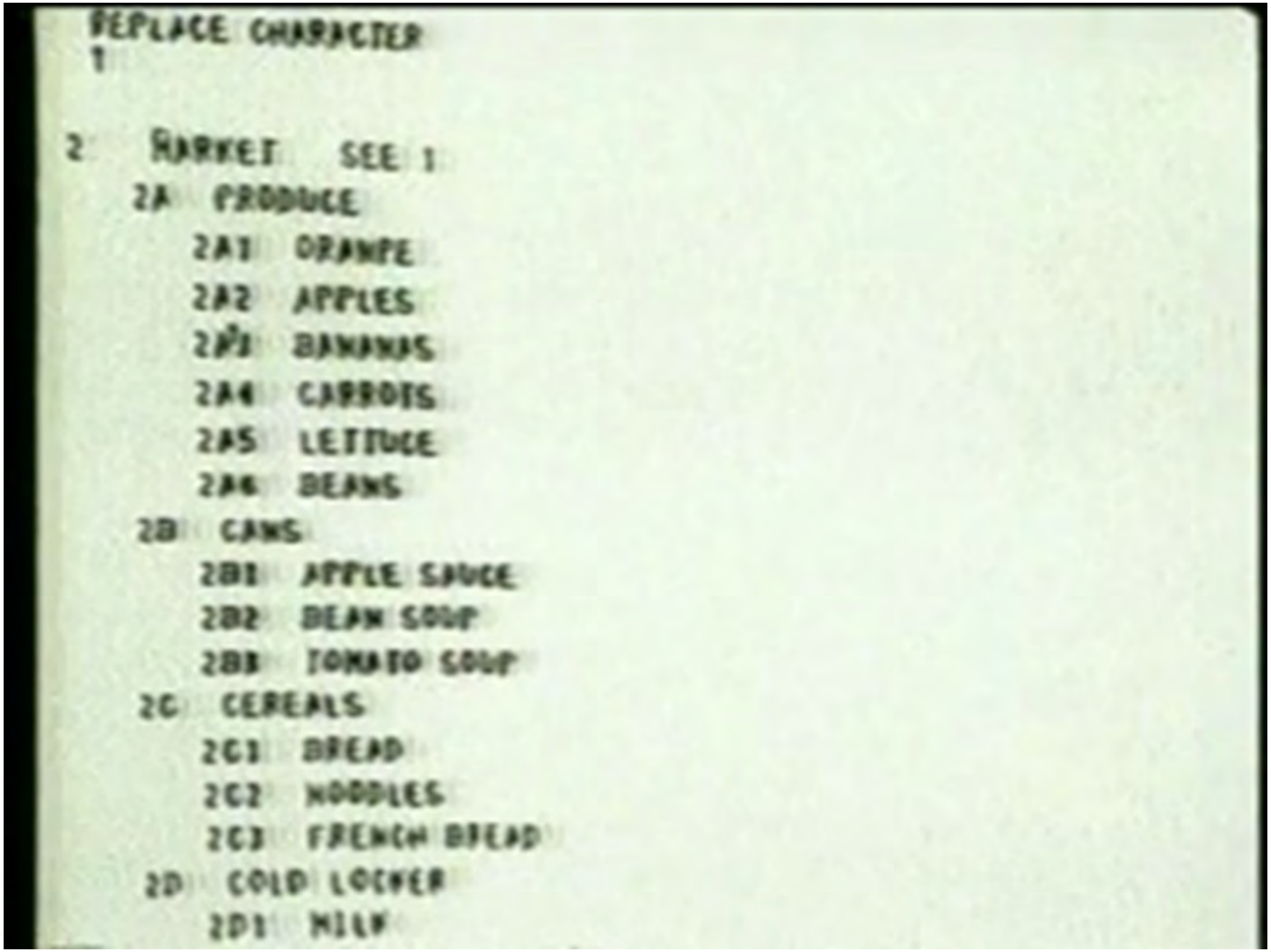
1962

Windows

Constraints
(i.e., non-procedural)

Prototype/Instance Inheritance
(i.e., object-oriented)

Doug Engelbart’s NLS (Online System)

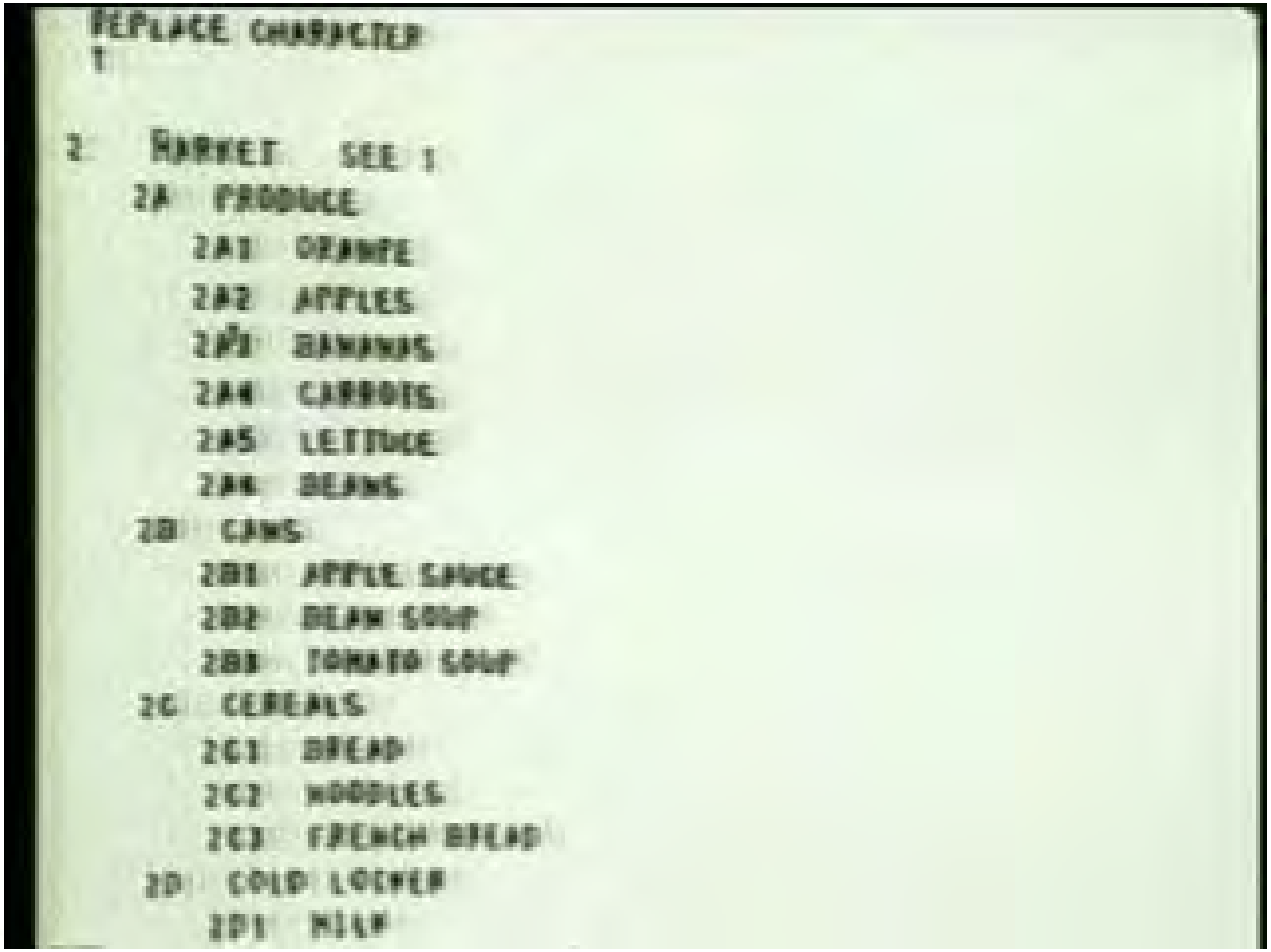


```
REPLACE CHARACTER
1

2    MARKET    SEE 1
   2A   PRODUCE
      2A1   ORANGE
      2A2   APPLES
      2A3   BANANAS
      2A4   CARROTS
      2A5   LETTUCE
      2A6   BEANS
   2B   CANS
      2B1   APPLE SAUCE
      2B2   BEAN SOUP
      2B3   TOMATO SOUP
   2C   CEREALS
      2C1   BREAD
      2C2   NOODLES
      2C3   FRENCH BREAD
   2D   COLD LOCKER
      2D1   MILK
```

http://courses.cs.washington.edu/courses/cse440/videos/history/AlanKay1987-NLS.m4v

Doug Engelbart's NLS (Online System)



```
  REPLACE CHARACTER
  T

2   MARKET   SEE 1
    2A  PRODUCE
        2A1  ORANGE
        2A2  APPLES
        2A3  BANANAS
        2A4  CARROTS
        2A5  LETTUCE
        2A6  BEANS
    2B  CANS
        2B1  APPLE SAUCE
        2B2  BEAN SOUP
        2B3  TOMATO SOUP
    2C  CEREALS
        2C1  BREAD
        2C2  NOODLES
        2C3  FRENCH BREAD
    2D  COLD LOCKER
        2D1  MILK
```

http://courses.cs.washington.edu/courses/cse440/videos/history/AlanKay1987-NLS.m4v

Doug Engelbart’s NLS (Online System)

When do we think this was done?

Doug Engelbart's NLS (Online System)

When do we think this was done? 1968

Invention of the mouse

First working hypertext system

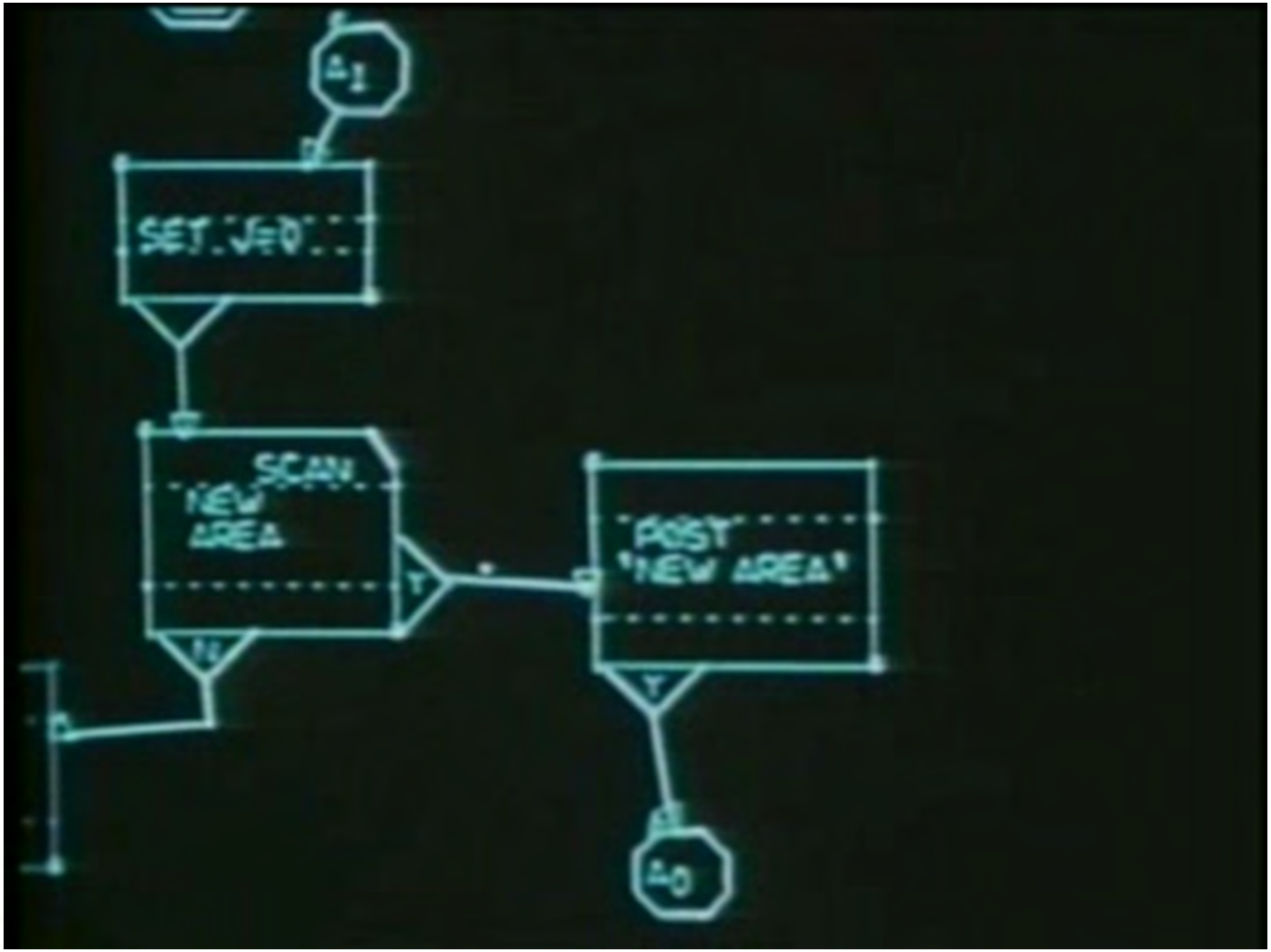
Chording keyboard to reduce hand movement

Remote collaboration

Analog Mouse leads to heavy moding

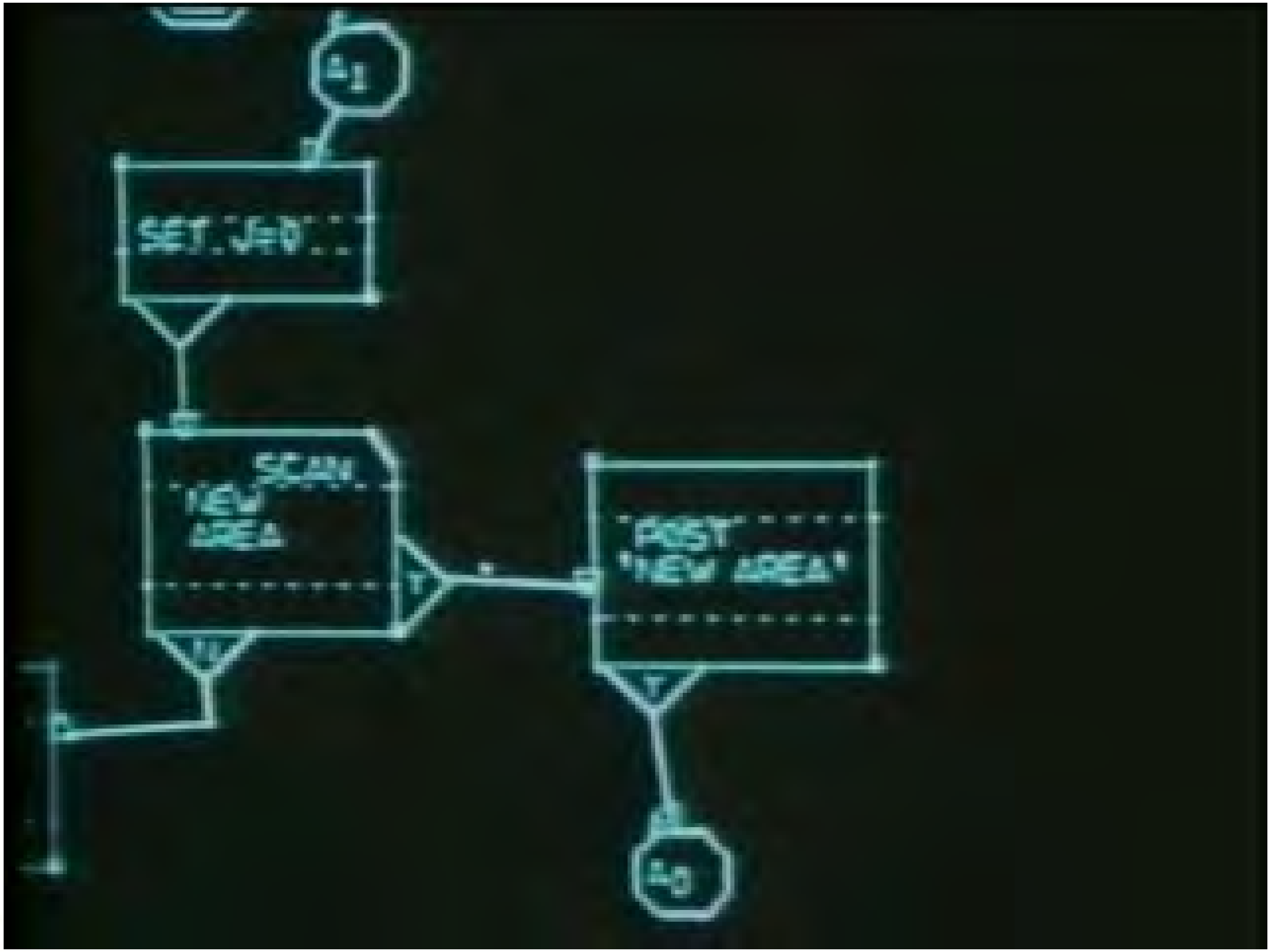
Reactions include accusations of "faking it" and claims of irrelevance because "terminal can do that"

GRAIL



http://courses.cs.washington.edu/courses/cse440/videos/history/AlanKay1987-GRAIL.m4v

GRAIL



http://courses.cs.washington.edu/courses/cse440/videos/history/AlanKay1987-GRAIL.m4v

GRAIL

When do we think this was done?

GRAIL

When do we think this was done? 1968

Window handles

Modeless interaction via direct action

Gesture recognition

Proposed for end-user programming via flow charts

Dynabook

http://courses.cs.washington.edu/courses/cse440/videos/history/AlanKay1987-Dynabook.m4v

Dynabook

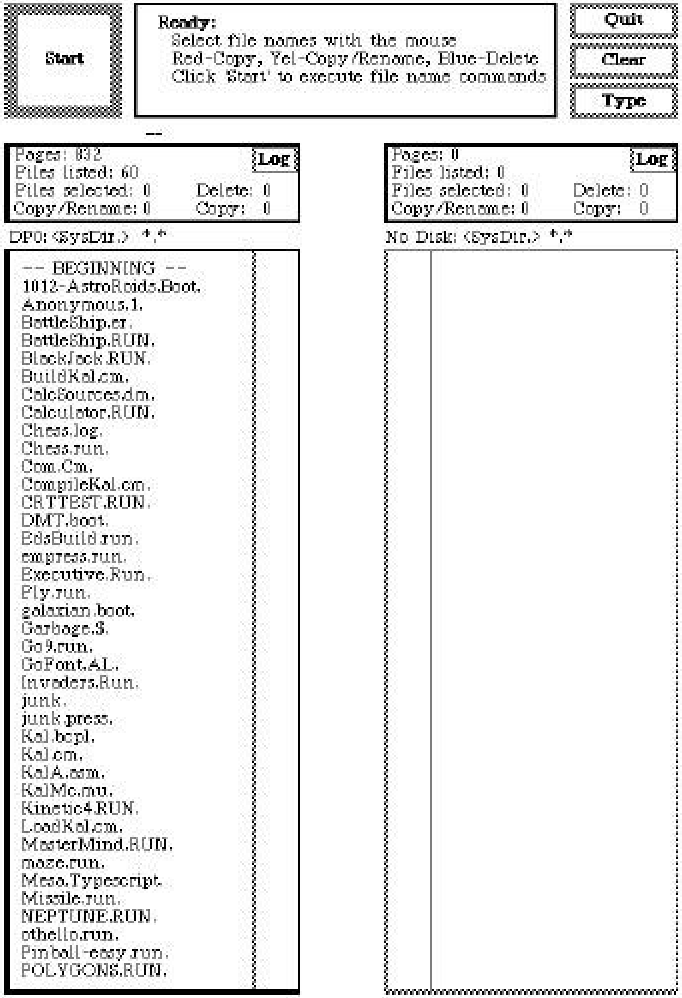
http://courses.cs.washington.edu/courses/cse440/videos/history/AlanKay1987-Dynabook.m4v

Xerox to Apple and Microsoft

XEROX Alto 1973

Xerox Alto

Xerox Alto



Ready:
Select file names with the mouse
Red-Copy, Yel-Copy/Rename, Blue-Delete
Click 'Start' to execute file name commands

```
Pages: 832
Files listed: 60
Files selected: 0        Delete: 0
Copy/Rename: 0           Copy:   0
DP0: <SysDir.>  *.*
-- BEGINNING --
1012-AstroRoids.Boot.
Anonymous.1.
BattleShip.cr.
BattleShip.RUN.
BlackJack.RUN.
BuildKal.cm.
CalcSources.dm.
Calculator.RUN.
Chess.log.
Chess.run.
Com.Cm.
CompileKal.cm.
CRTTEST.RUN.
DMT.boot.
EdsBuild.run.
empress.run.
Executive.Run.
Fly.run.
galaxian.boot.
Garbage.$.
Go9.run.
GoFont.AL.
Invaders.Run.
junk.
junk.press.
Kal.bcpl.
Kal.cm.
KalA.asm.
KalMc.mu.
Kinetic4.RUN.
LoadKal.cm.
MasterMind.RUN.
maze.run.
Mesa.Typescript.
Missile.run.
NEPTUNE.RUN.
othello.run.
Pinball-easy.run.
POLYGONS.RUN.
```

```
Pages: 0
Files listed: 0
Files selected: 0        Delete: 0
Copy/Rename: 0           Copy:   0
No Disk: <SysDir.>  *.*
```

Xerox to Apple and Microsoft

XEROX Alto 1973

Steve Jobs visits PARC in 1979

Xerox to Apple and Microsoft

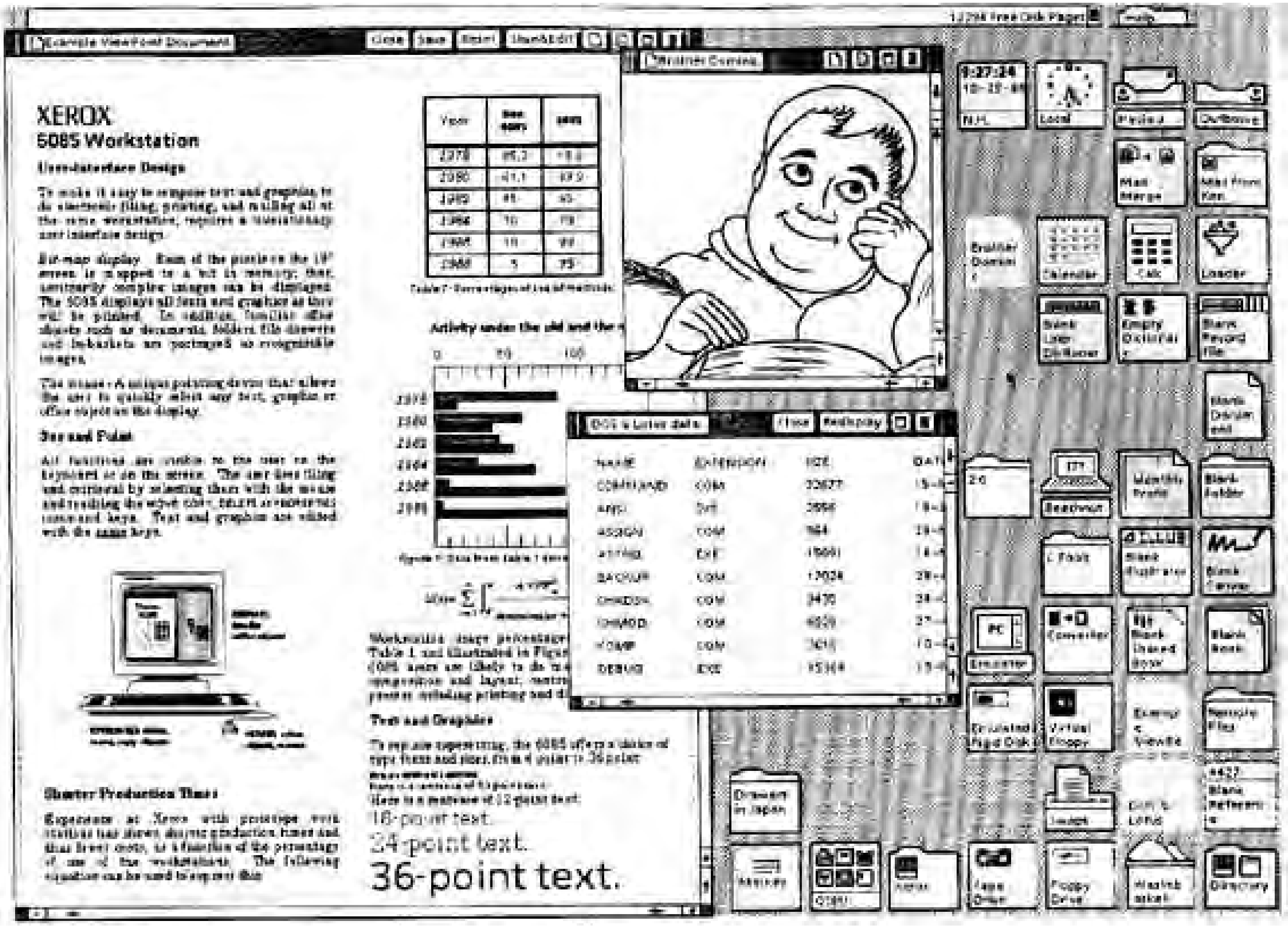
XEROX Alto 1973

Steve Jobs visits PARC in 1979

XEROX STAR 1981

Xerox Star

Xerox Star



XEROX

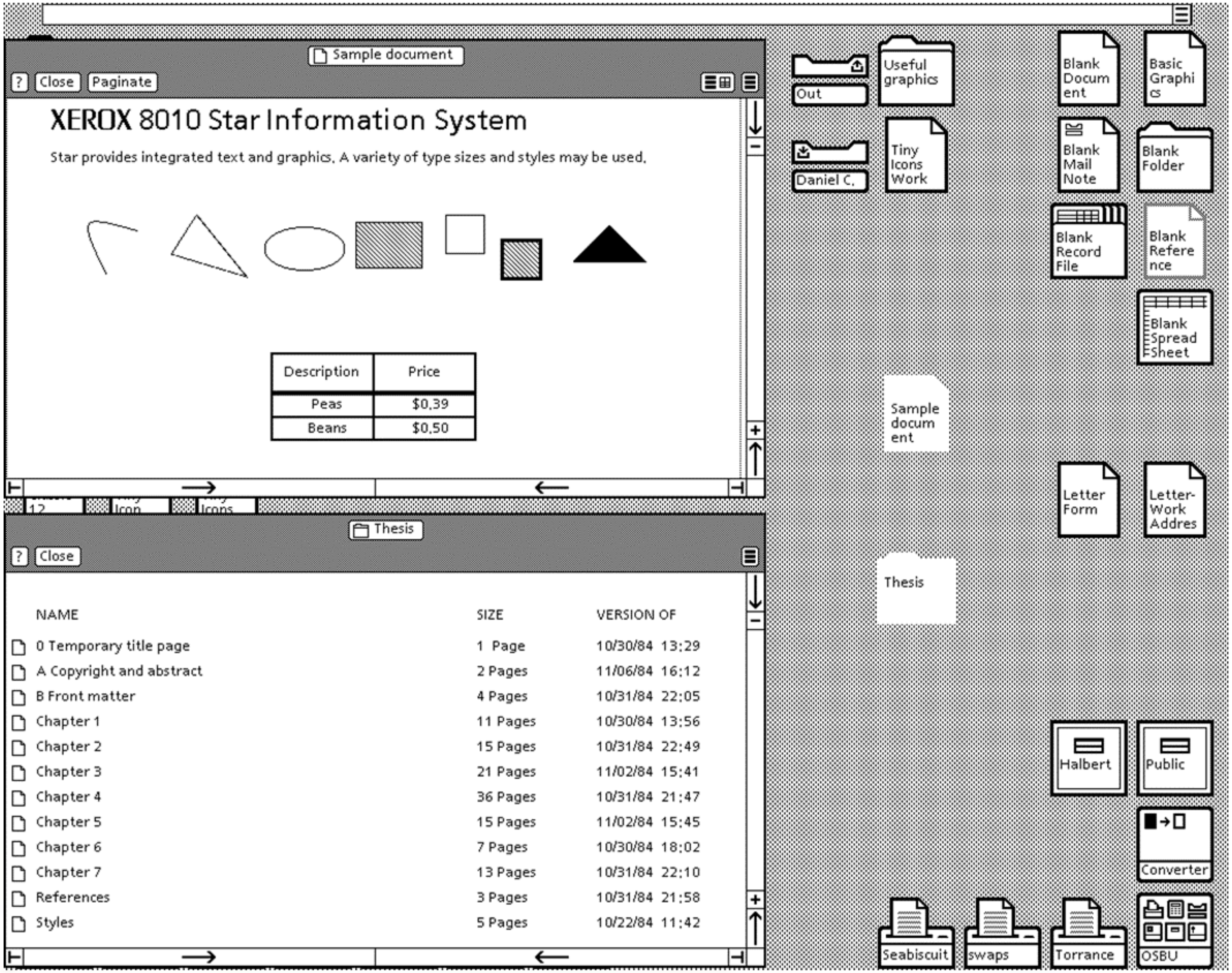
6085 Workstation

18-point text.

24-point text.

36-point text.

Xerox Star



XEROX 8010 Star Information System

Star provides integrated text and graphics. A variety of type sizes and styles may be used.

Description	Price
Peas	$0.39
Beans	$0.50

NAME	SIZE	VERSION OF
0 Temporary title page	1 Page	10/30/84 13:29
A Copyright and abstract	2 Pages	11/06/84 16:12
B Front matter	4 Pages	10/31/84 22:05
Chapter 1	11 Pages	10/30/84 13:56
Chapter 2	15 Pages	10/31/84 22:49
Chapter 3	21 Pages	11/02/84 15:41
Chapter 4	36 Pages	10/31/84 21:47
Chapter 5	15 Pages	11/02/84 15:45
Chapter 6	7 Pages	10/30/84 18:02
Chapter 7	13 Pages	10/31/84 22:10
References	3 Pages	10/31/84 21:58
Styles	5 Pages	10/22/84 11:42

Xerox to Apple and Microsoft

XEROX Alto 1973

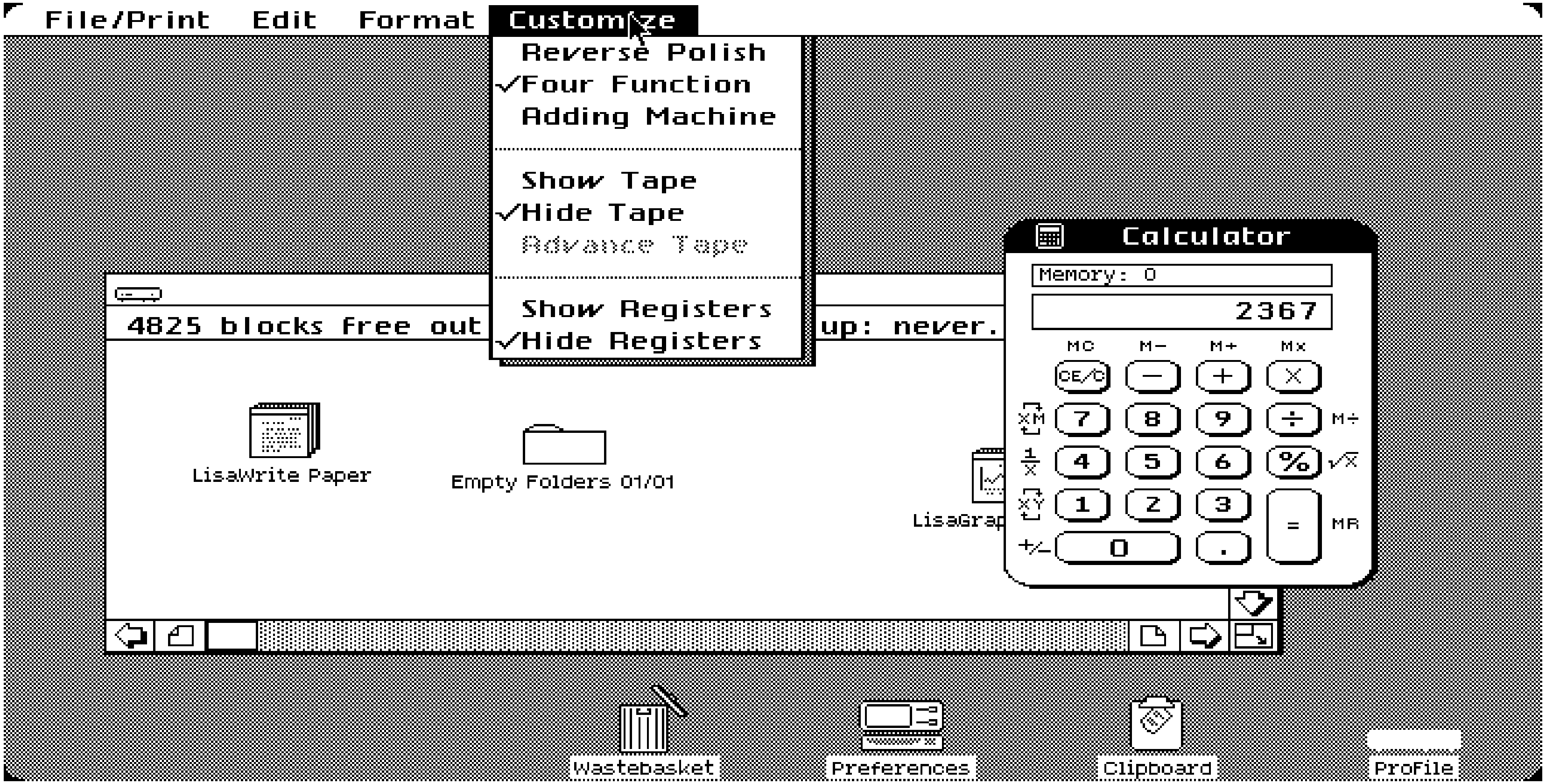
Steve Jobs visits PARC in 1979

XEROX STAR 1981

Apple Lisa 1981

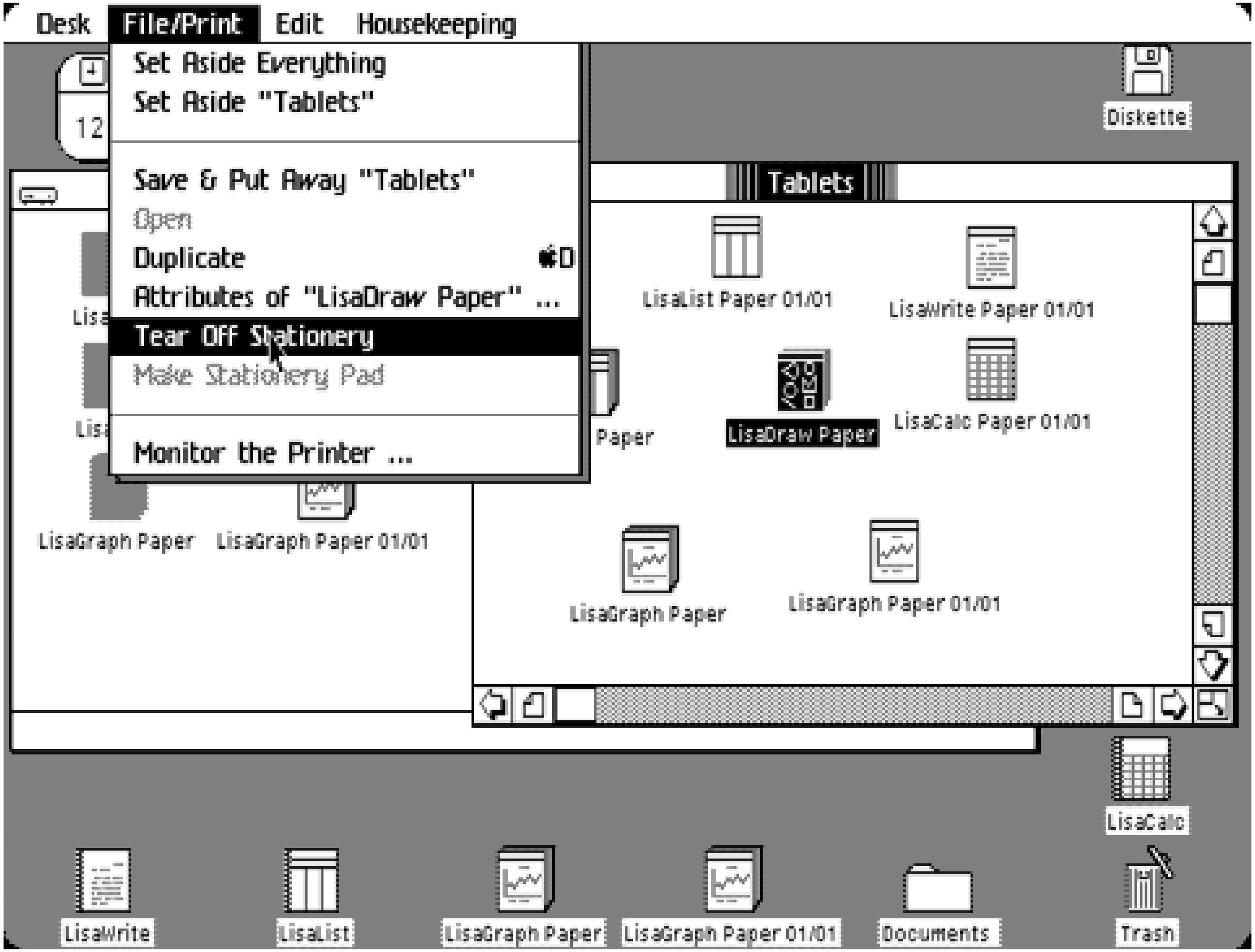
Apple Lisa

Apple Lisa

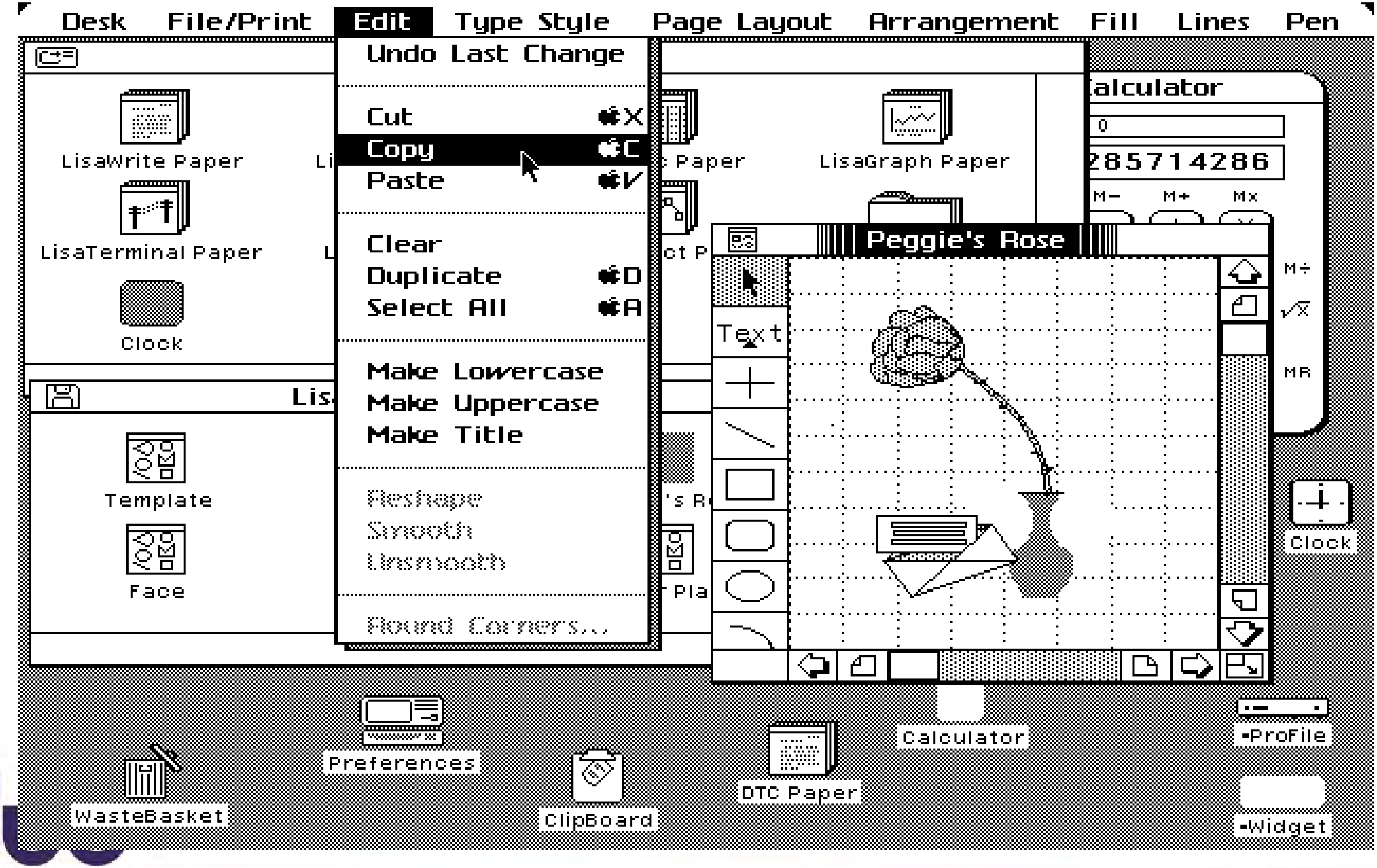


4825 blocks free out … up: never.

Apple Lisa


Desk
File/Print
Edit
Housekeeping
Set Aside Everything
Set Aside "Tablets"
Save & Put Away "Tablets"
Open
Duplicate ⌘D
Attributes of "LisaDraw Paper" ...
Tear Off Stationery
Make Stationery Pad
Monitor the Printer ...
12
Diskette
Tablets
LisaList Paper 01/01
LisaWrite Paper 01/01
Paper
LisaDraw Paper
LisaCalc Paper 01/01
LisaGraph Paper
LisaGraph Paper 01/01
LisaGraph Paper
LisaGraph Paper 01/01
LisaCalc
LisaWrite
LisaList
LisaGraph Paper
LisaGraph Paper 01/01
Documents
Trash

Apple Lisa


Desk
File/Print
Edit
Type Style
Page Layout
Arrangement
Fill
Lines
Pen
Undo Last Change
Cut ⌘X
Copy ⌘C
Paste ⌘V
Clear
Duplicate ⌘D
Select All ⌘A
Make Lowercase
Make Uppercase
Make Title
Reshape
Smooth
Unsmooth
Round Corners...
LisaWrite Paper
LisaTerminal Paper
Clock
LisaGraph Paper
Template
Face
Calculator
285714286
M−
M+
M×
M÷
√x
MR
Peggie's Rose
Text
Clock
Preferences
WasteBasket
ClipBoard
DTC Paper
Calculator
ProFile
Widget

Xerox to Apple and Microsoft

XEROX Alto 1973

Steve Jobs visits PARC in 1979

XEROX STAR 1981

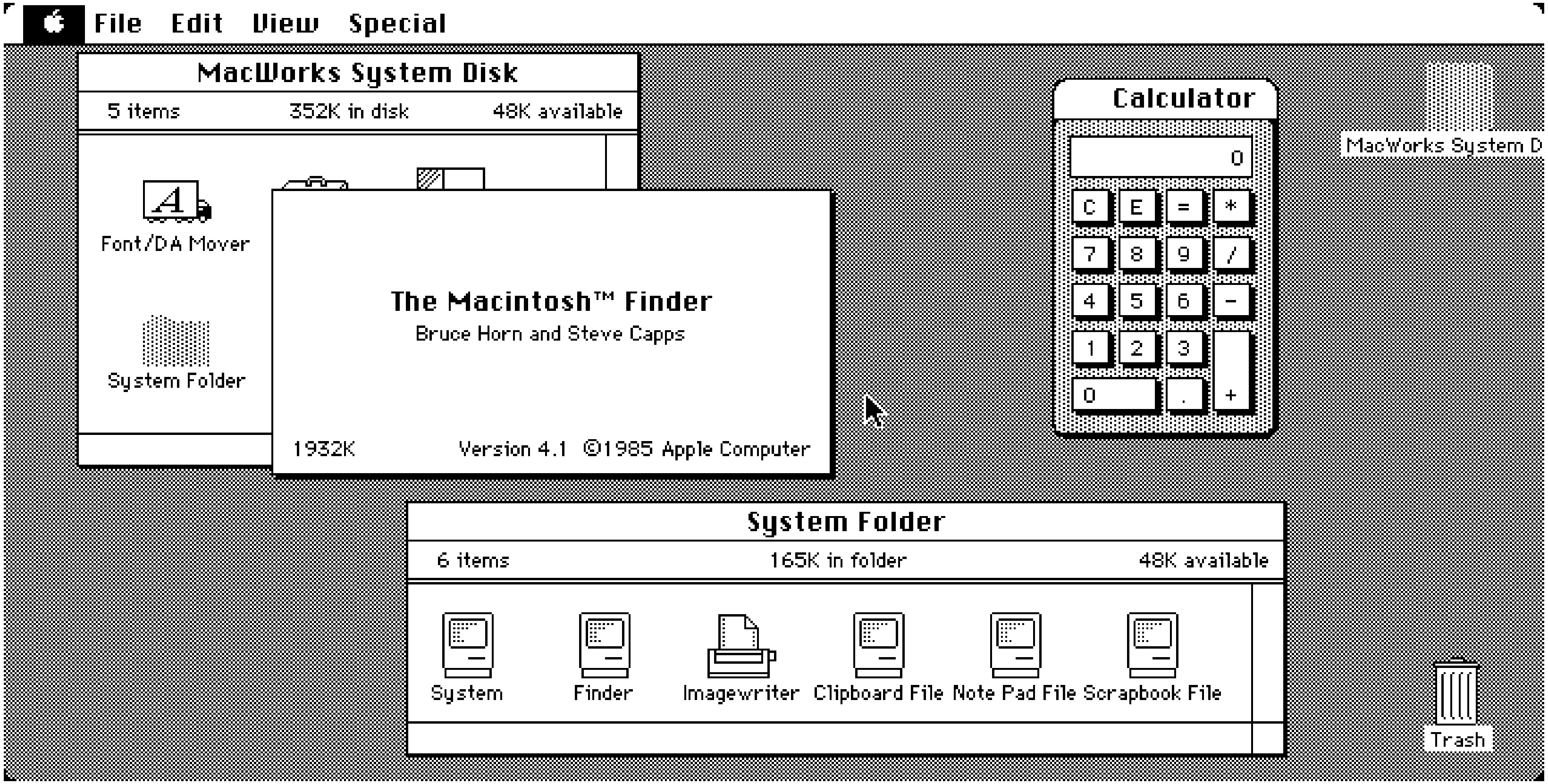
Apple Lisa 1981

Apple Macintosh 1984

Macintosh


Archivio
Composizione
Esposizione
Strumenti
System Disk
The Macintosh™ Finder
Bruce Horn and Steve Capps
512K
Version 4.1 ©1985 Apple Computer
Cestino

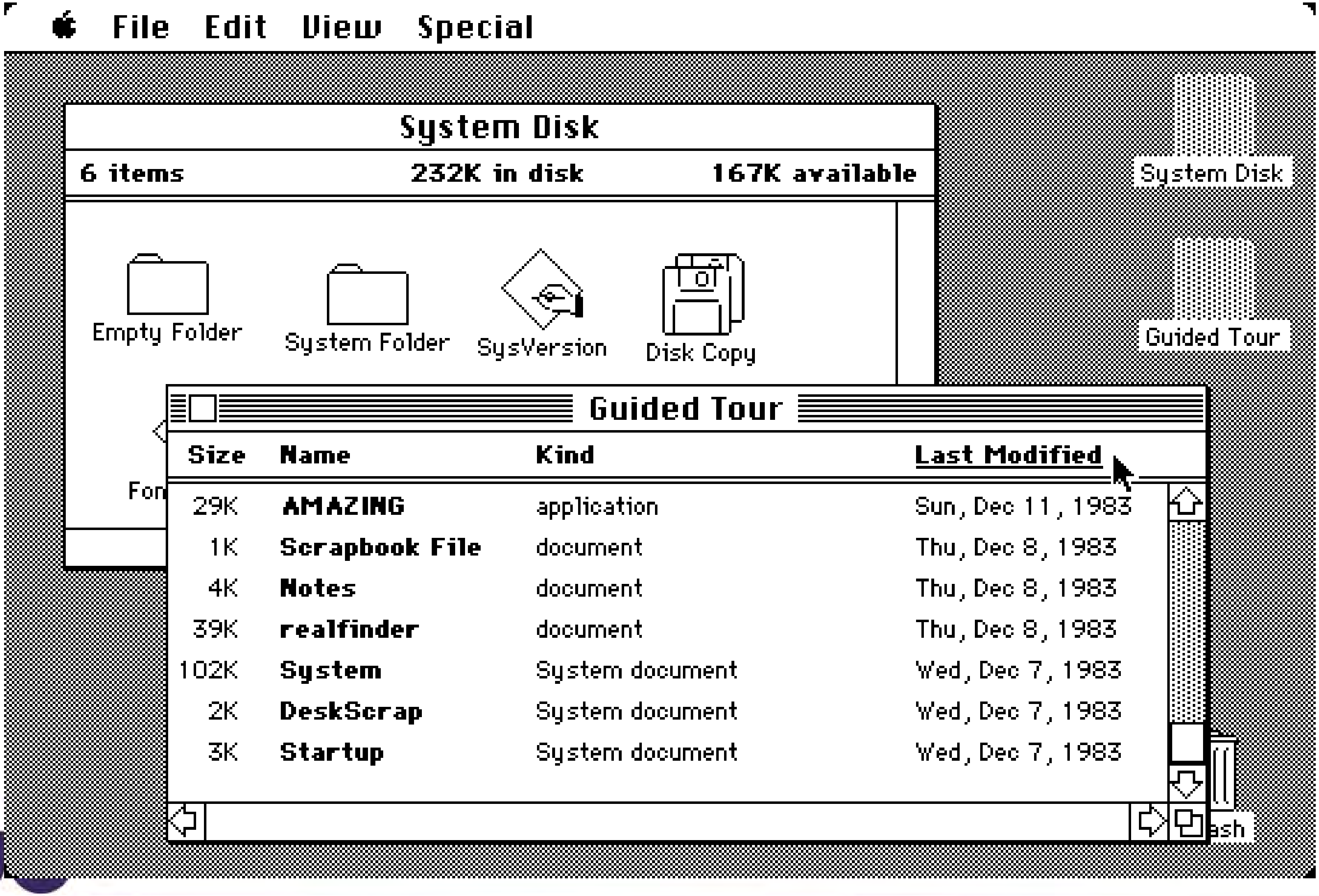
Macintosh



The Macintosh™ Finder
Bruce Horn and Steve Capps

1932K
Version 4.1 ©1985 Apple Computer

Macintosh



6 items 232K in disk 167K available

Guided Tour

Size	Name	Kind	Last Modified
29K	**AMAZING**	application	Sun, Dec 11, 1983
1K	**Scrapbook File**	document	Thu, Dec 8, 1983
4K	**Notes**	document	Thu, Dec 8, 1983
39K	**realfinder**	document	Thu, Dec 8, 1983
102K	**System**	System document	Wed, Dec 7, 1983
2K	**DeskScrap**	System document	Wed, Dec 7, 1983
3K	**Startup**	System document	Wed, Dec 7, 1983

Xerox to Apple and Microsoft

XEROX Alto 1973

Steve Jobs visits PARC in 1979

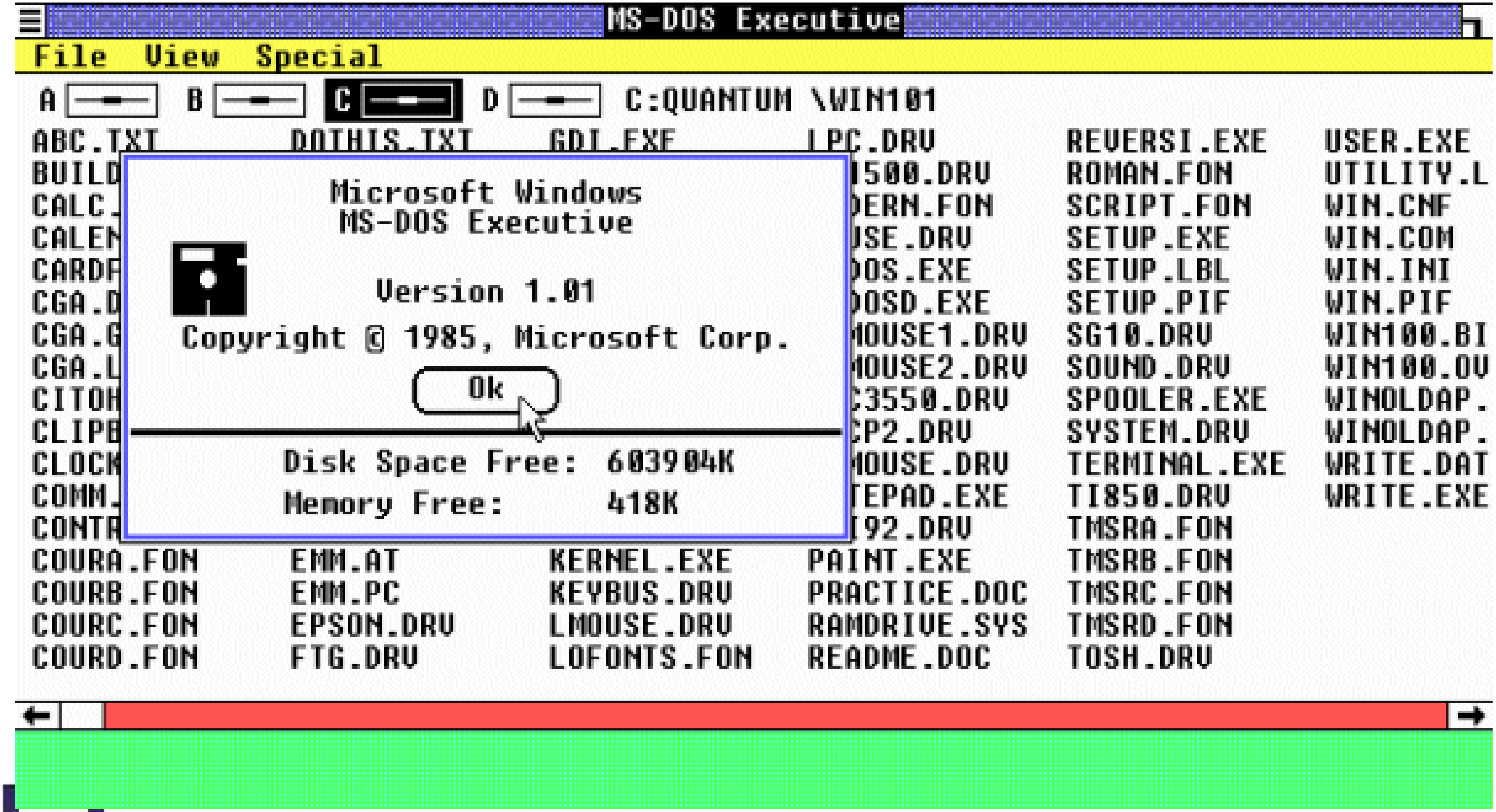
XEROX STAR 1981

Apple Lisa 1981

Apple Macintosh 1984

Windows 1.0 1985

Windows 1.0



C:QUANTUM \WIN101

ABC.TXT
BUILD
CALC.
CALEN
CARDF
CGA.D
CGA.G
CGA.L
CITOH
CLIPB
CLOCK
COMM.
CONTR
COURA.FON
COURB.FON
COURC.FON
COURD.FON

DOTHIS.TXT
EMM.AT
EMM.PC
EPSON.DRV
FTG.DRV

GDI.EXE
KERNEL.EXE
KEYBUS.DRV
LMOUSE.DRV
LOFONTS.FON

LPC.DRV
1500.DRV
DERN.FON
USE.DRV
DOS.EXE
DOSD.EXE
MOUSE1.DRV
MOUSE2.DRV
C3550.DRV
CP2.DRV
MOUSE.DRV
TEPAD.EXE
I92.DRV
PAINT.EXE
PRACTICE.DOC
RAMDRIVE.SYS
README.DOC

REVERSI.EXE
ROMAN.FON
SCRIPT.FON
SETUP.EXE
SETUP.LBL
SETUP.PIF
SG10.DRV
SOUND.DRV
SPOOLER.EXE
SYSTEM.DRV
TERMINAL.EXE
TI850.DRV
TMSRA.FON
TMSRB.FON
TMSRC.FON
TMSRD.FON
TOSH.DRV

USER.EXE
UTILITY.L
WIN.CNF
WIN.COM
WIN.INI
WIN.PIF
WIN100.BI
WIN100.OV
WINOLDAP.
WINOLDAP.
WRITE.DAT
WRITE.EXE

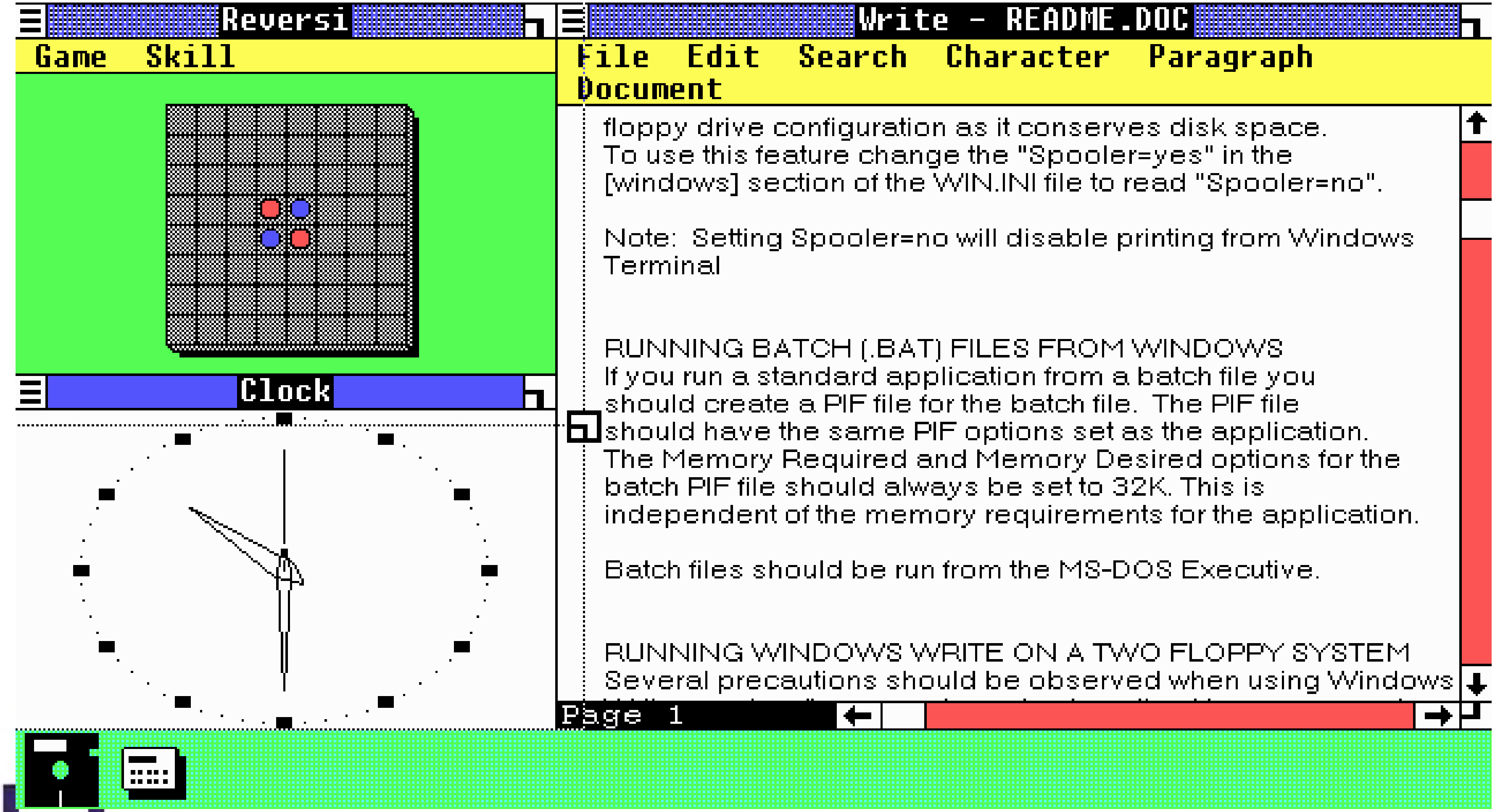
Microsoft Windows
MS-DOS Executive

Version 1.01

Copyright © 1985, Microsoft Corp.

Disk Space Free: 603904K
Memory Free: 418K

Windows 1.0



floppy drive configuration as it conserves disk space.
To use this feature change the "Spooler=yes" in the [windows] section of the WIN.INI file to read "Spooler=no".

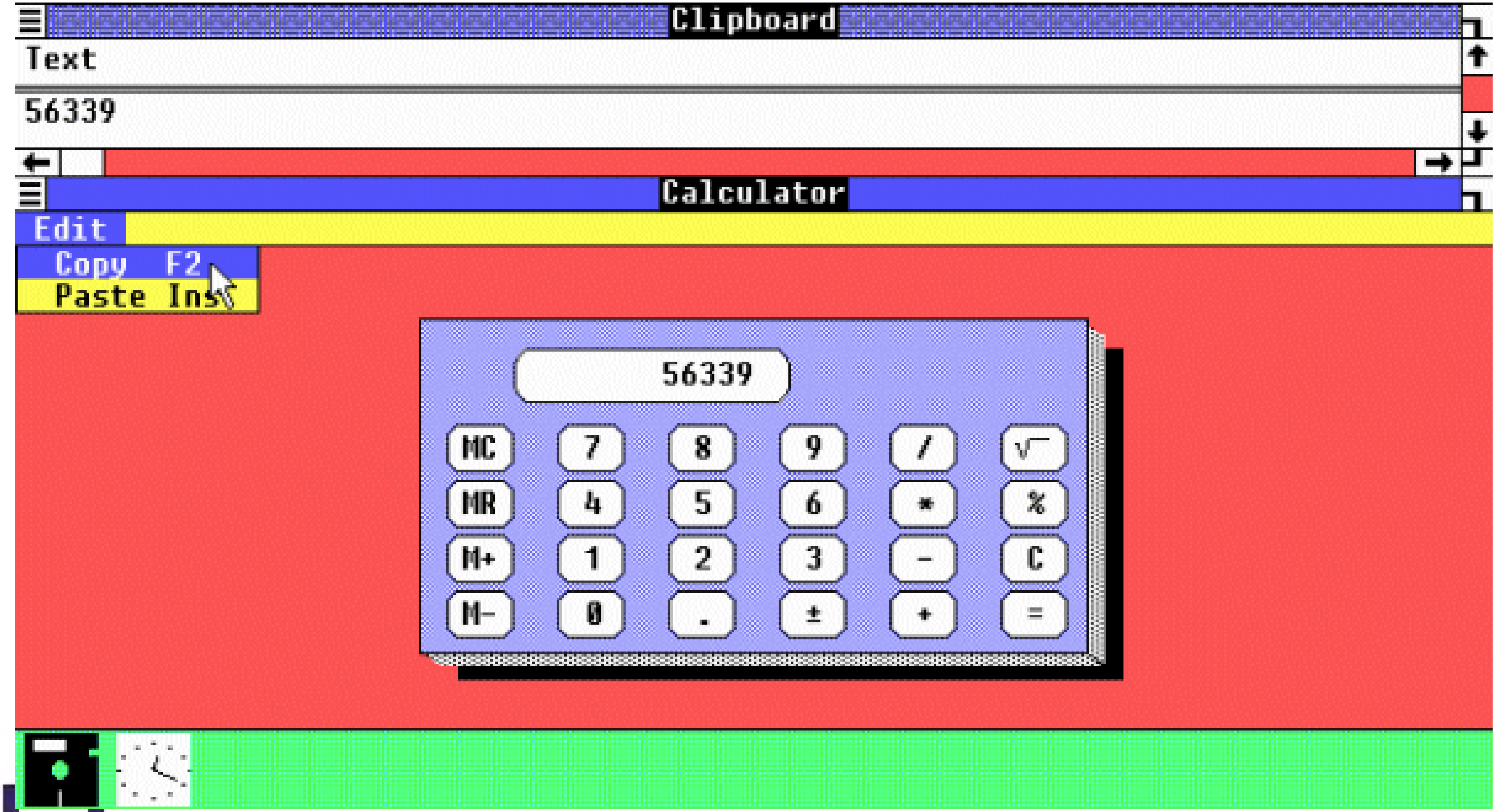
Note: Setting Spooler=no will disable printing from Windows Terminal

RUNNING BATCH (.BAT) FILES FROM WINDOWS
If you run a standard application from a batch file you should create a PIF file for the batch file. The PIF file should have the same PIF options set as the application. The Memory Required and Memory Desired options for the batch PIF file should always be set to 32K. This is independent of the memory requirements for the application.

Batch files should be run from the MS-DOS Executive.

RUNNING WINDOWS WRITE ON A TWO FLOPPY SYSTEM
Several precautions should be observed when using Windows

Windows 1.0


Clipboard
Text
56339
Calculator
Edit
Copy F2
Paste Ins
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MC
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Xerox to Apple and Microsoft

XEROX Alto 1973

Steve Jobs visits PARC in 1979

XEROX STAR 1981

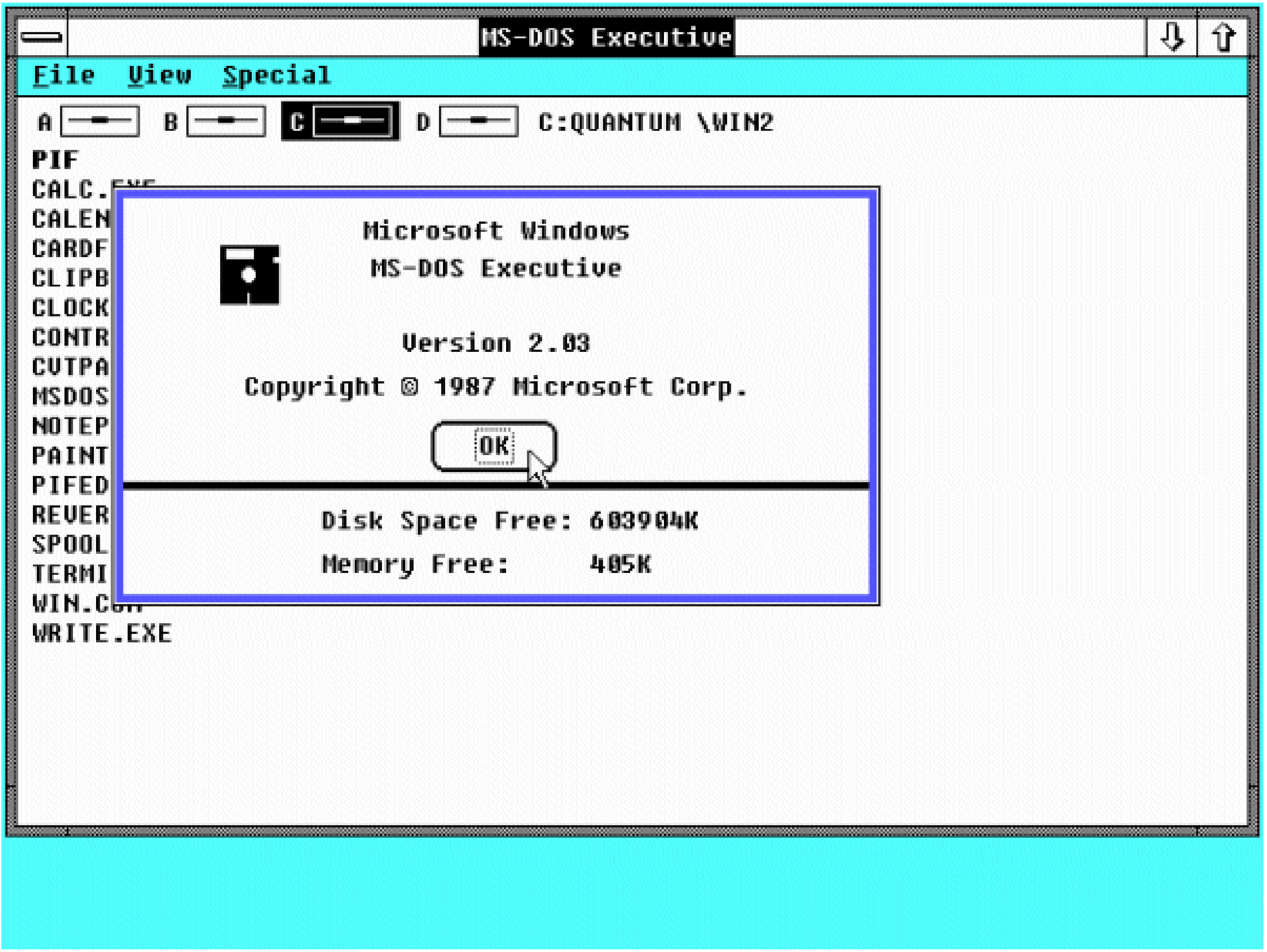
Apple Lisa 1981

Apple Macintosh 1984

Windows 1.0 1985

Windows 2.0 1987

Windows 2.0 (1987)



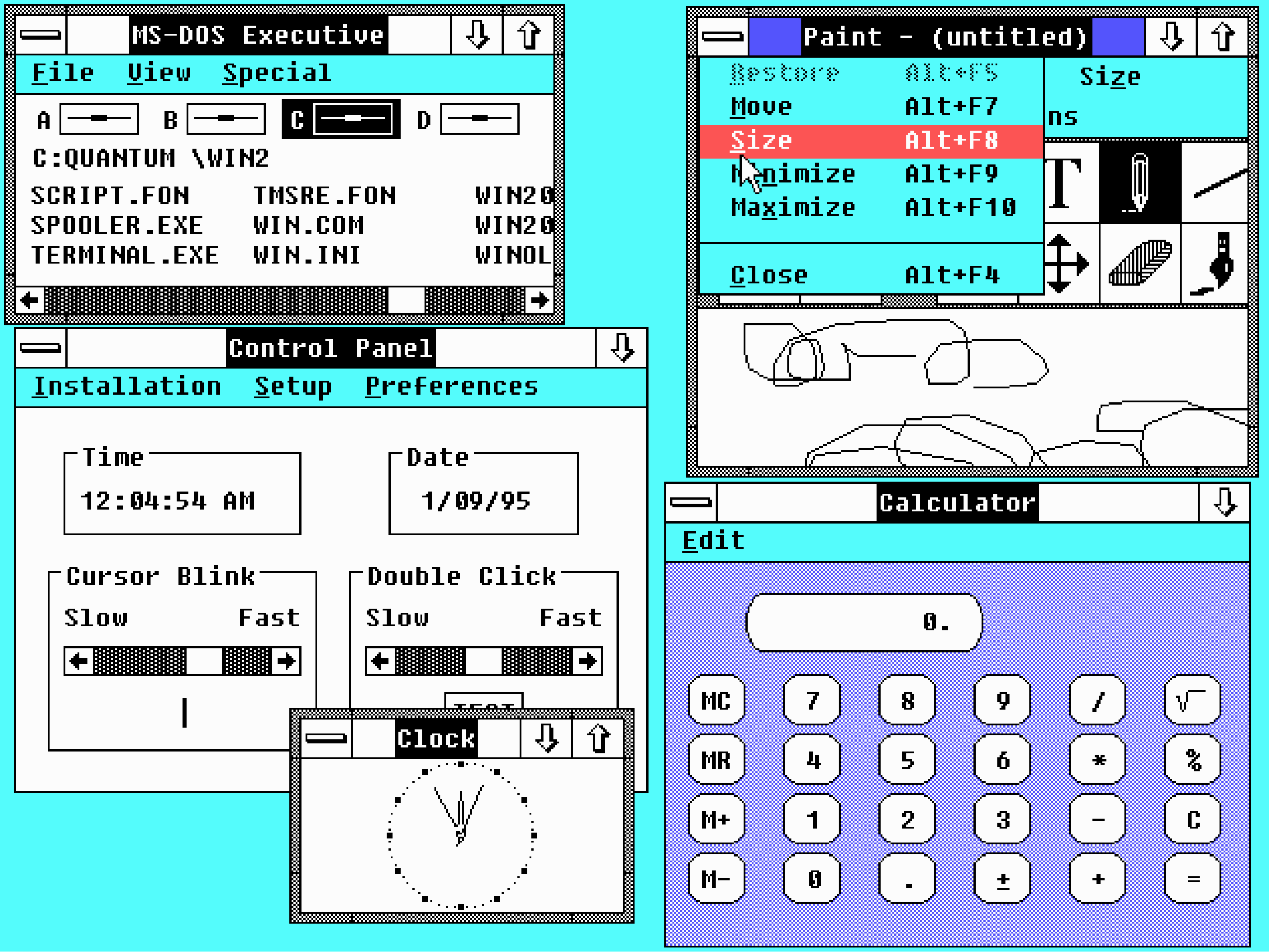
Microsoft Windows
MS-DOS Executive

Version 2.03

Copyright © 1987 Microsoft Corp.

Disk Space Free: 603904K
Memory Free: 405K

Windows 2.0



Time
12:04:54 AM

Date
1/09/95

Xerox to Apple and Microsoft

XEROX Alto 1973

Steve Jobs visits PARC in 1979

XEROX STAR 1981

Apple Lisa 1981

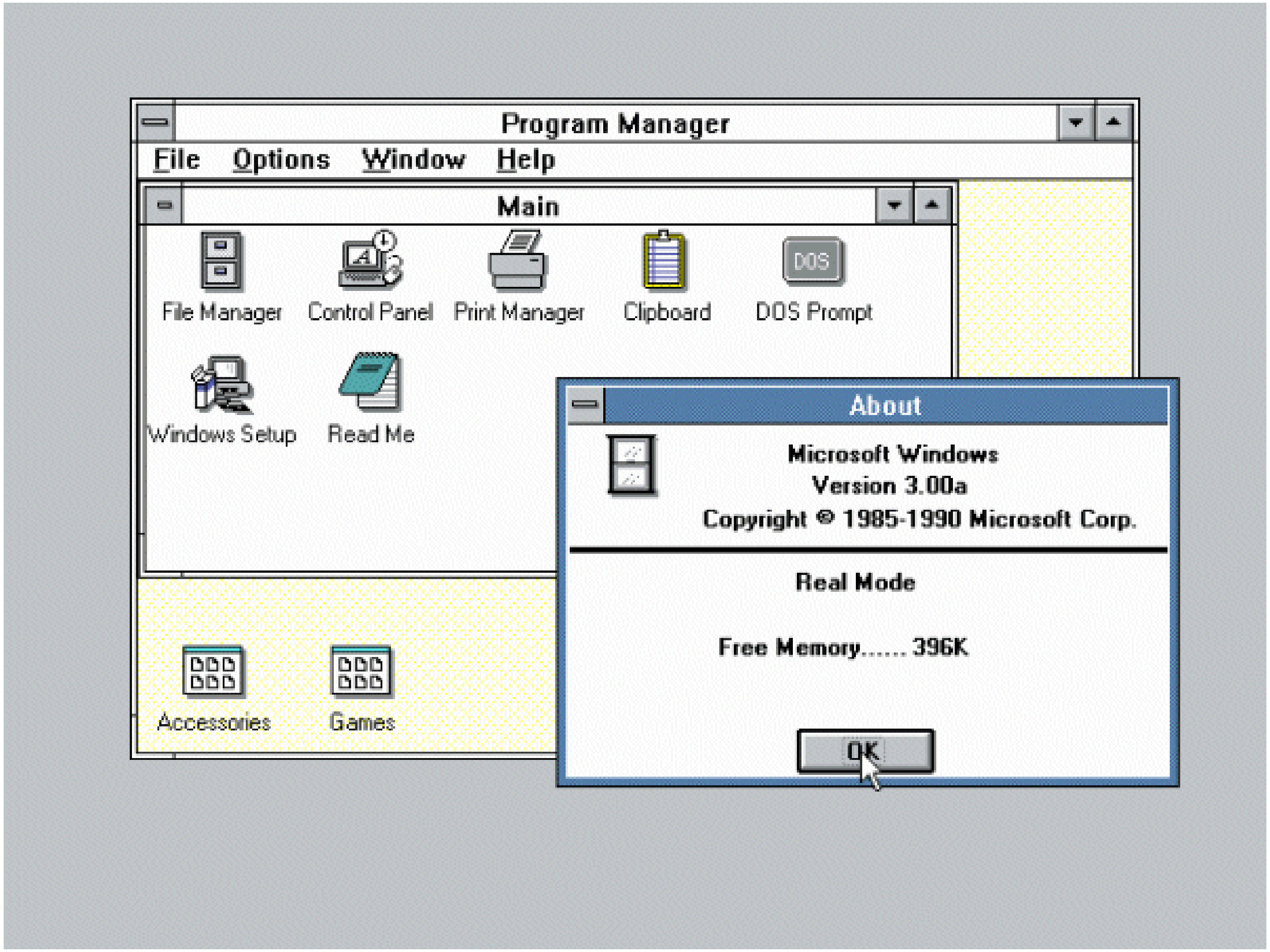
Apple Macintosh 1984

Windows 1.0 1985

Windows 2.0 1987

Windows 3.0 1990

Windows 3.0

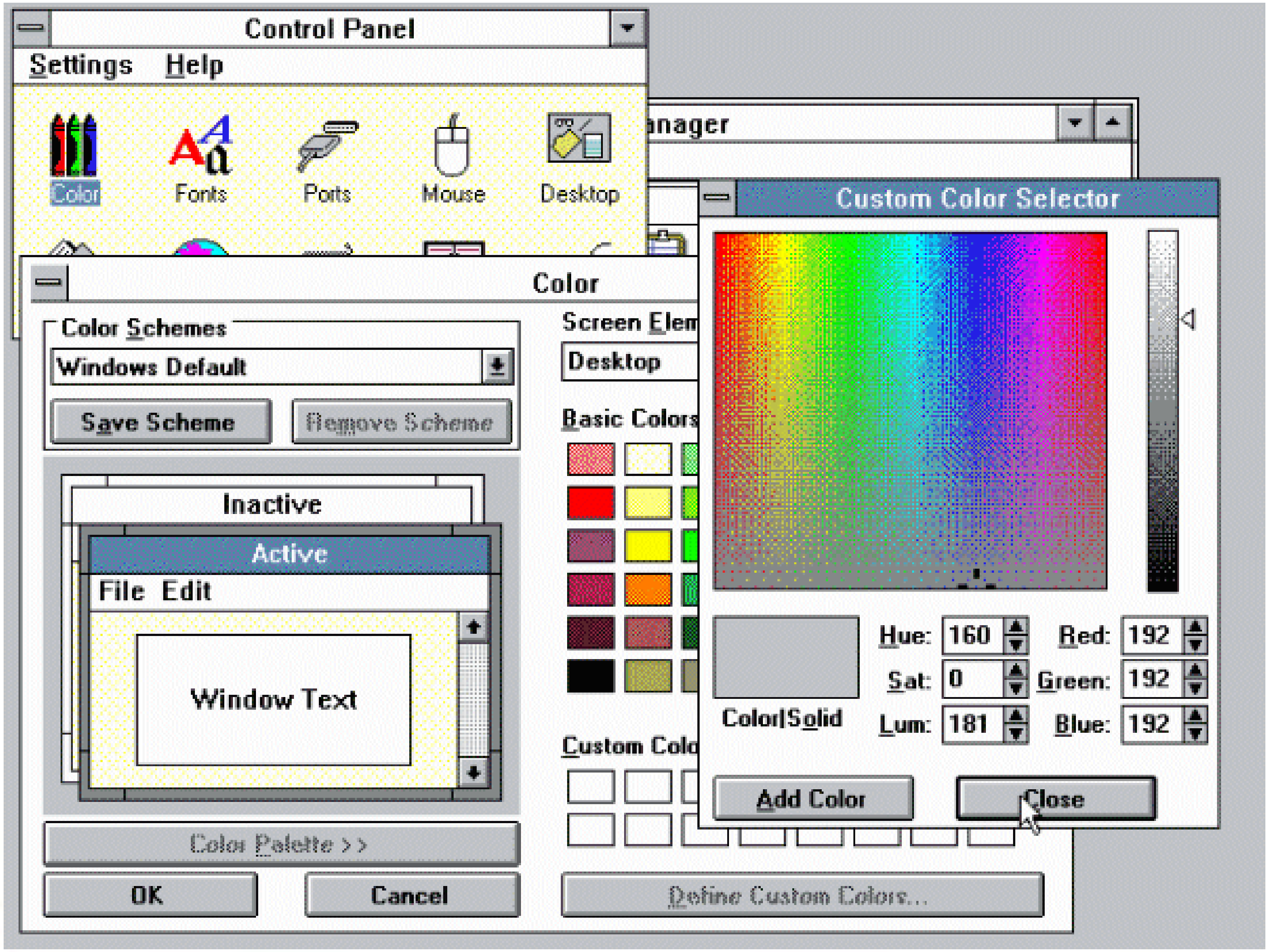


Microsoft Windows
Version 3.00a
Copyright © 1985-1990 Microsoft Corp.

Real Mode

Free Memory...... 396K

Windows 3.0

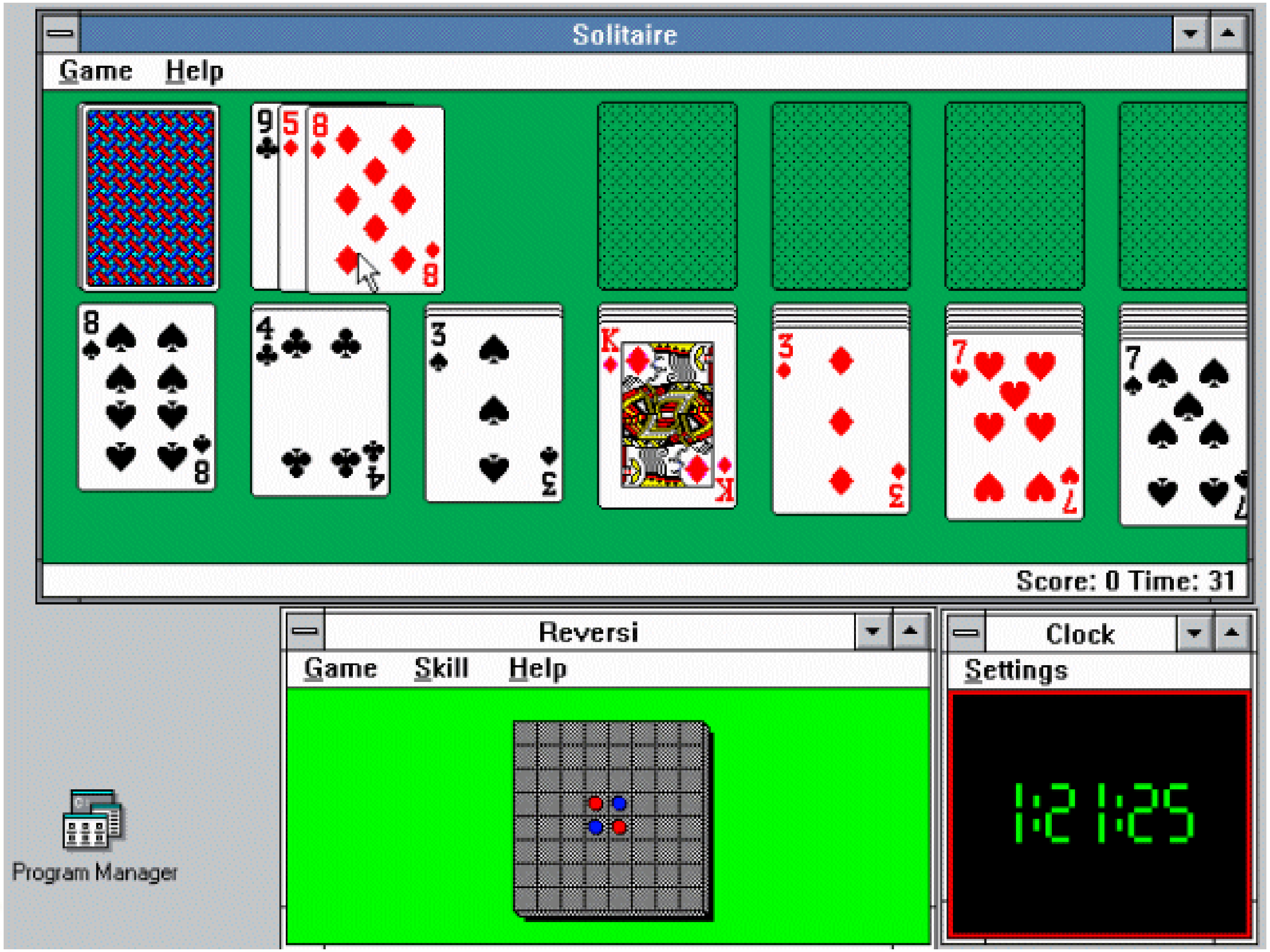


Color Schemes: Windows Default

Screen Elem: Desktop

Hue: 160
Sat: 0
Lum: 181
Red: 192
Green: 192
Blue: 192

Windows 3.0


Solitaire
Game
Help
Score: 0 Time: 31
Reversi
Game
Skill
Help
Clock
Settings
1:21:25
Program Manager

Xerox to Apple and Microsoft

XEROX Alto 1973

Steve Jobs visits PARC in 1979

XEROX STAR 1981

Apple Lisa 1981

Apple Macintosh 1984

Windows 1.0 1985

Windows 2.0 1987

Windows 3.0 1990

Bill Gates: "Hey, Steve, just because you broke into Xerox's house before I did and took the TV doesn't mean I can't go in later and take the stereo"

HCI Turing Awards

Sutherland wins 1988 Turing Award

Engelbart wins 1997 Turing Award

Alan Kay wins 2003 Turing Award

(in part for SmallTalk and OOP,
though he says OOP is linked to the GUI)

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 09:
History

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

dub
design:
use:
build:

University of Washington

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 10:
Paper Prototyping and Testing

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

dub design: use: build:

University of Washington

Today

Presentations on Thursday / Friday

Prototyping / Testing Readings Posted

Paper Prototypes over Weekend

Bring Prototypes to Class Tuesday

- In-Class Inspection Methods

Is My Design Good?

This is not a meaningful question

- It can and will be answered with “Yes”

At least consider asking:

- “What are three good things about this design?”
- “What are three bad things about this design?”

But really the answer is “it depends”

- Remember that designs are used for tasks
- We should ask this in the context of tasks

Fidelity in Prototyping

High Fidelity

Prototypes look like
the final product

Low Fidelity

Designer sketches
with many details missing

We have discussed the value of staying lightweight in sketching, but this also applies to prototyping

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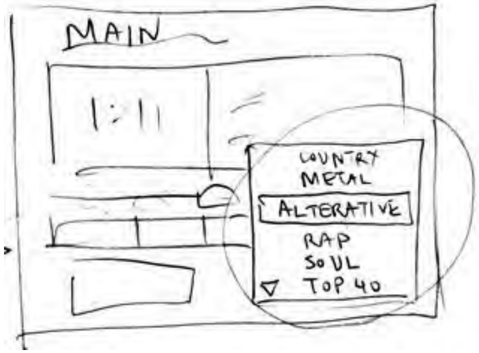


High-Fidelity Prototypes Warp

Time and creativity

- Require precision (e.g., must choose a font)
- Specifying details takes time
- Can lose track of the big picture

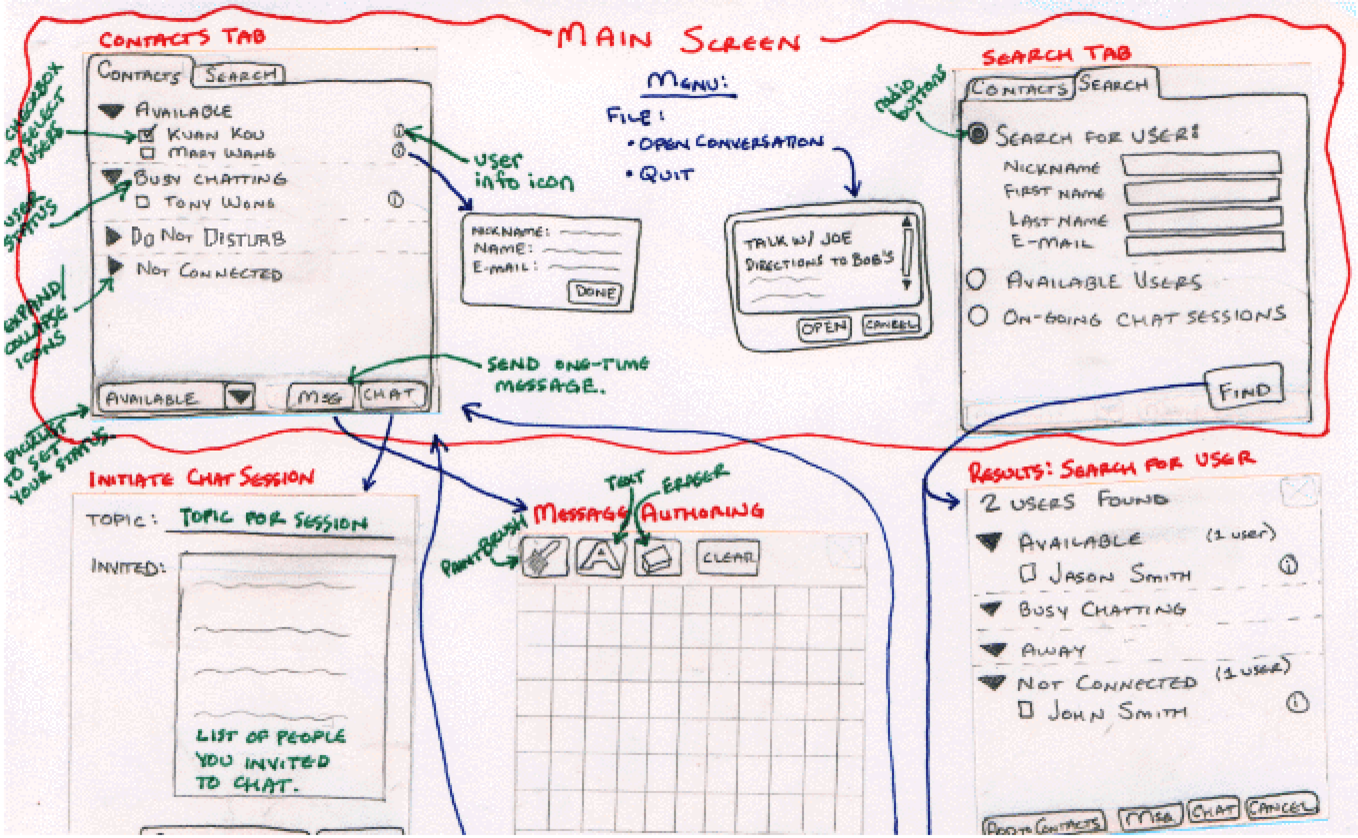
Perceptions of a person reviewing or testing

- Representation communicates “finished”
- Comments often focus on color, fonts, alignment

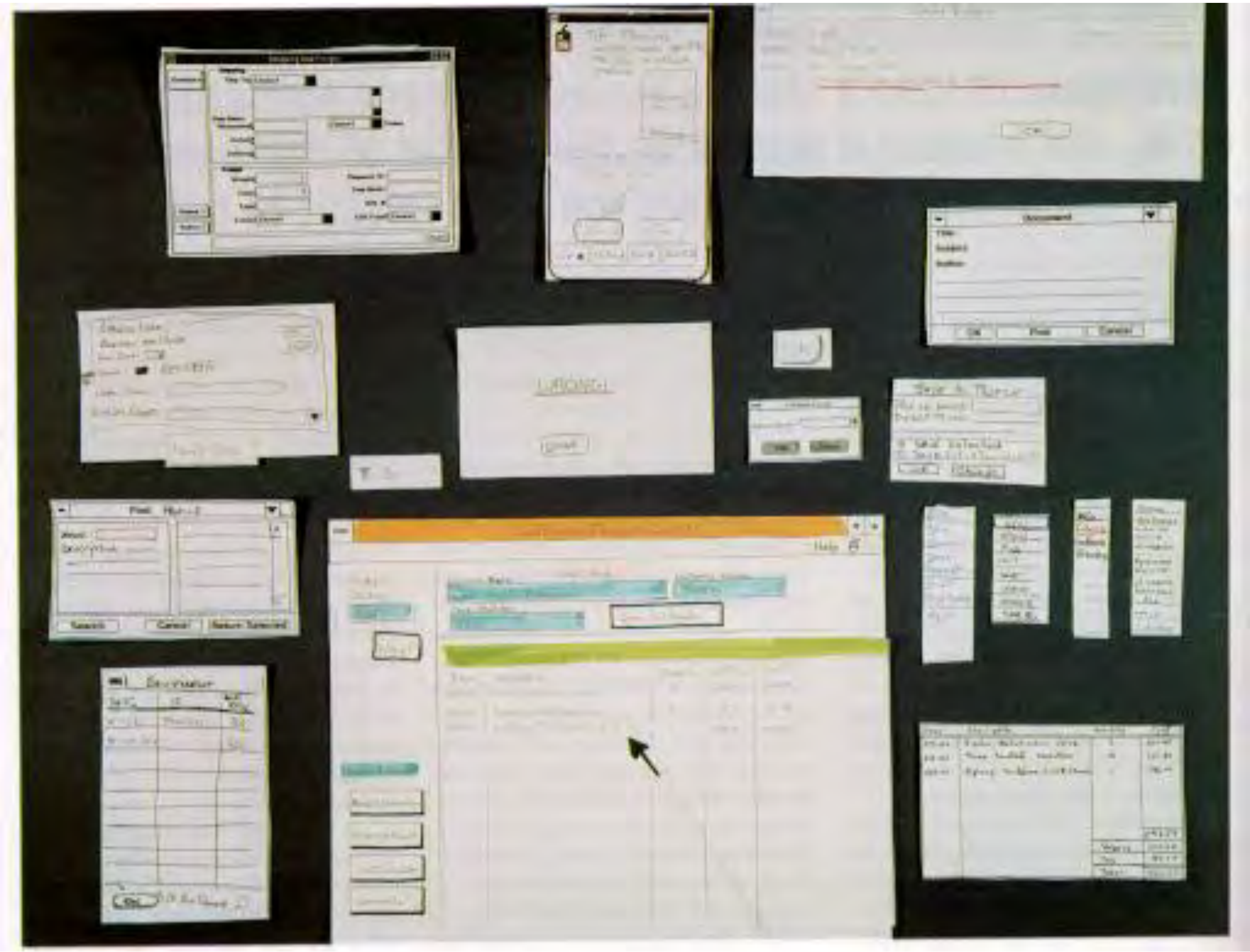
Low-Fidelity Prototypes

- Traditional methods take too long
  - Sketches → Prototype → Evaluate → Iterate
- Instead simulate the prototype
  - Sketches → Evaluate → Iterate
- Sketches act as prototypes
  - A designer "plays computer"
  - Other design team members observe & record
- Kindergarten implementation skills reduce barriers to participation in design and testing

Sketches


MAIN SCREEN
CONTACTS TAB
CONTACTS
SEARCH
AVAILABLE
☑ KUAN KOU
☐ MARY WANG
BUSY CHATTING
☐ TONY WONG
DO NOT DISTURB
NOT CONNECTED
AVAILABLE
MSG
CHAT
CHECKBOX TO SELECT USERS
USER STATUS
EXPAND/ COLLAPSE ICONS
PICKLIST TO SET YOUR STATUS
user info icon
NICKNAME:
NAME:
E-MAIL:
DONE
SEND ONE-TIME MESSAGE.
MENU:
FILE:
• OPEN CONVERSATION
• QUIT
TALK W/ JOE
DIRECTIONS TO BOB'S
OPEN
CANCEL
SEARCH TAB
radio buttons
CONTACTS
SEARCH
● SEARCH FOR USER:
NICKNAME
FIRST NAME
LAST NAME
E-MAIL
○ AVAILABLE USERS
○ ON-GOING CHAT SESSIONS
FIND
INITIATE CHAT SESSION
TOPIC: TOPIC FOR SESSION
INVITED:
LIST OF PEOPLE YOU INVITED TO CHAT.
MESSAGE AUTHORING
PAINTBRUSH
TEXT
ERASER
CLEAR
RESULTS: SEARCH FOR USER
2 USERS FOUND
AVAILABLE (1 user)
☐ JASON SMITH
BUSY CHATTING
AWAY
NOT CONNECTED (1 USER)
☐ JOHN SMITH
ADD TO CONTACTS
MSG
CHAT
CANCEL

Paper Prototype



University of Washington

Basic Materials

Heavy, white paper

Index cards

Post-its

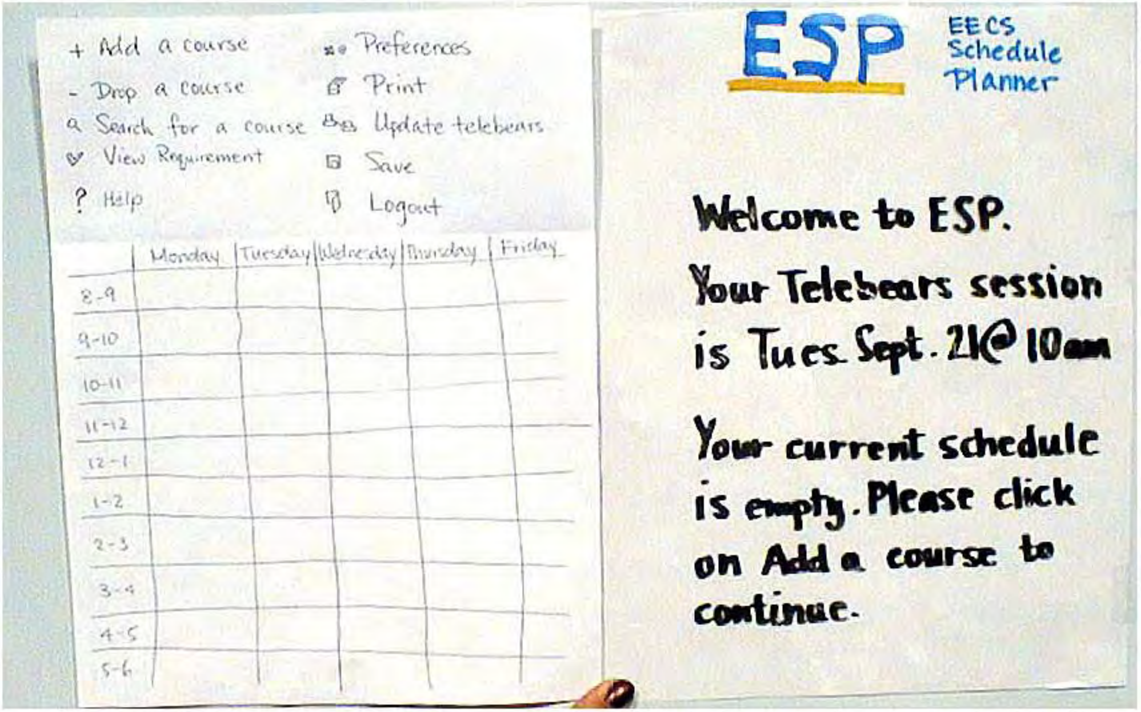
Tape, stick glue, correction tape

Pens and markers in many colors and sizes

Overhead transparencies

Scissors, X-Acto knife

Paper Prototype



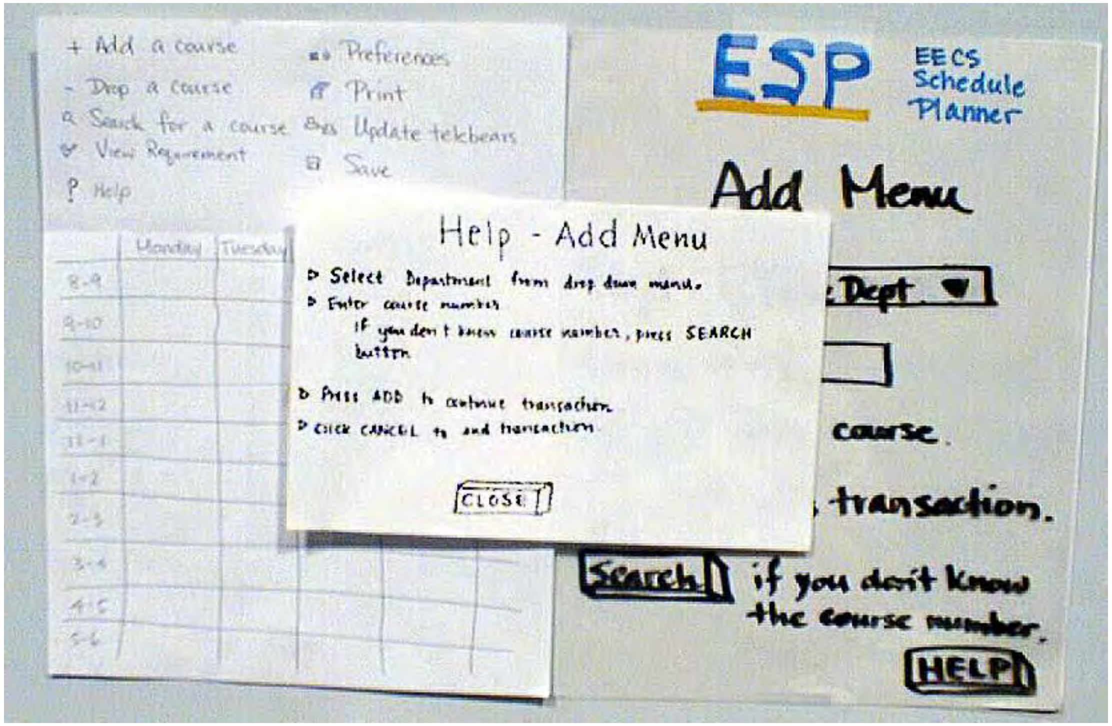
Welcome to ESP.

Your Telebears session is Tues. Sept. 21@ 10am

Your current schedule is empty. Please click on Add a course to continue.

"Screen" faked with pre-constructed pieces

Paper Prototype

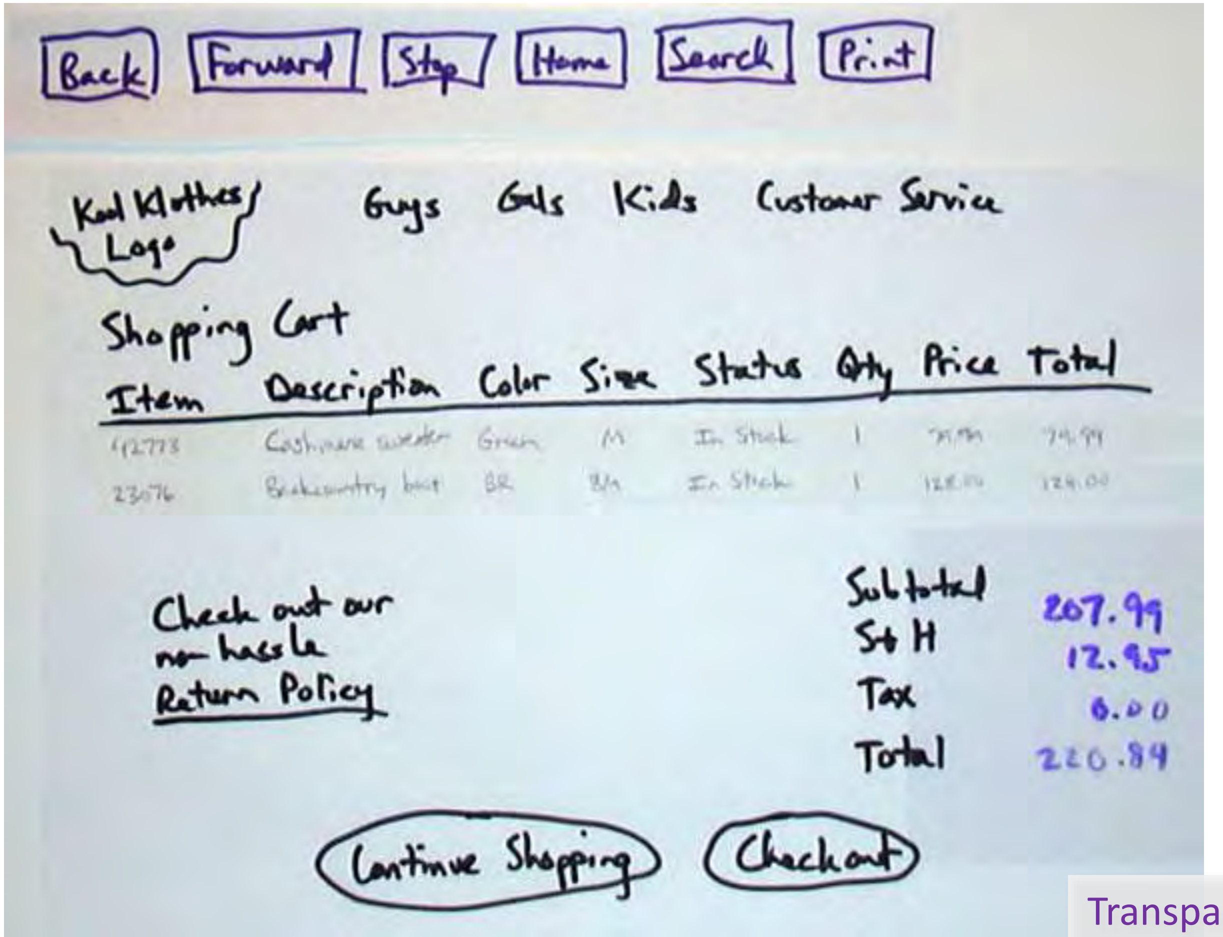


Help - Add Menu

- Select Department from drop down menu.
- Enter course number
  If you don't know course number, press SEARCH button
- Press ADD to continue transaction.
- Click CANCEL to end transaction.

New pieces added in response to interaction

Paper Prototype



Shopping Cart

Item	Description	Color	Size	Status	Qty	Price	Total
412773	Cashmere sweater	Green	M	In Stock	1	79.99	79.99
23076	Backcountry boot	BR	8½	In Stock	1	128.00	128.00

Check out our no-hassle Return Policy

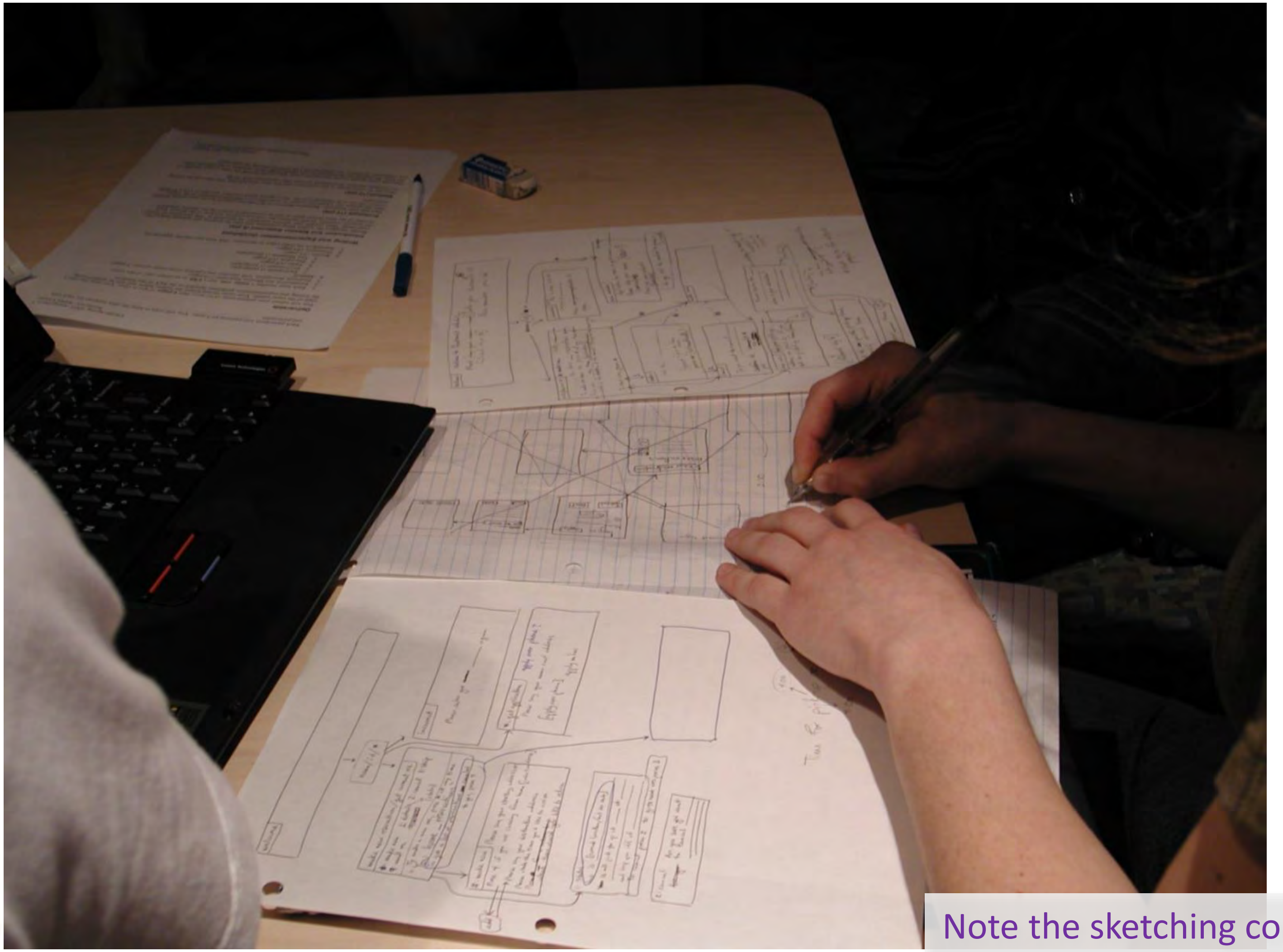
Subtotal	207.99
S+H	12.95
Tax	0.00
Total	220.84

Transparencies allow flexible use of text

Constructing the Prototype

- Set a deadline
  - Do not think too long
  - Instead build it, then learn and iterate as you go
- Put different screen regions on cards
  - Anything that moves, changes, appears/disappears
- Ready responses for actions
  - Have those pull-down menus already made
  - Planned tasks can guide this
- Use photocopier to make many versions

Constructing the Prototype



Note the sketching continues

dub University of Washington

Constructing the Prototype

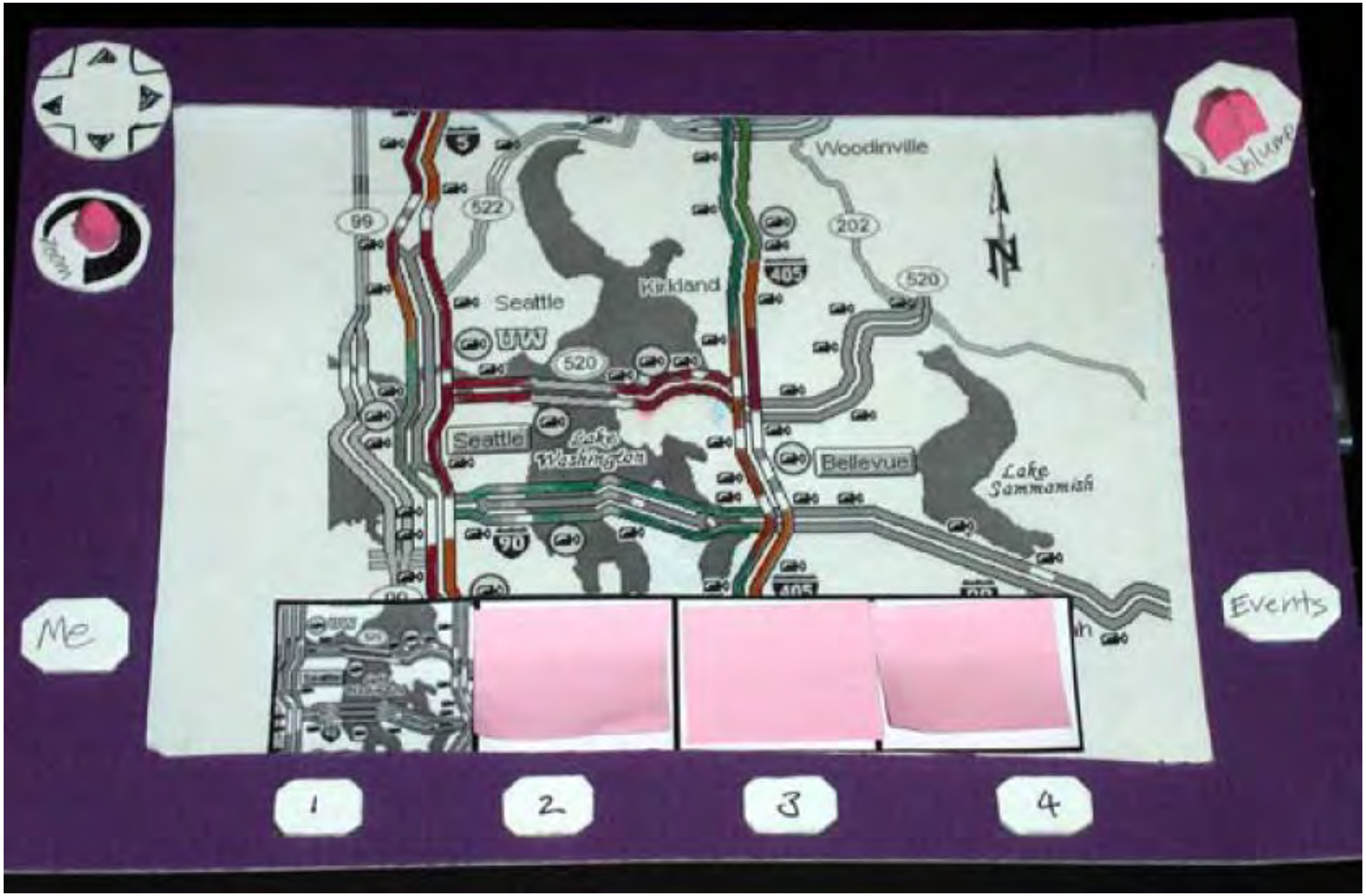
Planning what is needed given tasks

Constructing the Prototype

Prototyping physical form

University of Washington

Constructing the Prototype



Prototyping physical form

Constructing the Prototype

Remember your target platform constraints

Why Usability Test?

Find and fix problems in a design

- Removes the expert blind spot
- Obtain data to unify team around changes
- Uncover unexpected behaviors

Results drive changes, sometimes innovations

In the long run, this is a win-win

- Both improves design and saves money

Deciding What Data to Collect

Process data

- Observations of what people do and think
- Focused on improving this process

Summary, statistical, or bottom-line data

- Summary of what happened (time, errors, success)
- Focused on measurement

Deciding What Data to Collect

- Process data
  - Observations of what people do and think
  - Focused on improving this process
- Summary, statistical, or bottom-line data
  - Summary of what happened (time, errors, success)
  - Focused on measurement
- Focus on process data
  - Gives overview of where the problems are
  - More useful than “too slow” or “too many errors”

Not a Scientific Experiment

- Focus is on improving the design
  - Experimental control is not as necessary
  - Data measurement is not as precise
  - Number of participants is fairly small
- Changes can be made
  - Fix the obviously broken design
  - Quickly explore alternatives
  - Modify the focus of testing between participants

Task-Based Usability

Set up an overall context

> "We are interested in improving people's ability to save, update, and use contacts in their mobile phones."

Then prescribe tasks

1. Try to find the contacts list in the phone
2. View the contact information for John Smith
3. Change John Smith's number to be 555-555-5555

Tasks can be chained to naturally lead to the next

Stages of a Usability Test

Preparation

Introducing the Test

Conducting the Test

Debriefing

Analyzing the Data

Creating the Report

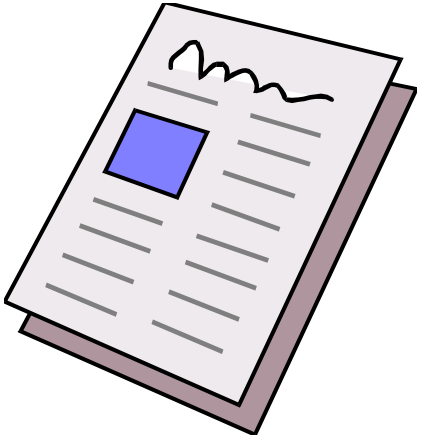
Preparing for a Test

- Select your participants
  - Friends and family are not your design targets
  - Understand background, consider recruiting questionnaire
- Prepare tasks and paper prototype
- Practice to avoid “bugs” in your prototype

Usability Test Proposal

A report that contains

Objective, Description of System, Environment and Materials, Participants, Methodology, Tasks, Test Measures



Work through it with colleagues to debug test

Reuse when presenting final report

Introducing the Test

Address Feelings of Judgment

“Today we are interested in learning about X. That’s where you come in!”

“I did not develop X. I just want to know what the problems are with X.”

“It is X being tested here, not you.”

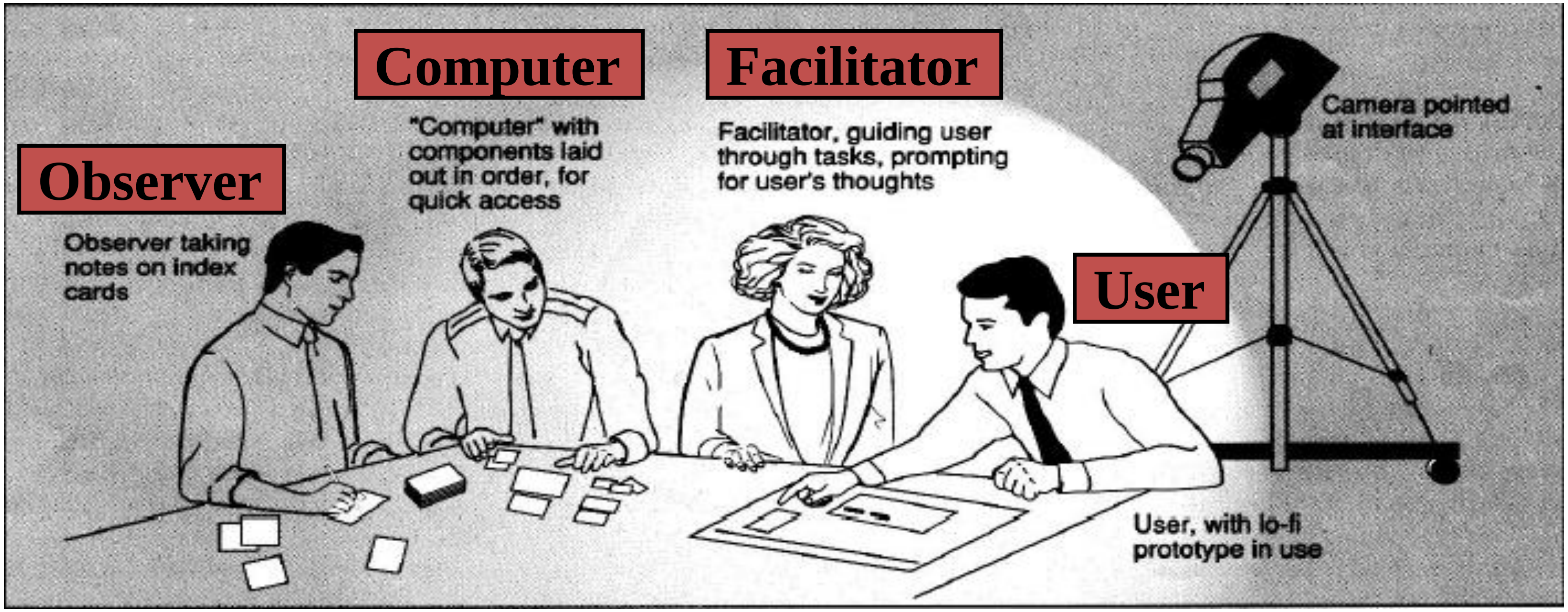
Introducing the Test

Set Expectations for Process

> “It is essential you think out loud while working with X. Tell me constantly what you are thinking, looking for, wondering, confused about, surprised, and so on. If you stop talking, I will prompt you to talk.”

> “I will not be able to answer your questions when you start using X. Do you have any questions now?”

Conducting a Test



See the Gommol reading tips on a test session

Rettig, 1994

Talk-Aloud Prompts

"Tell me what you are trying to do."

"Please keep talking."

"Tell me what you are thinking."

"Are you looking for something? What?"

"What did you expect to happen just now?"

"What do you mean by that?"

"Talk-aloud" is similar but distinct from "think-aloud"

Most do not know or care about the difference,
so you may see the terms used interchangeably

Insight Problems

When people are trying to figure something out, talking aloud can prevent needed "insight"

If your participant is really baffled, it might not be the best time to prompt them to keep talking

- Wait for a natural break, and then ask "What were you thinking just there?"

Retrospective talk-aloud

- Record session, talk through immediately afterward

Answering Questions

Remember the purpose of this test

- You would not be there “in real life”
- You want to see if they can figure it out
- You want to see how hard it is
- You want to see how catastrophic the outcome is

But you do not want to punish the person or completely undermine the rest of the session

- Note any help you provide as a major failure
- Do not allow observing engineers to help

Debriefing

Give them more details about what you were interested in discovering, with their help

Answer any questions they have

- Now you can show them how to accomplish the tasks, talk about what you learned from the test

Thank them for their time

- Appropriate to give some compensation

Analyzing and Reporting the Results

Tests yield many forms of data

Quantitative counts

- time, success/failure
- confusions, errors, workarounds

Observations

- notes about when, where, why, how above occur

Participant comments and feedback

- during session of via a questionnaire

Analyzing and Reporting the Results

Summarize the data

Make a list of critical incidents
- can be positive and negative
- include references back to original data
- try to judge why each difficulty occurred

Sort and prioritize findings
- what does data tell you
- what are the important results
- anything missing from test

Task Design is Important

The goal of a test is to figure out how a person interacts with an interface in the wild...

There are two possible explanations for why a test does not find significant problems:

The interface does not have significant problems

The test itself has significant problems

Task Design is Important

Testing is not entirely in the wild

As a part of focusing the test, you often need to give a person a somewhat artificial task

The artificiality of the task may influence how people interact with an interface...

...and thus may influence the outcomes and insights gained through user testing

Bad: Artificial Subgoals

People using the design “in the wild”
may not necessarily form these same subgoals

The task should give one top-level goal, a people should form their subgoals while pursuing this

Now you want to choose the type of paper you want to print your document on. Lets imagine that Bin “B” has the paper you want to print your paper on, please complete this task.

Now set the darkness of your copies to about 50% dark.
After setting the darkness, you decide you want to print 2 sides of copies on two sides of paper. Please complete this task.

Bad: Artificial Ordering

With an artificial ordering of information or subgoals, people might not proceed in this order

The ordering might also be biased towards the layout of the interface, which would conceal any problems with finding the appropriate control

- Enter in 10 copies, with lightness set to 10%.
- Choose 1 sided to 2 sided, use paper source bin A.
- Cover sheet needed, using paper bin B for cover sheet.
- Set stapling feature on and collating on.
- Start printing.

Bad: Changing the Task

The task is to make copies, and this happens to involve entering information in the copier interface

But this task description is an data entry task, “Here is some information. Put it in the interface.”

- Make 23 copies
- With collate
- Cover sheets
- Default darkness
- 1 Sided-> 1 Sided

Bad: Giving the Answers

Tells the person what terminology the interface uses, which they might not otherwise know

lighten = contrast, sorted = collated?

> You are a teacher and are trying to make 40 copies of a one-sided magazine article that is 10 pages long for your class tomorrow. Due to the large number of copies, you print the article double-sided, in other words 10 page article would be printed on 5 sheets of paper. Due to the high contrast of the article, you must lighten the copy, in other words change the contrast. You then want the copies to be collated and stapled.

Good: Giving Context

Giving realistic context through scenarios can reduce the artificiality of the task

It's your first day in the office, starting a new job. You would like to make some copies of several documents that your boss gave you to browse through. Your colleague in the next cubicle tells you that you need an access code to make copies. The code is 5150. You walk over to the copy machine at the end of the hall and realize that it is not the Xerox copier that you are accustomed too... Make 2 copies of the "Company Annual Report".

Consider: Under-Specified Tasks

Many realistic goals are under-specified, as people have only a general idea what they want

By under-specifying the task, you can elicit realistic confusion and decision-making

> You just finished fixing up the old hot rod in the garage and now its time to sell her. Make a couple copies of the pictures you took to send into the used car sales magazines. It’s ok that they’re in black and white but maybe you should lighten them up a bit. Your account billing code is 5150.

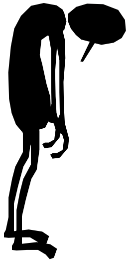
Task Design Summary

Task design is difficult and important

Poorly designed tasks mask interface failures

If you are not confident in your task descriptions, have others help you “debug” them before testing

Ethical Considerations



Testing is stressful, can be distressing

- people can leave in tears

You have a responsibility to alleviate

- make voluntary with informed consent
- avoid pressure to participate
- let them know they can stop at any time
- stress that you are testing the system, not them
- make collected data as anonymous as possible

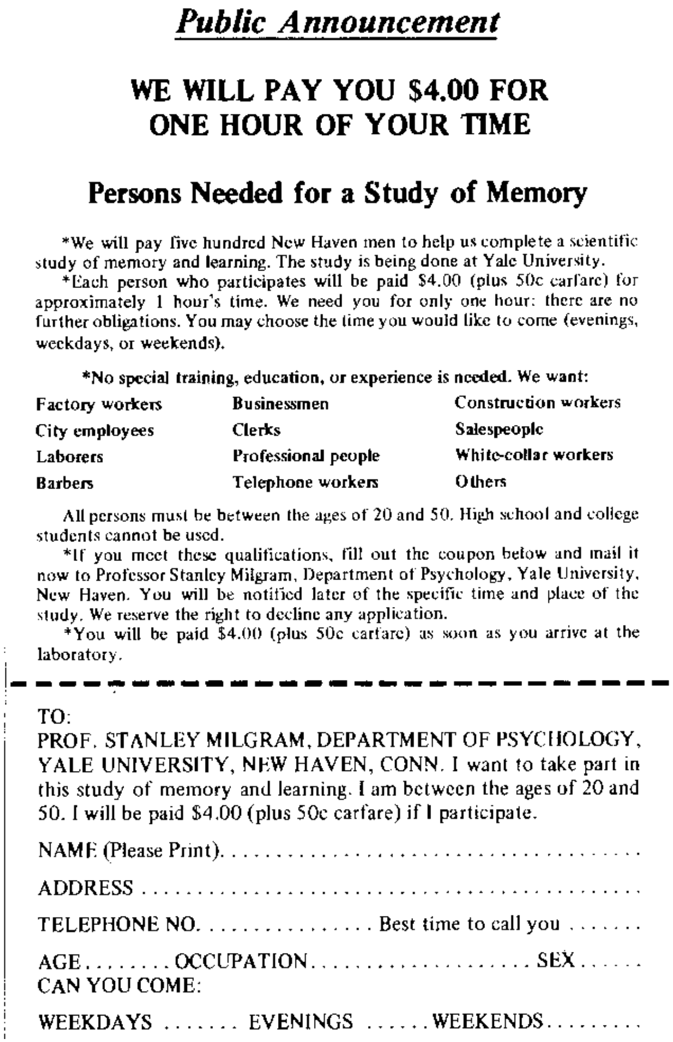
Human Subjects Approvals

Research requires human subjects review of process

This does not formally apply to your design work

- But understand why we do this and check yourself

- Companies are judged in the eye of the public



Public Announcement

WE WILL PAY YOU $4.00 FOR ONE HOUR OF YOUR TIME

Persons Needed for a Study of Memory

*We will pay five hundred New Haven men to help us complete a scientific study of memory and learning. The study is being done at Yale University.

*Each person who participates will be paid $4.00 (plus 50c carfare) for approximately 1 hour's time. We need you for only one hour: there are no further obligations. You may choose the time you would like to come (evenings, weekdays, or weekends).

*No special training, education, or experience is needed. We want:

Factory workers	Businessmen	Construction workers
City employees	Clerks	Salespeople
Laborers	Professional people	White-collar workers
Barbers	Telephone workers	Others

All persons must be between the ages of 20 and 50. High school and college students cannot be used.

*If you meet these qualifications, fill out the coupon below and mail it now to Professor Stanley Milgram, Department of Psychology, Yale University, New Haven. You will be notified later of the specific time and place of the study. We reserve the right to decline any application.

*You will be paid $4.00 (plus 50c carfare) as soon as you arrive at the laboratory.

TO:
PROF. STANLEY MILGRAM, DEPARTMENT OF PSYCHOLOGY, YALE UNIVERSITY, NEW HAVEN, CONN. I want to take part in this study of memory and learning. I am between the ages of 20 and 50. I will be paid $4.00 (plus 50c carfare) if I participate.

NAME (Please Print). . . . .

ADDRESS . . . .

TELEPHONE NO. . . . . Best time to call you . . . .

AGE . . . . OCCUPATION. SEX . . . . . .
CAN YOU COME:

WEEKDAYS . . . . EVENINGS . . . . . . WEEKENDS. . . . .

In-Class Design, Prototype, Test

Design and prototype a new touchscreen alarm clock to be deployed in a very high end hotel brand. Your alarm clock should be immediately usable for tired, busy, or just-don't-want-to-be-bothered travelers who will spend zero time learning your interface.

In addition to displaying the current time, your alarm clock should include basic functionality for:

turning the alarm on/off

setting the wake-up time

anything else you think is appropriate

Guests will interact with your alarm using a touch panel.

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 10:
Paper Prototyping and Testing

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

design:
use:
build:

University of Washington

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 12:
Inspection-Based Methods

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

design:
use:
build:

University of Washington

Today

In-Class

- Inspection-Based Methods
- Heuristic Evaluation of Paper Prototypes

Revise Prototypes

Usability Testing Check-In for Friday

- Changes from Inspection
- Changes from First Usability Test

Inspection-Based Methods

We have cut prototyping to its minimum

- Sketches, storyboards, paper prototypes
- Rapid exploration of potential ideas

But we need evaluation to guide improvement

- Evaluation can become relatively slow and expensive
- Study participants can be scarce
- May waste participants on fairly obvious problems

Inspection-Based Methods

Simulate study participants

- Instead of actual study participants, use inspection to quickly and cheaply identify likely problems

Inspection methods are rational, not empirical

Today we cover two complementary methods

- Heuristic Evaluation
- Cognitive Walkthrough

Heuristic Evaluation

Developed by Jakob Nielsen

Helps find usability problems in a design

Small set of evaluators examine interface

- three to five evaluators
- independently check compliance with principles
- different evaluators will find different problems
- evaluators only communicate afterwards

Can perform on working interfaces or sketches

Nielsen’s 10 Heuristics

Too few unhelpful, too many overwhelming

- “Be Good” versus thousands of detailed rules

Nielsen seeks to create a small set

- Collects 249 usability problems
- Collects 101 usability heuristics
- Rates how well each heuristics explains each problem
- Factor analysis to identify key heuristics

University of
Washington

Nielsen, 1994

Nielsen’s 10 Heuristics

Visibility of system status
Match between system and the real world
User control and freedom
Consistency and standards
Error prevention
Recognition rather than recall
Flexibility and efficiency of use
Aesthetic and minimalist design
Help recognize, diagnose, and recover from errors
Help and documentation

Nielsen, 1994

1. Visibility

Visibility of system status

The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

1. Visibility

Visibility of system status

The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

Refers to both visibility of system status and use of feedback

Anytime wondering what state the system is in, or the result of some action, this is a visibility violation.

2. Real World Match

Match between system and the real world

The system should speak the users’ language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

2. Real World Match

Match between system and the real world

> The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

Refers to word and language choice, mental model, metaphor, mapping, and sequencing

3. User in Control

User control and freedom

Users often choose system functions by mistake and will need a clearly marked “emergency exit” to leave the unwanted state without having to go through an extended dialogue.

Support undo and redo.

3. User in Control

User control and freedom

Users often choose system functions by mistake and will need a clearly marked “emergency exit” to leave the unwanted state without having to go through an extended dialogue.

Support undo and redo.

Not just for navigation exits,
but for getting out of any situation or state.

4. Consistency

Consistency and standards

Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.

4. Consistency

Consistency and standards

> Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.

Internal consistency is consistency throughout the same product. External consistency is consistency with other products in its class.

5. Error Prevention

Error prevention

Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.

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Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.

Try to commit errors and see how they are handled. Could they have been prevented?

6. Recognition not Recall

Recognition rather than recall

Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

6. Recognition not Recall

Recognition rather than recall

- Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

People should never carry a memory load

6. Recognition not Recall

Addresses visibility of features and information

- where to find things

Visibility addresses system status and feedback

- what is going on

Problems with affordances may go here

- hidden affordance: remember where to act
- false affordance: remember it is a fake

7. Flexibility and Efficiency

Flexibility and efficiency of use

Accelerators -- unseen by the novice user -- may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users.

Allow users to tailor frequent actions.

7. Flexibility and Efficiency

Flexibility and efficiency of use

> Accelerators -- unseen by the novice user -- may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users.
>
> Allow users to tailor frequent actions.

Concerns anywhere users have repetitive actions that must be done manually. Also concerns allowing multiple ways to do things.

8. Aesthetic Design

Aesthetic and minimalist design

Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

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Aesthetic and minimalist design

Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

Not just about "ugliness".
About clutter, overload of visual field,
visual noise, distracting animations, and so on.

9. Error Recovery

Help users recognize, diagnose, and recover from errors

Error messages should be expressed in plain language (no codes),
precisely indicate the problem,
and constructively suggest a solution.

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Help users recognize, diagnose, and recover from errors

> Error messages should be expressed in
> plain language (no codes),
> precisely indicate the problem,
> and constructively suggest a solution.

Error prevention is about preventing errors before they occur. This is about after they occur.

10. Help

Help and documentation

Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search,
focused on the user’s task, list concrete steps to be carried out, and not be too large.

10. Help

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Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

This does not mean that the user must be able to ask for help on every single item.

Heuristic Evaluation Process

Evaluators go through interface several times

  inspect various dialogue elements

  compare with list of usability principles

Usability principles

  Nielsen’s “heuristics”

  supplementary list of category-specific heuristics (competitive analysis or testing existing products)

Use violations to redesign/fix problems

Examples

Can’t copy info from one window to another

- violates “Minimize memory load” (H6)
- fix: allow copying

Typography uses different fonts in 3 dialog boxes

- violates “Consistency and standards” (H4)
  - slows users down
  - probably wouldn’t be found by usability testing
- fix: pick a single format for entire interface

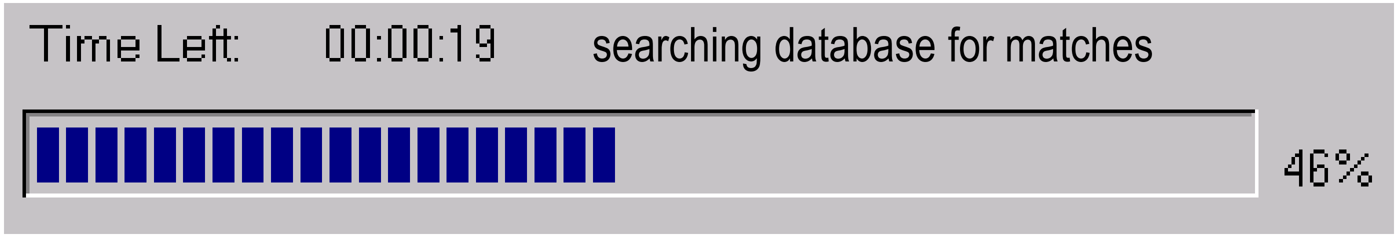
Heuristics

Heuristics


Time Left: 00:00:19

46%

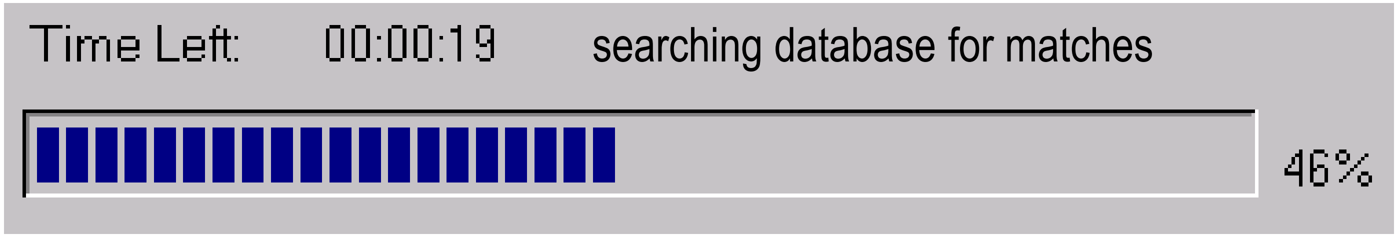
Heuristics



Time Left: 00:00:19 searching database for matches

46%

Heuristics



Time Left: 00:00:19 searching database for matches

46%

Visibility of system status

pay attention to response time

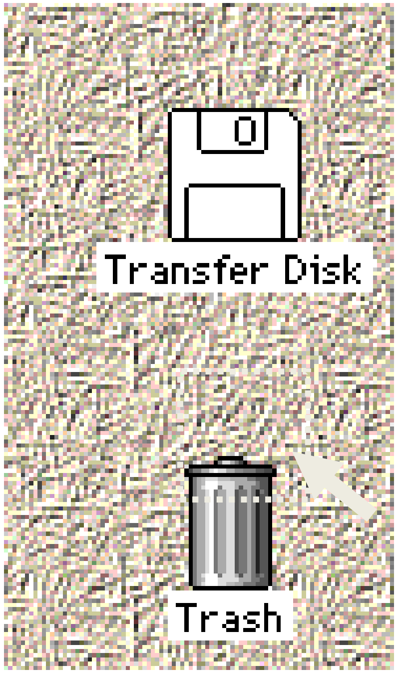
0.1 sec: no special indicators needed (why?)

1.0 sec: user tends to lose track of data

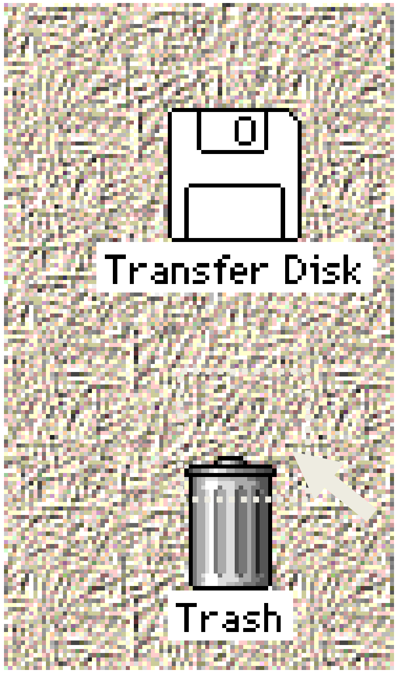
10 sec: maximum duration if user to stay focused on action

longer delays absolutely require percent-done progress bars

Heuristics



Heuristics



Mac desktop

- Dragging disk to trash should delete, not eject it

Match system to real world

- Speak the user’s language
- Follow conventions

Heuristics

mailto is not a registered protocol.

Heuristics

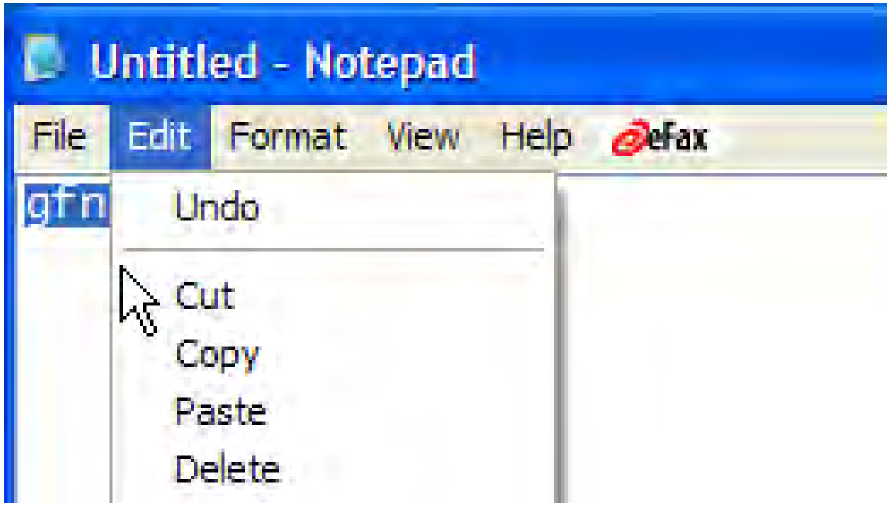
mailto is not a registered protocol.

“Mailto”, “protocol”?

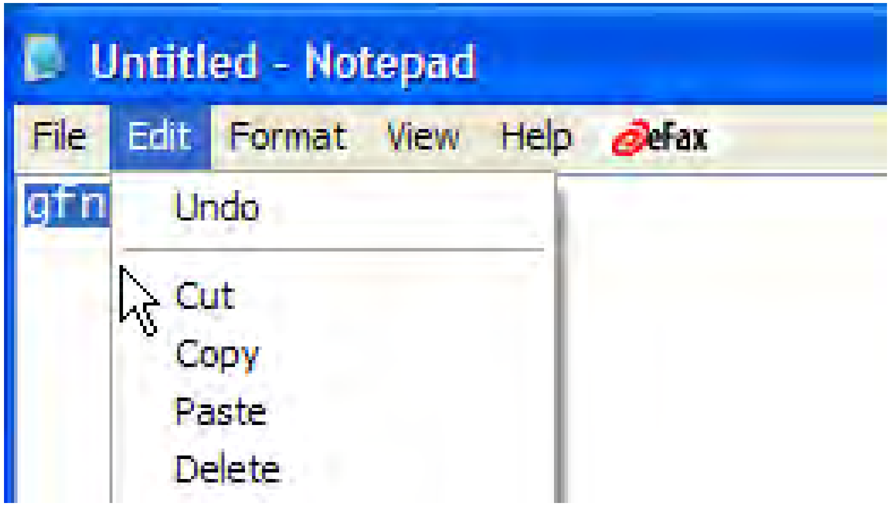
Match system to real world

Speak the user’s language

Heuristics


Untitled - Notepad
File
Edit
Format
View
Help
efax
gfn
Undo
Cut
Copy
Paste
Delete

Heuristics

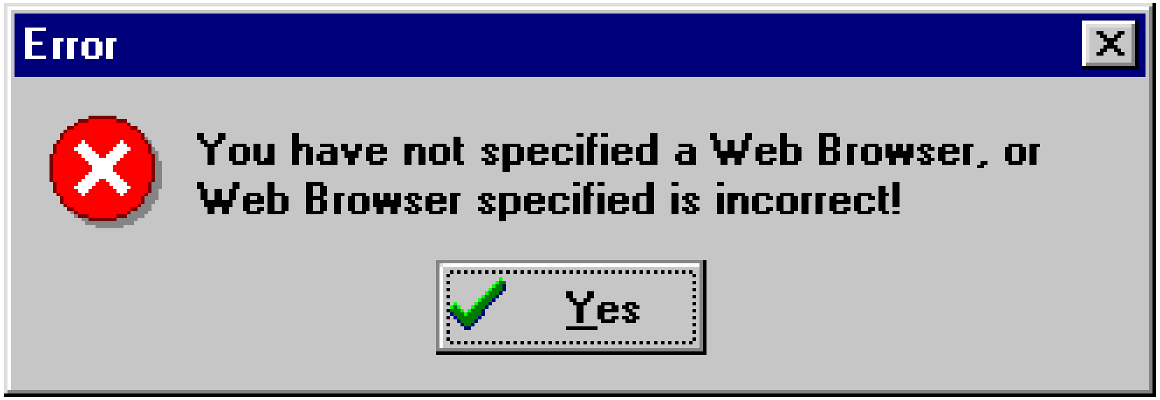


Flexibility and Efficiency of Use

accelerators for experts (e.g., keyboard shortcuts)

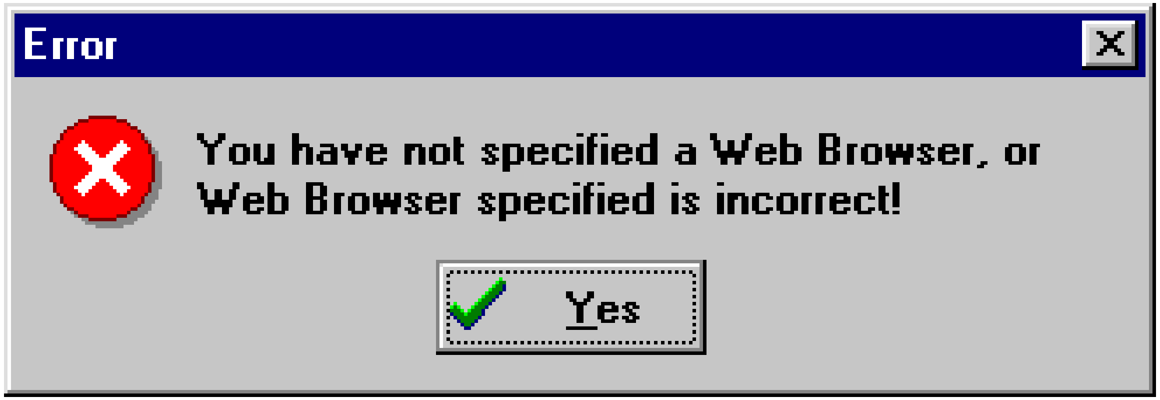
allow tailoring of frequent actions (e.g., macros)

Heuristics



You have not specified a Web Browser, or Web Browser specified is incorrect!

Heuristics



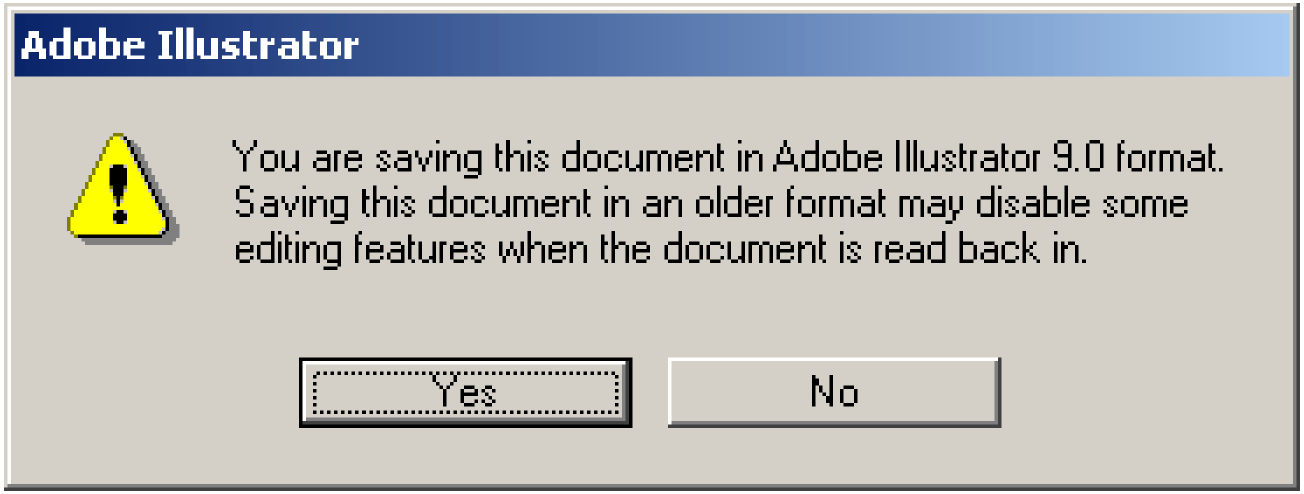
Error

You have not specified a Web Browser, or Web Browser specified is incorrect!

Help recognize, diagnose, & recover from errors

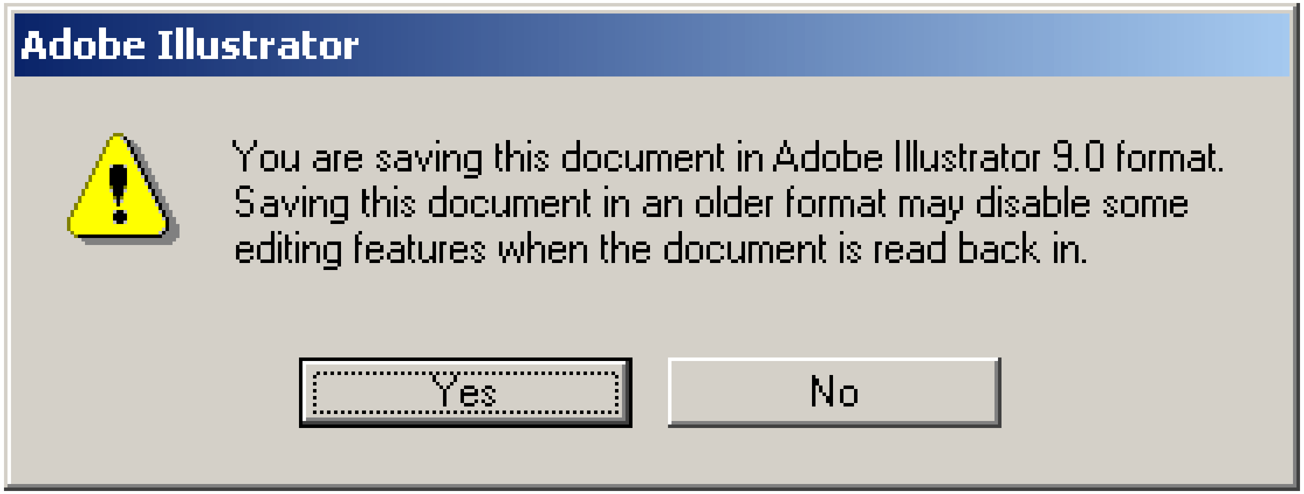
- error messages in plain language
- precisely indicate the problem
- constructively suggest a solution

Heuristics



You are saving this document in Adobe Illustrator 9.0 format. Saving this document in an older format may disable some editing features when the document is read back in.

Heuristics

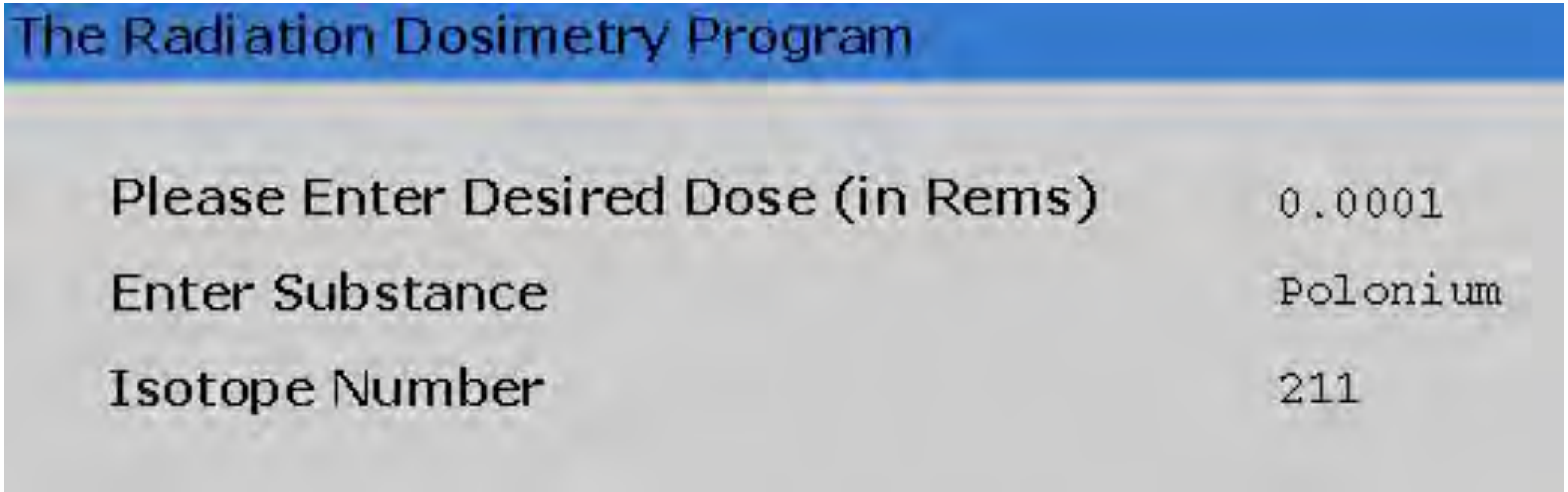


You are saving this document in Adobe Illustrator 9.0 format. Saving this document in an older format may disable some editing features when the document is read back in.

User Control and Freedom

Prevent Errors

Heuristics



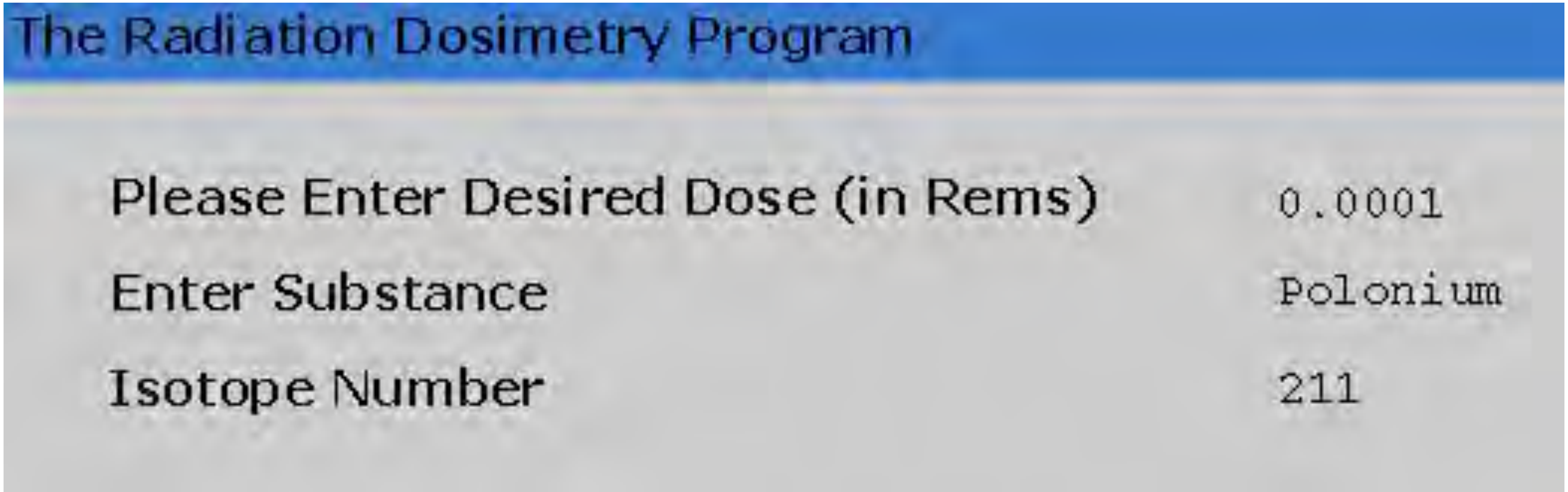
The Radiation Dosimetry Program

Please Enter Desired Dose (in Rems) 0.0001

Enter Substance Polonium

Isotope Number 211

Heuristics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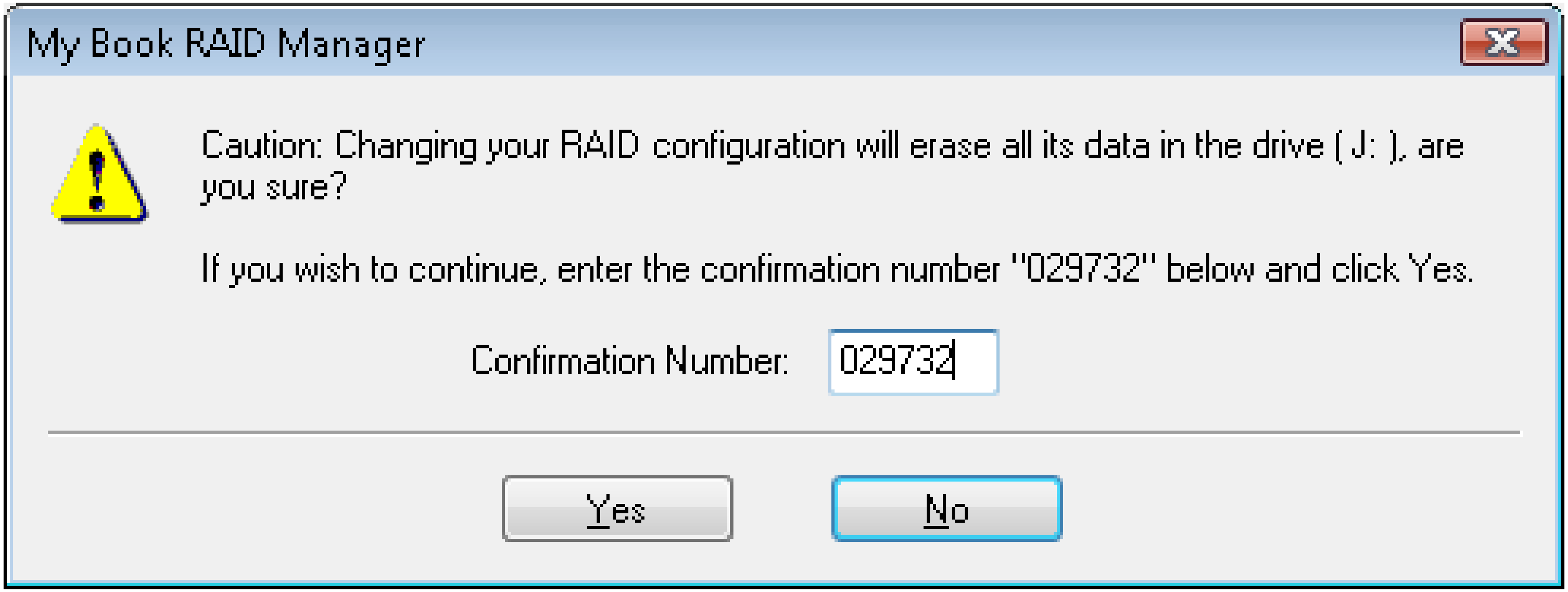
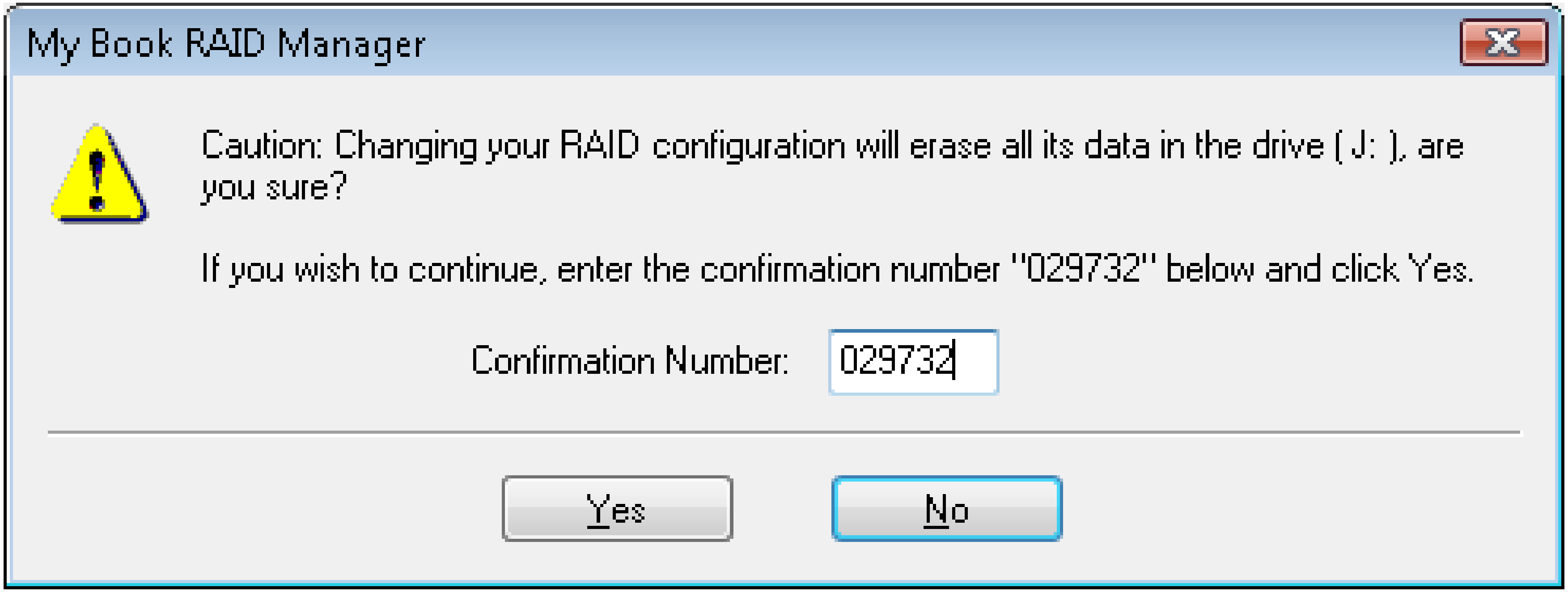


Caution: Changing your RAID configuration will erase all its data in the drive (J:), are you sure?

If you wish to continue, enter the confirmation number "029732" below and click Yes.

Confirmation Number: 029732

Heuristics



My Book RAID Manager

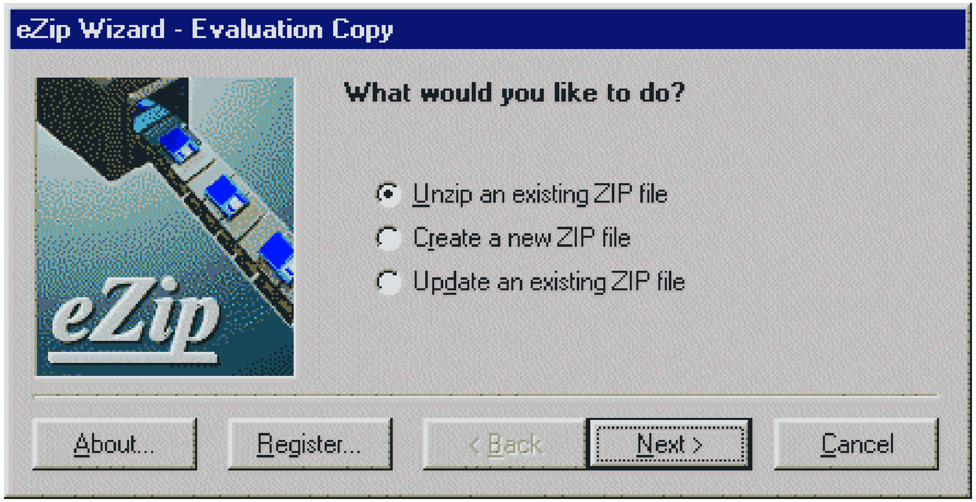
Caution: Changing your RAID configuration will erase all its data in the drive (J:), are you sure?

If you wish to continue, enter the confirmation number "029732" below and click Yes.

Confirmation Number: 029732

Prevent Errors

Heuristics

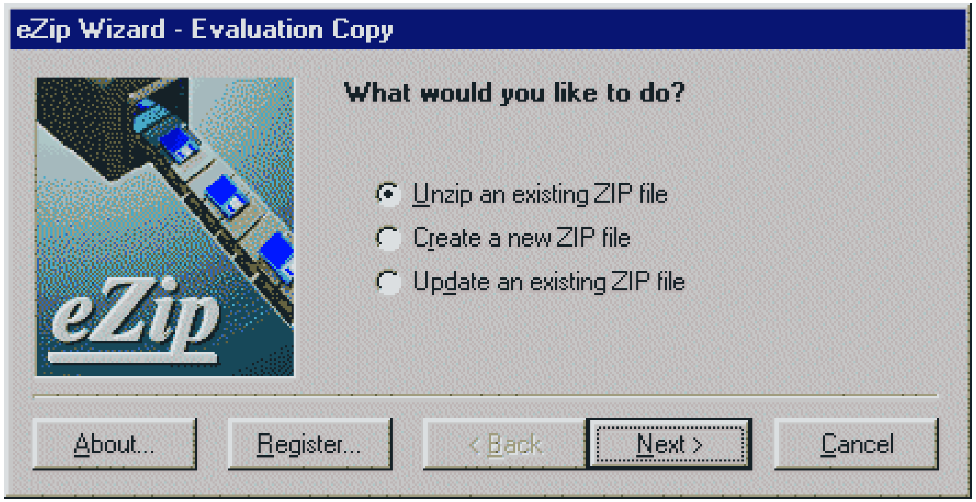


eZip Wizard - Evaluation Copy

What would you like to do?

● Unzip an existing ZIP file
○ Create a new ZIP file
○ Update an existing ZIP file

Heuristics



What would you like to do?

● Unzip an existing ZIP file
○ Create a new ZIP file
○ Update an existing ZIP file

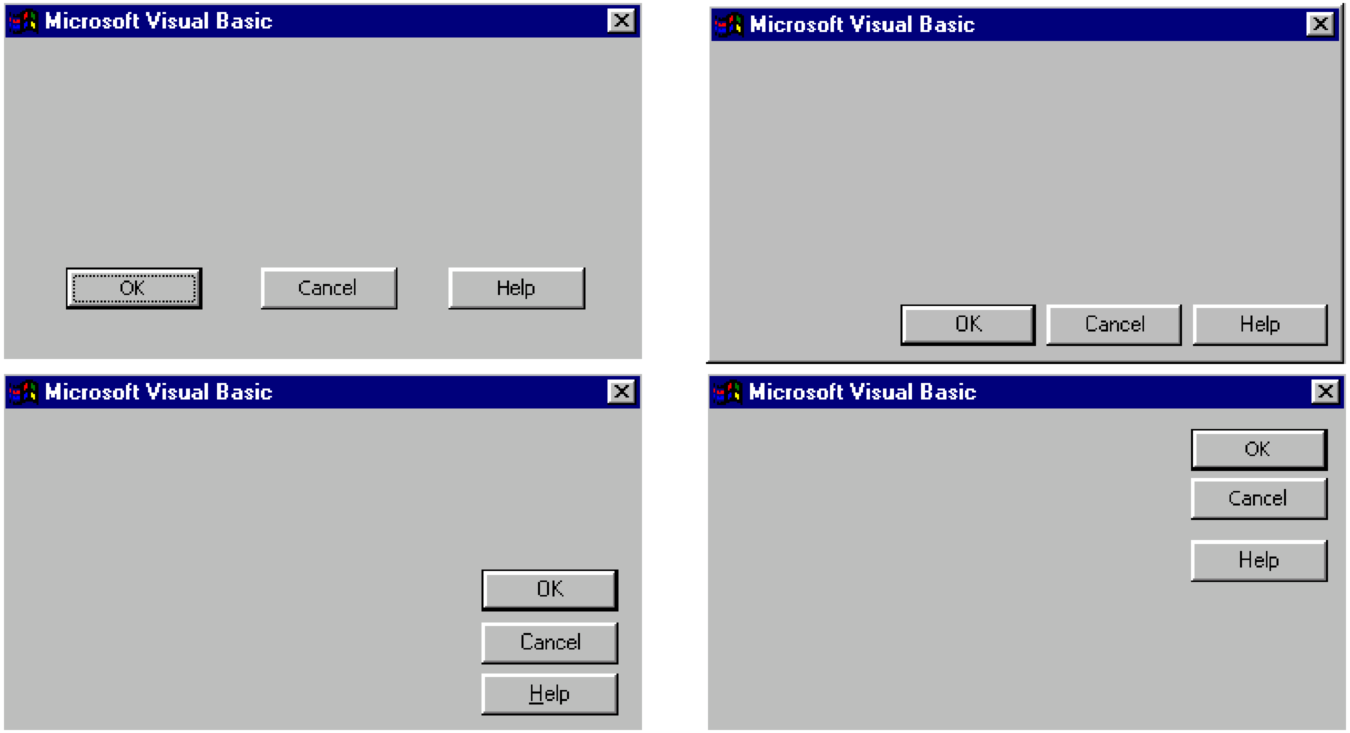
User control & freedom

- provide “exits” for mistaken choices, undo, redo
- don’t force down fixed paths

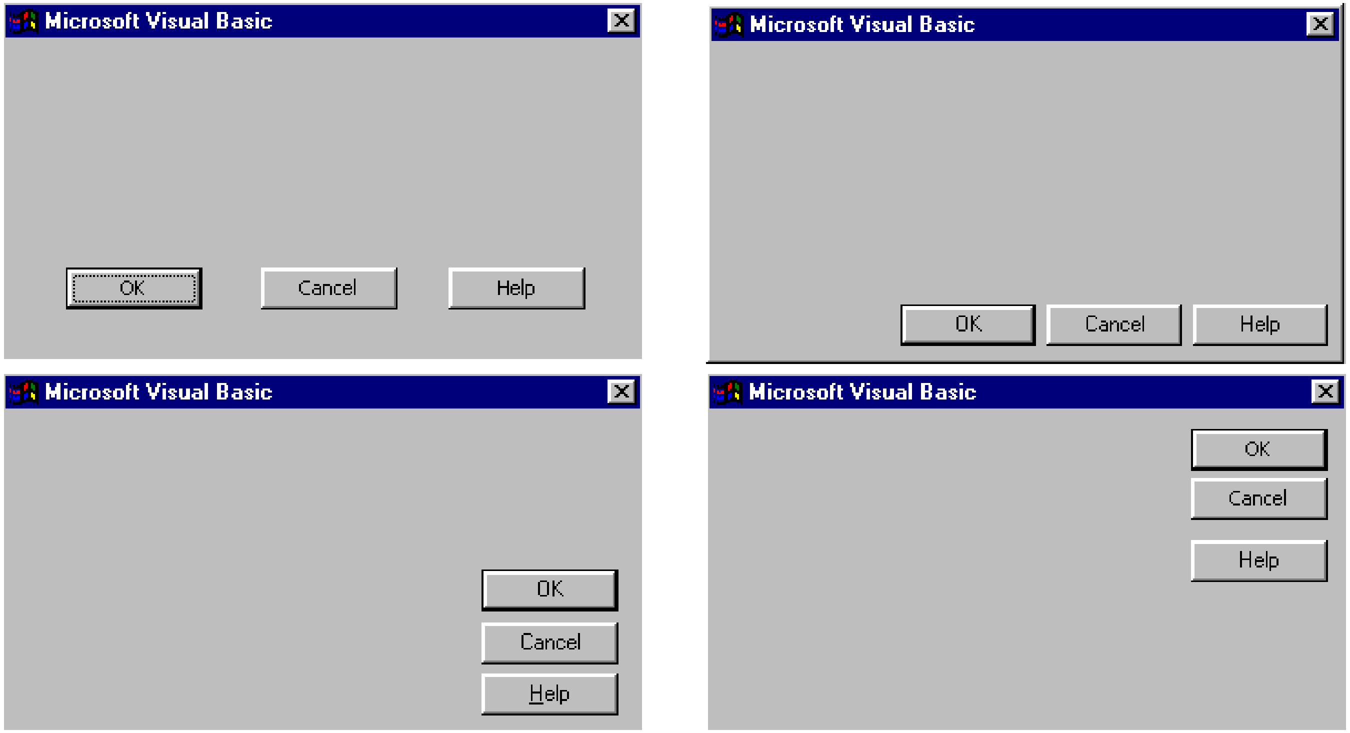
Wizards

- must respond to question before going to next
- good for beginners, infrequent tasks
- not for common tasks
- consider having 2 versions (WinZip)

Heuristics


Microsoft Visual Basic
OK
Cancel
Help
Microsoft Visual Basic
OK
Cancel
Help
Microsoft Visual Basic
OK
Cancel
Help
Microsoft Visual Basic
OK
Cancel
Help

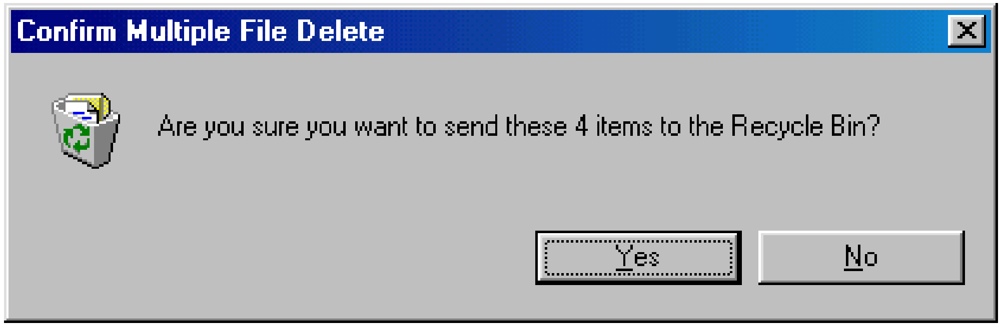
Heuristics



Consistency & Standards

Heuristics

```
% rm cse440*
%
```

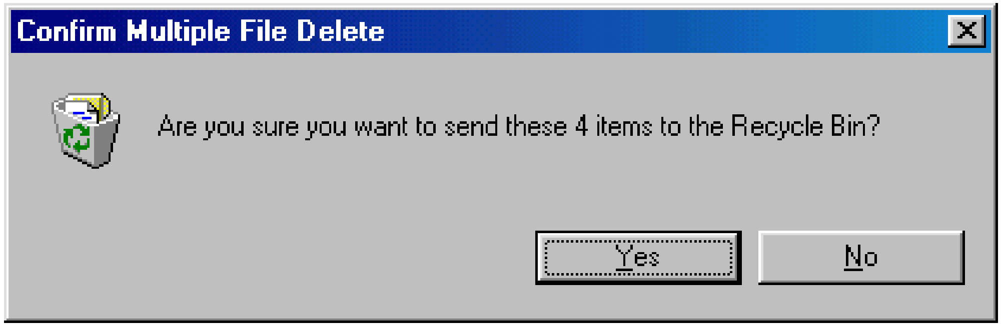


Confirm Multiple File Delete

Are you sure you want to send these 4 items to the Recycle Bin?

Heuristics

```
% rm cse440*
%
```



Confirm Multiple File Delete

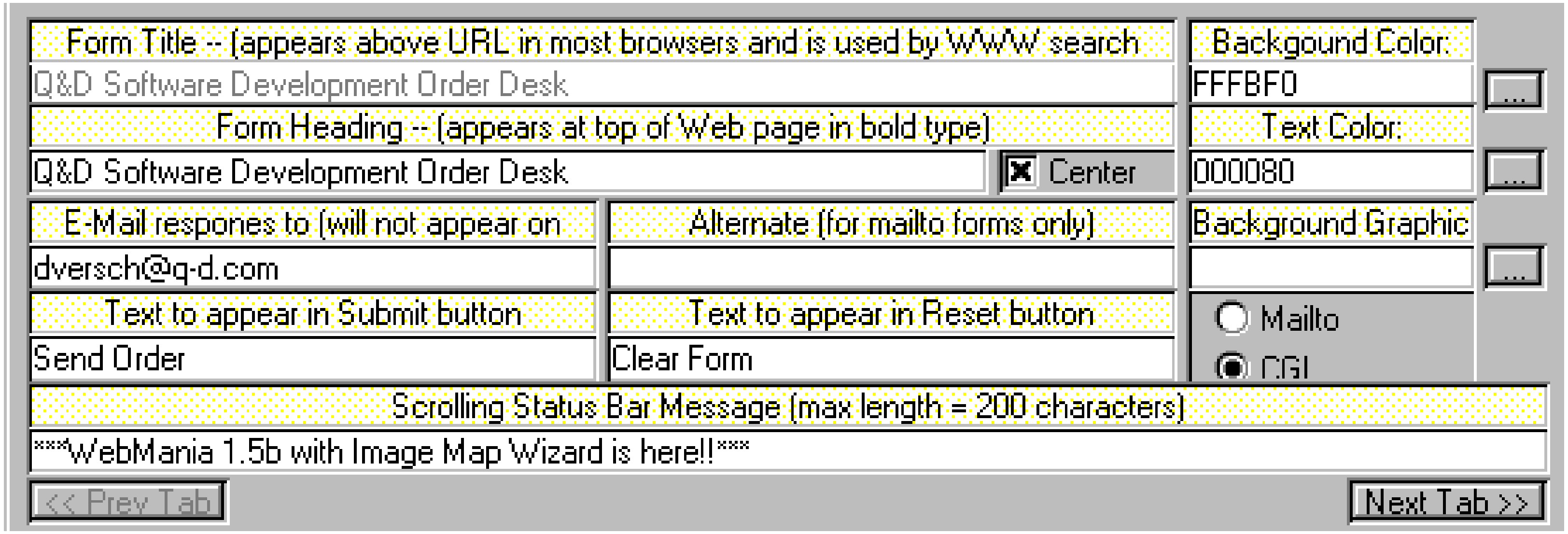
Are you sure you want to send these 4 items to the Recycle Bin?

Error prevention

Recognition rather than recall

Visibility

Heuristics



Form Title -- (appears above URL in most browsers and is used by WWW search
Q&D Software Development Order Desk

Form Heading -- (appears at top of Web page in bold type)
Q&D Software Development Order Desk
☒ Center

E-Mail respones to (will not appear on
dversch@q-d.com

Alternate (for mailto forms only)

Text to appear in Submit button
Send Order

Text to appear in Reset button
Clear Form

Backgound Color:
FFFBF0

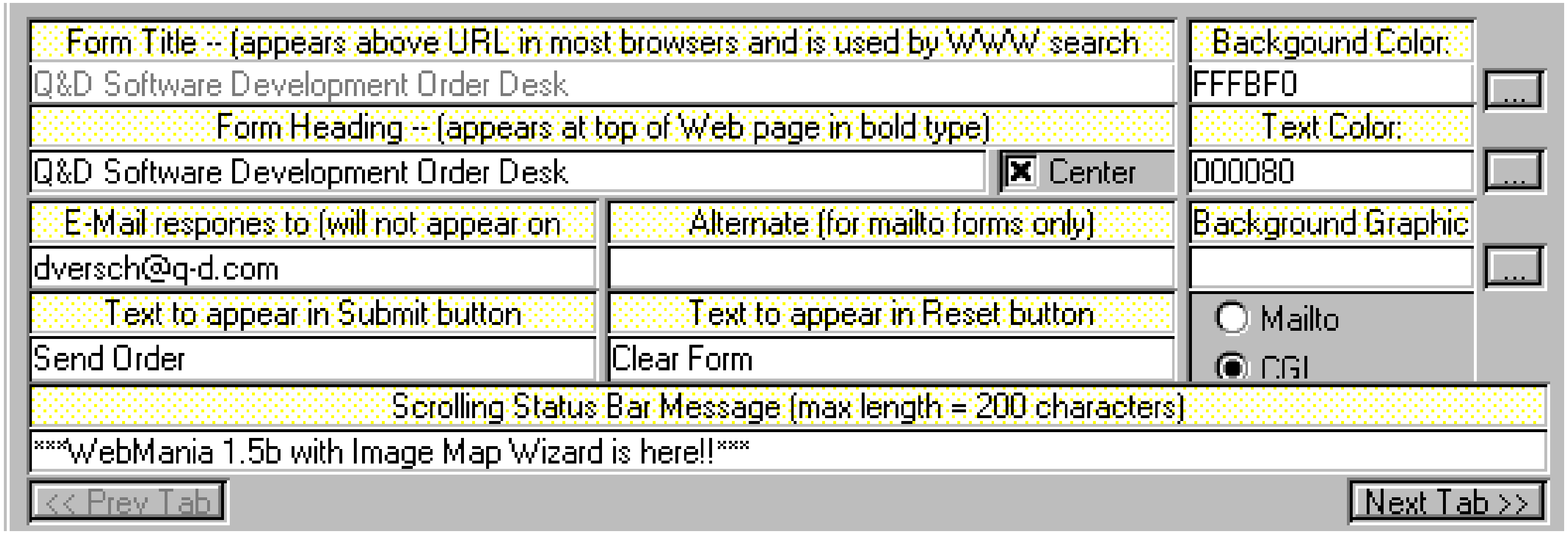
Text Color:
000080

Background Graphic

○ Mailto
● CGI

Scrolling Status Bar Message (max length = 200 characters)
WebMania 1.5b with Image Map Wizard is here!!

Heuristics



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Scrolling Status Bar Message (max length = 200 characters)

WebMania 1.5b with Image Map Wizard is here!!

Aesthetic & Minimalist design

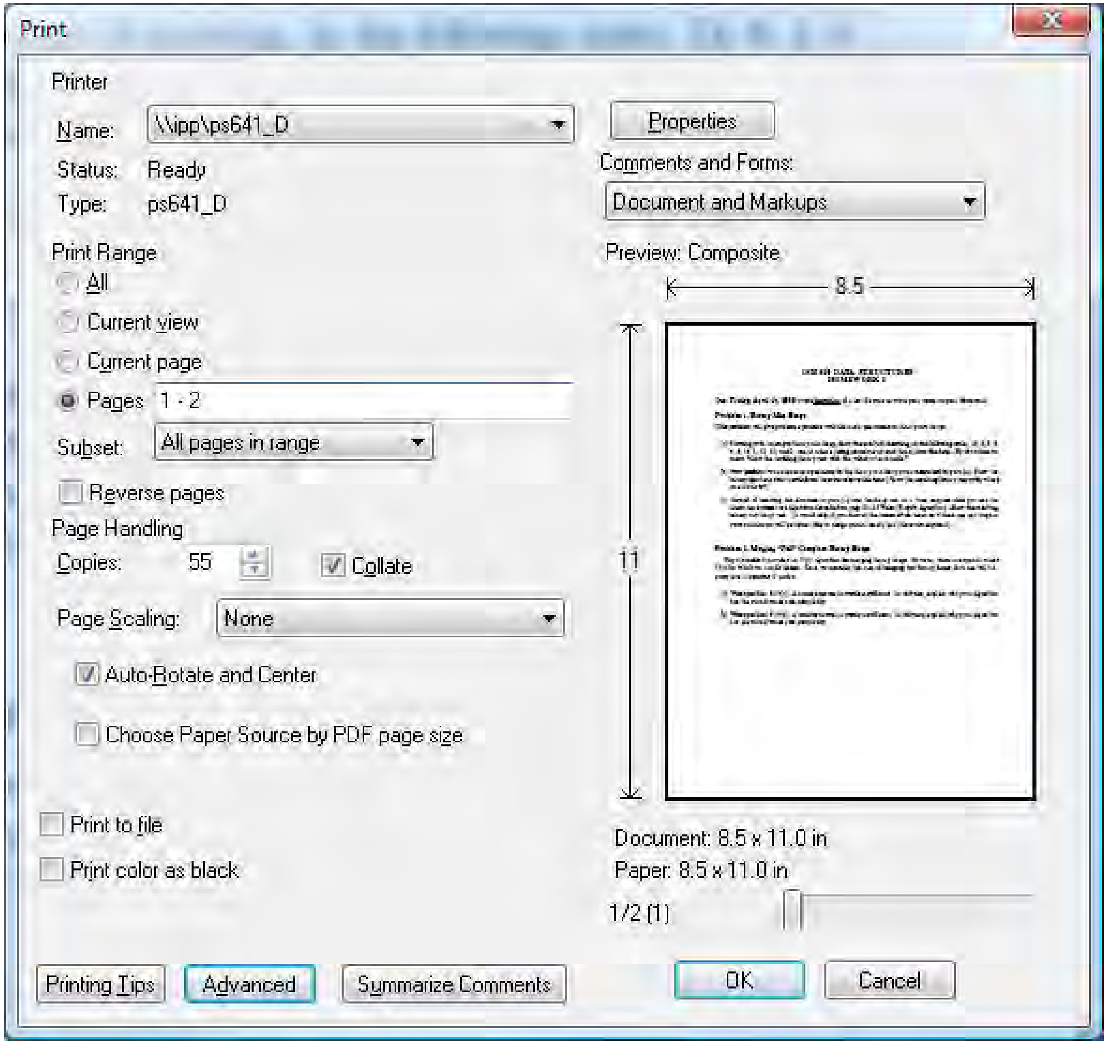
no irrelevant information in dialogues

Heuristics

Select an award style using the scroll bar. When you've found a style that suits you, press OKAY to create that award and open the editor.

CERTIFICATE OF ACHIEVEMENT

Heuristics



Print

Printer

Name: \\ipp\ps641_D

Status: Ready

Type: ps641_D

Print Range

○ All

○ Current view

○ Current page

● Pages 1 - 2

Subset: All pages in range

☐ Reverse pages

Page Handling

Copies: 55

☑ Collate

Page Scaling: None

☑ Auto-Rotate and Center

☐ Choose Paper Source by PDF page size

☐ Print to file

☐ Print color as black

Comments and Forms: Document and Markups

Preview: Composite

Document: 8.5 x 11.0 in

Paper: 8.5 x 11.0 in

1/2 (1)

Heuristics

Your rewards balance is 25,601 Points

Rewarding Experiences

Your Chase card with Ultimate Rewards gives you access to great entertainment including concerts, sporting events, chef dinners and more.

Use your points or your Chase card to redeem for most items, or just your points to bid on the auctions.

Five-Night Vacation to Rome for Two

Auction

Rome, Italy

Opening Bid: 128,575 points

Culinary & Wine	Sports & Leisure	Art & Entertainment
Culinary Experiences (29)	Car Racing (38)	More Art & Entertainment (4)
Wine Experiences (2)	Adventure (27)	Museums (1)
Restaurants (1)	Outdoor Activities (24)	Music (1)
See All Culinary & Wine	See All Sports & Leisure	See All Art & Entertainment

Gift Ideas

Cook up Sweet Chocolate Creations
43,400 points or
$434 on your Chase Card

Private Photography Lesson
Current Bid: 12,519 points

DJ Delights
14,400 points or

Featured Experiences

These new Experiences offer excitement on land, on sea and in the air!

Ride shotgun in a dragster at Brainerd International Raceway. $184 or 18400 points.

Dance and dine on a Washington, D.C. dinner cruise for two. $249 or 24900 points.

How It Works

There are two types of rewards:

Auctions
For auctions, you can bid on rewards using your points. If you are the top bidder when the auction expires, you win.

Redeem Now
For everything else, you can redeem now using your points or your Chase card with Ultimate Rewards.

Phases of Heuristic Evaluation

1) Pre-evaluation training

   give expert evaluators needed
   domain knowledge & information on the scenario

2) Evaluation

   individuals evaluate interface & make lists of problems

3) Severity rating

   determine how severe each problem is

4) Aggregation

   group meets & aggregates problems (w/ ratings)

5) Debriefing

   discuss the outcome with design team

How to Perform Evaluation

At least two passes for each evaluator

- first to get feel for flow and scope of system
- second to focus on specific elements

If system is walk-up-and-use or evaluators are domain experts, no assistance needed

- otherwise might supply evaluators with scenarios

Each evaluator produces list of problems

- explain why with reference to heuristic
- be specific & list each problem separately

Example Heuristic Violation

1. [H4 Consistency]

The interface used the string "Save" on the first screen for saving the user's file, but used the string "Write file" on the second screen. Users may be confused by this different terminology for the same function.

How to Perform Heuristic Evaluation

- Why separate listings for each violation?
  - risk of repeating problematic aspect
  - may not be possible to fix all problems
- Where problems may be found
  - single location in interface
  - two or more locations that need to be compared
  - problem with overall structure of interface
  - something that is missing
    - common problem with paper prototypes
    - (sometimes features are implied by design documents and just haven’t been “implemented” – relax on those)

Severity Rating

Used to allocate resources to fix problems

Estimates of need for more usability efforts

Combination of

- frequency
- impact
- persistence (one time or repeating)

Should be calculated after all evaluations are in

Should be done independently by all judges

Severity Rating

0 - Do not agree this is a problem.

1 - Usability blemish. Mild annoyance or cosmetic problem. Easily avoidable.

2 - Minor usability problem. Annoying, misleading, unclear, confusing. Can be avoided or easily learned. May occur only once.

3 - Major usability problem. Prevents users from completing tasks. Highly confusing or unclear. Difficult to avoid. Likely to occur more than once.

4 - Critical usability problem. Users will not be able to accomplish their goals. Users may quit using system all together.

Example Heuristic Violation

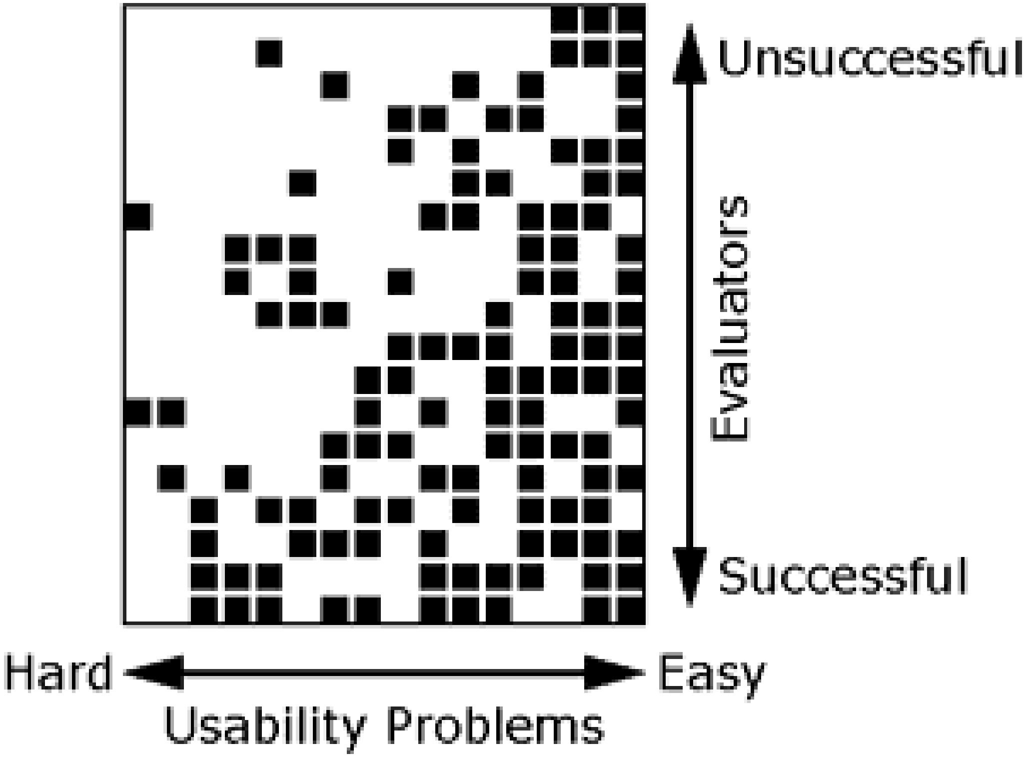
1. [H4 Consistency] [Severity 3]

The interface used the string "Save" on the first screen for saving the user's file, but used the string "Write file" on the second screen. Users may be confused by this different terminology for the same function.

Why Multiple Evaluators?

Every evaluator doesn't find every problem

Good evaluators find both easy & hard ones



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Fixability Scores

1 - Nearly impossible to fix. Requires massive re-engineering or use of new technology. Solution not known or understood at all.

2 - Difficult to fix. Redesign and re-engineering required. Significant code changes. Solution identifiable but details not fully understood.

3 - Easy to fix. Minimal redesign and straightforward code changes. Solution known and understood.

4 - Trivial to fix. Textual changes and cosmetic changes. Minor code tweaking.

Debriefing

Conduct with evaluators, observers, and development team members

Discuss general characteristics of interface

Suggest potential improvements to address major usability problems

Development team rates how hard to fix

Make it a brainstorming session

Example Heuristic Violation

1. [H4 Consistency] [Severity 3] [Fix 4]

The interface used the string "Save" on the first screen for saving the user's file, but used the string "Write file" on the second screen. Users may be confused by this different terminology for the same function.

Fix: Change second screen to "Save".

Results of Using HE

Discount: benefit-cost ratio of 48

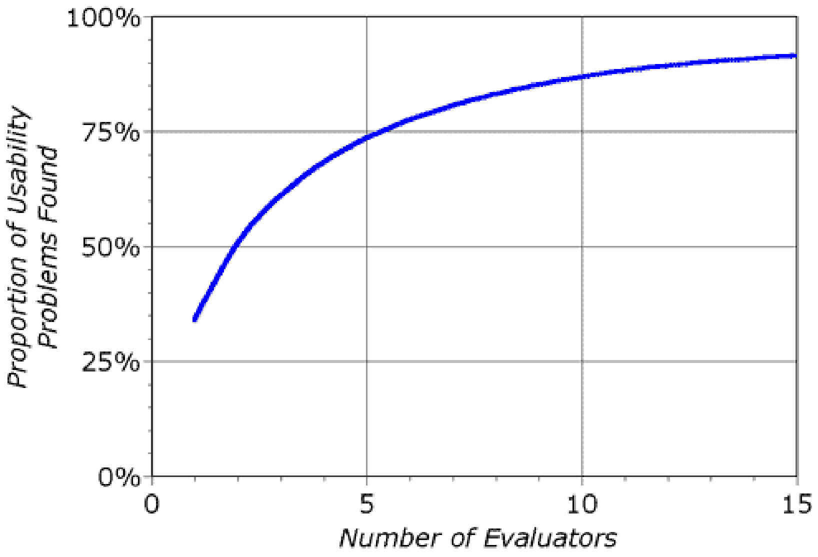
- cost was $10,500 for benefit of $500,000
- how might we calculate this value?
  - in-house → productivity; open market → sales

Single evaluator achieves poor results

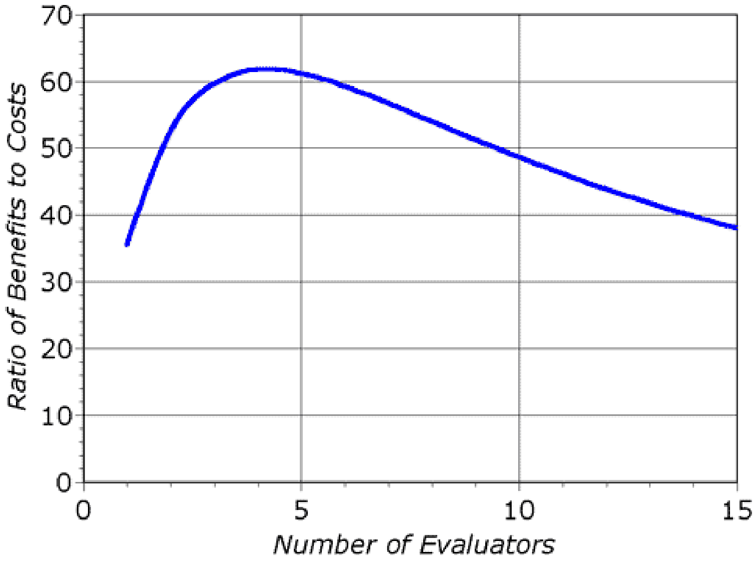
- only finds 35% of usability problems
- 5 evaluators find ~ 75% of usability problems
- why not more evaluators?

Nielsen, 1994

Decreasing Returns



problems found



benefits / cost

Nielsen, 1994

Alternative Inspection-Based Methods

Cognitive Walkthrough

- Helps surface different types of usability problems
- Consider this as a complement to heuristic evaluation

Action Analysis

- Low-level modeling of expert performance
- Be aware of GOMS, but you may never encounter it

Cognitive Walkthrough

Evaluation method based on:

- A person works through an interface in an exploratory manner
- A person has goals
- The person is applying means-ends reasoning to work out how to accomplish these goals

Evaluation by an expert, who goes through a task while simulating this cognitive process

Preparation: Need Four Things

1) User description, including level of experience any assumptions made by the designer

2) System description (e.g., paper prototype)

3) Task description, specifying the task the expert has to carry out, from a user’s point of view

4) Action sequence describing the system display and the user actions needed to complete the given task. One system display and one user action together are one step.

Cognitive Walkthrough Process

Designer/Developer prepares the required documents described on previous slide

Gives these documents to the usability expert

Expert reads the descriptions, and carries out the task by following the action list

At each step in action list, asks four questions

Record problems similar to heuristic evaluation

Believability

1) Will the user be trying to produce whatever effect the action has?
2) Will the user be able to notice that the correct action is available?
3) Once the user finds the correct action at the interface, will they know that it is the right one for the effect they are trying to produce?
4) After the action is taken, will the user understand the feedback given?

Action Analysis / Cognitive Modeling

GOMS: Goals, Operators, Methods, Selection

Developed by Card, Moran and Newell

Walk through sequence of steps

Assign each an approximate time duration

Sum to estimate overall performance time

1. Select sentence

Reach for mouse	H	0.40
Point to first word	P	1.10
Click button down	K	0.60
Drag to last word	P	1.20
Release	K	0.60
		3.90 secs

Inspection vs. Usability Testing

Inspection is

- Is much faster
- Does not require interpreting user actions
- May miss problems or find false positives

Usability testing is

- More accurate, by definition
- Account for actual users and tasks

One approach is to alternate between them

- Find different problems, conserve participants

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 12:
Inspection-Based Methods

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

design:
use:
build:

University of Washington

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 12:
Testing, Patterns, Anti-Patterns

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

design:
use:
build:

University of Washington

Remote Usability Testing

Conferencing-based testing

Use tools like video conferencing, instant messaging, and screencasting to test with a remote participant

Semi-automated remote testing

Automatic logging and some analysis of usage

Controlled online A/B experiments

Carefully measure results of showing different versions to different sets of live customers

Semi-Automated Remote Usability

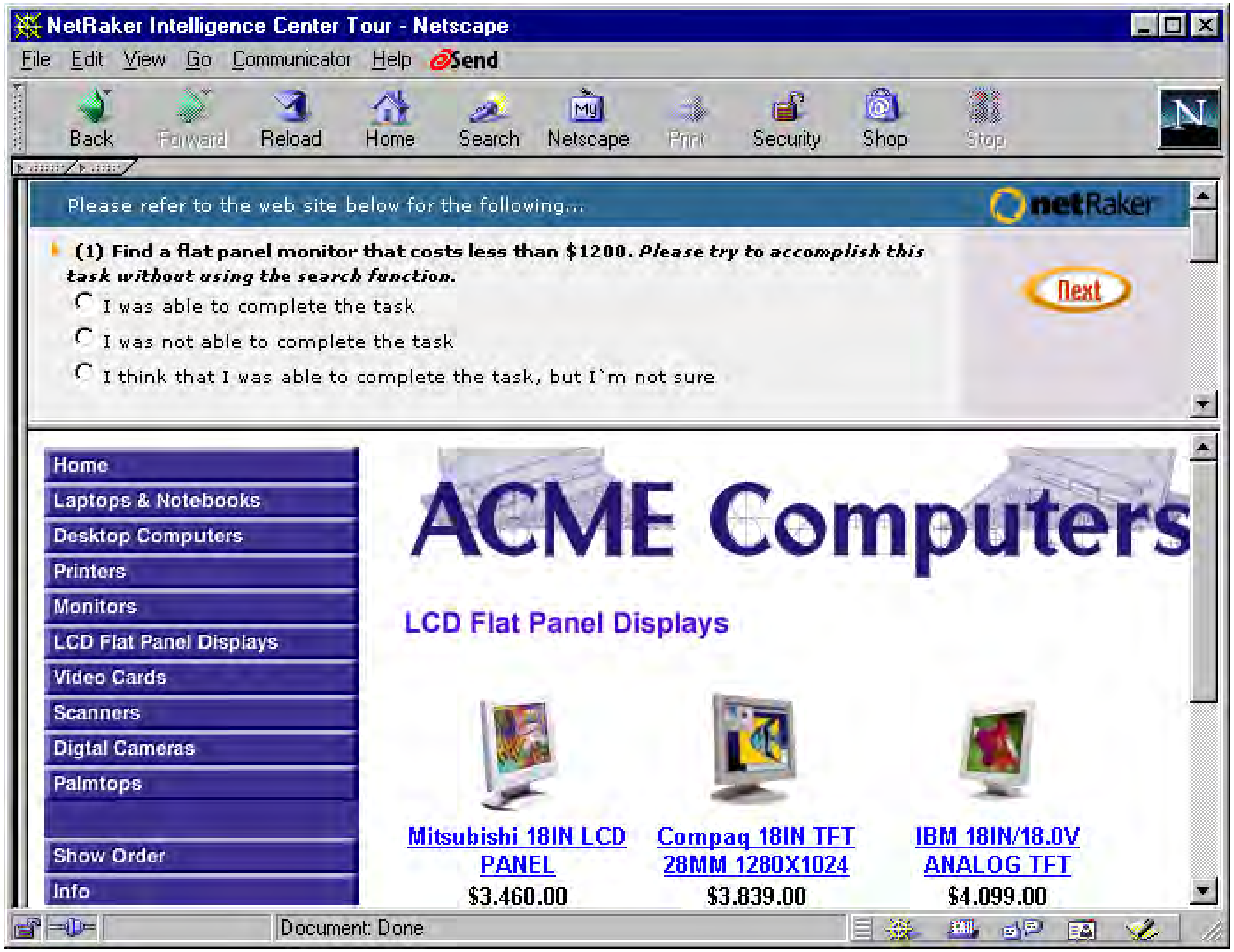
Move usability testing online

- participants access the “lab” via web
- answer questions & complete tasks in “survey”
- records actions or screens for playback
- can test many people completing many tasks

Analyze data individually or in aggregate

- playback individual sessions
- find general problem areas
- if needed, look more closely with traditional methods

Semi-Automated Remote Usability



Please refer to the web site below for the following...

(1) Find a flat panel monitor that costs less than $1200. *Please try to accomplish this task without using the search function.*

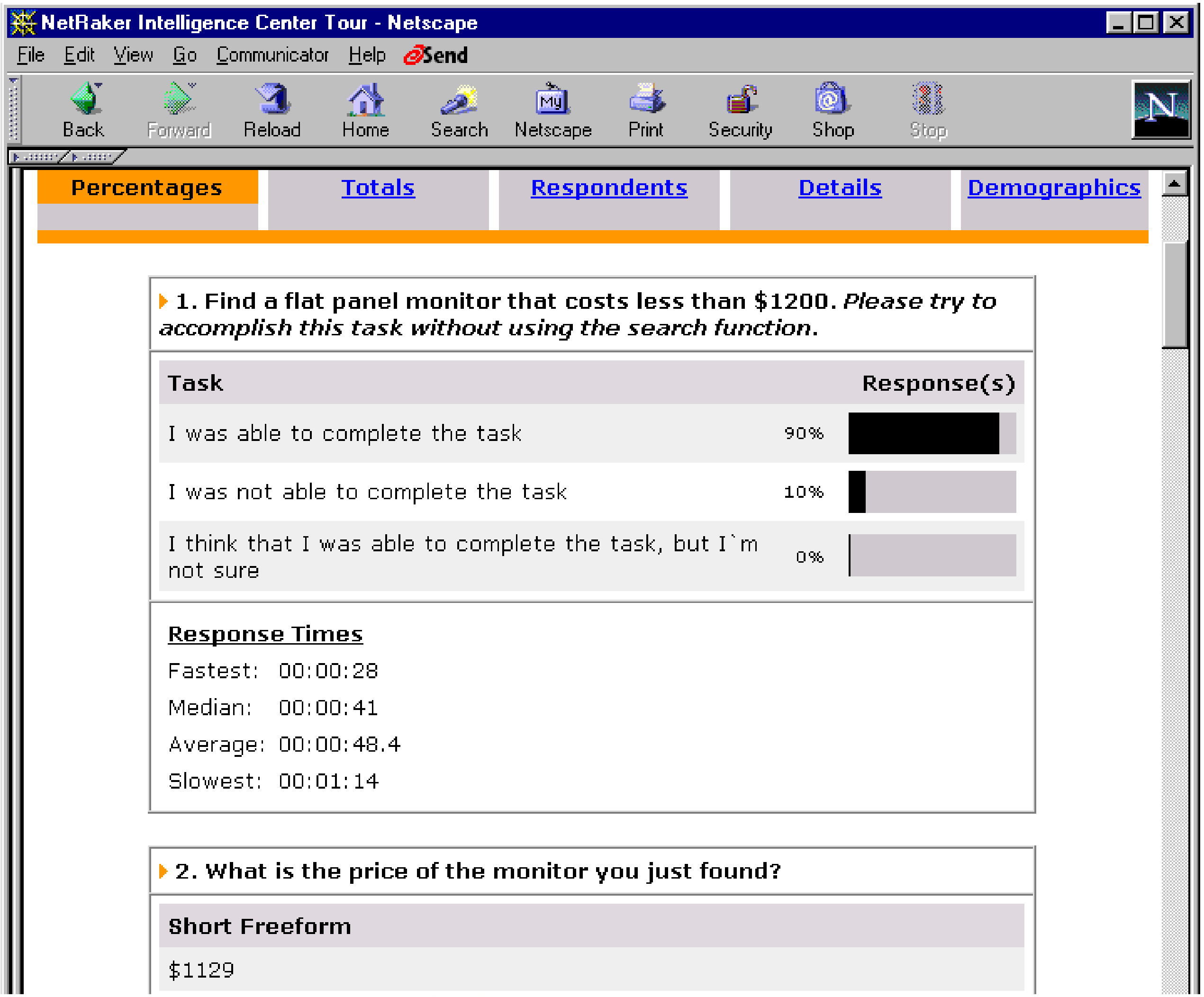
○ I was able to complete the task
○ I was not able to complete the task
○ I think that I was able to complete the task, but I`m not sure

LCD Flat Panel Displays

Mitsubishi 18IN LCD PANEL	Compaq 18IN TFT 28MM 1280X1024	IBM 18IN/18.0V ANALOG TFT
$3.460.00	$3.839.00	$4.099.00

University of Washington

Semi-Automated Remote Usability



1. Find a flat panel monitor that costs less than $1200. *Please try to accomplish this task without using the search function.*

Task	Response(s)	
I was able to complete the task	90%	
I was not able to complete the task	10%	
I think that I was able to complete the task, but I`m not sure	0%	

Response Times

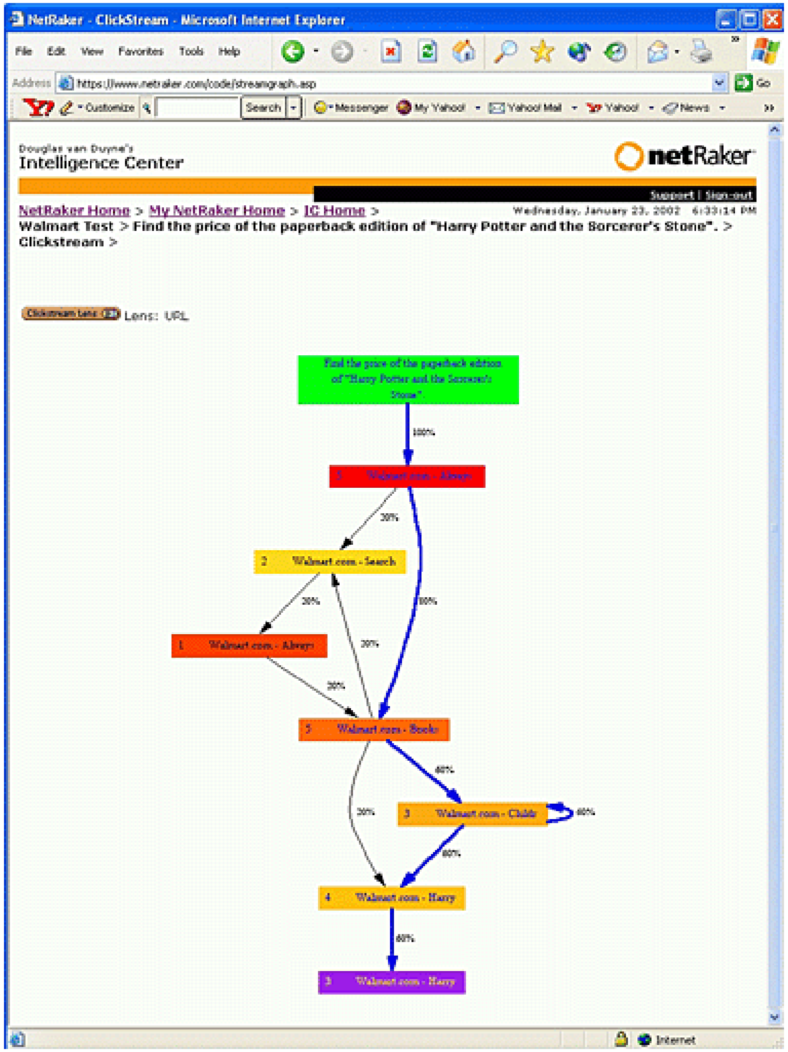
Fastest: 00:00:28
Median: 00:00:41
Average: 00:00:48.4
Slowest: 00:01:14

2. What is the price of the monitor you just found?

Short Freeform
$1129

dub
University of Washington

Semi-Automated Remote Usability

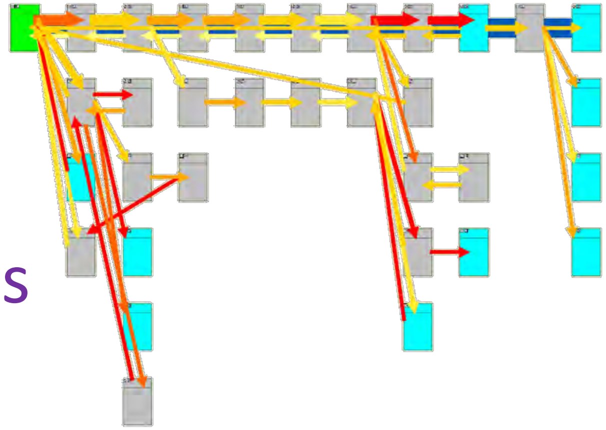


Douglas van Duyne's
Intelligence Center

NetRaker Home > My NetRaker Home > IC Home >
Wednesday, January 23, 2002 6:33:14 PM
Walmart Test > Find the price of the paperback edition of "Harry Potter and the Sorcerer's Stone". >
Clickstream >

Lens: URL

WebQuilt: Visual Analysis

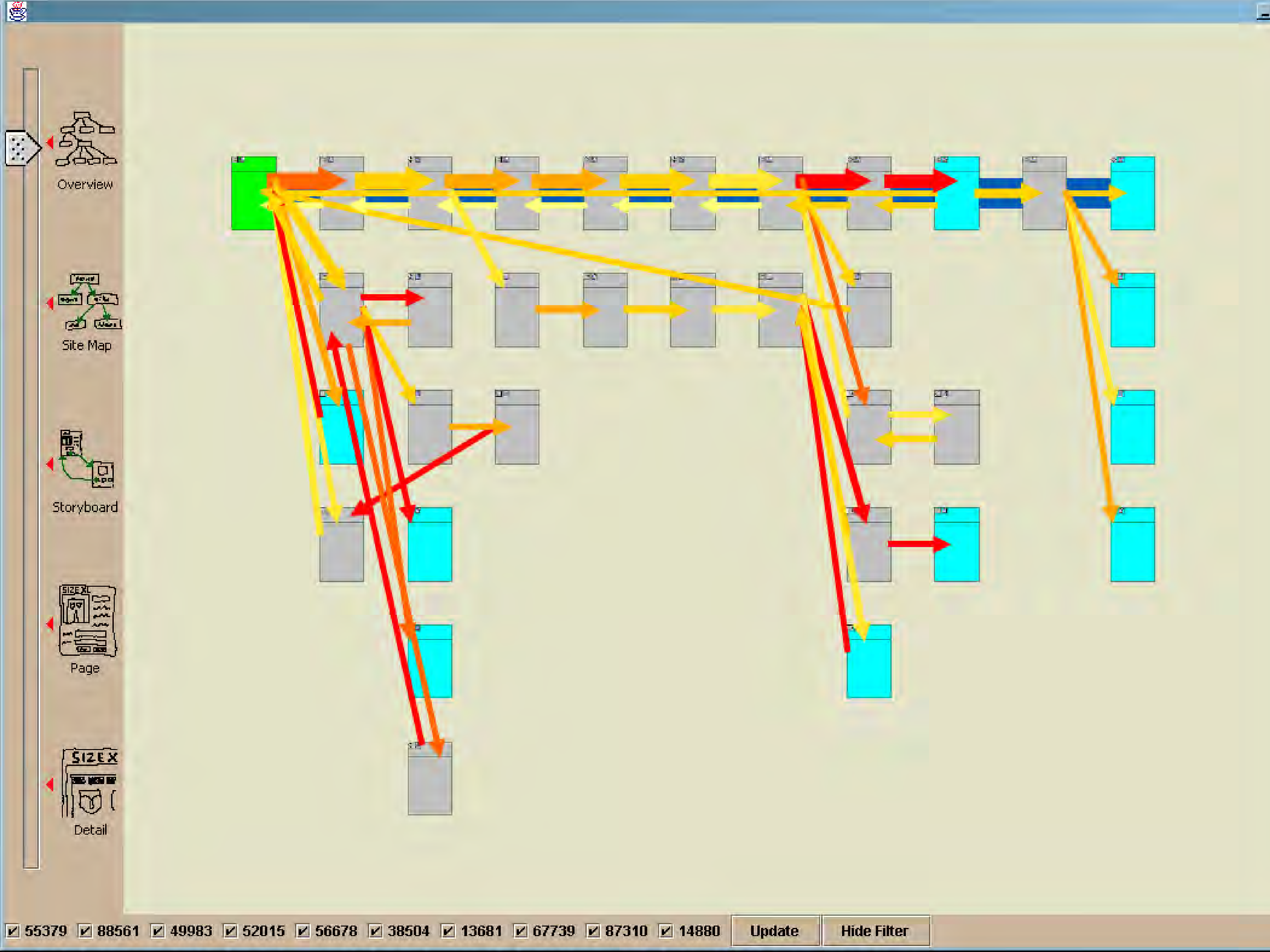


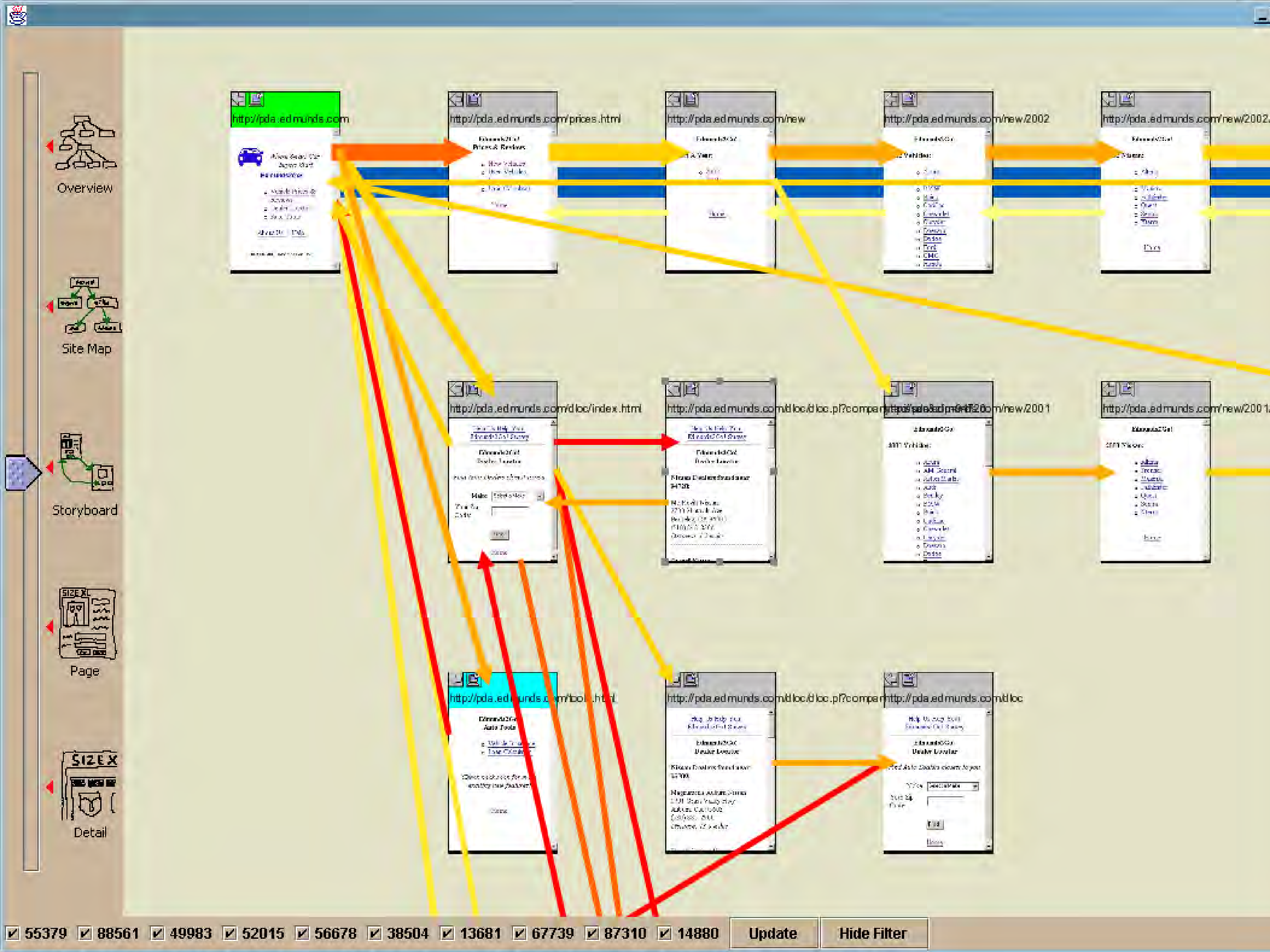
Goals

- link page elements to actions
- identify behavior/navigation patterns
- highlight potential problems areas

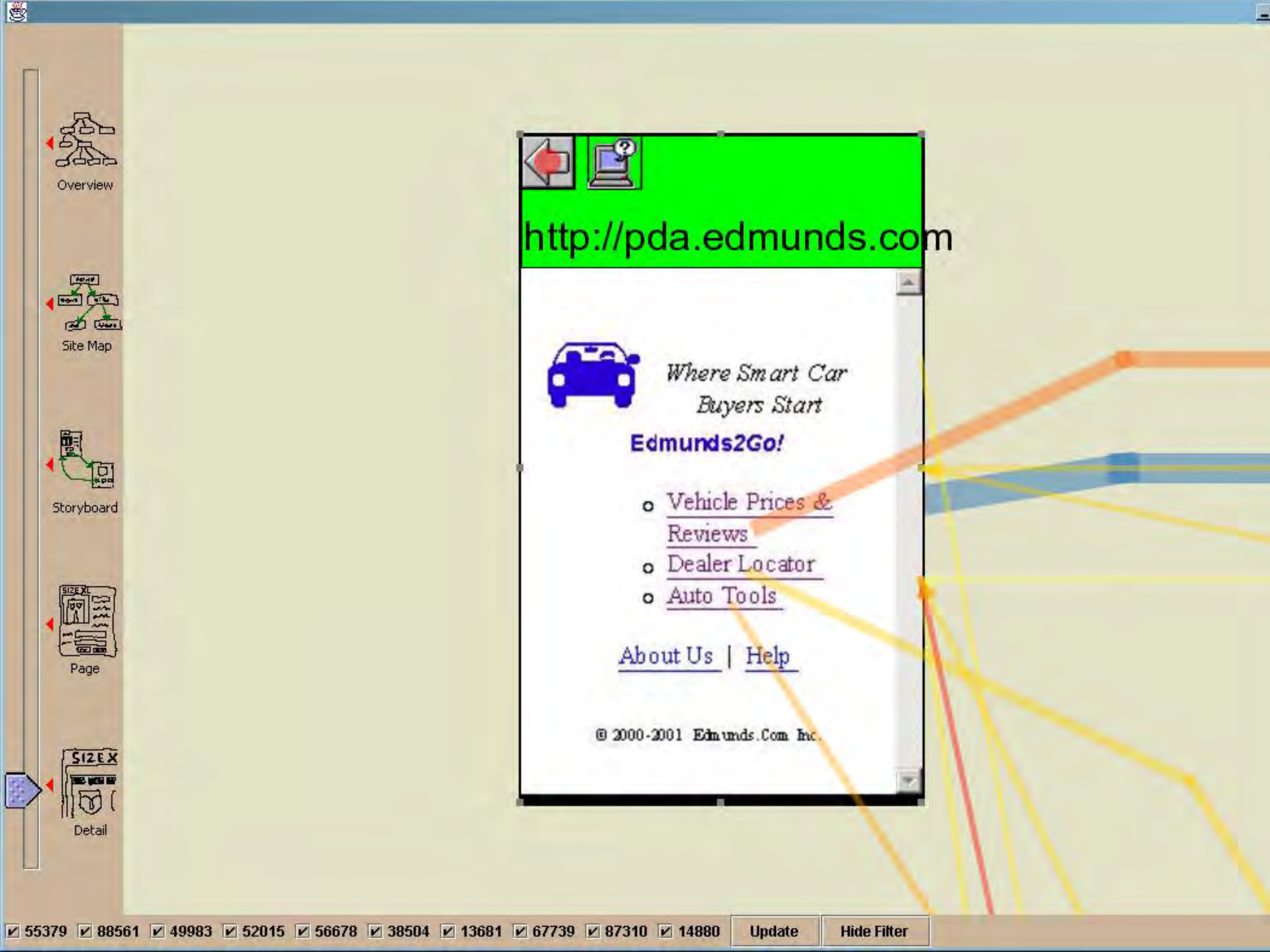
Interactive graph based on web content

- designers can indicate expected paths
- color code common usability interests
- filtering to show only target participants
- use zooming for analyzing data at varying granularity


Overview
Site Map
Storyboard
Page
Detail
☑ 55379 ☑ 88561 ☑ 49983 ☑ 52015 ☑ 56678 ☑ 38504 ☑ 13681 ☑ 67739 ☑ 87310 ☑ 14880
Update
Hide Filter



☑ 55379 ☑ 88561 ☑ 49983 ☑ 52015 ☑ 56678 ☑ 38504 ☑ 13681 ☑ 67739 ☑ 87310 ☑ 14880



http://pda.edmunds.com

Where Smart Car Buyers Start

Edmunds2Go!

- Vehicle Prices & Reviews
- Dealer Locator
- Auto Tools

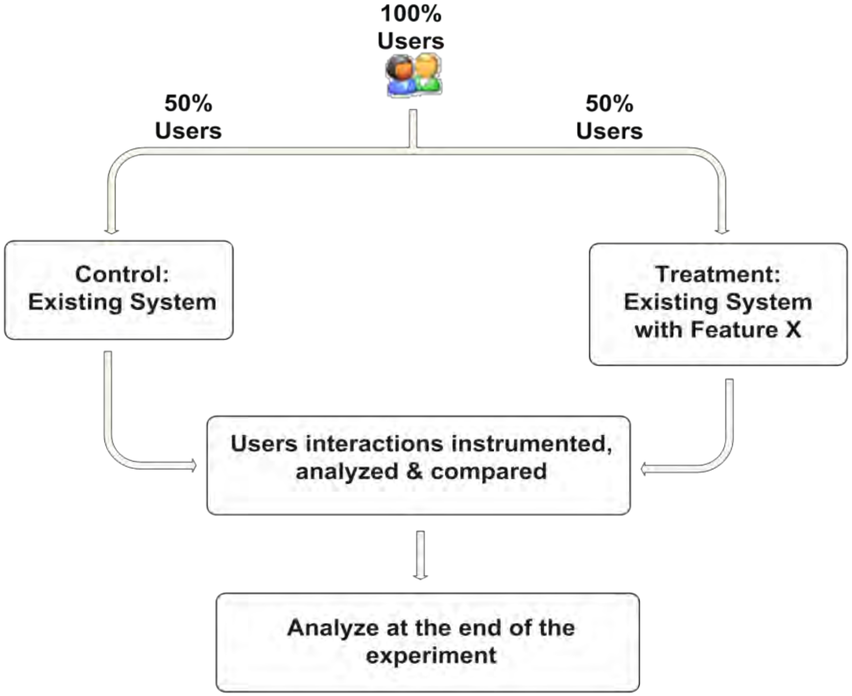
About Us | Help

© 2000-2001 Edmunds.Com Inc.

Controlled A/B Experiments

Many names for concept

- A/B tests or Control/Treatment
- Randomized Experimental Design
- Controlled experiments
- Split testing
- Parallel flights



100% Users

50% Users

50% Users

Control: Existing System

Treatment: Existing System with Feature X

Users interactions instrumented, analyzed & compared

Analyze at the end of the experiment

(this section mostly due Ronny Kohavi)

Controlled A/B Experiments

Example: Amazon Shopping Cart Recommendations

- Add an item to your shopping cart
- Most sites show the cart

At Amazon, Greg Linden had idea to show recommendations based on cart items

From Greg Linden's Blog: http://glinden.blogspot.com/2006/04/early-amazon-shopping-cart.html

Controlled A/B Experiments

Evaluation

- Pro: cross-sell more items
- Con: distract people from checking out

Highest Paid Person’s Opinion:

- Stop the project

Simple experiment run:

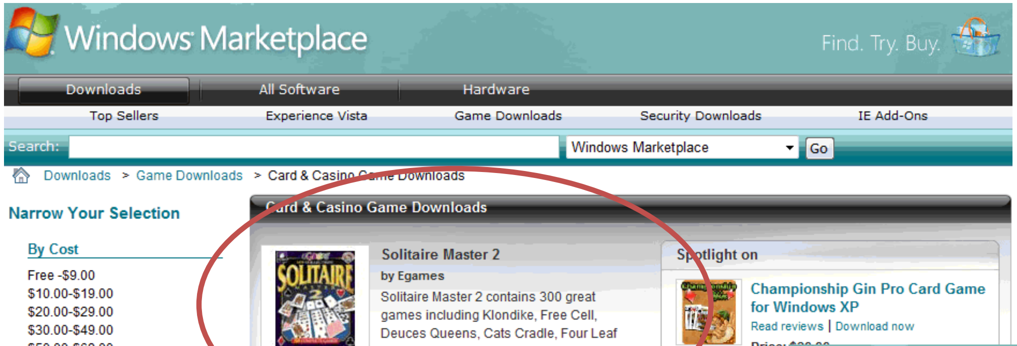
- Wildly successful

From Greg Linden’s Blog: http://glinden.blogspot.com/2006/04/early-amazon-shopping-cart.html

Marketplace: Solitaire v Poker

Experiment run in Windows Marketplace / Game Downloads

Which image has the higher clickthrough? By how much?



Windows Marketplace
Find. Try. Buy.

Downloads | All Software | Hardware

Top Sellers | Experience Vista | Game Downloads | Security Downloads | IE Add-Ons

Search: Windows Marketplace Go

Downloads > Game Downloads > Card & Casino Game Downloads

Narrow Your Selection

By Cost
Free -$9.00
$10.00-$19.00
$20.00-$29.00
$30.00-$49.00
$50.00-$69.00
$70.00-$129.00

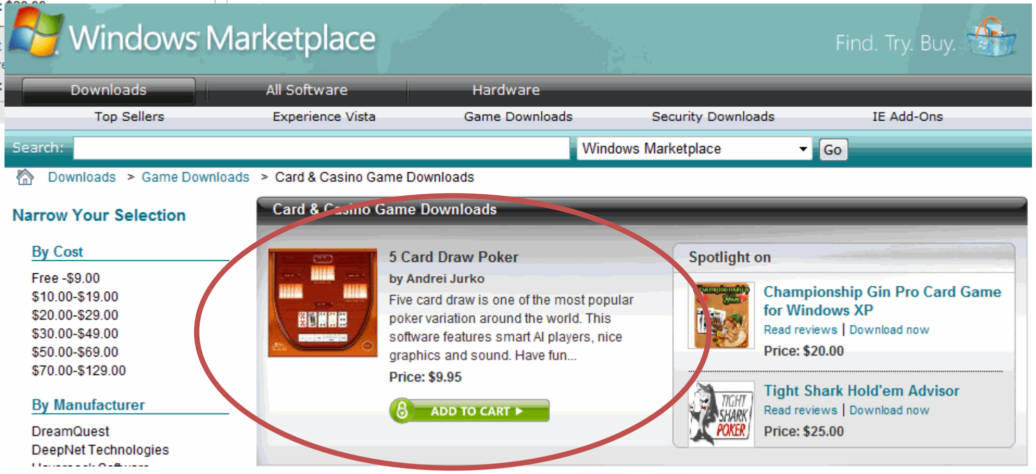
By Manufacturer
DreamQuest
DeepNet Technologies

Card & Casino Game Downloads

Solitaire Master 2
by Egames
Solitaire Master 2 contains 300 great games including Klondike, Free Cell, Deuces Queens, Cats Cradle, Four Leaf Clover,Spider Web and many more! Plu...
Price: $12.99
ADD TO CART

Spotlight on
Championship Gin Pro Card Game for Windows XP
Read reviews | Download now
Price:
Tight
Price:

A: Solitaire game



Windows Marketplace
Find. Try. Buy.

Downloads | All Software | Hardware

Top Sellers | Experience Vista | Game Downloads | Security Downloads | IE Add-Ons

Search: Windows Marketplace Go

Downloads > Game Downloads > Card & Casino Game Downloads

Narrow Your Selection

By Cost
Free -$9.00
$10.00-$19.00
$20.00-$29.00
$30.00-$49.00
$50.00-$69.00
$70.00-$129.00

By Manufacturer
DreamQuest
DeepNet Technologies

Card & Casino Game Downloads

5 Card Draw Poker
by Andrei Jurko
Five card draw is one of the most popular poker variation around the world. This software features smart AI players, nice graphics and sound. Have fun...
Price: $9.95
ADD TO CART

Spotlight on
Championship Gin Pro Card Game for Windows XP
Read reviews | Download now
Price: $20.00
Tight Shark Hold'em Advisor
Read reviews | Download now
Price: $25.00

B: Poker game

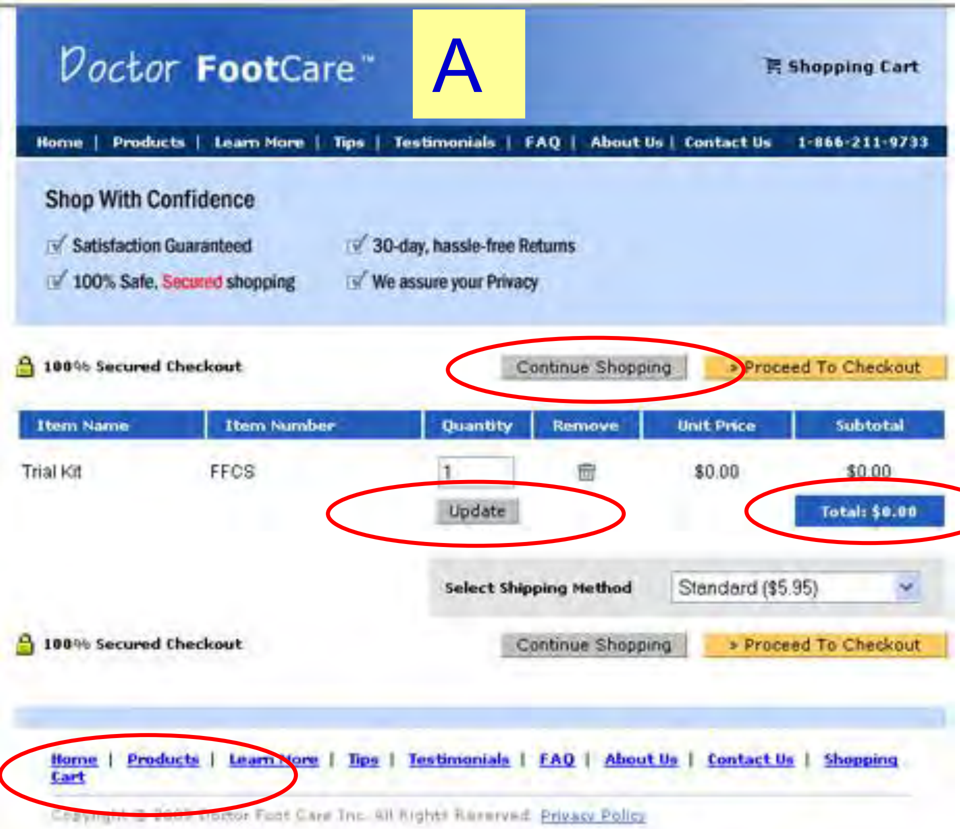
A is 61% better

University of Washington


SIX CHIX
BY RINA PICCOLO
OUR COMPUTERS ARE DOWN, SO WE HAVE TO DO EVERYTHING MANUALLY...
PICCOLO

Checkout Page

***Conversion rate* is percentage of visits that include purchase**



Shop With Confidence

- Satisfaction Guaranteed
- 100% Safe, Secured shopping
- 30-day, hassle-free Returns
- We assure your Privacy

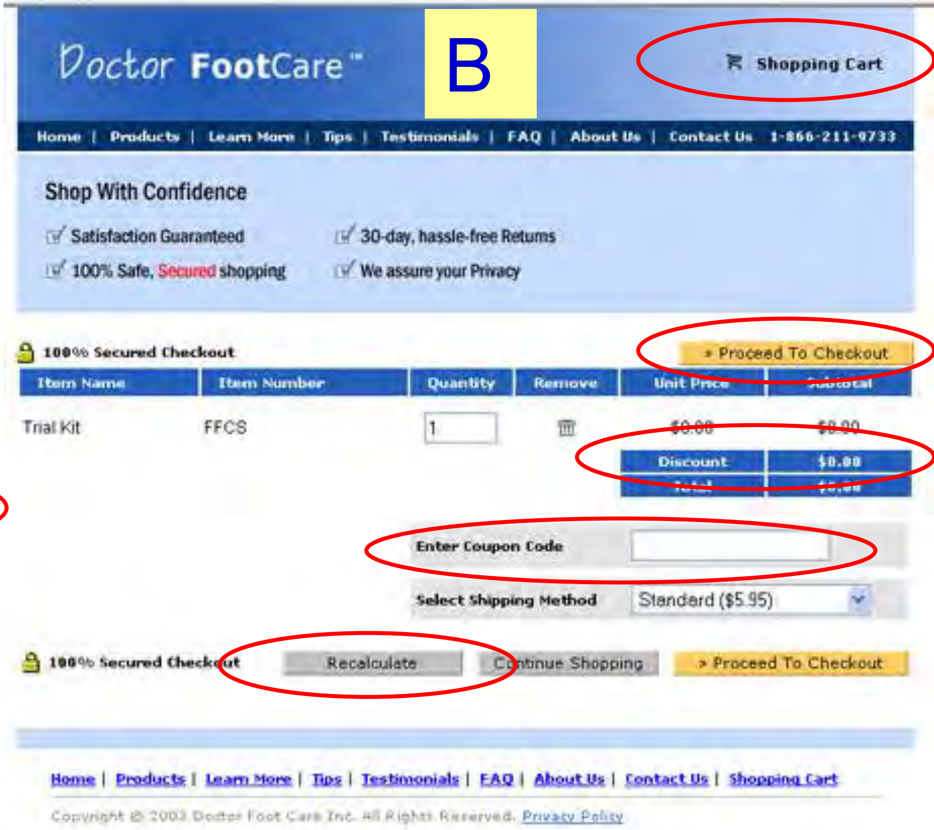
100% Secured Checkout

Item Name	Item Number	Quantity	Remove	Unit Price	Subtotal
Trial Kit	FFCS	1	🗑	$0.00	$0.00

Select Shipping Method: Standard ($5.95)

100% Secured Checkout

Copyright © 2003 Doctor Foot Care Inc. All Rights Reserved.



Shop With Confidence

- Satisfaction Guaranteed
- 100% Safe, Secured shopping
- 30-day, hassle-free Returns
- We assure your Privacy

100% Secured Checkout

Item Name	Item Number	Quantity	Remove	Unit Price	Subtotal
Trial Kit	FFCS	1	🗑	$0.00	$0.00

Enter Coupon Code:

Select Shipping Method: Standard ($5.95)

100% Secured Checkout

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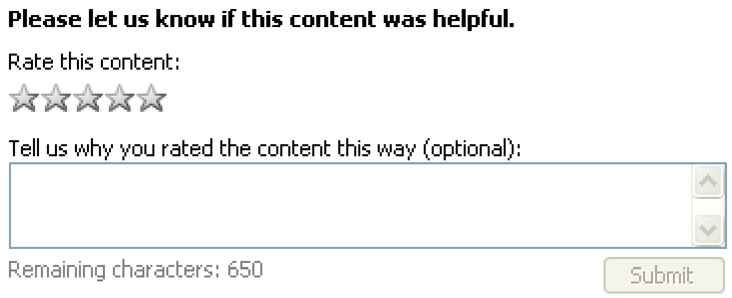
Which version has a higher conversion rate?

Coupon code decreases by factor of 10

Example from Bryan Eisenberg’s article on clickz.com

Office Online Feedback

A



Please let us know if this content was helpful.

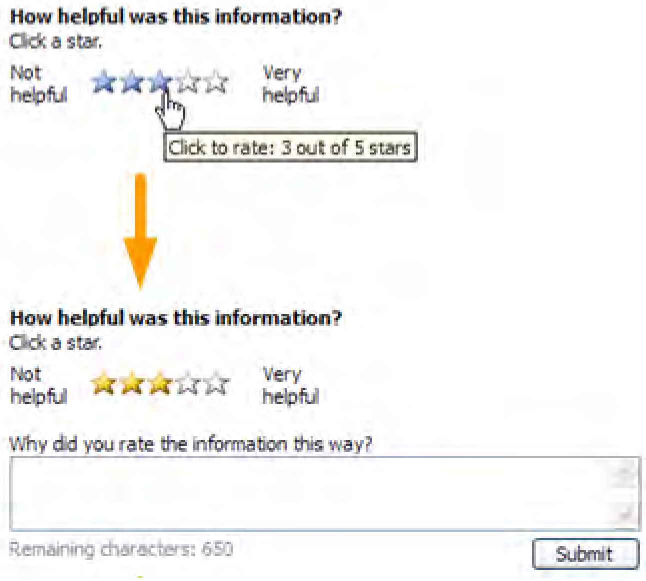
Rate this content:

☆☆☆☆☆

Tell us why you rated the content this way (optional):

Remaining characters: 650

B



How helpful was this information?

Click a star.

Not helpful ★★★☆☆ Very helpful

Click to rate: 3 out of 5 stars

How helpful was this information?

Click a star.

Not helpful ★★★☆☆ Very helpful

Why did you rate the information this way?

Remaining characters: 650

Feedback A puts everything together, whereas feedback B is two-stage: question follows rating.

Feedback A just has 5 stars, whereas B annotates the stars with “Not helpful” to “Very helpful” and makes them brighter.

Which one has a higher response rate? By how much?

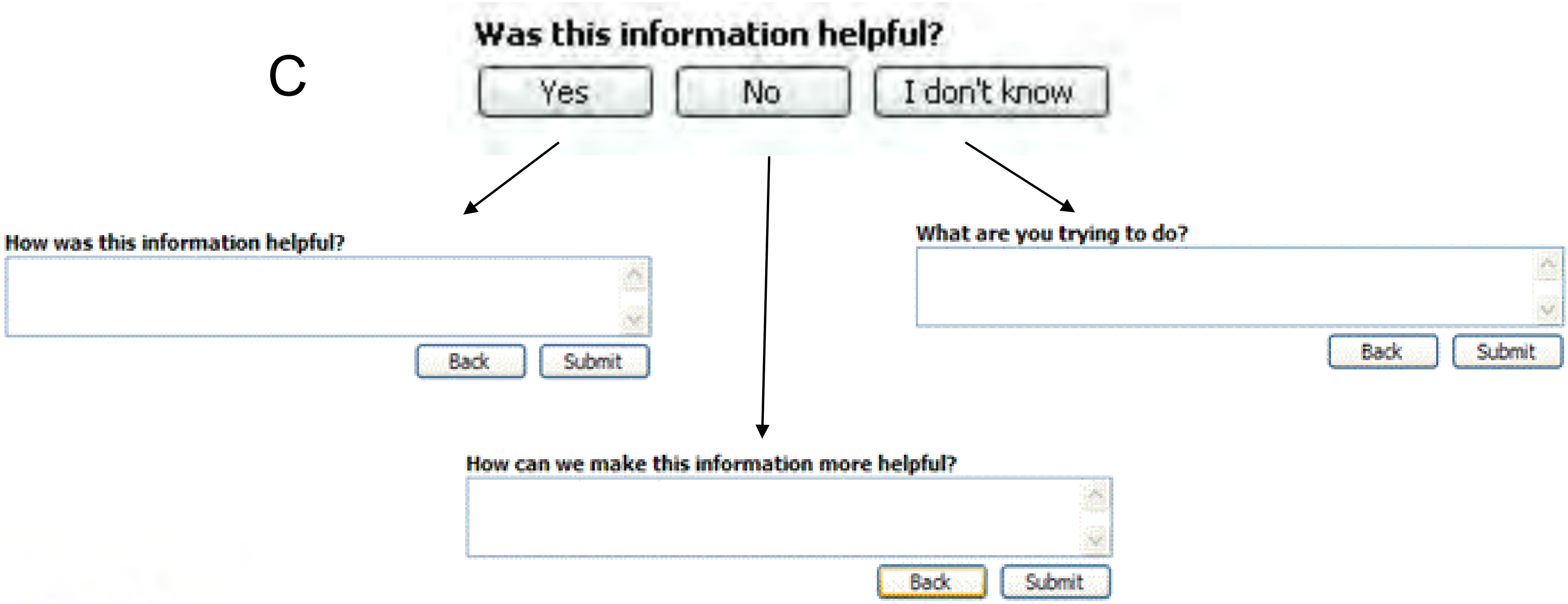
B gets more than double the response rate.

Another Feedback Variant

Call this variant C. Like B, also two stage.

Which one has a higher response rate, B or C?

C



Was this information helpful?

How was this information helpful?

How can we make this information more helpful?

What are you trying to do?

C outperforms B by a factor of 3.5 !

MSN US Home Page

Proposal: New Offers module below Shopping

Shopping

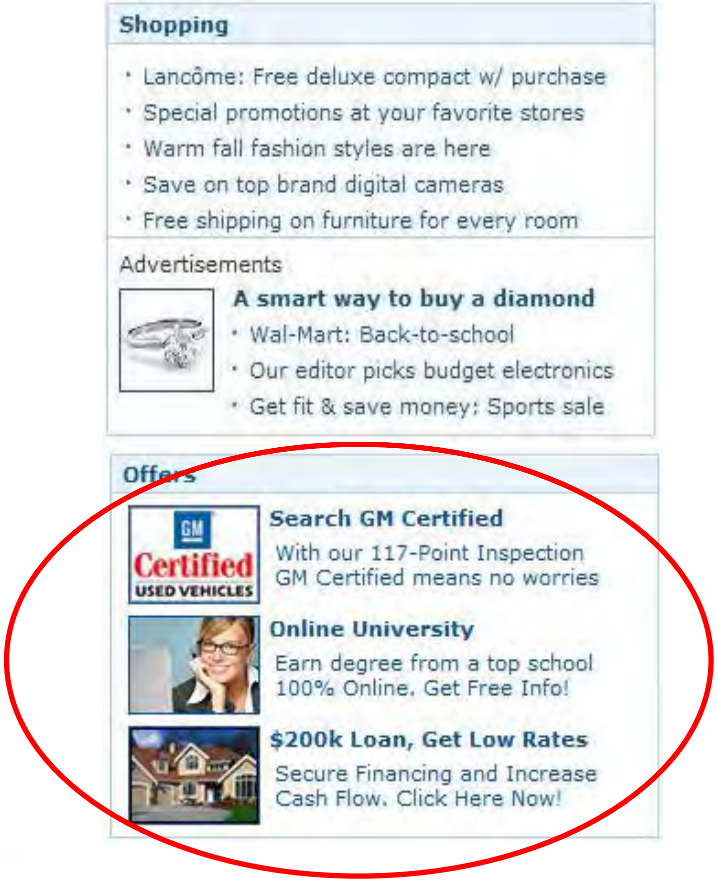
- Lancôme: Free deluxe compact w/ purchase
- Special promotions at your favorite stores
- Warm fall fashion styles are here
- Save on top brand digital cameras
- Free shipping on furniture for every room

Advertisements

A smart way to buy a diamond

- Wal-Mart: Back-to-school
- Our editor picks budget electronics
- Get fit & save money: Sports sale

Control



Shopping

- Lancôme: Free deluxe compact w/ purchase
- Special promotions at your favorite stores
- Warm fall fashion styles are here
- Save on top brand digital cameras
- Free shipping on furniture for every room

Advertisements

A smart way to buy a diamond

- Wal-Mart: Back-to-school
- Our editor picks budget electronics
- Get fit & save money: Sports sale

Offers

Search GM Certified

With our 117-Point Inspection GM Certified means no worries

Online University

Earn degree from a top school 100% Online. Get Free Info!

$200k Loan, Get Low Rates

Secure Financing and Increase Cash Flow. Click Here Now!

Treatment

Experiment Results

Ran A/B test for 12 days on 5% of MSN US visitors

Clickthrough decreased 0.49% (p<0.0001)

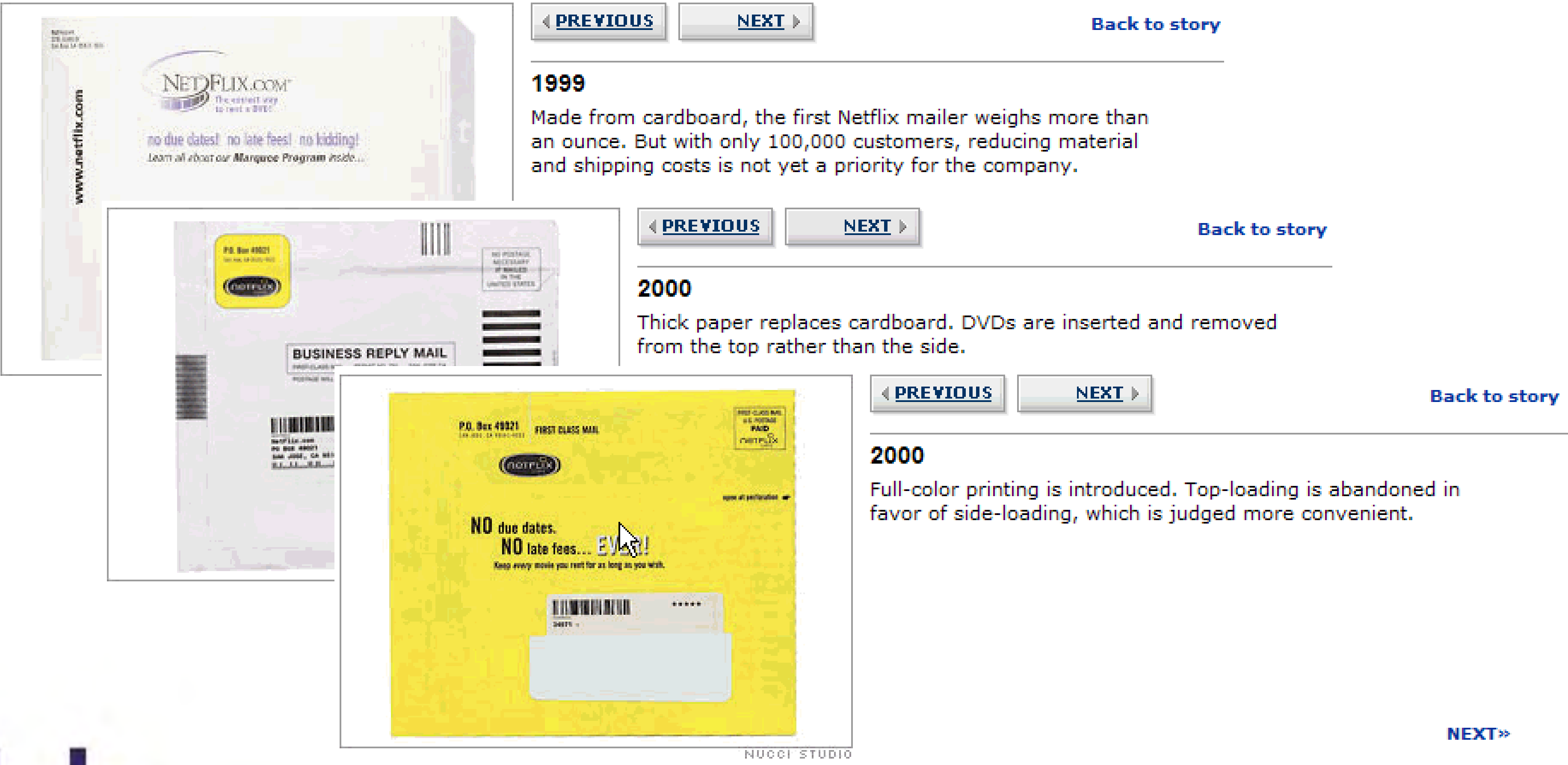
Page views per user-day decreased 0.35% (p<0.0001)

Value of click from home page: X cents

Net = Expected Revenue –
direct lost clicks –
lost clicks due to decreased page views

Net was negative (in millions of dollars), offers module did not launch

Data Driven Methods Not Just Online



1999

Made from cardboard, the first Netflix mailer weighs more than an ounce. But with only 100,000 customers, reducing material and shipping costs is not yet a priority for the company.

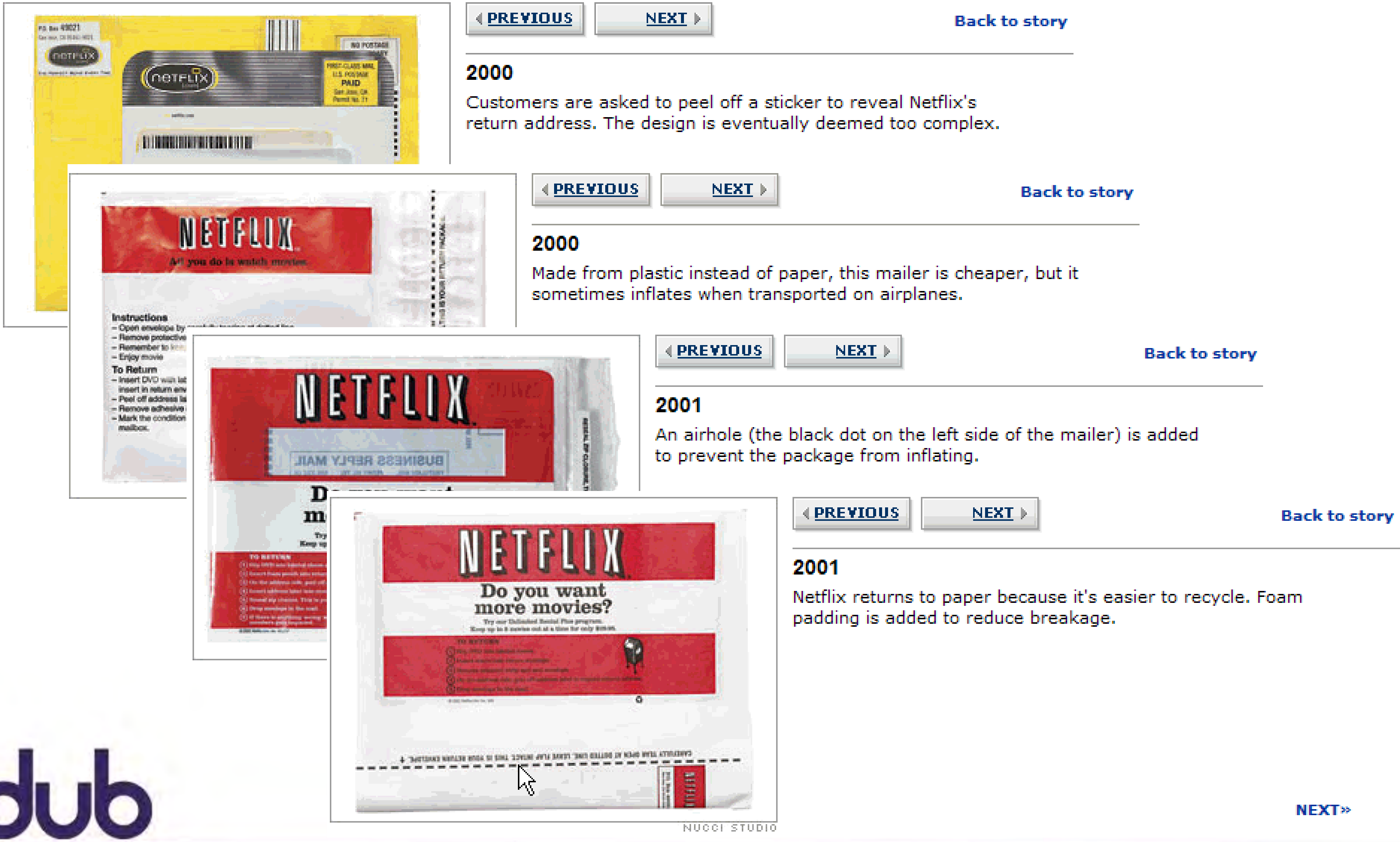
2000

Thick paper replaces cardboard. DVDs are inserted and removed from the top rather than the side.

2000

Full-color printing is introduced. Top-loading is abandoned in favor of side-loading, which is judged more convenient.

Data Driven Methods Not Just Online



2000

Customers are asked to peel off a sticker to reveal Netflix's return address. The design is eventually deemed too complex.

2000

Made from plastic instead of paper, this mailer is cheaper, but it sometimes inflates when transported on airplanes.

2001

An airhole (the black dot on the left side of the mailer) is added to prevent the package from inflating.

2001

Netflix returns to paper because it's easier to recycle. Foam padding is added to reduce breakage.

Data Driven Methods Not Just Online

2001

Foam padding is dropped because the benefits don't justify the cost. The company gives top-loading another try.

2001

Marking a return to side-loading, this mailer is a direct ancestor of the one the company uses today.

2003

Instead of sealing the entire top and bottom, Netflix introduces a circular sticker, affixed only on the top.

2004

A window shows the disc bar code. Speculation is that this enables storing discs in mailers prior to shipping.

Limitations

Drives hill-climbing, but not overall design

- A design may be better, but is it good?

Impossible for new designs to compete

Can be difficult to scale to many features

- How about we step through a larger example

The Smartest Place to Buy and Sell Books, Music, Computers, Electronics, DVDs & more...

Welcome

Learn about Buying
Learn about Selling
Register Now!
Announcement Board
Updated Jun 13, 2002

DESKTOP LIQUIDATION CENTER as low as $249!

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Games
PS2, Xbox, GameCube, Dreamcast, N64, & more...

New CD Releases! only $11.88

More Hot New Releases!

Music

Red Hot Price for the Chili Peppers' New CD: $11.88!
Evolving after the popularity of *Californication*, the Chili Peppers release a new album featuring the hit song "By the Way".

In-Stock Now!	Our Price	List Price
Weezer, Weezer	$6.99	$18.97
oo Dolls	$9.00	$18.98
The Slim Shady LP, Eminem	$2.98	$18.97
Echoes, Pink Floyd	$11.54	$24.97
18, Moby	$10.99	$18.98

Movies

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Tom Clancy: Red Rabbit (Hardcover) **$19.40** Save 33%!

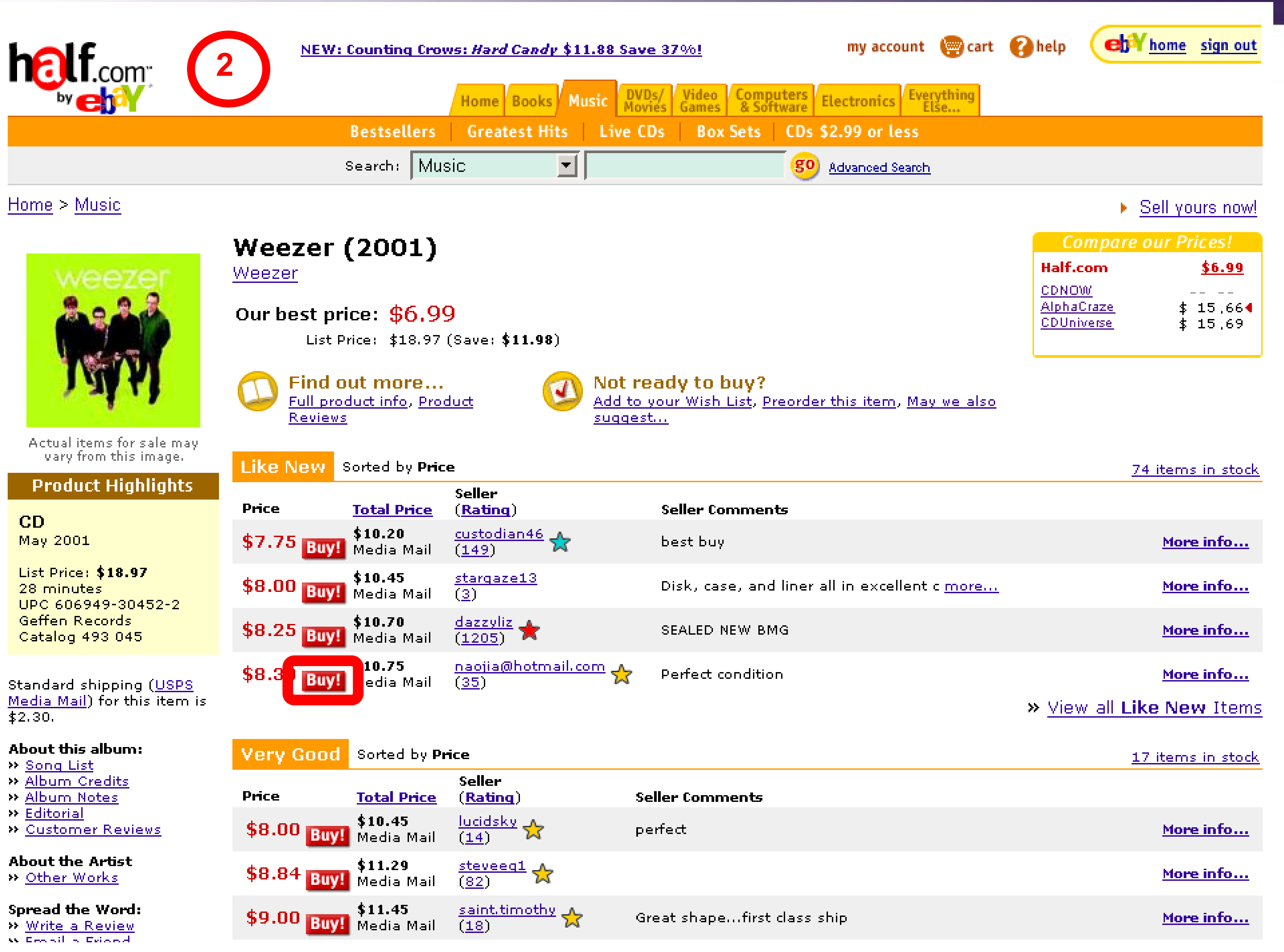
In Computers

Gateway Desktop Under $400!
$399.00
Includes an 800MHz Intel Celeron processor, 256MB RAM, 20GB hard drive, DVD-ROM drive, and more!

Save Over $100 on Dell Latitude CPx!
$639.00
Get the best quality at the best price with the Dell Latitude CPx featuring an Intel Pentium III® 500 MHz processor, 256 MB RAM and 12 GB hard drive.

Gateway Desktop Under $500
$499.00
Includes a 1GHz Intel Pentium III processor, 256MB RAM, 20GB hard drive, CD-RW drive, 250MB ZIP Drive, and more!

More great deals...



Weezer (2001)

Weezer

Our best price: $6.99

List Price: $18.97 (Save: **$11.98**)

Compare our Prices!	
Half.com	**$6.99**
CDNOW	-- --
AlphaCraze	$ 15.66
CDUniverse	$ 15.69

Find out more...
Full product info, Product Reviews

Not ready to buy?
Add to your Wish List, Preorder this item, May we also suggest...

Actual items for sale may vary from this image.

Product Highlights

CD
May 2001

List Price: **$18.97**
28 minutes
UPC 606949-30452-2
Geffen Records
Catalog 493 045

Standard shipping (USPS Media Mail) for this item is $2.30.

About this album:
- Song List
- Album Credits
- Album Notes
- Editorial
- Customer Reviews

About the Artist
- Other Works

Spread the Word:
- Write a Review
- Email a Friend

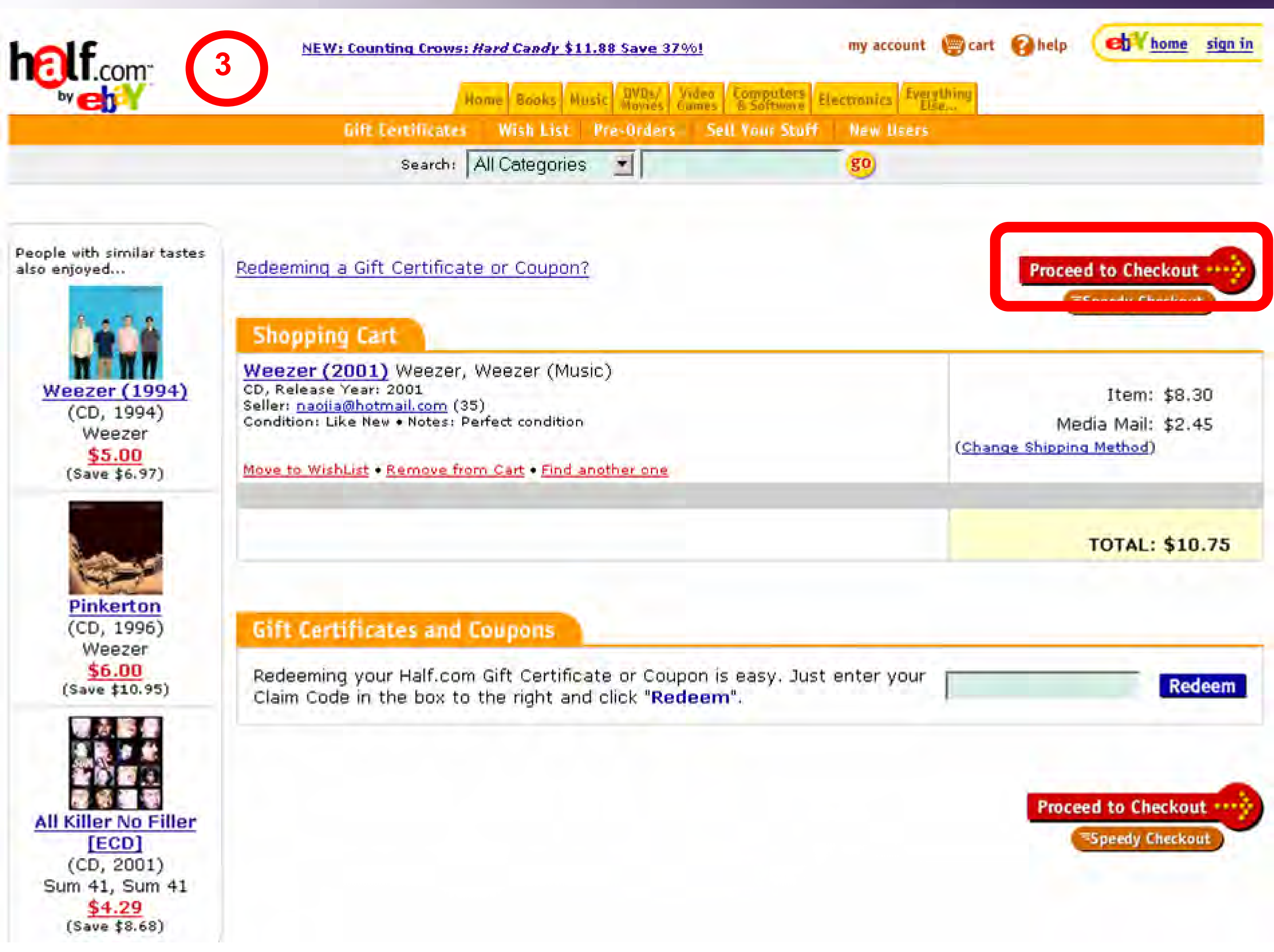
Like New Sorted by **Price** 74 items in stock

Price		Total Price	Seller (Rating)	Seller Comments	
$7.75	Buy!	**$10.20** Media Mail	custodian46 (149)	best buy	More info...
$8.00	Buy!	**$10.45** Media Mail	stargaze13 (3)	Disk, case, and liner all in excellent c more...	More info...
$8.25	Buy!	**$10.70** Media Mail	dazzyliz (1205)	SEALED NEW BMG	More info...
$8.3	Buy!	**10.75** edia Mail	naojia@hotmail.com (35)	Perfect condition	More info...

» View all **Like New** Items

Very Good Sorted by **Price** 17 items in stock

Price		Total Price	Seller (Rating)	Seller Comments	
$8.00	Buy!	**$10.45** Media Mail	lucidsky (14)	perfect	More info...
$8.84	Buy!	**$11.29** Media Mail	steveeq1 (82)		More info...
$9.00	Buy!	**$11.45** Media Mail	saint.timothy (18)	Great shape...first class ship	More info...



People with similar tastes also enjoyed...

Weezer (1994)
(CD, 1994)
Weezer
$5.00
(Save $6.97)

Pinkerton
(CD, 1996)
Weezer
$6.00
(Save $10.95)

All Killer No Filler [ECD]
(CD, 2001)
Sum 41, Sum 41
$4.29
(Save $8.68)

Shopping Cart

Weezer (2001) Weezer, Weezer (Music)
CD, Release Year: 2001
Seller: naojia@hotmail.com (35)
Condition: Like New • Notes: Perfect condition

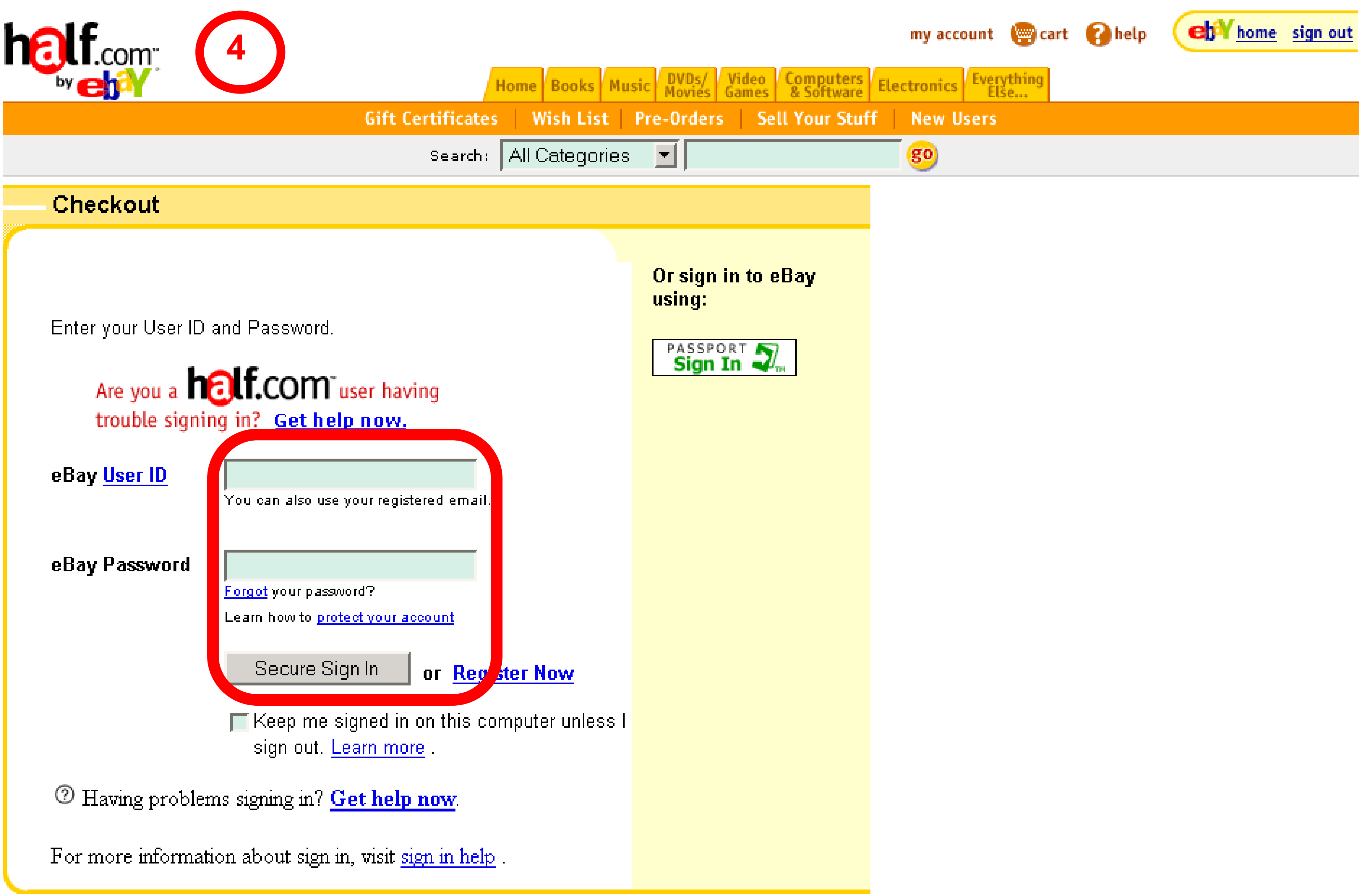
Item: $8.30
Media Mail: $2.45

TOTAL: $10.75

Gift Certificates and Coupons

Redeeming your Half.com Gift Certificate or Coupon is easy. Just enter your Claim Code in the box to the right and click "**Redeem**".

4



Checkout

Enter your User ID and Password.

Are you a half.com user having trouble signing in? Get help now.

eBay User ID

You can also use your registered email.

eBay Password

Forgot your password?

Learn how to protect your account

or Register Now

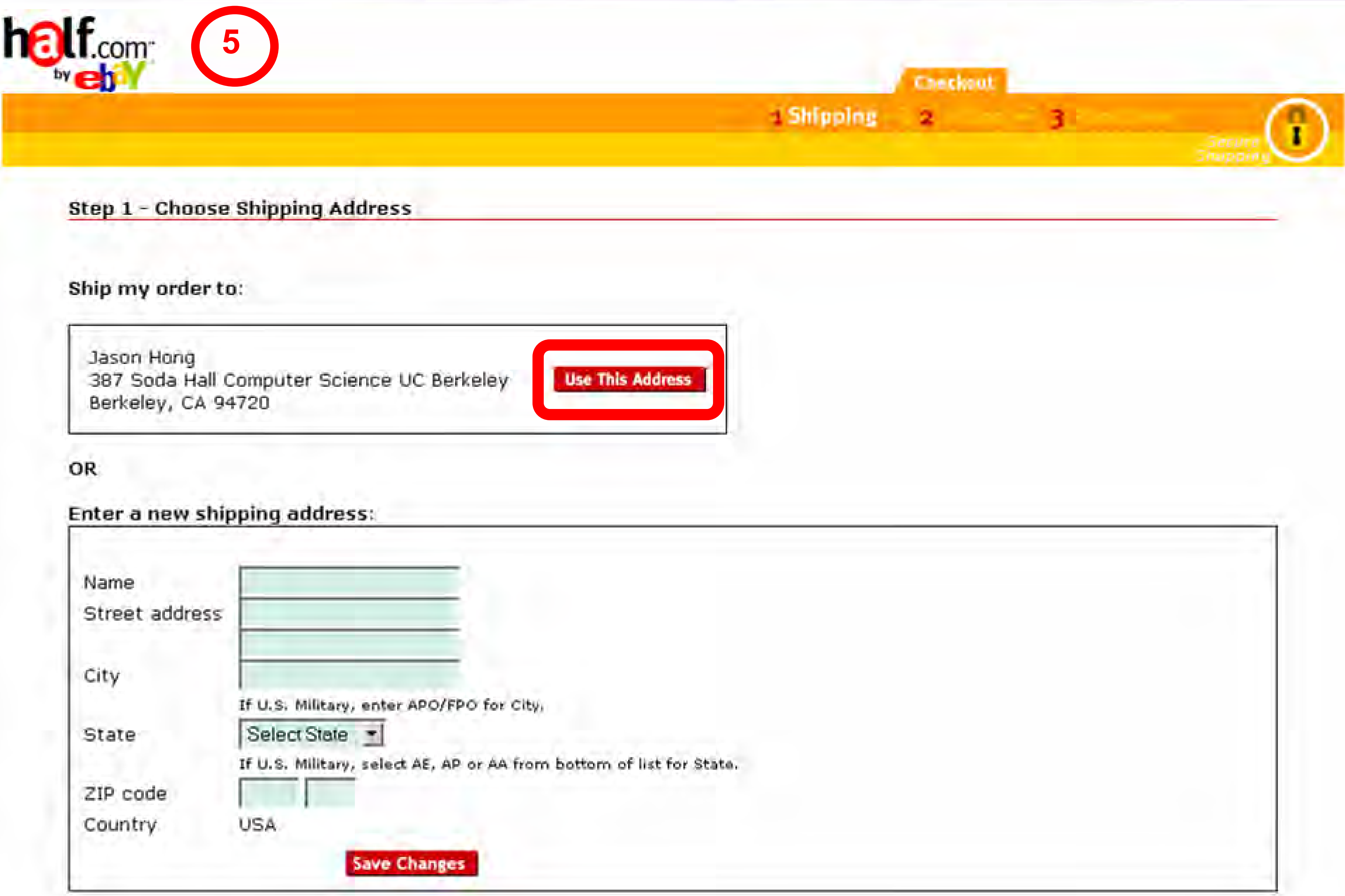
☐ Keep me signed in on this computer unless I sign out. Learn more .

Having problems signing in? Get help now.

For more information about sign in, visit sign in help .

Or sign in to eBay using:

5



Step 1 - Choose Shipping Address

Ship my order to:

Jason Hong
387 Soda Hall Computer Science UC Berkeley
Berkeley, CA 94720

OR

Enter a new shipping address:

Name
Street address
City
If U.S. Military, enter APO/FPO for City.
State
If U.S. Military, select AE, AP or AA from bottom of list for State.
ZIP code
Country USA

⑥

Order Summary

Weezer (2001) Weezer, Weezer (Music)
Seller: naojia@hotmail.com (35)
Condition: Like New • Notes: Perfect condition

Item: $8.30
Media Mail: $2.45
Subtotal: $10.75

Total Merchandise: $8.30
Total Shipping: $2.45
TOTAL: $10.75

Ship to

Jason Hong
387 Soda Hall Computer Science UC Berkeley
Berkeley, CA 94720

Edit / Change Shipping Address

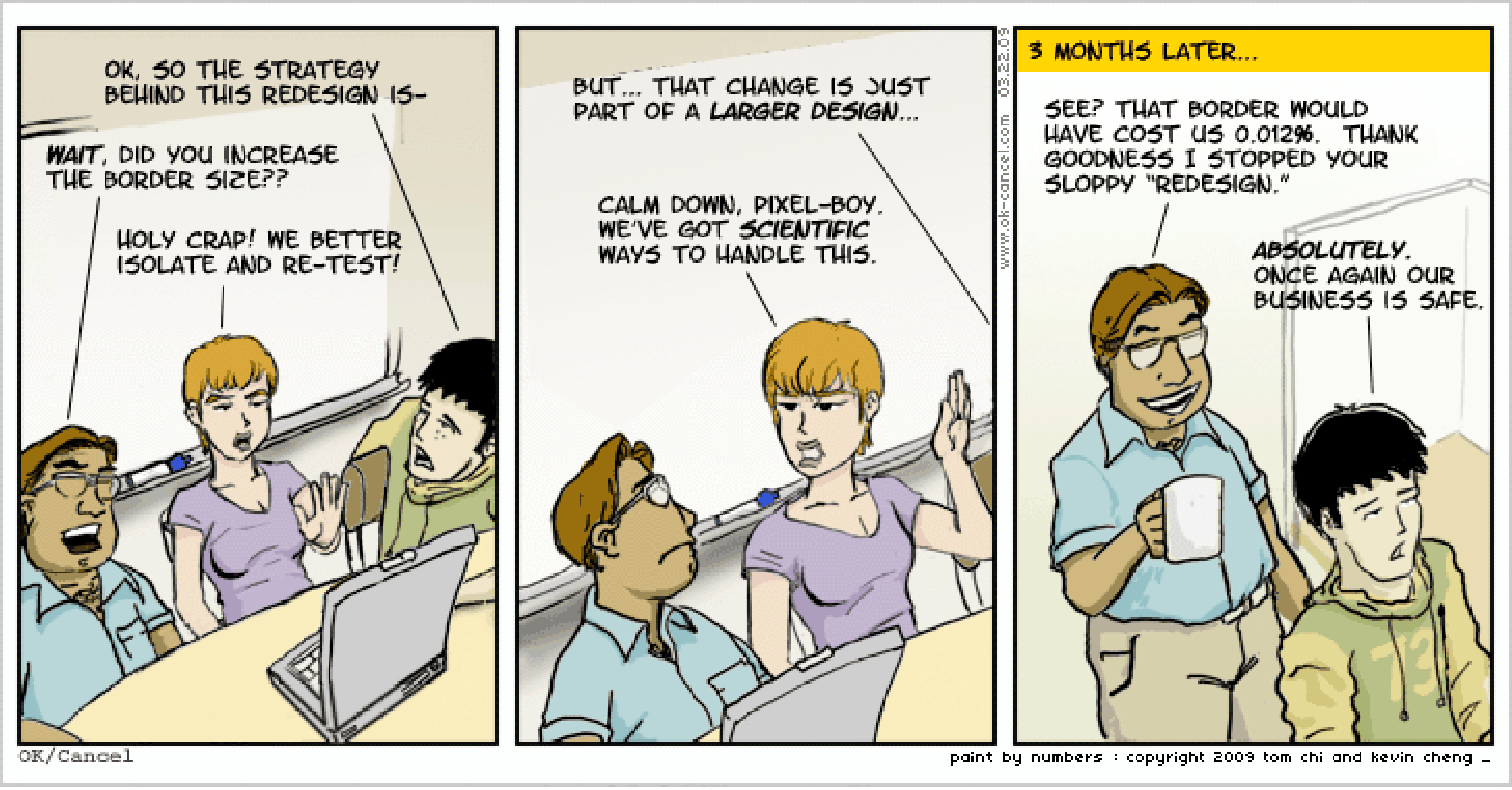
Bill to

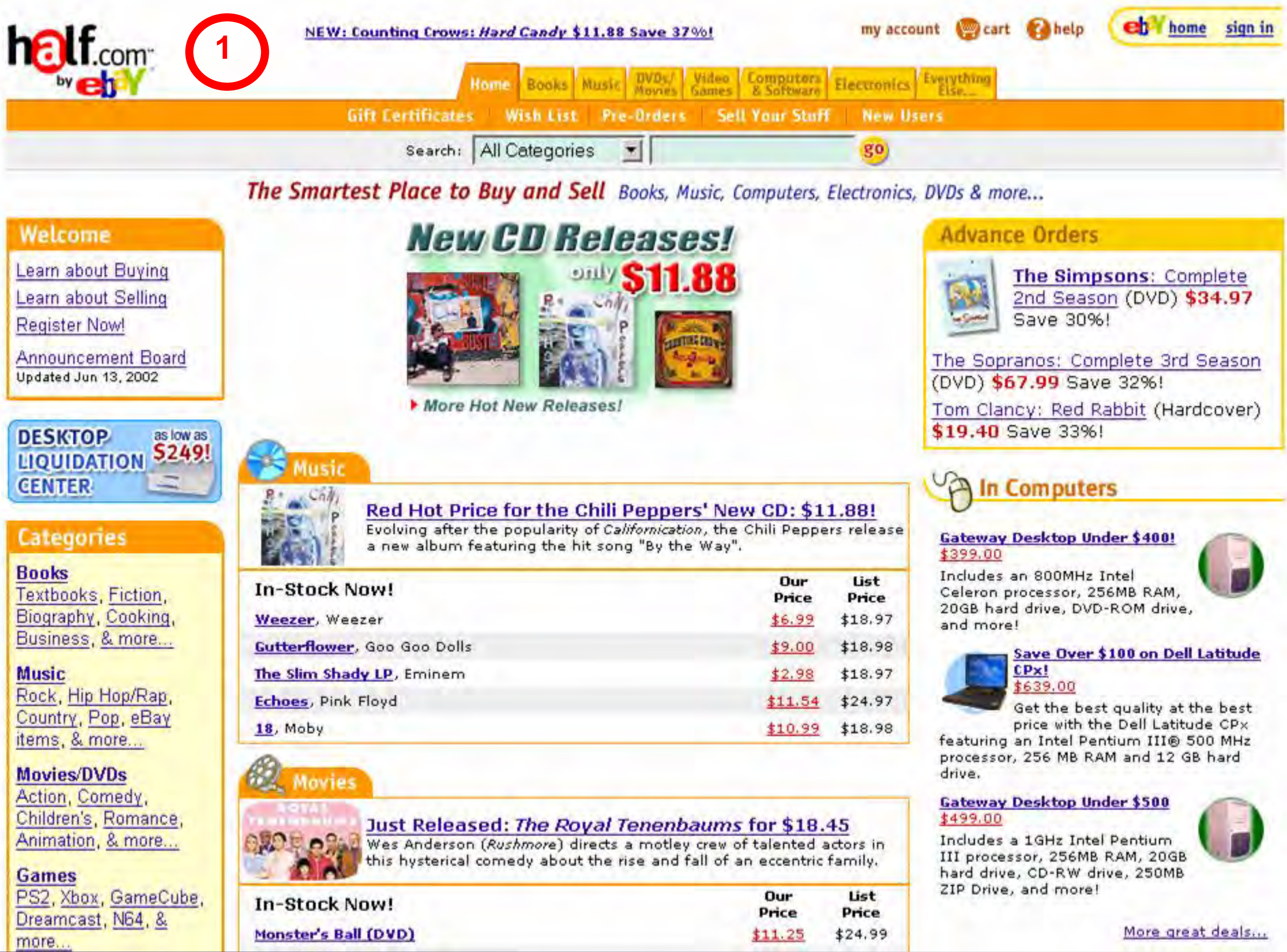
MasterCard ending with 0155
Expires 11/2003
Zipcode: 94709

Edit / Change Billing

☐ Use this shipping and billing information as my Speedy Checkout settings.

A larger example





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Rock, Hip Hop/Rap, Country, Pop, eBay items, & more...

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Tom Clancy: Red Rabbit (Hardcover) **$19.40** Save 33%!

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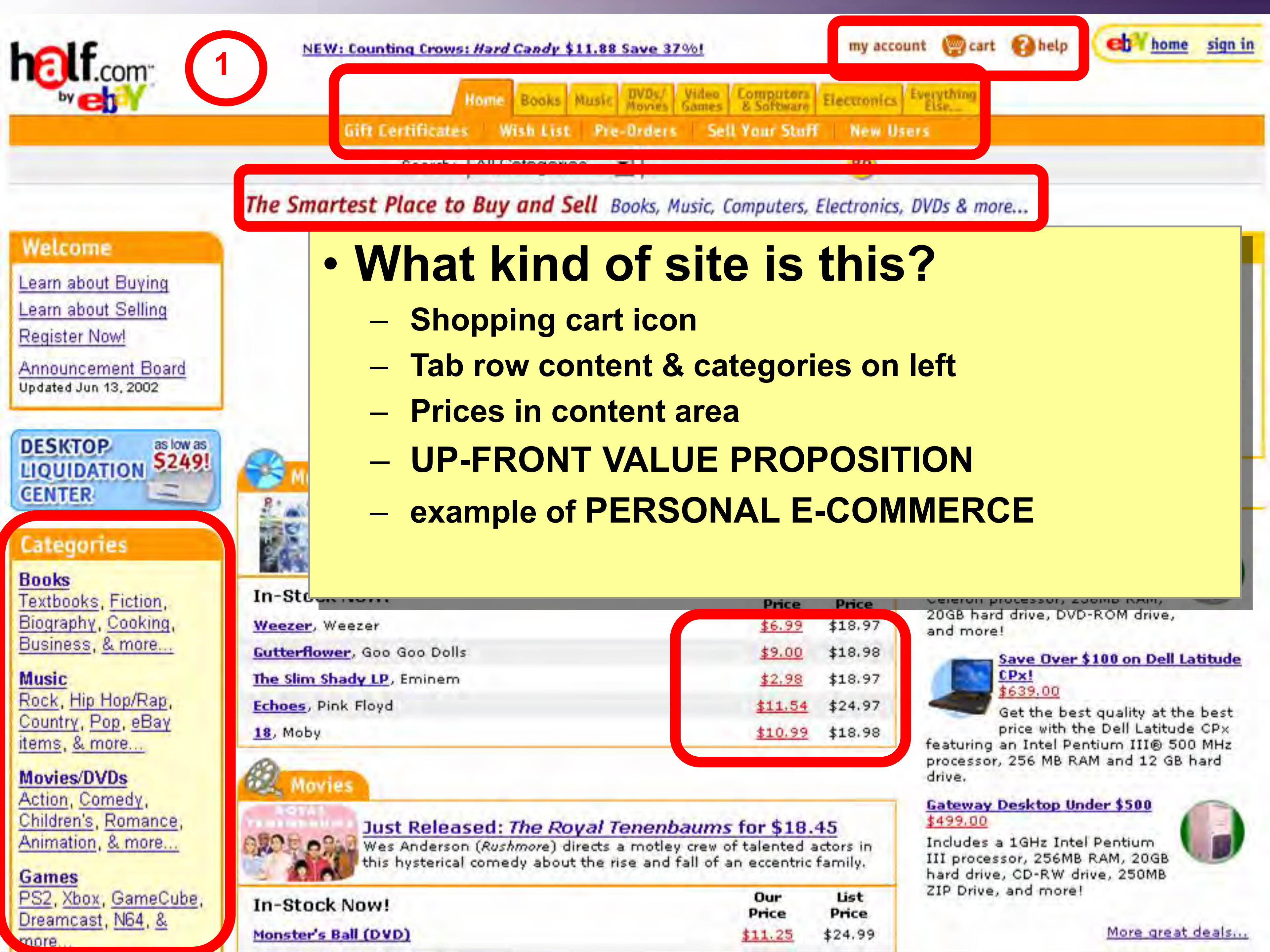

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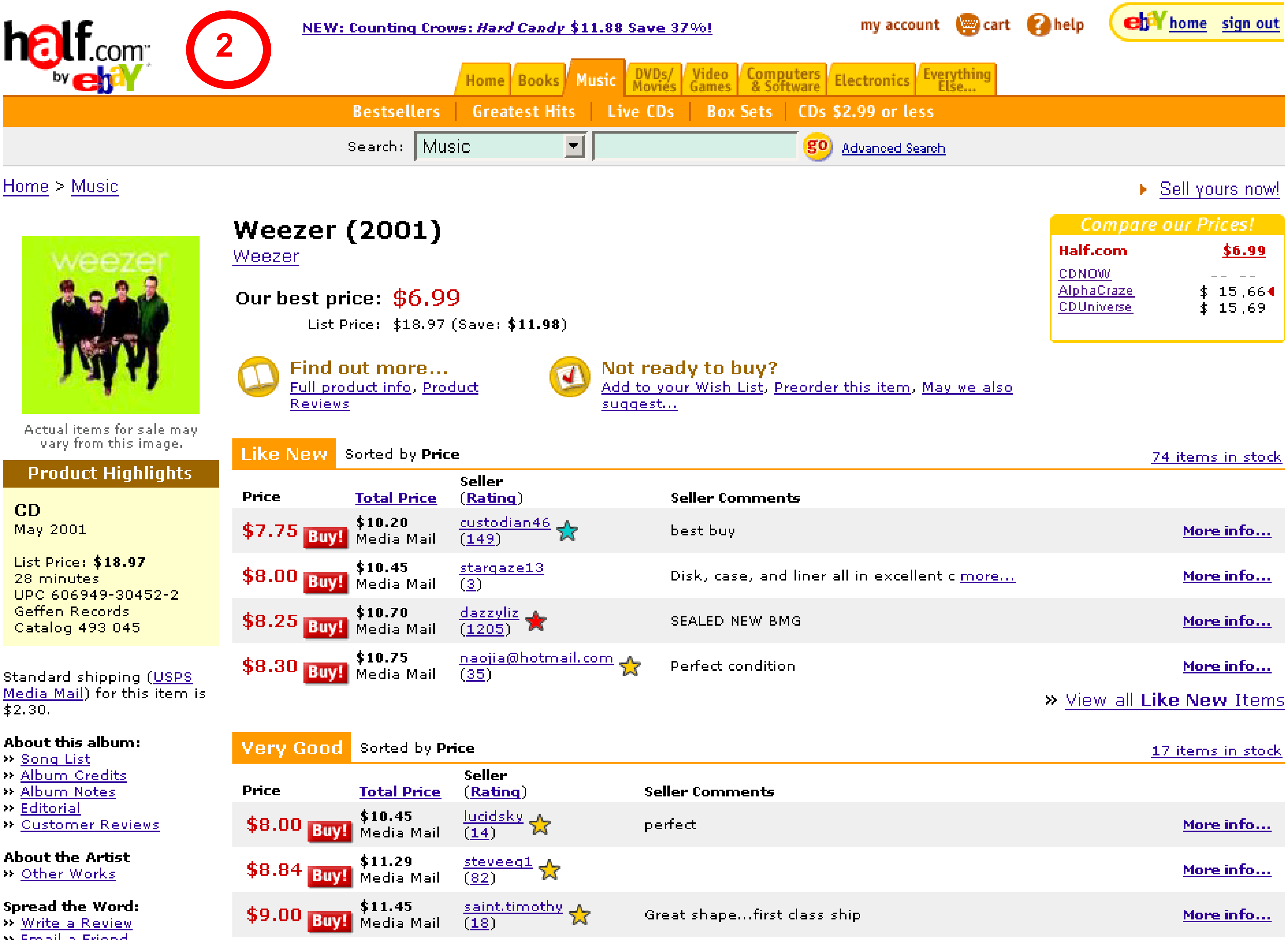

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May 2001

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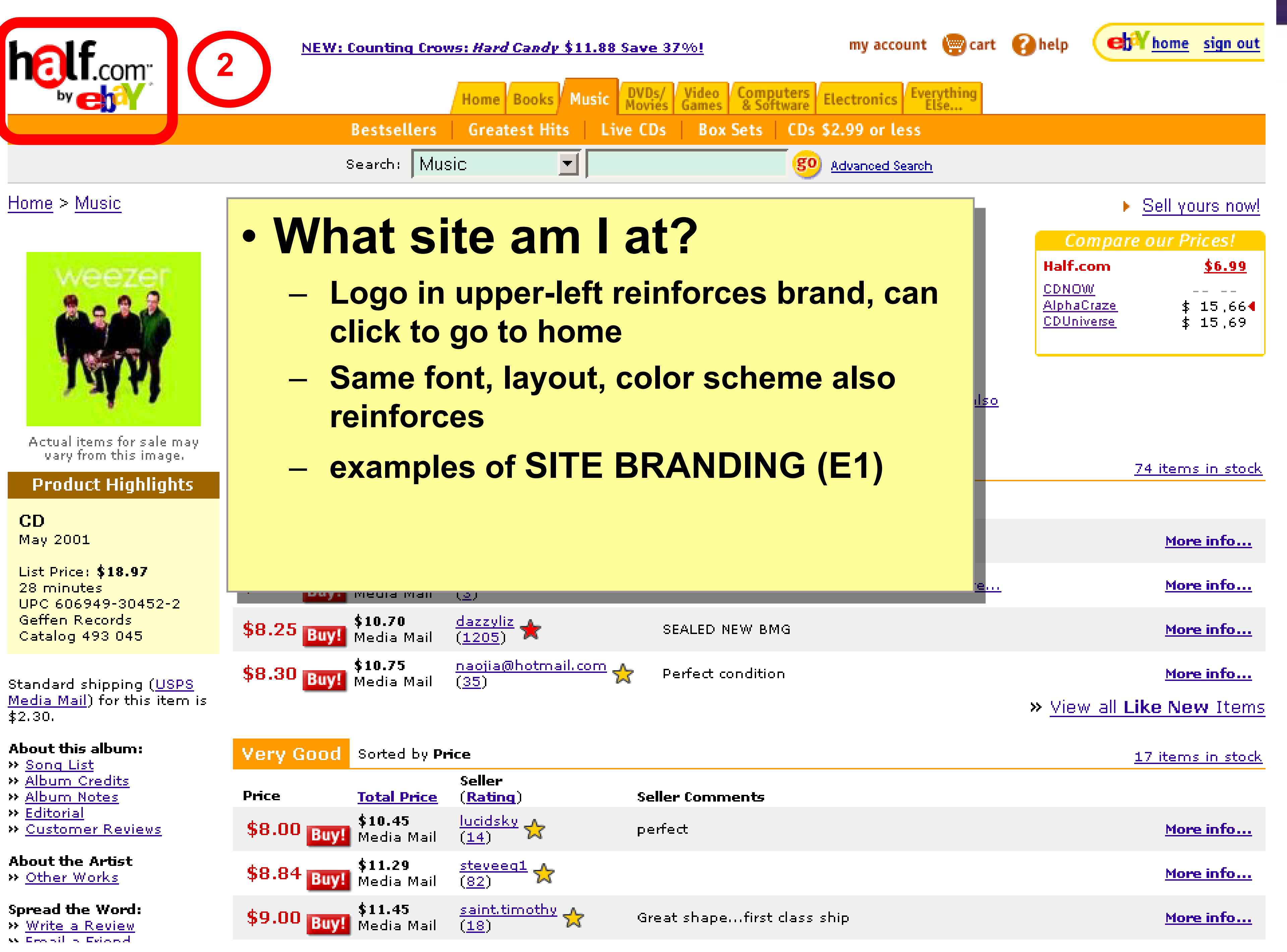

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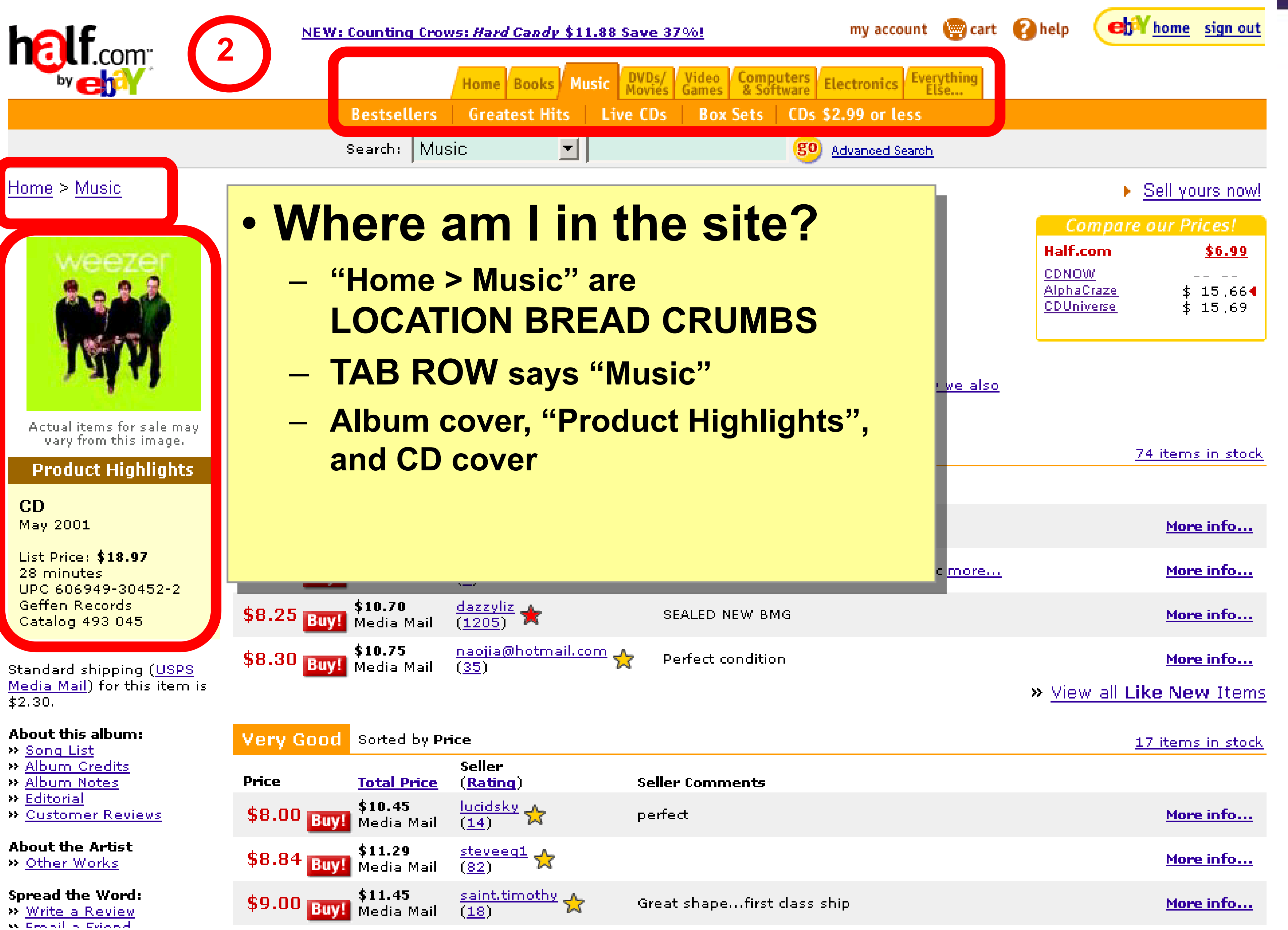

- **Where am I in the site?**
  - “Home > Music” are LOCATION BREAD CRUMBS
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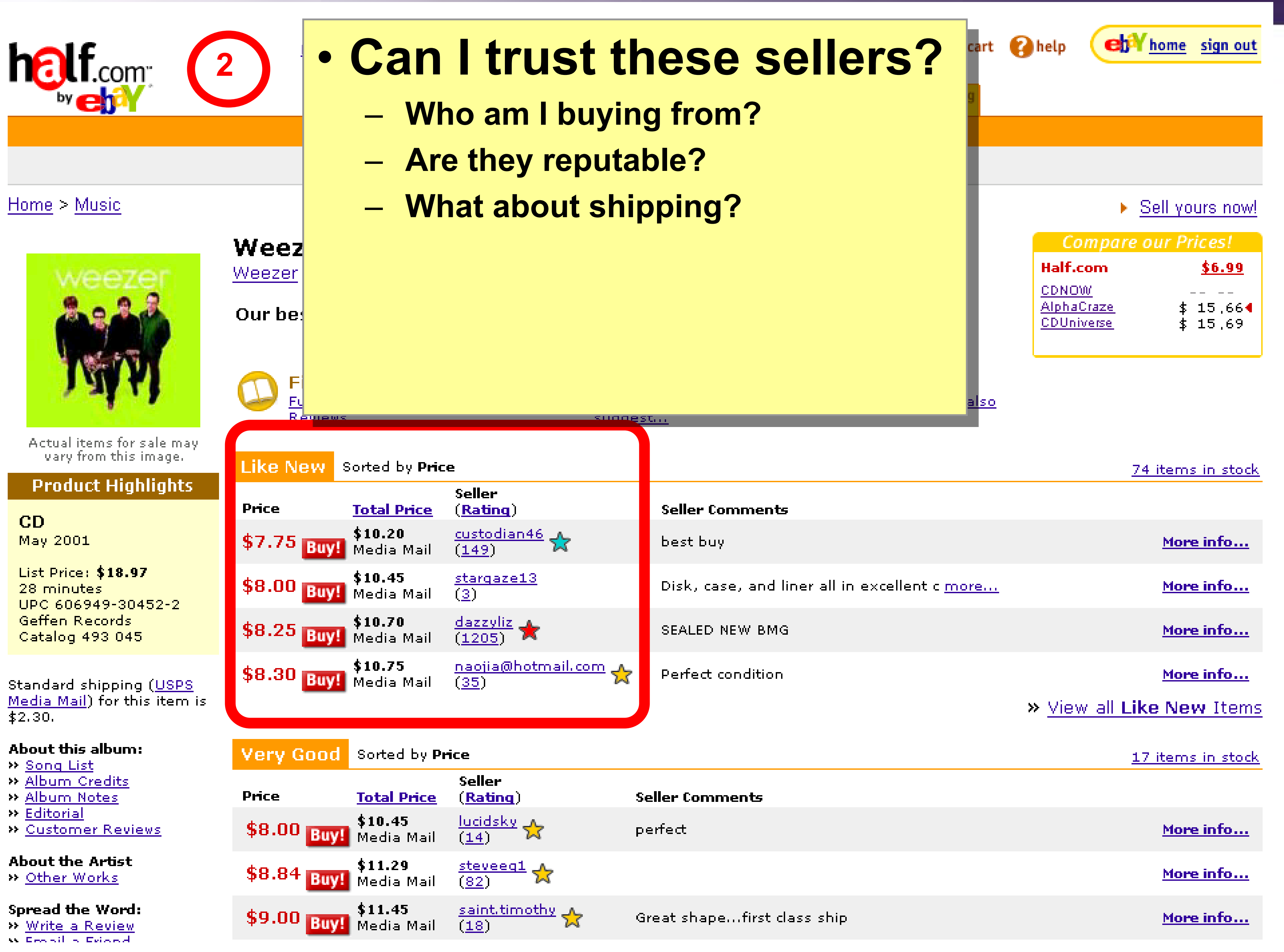

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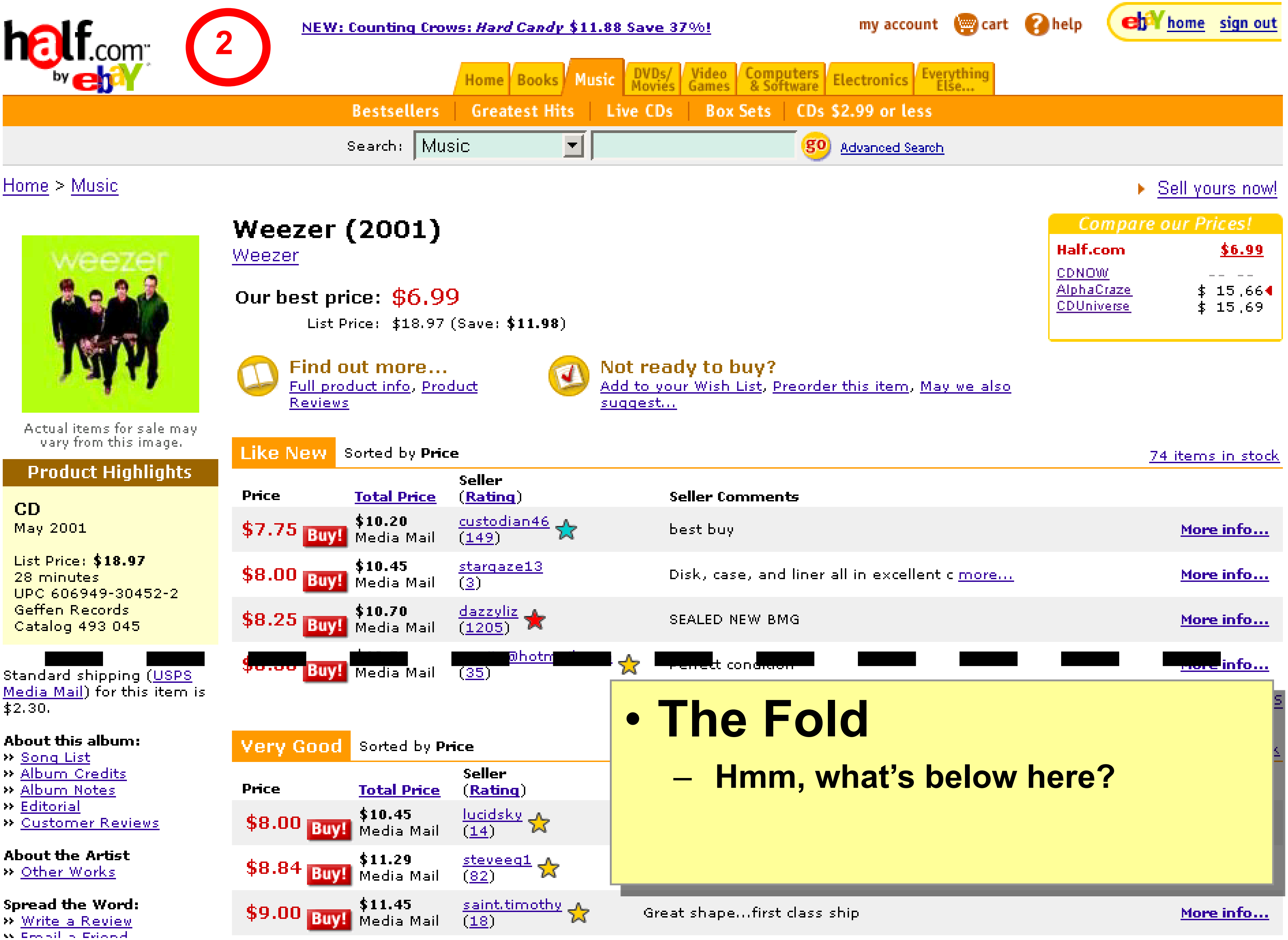

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About this album

Song List

1. Don't Let Go
2. Photograph
3. Hashpipe
4. Island In The Sun
5. Crab
6. Knock-Down Drag-Out
7. Smile
8. Simple Pages
9. Glorious Days
10. O Girlfriend

Album Credits

Ken Allerdyce, Engineer
Ric Ocasek, Producer

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  - PESONALIZED RECOMMENDATIONS
- About this album
- Lots of unused space
- Still more info below…

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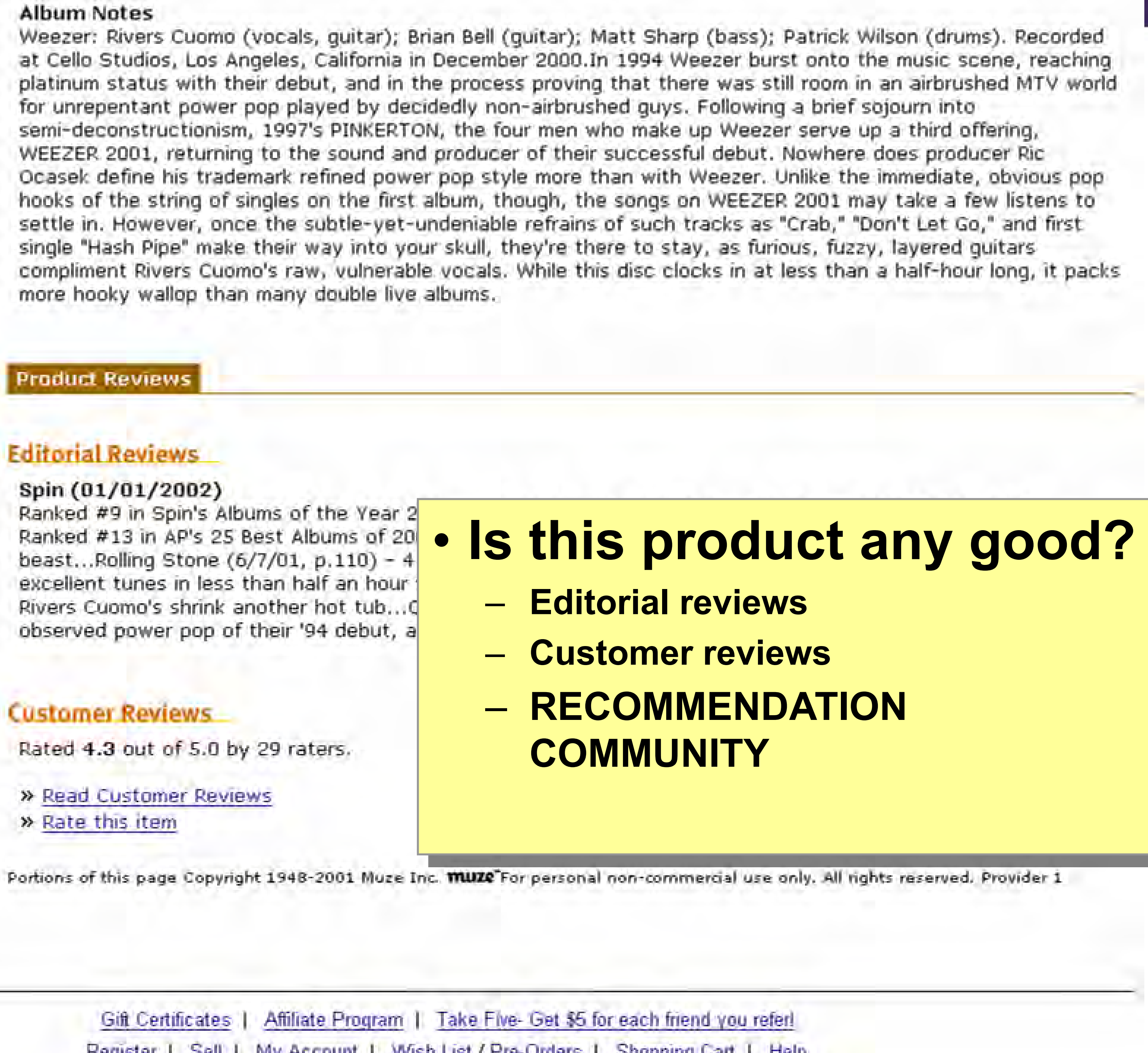

Album Notes

Weezer: Rivers Cuomo (vocals, guitar); Brian Bell (guitar); Matt Sharp (bass); Patrick Wilson (drums). Recorded at Cello Studios, Los Angeles, California in December 2000.In 1994 Weezer burst onto the music scene, reaching platinum status with their debut, and in the process proving that there was still room in an airbrushed MTV world for unrepentant power pop played by decidedly non-airbrushed guys. Following a brief sojourn into semi-deconstructionism, 1997's PINKERTON, the four men who make up Weezer serve up a third offering, WEEZER 2001, returning to the sound and producer of their successful debut. Nowhere does producer Ric Ocasek define his trademark refined power pop style more than with Weezer. Unlike the immediate, obvious pop hooks of the string of singles on the first album, though, the songs on WEEZER 2001 may take a few listens to settle in. However, once the subtle-yet-undeniable refrains of such tracks as "Crab," "Don't Let Go," and first single "Hash Pipe" make their way into your skull, they're there to stay, as furious, fuzzy, layered guitars compliment Rivers Cuomo's raw, vulnerable vocals. While this disc clocks in at less than a half-hour long, it packs more hooky wallop than many double live albums.

Product Reviews

Editorial Reviews

Spin (01/01/2002)

Ranked #9 in Spin's Albums of the Year 2
Ranked #13 in AP's 25 Best Albums of 20
beast...Rolling Stone (6/7/01, p.110) - 4
excellent tunes in less than half an hour
Rivers Cuomo's shrink another hot tub...
observed power pop of their '94 debut, a

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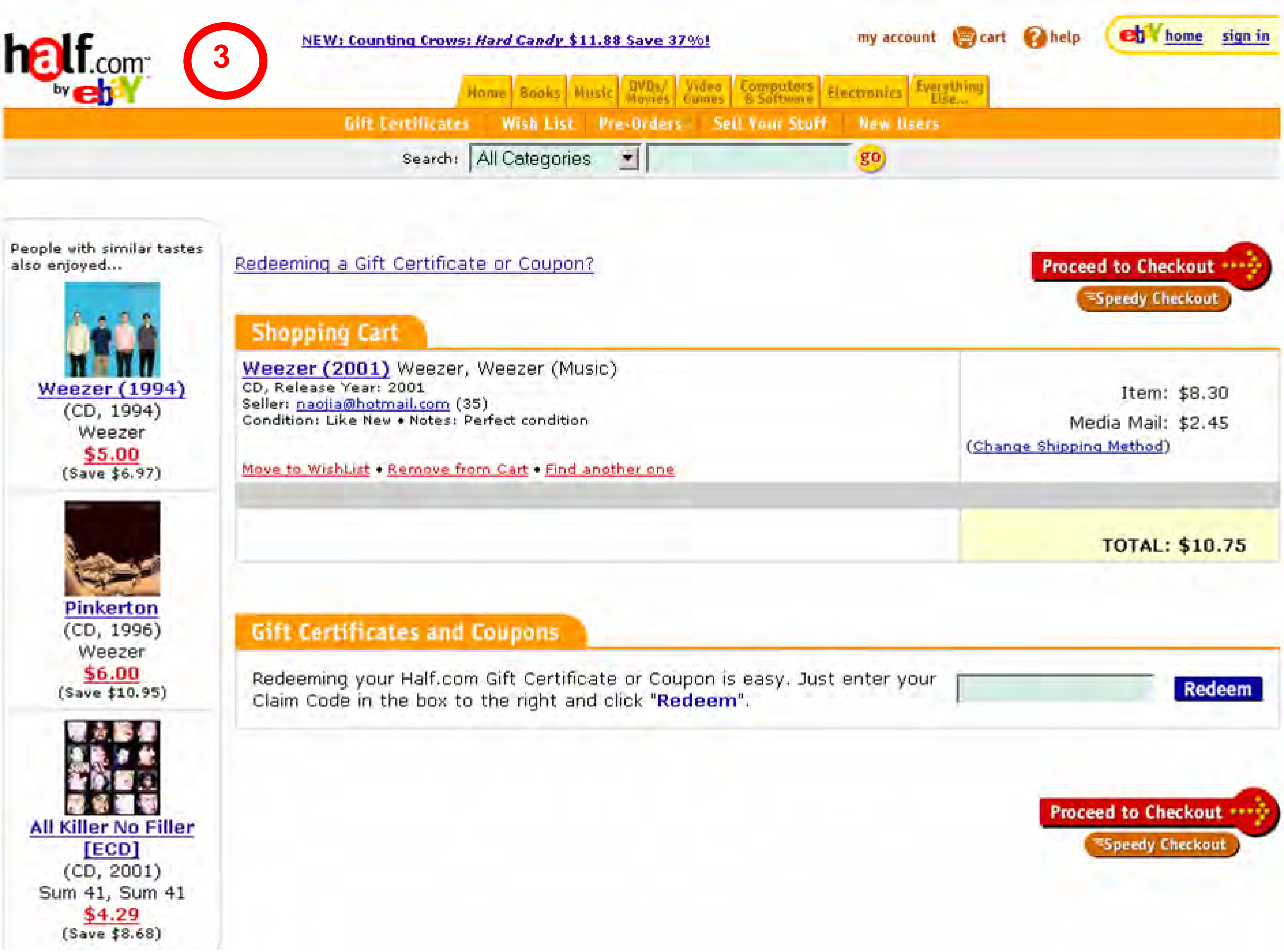

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(CD, 1996)
Weezer
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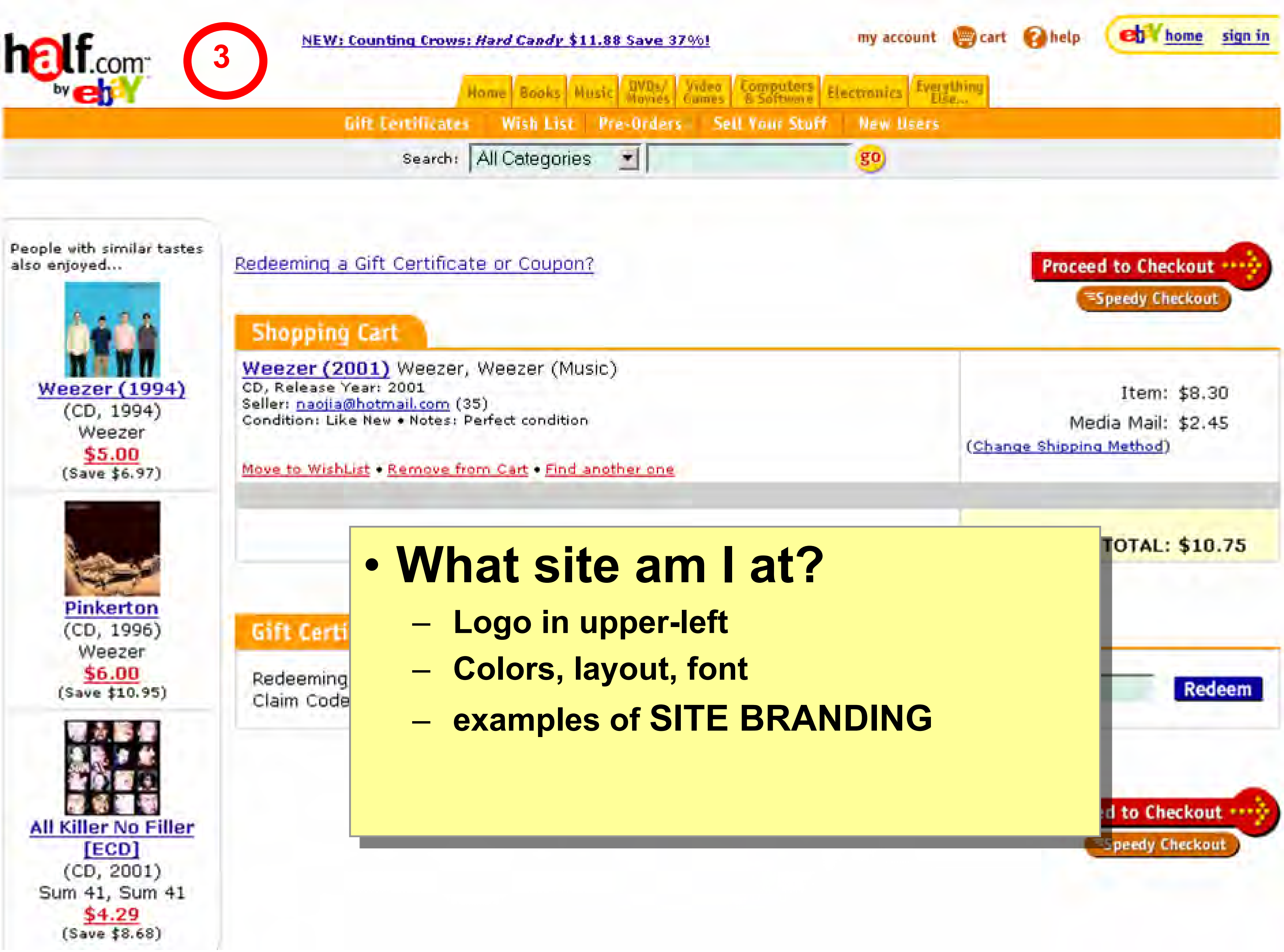

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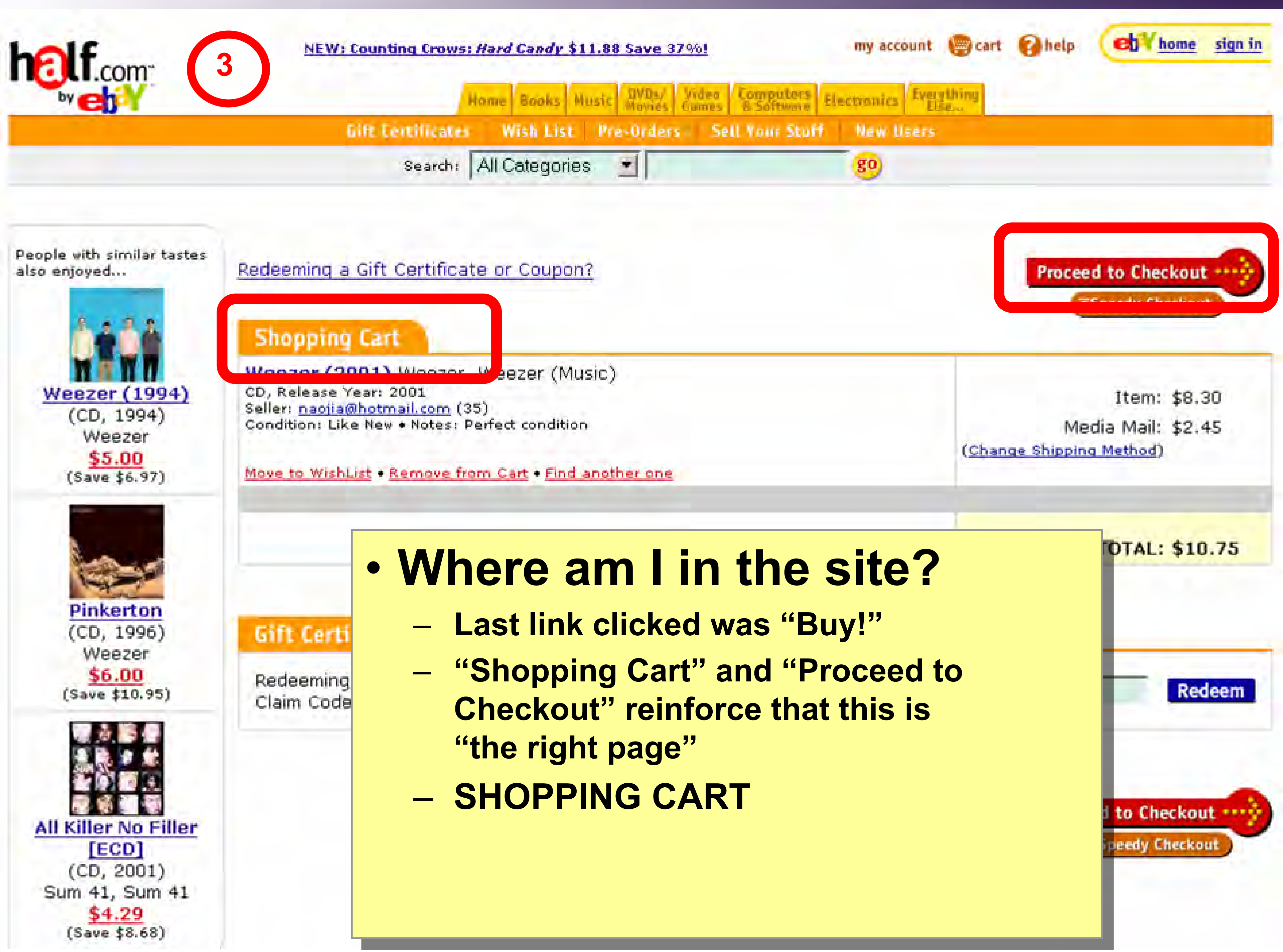
  - Colors, layout, font
  - examples of SITE BRANDING



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Claim Code

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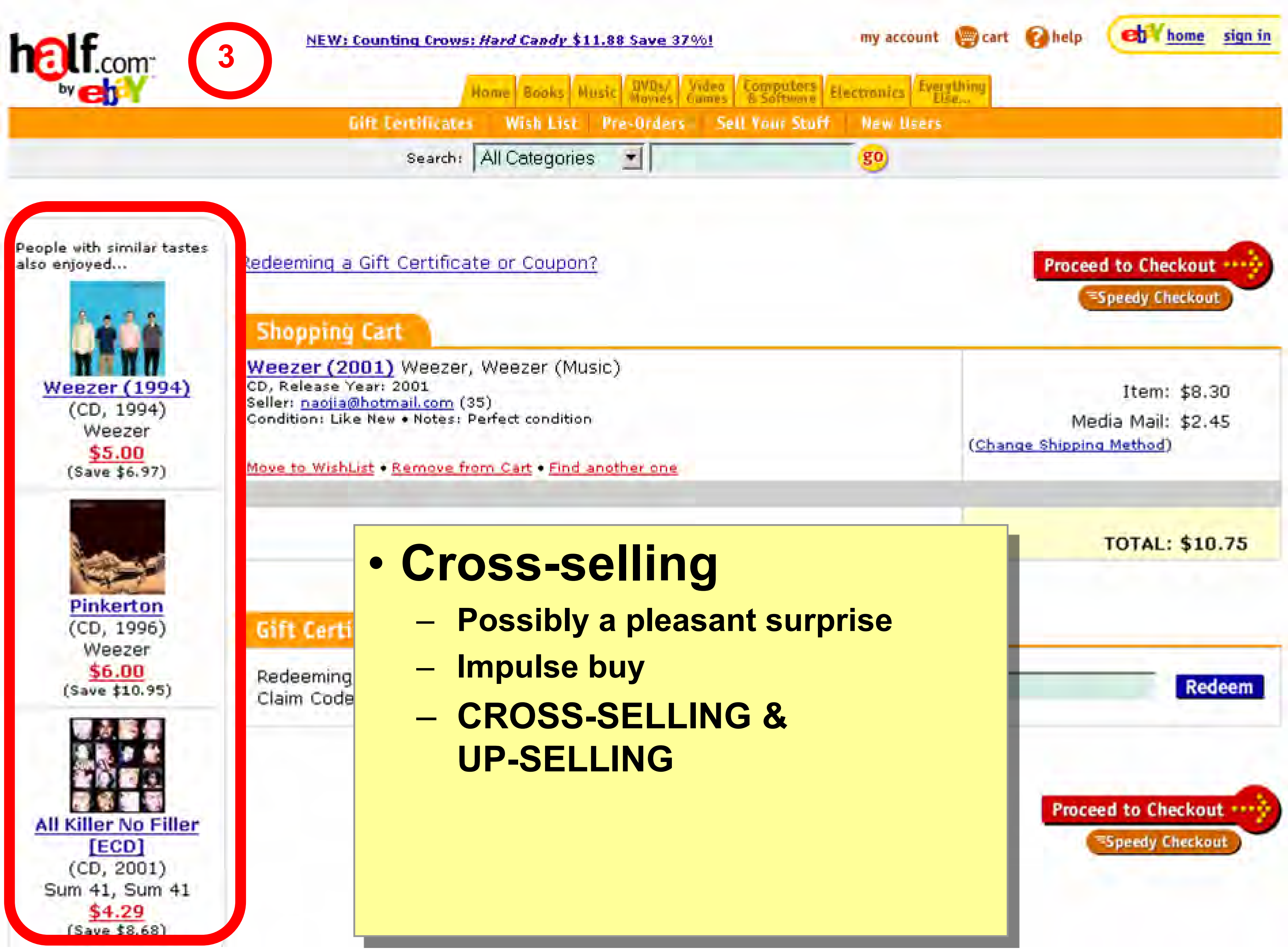
  - **Last link clicked was “Buy!”**
  - **“Shopping Cart” and “Proceed to Checkout” reinforce that this is “the right page”**
  - **SHOPPING CART**



People with similar tastes also enjoyed...

Weezer (1994)
(CD, 1994)
Weezer
$5.00
(Save $6.97)

Pinkerton
(CD, 1996)
Weezer
$6.00
(Save $10.95)

All Killer No Filler [ECD]
(CD, 2001)
Sum 41, Sum 41
$4.29
(Save $8.68)

Redeeming a Gift Certificate or Coupon?

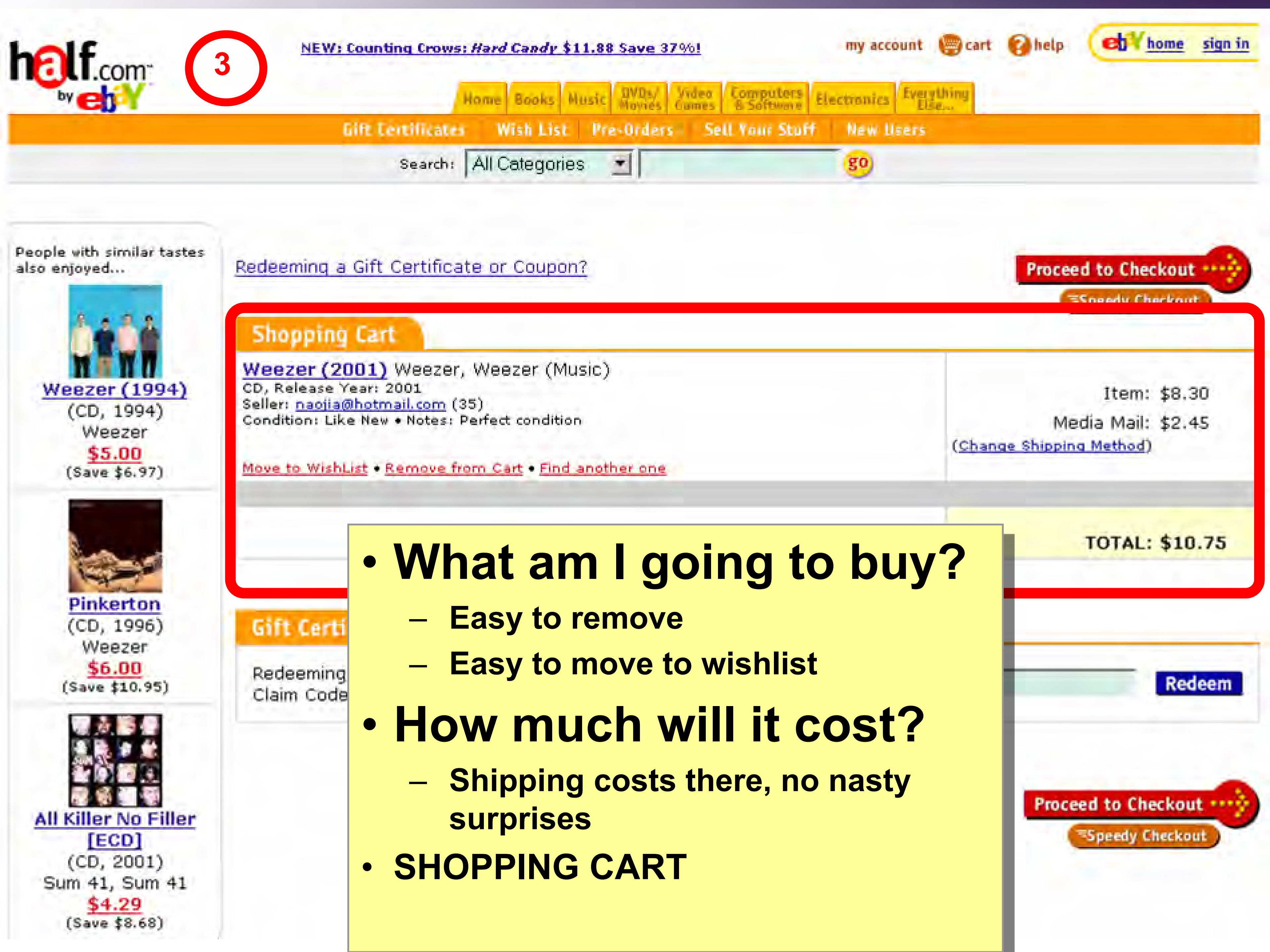
Weezer (2001) Weezer, Weezer (Music)
CD, Release Year: 2001
Seller: naojia@hotmail.com (35)
Condition: Like New • Notes: Perfect condition

Item: $8.30
Media Mail: $2.45

TOTAL: $10.75

Redeeming
Claim Code

- **Cross-selling**
  - Possibly a pleasant surprise
  - Impulse buy
  - CROSS-SELLING & UP-SELLING



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Sum 41, Sum 41
$4.29
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Redeeming a Gift Certificate or Coupon?

Shopping Cart

Weezer (2001) Weezer, Weezer (Music)
CD, Release Year: 2001
Seller: naojia@hotmail.com (35)
Condition: Like New • Notes: Perfect condition

Move to WishList • Remove from Cart • Find another one

Item: $8.30
Media Mail: $2.45
(Change Shipping Method)

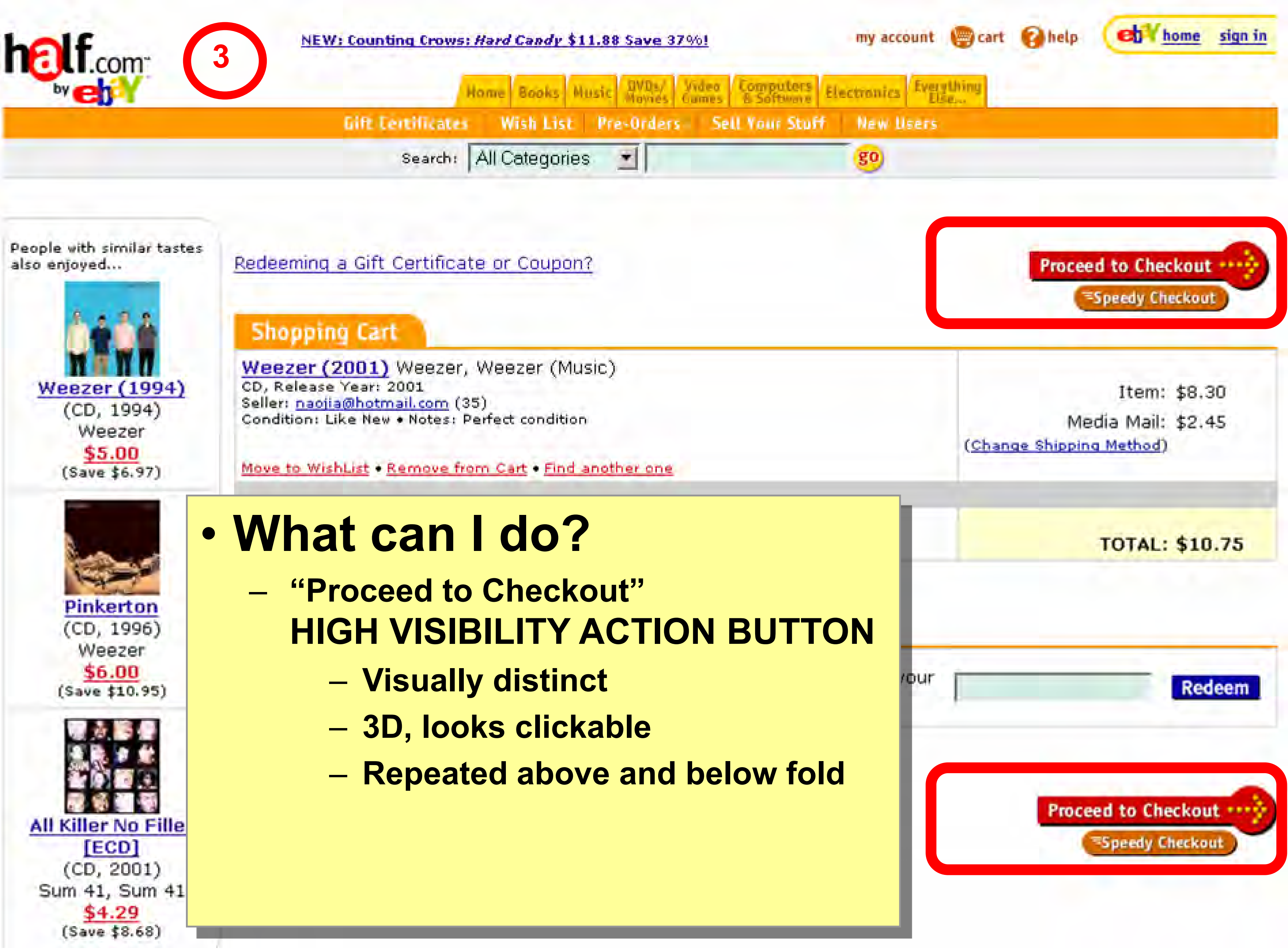
TOTAL: $10.75

Gift Certi

Redeeming
Claim Code

- **What am I going to buy?**
  - **Easy to remove**
  - **Easy to move to wishlist**
- **How much will it cost?**
  - **Shipping costs there, no nasty surprises**
- **SHOPPING CART**

③



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$4.29
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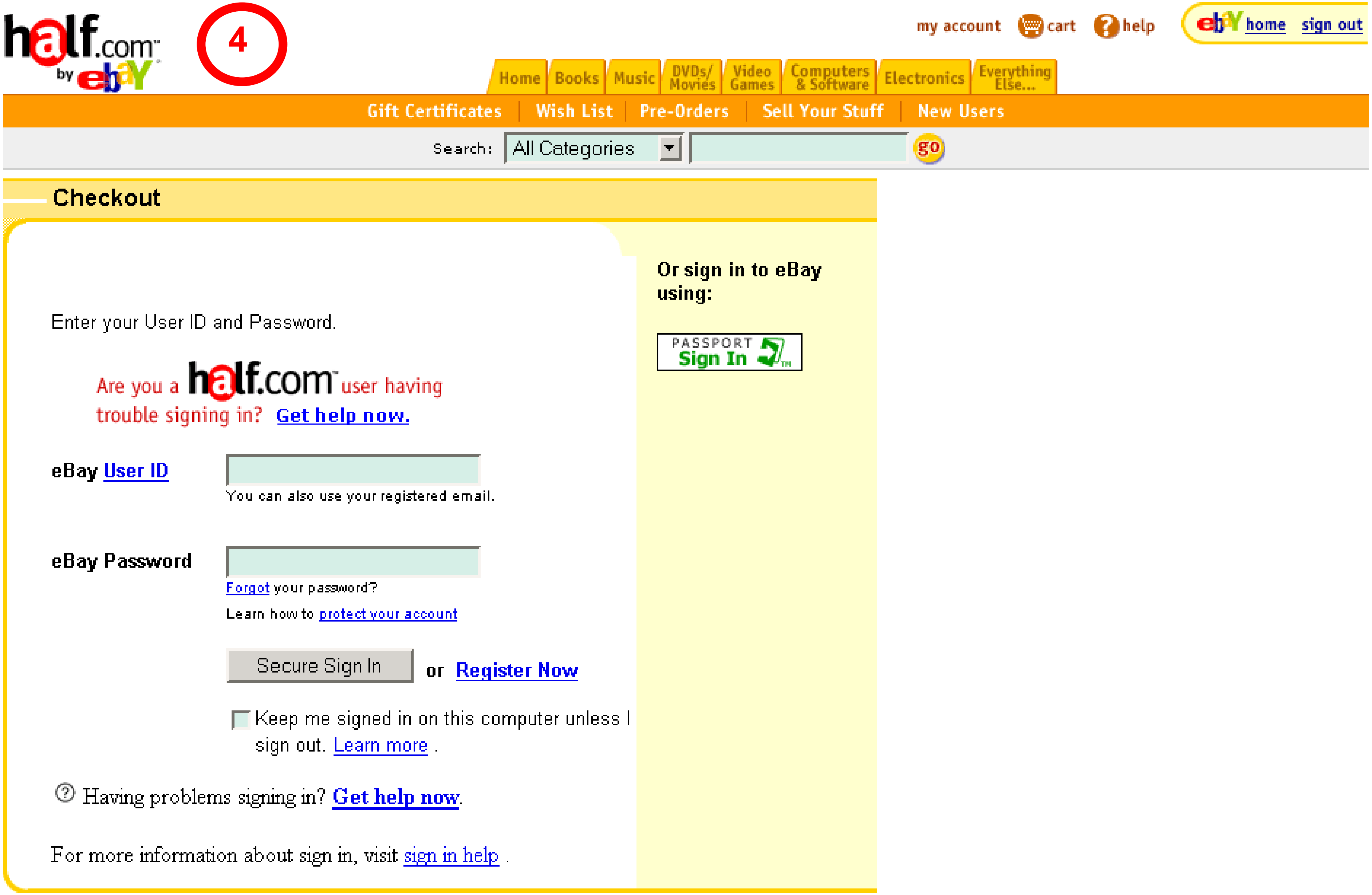
Move to WishList • Remove from Cart • Find another one

Item: $8.30
Media Mail: $2.45
(Change Shipping Method)

TOTAL: $10.75

- **What can I do?**
  - **"Proceed to Checkout" HIGH VISIBILITY ACTION BUTTON**
    - **Visually distinct**
    - **3D, looks clickable**
    - **Repeated above and below fold**

④



Checkout

Enter your User ID and Password.

Are you a half.com user having trouble signing in? Get help now.

eBay User ID

You can also use your registered email.

eBay Password

Forgot your password?

Learn how to protect your account

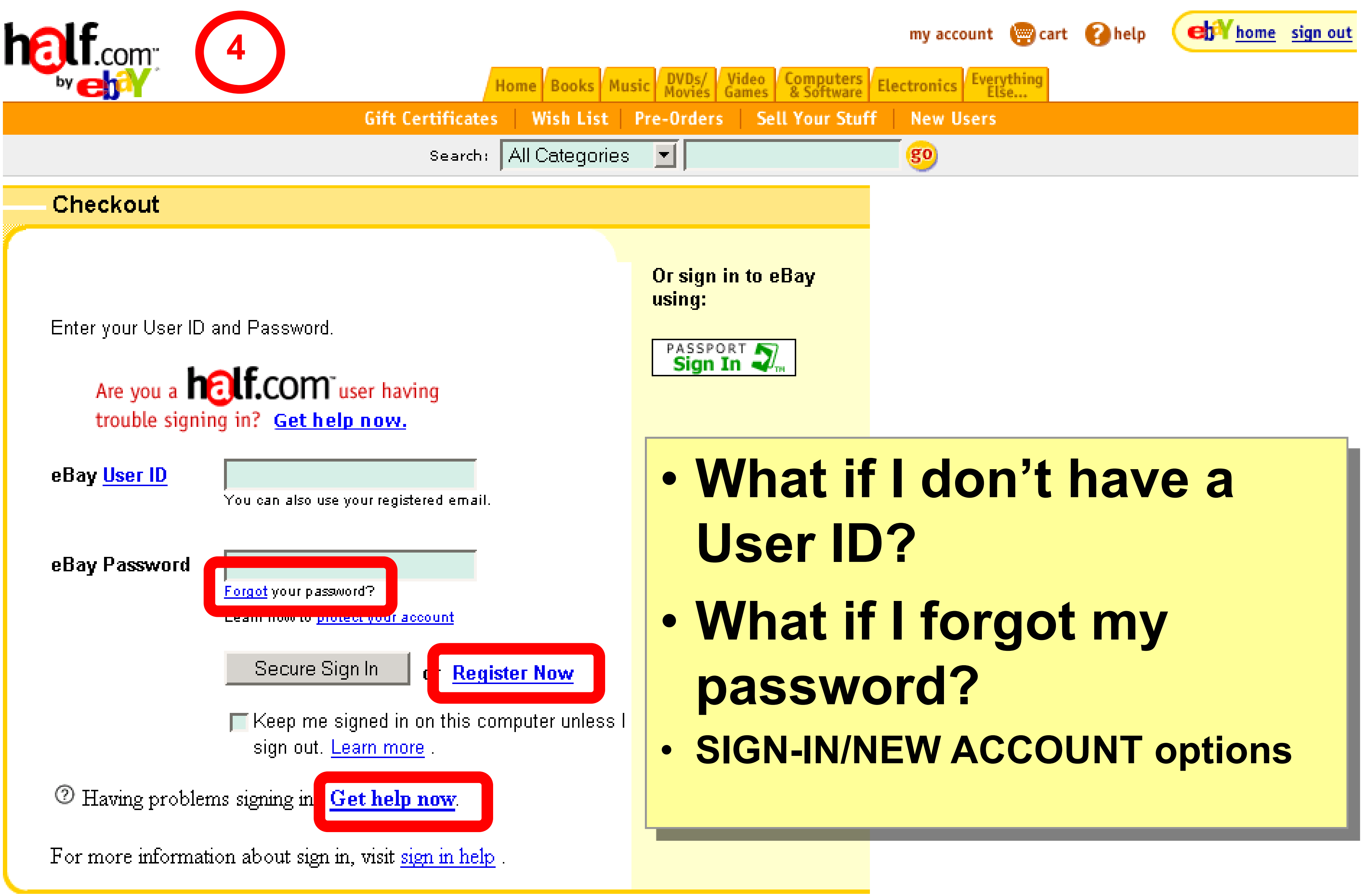
or **Register Now**

☐ Keep me signed in on this computer unless I sign out. Learn more .

Having problems signing in? **Get help now.**

For more information about sign in, visit sign in help .

Or sign in to eBay using:



Checkout

Enter your User ID and Password.

Are you a half.com user having trouble signing in? Get help now.

eBay User ID

You can also use your registered email.

eBay Password

Forgot your password?

Learn how to protect your account

Secure Sign In or Register Now

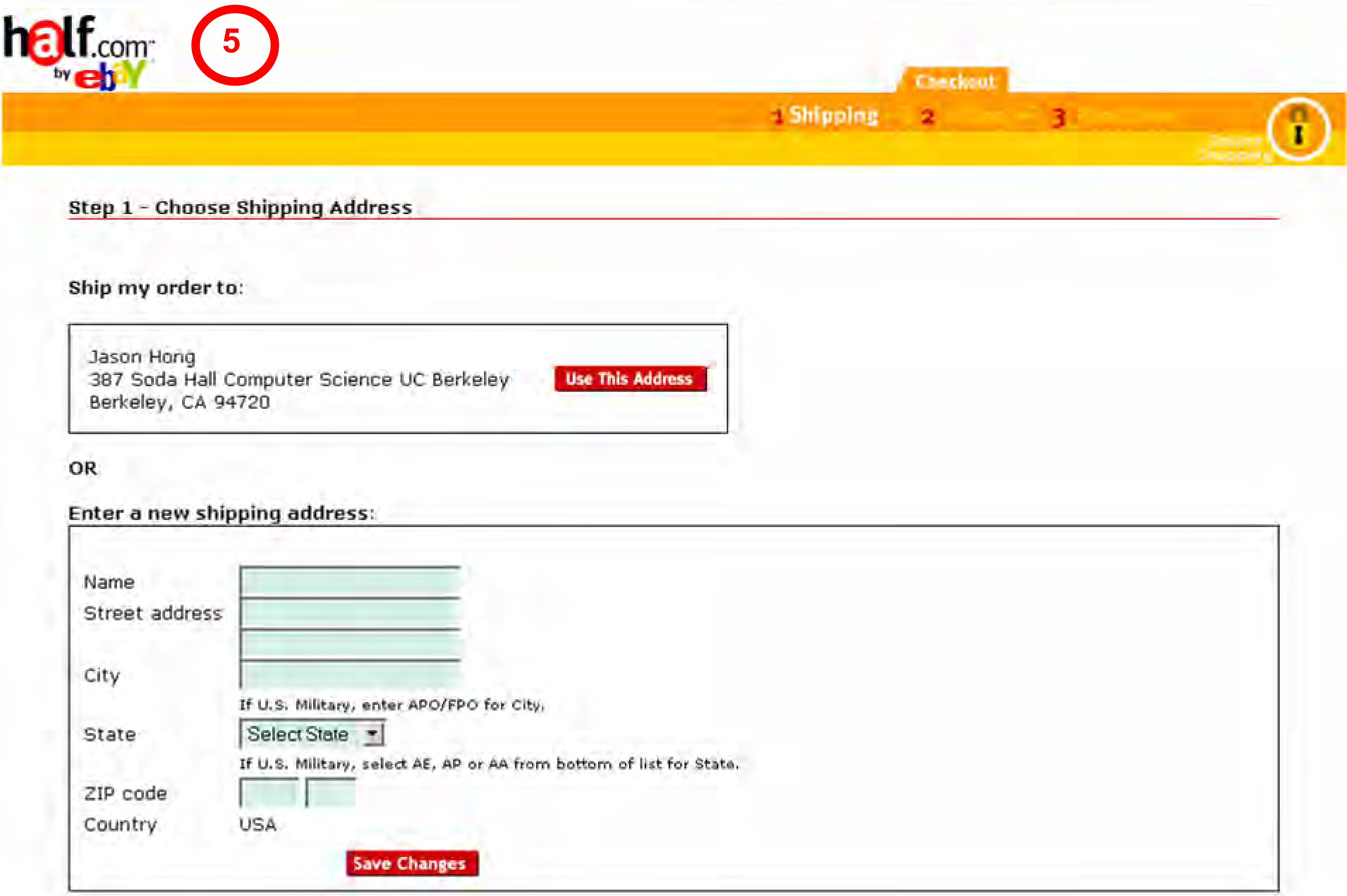
☐ Keep me signed in on this computer unless I sign out. Learn more .

Having problems signing in? Get help now.

For more information about sign in, visit sign in help .

Or sign in to eBay using:

- **What if I don't have a User ID?**
- **What if I forgot my password?**
- **SIGN-IN/NEW ACCOUNT options**



Step 1 - Choose Shipping Address

Ship my order to:

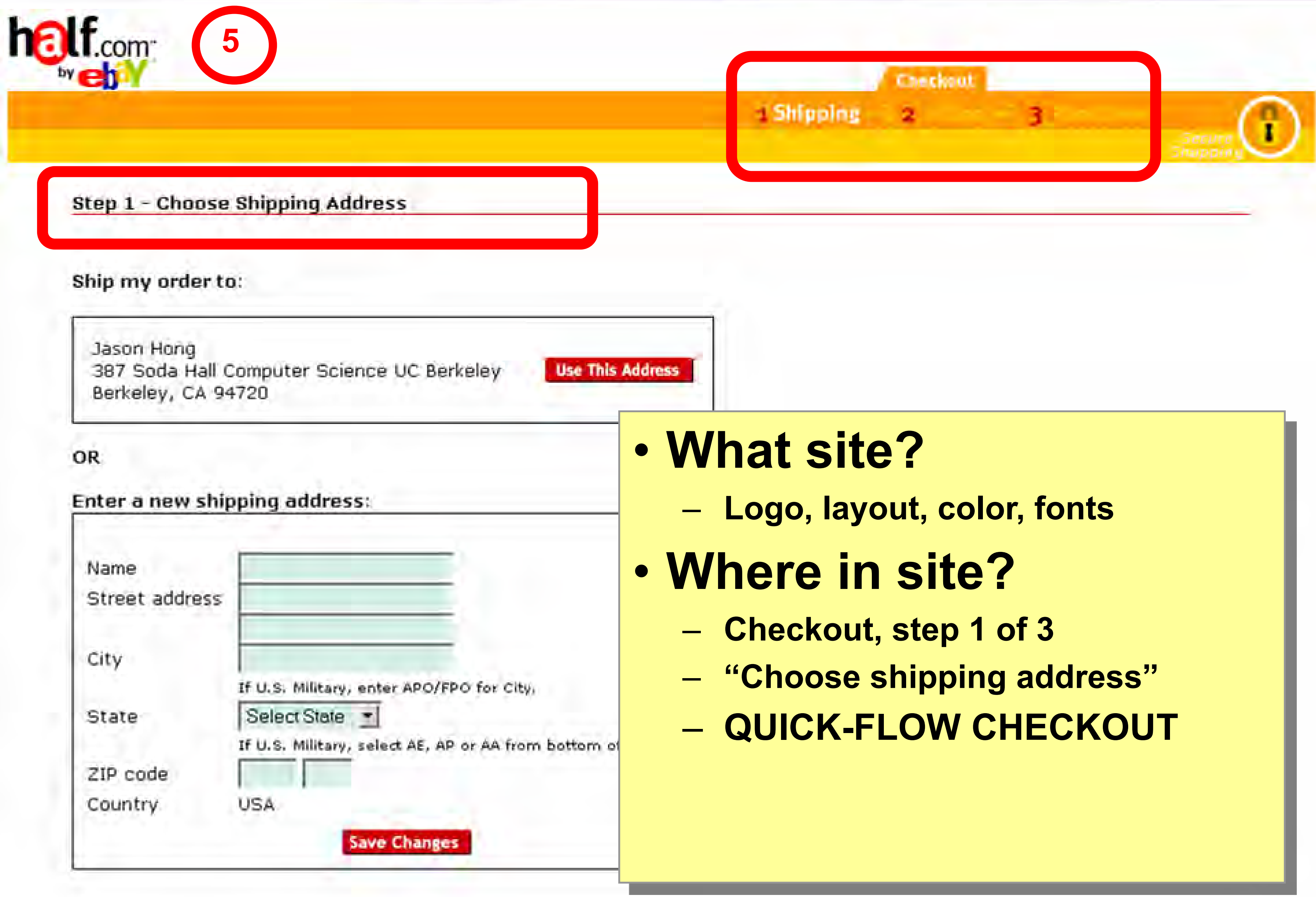
Jason Hong
387 Soda Hall Computer Science UC Berkeley
Berkeley, CA 94720

OR

Enter a new shipping address:

Name
Street address
City
If U.S. Military, enter APO/FPO for City.
State
If U.S. Military, select AE, AP or AA from bottom of list for State.
ZIP code
Country USA

5



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Ship my order to:

Jason Hong
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Berkeley, CA 94720

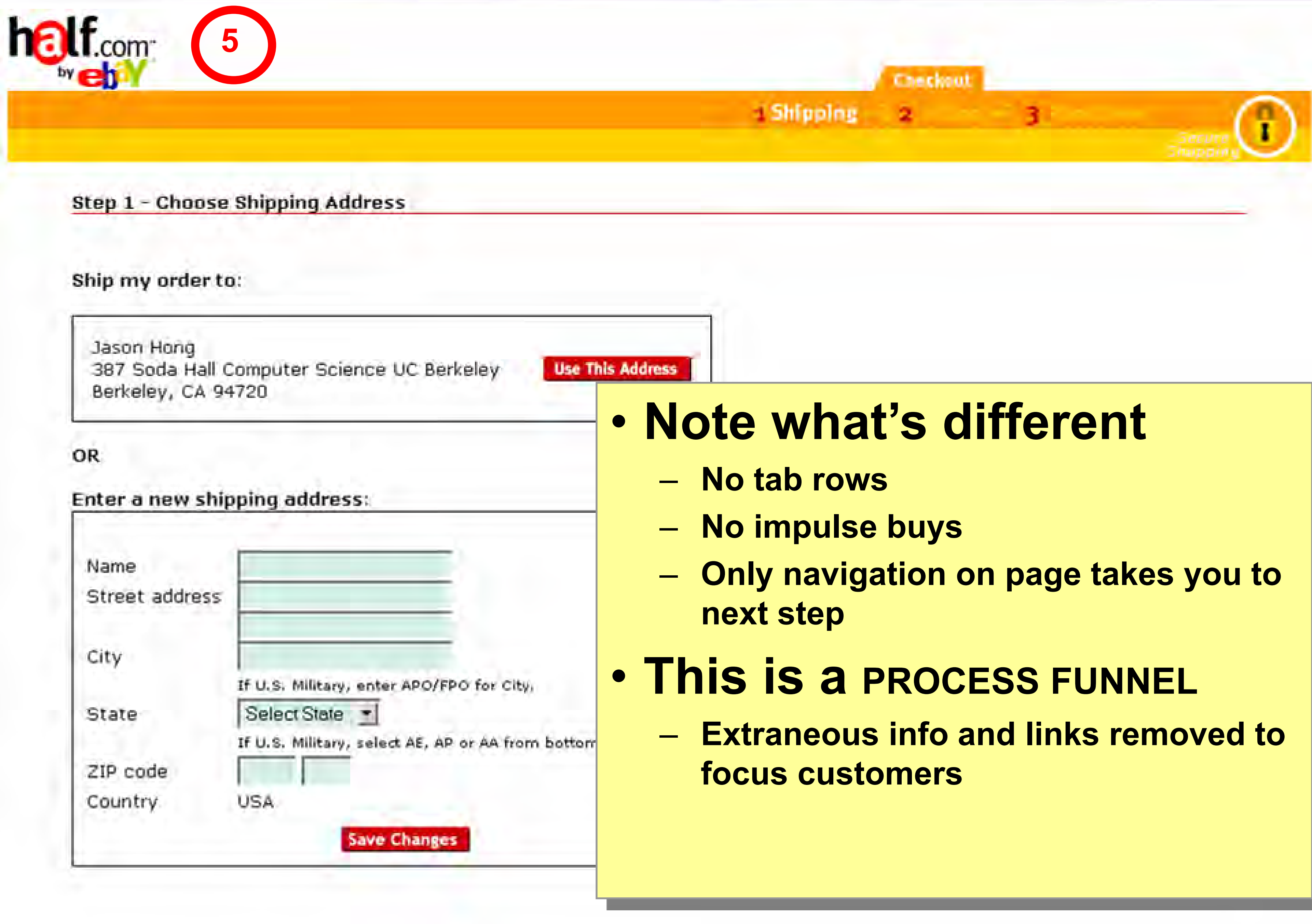
OR

Enter a new shipping address:

Name	
Street address	
City	
	If U.S. Military, enter APO/FPO for City,
State	Select State
	If U.S. Military, select AE, AP or AA from bottom of
ZIP code	
Country	USA

- **What site?**
  - Logo, layout, color, fonts
- **Where in site?**
  - Checkout, step 1 of 3
  - “Choose shipping address”
  - QUICK-FLOW CHECKOUT

⑤



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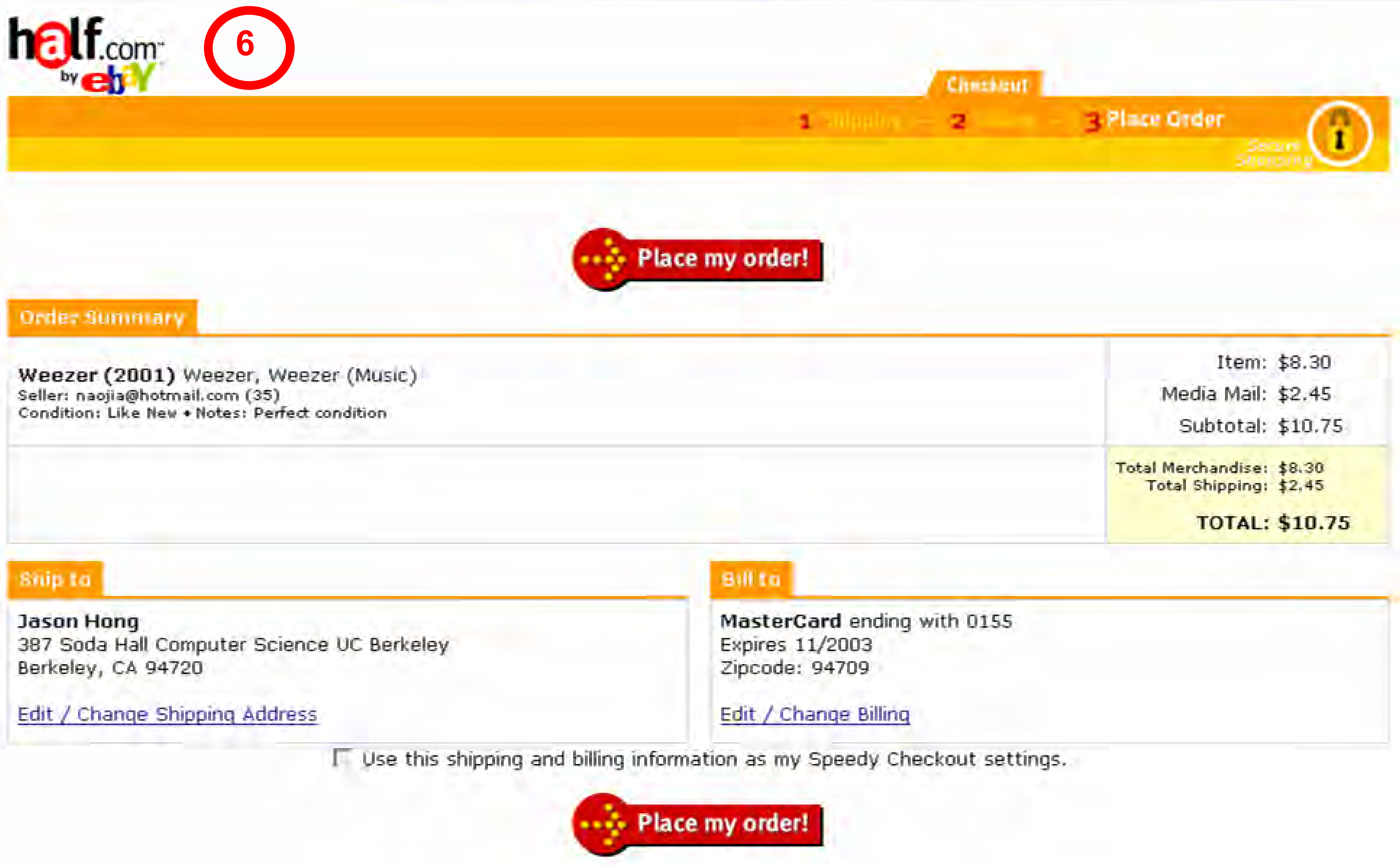
Enter a new shipping address:

Name
Street address
City
If U.S. Military, enter APO/FPO for City.
State: Select State
If U.S. Military, select AE, AP or AA from bottom
ZIP code
Country: USA

- **Note what’s different**
  - **No tab rows**
  - **No impulse buys**
  - **Only navigation on page takes you to next step**
- **This is a PROCESS FUNNEL**
  - **Extraneous info and links removed to focus customers**



Order Summary

Weezer (2001) Weezer, Weezer (Music)
Seller: naojia@hotmail.com (35)
Condition: Like New • Notes: Perfect condition

Item:	$8.30
Media Mail:	$2.45
Subtotal:	$10.75
Total Merchandise:	$8.30
Total Shipping:	$2.45
TOTAL:	**$10.75**

Ship to

Jason Hong
387 Soda Hall Computer Science UC Berkeley
Berkeley, CA 94720

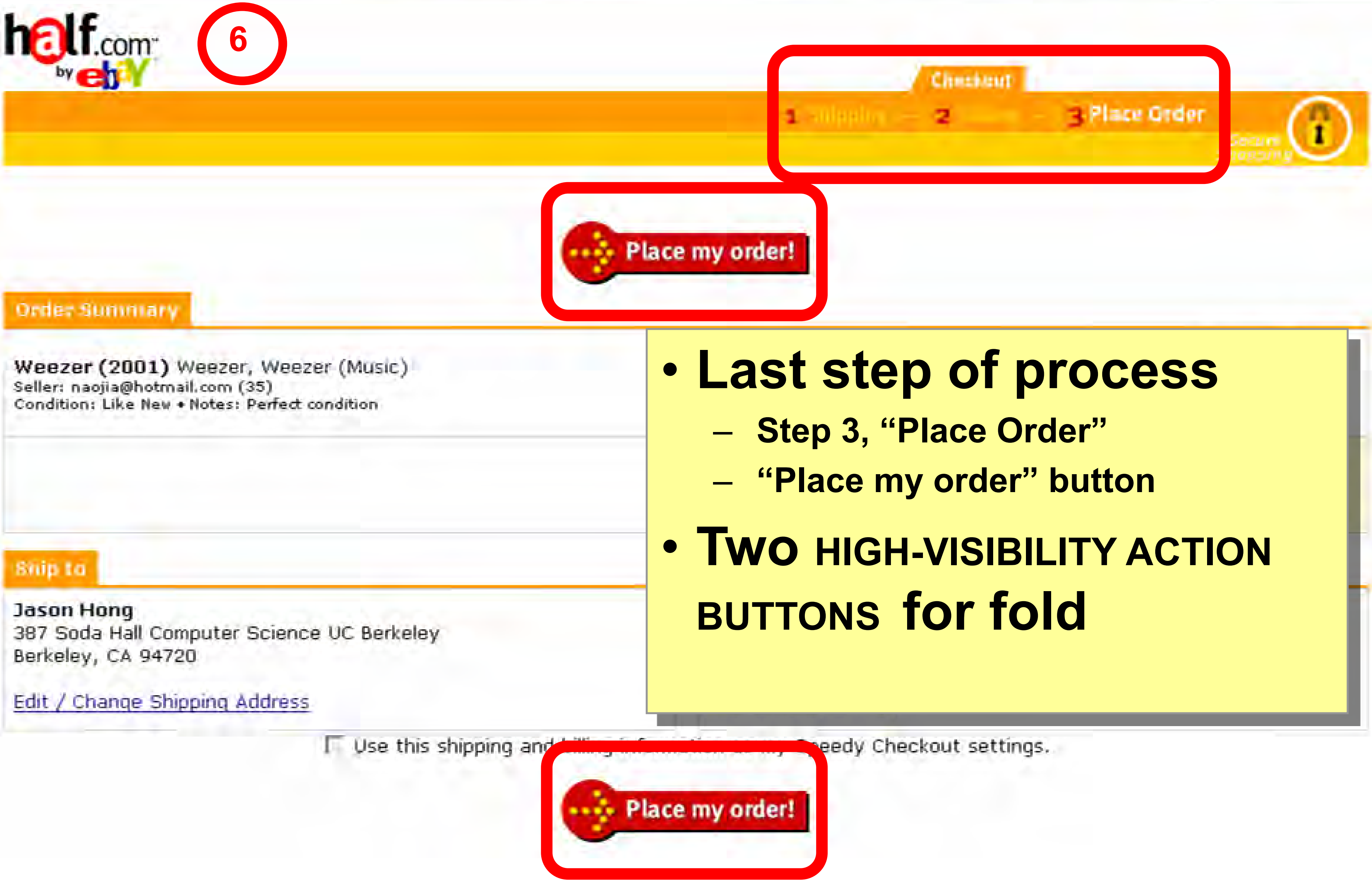
Edit / Change Shipping Address

Bill to

MasterCard ending with 0155
Expires 11/2003
Zipcode: 94709

Edit / Change Billing

☐ Use this shipping and billing information as my Speedy Checkout settings.



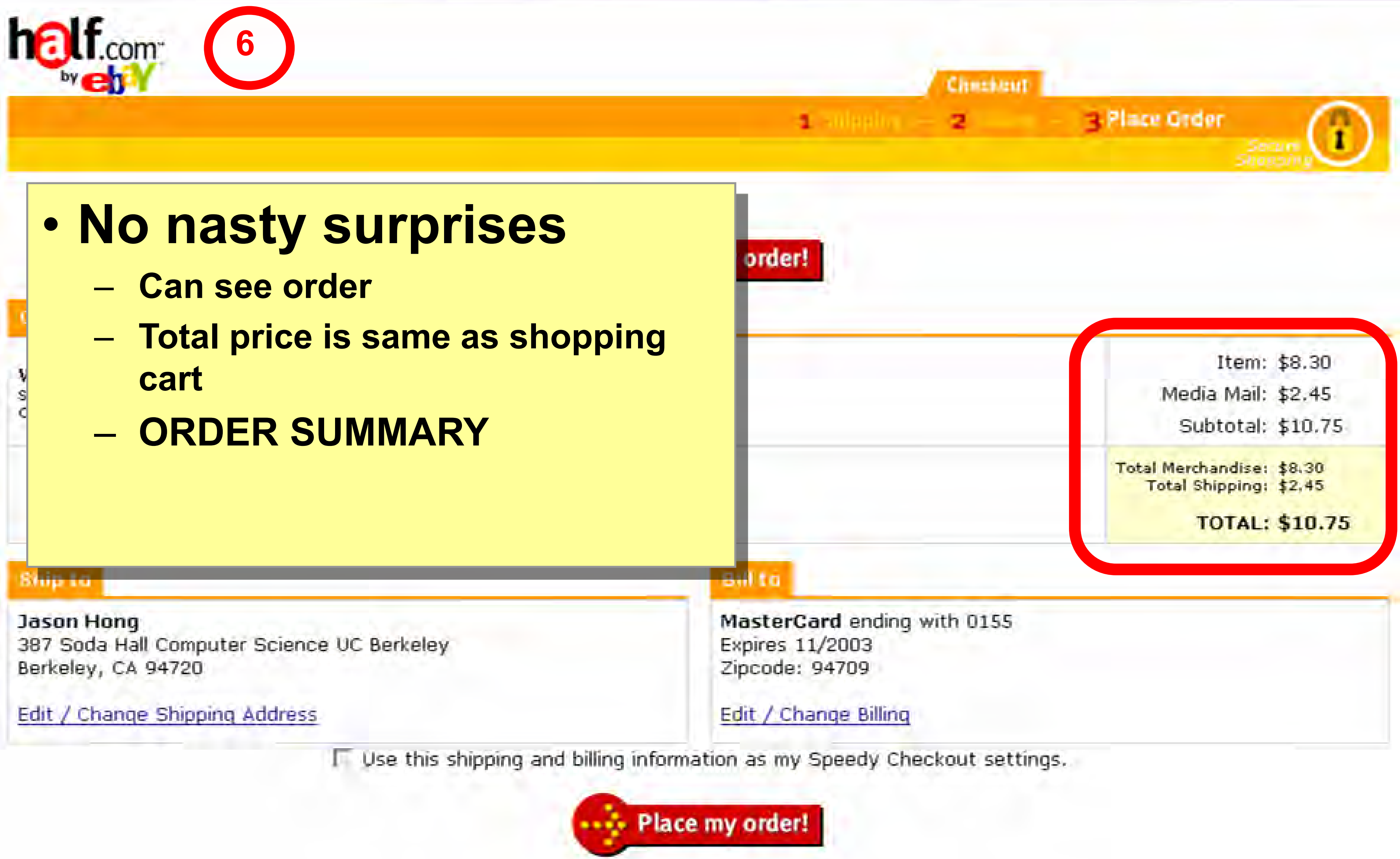
Weezer (2001) Weezer, Weezer (Music)
Seller: naojia@hotmail.com (35)
Condition: Like New • Notes: Perfect condition

Jason Hong
387 Soda Hall Computer Science UC Berkeley
Berkeley, CA 94720

☐ Use this shipping and … eedy Checkout settings.

- **Last step of process**
  - Step 3, “Place Order”
  - “Place my order” button
- **Two HIGH-VISIBILITY ACTION BUTTONS for fold**

⑥



- No nasty surprises
  - Can see order
  - Total price is same as shopping cart
  - ORDER SUMMARY

Item: $8.30
Media Mail: $2.45
Subtotal: $10.75

Total Merchandise: $8.30
Total Shipping: $2.45

TOTAL: $10.75

Ship to

Jason Hong
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Edit / Change Shipping Address

Bill to

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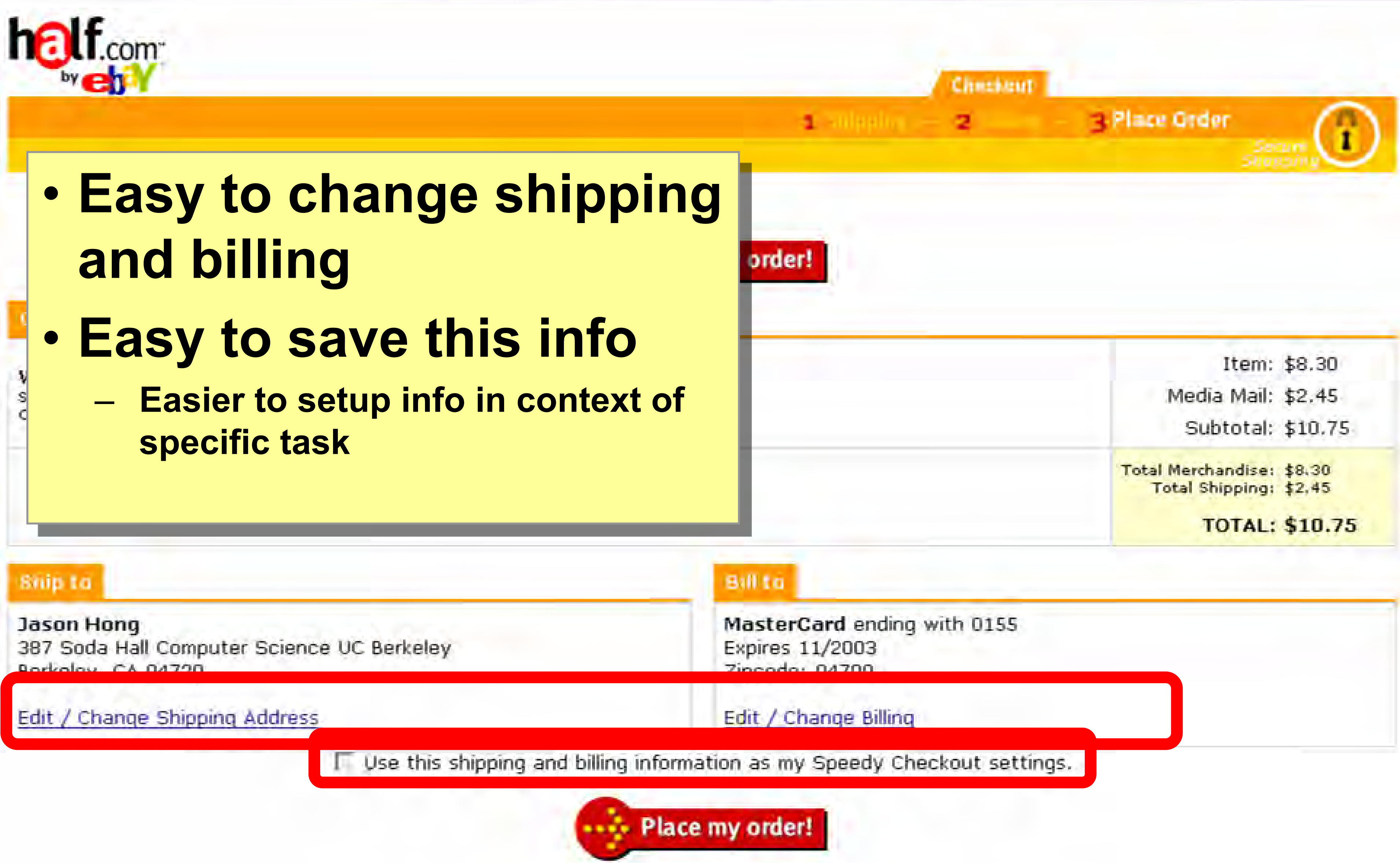
Zipcode: 94709

Edit / Change Billing

☐ Use this shipping and billing information as my Speedy Checkout settings.

Place my order!



- Easy to change shipping and billing
- Easy to save this info
  - Easier to setup info in context of specific task

Item: $8.30
Media Mail: $2.45
Subtotal: $10.75

Total Merchandise: $8.30
Total Shipping: $2.45
TOTAL: $10.75

Jason Hong
387 Soda Hall Computer Science UC Berkeley

Edit / Change Shipping Address

MasterCard ending with 0155
Expires 11/2003

Edit / Change Billing

☐ Use this shipping and billing information as my Speedy Checkout settings.

Design equals Solutions

Design is about finding solutions

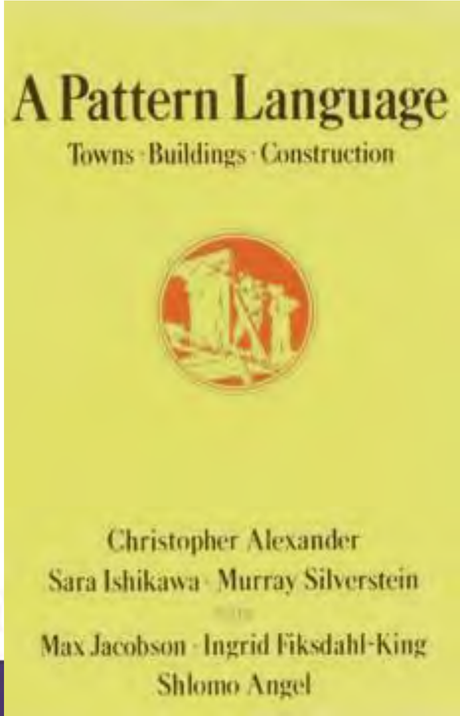
Designers often reinvent

- Hard to know how things were done before
- Why things were done a certain way
- How to reuse solutions

Design Patterns

Design patterns communicate common design problems and solutions

- First used in architecture [Alexander]
- How to create a beer hall where people socialize?



A Pattern Language

Towns · Buildings · Construction

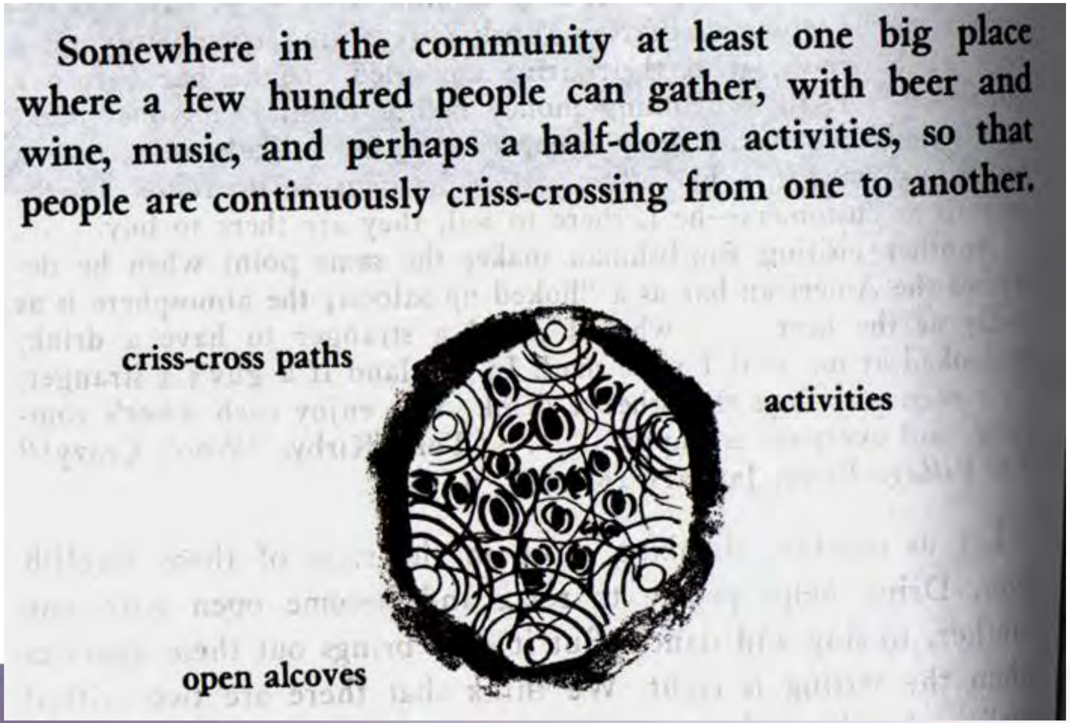
Christopher Alexander

Sara Ishikawa · Murray Silverstein

with

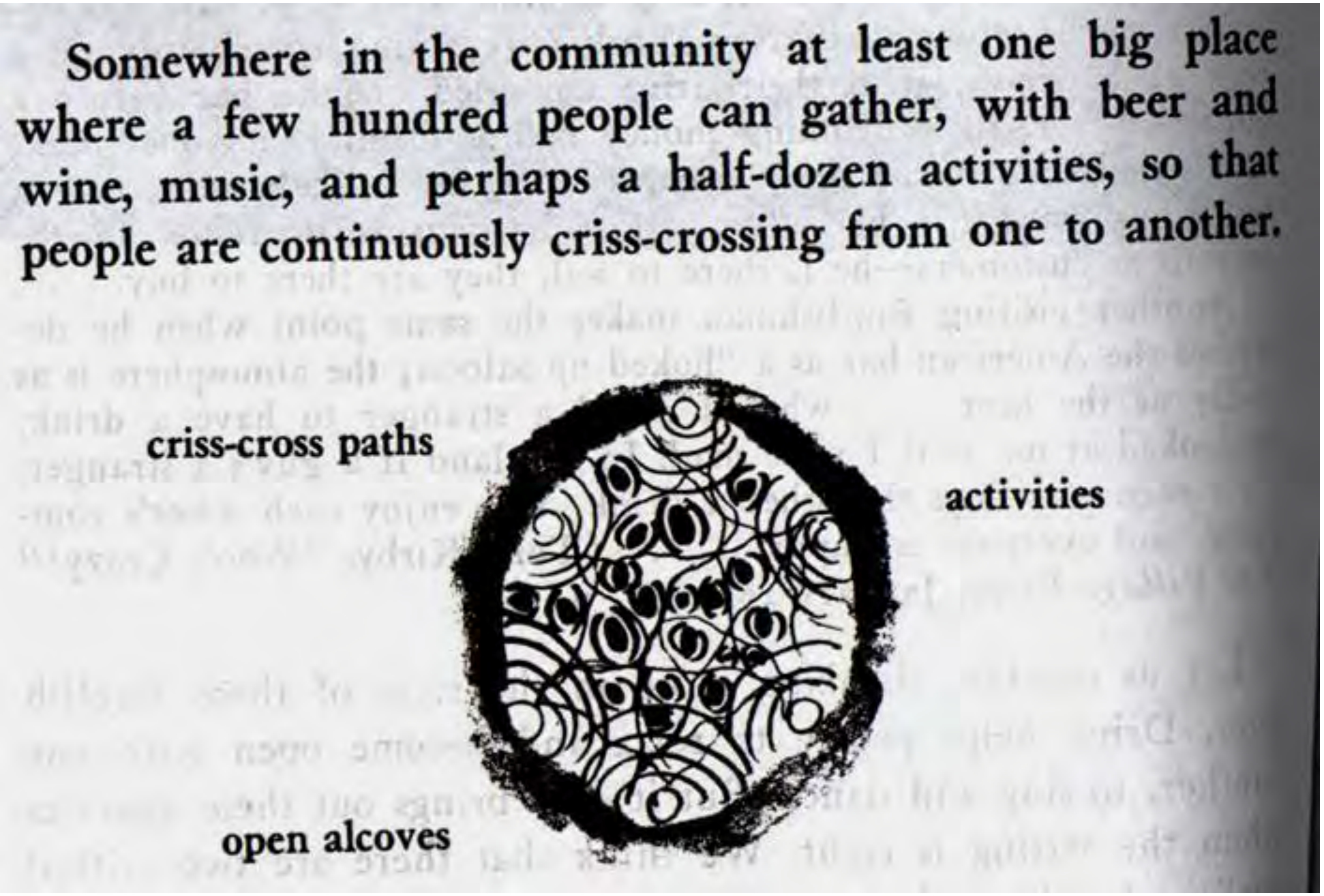
Max Jacobson · Ingrid Fiksdahl-King

Shlomo Angel



Somewhere in the community at least one big place where a few hundred people can gather, with beer and wine, music, and perhaps a half-dozen activities, so that people are continuously criss-crossing from one to another.

Design Patterns



Somewhere in the community at least one big place where a few hundred people can gather, with beer and wine, music, and perhaps a half-dozen activities, so that people are continuously criss-crossing from one to another.

Using Design Patterns

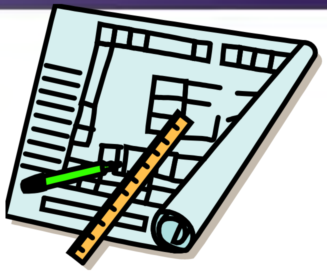
Not too general and not too specific

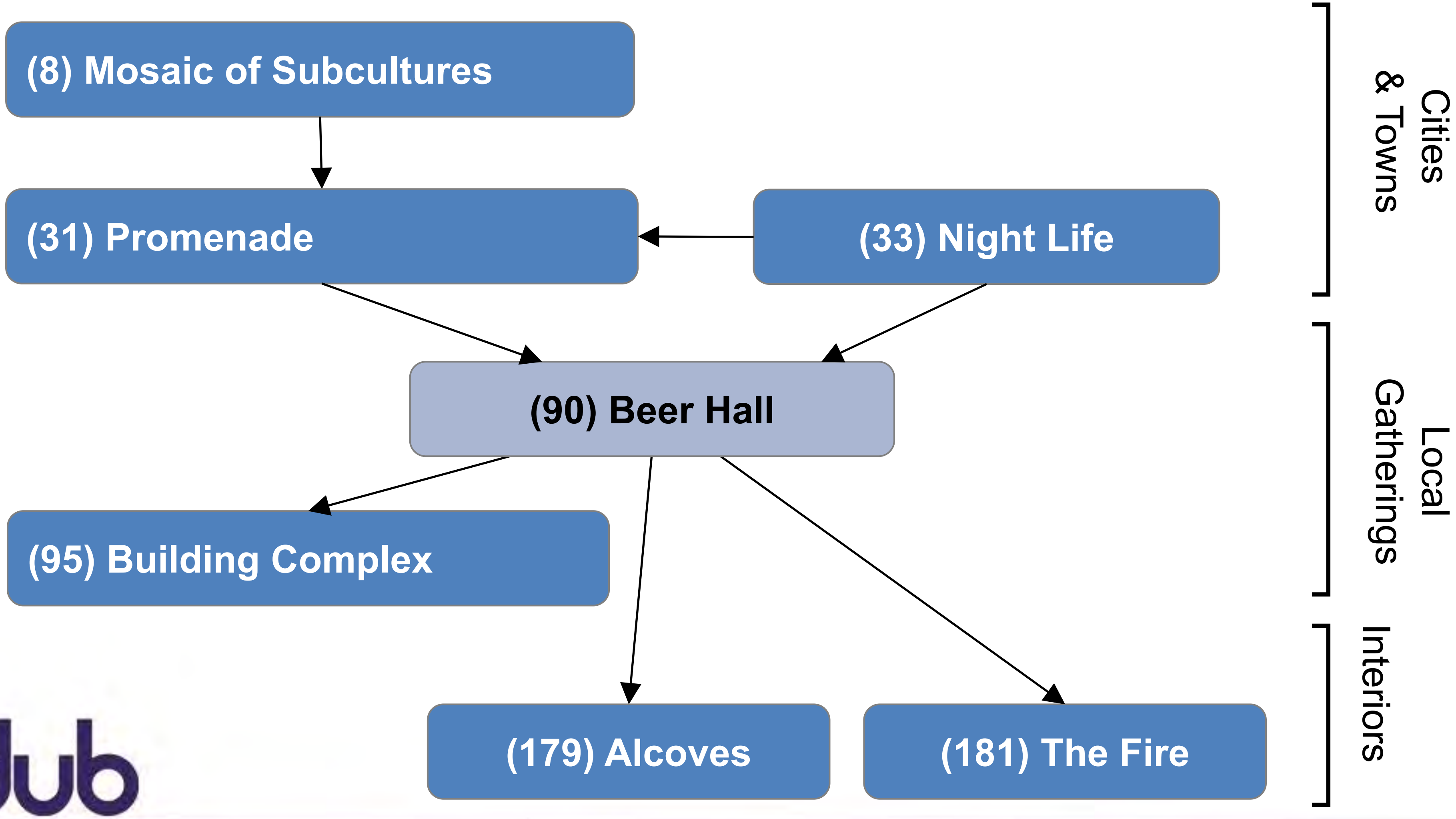
- use a solution "a million times over, without ever doing it the same way twice"

Design patterns are a shared language

- for "building and planning towns, neighborhoods, houses, gardens, and rooms"
  - Beer hall is part of a center for public life
  - Beer hall needs spaces for groups to be alone ALCOVES

A Web of Design Patterns





(8) Mosaic of Subcultures

(31) Promenade

(33) Night Life

(90) Beer Hall

(95) Building Complex

(179) Alcoves

(181) The Fire

Cities & Towns

Local Gatherings

Interiors

Web Design Patterns

Communicate design problems & solutions

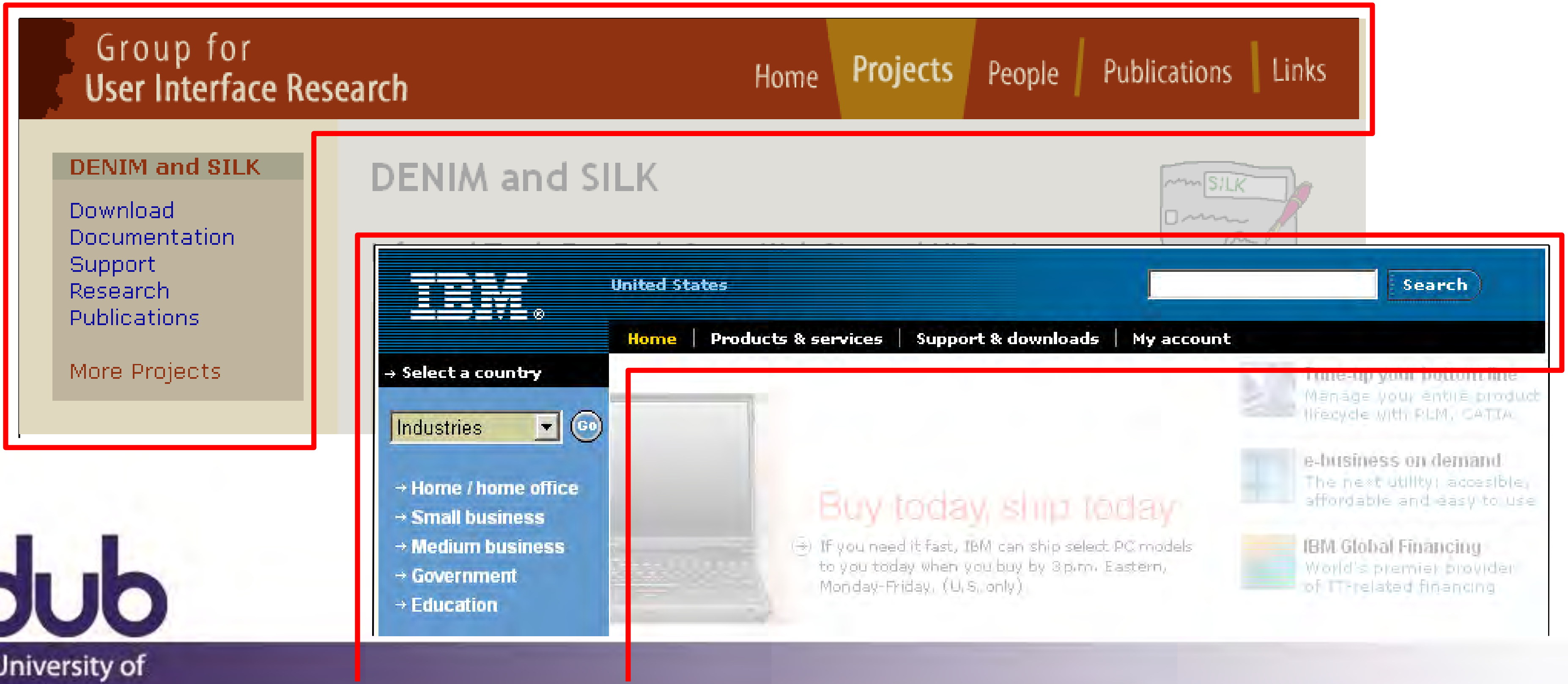
how to create navigation bars for finding relevant content

how to create a shopping cart that suports check out

how to make e-commerce sites where people return & buy

NAVIGATION BAR (K2)

Problem: Customers need a structured, organized way of finding the most important parts of your Web site



Group for User Interface Research

DENIM and SILK

DENIM and SILK

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Manage your entire product lifecycle with PLM, CATIA

e-business on demand

The next utility: accessible, affordable and easy to use

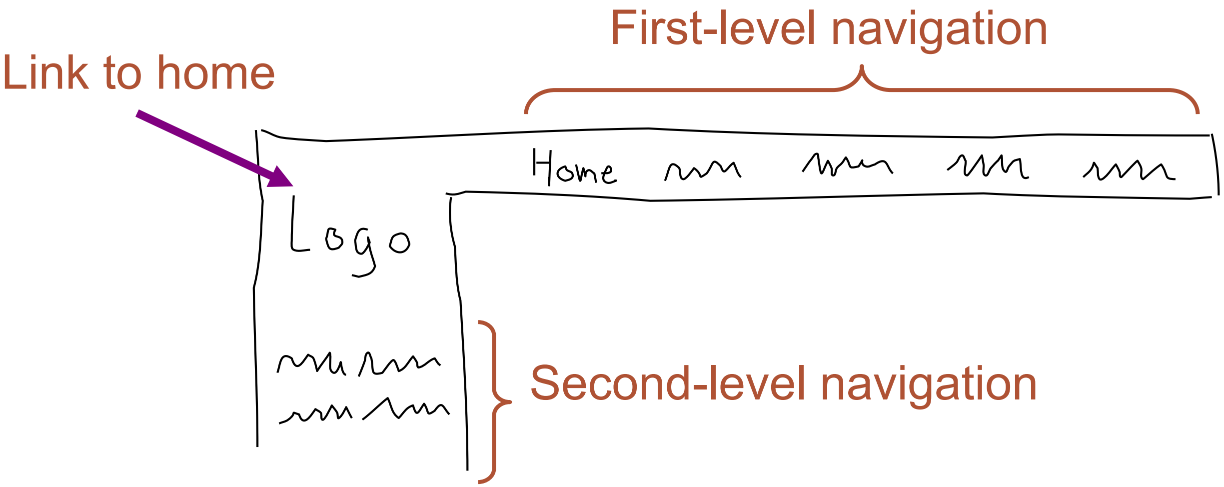
IBM Global Financing

World's premier provider of IT-related financing

NAVIGATION BAR (K2)

Solution diagram

Captures essence on how to solve problem



First-level navigation

Link to home

Second-level navigation

Pattern Groups

Patterns organized by group

- A Site genres
- B Navigational framework
- C Home page
- D Content management
- E Trust and credibility
- F Basic ecommerce
- G Advanced ecommerce
- H Completing tasks
- I Page layouts
- J Search
- K Page-level navigation
- L Speed
- M The mobile web

PROCESS FUNNEL (H1)

Problem:

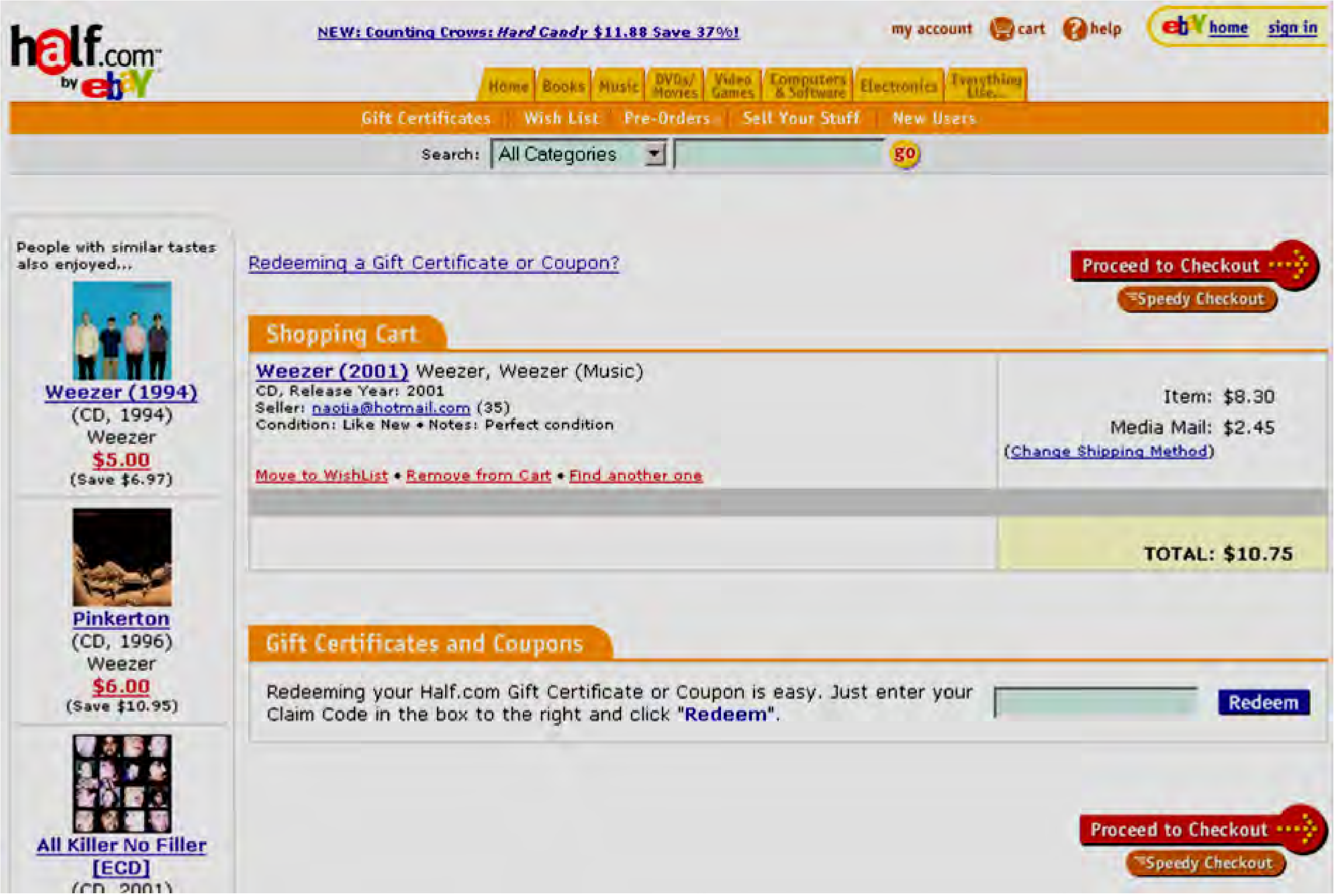
Need a way to help people complete highly specific stepwise tasks

Ex. Create a new account

Ex. Fill out survey forms

Ex. Check out

PROCESS FUNNEL (H1)



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Move to WishList • Remove from Cart • Find another one

Item: $8.30
Media Mail: $2.45
(Change Shipping Method)

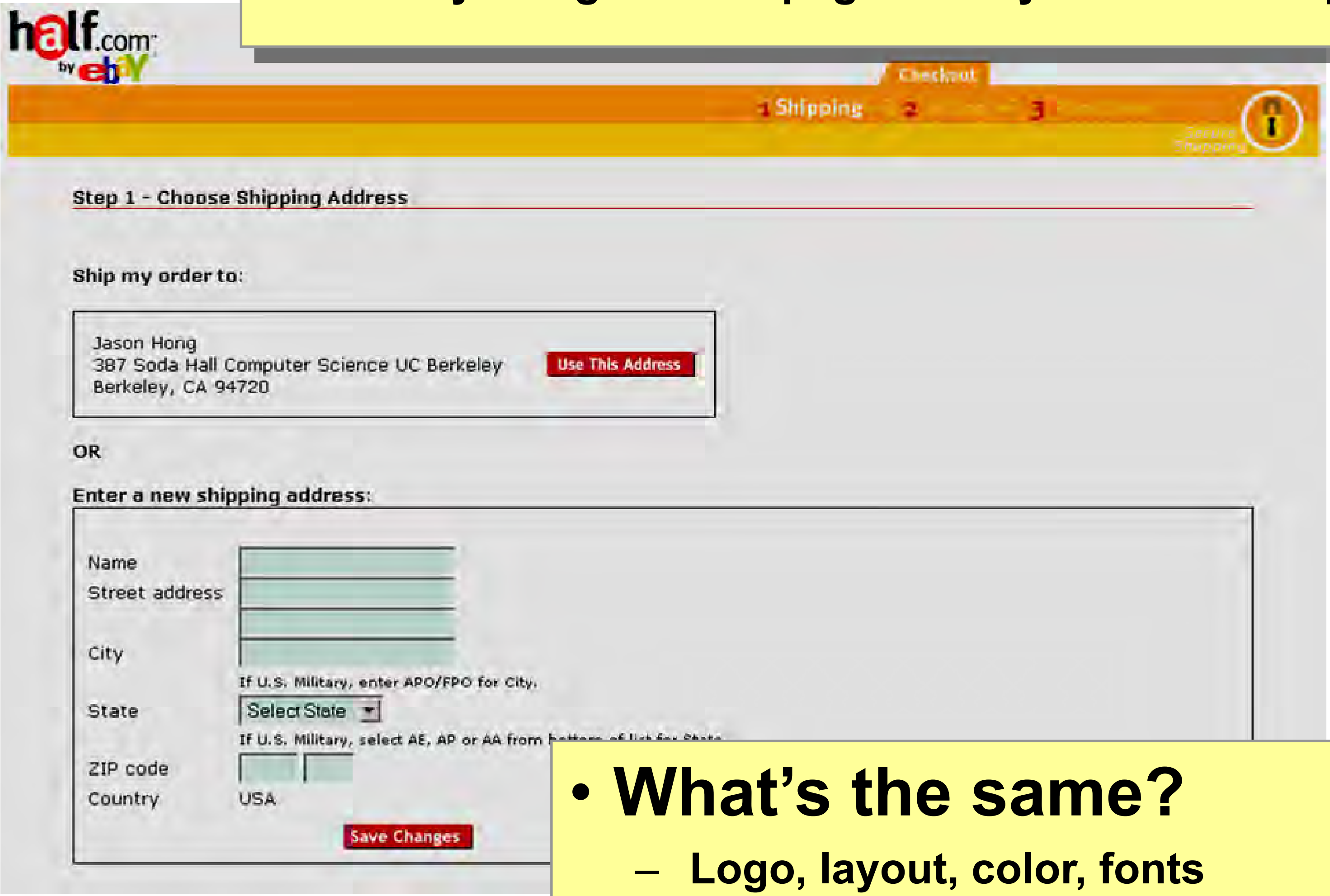
TOTAL: $10.75

Gift Certificates and Coupons

Redeeming your Half.com Gift Certificate or Coupon is easy. Just enter your Claim Code in the box to the right and click "**Redeem**".

PROCESS

- **What's different?**
  - **No tab rows**
  - **No impulse buys**
  - **Only navigation on page takes you to next step**



Step 1 - Choose Shipping Address

Ship my order to:

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Berkeley, CA 94720

OR

Enter a new shipping address:

Name
Street address
City
If U.S. Military, enter APO/FPO for City.
State
If U.S. Military, select AE, AP or AA from
ZIP code
Country USA

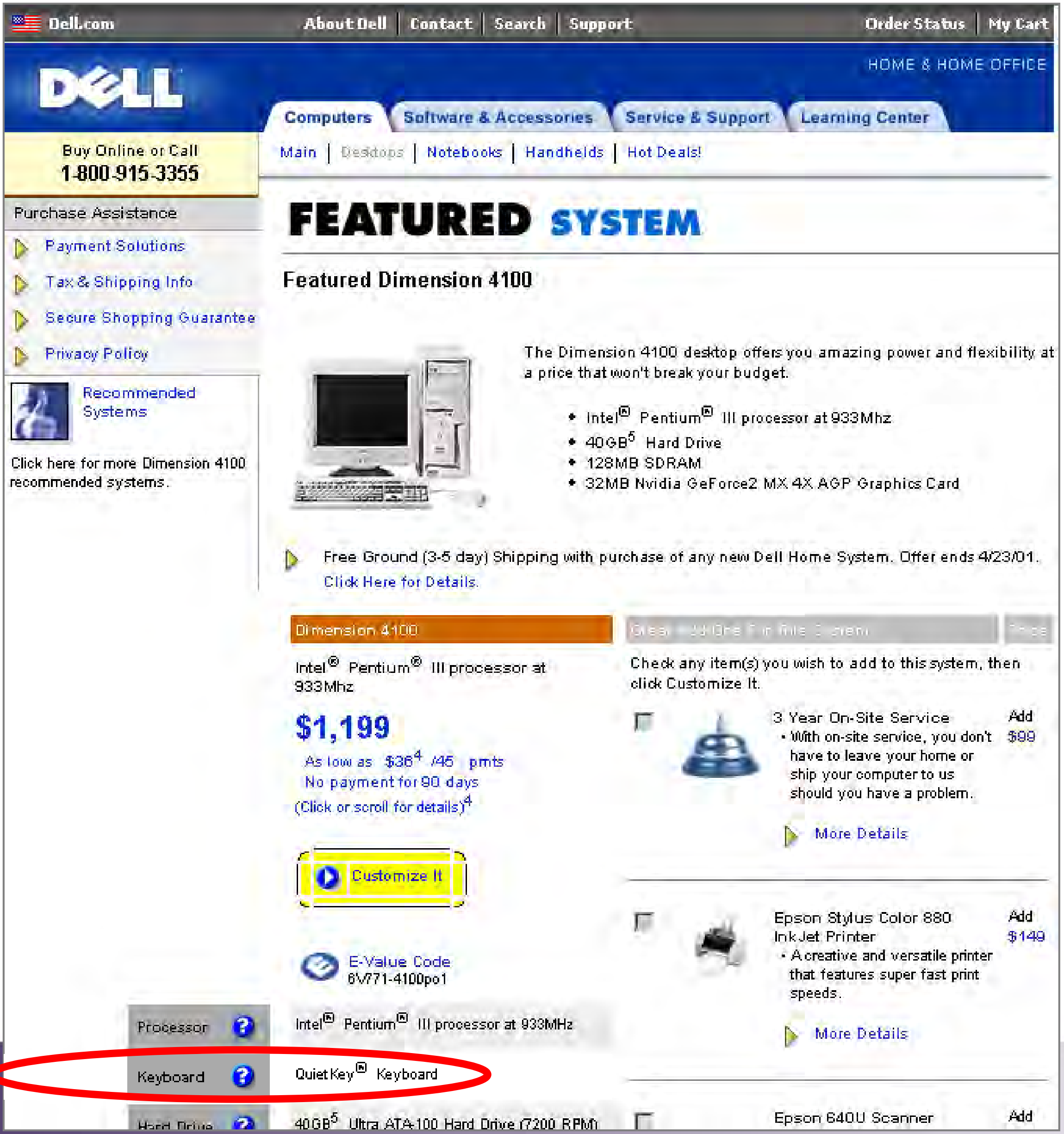
- **What's the same?**
  - **Logo, layout, color, fonts**

PROCESS FUNNEL (H1)

Problem:

What if users need extra help?

PROCESS FUNNEL (H1)



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Dimension 4100

Intel® Pentium® III processor at 933Mhz

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No payment for 90 days
(Click or scroll for details)4

Customize It

E-Value Code
6V771-4100po1

Great Add-Ons For This System | Price

Check any item(s) you wish to add to this system, then click Customize It.

☐ 3 Year On-Site Service — Add $99
- With on-site service, you don't have to leave your home or ship your computer to us should you have a problem.

More Details

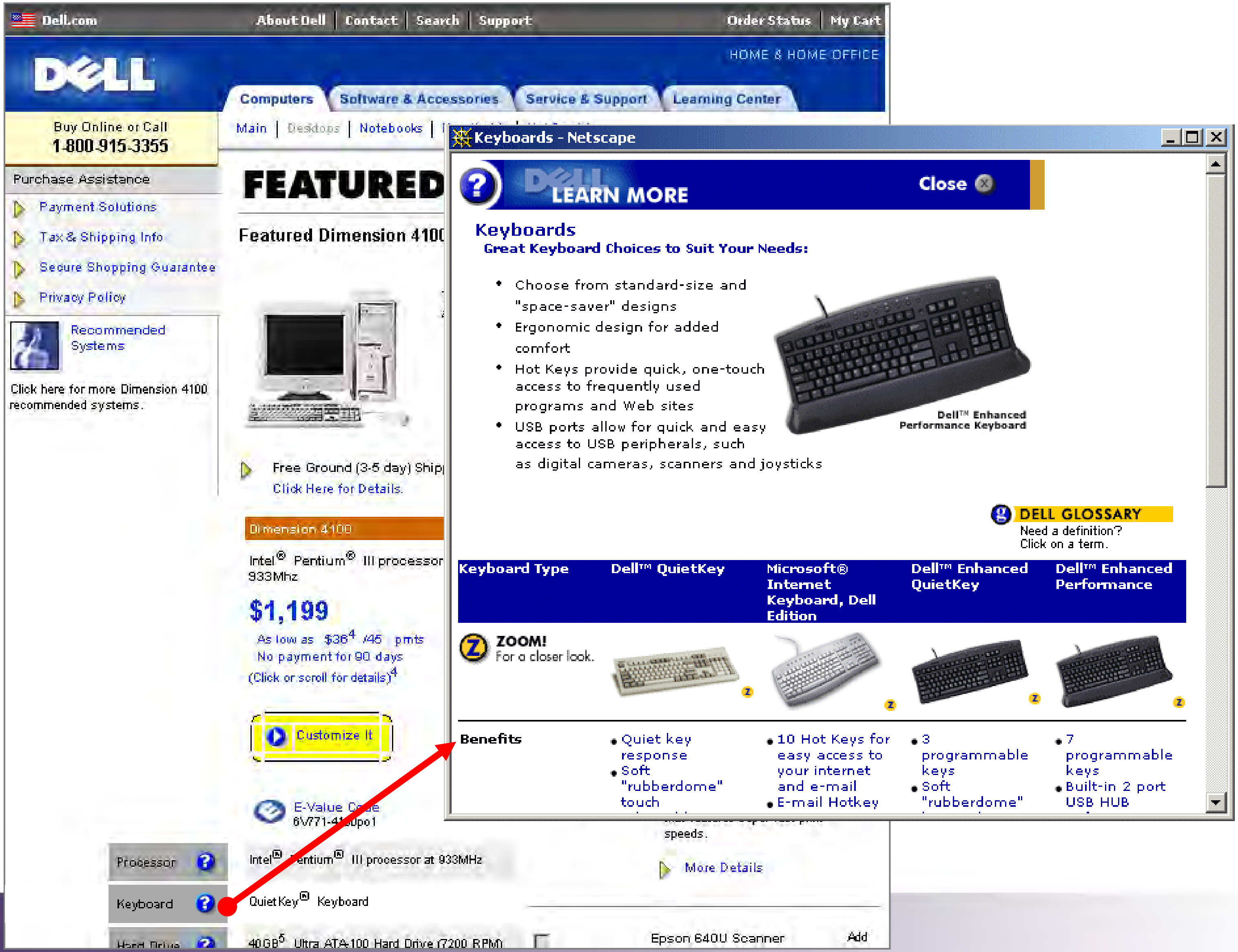
☐ Epson Stylus Color 880 Ink Jet Printer — Add $149
- A creative and versatile printer that features super fast print speeds.

More Details

☐ Epson 640U Scanner — Add

Processor ?	Intel® Pentium® III processor at 933MHz
Keyboard ?	QuietKey® Keyboard
Hard Drive ?	40GB5 Ultra ATA-100 Hard Drive (7200 RPM)

CONTEXT-SENSITIVE HELP (H8)



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- Hot Keys provide quick, one-touch access to frequently used programs and Web sites
- USB ports allow for quick and easy access to USB peripherals, such as digital cameras, scanners and joysticks

Dell™ Enhanced Performance Keyboard

DELL GLOSSARY

Need a definition?
Click on a term.

Keyboard Type	Dell™ QuietKey	Microsoft® Internet Keyboard, Dell Edition	Dell™ Enhanced QuietKey	Dell™ Enhanced Performance
ZOOM! For a closer look.				
Benefits	Quiet key response Soft "rubberdome" touch	10 Hot Keys for easy access to your internet and e-mail E-mail Hotkey	3 programmable keys Soft "rubberdome"	7 programmable keys Built-in 2 port USB HUB

FLOATING WINDOWS (H6)

Recommendations

Movie suggestions based on your ra

NEW RECOMMENDATIONS

Gladiator: Extended E

Fans of Gladiator's original release will appreciate this version of the epic Ridley S packed with 17 extra minut footage and gripping dialog a ... Read More

Samurai Champloo (7-

Director Shinichiro Watanabe mixes a maturity rarely found in anime with a historical Japanese setting and a funky hip-hop soundtrack. Fuu is a spacey waitress at a teahouse where a sword fight breaks out between Mugen, a wild warrior, and Jin, a ... Read More

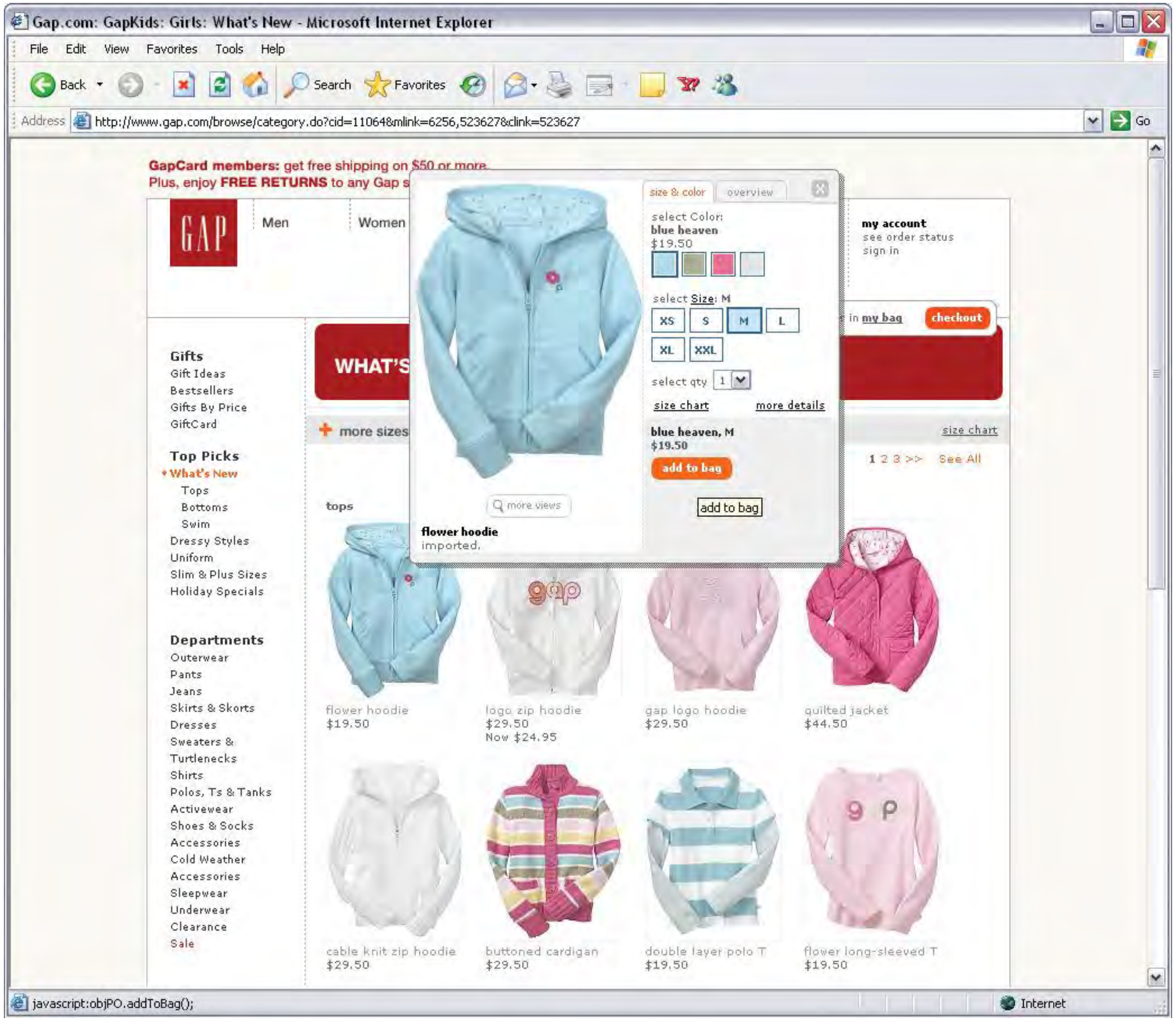
Gladiator: Extended Edition
(2000)

Fans of Gladiator's original theatrical release will appreciate this extended version of the epic Ridley Scott film, packed with 17 extra minutes of action footage and gripping dialogue. Featuring a strong supporting cast and an Oscar-winning performance from actor Russell Crowe as the dauntless Roman general Maximus, this big-budget Best Picture winner became an instant classic -- and helped elevate its leading man to icon status.

Starring: Russell Crowe, Joaquin Phoenix
Director: Ridley Scott
Genre: Action & Adventure
MPAA: R

Recommended based on 1 rating

FLOATING WINDOWS (H6)



Gap.com: GapKids: Girls: What's New - Microsoft Internet Explorer

Address http://www.gap.com/browse/category.do?cid=11064&mlink=6256,523627&clink=523627

GapCard members: get free shipping on $50 or more.
Plus, enjoy **FREE RETURNS** to any Gap s

select Color:
blue heaven
$19.50

select Size: M

select qty 1

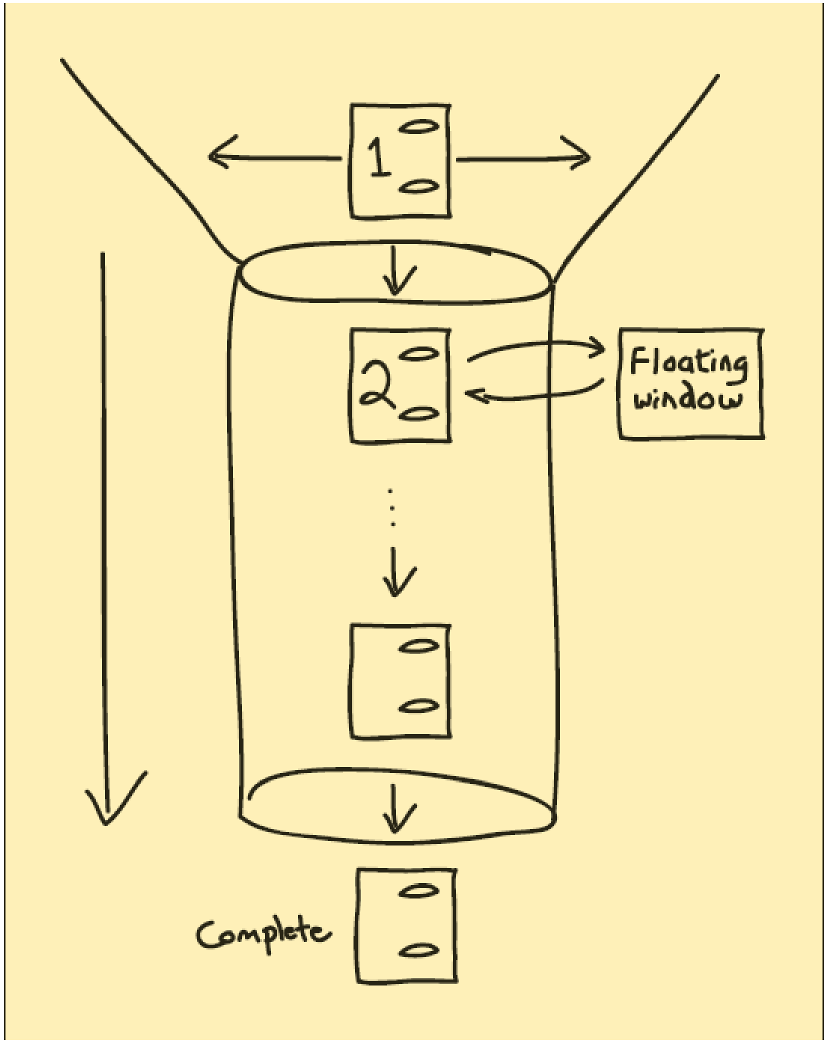
blue heaven, M
$19.50

flower hoodie
imported.

javascript:objPO.addToBag();

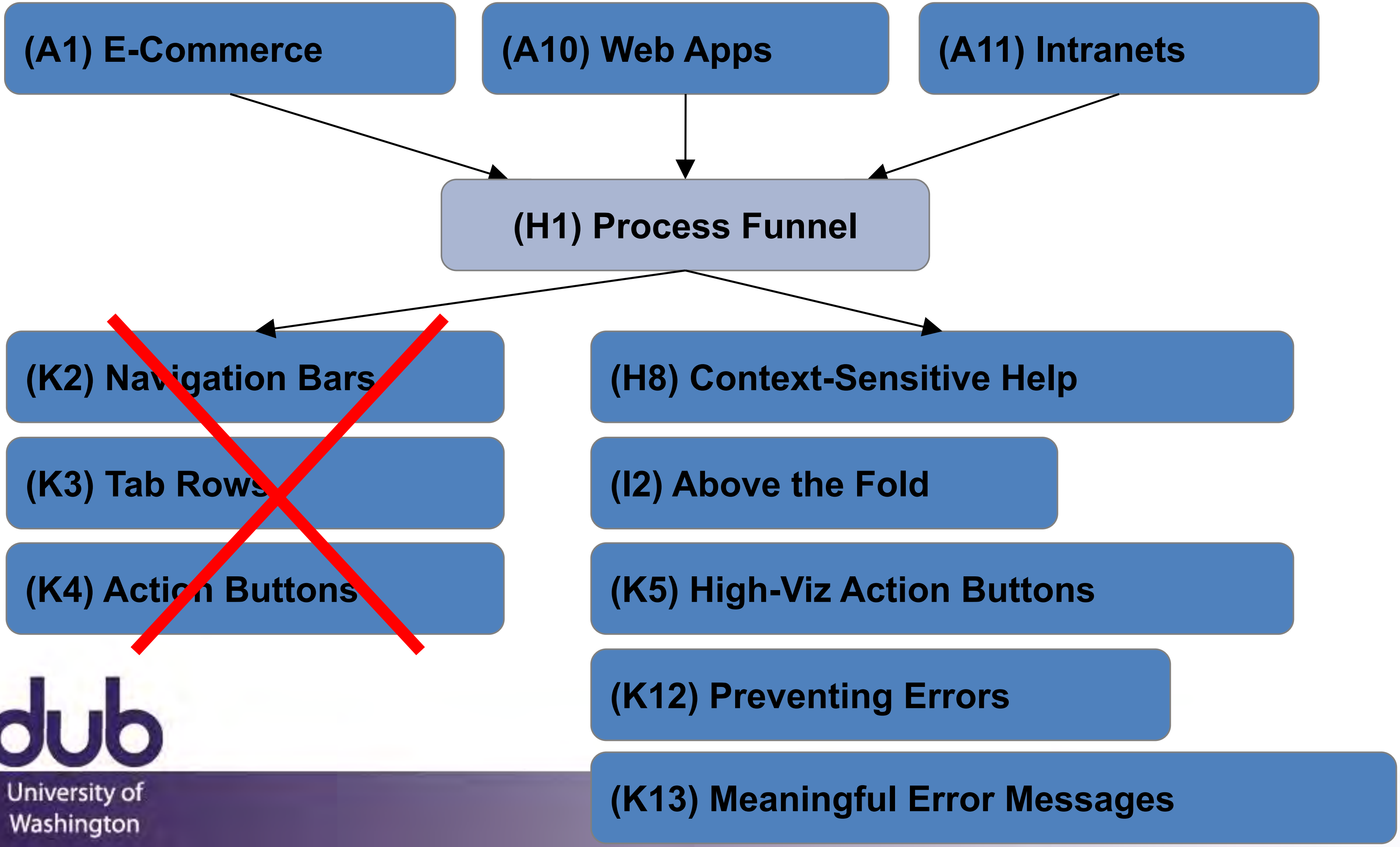
PROCESS FUNNEL (H1)

Solution Diagram



University of Washington

Related Patterns



(A1) E-Commerce

(A10) Web Apps

(A11) Intranets

(H1) Process Funnel

~~(K2) Navigation Bars~~

~~(K3) Tab Rows~~

~~(K4) Action Buttons~~

(H8) Context-Sensitive Help

(I2) Above the Fold

(K5) High-Viz Action Buttons

(K12) Preventing Errors

(K13) Meaningful Error Messages

Patterns Support Creativity

- Patterns come from successful examples
  - sites that are so successful that lots of people are familiar with their paradigms
  - interaction techniques/metaphors that work well across many sites (e.g., shopping carts)
- Not too general and not too specific
  - you need to specialize to your needs
- Patterns let you focus on the hard, unique problems of your design situation

Principles, Guidelines, Templates

Patterns help design without over-constraining

- unlike principles, patterns are not too general
- unlike guidelines, patterns discuss tradeoffs, show good examples, and tie to other patterns
- unlike style guides, patterns not too specific, can be specialized to a design
- unlike templates, patterns illustrate flows and relationships among different pages

Format of Web Design Patterns

Pattern Name and Number

Exemplar

Background

Problem

Forces

Solution

Solution Diagram

Related Patterns

Pattern Name and Number

H1 PROCESS FUNNEL

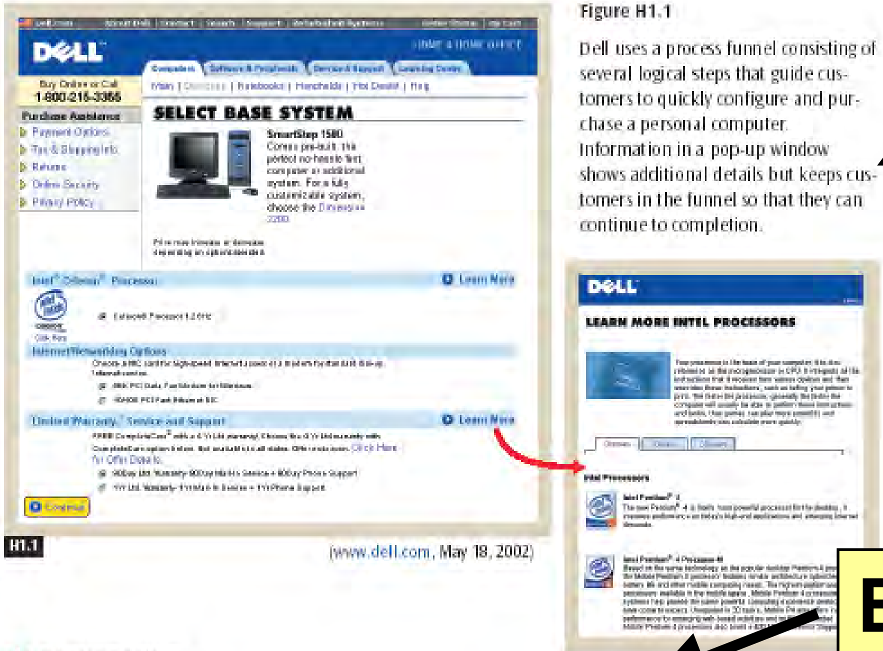


Figure H1.1

Dell uses a process funnel consisting of several logical steps that guide customers to quickly configure and purchase a personal computer. Information in a pop-up window shows additional details but keeps customers in the funnel so that they can continue to completion.

H1.1

(www.dell.com, May 18, 2002)

Exemplar

Background

BACKGROUND

All Web applications that lead visitors through stepped tasks—PERSONAL E-COMMERCE (A1), SELF-SERVICE GOVERNMENT (A4), WEB APPS THAT WORK (A10), and ENABLING INTRANETS (A11)—need ways to help people succeed at completing the tasks. A1 A4 A10 A11

Problem Statement

PROBLEM

Customers often need to complete highly specific tasks on Web sites, but pages with tangential links and many questions can prevent them from carrying out these tasks successfully.

People enjoy completing the tasks they start. Yet all kinds of distractions—including links that lead off the critical path, extra steps, and extra content—can inadvertently lead them away from accomplishing their goals. These diversions can have legitimate purposes, however, such as providing continuity, giving visitors opportunities to explore, providing instructions, or providing extra details. Striking a balance between these k can be challenging.

Forces & Solution

equired to Complete a Task • Customers oo many steps. A process funnel should eps. Anything less than two steps is not a process, and a process of more than eight steps is unmanageable. If there are more than eight steps, try to split the process into two or more separate process funnels, or try combining multiple steps into one page. However, this is not always a viable solution because one choice may precede another, and not every page can hold all the information that customers might need at certain points.

Provide a Progress Bar to Let Customers Funnel • Showing a progr r at ea how much farther they to go to c It is often not worth your time to progress bar clickable because doing benefit for customers.

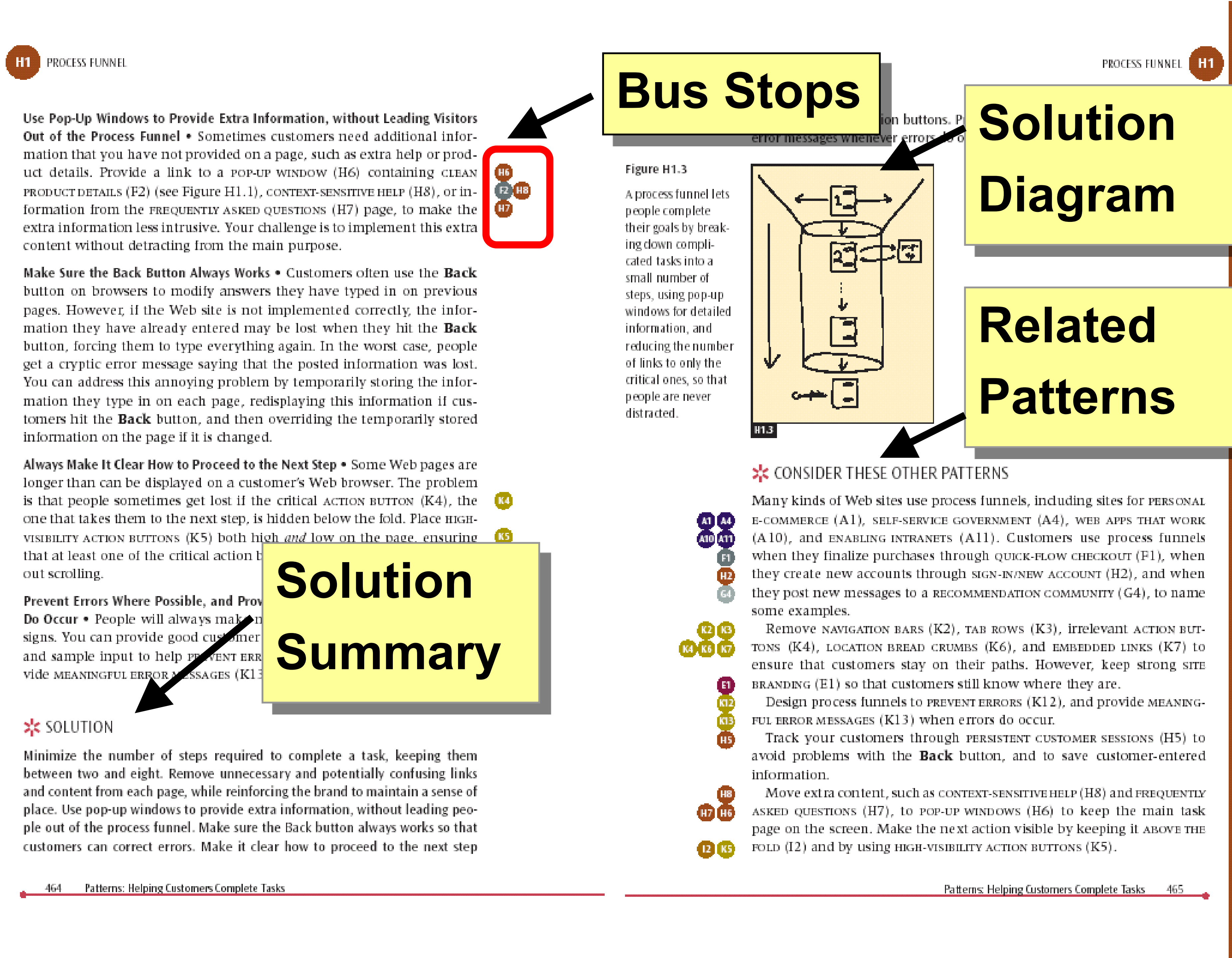
Remove Unnecessary Links and Content While Reinforcing the Brand • Removing links and content unrelated to the task at hand will reduce the making it more likely that your customers will eir tasks. Remove all NAVIGATION BARS (K2), TAB AD CRUMBS (K6), and EMBEDDED LINKS (K7), leaving CTION BUTTONS (K4) that help visitors reach their goals. Take out any content that is superfluous to the task.

Reinforce the Web site brand to minimize any disorientation customers might feel from sudden changes in navigation options. Use the same out, and logo throughout the Web site so that no eople know they're still on the same site.

where they are in the process funnel and how much farther they have to go.

H1.2

(www.half.com, October 24, 2001)



Use Pop-Up Windows to Provide Extra Information, without Leading Visitors Out of the Process Funnel • Sometimes customers need additional information that you have not provided on a page, such as extra help or product details. Provide a link to a POP-UP WINDOW (H6) containing CLEAN PRODUCT DETAILS (F2) (see Figure H1.1), CONTEXT-SENSITIVE HELP (H8), or information from the FREQUENTLY ASKED QUESTIONS (H7) page, to make the extra information less intrusive. Your challenge is to implement this extra content without detracting from the main purpose.

Make Sure the Back Button Always Works • Customers often use the **Back** button on browsers to modify answers they have typed in on previous pages. However, if the Web site is not implemented correctly, the information they have already entered may be lost when they hit the **Back** button, forcing them to type everything again. In the worst case, people get a cryptic error message saying that the posted information was lost. You can address this annoying problem by temporarily storing the information they type in on each page, redisplaying this information if customers hit the **Back** button, and then overriding the temporarily stored information on the page if it is changed.

Always Make It Clear How to Proceed to the Next Step • Some Web pages are longer than can be displayed on a customer's Web browser. The problem is that people sometimes get lost if the critical ACTION BUTTON (K4), the one that takes them to the next step, is hidden below the fold. Place HIGH-VISIBILITY ACTION BUTTONS (K5) both high *and* low on the page, ensuring that at least one of the critical action b

out scrolling.

Prevent Errors Where Possible, and Prov

Do Occur • People will always mak n

signs. You can provide good cu mer

and sample input to help PREVENT ERR

vide MEANINGFUL ERROR SSAGES (K13

SOLUTION

Minimize the number of steps required to complete a task, keeping them between two and eight. Remove unnecessary and potentially confusing links and content from each page, while reinforcing the brand to maintain a sense of place. Use pop-up windows to provide extra information, without leading people out of the process funnel. Make sure the Back button always works so that customers can correct errors. Make it clear how to proceed to the next step

ion buttons. P

error messages whenever errors do o

Figure H1.3

A process funnel lets people complete their goals by breaking down complicated tasks into a small number of steps, using pop-up windows for detailed information, and reducing the number of links to only the critical ones, so that people are never distracted.

CONSIDER THESE OTHER PATTERNS

Many kinds of Web sites use process funnels, including sites for PERSONAL E-COMMERCE (A1), SELF-SERVICE GOVERNMENT (A4), WEB APPS THAT WORK (A10), and ENABLING INTRANETS (A11). Customers use process funnels when they finalize purchases through QUICK-FLOW CHECKOUT (F1), when they create new accounts through SIGN-IN/NEW ACCOUNT (H2), and when they post new messages to a RECOMMENDATION COMMUNITY (G4), to name some examples.

Remove NAVIGATION BARS (K2), TAB ROWS (K3), irrelevant ACTION BUTTONS (K4), LOCATION BREAD CRUMBS (K6), and EMBEDDED LINKS (K7) to ensure that customers stay on their paths. However, keep strong SITE BRANDING (E1) so that customers still know where they are.

Design process funnels to PREVENT ERRORS (K12), and provide MEANINGFUL ERROR MESSAGES (K13) when errors do occur.

Track your customers through PERSISTENT CUSTOMER SESSIONS (H5) to avoid problems with the **Back** button, and to save customer-entered information.

Move extra content, such as CONTEXT-SENSITIVE HELP (H8) and FREQUENTLY ASKED QUESTIONS (H7), to POP-UP WINDOWS (H6) to keep the main task page on the screen. Make the next action visible by keeping it ABOVE THE FOLD (I2) and by using HIGH-VISIBILITY ACTION BUTTONS (K5).

Bus Stops

Solution Diagram

Related Patterns

Solution Summary

Pre-Patterns

Patterns require broad adoption and examples

- Many version of the same basic idea
- Shown successful in many contexts
- That is what makes them patterns

This is challenging in novel domains

Pre-patterns are based in weaker evidence

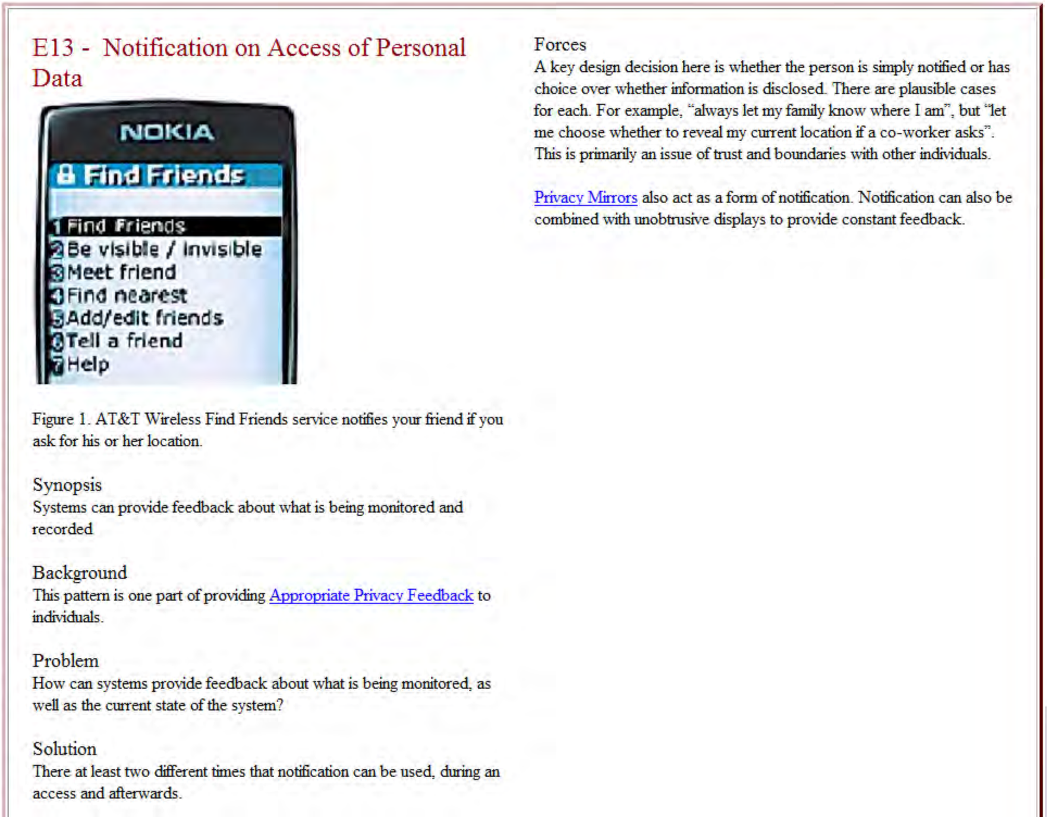
- Can help speed diffusion of techniques and results
- Can help see relationships among ideas

UbiComp Pre-Patterns

Literature review

Button-up card sorting of lessons from literature

Cut down based on critique by other researchers



E13 - Notification on Access of Personal Data

Figure 1. AT&T Wireless Find Friends service notifies your friend if you ask for his or her location.

Synopsis
Systems can provide feedback about what is being monitored and recorded

Background
This pattern is one part of providing Appropriate Privacy Feedback to individuals.

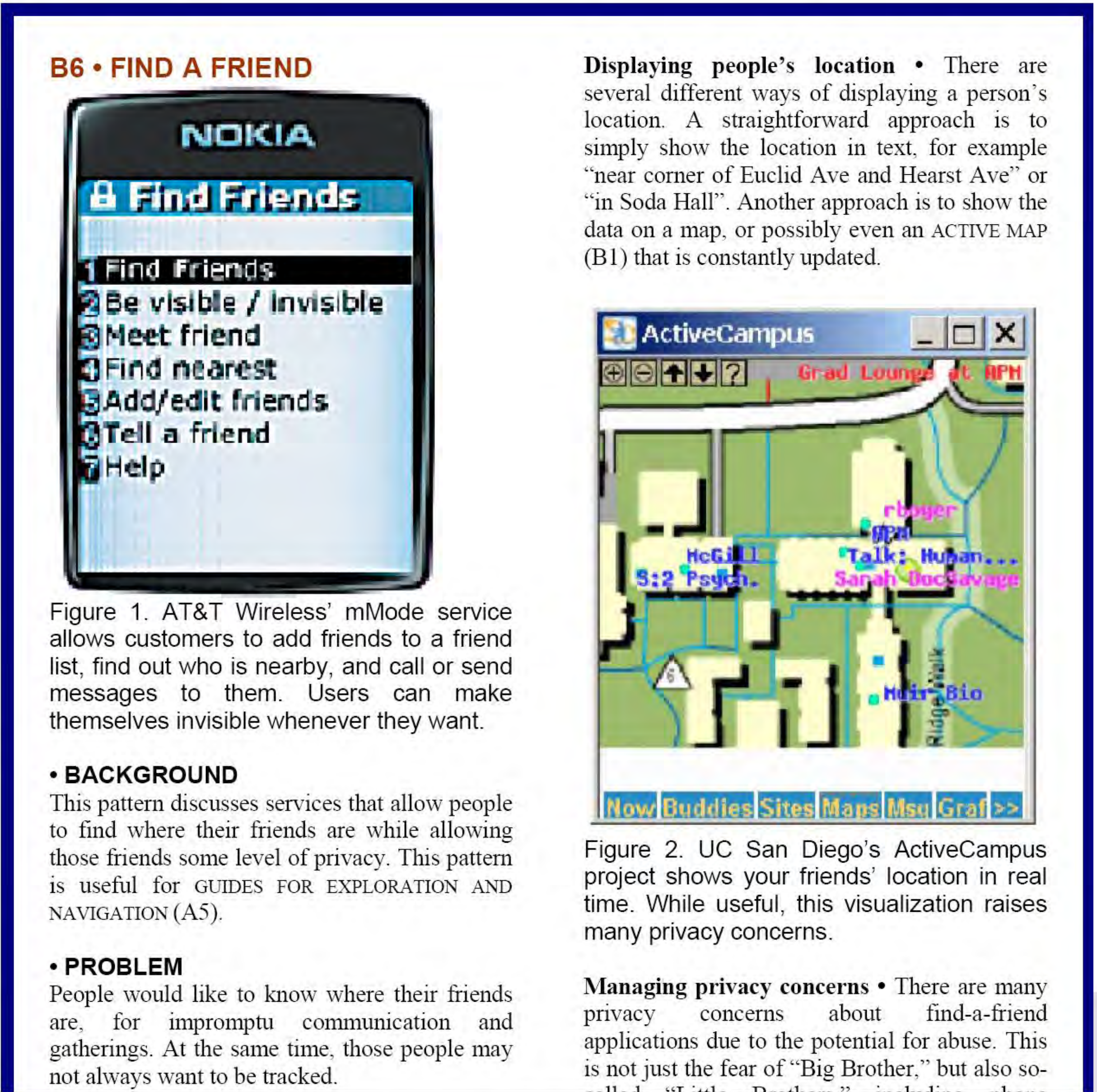
Problem
How can systems provide feedback about what is being monitored, as well as the current state of the system?

Solution
There at least two different times that notification can be used, during an access and afterwards.

Forces
A key design decision here is whether the person is simply notified or has choice over whether information is disclosed. There are plausible cases for each. For example, “always let my family know where I am”, but “let me choose whether to reveal my current location if a co-worker asks”. This is primarily an issue of trust and boundaries with other individuals.

Privacy Mirrors also act as a form of notification. Notification can also be combined with unobtrusive displays to provide constant feedback.

UbiComp Pre-Patterns



B6 • FIND A FRIEND

Figure 1. AT&T Wireless' mMode service allows customers to add friends to a friend list, find out who is nearby, and call or send messages to them. Users can make themselves invisible whenever they want.

• BACKGROUND

This pattern discusses services that allow people to find where their friends are while allowing those friends some level of privacy. This pattern is useful for GUIDES FOR EXPLORATION AND NAVIGATION (A5).

• PROBLEM

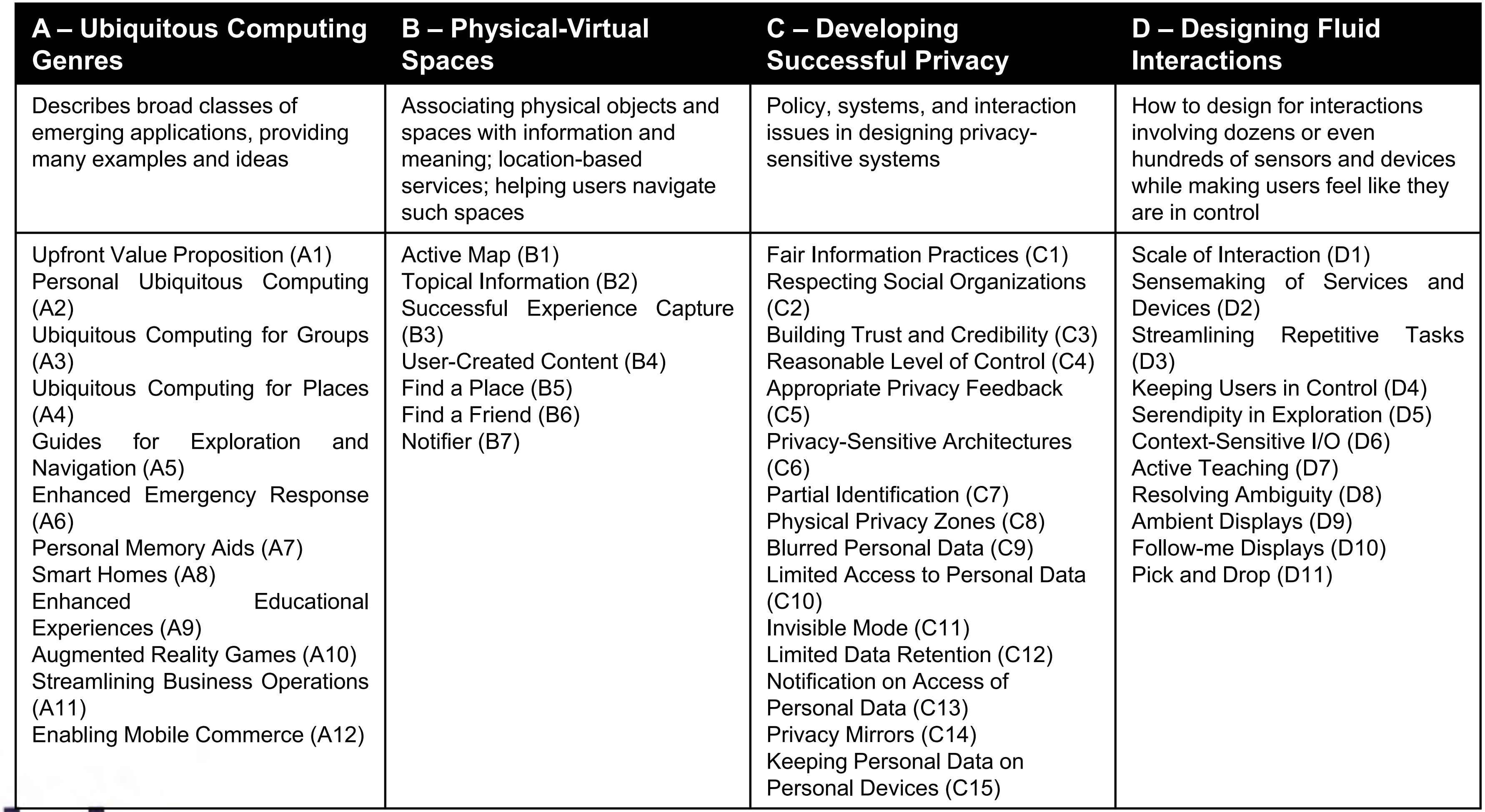
People would like to know where their friends are, for impromptu communication and gatherings. At the same time, those people may not always want to be tracked.

Displaying people's location • There are several different ways of displaying a person's location. A straightforward approach is to simply show the location in text, for example "near corner of Euclid Ave and Hearst Ave" or "in Soda Hall". Another approach is to show the data on a map, or possibly even an ACTIVE MAP (B1) that is constantly updated.

Figure 2. UC San Diego's ActiveCampus project shows your friends' location in real time. While useful, this visualization raises many privacy concerns.

Managing privacy concerns • There are many privacy concerns about find-a-friend applications due to the potential for abuse. This is not just the fear of "Big Brother," but also so-

UbiComp Pre-Patterns



A – Ubiquitous Computing Genres	B – Physical-Virtual Spaces	C – Developing Successful Privacy	D – Designing Fluid Interactions
Describes broad classes of emerging applications, providing many examples and ideas	Associating physical objects and spaces with information and meaning; location-based services; helping users navigate such spaces	Policy, systems, and interaction issues in designing privacy-sensitive systems	How to design for interactions involving dozens or even hundreds of sensors and devices while making users feel like they are in control
Upfront Value Proposition (A1) Personal Ubiquitous Computing (A2) Ubiquitous Computing for Groups (A3) Ubiquitous Computing for Places (A4) Guides for Exploration and Navigation (A5) Enhanced Emergency Response (A6) Personal Memory Aids (A7) Smart Homes (A8) Enhanced Educational Experiences (A9) Augmented Reality Games (A10) Streamlining Business Operations (A11) Enabling Mobile Commerce (A12)	Active Map (B1) Topical Information (B2) Successful Experience Capture (B3) User-Created Content (B4) Find a Place (B5) Find a Friend (B6) Notifier (B7)	Fair Information Practices (C1) Respecting Social Organizations (C2) Building Trust and Credibility (C3) Reasonable Level of Control (C4) Appropriate Privacy Feedback (C5) Privacy-Sensitive Architectures (C6) Partial Identification (C7) Physical Privacy Zones (C8) Blurred Personal Data (C9) Limited Access to Personal Data (C10) Invisible Mode (C11) Limited Data Retention (C12) Notification on Access of Personal Data (C13) Privacy Mirrors (C14) Keeping Personal Data on Personal Devices (C15)	Scale of Interaction (D1) Sensemaking of Services and Devices (D2) Streamlining Repetitive Tasks (D3) Keeping Users in Control (D4) Serendipity in Exploration (D5) Context-Sensitive I/O (D6) Active Teaching (D7) Resolving Ambiguity (D8) Ambient Displays (D9) Follow-me Displays (D10) Pick and Drop (D11)

Patterns

When you see advice, consider its depth

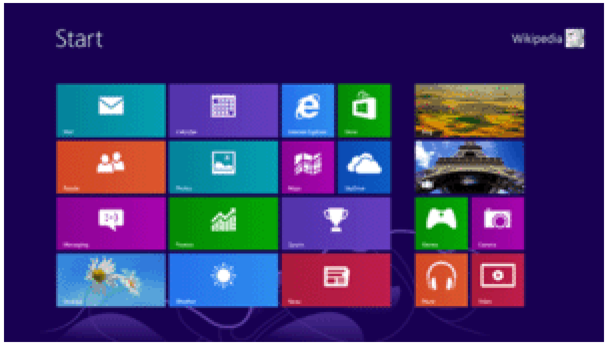
- Result of an individual study
- Pre-pattern based on some meta-analysis
- Established pattern

Be aware of misapplying patterns

Touch and Microsoft Windows

Microsoft Windows XP
Tablet PC Edition

2004



2012

Consistency vs. Specialization

Beware of simply copying a design language

- Consistency is your friend until is it not your friend

Not limited to platform-level decisions

- One “look” for your app
- Or targeted at each device

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 12:
Testing, Patterns, Anti-Patterns

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

design:
use:
build:

University of Washington

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 14:
Designing for Diverse Needs

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

University of Washington

Today

Digital Mockups Due

Getting the Design Right Reports Due

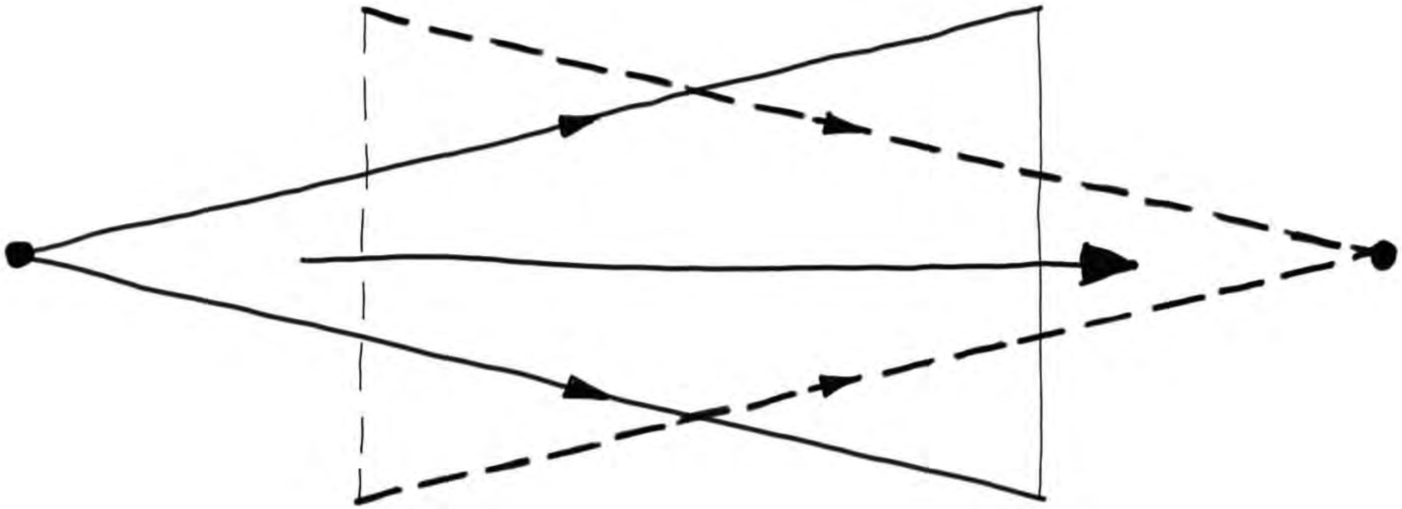
Getting the Design Right Presentations

Exam

Designing for Diverse Needs

A Basic Tenet of Design

If you do not actually understand your design problem, then you cannot make the best design



A Basic Tenet of Design

You are not designing for yourself

- You bring a lot of background to the table
- That background is your asset
- But you also need to be mindful of it

You need to understand the context of your design and the people who will use it

- What this means can vary widely
- And may be beyond what you can or will do

Pinkification

This is a really complicated issue

- But it is not new

We will start here

- Then work to more obvious problems

Kodak, 1926

Kodak Vest Pocket Series III (1926)

Kodak launched this black camera in 1926

It was successful, but was selling more to men

Engaged Walter Dorwin Teague to design a model that would appeal to women

His solution was to release a the camera in 5 different colors, each packed in a pseudo-silk lined box, where the box and liner matched the color of the camera

dub
University of Washington

Walter Dowrin Teague
Vanity Kodak (1928)

Apple, 2001

Apple G1 iPod, October 2001

Apple launched this white iPod in 2001

It was successful, but was selling more to men

Designed a model that would appeal to women

Their solution was a smaller version of the iPod in 5 different colors

Jonathan Ive
Apple iPod Mini (2004)

Walter Dowrin Teague
Vanity Kodak (1928)

Observations by Buxton

Same basic design brief

- Same use of color
- Same number and choice of colors
- Same simultaneous release of colors

Teague/Kodak example is a classic

- Known to any trained industrial designer
- Jonathan Ive is an extremely well trained designer
- Draws inspiration from the past

Buxton, CHI 2014

How About Less Controversial

Our perception of the trustworthiness and usability of a website is dramatically shaped by a first impression of appeal

How about we examine appeal around the world

- Throw in age and gender for good fun

Search Toronto.com for information on local restaurants, movies and events...

Home / Guides / Bars Guide

Bars Guide

100 Places to Pick Up in Toronto

100 places to pick up all around Toronto. More...

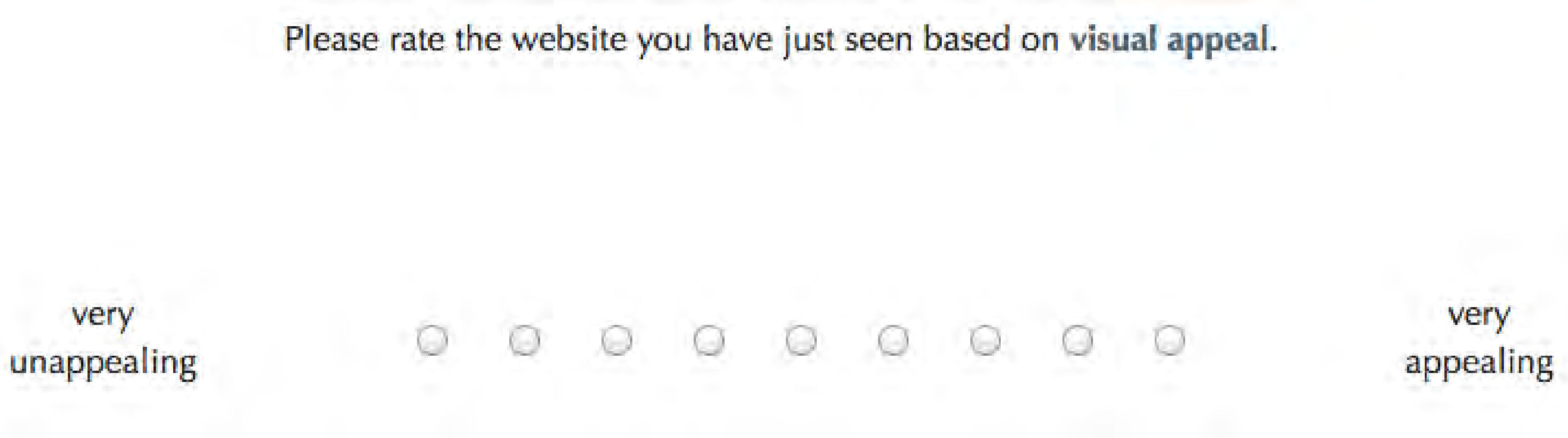
Best Bars Near the Rogers Centre
1 Comment
Posted: May 31, 2013
By Kevin Scott
These bars around the Rogers Centre are great spots before or after the game.

Best Karaoke Bars with Private Rooms
1 Comment
Posted: March 08, 2013
By Samantha Edwards
Check out these karaoke bars with private rooms in Toronto.

Best Bars for Live Music in Toronto
Posted: September 20, 2012
By Stephen Baldwin
Here are the top venues in Toronto to enjoy some live music with your drink.

Bars with the Best Late-Night Menus
Posted: November 15, 2012
By Samantha Edwards
Here are five bars with a great late-night menu.

Reinecke and Gajos, CHI 2014



Please rate the website you have just seen based on **visual appeal**.

very unappealing ○ ○ ○ ○ ○ ○ ○ ○ ○ very appealing

Reinecke and Gajos, CHI 2014

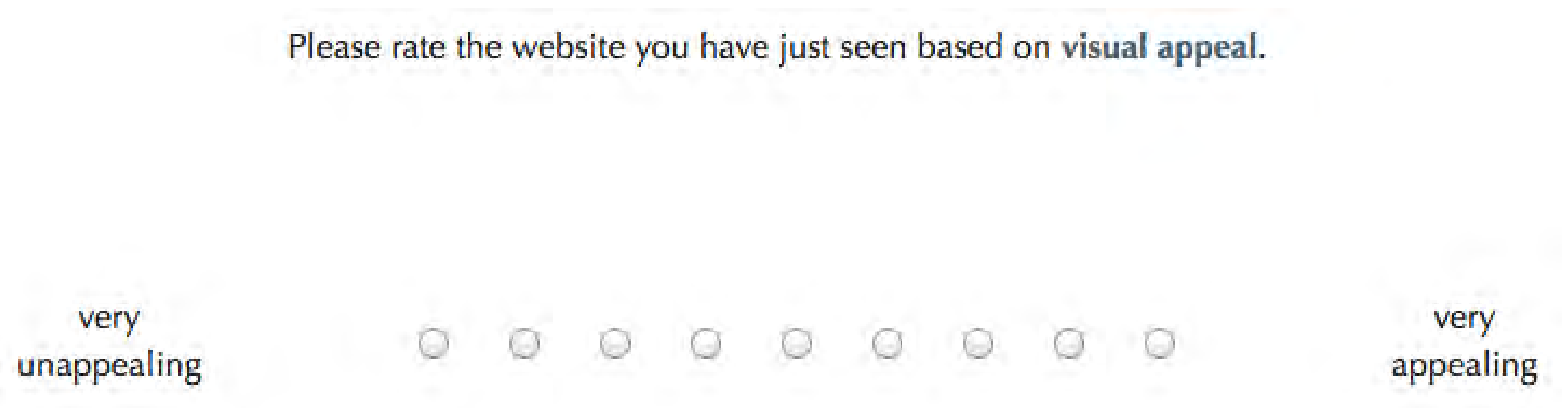
tapir design

classic design for today.

Tapir Design specialises in producing attractive, stylish websites that are accessible to all Internet users, regardless of the web browser or computer operating system that they use.

Contact the webmaster

Click here for the Tapir Blog: for all of your tapir news from around the globe



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very unappealing ○ ○ ○ ○ ○ ○ ○ ○ ○ very appealing

Reinecke and Gajos, CHI 2014

Hotel Chez Lando

Hotel Chez Lando
P.O Box 1519
Kigali Remera - Rwanda
+250 252 589 804 / +250 788 385 300
Email: info@chezlando.com

Rooms & Suites!

Every room has a private patio and beautiful views of our expansive gardens. We offer 2 restaurants

Meetings & Events

Hotel Chez Lando has a variety of meetings & events facilities to hold your event. Hotel Chez Lando

Dining & Bars

On the menu are a variety of old La Fringale favorites such as pepper steak,chicken cordon bleu

Welcome to Hotel Chez Lando!

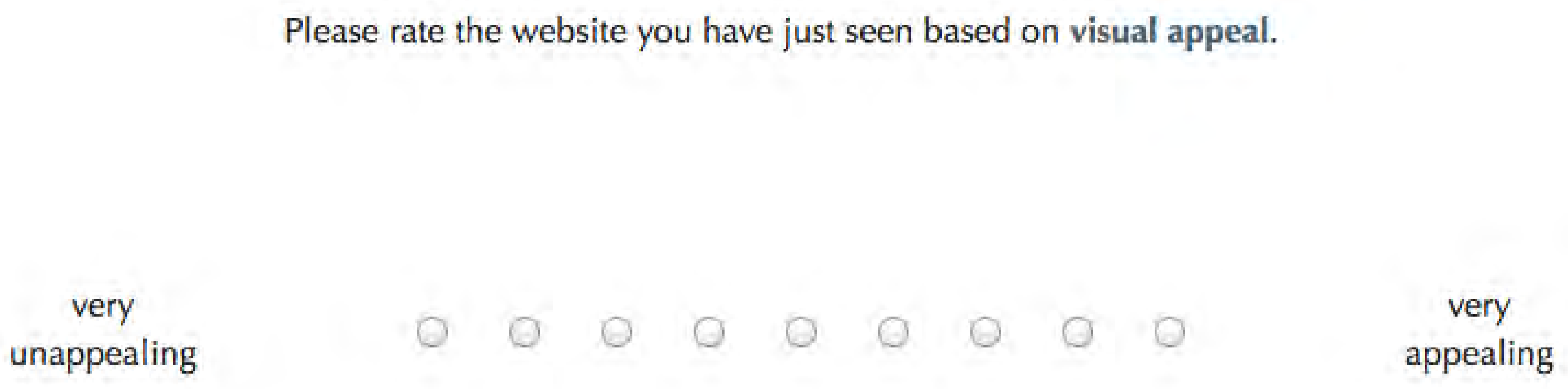
Hotel Chez Lando, your first window to Rwanda. At Chez Lando, we apply the tradition of Rwandan hospitality to the needs of modern travelers; we cater to the smallest detail of your stay. Our quaint garden-style hotel is located just five minutes from Kigali International Airport and is right on the way to the heart of town.

Sixteen years after the Genocide, Hotel Chez Lando is opening its new Barbecue, new Restaurant with Terrace and new Meeting Hall where comfort and light meet blossoming flowers. The architecture of the new additions blends with its environment; stylish and modern, it is matching the new face of Rwanda.

*** Special Offers***

-We offer a free breakfast,airport shuttle & Wi-fi must mention the arrival time,flight name & number in your booking(special request part in case of online booking) !!VISA & Master Card Accepted.

Reinecke and Gajos, CHI 2014



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Reinecke and Gajos, CHI 2014

KEEP TRACK OF YOUR ACCOUNT ON THE GO.
WITH SMS & EMAIL ALERTS

You want to acquire your first drive?

Carry your bank with you 24/7

Simple things that make life easer.

LATEST NEWS

On the 18th of June, 2013 Banque Populaire du Rwanda scooped an Award as the Best Agri Business...

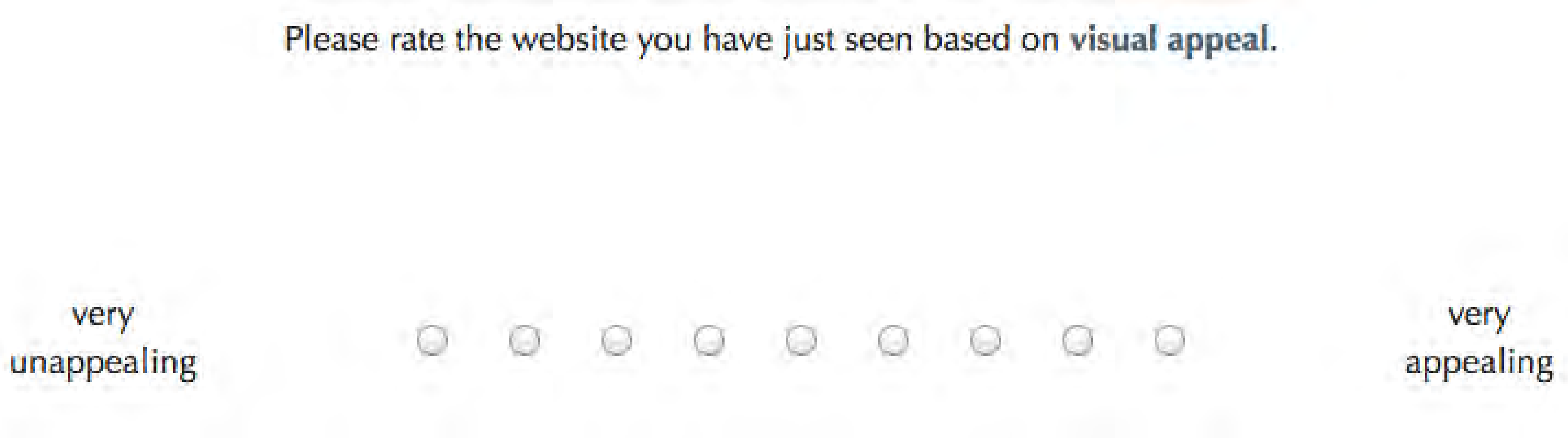
Banque Populaire du Rwanda on Friday of the 26th April, 2013, held a commemoration ceremony to...

Banque Populaire du Rwanda

Tariff Guide

EXHANGE RATES

Currency	Selling	Buying
USD	696.824572	679.824572
EURO	984.813009	925.006257
GBP	1161.400411	1132.103058
CAD	619.531308	603.393408
CHF	777.24316	757.423256



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very unappealing ○ ○ ○ ○ ○ ○ ○ ○ ○ very appealing

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Popular Rwandan Website

THE PEOPLE'S BANK
Banki yacu, Hafi yacu.

KEEP TRACK OF YOUR ACCOUNT ON THE GO.
WITH SMS & EMAIL ALERTS

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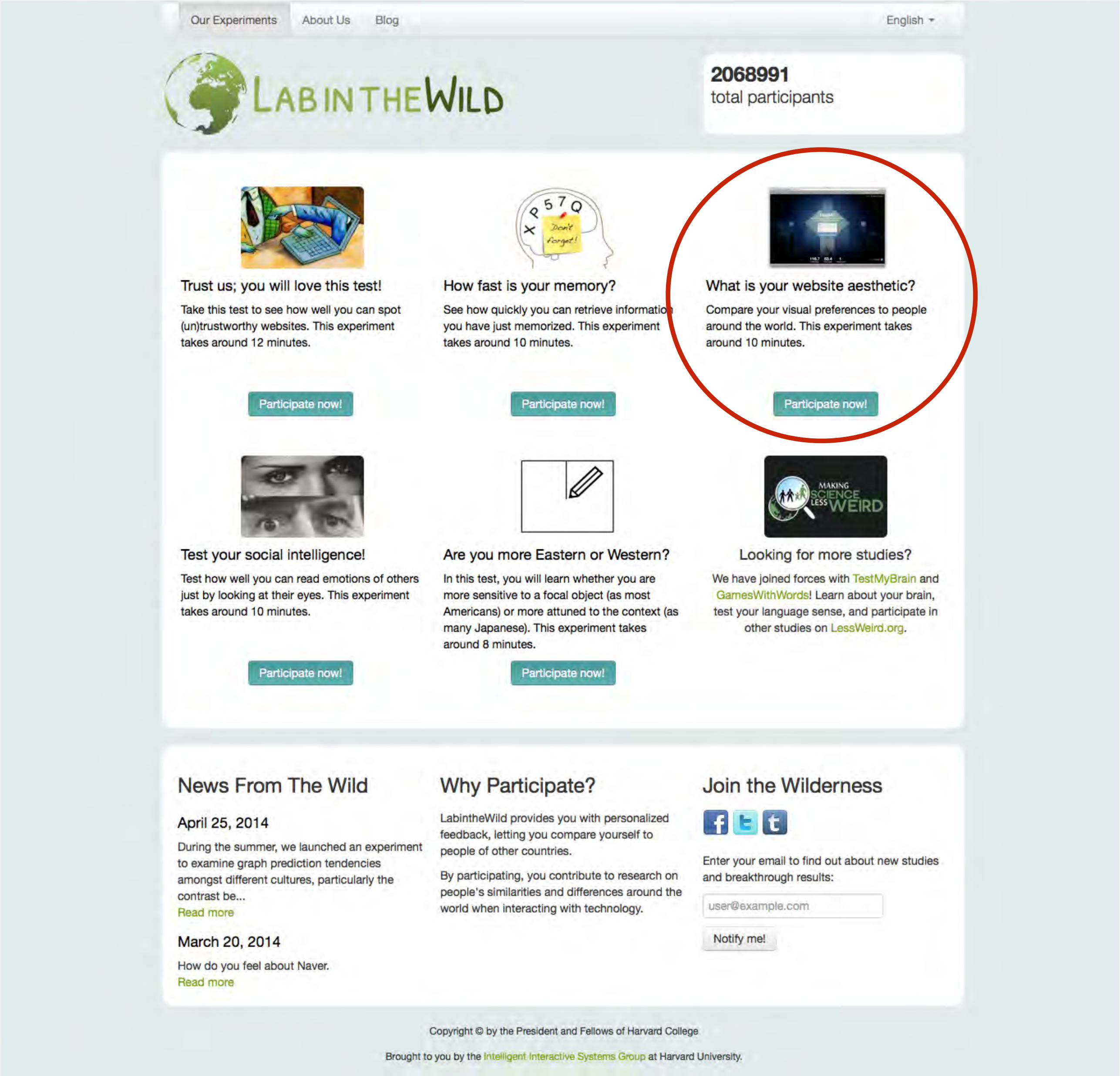

2068991
total participants

Trust us; you will love this test!

Take this test to see how well you can spot (un)trustworthy websites. This experiment takes around 12 minutes.

How fast is your memory?

See how quickly you can retrieve information you have just memorized. This experiment takes around 10 minutes.

What is your website aesthetic?

Compare your visual preferences to people around the world. This experiment takes around 10 minutes.

Test your social intelligence!

Test how well you can read emotions of others just by looking at their eyes. This experiment takes around 10 minutes.

Are you more Eastern or Western?

In this test, you will learn whether you are more sensitive to a focal object (as most Americans) or more attuned to the context (as many Japanese). This experiment takes around 8 minutes.

Looking for more studies?

We have joined forces with TestMyBrain and GamesWithWords! Learn about your brain, test your language sense, and participate in other studies on LessWeird.org.

News From The Wild

April 25, 2014

During the summer, we launched an experiment to examine graph prediction tendencies amongst different cultures, particularly the contrast be...
Read more

March 20, 2014

How do you feel about Naver.
Read more

Why Participate?

LabintheWild provides you with personalized feedback, letting you compare yourself to people of other countries.

By participating, you contribute to research on people's similarities and differences around the world when interacting with technology.

Join the Wilderness

Enter your email to find out about new studies and breakthrough results:

Brought to you by the Intelligent Interactive Systems Group at Harvard University.

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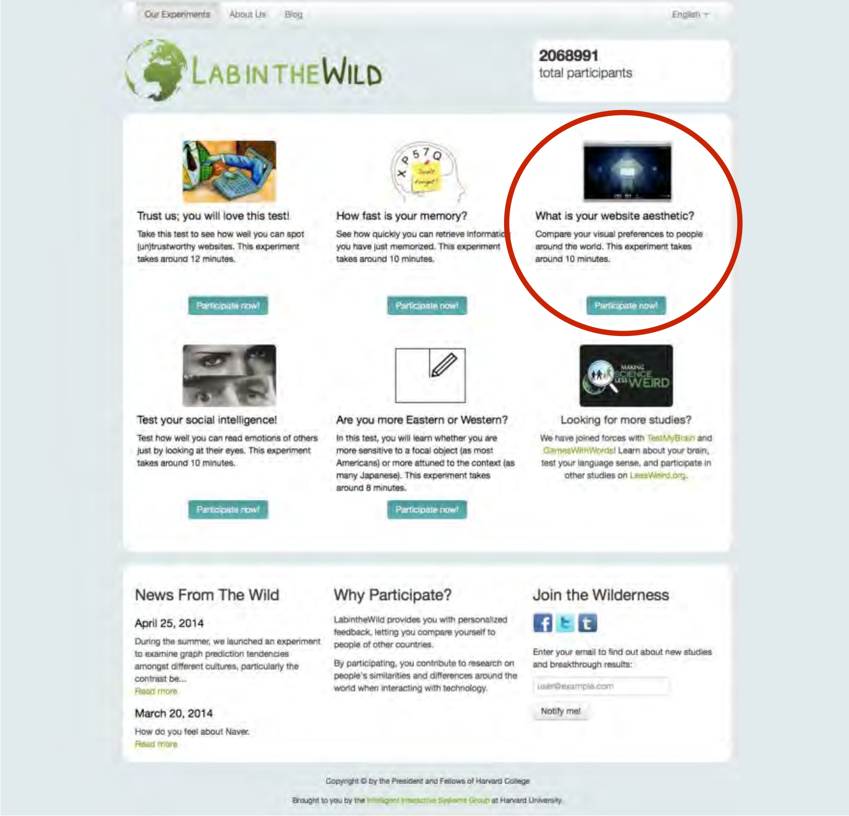
Large Scale Data Collection



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Join the Wilderness

Enter your email to find out about new studies and breakthrough results:
user@example.com

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Brought to you by the Intelligent Interactive Systems Group at Harvard University.

2.4 million ratings

39,975 participants

430 websites

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Visual Feature Analysis

Welcome new visitor!

Know Your Meme is a website dedicated to documenting internet phenomena: viral videos, image macros, catchphrases, web celebs and more.

Like Cheezburger on Facebook! 347,344 people like this. Be the first of your friends.

KYM Gallery: Some Men Just Want to Watch the World Burn

Click thru for more snowclone parodies of the memorable quote from Batman: The Dark Knight.

July 19th, 2012 2:00 AM

0 comments

Like Cheezburger on Facebook

347,344 people like this. Be the first of your friends.

Today's Top Image Galleries

My Little Pony: Friendship is Magic

17,245 views

Some Men Just Want to Watch the World Burn

6,769 views

Avatar: The Last Airbender / The Legend of Korra

3,794 views

Reaction Faces

2,893 views

Breaking Bad

2.4 million ratings

39,975 participants

430 websites

39 image metrics describing website perceived colorfulness and complexity

Age, country, gender, education

Reinecke and Gajos, CHI 2014

It's a July morning. Mason is front-end-developing, Phil is conference-calling, and Kim is website-updating.

From: Poccuo's Twitter

Featured Work

University of
Washington

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HostRocket

1.866.519.7079

The Ultimate Hosting Plan

6 MONTHS FREE

$5.99/mo.

LEARN MORE

Website Hosting

$5.99

Reseller Cloud Hosting

$34.99

Dedicated Hosting

$69.99

LIZARD POINT

BROWSER-BASED ACTIVITIES FOR FUN AND LEARNING

JEWELRY CREATIONS BY LIZARD POINT

POCCUO

ABOUT US WHAT WE DO OUR WORK THE LATEST CONTACT US

It's a July morning. Mason is front-end-developing, Phil is conference-calling, and Kim is website-updating.

From Poccuo's Twitter

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classic design for today

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LIZARD POINT

BROWSER-BASED ACTIVITIES FOR FUN AND LEARNING

JEWELRY CREATIONS BY LIZARD POINT

tapir design

classic design for today

DoodleKit™

The time's most beautiful, quickest and advanced website tool is Doodlekit... Right now, Doodlekit is the strongest available online website builder...

Kenneth Bernholm - PC WORLD

You'll Be Amazed By What You Can Build!

- Completely FREE PLAN Available - No Time Limits!
- No Coding Required - Easy To Use Website Creator Design Tools

Find over 12,000 Restaurants on our website!

BUCKHEAD RESTAURANT GUIDE...Click to View Website

NEW! Atlanta's Top Restaurants

Find cuisine from all over the world on our Cuisine Guide!! Page

Search by Cuisine Type

Search by Restaurant Name or by Cuisine Type

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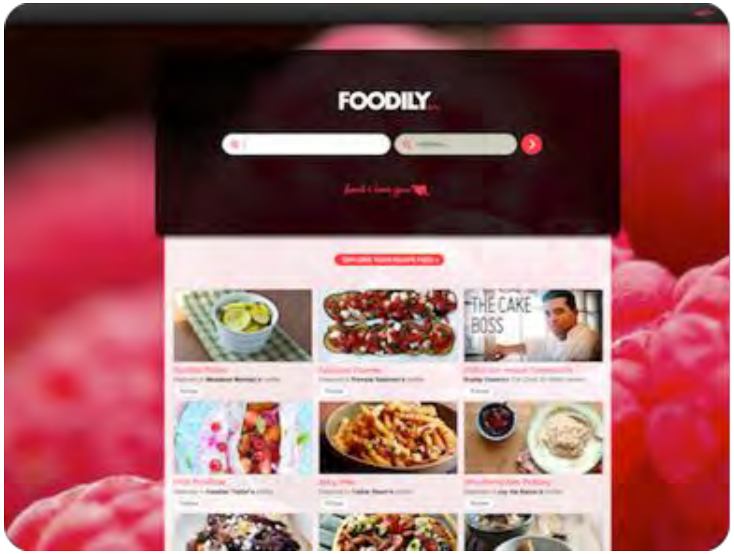
> 50
years

< 20
years



Reinecke and Gajos, CHI 2014

female

I made $$$$'s making pottery, you can too!

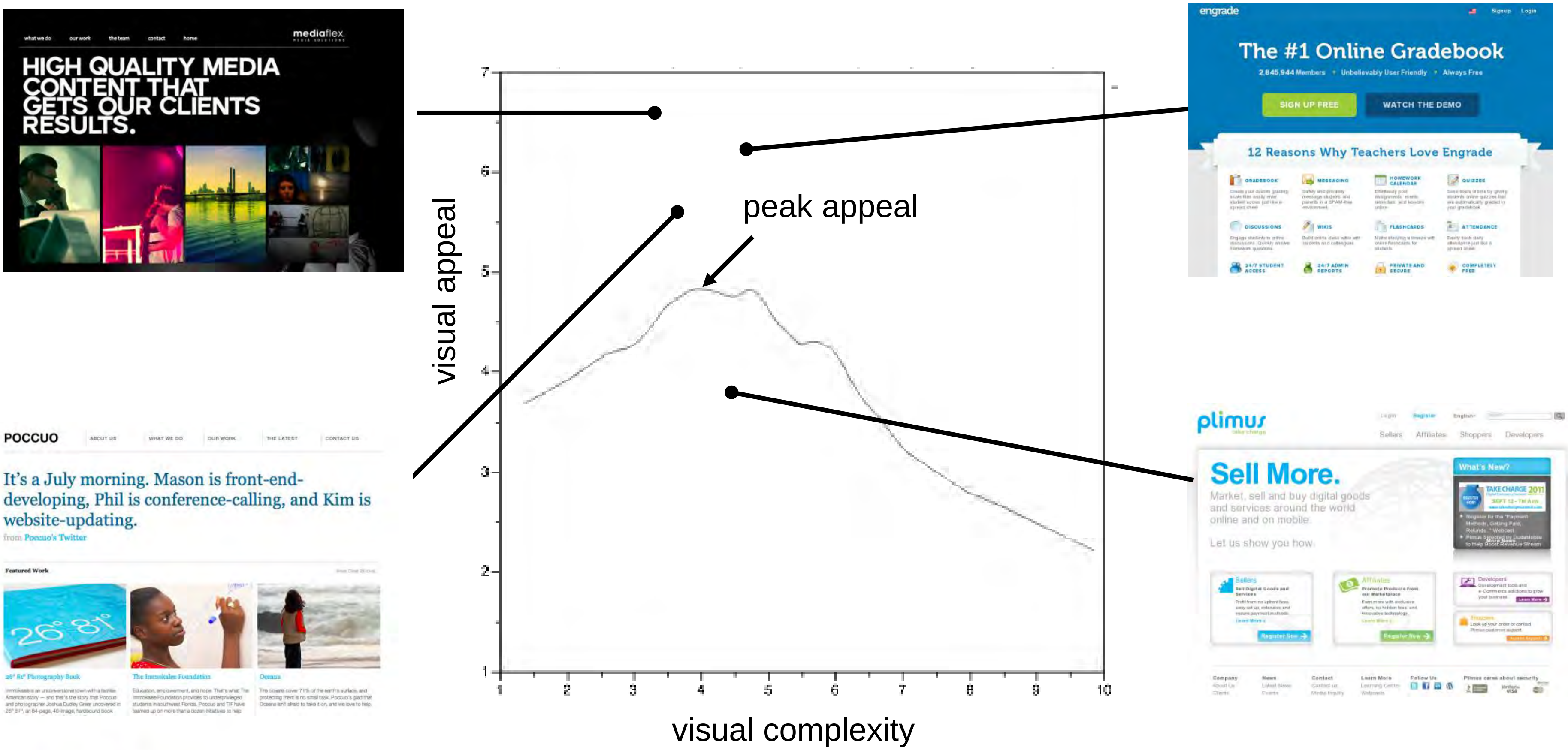
male

What do you want to learn today?

University of Washington

Reinecke and Gajos, CHI 2014

Plotting Appeal by Complexity



what we do our work the team contact home

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12 Reasons Why Teachers Love Engrade

GRADEBOOK MESSAGING HOMEWORK CALENDAR QUIZZES DISCUSSIONS WIKIS FLASHCARDS ATTENDANCE 24/7 STUDENT ACCESS 24/7 ADMIN REPORTS PRIVATE AND SECURE COMPLETELY FREE

POCCUO ABOUT US WHAT WE DO OUR WORK THE LATEST CONTACT US

It's a July morning. Mason is front-end-developing, Phil is conference-calling, and Kim is website-updating.

from Poccuo's Twitter

Featured Work

26° 81° Photography Book The Immokalee Foundation Oceana

plimus

Sellers Affiliates Shoppers Developers

Sell More.

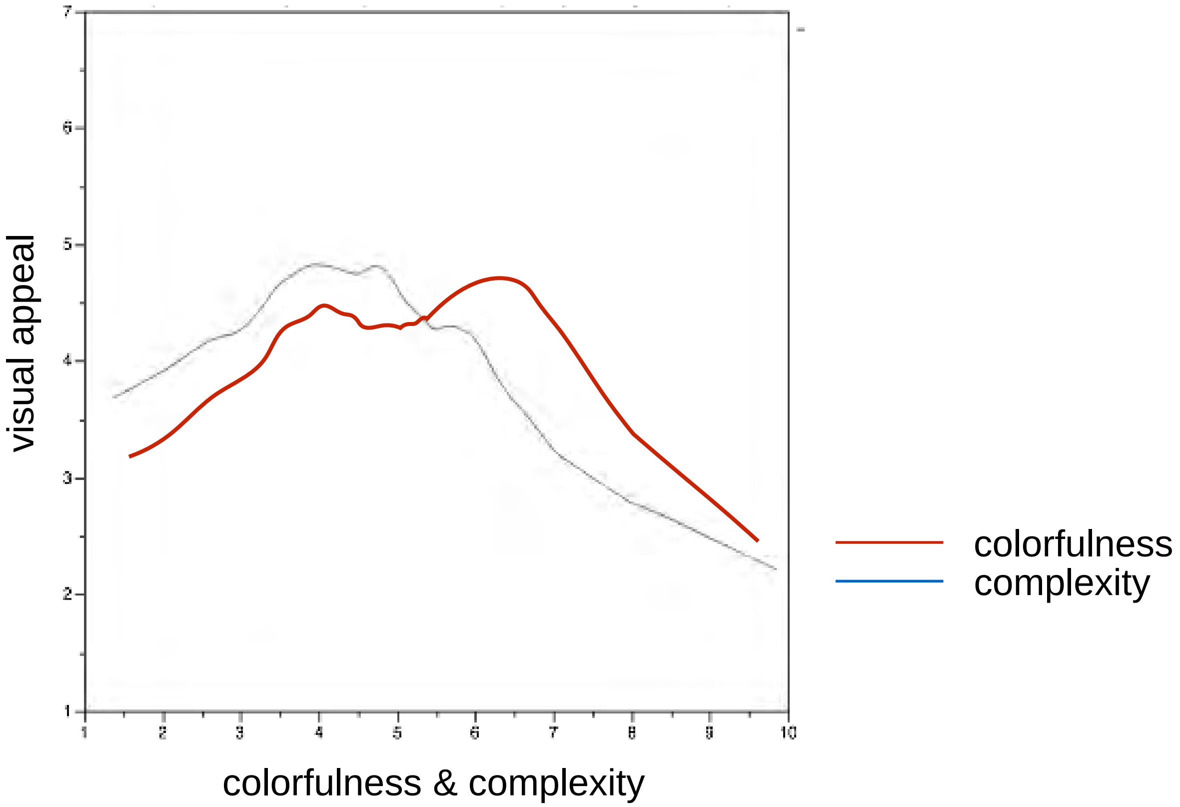
Market, sell and buy digital goods and services around the world online and on mobile.

Let us show you how

What's New?

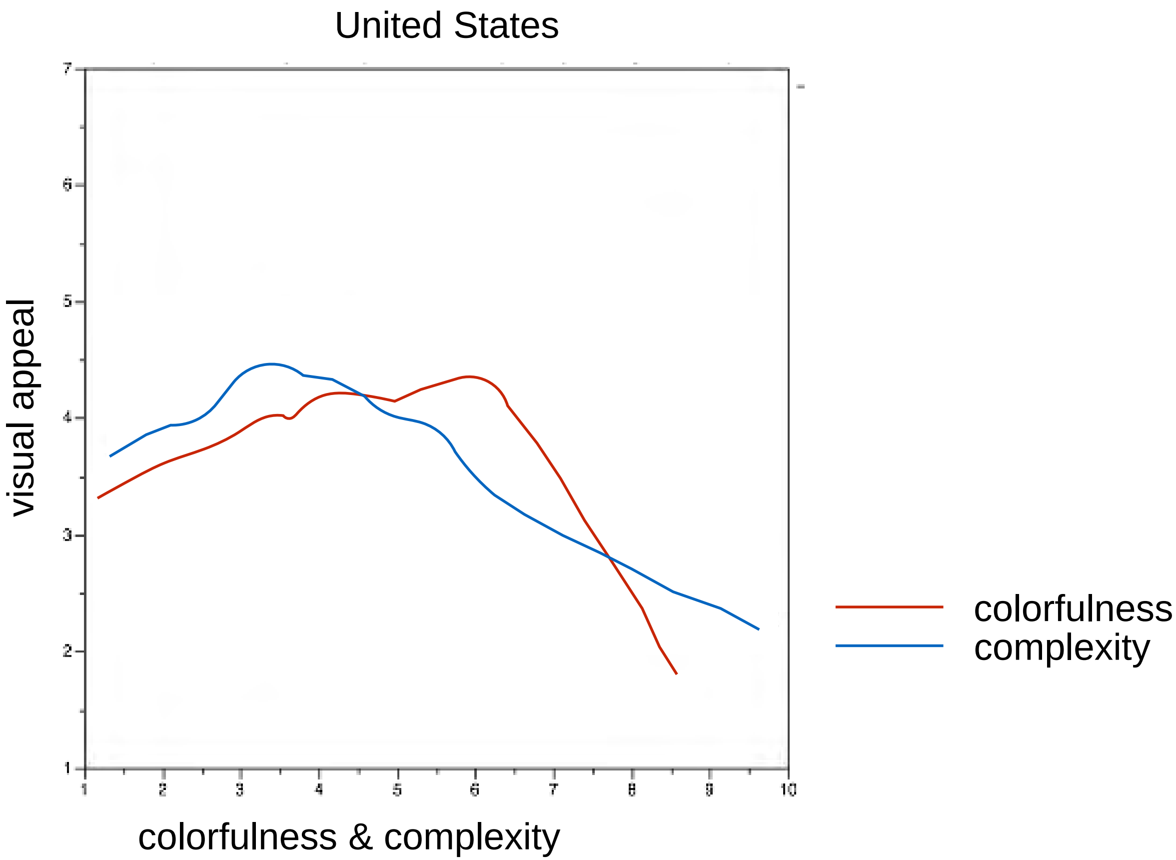
Reinecke and Gajos, CHI 2014

Plotting Appeal by Colorfulness



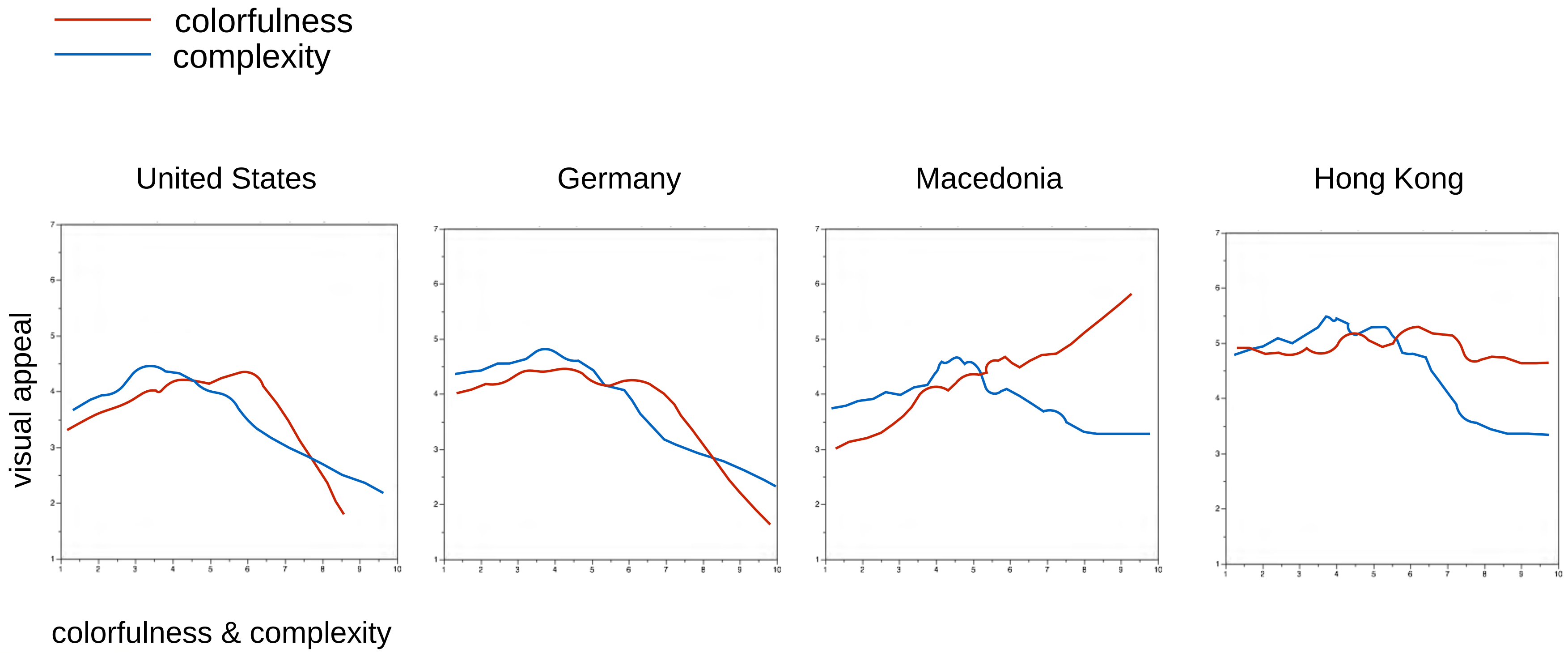
Reinecke and Gajos, CHI 2014

United States



Reinecke and Gajos, CHI 2014

Other Countries



Reinecke and Gajos, CHI 2014

Abandoning “One Best Design”

People have different preferences

- We can study these preferences
- We can even predict these preferences

How should we think about differences

- One powerful viewpoint is social justice

Accessibility is the Law

National Federation of the Blind vs. Target, 2006

Americans with Disabilities Act, 1990

- Requires accessibility in employment, public entities and public transportation, public accommodations and commercial facilities

Rehabilitation Act, 1973

- Section 508, 1998
- Mandates federal procurement of accessible electronic and information technologies

Universal Design vs. Assistive Technology

Personal Texting by Deaf People

Teletypewriter (TTY)
used by deaf people
in their homes circa 1970

1990s TTY with
built-in acoustic modem

SMS texting

People with Disabilities

1 billion people worldwide

  15% of the population

50 million people in US

Including yourself if you are fortunate to live to develop disabilities

A Social Justice Problem

1 billion people worldwide

15% of the population

50 million people in US

Including yourself if you are fortunate to live to develop disabilities

16% of people in the US
10% of workforce
5% of STEM workforce
1% of PhDs in STEM

Current State of Devices

Slide Rule, Kane et al, ASSETS 2008

Apple VoiceOver

Current State of Devices

Slide Rule, Kane et al, ASSETS 2008

Apple VoiceOver

University of Washington

Equal Access to Information

Is this access equal?

Equal Access to Information

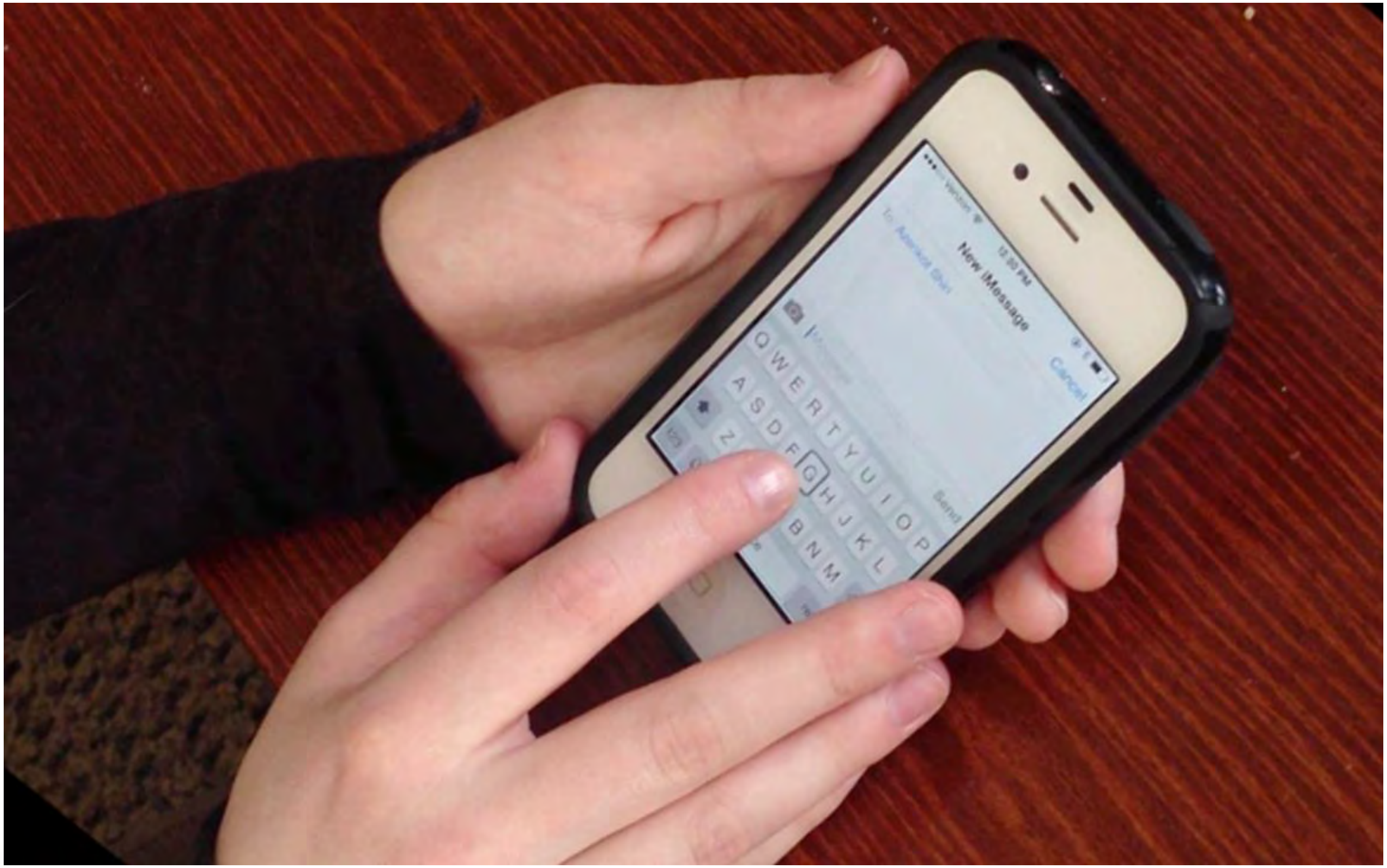
Is this access equal?

Some dimensions to consider

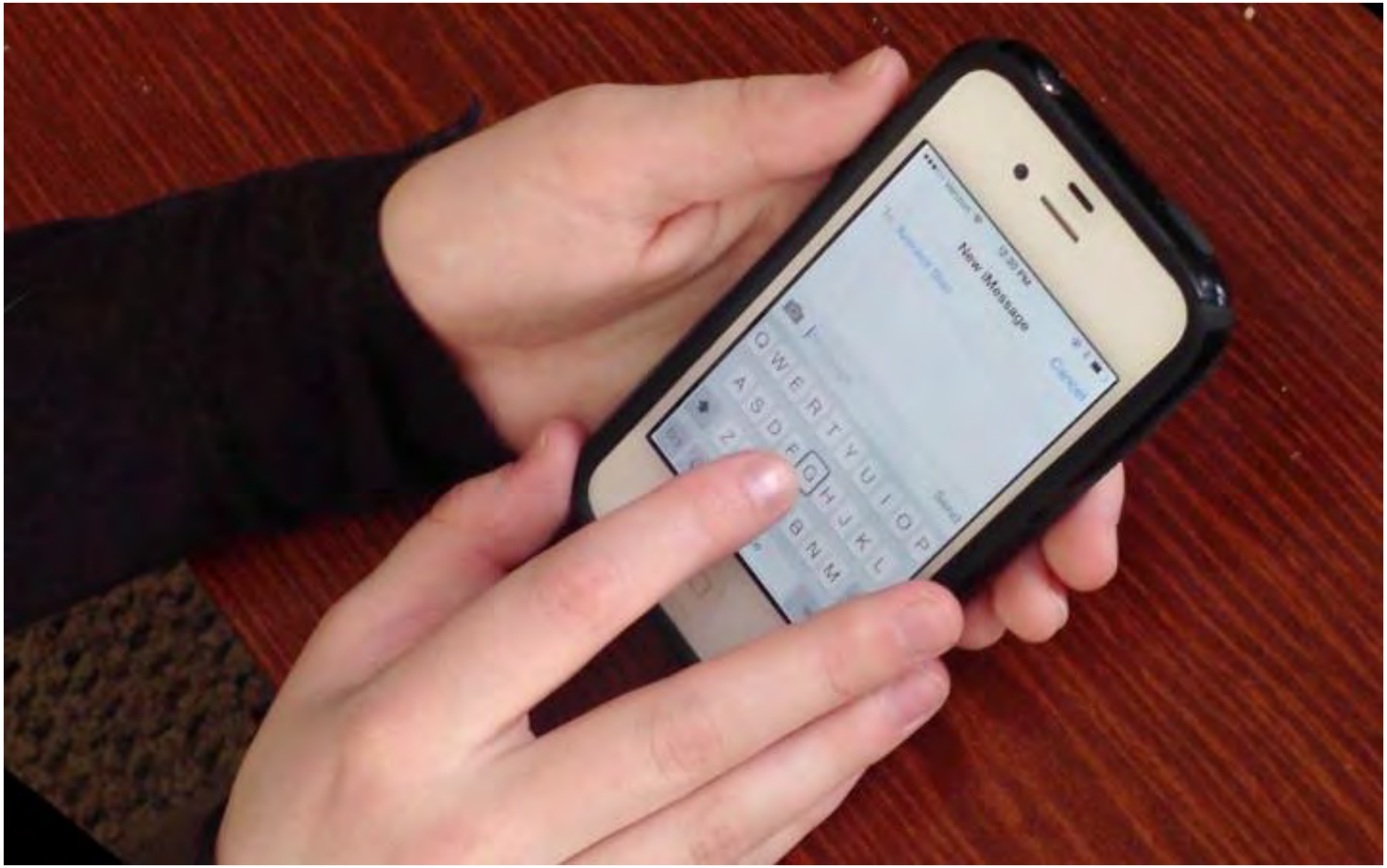
- Cost
- Speed
- Accuracy
- Ease

It simply being possible is not enough

A Closer Look at Text Entry

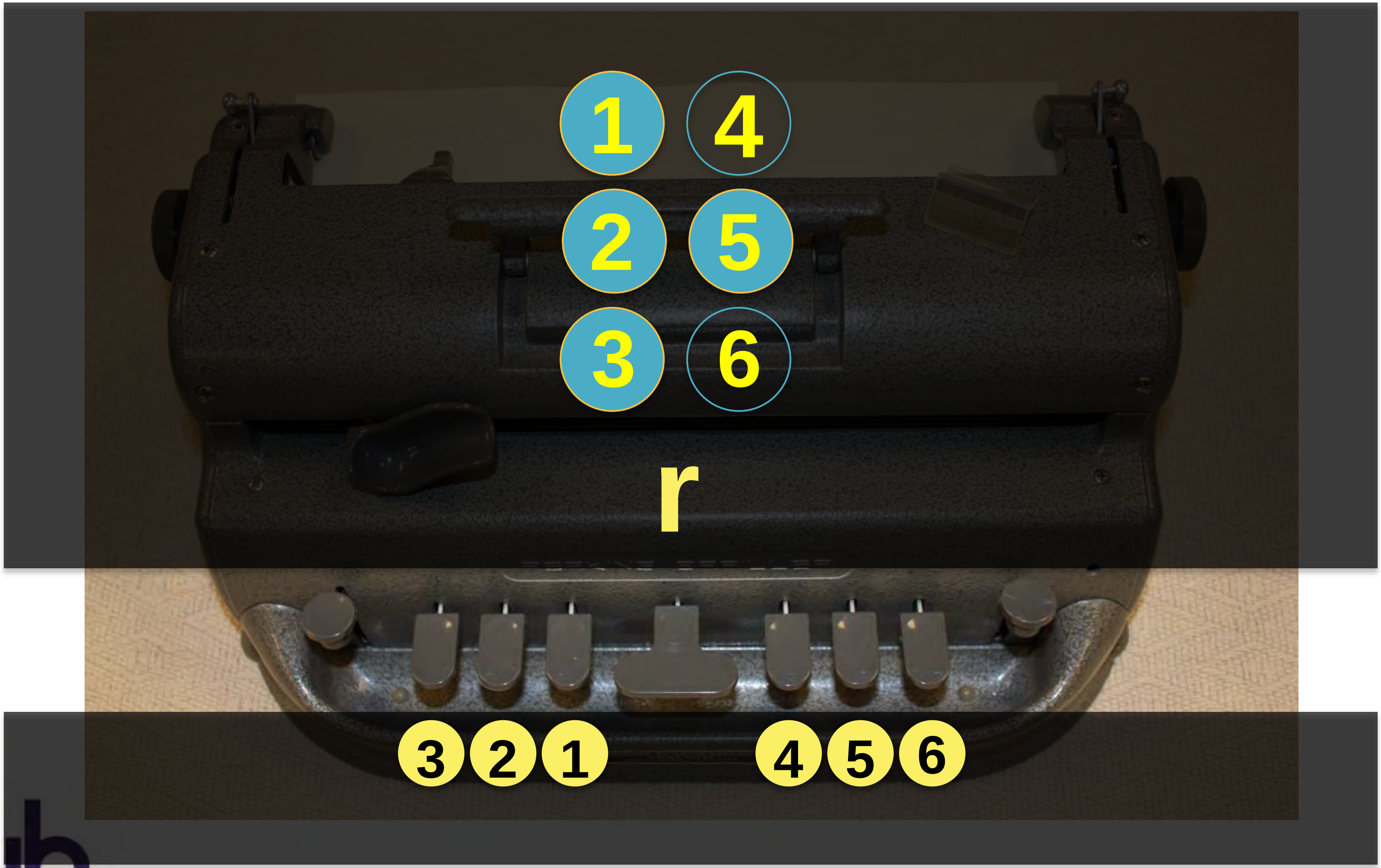


A Closer Look at Text Entry



Contrast with Braille Input

Contrast with Braille Input



Perkinput

University of Washington

Azenkot et al, GI 2012

Perkinput

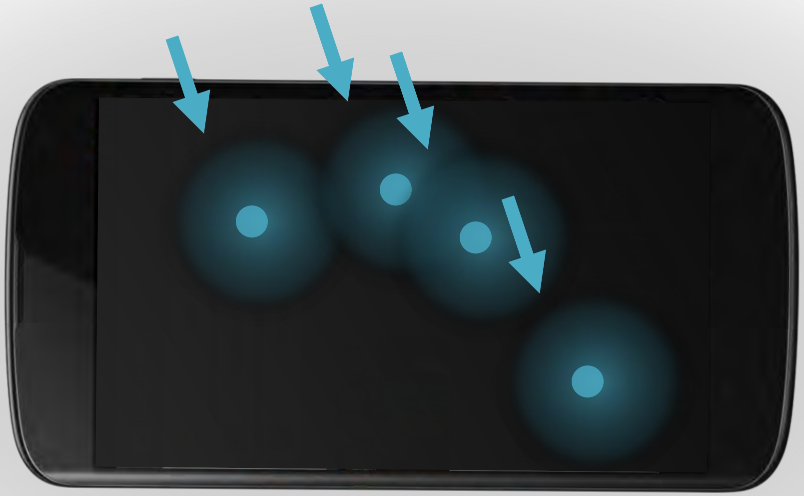
Azenkot et al, GI 2012

Perkinput

University of Washington

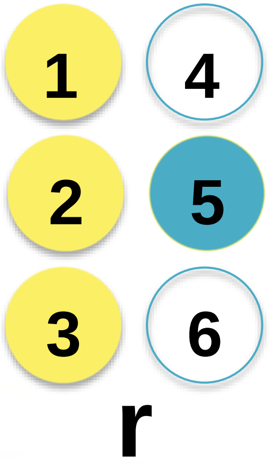
Azenkot et al, GI 2012

Perkinput



Azenkot et al, GI 2012

Perkinput



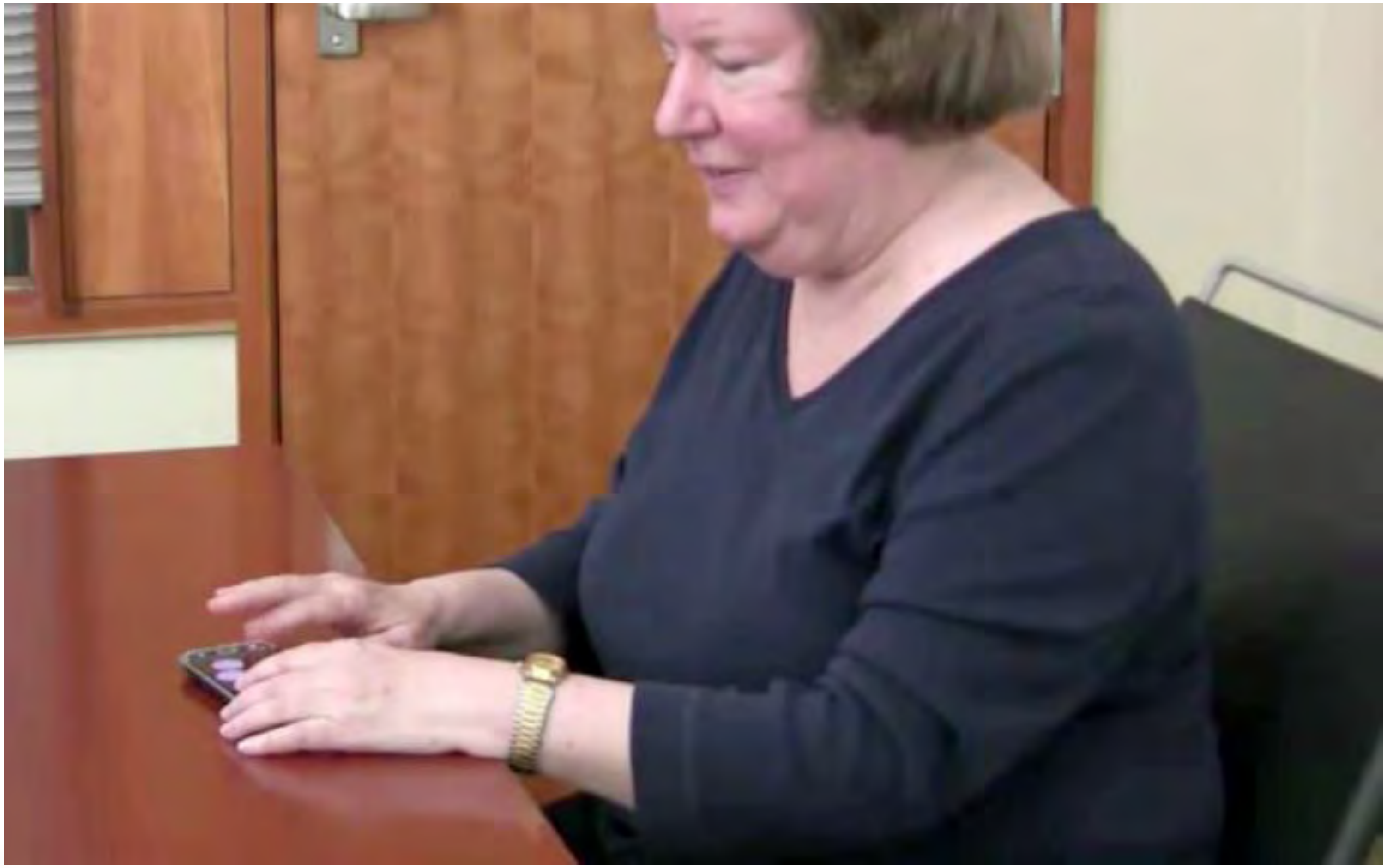
Azenkot et al, GI 2012

Perkinput

University of Washington

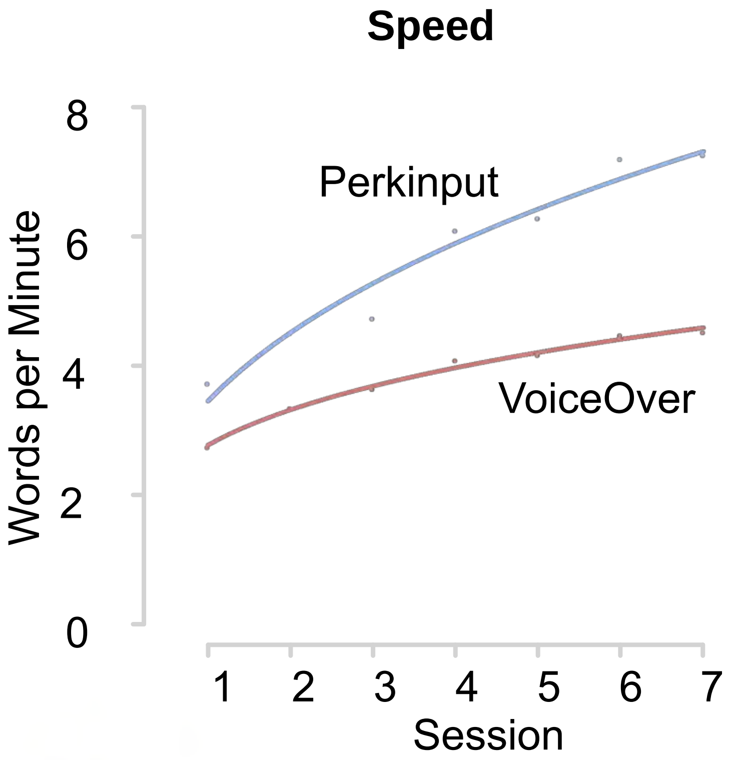
Azenkot et al, GI 2012

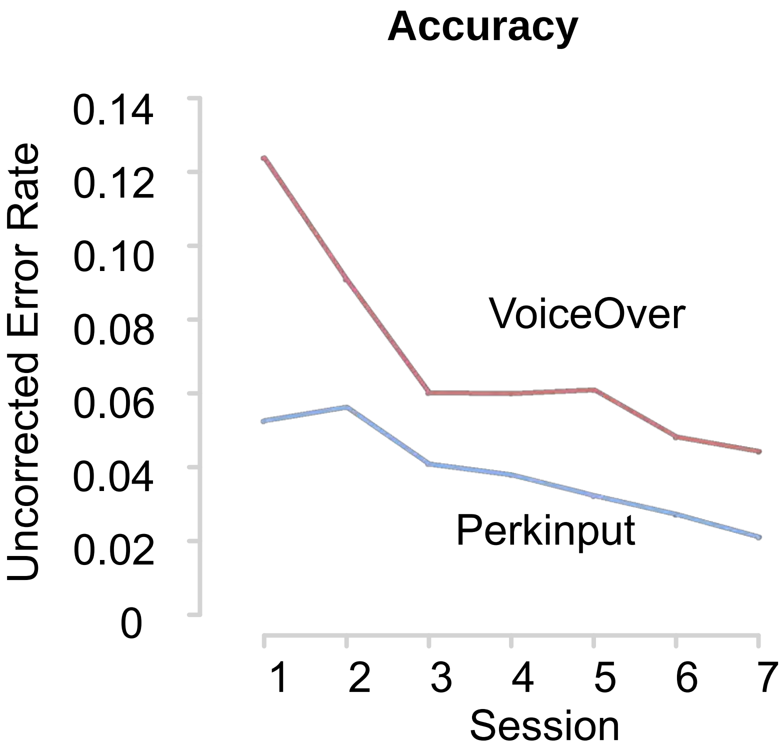
Perkinput



Azenkot et al, GI 2012

Speed and Accuracy


Speed


Accuracy

Azenkot et al, GI 2012

Another Problem

University of
Washington

Azenkot et al, ASSETS 2012

Another Problem

Azenkot et al, ASSETS 2012

PassChords

University of Washington

Azenkot et al, ASSETS 2012

PassChords

Azenkot et al, ASSETS 2012

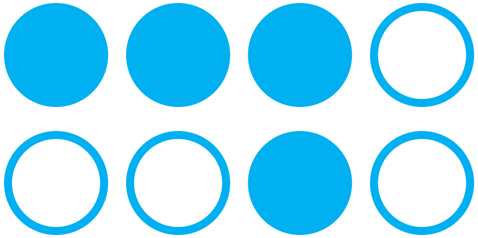
PassChords

●●●○

University of
Washington

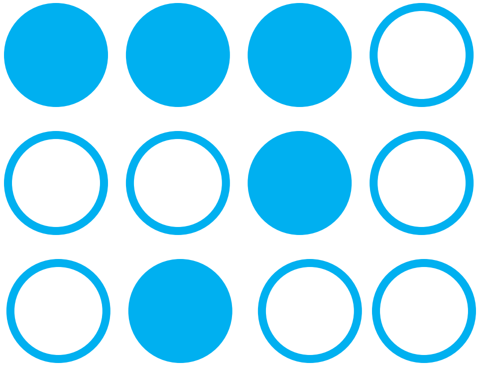
Azenkot et al, ASSETS 2012

PassChords



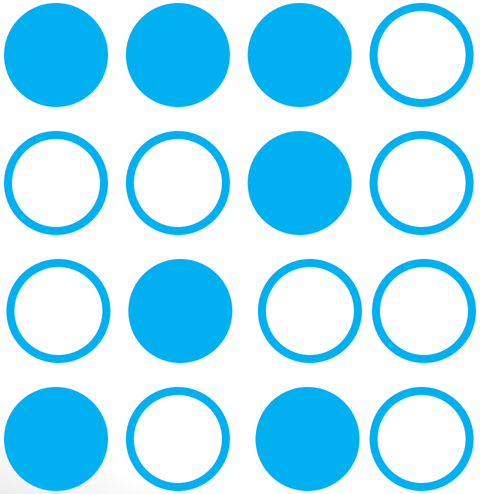
Azenkot et al, ASSETS 2012

PassChords



Azenkot et al, ASSETS 2012

PassChords



Azenkot et al, ASSETS 2012

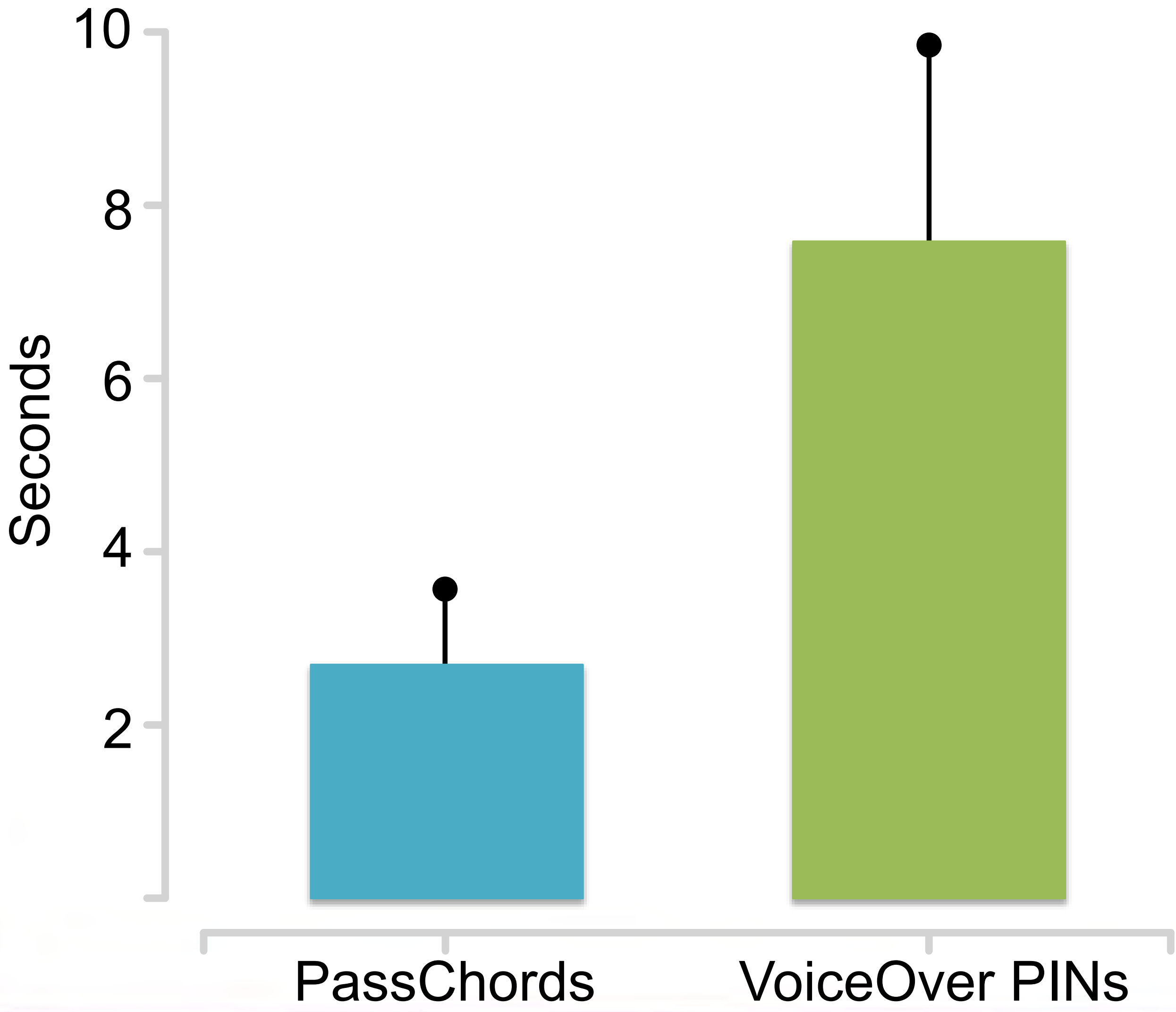
PassChords

Azenkot et al, ASSETS 2012

PassChords

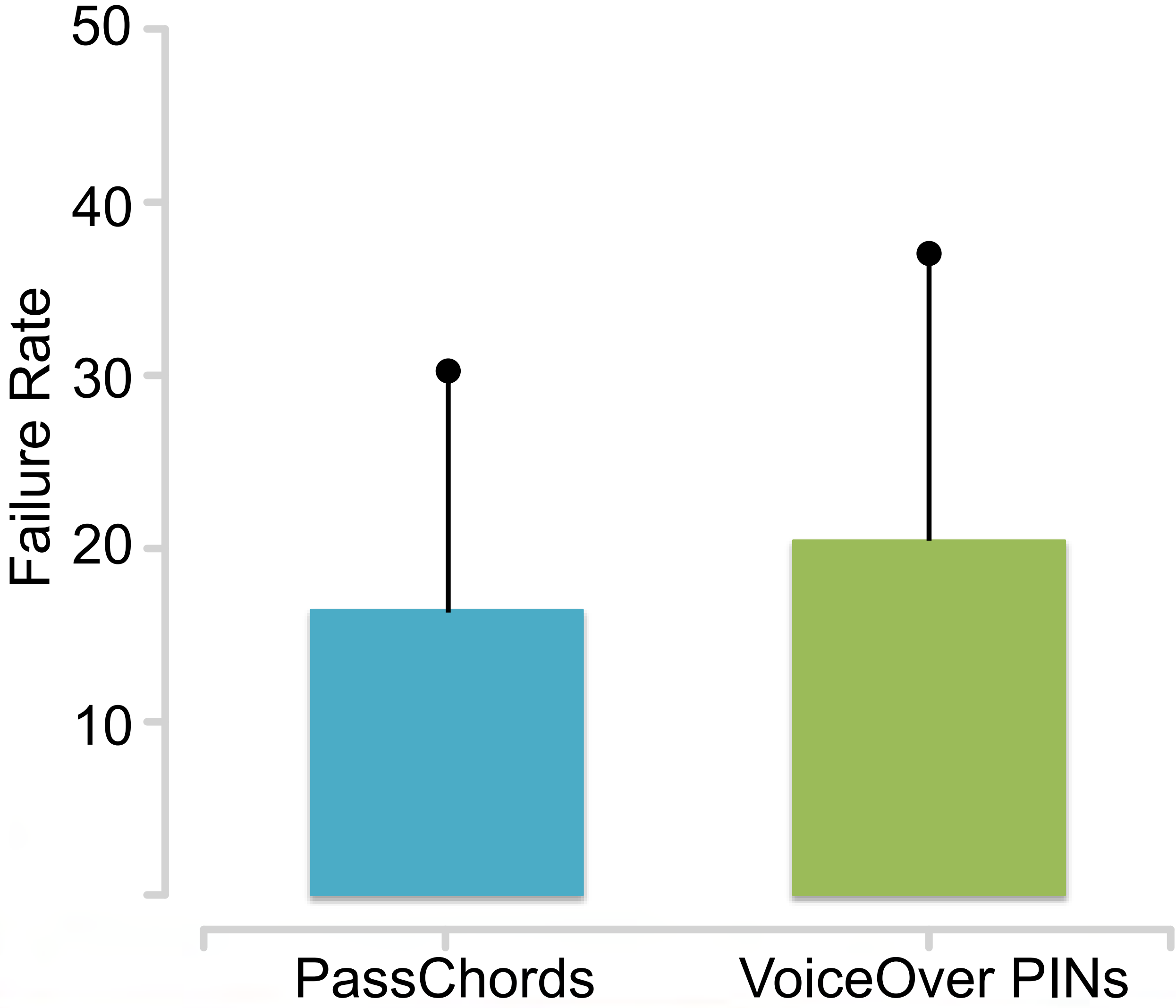
Azenkot et al, ASSETS 2012

Time to Authenticate



Azenkot et al, ASSETS 2012

Accuracy



Azenkot et al, ASSETS 2012

What About Security?

Azenkot et al, ASSETS 2012

What About Security?

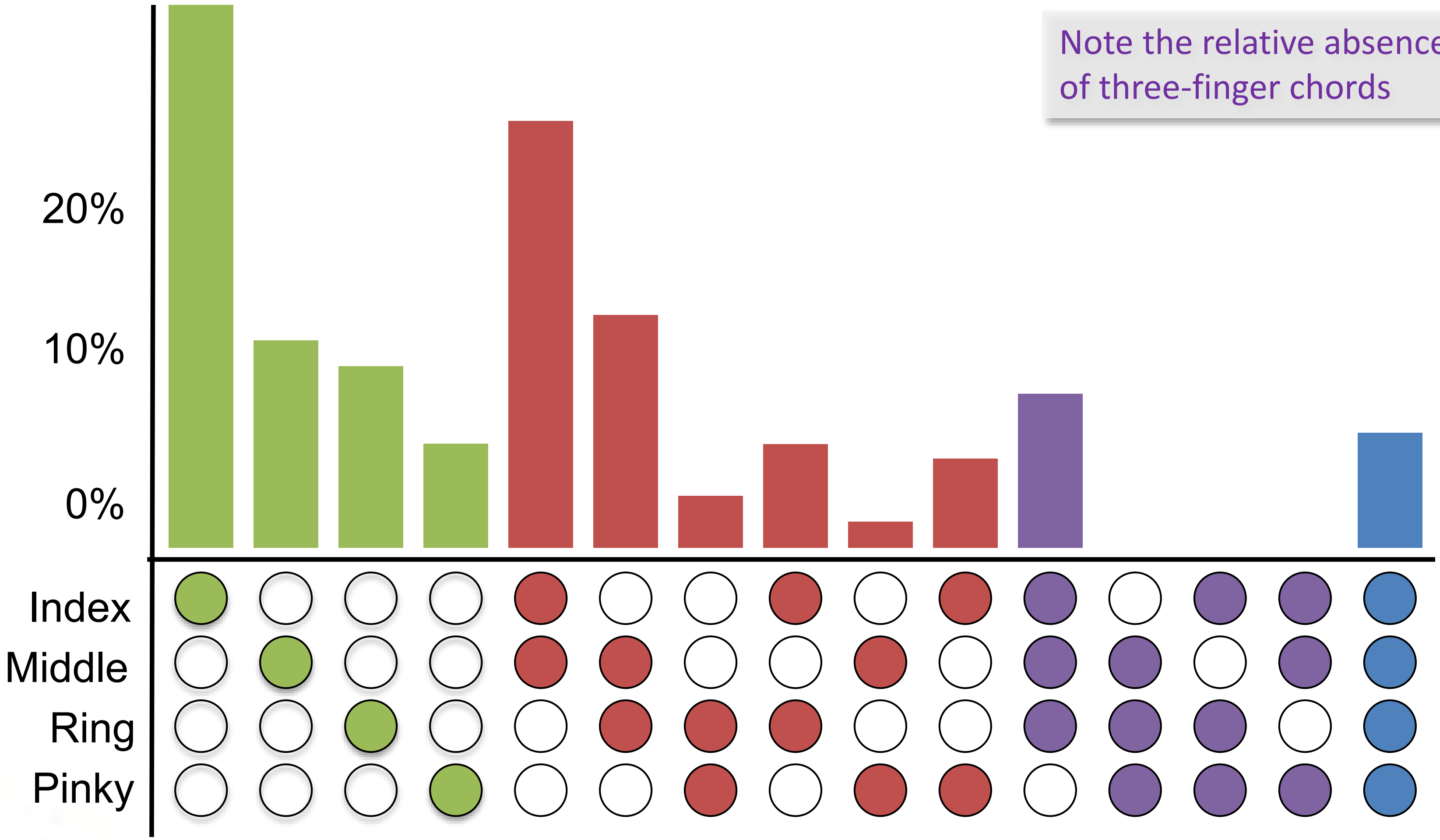
One measure is Guessing Entropy

The minimum number of bits needed to encode the set of all possible passwords

4-digit PINS:	12.7 bits

Azenkot et al, ASSETS 2012

Finger Pattern Frequency



Note the relative absence of three-finger chords

Azenkot et al, ASSETS 2012

What About Security?

One measure is Guessing Entropy

The minimum number of bits needed
to encode the set of all possible passwords

4-digit PINS:	12.7 bits
4-tap PassChords:	12.6 bits

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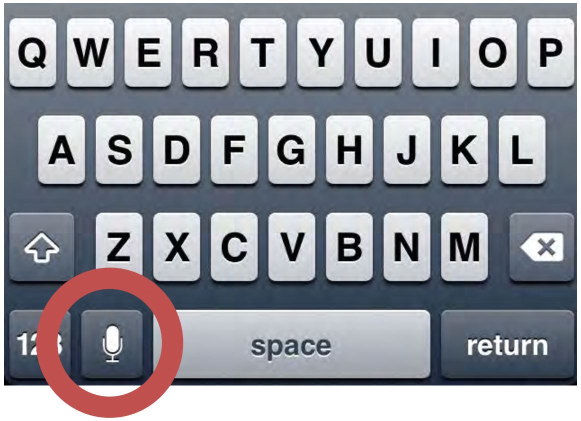
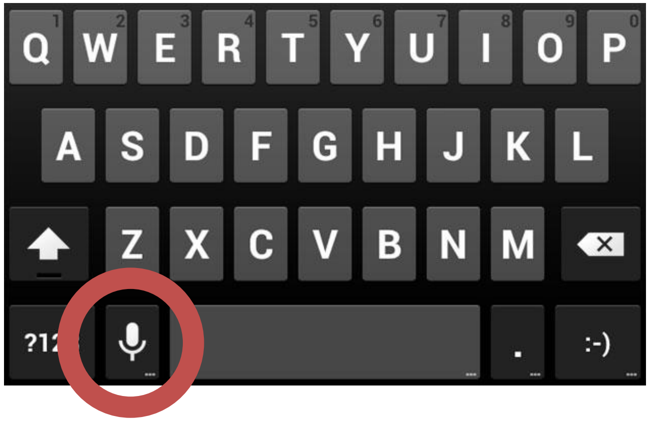
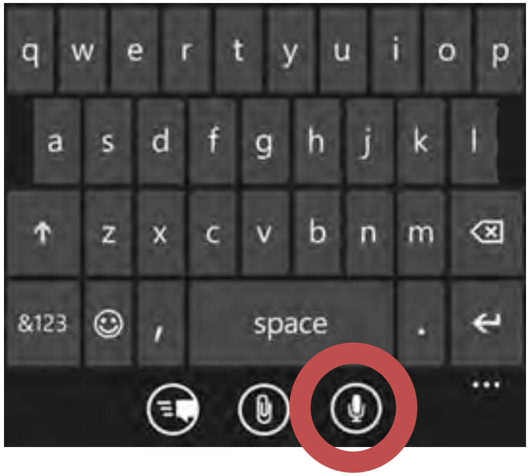
Azenkot et al, ASSETS 2012

Speech Input







Azenkot et al, ASSETS 2013

Reviewing Errors and Edits

When of my hobbies is hiking.
I really **enjoyed** getting away…

The triangle **consist** of a **2 mile** hike to the beach, **I three-mile** hike along the beach, and a **2 mile** hike back.

It is a very common hike, but **I knew** to the **northwestern if you** like I need to do it.

Azenkot et al, ASSETS 2013

Serial Access in Reviewing Transcript

When

Serial Access in Reviewing Transcript

of

University of Washington

Azenkot et al, ASSETS 2013

Serial Access in Reviewing Transcript

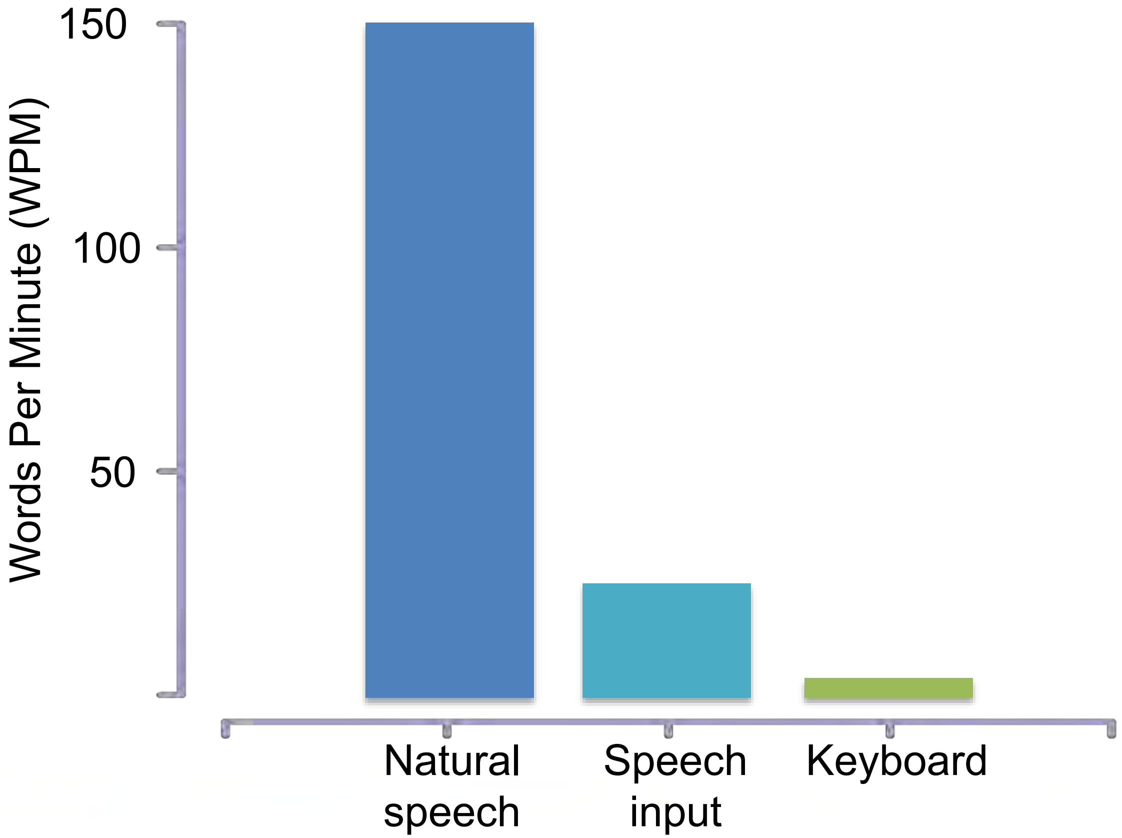
my

Serial Access in Reviewing Transcript

hobbies

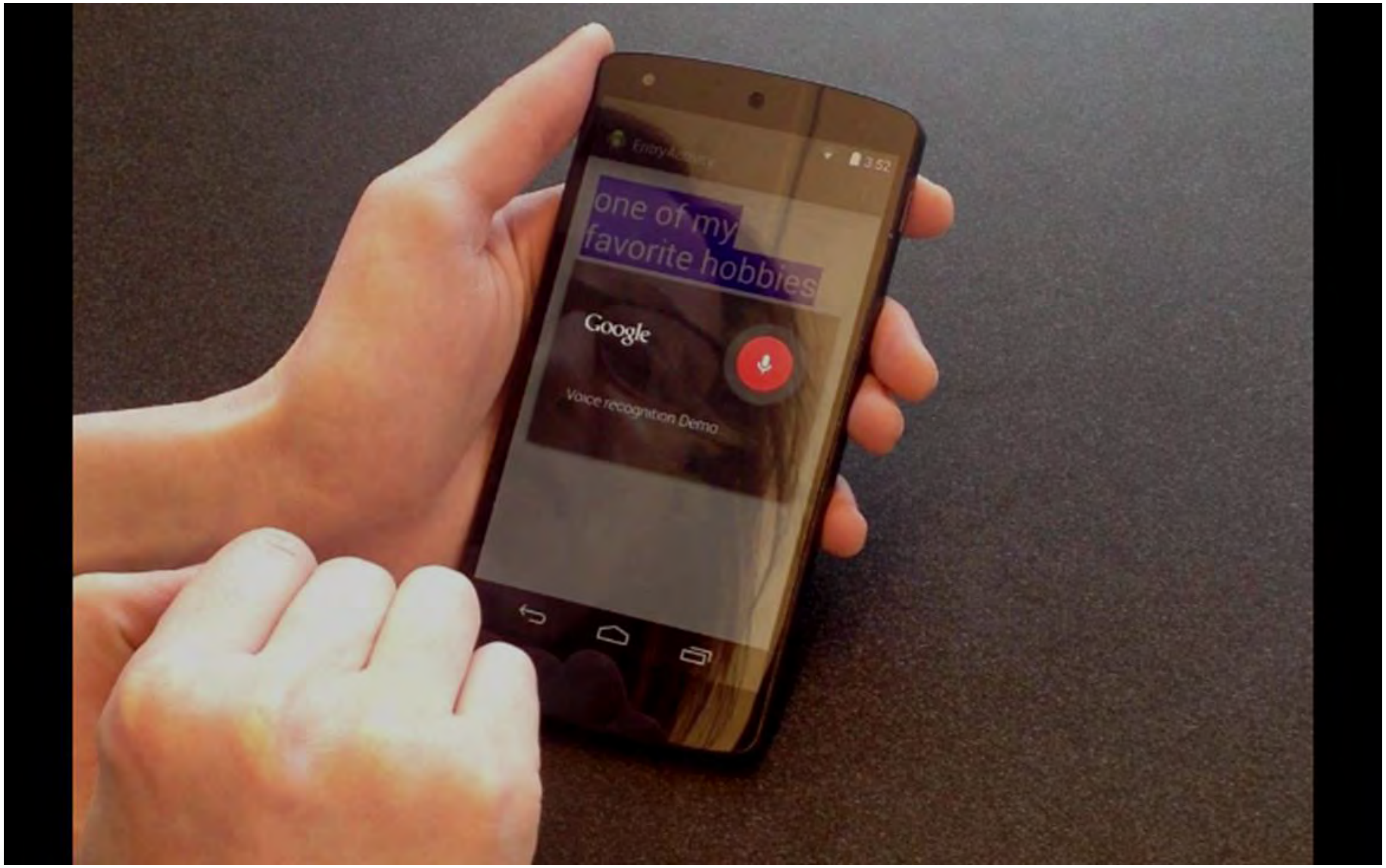
Reviews and Edits

80% of composition time in review and edits



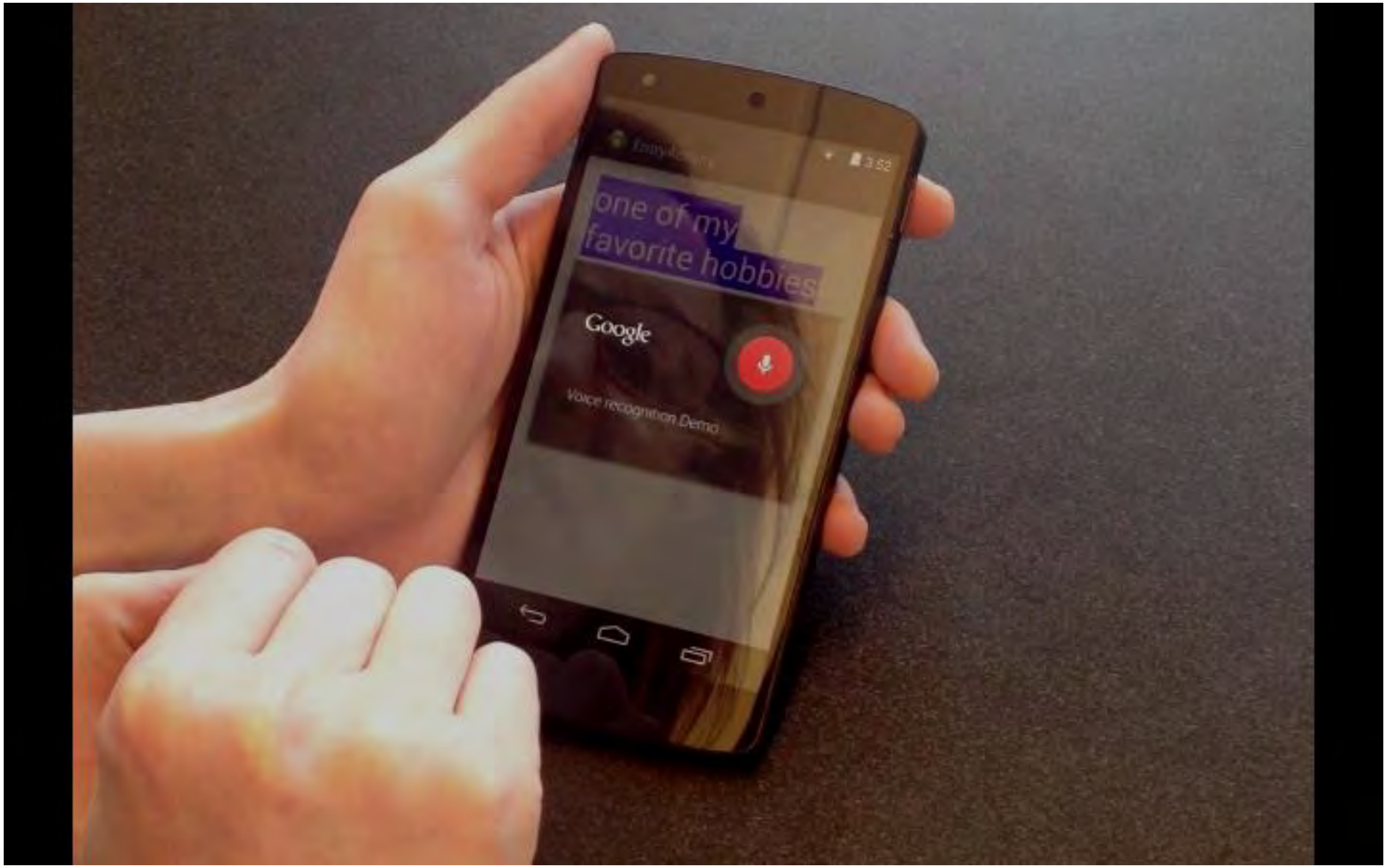
Azenkot et al, ASSETS 2013

Spifi



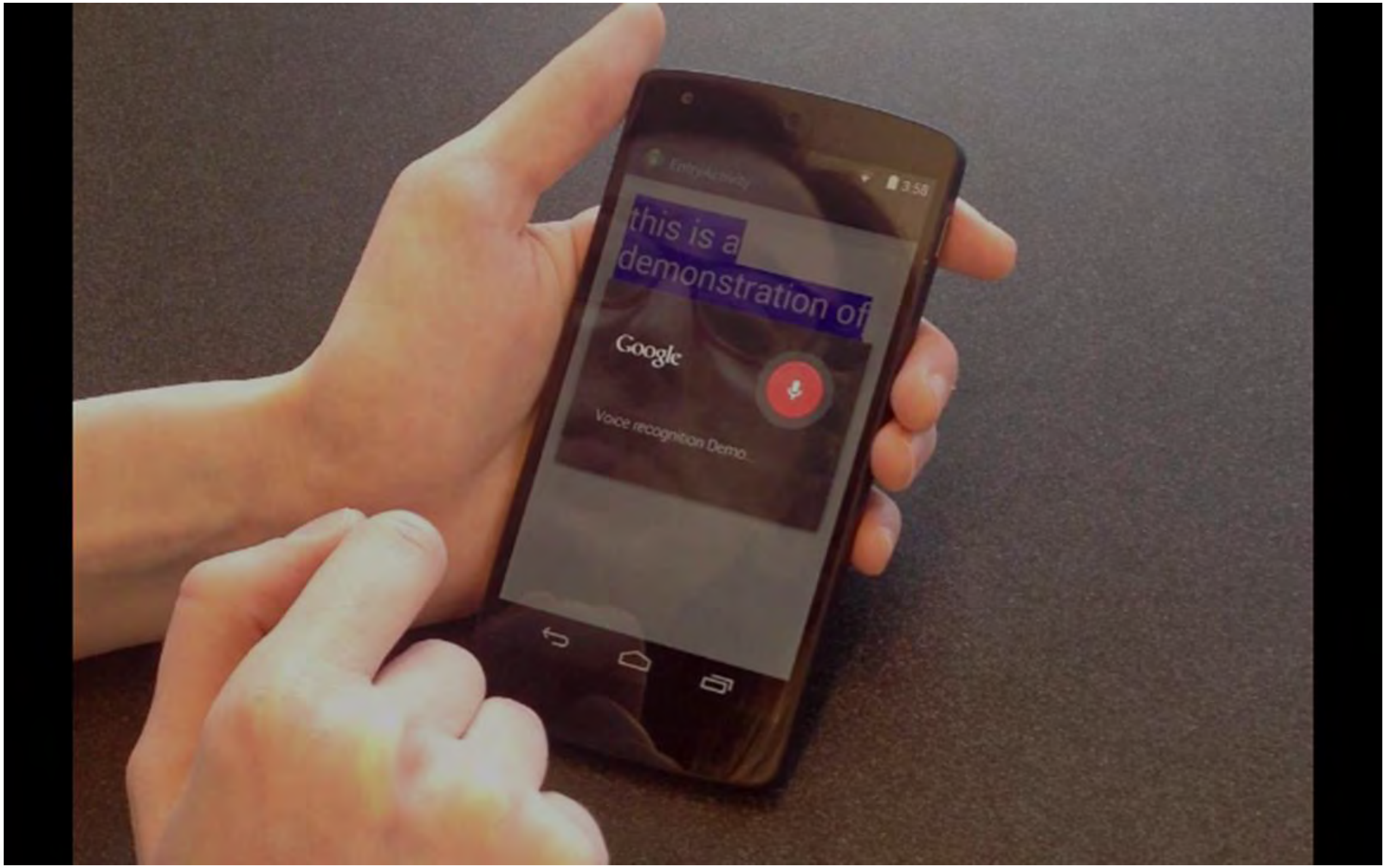
Azenkot et al, ASSETS 2013

Spifi



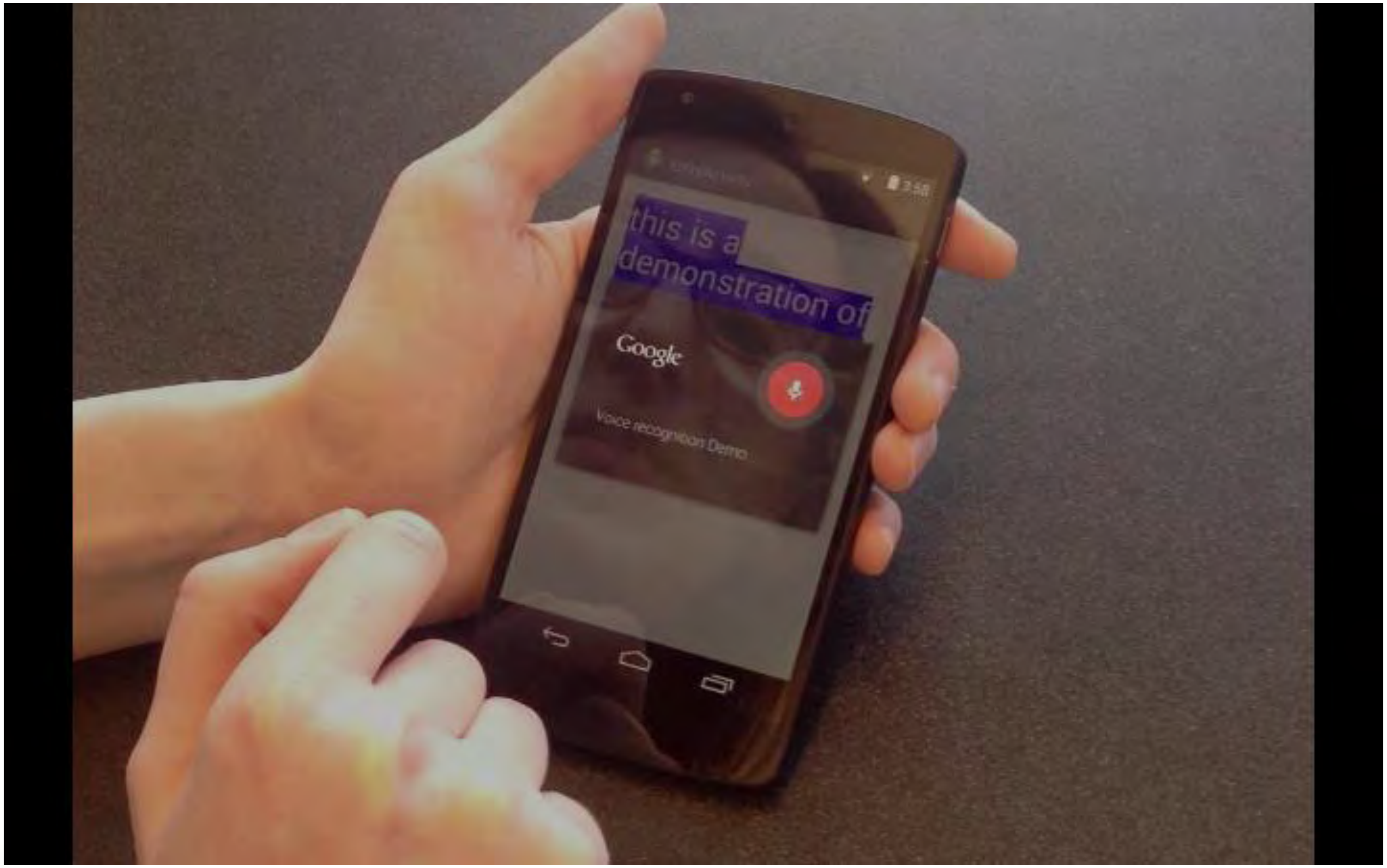
Azenkot et al, ASSETS 2013

Spifi



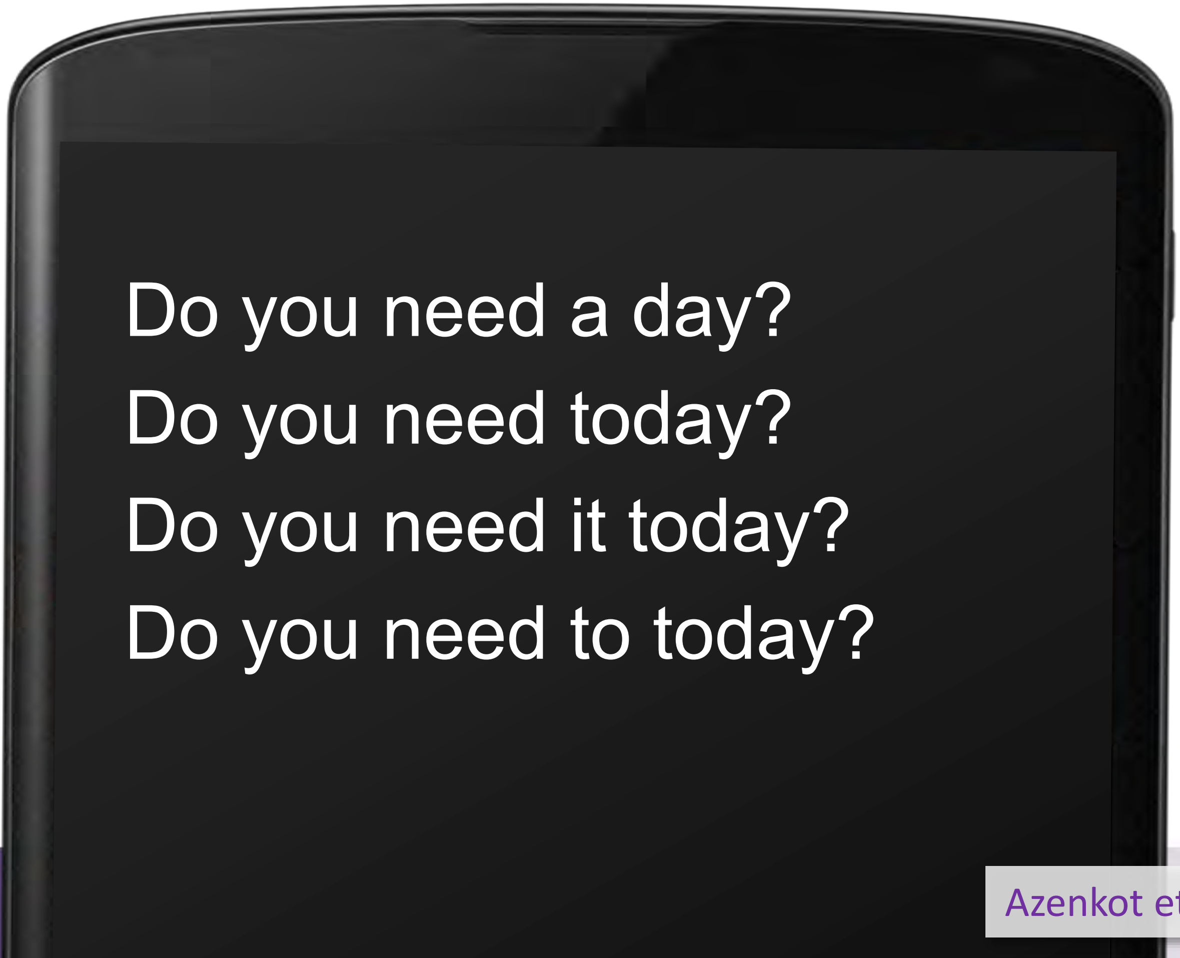
Azenkot et al, ASSETS 2013

Spifi



Azenkot et al, ASSETS 2013

Recognize Speech as N-best List



Do you need a day?

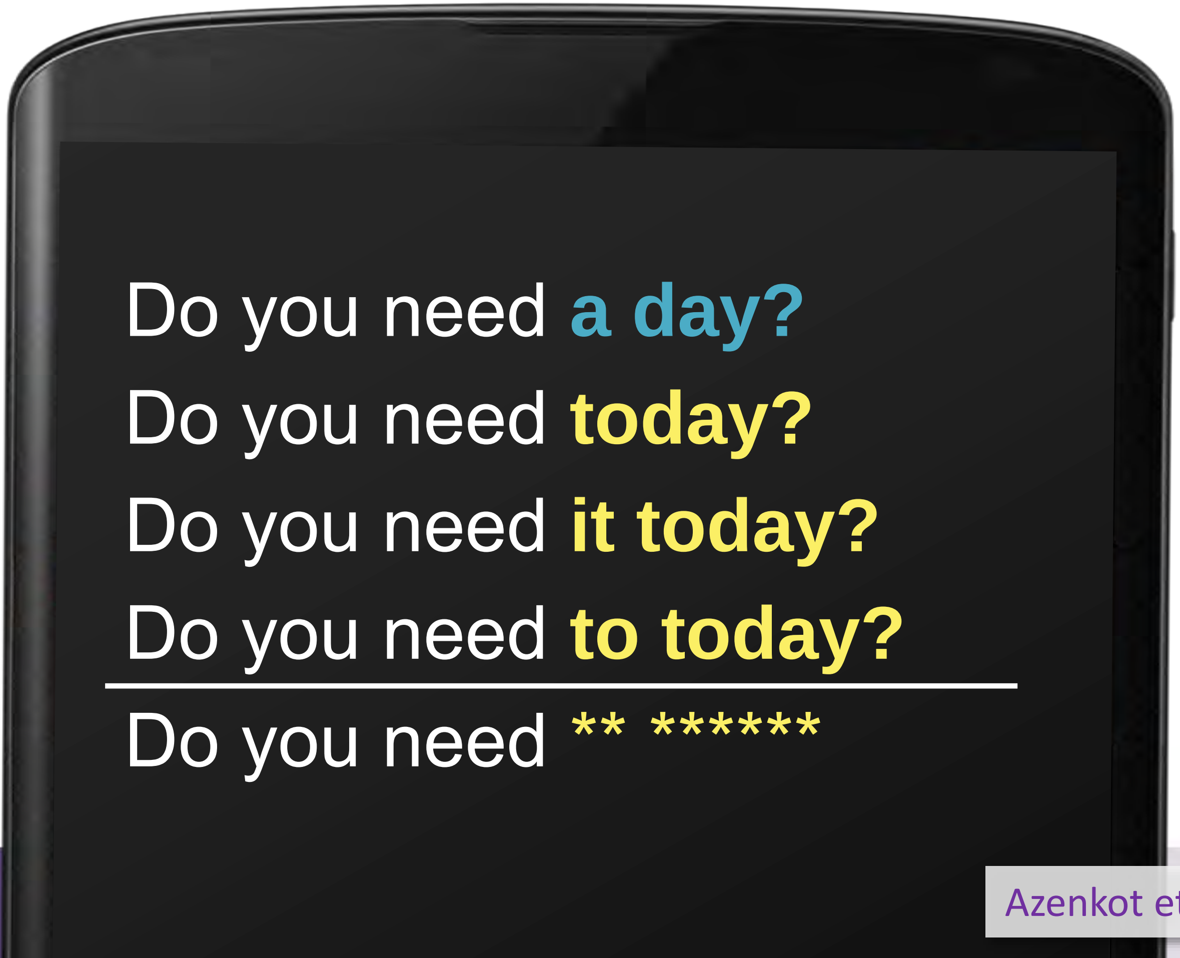
Do you need today?

Do you need it today?

Do you need to today?

Azenkot et al, ASSETS 2013

Find Uncertain Words



Do you need a day?

Do you need today?

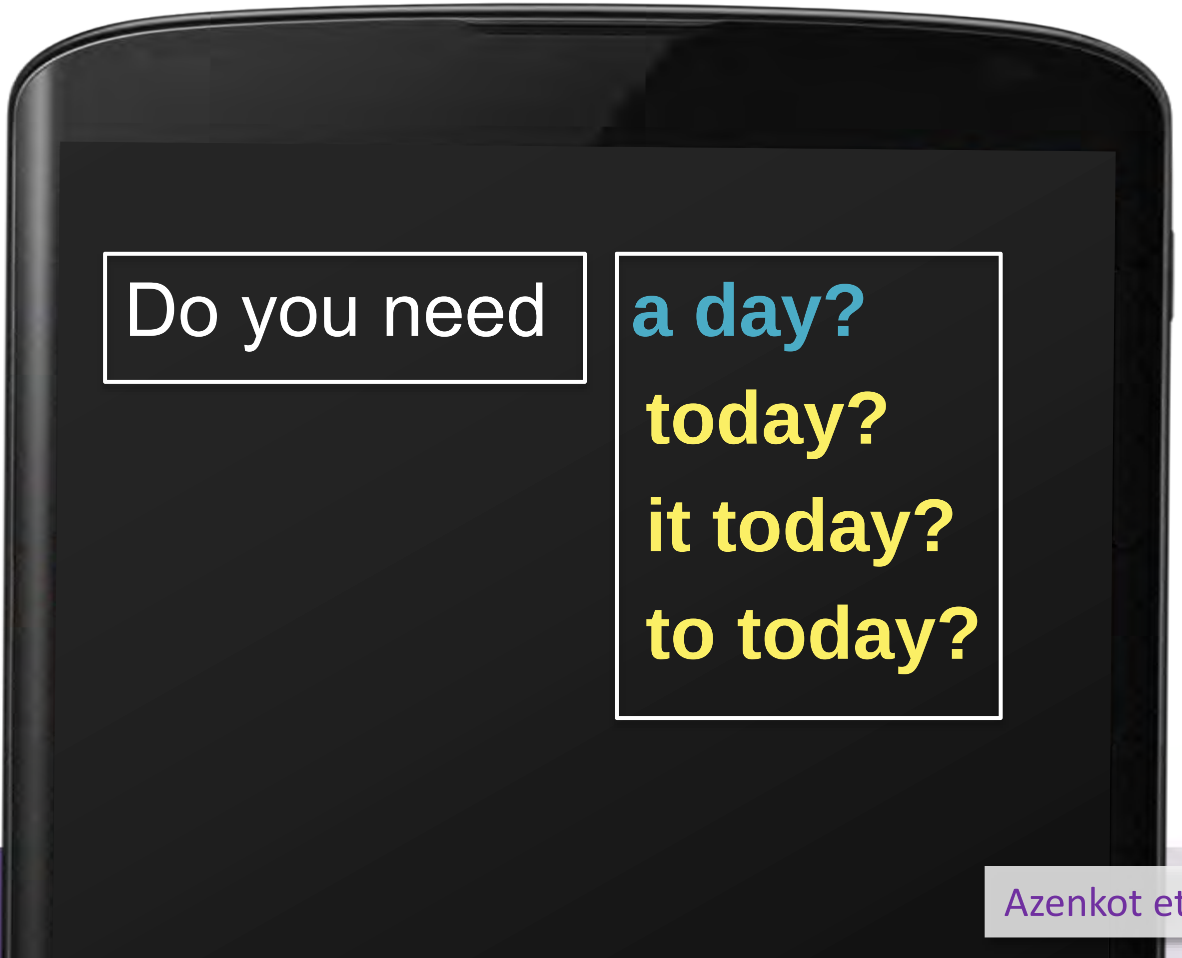
Do you need it today?

Do you need to today?

Do you need ** ******

Azenkot et al, ASSETS 2013

Split Into Phrases and Align Alternatives



Do you need

a day?
today?
it today?
to today?

Azenkot et al, ASSETS 2013

Accessibility is More than Text Entry

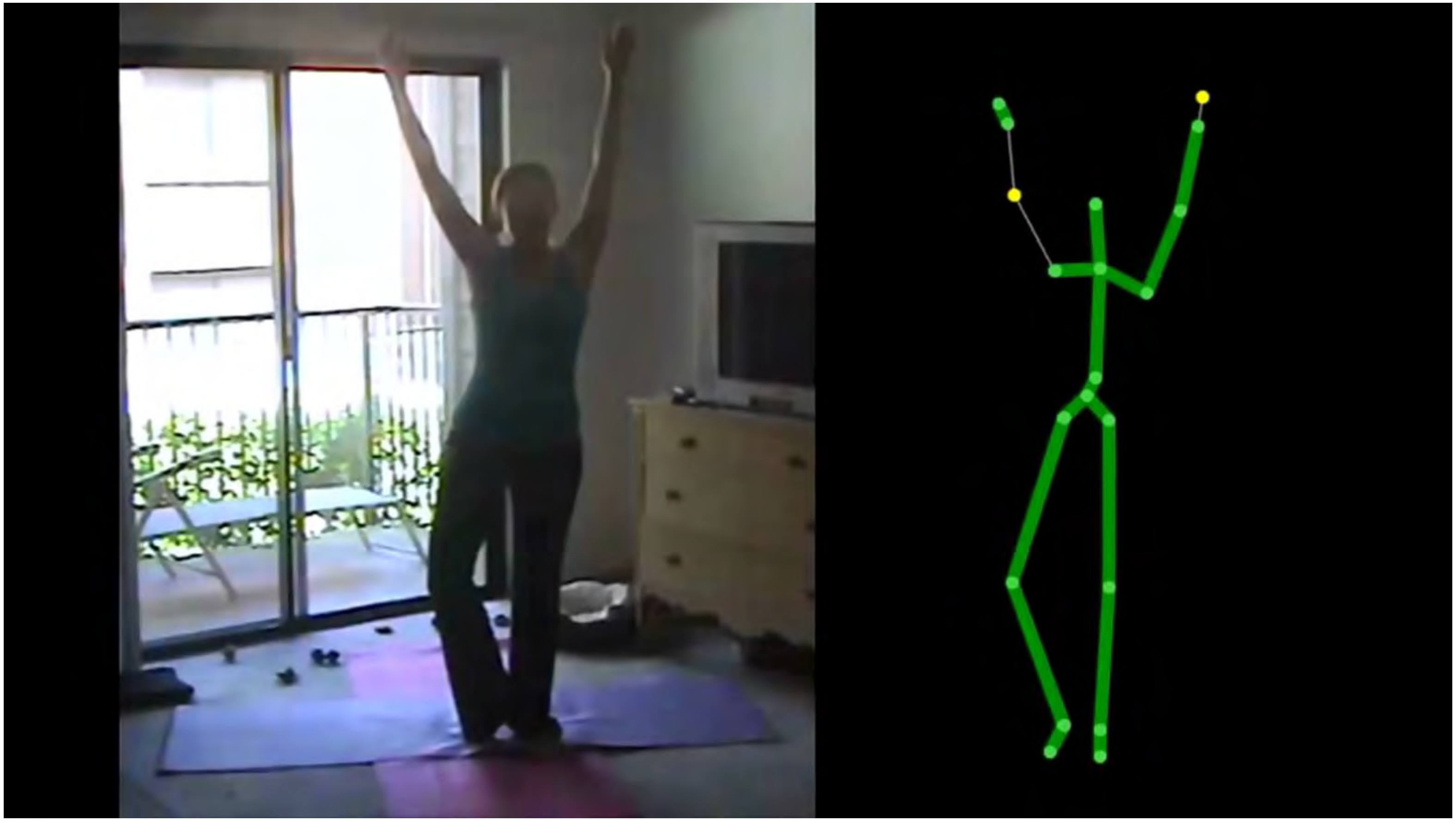
“Sometimes you don’t follow along as well unless [you are] one on one.”

Eyes-Free Yoga, Rector et al, ASSETS 2013

Accessibility is More than Text Entry

Eyes-Free Yoga, Rector et al, ASSETS 2013

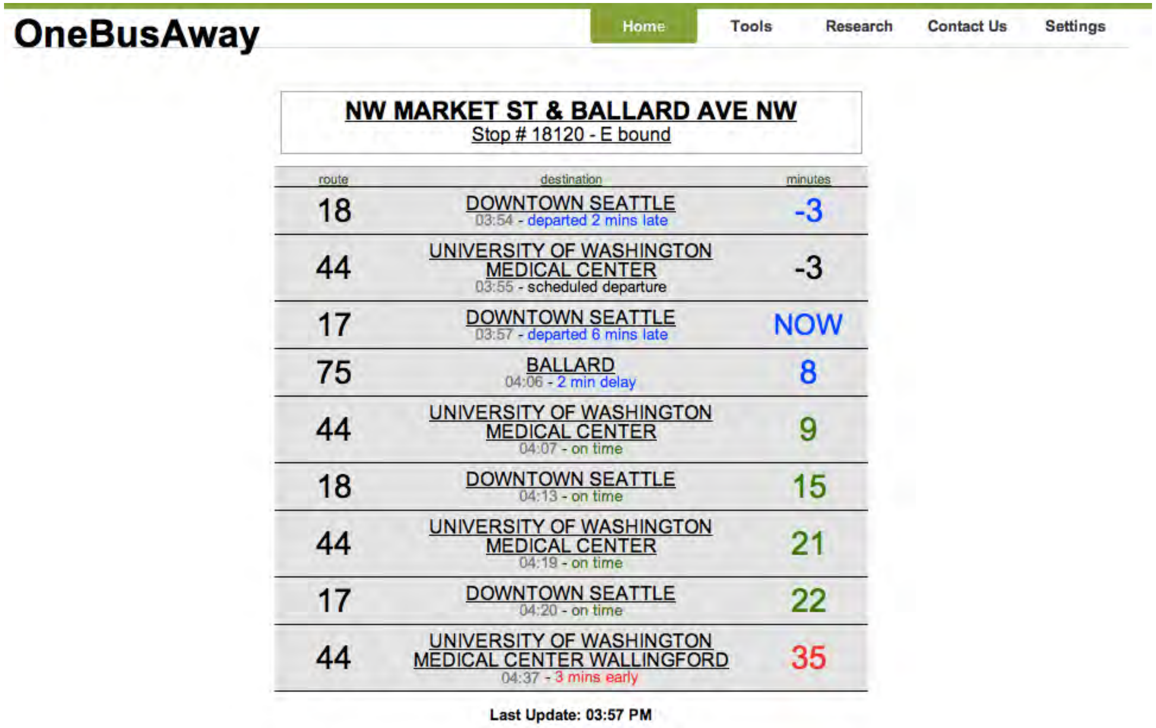
Accessibility is More than Text Entry



Eyes-Free Yoga, Rector et al, ASSETS 2013

Accessibility is More than Text Entry

STEVENS WAY & BENTON LN
S bound - Routes: 25, 31, 32, 65, 67, 68, 75,...



NW MARKET ST & BALLARD AVE NW
Stop # 18120 - E bound

route	destination	minutes
18	DOWNTOWN SEATTLE 03:54 - departed 2 mins late	-3
44	UNIVERSITY OF WASHINGTON MEDICAL CENTER 03:55 - scheduled departure	-3
17	DOWNTOWN SEATTLE 03:57 - departed 6 mins late	NOW
75	BALLARD 04:06 - 2 min delay	8
44	UNIVERSITY OF WASHINGTON MEDICAL CENTER 04:07 - on time	9
18	DOWNTOWN SEATTLE 04:13 - on time	15
44	UNIVERSITY OF WASHINGTON MEDICAL CENTER 04:19 - on time	21
17	DOWNTOWN SEATTLE 04:20 - on time	22
44	UNIVERSITY OF WASHINGTON MEDICAL CENTER WALLINGFORD 04:37 - 3 mins early	35

Last Update: 03:57 PM

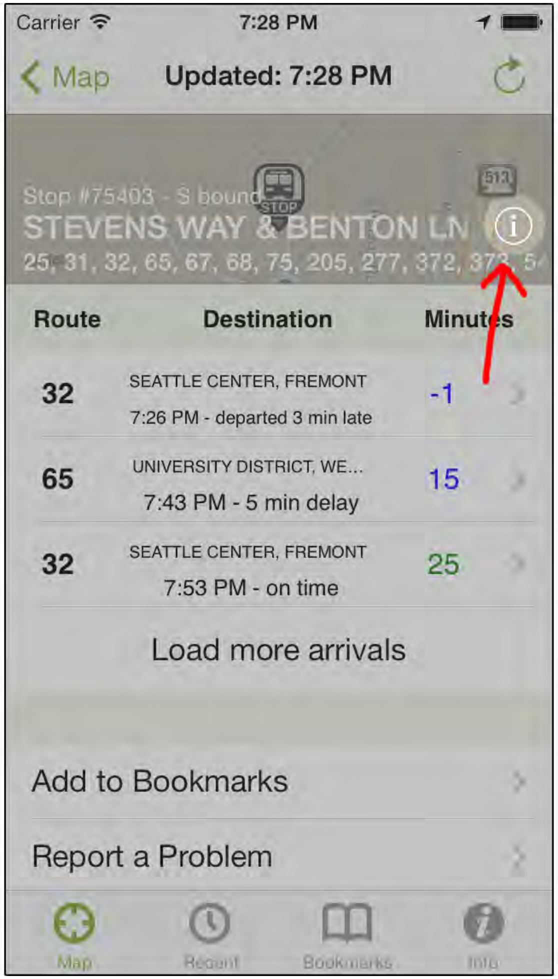
Ferris et al, 2010

Accessibility is More than Text Entry

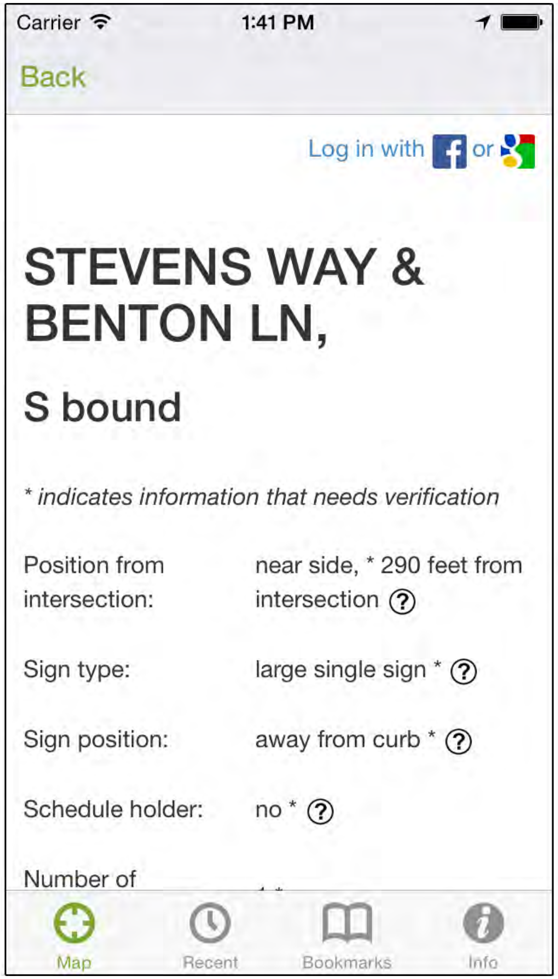
How do you find a bus stop?

Azenkot et al, CHI 2011

Accessibility is More than Text Entry



Route	Destination	Minutes
32	SEATTLE CENTER, FREMONT 7:26 PM - departed 3 min late	-1
65	UNIVERSITY DISTRICT, WE... 7:43 PM - 5 min delay	15
32	SEATTLE CENTER, FREMONT 7:53 PM - on time	25



STEVENS WAY & BENTON LN,

S bound

* indicates information that needs verification

Position from intersection:	near side, * 290 feet from intersection ?
Sign type:	large single sign * ?
Sign position:	away from curb * ?
Schedule holder:	no * ?
Number of	

StopInfo, Campbell et al, ASSETS 2014

What is Disability?

Old model is medical, focused on the individual with a mindset of “fixing” an impairment

Current model understands disability is imposed by society and design not accounting for diversity

> “Disability is thus not just a health problem.
>
> …the interaction between features of
> a person’s body and features of the society in which he or she lives.
>
> Overcoming the difficulties…requires interventions to remove environmental and social barriers.”

What is Disability?

Impairment

a problem in body function or structure

Activity Limitation

a difficulty encountered by a person
in executing a task or action

Participation Restriction

a problem experienced by a person
in involvement in life situations

A Basic Tenet of Design

You are not designing for yourself

You need to understand the context of your design and the people who will use it

We need diversity in who is doing design

- As a field, our work suffers because of this failing

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 14:
Designing for Diverse Needs

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

dub
design:
use:
build:

University of Washington

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 15:
Interface Implementation

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

design:
use:
build:

University of Washington

Tools and Interfaces

Why Interface Tools?

Case Study of Model-View-Controller

Case Study of Animation

Sapir-Whorf Hypothesis

Thoughtfulness in Tools

Sequential Programs

Program takes control, prompts for input

Person waits
on the program

Program says when
it is ready for more
input, which the
person then provides

```
C:\>dir
 Volume in drive C has no label.
 Volume Serial Number is ACE2-D367

 Directory of C:\

09/25/2006  01:08 PM                24 autoexec.bat
09/25/2006  01:08 PM                10 config.sys
10/13/2006  01:43 PM    <DIR>          DELL
01/05/2002  02:38 AM            54,784 msvci70.dll
10/17/2006  01:41 AM    <DIR>          Perl
10/29/2006  11:41 PM    <DIR>          Program Files
10/13/2006  04:41 PM    <DIR>          ProgramDataTechSmith
10/13/2006  02:24 PM    <DIR>          Users
10/21/2006  06:04 PM    <DIR>          Windows
10/13/2006  05:58 PM    <DIR>          Windows.old
10/13/2006  03:40 PM               146 YServer.txt
               4 File(s)         54,964 bytes
               7 Dir(s)  24,839,090,176 bytes free

C:\>ls -l
ls: reading directory .: Permission denied
total 472
drw-rw-rw-   5 Ajit 0   4096 2006-10-13 15:24 $Recycle.Bin
-rwxrwxrwx   1 Ajit 0     24 2006-09-25 14:08 autoexec.bat
drw-rw-rw-  26 Ajit 0   4096 2006-10-13 19:07 Boot
-rw-rw-rw-   1 Ajit 0    353 2006-10-13 14:57 Boot.BAK
-r--r--r--   1 Ajit 0    353 2006-10-13 19:07 Boot.ini.saved
-r--r--r--   1 Ajit 0 438328 2006-10-04 03:02 bootmgr
-r--r--r--   1 Ajit 0   8192 2006-10-13 19:07 BOOTSECT.BAK
drw-rw-rw-   2 Ajit 0      0 2006-10-24 23:34 Config.Msi
-rw-rw-rw-   2 Ajit 0     10 2006-09-25 14:08 config.sys
drw-rw-rw-   3 Ajit 0   4096 2006-10-13 14:43 DELL
dr--r--r--   2 Ajit 0   4096 2006-10-13 15:24 Documents and Settings

C:\>
```

Sequential Programs

```
while true {
      print “Prompt for Input”
      input = read_line_of_text()
      output = do_work()
      print output
}
```

Person is literally modeled as a file

Event-Driven Programming

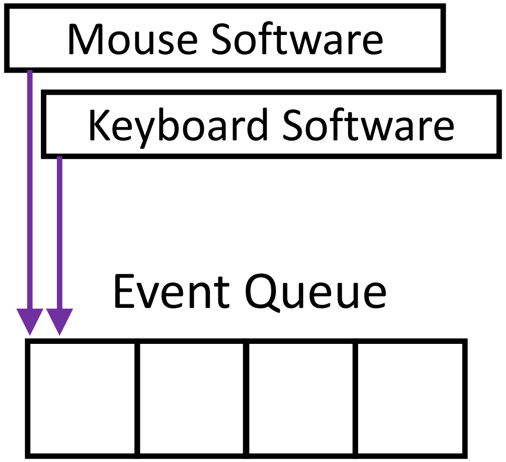
A program waits for a person to provide input

All communication done via events

- “mouse down”, “item drag”, “key up”

All events go to a queue

- Ensures events handled in order
- Hides specifics from applications



Basic Interactive Software Loop

```
do {
      e = read_event();              }  input
      dispatch_event(e);             }  processing
      if (damage_exists())
                                     }  output
            update_display();
} while (e.type != WM_QUIT);
```

Nearly all interactive software has this somewhere

Basic Interactive Software Loop

Have you ever written this loop?

Basic Interactive Software Loop

Have you ever written this loop?

Contrast with:

> "One of the most complex aspects of Xlib programming is designing the event loop, which must take into account all of the possible events that can occur in a window."

Nye & O'Reilly, X Toolkit Intrinsics Programming Manual, vol. 4, 1990, p. 241.

Understanding Tools

We use tools because they

- Identify common or important practices
- Package those practices in a framework
- Make it easy to follow those practices
- Make it easier to focus on our application

What are the benefits of this?

Understanding Tools

We use tools because they

- Identify common or important practices
- Package those practices in a framework
- Make it easy to follow those practices
- Make it easier to focus on our application

What are the benefits of this?

- Being faster allows more iterative design
- Implementation is generally better in the tool
- Consistency across applications using same tool

Understanding Tools

Why is designing tools difficult?

- Need to understand the core practices and problems
- Those are often evolving with technology and design

Example: Responsiveness in event-driven interface

- Event-driven interaction is asynchronous

- How to maintain responsiveness in the interface while executing some large computation?

Understanding Tools

Why is designing tools difficult?

- Need to understand the core practices and problems
- Those are often evolving with technology and design

Example: Responsiveness in event-driven interface

- Cursor:
  - WaitCursor vs. CWaitCursor vs. In Framework
- Progress Bar:
  - Data Races vs. Idle vs. Loop vs. Worker Objects

Tools Terminology

Myers et al, 2000
http://dx.doi.org/10.1145/344949.344959

- Threshold vs. Ceiling
  - Threshold: How hard to get started
  - Ceiling: How much can be achieved
  - These depend on what is being implemented
- Path of Least Resistance
  - Tools influence what interfaces are created
- Moving Targets
  - Changing needs make tools incomplete or obsolete

Tools and Interfaces

Why Interface Tools?

Case Study of Model-View-Controller

Case Study of Animation

Sapir-Whorf Hypothesis

Thoughtfulness in Tools

Model-View-Controller

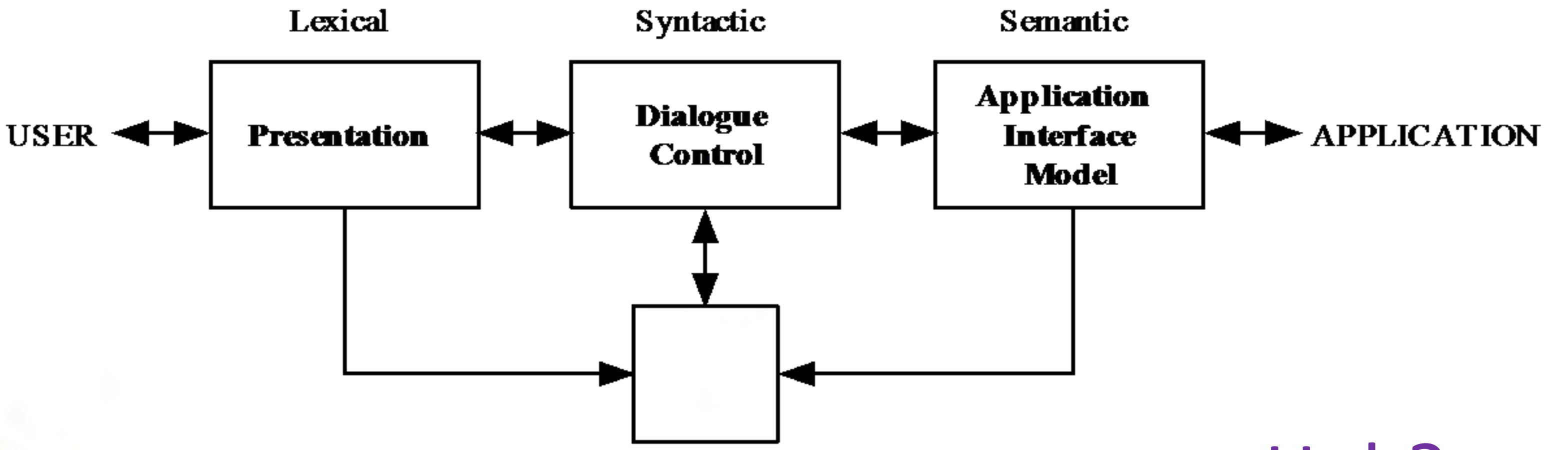
How to organize the code of an interface?

This is a surprisingly complicated question, with many unstated assumptions requiring significant background to understand and resolve

Seeheim Model

Buxton, 1983
http://dx.doi.org/10.1145/988584.988586

Results from 1985 workshop on user interface management systems, driven by goals of portability and modifiability, based in separating the interface from application functionality



Huh?

Seeheim Model

Lexical - Presentation

- External presentation of interface — e.g., “add” vs. “append” vs. “^a” vs. 📋
- Generates the display, receive input — e.g., how to make a “menu” or “button”

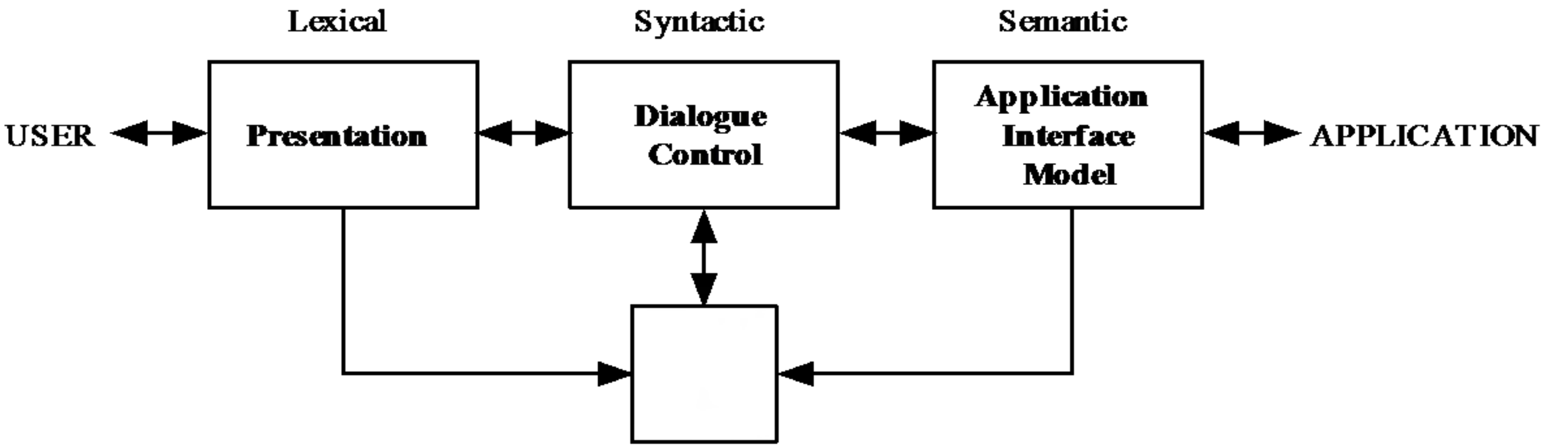
Syntactic - Dialog Control

- Parsing of tokens into syntax — e.g., interface modes
- Maintain state

Semantic - Application Interface Model

- Defines interaction between interface and rest of software — e.g., drag-and-drop target highlighting

Seeheim Model



Lexical

Syntactic

Semantic

USER

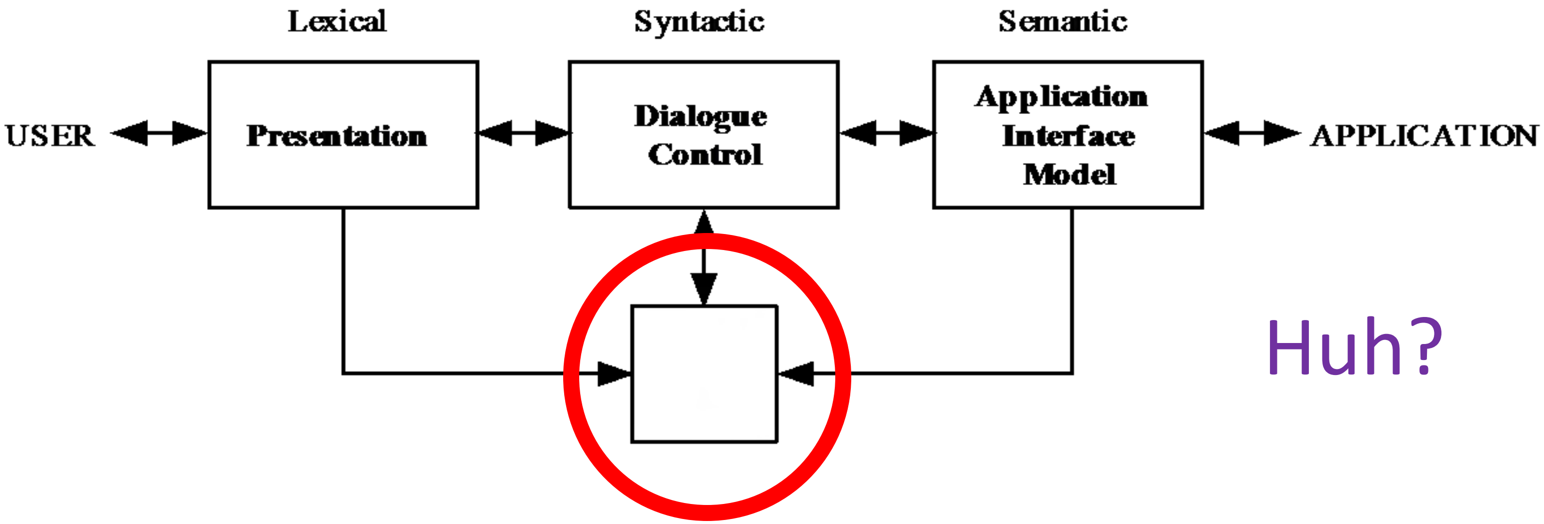
Presentation

Dialogue Control

Application Interface Model

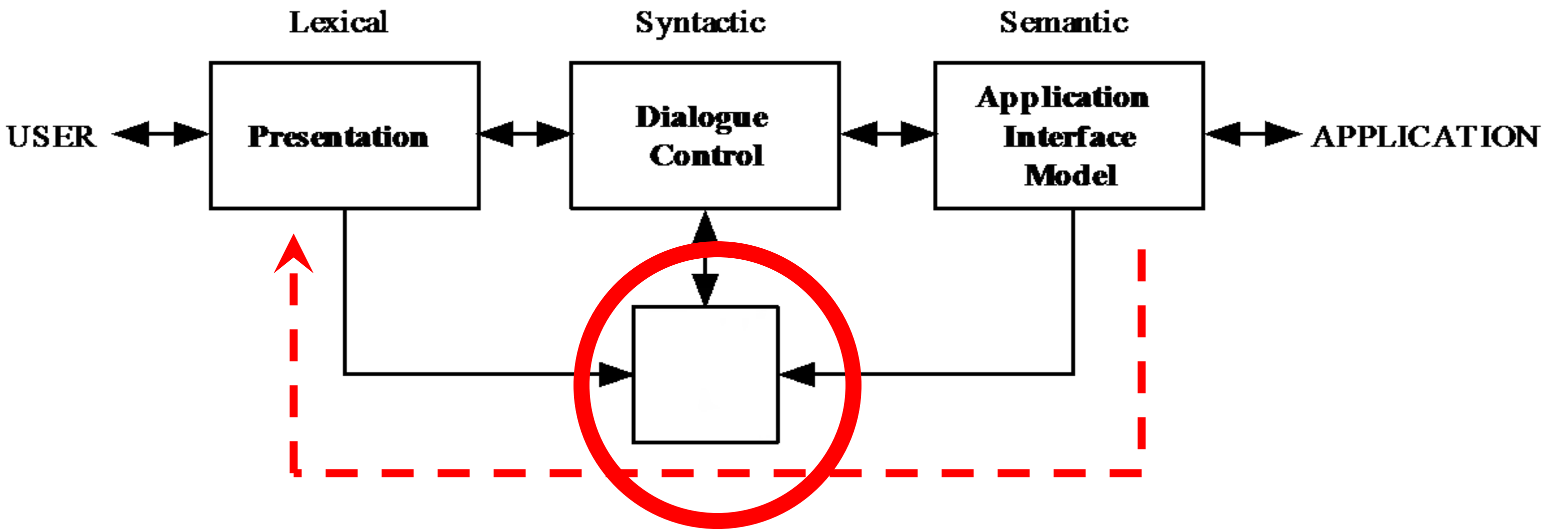
APPLICATION

Seeheim Model



Huh?

Seeheim Model



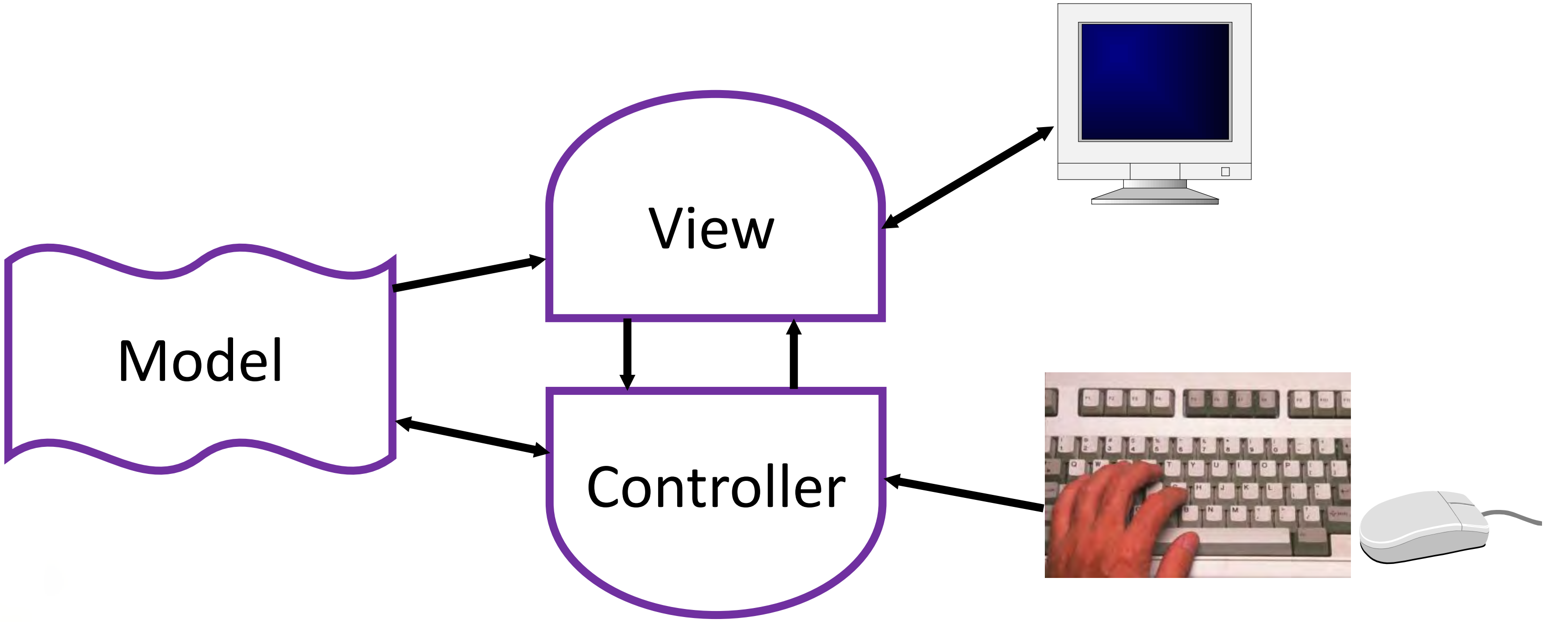
Rapid Semantic Feedback

In practice, all of the code goes in here

Model-View-Controller

Introduced by Smalltalk developers at PARC

Partitions application to be scalable, maintainable



View

Model

Controller

View / Controller Relationship

In theory:

Pattern of behavior in response to input events (i.e., concerns of the controller) are independent of visual geometry (i.e., concerns of the view)

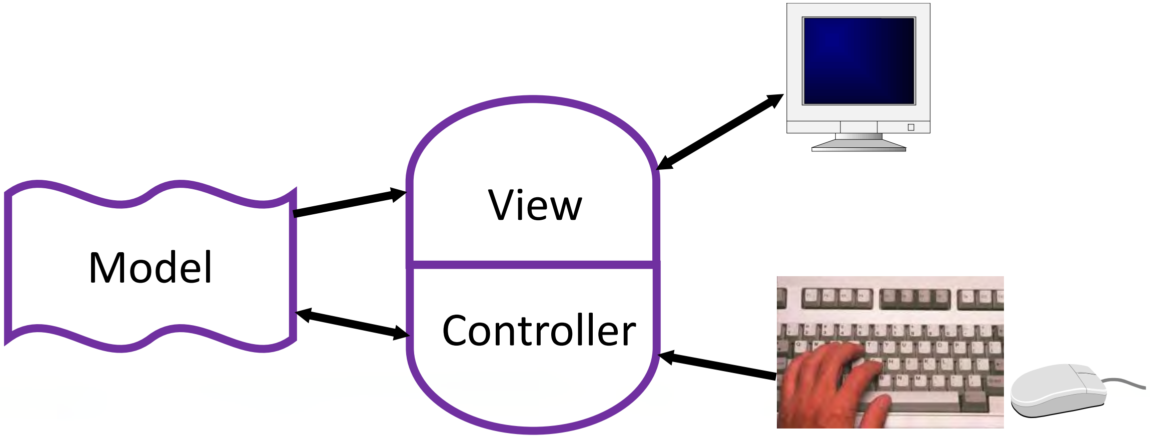
Controller contacts view to interpret what input events mean in context of a view (e.g., selection)

View / Controller Relationship

In practice:

View and controller often tightly intertwined, almost always occur in matched pairs

Many architectures combine into a single class



Model-View-Controller

MVC separates concerns and scales better than global variables or putting everything together

Separation eases maintenance

- Can add new fields to model,
  new views can leverage, old views will still work
- Can replace model without changing views

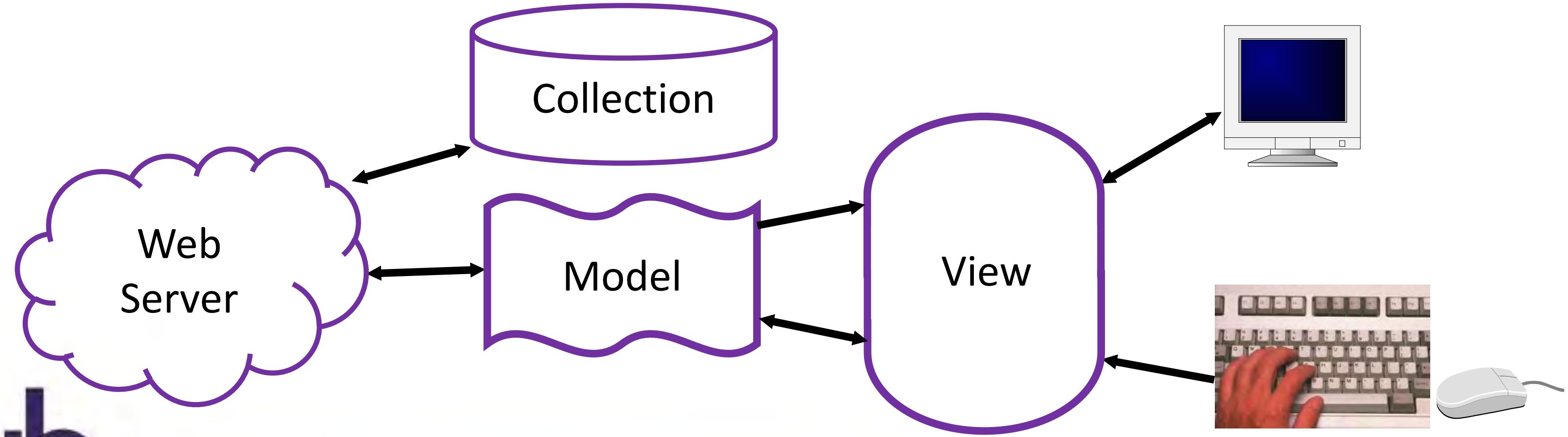
Separation of “business logic” can require care

- May help to think of model as the client model

MVC on the Web

Core ideas manifest differently according to needs

- For example, backbone.js implements client views of models, with REST API calls to web server
- Web tools often implement views as templates



Tools and Interfaces

Why Interface Tools?

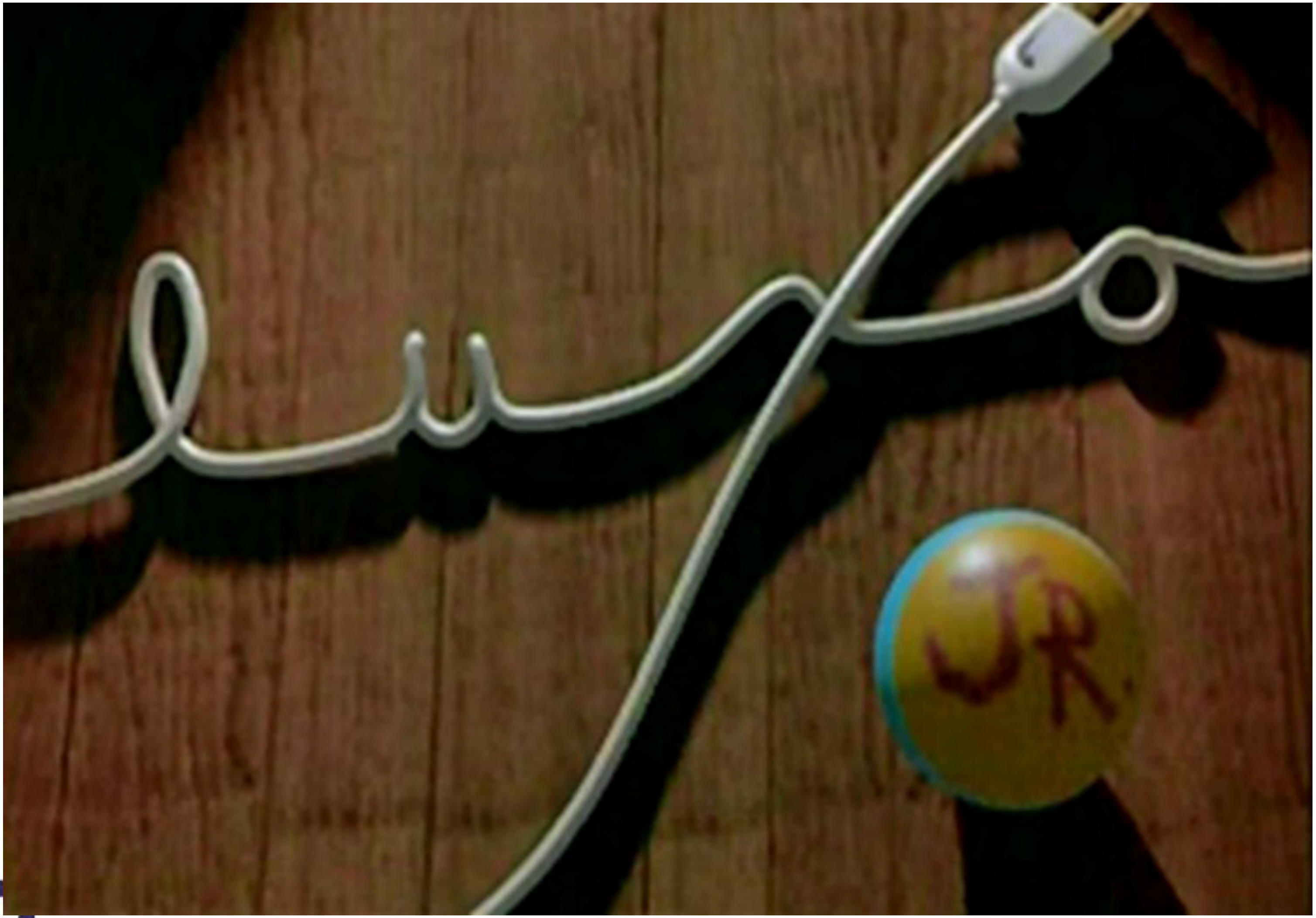
Case Study of Model-View-Controller

Case Study of Animation

Sapir-Whorf Hypothesis

Thoughtfulness in Tools

Luxor Jr.

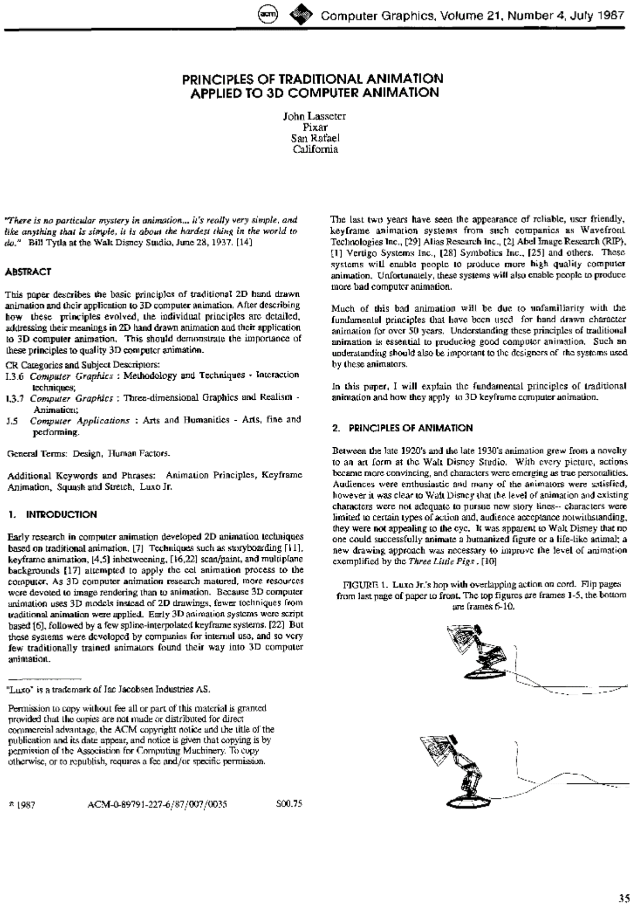


Animation Case Study

Principles of Traditional Animation Applied to 3D Computer Animation

Lasseter, 1987

http://dx.doi.org/10.1145/37402.37407



Computer Graphics, Volume 21, Number 4, July 1987

PRINCIPLES OF TRADITIONAL ANIMATION APPLIED TO 3D COMPUTER ANIMATION

John Lasseter
Pixar
San Rafael
California

"There is no particular mystery in animation... it's really very simple, and like anything that is simple, it is about the hardest thing in the world to do." Bill Tytla at the Walt Disney Studio, June 28, 1937. [14]

ABSTRACT

This paper describes the basic principles of traditional 2D hand drawn animation and their application to 3D computer animation. After describing how these principles evolved, the individual principles are detailed, addressing their meanings in 2D hand drawn animation and their application to 3D computer animation. This should demonstrate the importance of these principles to quality 3D computer animation.

CR Categories and Subject Descriptors:
I.3.6 *Computer Graphics* : Methodology and Techniques - Interaction techniques;
I.3.7 *Computer Graphics* : Three-dimensional Graphics and Realism - Animation;
J.5 *Computer Applications* : Arts and Humanities - Arts, fine and performing.

General Terms: Design, Human Factors.

Additional Keywords and Phrases: Animation Principles, Keyframe Animation, Squash and Stretch, Luxo Jr.

1. INTRODUCTION

Early research in computer animation developed 2D animation techniques based on traditional animation. [7] Techniques such as storyboarding [11], keyframe animation, [4,5] inbetweening, [16,22] scan/paint, and multiplane backgrounds [17] attempted to apply the cel animation process to the computer. As 3D computer animation research matured, more resources were devoted to image rendering than to animation. Because 3D computer animation uses 3D models instead of 2D drawings, fewer techniques from traditional animation were applied. Early 3D animation systems were script based [6], followed by a few spline-interpolated keyframe systems. [22] But these systems were developed by companies for internal use, and so very few traditionally trained animators found their way into 3D computer animation.

The last two years have seen the appearance of reliable, user friendly, keyframe animation systems from such companies as Wavefront Technologies Inc., [29] Alias Research inc., [2] Abel Image Research (RIP), [1] Vertigo Systems Inc., [28] Symbolics Inc., [25] and others. These systems will enable people to produce more high quality computer animation. Unfortunately, these systems will also enable people to produce more bad computer animation.

Much of this bad animation will be due to unfamiliarity with the fundamental principles that have been used for hand drawn character animation for over 50 years. Understanding these principles of traditional animation is essential to producing good computer animation. Such an understanding should also be important to the designers of the systems used by these animators.

In this paper, I will explain the fundamental principles of traditional animation and how they apply to 3D keyframe computer animation.

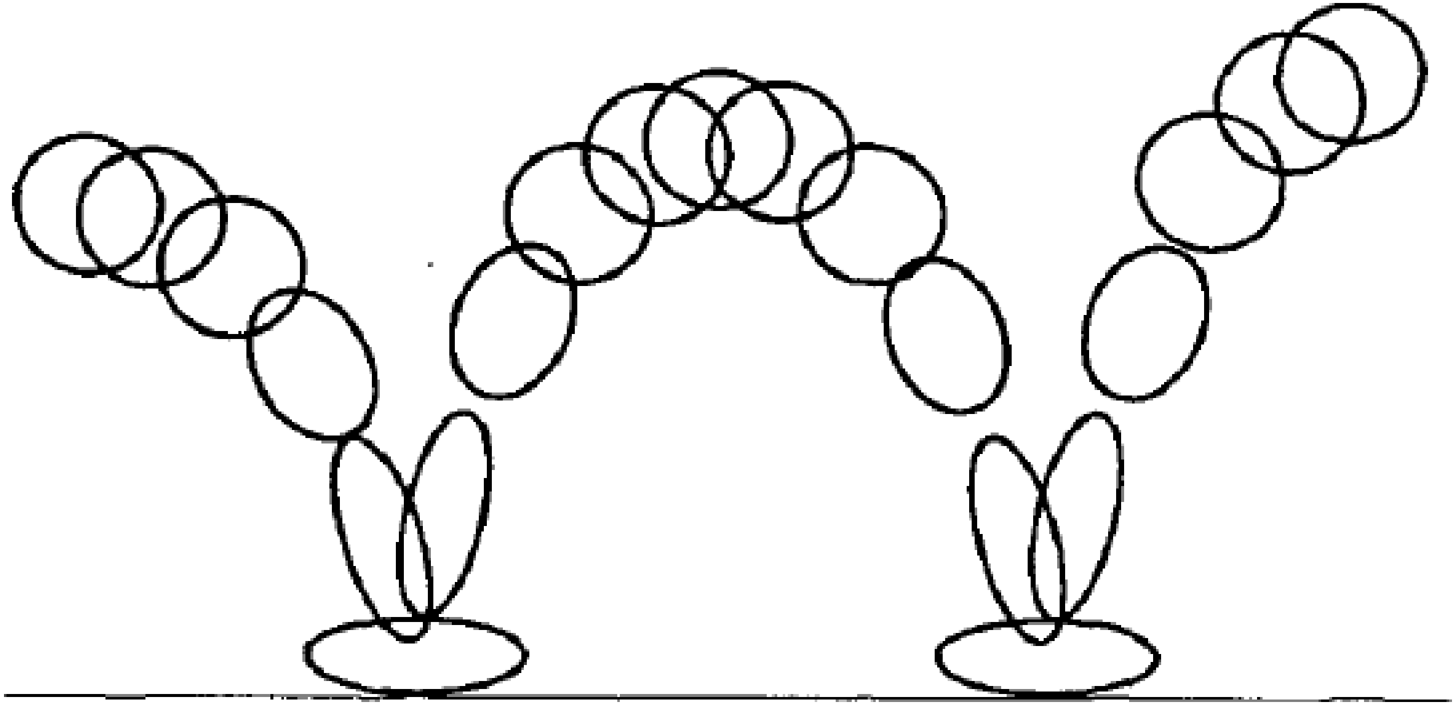
2. PRINCIPLES OF ANIMATION

Between the late 1920's and the late 1930's animation grew from a novelty to an art form at the Walt Disney Studio. With every picture, actions became more convincing, and characters were emerging as true personalities. Audiences were enthusiastic and many of the animators were satisfied, however it was clear to Walt Disney that the level of animation and existing characters were not adequate to pursue new story lines-- characters were limited to certain types of action and, audience acceptance notwithstanding, they were not appealing to the eye. It was apparent to Walt Disney that no one could successfully animate a humanized figure or a life-like animal; a new drawing approach was necessary to improve the level of animation exemplified by the *Three Little Pigs* . [10]

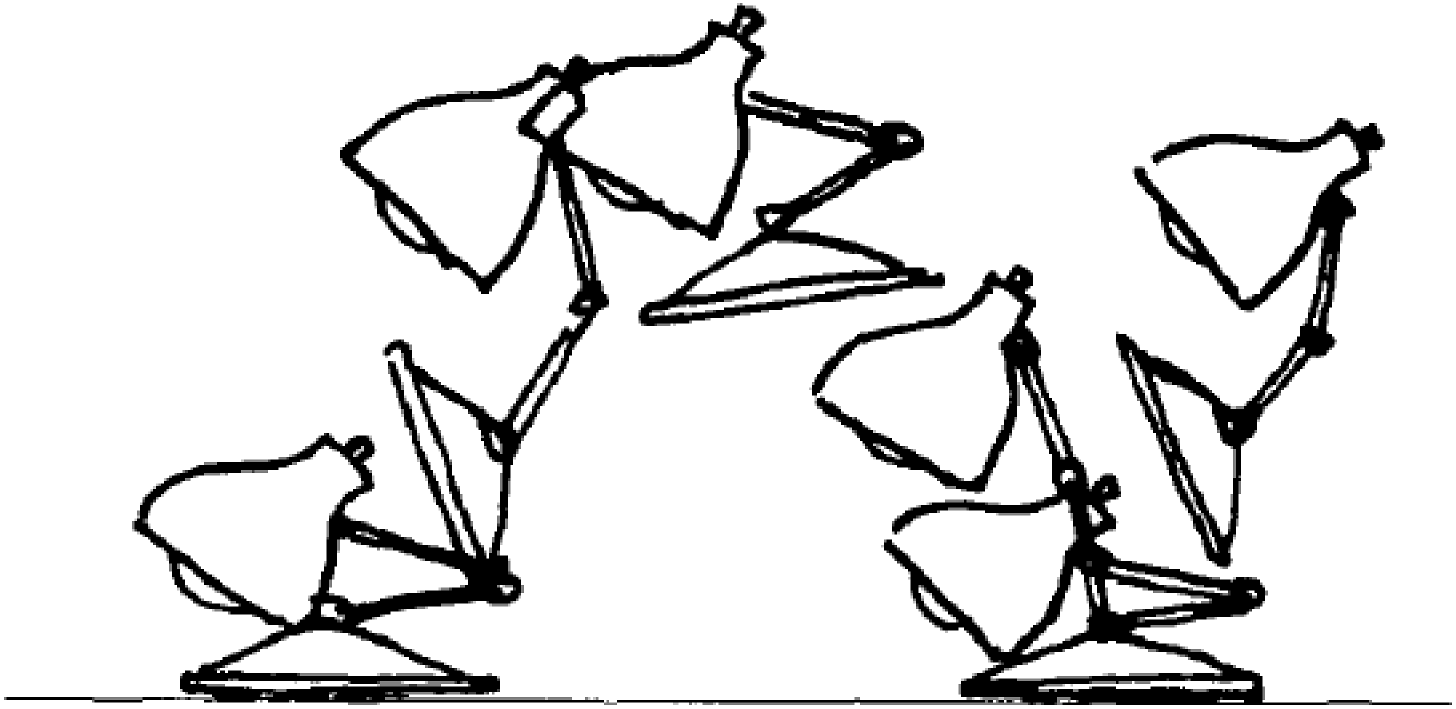
FIGURE 1. Luxo Jr.'s hop with overlapping action on cord. Flip pages from last page of paper to front. The top figures are frames 1-5, the bottom are frames 6-10.

"Luxo" is a trademark of Jac Jacobsen Industries AS.

Squash and Stretch



Squash and Stretch



Squash and Stretch

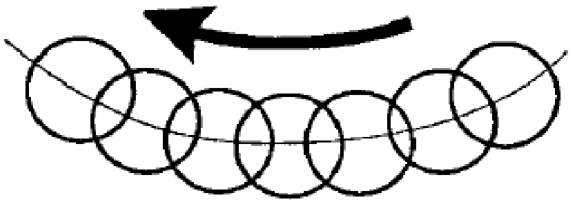


FIGURE 4a. In slow action, an object's position overlaps from frame to frame which gives the action a smooth appearance to the eye.

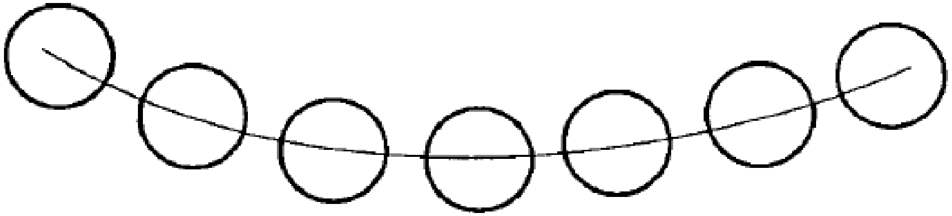


FIGURE 4b. Strobing occurs in a faster action when the object's positions do not overlap and the eye perceives seperate images.

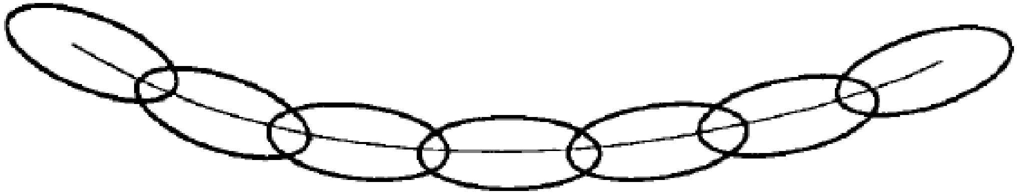
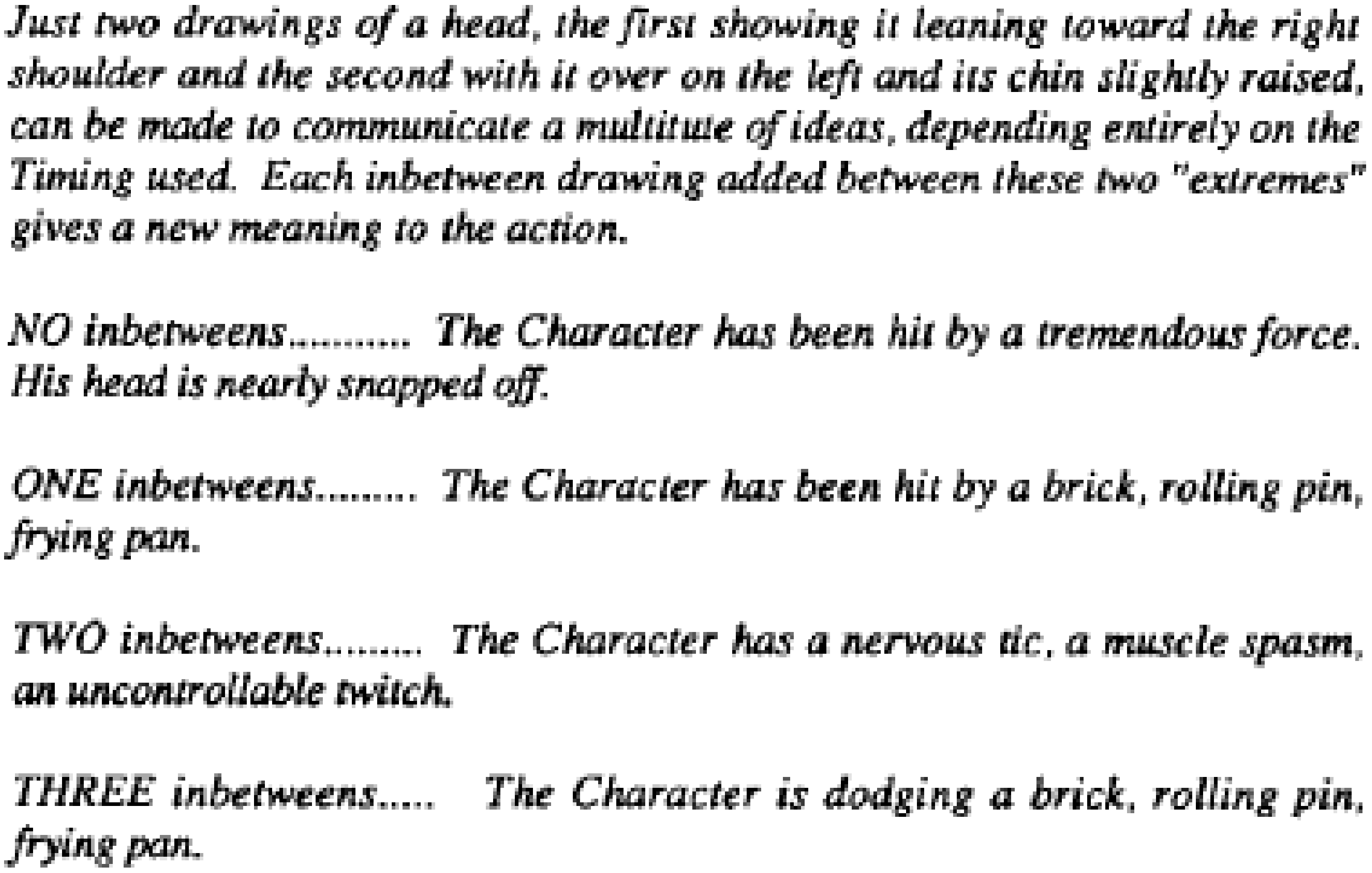


FIGURE 4c. Stretching the object so that it's positions overlap again will relieve the strobing effect.

Timing



Just two drawings of a head, the first showing it leaning toward the right shoulder and the second with it over on the left and its chin slightly raised, can be made to communicate a multitute of ideas, depending entirely on the Timing used. Each inbetween drawing added between these two "extremes" gives a new meaning to the action.

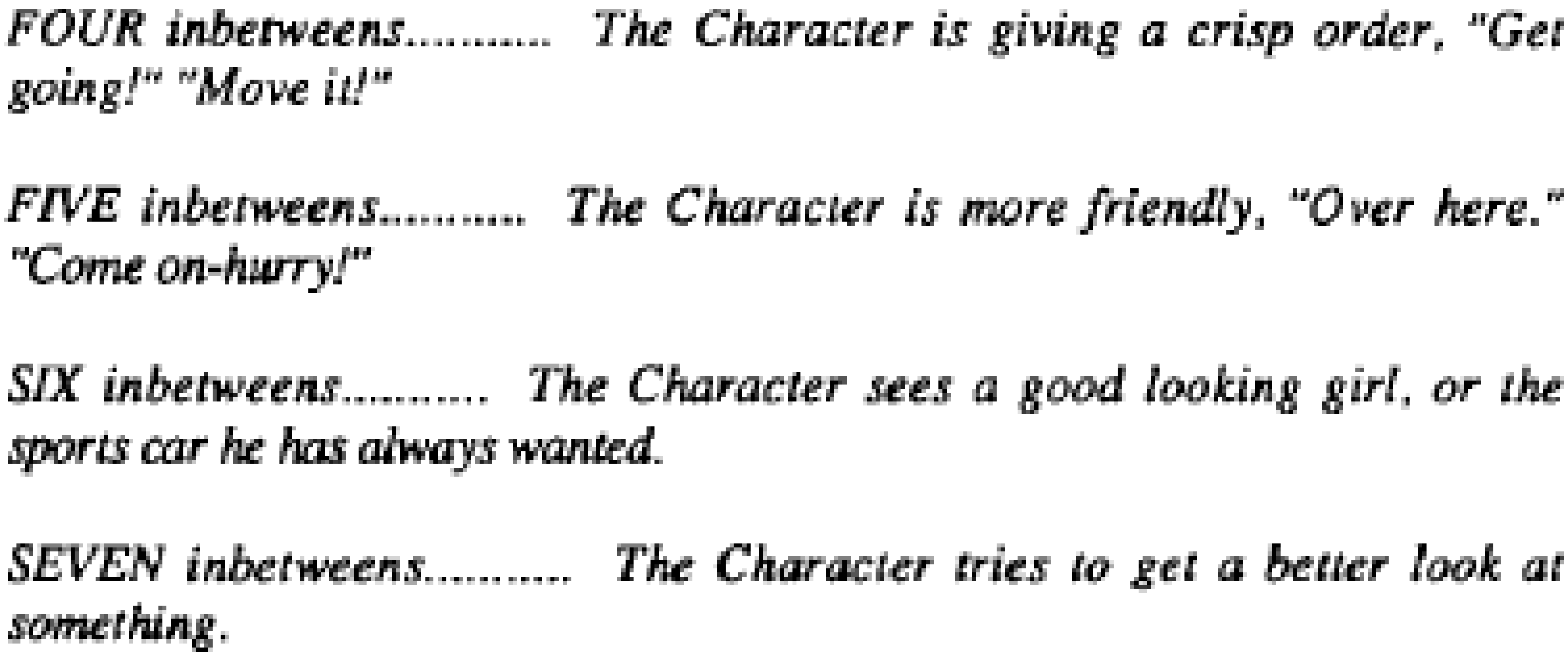
NO inbetweens........... The Character has been hit by a tremendous force. His head is nearly snapped off.

ONE inbetweens......... The Character has been hit by a brick, rolling pin, frying pan.

TWO inbetweens......... The Character has a nervous tic, a muscle spasm, an uncontrollable twitch.

THREE inbetweens..... The Character is dodging a brick, rolling pin, frying pan.

Timing



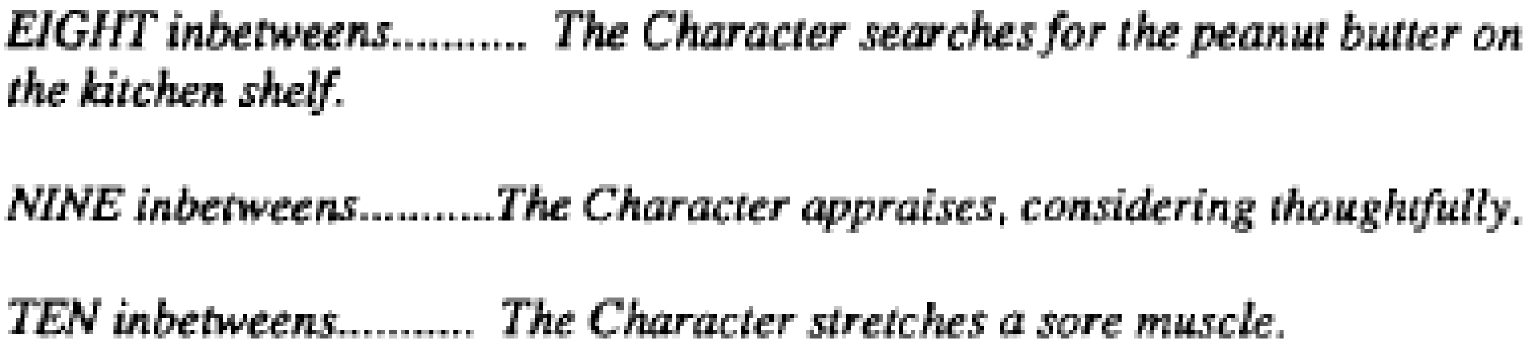
FOUR inbetweens........... The Character is giving a crisp order, "Get going!" "Move it!"

FIVE inbetweens........... The Character is more friendly, "Over here." "Come on-hurry!"

SIX inbetweens........... The Character sees a good looking girl, or the sports car he has always wanted.

SEVEN inbetweens........... The Character tries to get a better look at something.

Timing

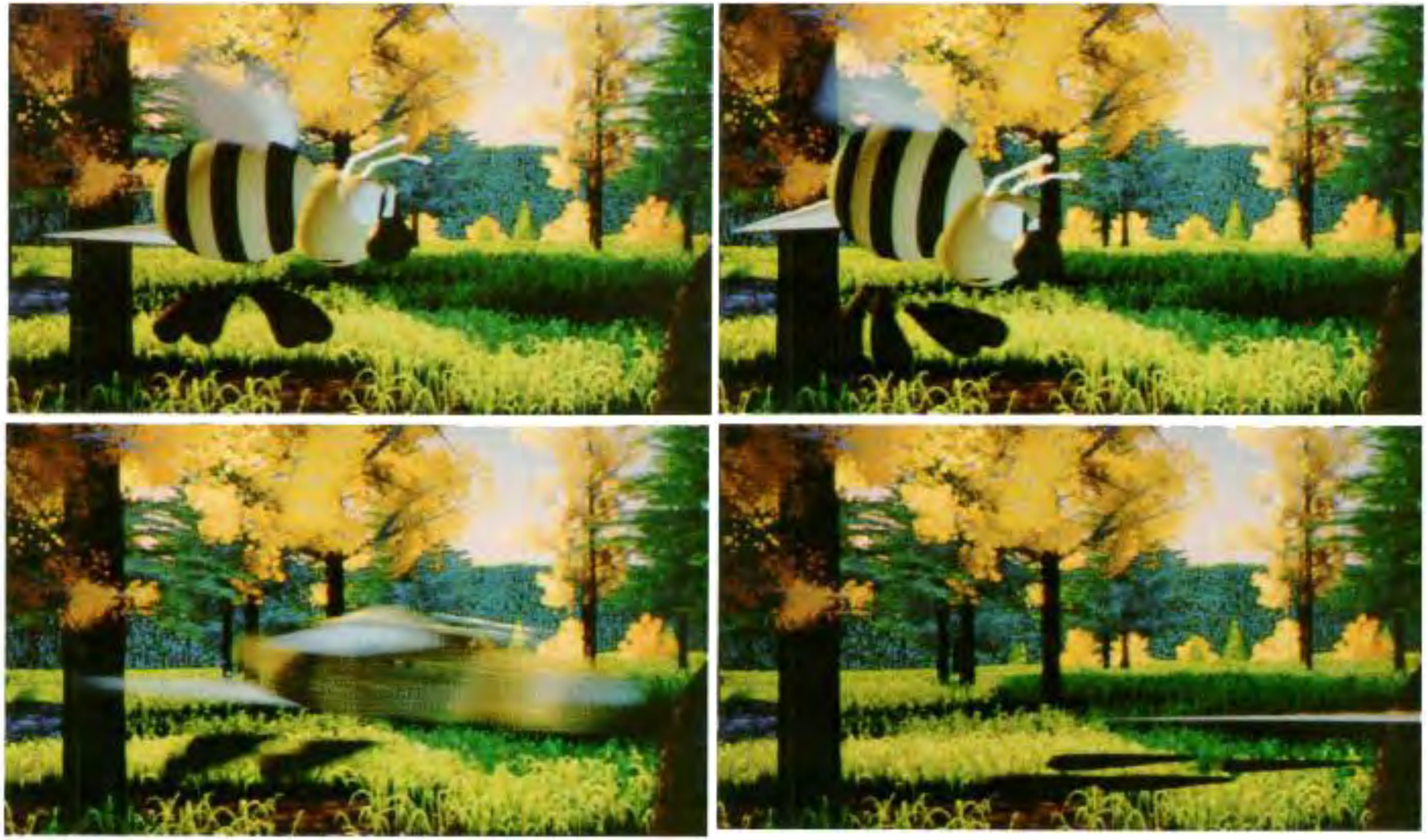


EIGHT inbetweens........... The Character searches for the peanut butter on the kitchen shelf.

NINE inbetweens...........The Character appraises, considering thoughtfully.

TEN inbetweens........... The Character stretches a sore muscle.

Anticipation



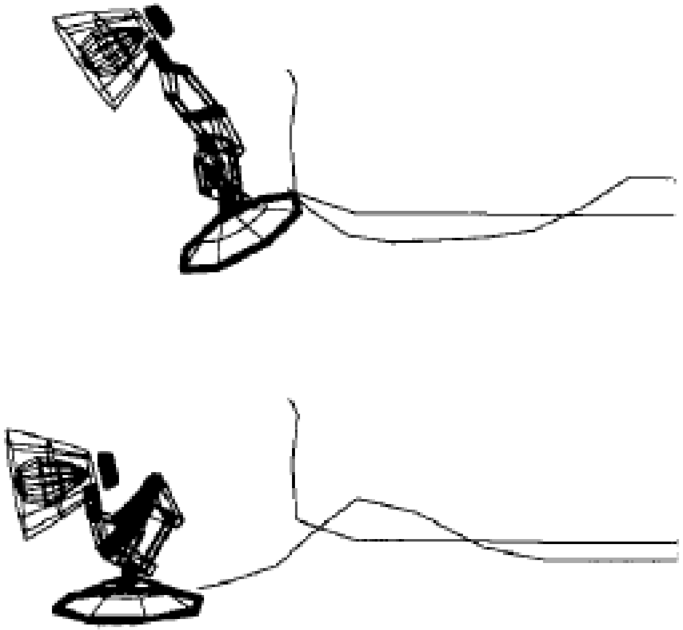
Staging

FIGURE 6. Andre's scratch was staged to the side (in "silhouette") for clarity and because that is where his itch was.

Staging

FIGURES 7-8. In *Luxo Jr.*, all action was staged to the side for clarity.

Follow Through, Overlap, Secondary



Pose-to-Pose, Slow In, Slow Out

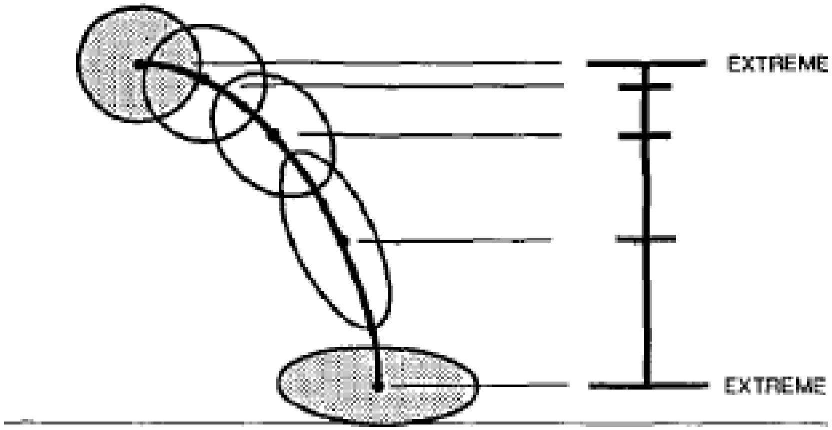
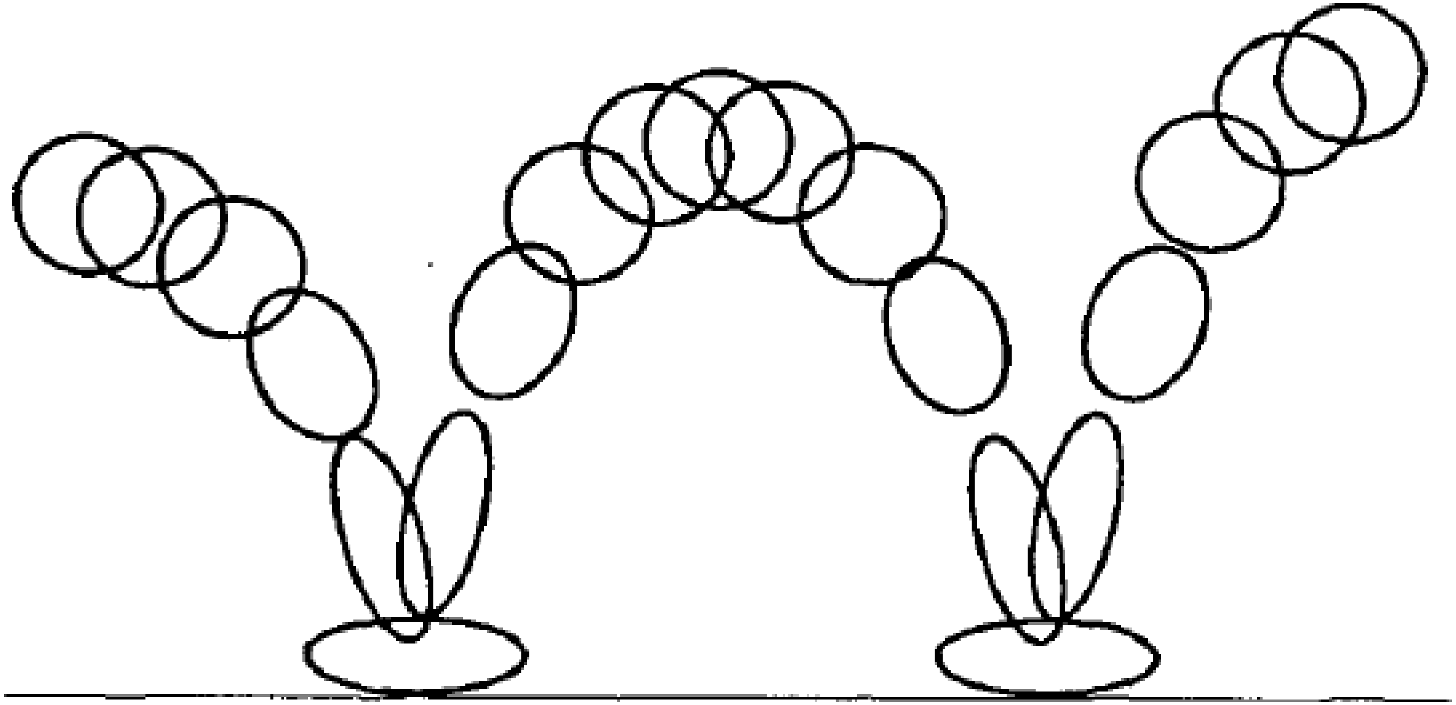


FIGURE 9. Timing chart for ball bounce.

Objects with mass must accelerate and decelerate

Interesting frames are typically at ends,
tweaks perception to emphasize these poses

Arcs



Animation Case Study

Animation: From Cartoons to the User Interface

Chang and Ungar, 1993

http://dx.doi.org/10.1145/168642.168647

Animation: From Cartoons to the User Interface

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> *You must learn to respect that golden atom, that single frame of action, that 1/24th of a second, because the difference between lightning and the lightning bug may hinge on that single frame.*
>
> *—Chuck Jones [10]*

ABSTRACT

User interfaces are often based on static presentations, a model ill suited for conveying change. Consequently, events on the screen frequently startle and confuse users. Cartoon animation, in contrast, is exceedingly successful at engaging its audience; even the most bizarre events are easily comprehended. The Self user interface has served as a testbed for the application of cartoon animation techniques as a means of making the interface easier to understand and more pleasant to use. Attention to timing and transient detail allows Self objects to move solidly. Use of cartoon-style motion blur allows Self objects to move quickly and still maintain their comprehensibility. Self objects arrive and depart smoothly, without sudden materializations and disappearances, and they rise to the front of overlapping objects smoothly through the use of dissolve. Anticipating motion with a small contrary motion and pacing the middle of transitions faster than the endpoints results in smoother and clearer movements. Despite the differences between user interfaces and cartoons—cartoons are frivolous, passive entertainment and user interfaces are serious, interactive tools—cartoon animation has much to lend to user interfaces to realize both affective and cognitive benefits.

KEYWORDS: animation, user interfaces, cartoons, motion blur, Self

1 INTRODUCTION

User interfaces are often based on static presentations—a series of displays each showing a new state of the system. Typically, there is much design that goes into the details of these tableaux, but less thought is given to the transitions between them. Visual changes in the user interface are sudden and often unexpected, surprising users and forcing them to mentally step away from their task in order to grapple with understanding what is happening in the interface itself.

When the user cannot visually track the changes occurring in the interface, the causal connection between the old state of the screen and the new state of the screen is not immediately clear. How are the objects now on the screen related to the ones which were there a moment ago? Are they the same objects, or have they been replaced by different objects? What changes are directly related to the user's actions, and which are incidental? To be able to efficiently and reliably interpret what has happened when the screen changes state, the user must be prepared with an expectation of what the screen will look like after the action. In the case of most interactions in unanimated interfaces, this expectation can only come by experience; little in the interface or the action gives the user a clue about what will happen, what is happening, or what just happened.

For example, the Microsoft Windows interface [15] expands an icon to a window by eliminating the icon and drawing the window in the next instant. In this case the first static presentation is the screen with the icon; the next is the screen with an expanded window. Much of the screen changes suddenly and without indication of the relationship between the old state and the new state. Current pop-up menus suffer from the same problem—one instant there is nothing there; the next instant a menu obscures part of the display.

Moving objects from one location to another is yet another example. Most current systems let the user move an outline of the object, and then, when the user is finished the move, the screen suddenly changes in two places: the object in the old location vanishes and the object appears in the new location. Sudden change, flash of the screen, no hint how the two states are related: the user must compare the current state and the preceding state and deduce the connection.

Users overcome obstacles like these by experience. The first few encounters are the worst; eventually users learn the behavior of the interface and come to interact with it efficiently. Yet while some of the cognitive load of

Frames Three Principles

Solidity

- Desktop objects should appear to be solid objects

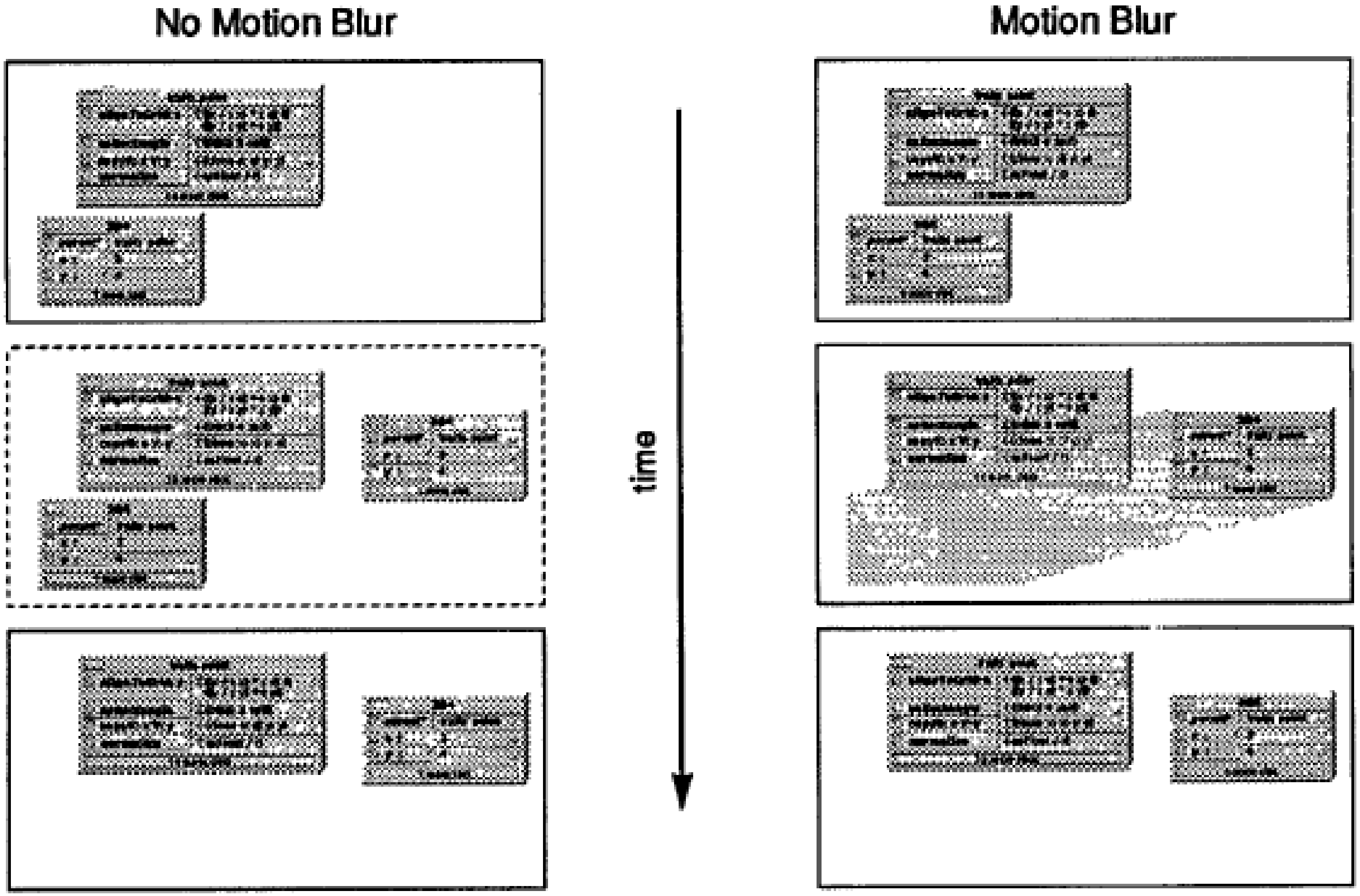
Exaggeration

- Exaggerate physical actions to enhance perception

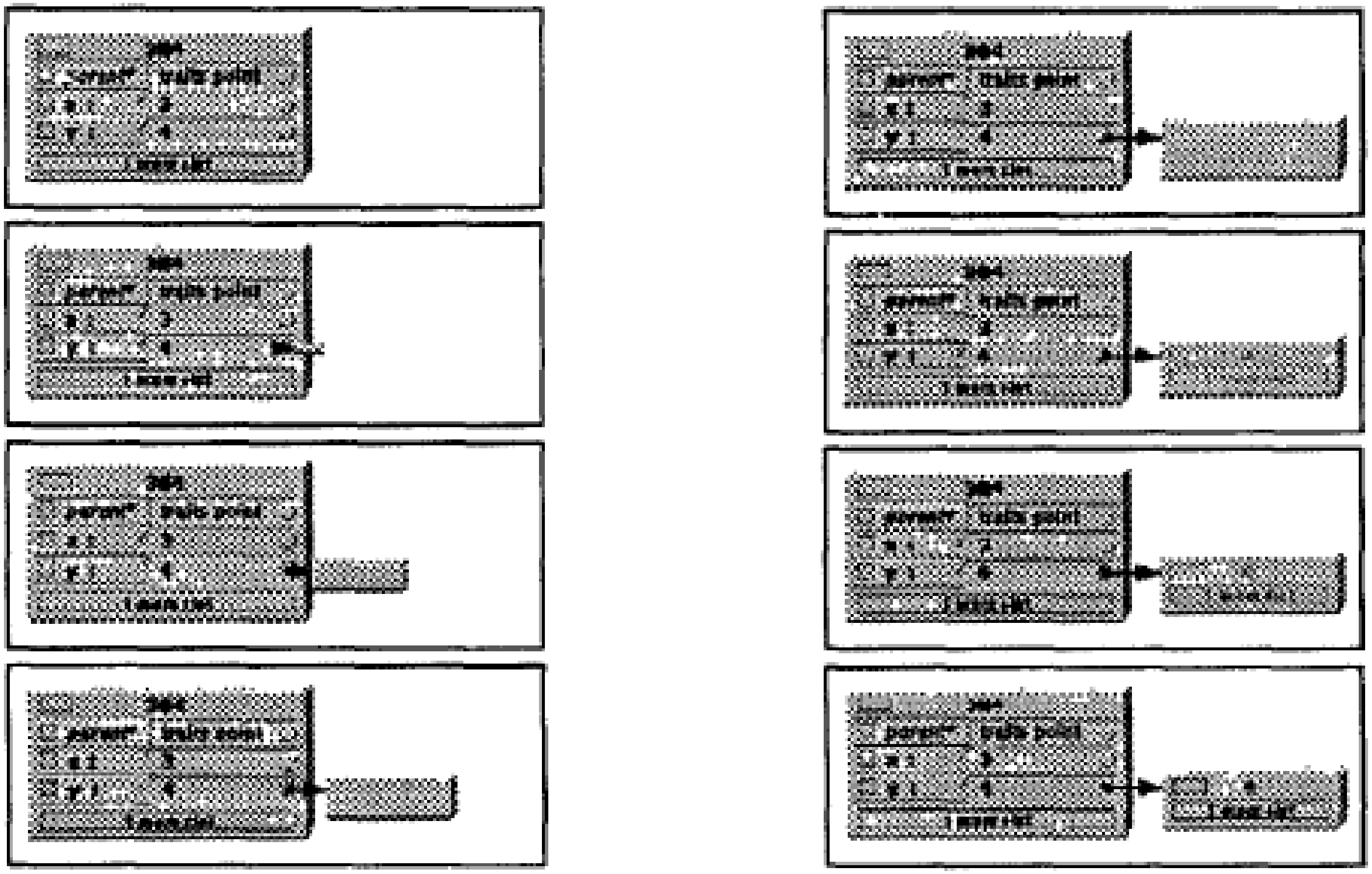
Reinforcement

- Use effects to drive home feeling of reality

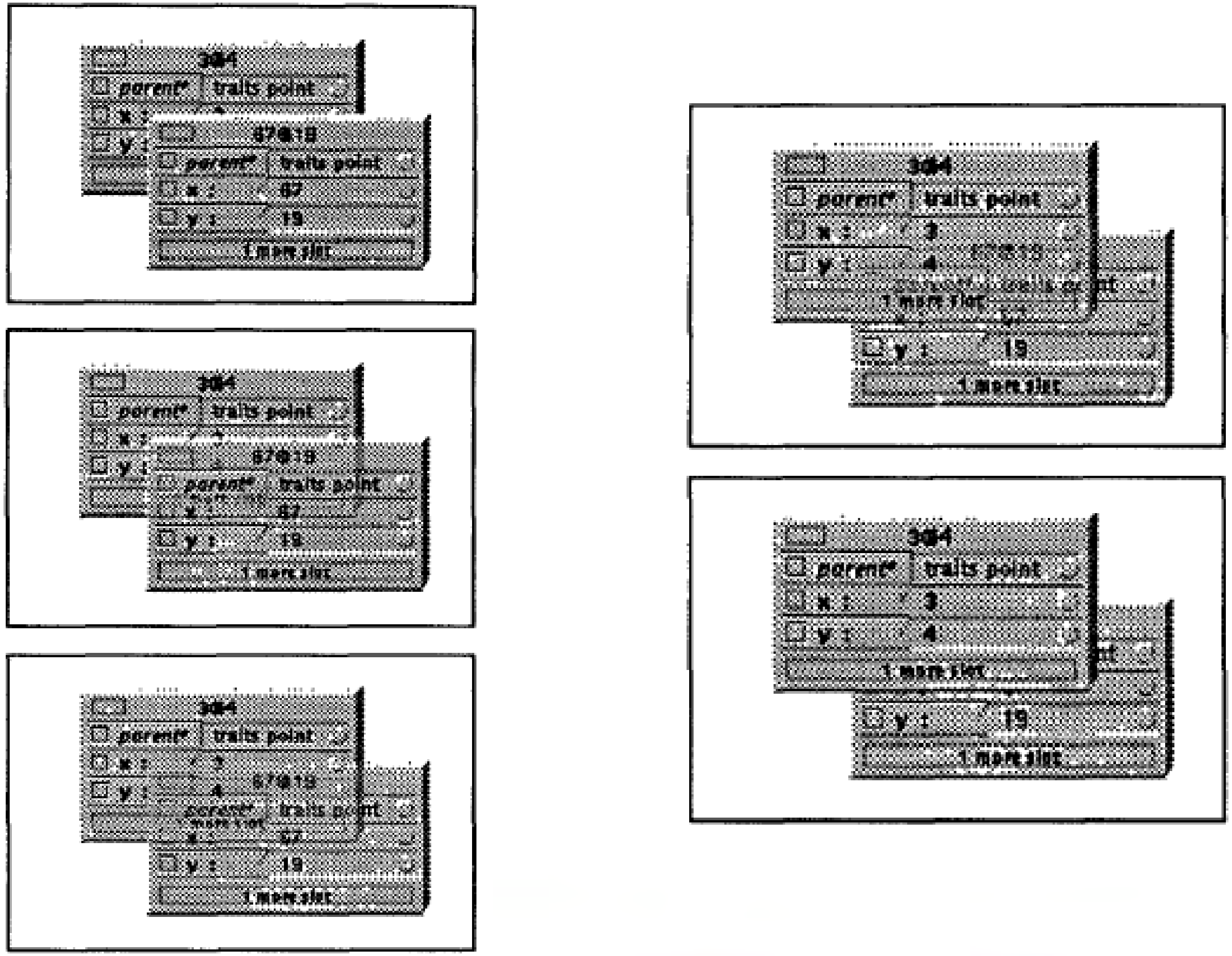
Solidity: Motion Blur



Solidity: Arrival and Departure



Solidity: Arrival and Departure



Exaggeration: Anticipation

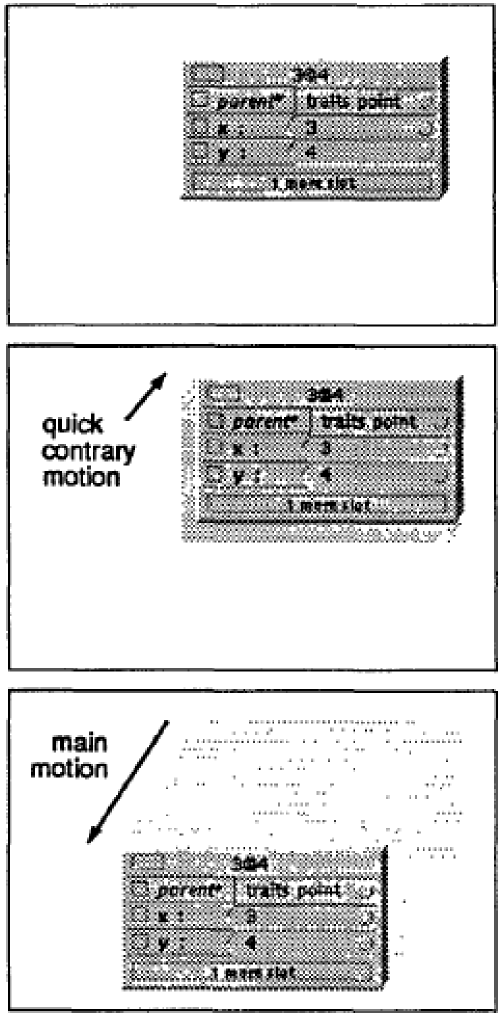


Figure 7. Objects anticipate major actions with a quick contrary motion that draws the user eye to the object in preparation for the main motion to come.

Reinforcement: Slow In Slow Out

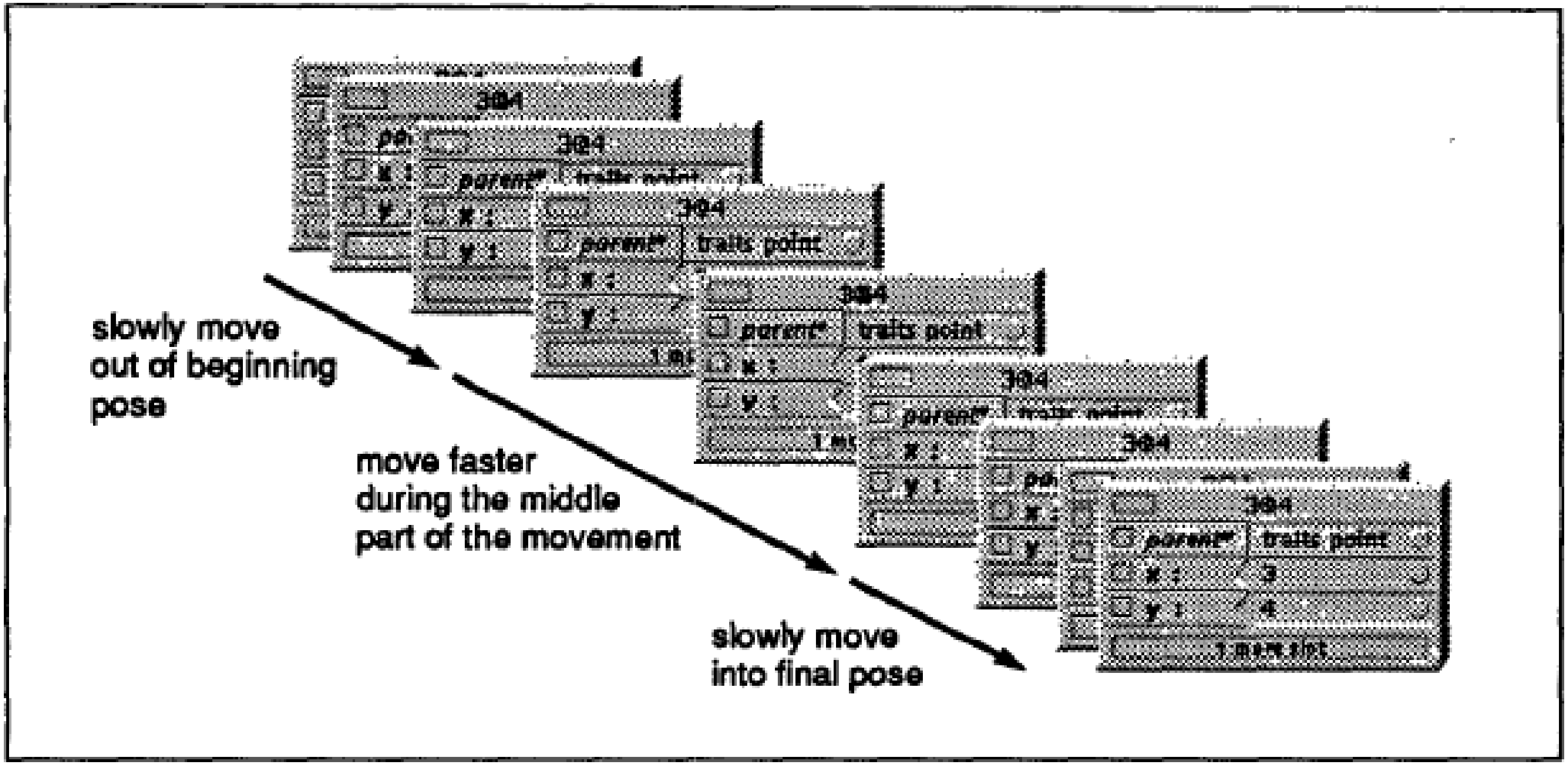


Figure 8. Objects ease out of their beginning poses and ease into their final poses. Although these motions are slower than that during the main portion of the movement, they are still quite fast.

Reinforcement: Arcs

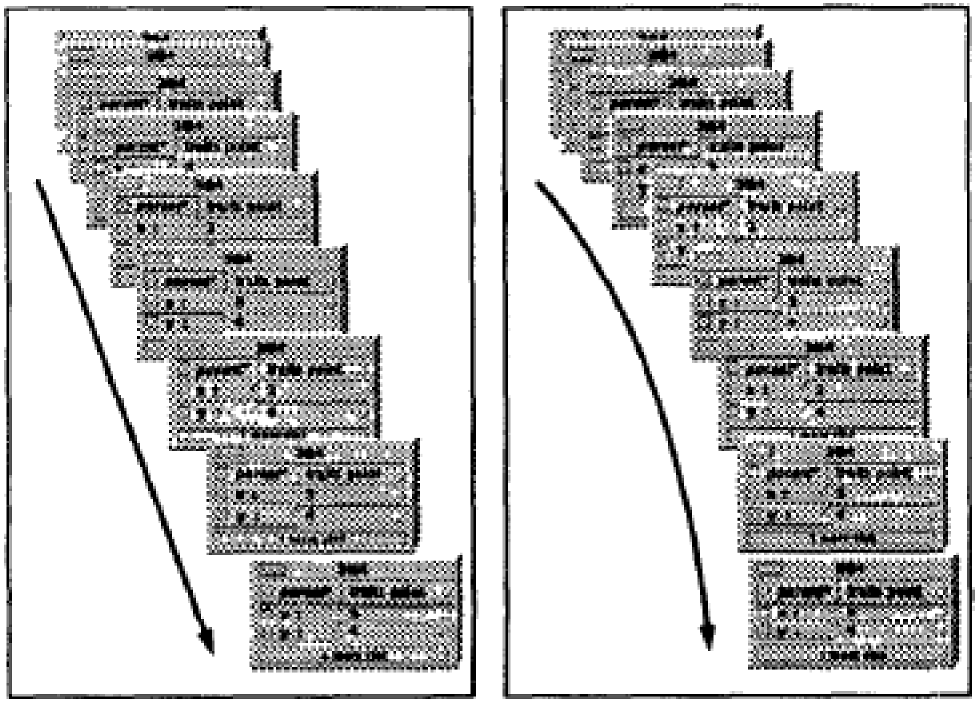


Figure 9. When objects travel under their own power (non-interactively), they move in arcs rather than straight lines.

Reinforcement: Follow Through

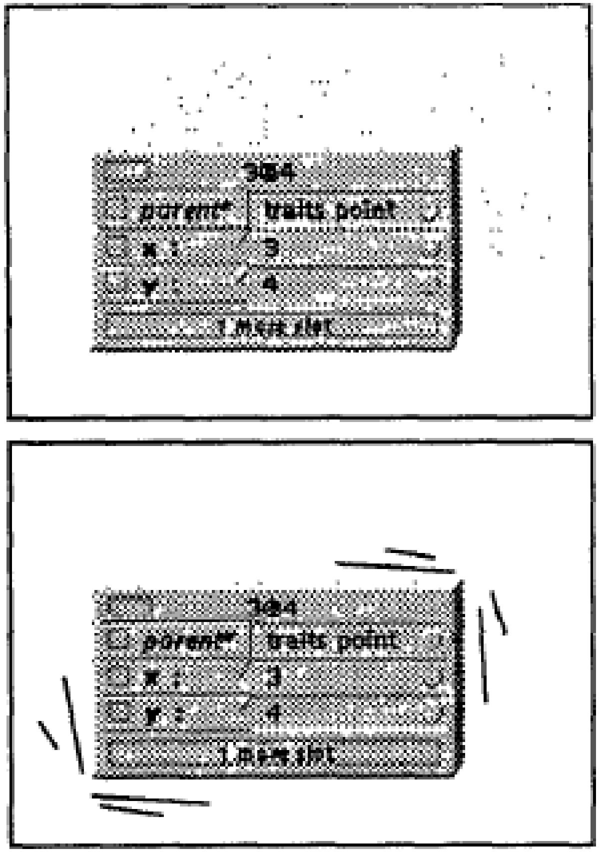


Figure 10. When objects come to a stop after moving on their own, they exhibit follow through in the form of wiggling back and forth quickly. This is just suggested by the "wiggle lines" in the figure—in actuality, the object moves back and forth, with motion blur.

Animation Case Study

Animation Support in a User Interface Toolkit: Flexible, Robust, and Reusable Abstractions

Hudson and Stasko, 1993

http://dx.doi.org/10.1145/168642.168648

Animation Support in a User Interface Toolkit: Flexible, Robust, and Reusable Abstractions

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ABSTRACT

Animation can be a very effective mechanism to convey information in visualization and user interface settings. However, integrating animated presentations into user interfaces has typically been a difficult task since, to date, there has been little or no explicit support for animation in window systems or user interface toolkits. This paper describes how the Artkit user interface toolkit has been extended with new animation support abstractions designed to overcome this problem. These abstractions provide a powerful but convenient base for building a range of animations, supporting techniques such as simple motion-blur, "squash and stretch", use of arcing trajectories, anticipation and follow through, and "slow-in / slow-out" transitions. Because these abstractions are provided by the toolkit they are reusable and may be freely mixed with more conventional user interface techniques. In addition, the Artkit implementation of these abstractions is robust in the face of systems (such as the X Window System and Unix) which can be ill-behaved with respect to timing considerations.

Keywords: object-oriented user interface toolkits, window systems, animation techniques, dynamic interfaces, motion blur, real-time scheduling.

1 INTRODUCTION

Human perceptual capabilities provide a substantial ability to quickly form and understand models of the world from moving images. As a result, in a well designed display, information can often be much more easily comprehended in a moving scene than in a single static image or even a sequence of static images. For example, the "cone tree" display described in [Robe93] provides a clear illustration that the use of continuous motion can allow much more information to be presented and understood more easily.

However, even though the potential benefits of animation in user interfaces have been recognized for some time ([Baec90] for example, surveys a number of uses for animation in the interface and cites their benefits and [Stask93] reviews principles for using animation in interfaces and describes a number of systems that make extensive use of animation in an interface), explicit support for animation is rarely, if ever, found in user interface support environments. The work described in this paper is designed to overcome this problem by showing how flexible, robust, and reusable support for animation can be incorporated into a full scale object-oriented user interface toolkit. Specifically, this paper describes how the extension mechanisms of Artkit — the Advanced Reusable Toolkit (supporting interfaces in C++) [Henr90] — have been employed to smoothly integrate animation support with other user interface capabilities.

The animation abstractions provided by the Artkit system are designed to be powerful and flexible — providing basic support that can be used to build a range of sophisticated techniques such as: simple motion-blur, "squash and stretch", use of arcing

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This work was supported in part by the National Science Foundation under grants IRI-9015407, DCA-9214947, CCR-9121607 and CCR-9109399.

Events and Animation

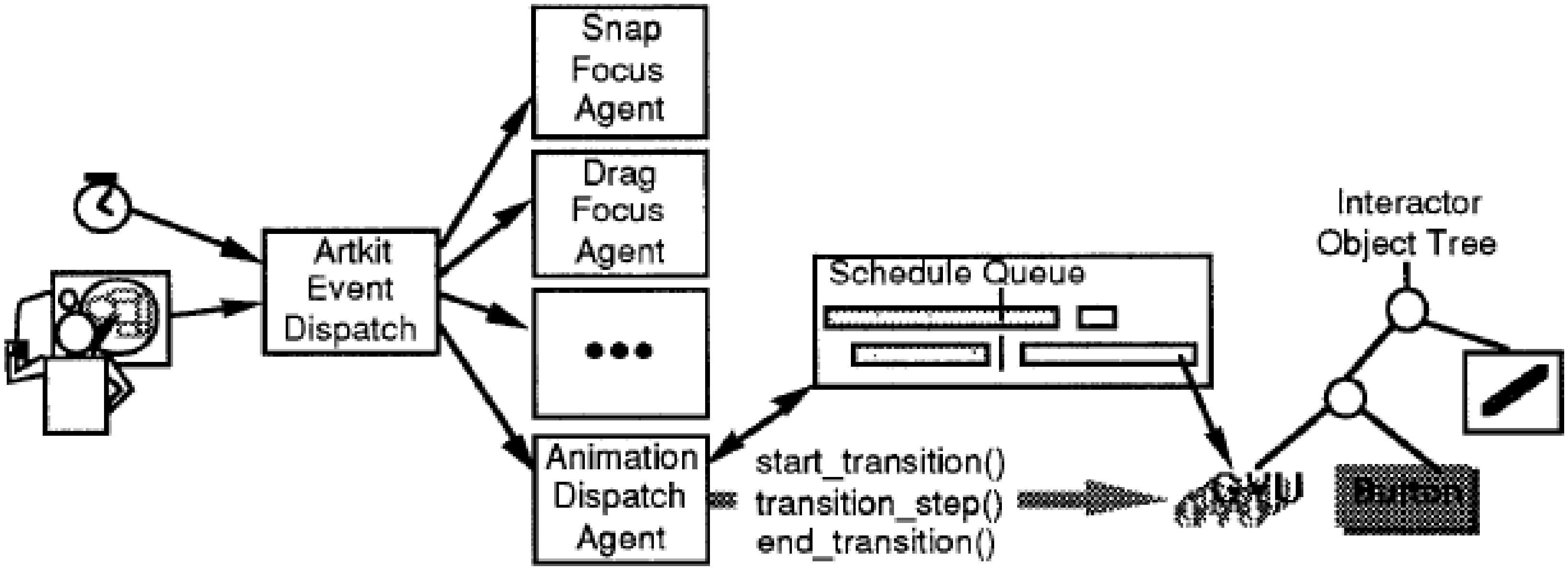


Figure 5. Animation Event Translation and Dispatch

Not Just an Implementation

Provides tool abstractions for implementing previously presented styles of animation

Overcomes a fundamental clash of approaches

- Event loop receives input, processes, repaints
- Animations expect careful control of frames, but the event loop has variable timing

Events and Animation

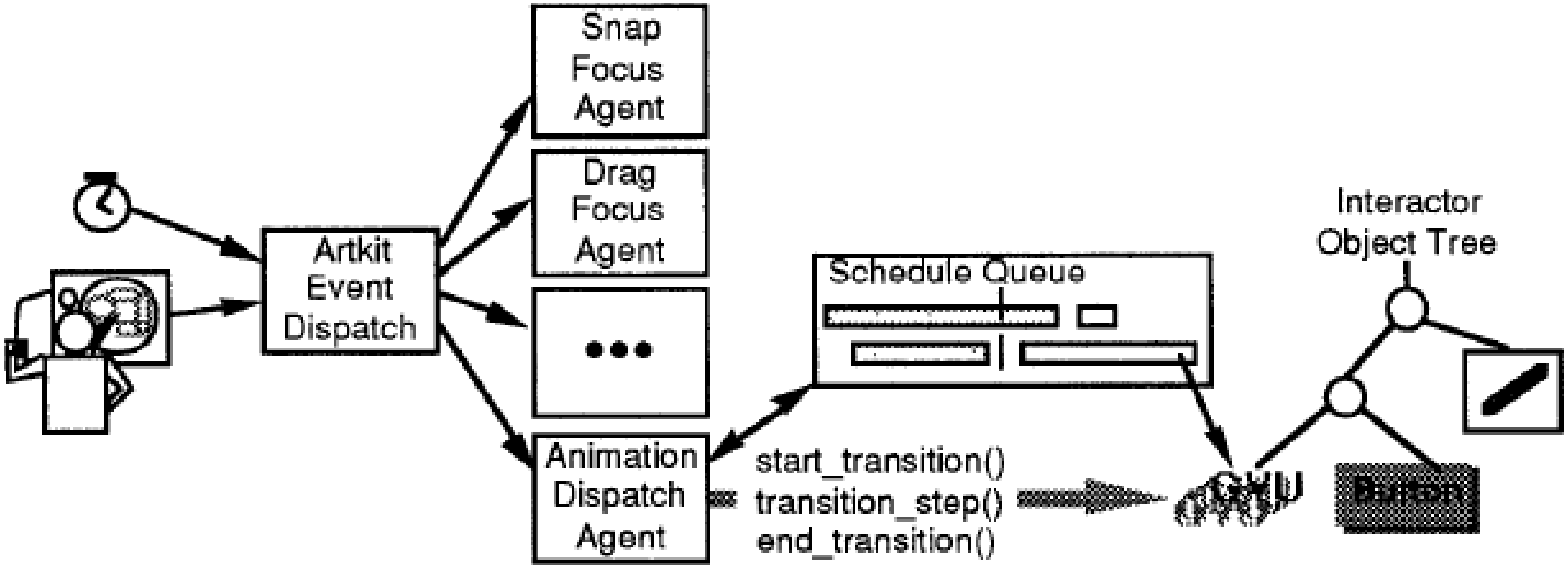
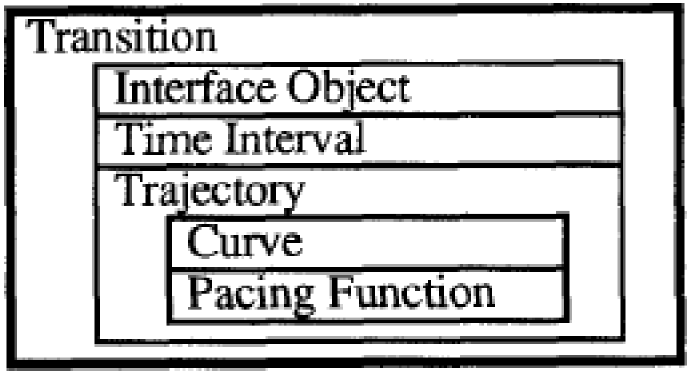


Figure 5. Animation Event Translation and Dispatch

Transition Object



- Transition
  - Interface Object
  - Time Interval
  - Trajectory
    - Curve
    - Pacing Function

Figure 3. Parts of a Transition Object

Pacing Function

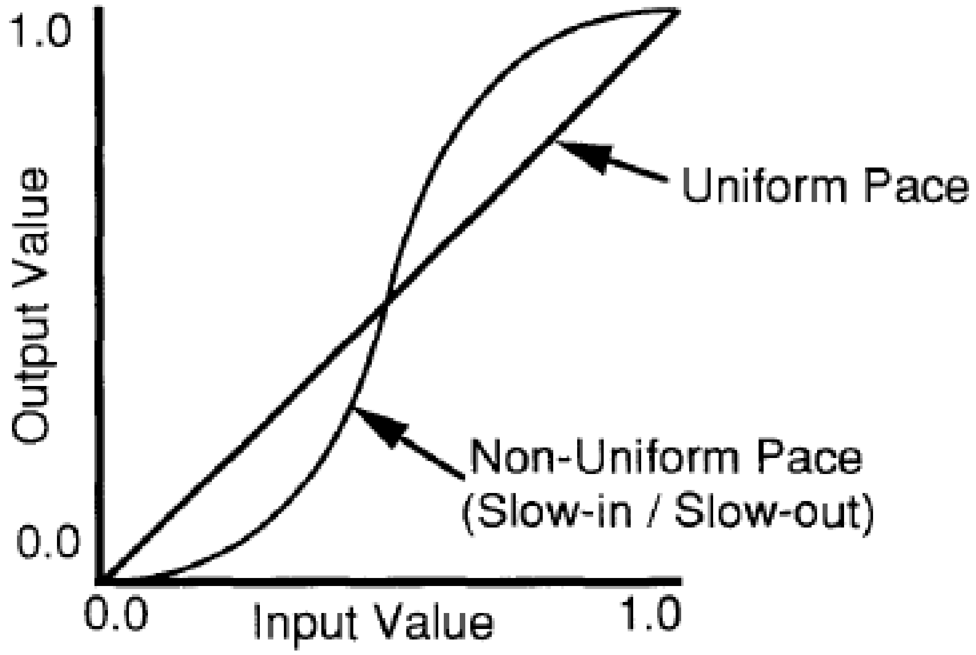


Figure 4. Two Example Pacing Functions

Computing a Frame

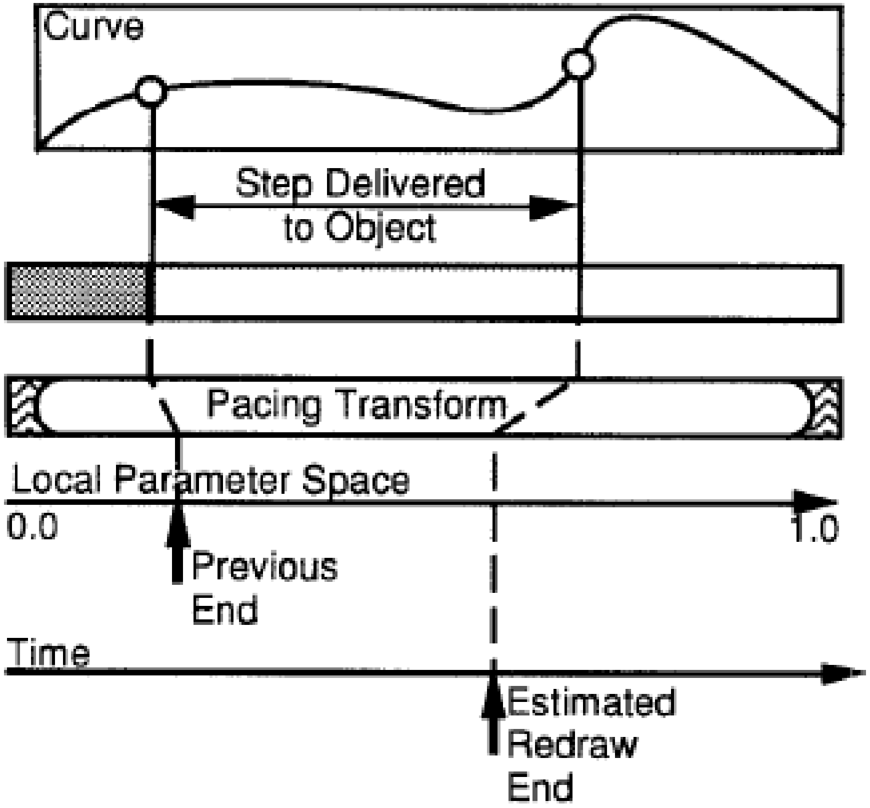


Figure 8. Translation from Time to Space

Animation Case Study

Based on increased understanding of how animation should be done in the interface, increasingly mature tools develop

Now built into major commercial toolkits (e.g., Microsoft’s WPF, JavaFX, jQuery)

Once mature, begins to be used as a building block in even more complex behaviors

Animation Case Study

The Kinetic Typography Engine: An Extensible System for Animating Expressive Text

Lee et al, 2002

http://dx.doi.org/10.1145/571985.571997

The Kinetic Typography Engine:
An Extensible System for Animating Expressive Text

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ABSTRACT

Kinetic typography – text that uses movement or other temporal change – has recently emerged as a new form of communication. As we hope to illustrate in this paper, kinetic typography can be seen as bringing some of the expressive power of film – such as its ability to convey emotion, portray compelling characters, and visually direct attention – to the strong communicative properties of text. Although kinetic typography offers substantial promise for expressive communications, it has not been widely exploited outside a few limited application areas (most notably in TV advertising). One of the reasons for this has been the lack of tools directly supporting it, and the accompanying difficulty in creating dynamic text. This paper presents a first step in remedying this situation – an extensible and robust system for animating text in a wide variety of forms. By supporting an appropriate set of carefully factored abstractions, this *engine* provides a relatively small set of components that can be plugged together to create a wide range of different expressions. It provides new techniques for automating effects used in traditional cartoon animation, and provides specific support for typographic manipulations.

KEYWORDS: kinetic typography, dynamic text, time-based presentation, automating animation effects

INTRODUCTION

The written word is one of humanity's most powerful and significant inventions. For over 4000 years, its basic communicative purpose has not changed. However, the method in which written communication is authored and presented has never stopped evolving. From cuneiform markings on clay tablets, to pen and parchment, to the Gutenberg press, to computers and the internet, technology has always provided text with new mediums to express itself. The explosion of available computing power has added a new possibility: *kinetic typography* – text that moves or otherwise changes over time.

Kinetic typography can be seen as a vehicle for adding some of the properties of film to that of text. For example, kinetic typography can be effective in conveying a speaker's tone of voice, qualities of character, and affective (emotional) qualities of text [Ford97]. It may also allow for a different kind of engagement with the viewer than static text, and in some cases, may explicitly direct or manipulate the attention of the viewer.

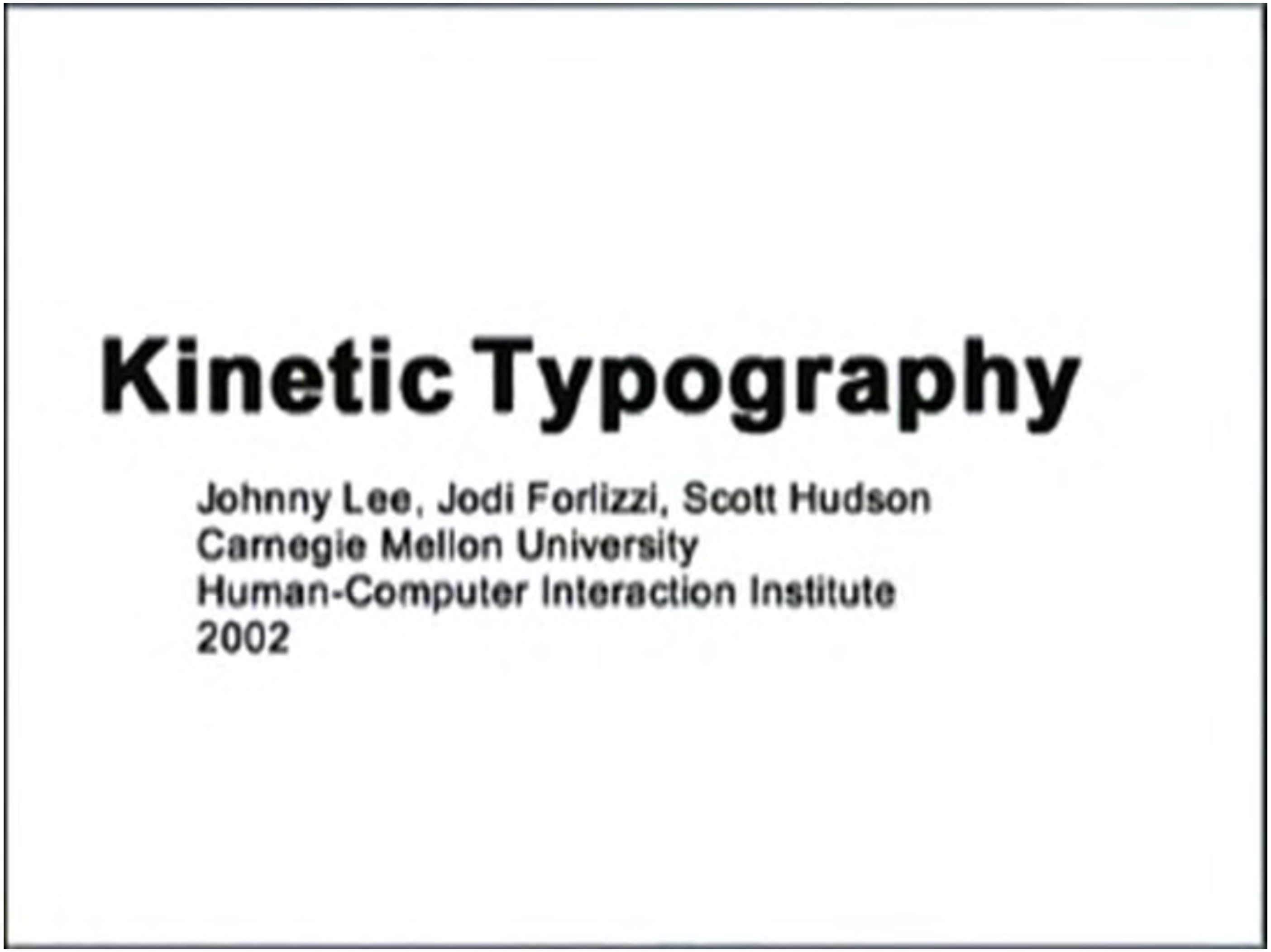
In fact, the first known use of kinetic typography appeared in film – specifically, Saul Bass' opening credit sequence for Hitchcock's *North by Northwest* [Bass59] and later *Psycho* [Bass60]. This work stemmed in part from a desire to have the opening credits set the stage for the film by establishing a mood, rather than simply conveying the information of the credits. Use of kinetic typography is now commonplace for this purpose, and is also very heavily used in TV advertising where its ability to convey emotive content and direct the user's attention is generally a good match to the goals of advertising. We believe that if it can be made accessible via good tools, the power of kinetic typography can also be applied to benefit other areas of digital communications.

A second origin for time-based presentation of text comes independently from psychological studies of perception and reading. For example, [Mill87] studies perceptual effects of a number of text presentations, such as scrolling text. One of the most fruitful of these is a method known as *Rapid Serial Visual Presentation* (RSVP), where text is displayed one word at a time in a fixed position [Pott84]. Studies have shown that, because scanning eye movements are unnecessary when using RSVP, it can result in rapid reading without a need for special training. In addition, RSVP techniques provide advantages for designers because they allow words to be treated independently without regard to effects on adjacent text elements. Finally, RSVP can be seen as a means for trading time for space, potentially allowing large bodies of text to be shown at readable sizes on small displays.

Figures 1-3 illustrate some of the things that kinetic typography can do. (Please refer to the video proceedings for dynamic renditions of these figures.) Figure 1 shows two different renditions of the same words expressing a different emotional tone. As described by Ishizaki [Ishi97]:

UIST'02, October 27-30, 2002, Paris, FRANCE.

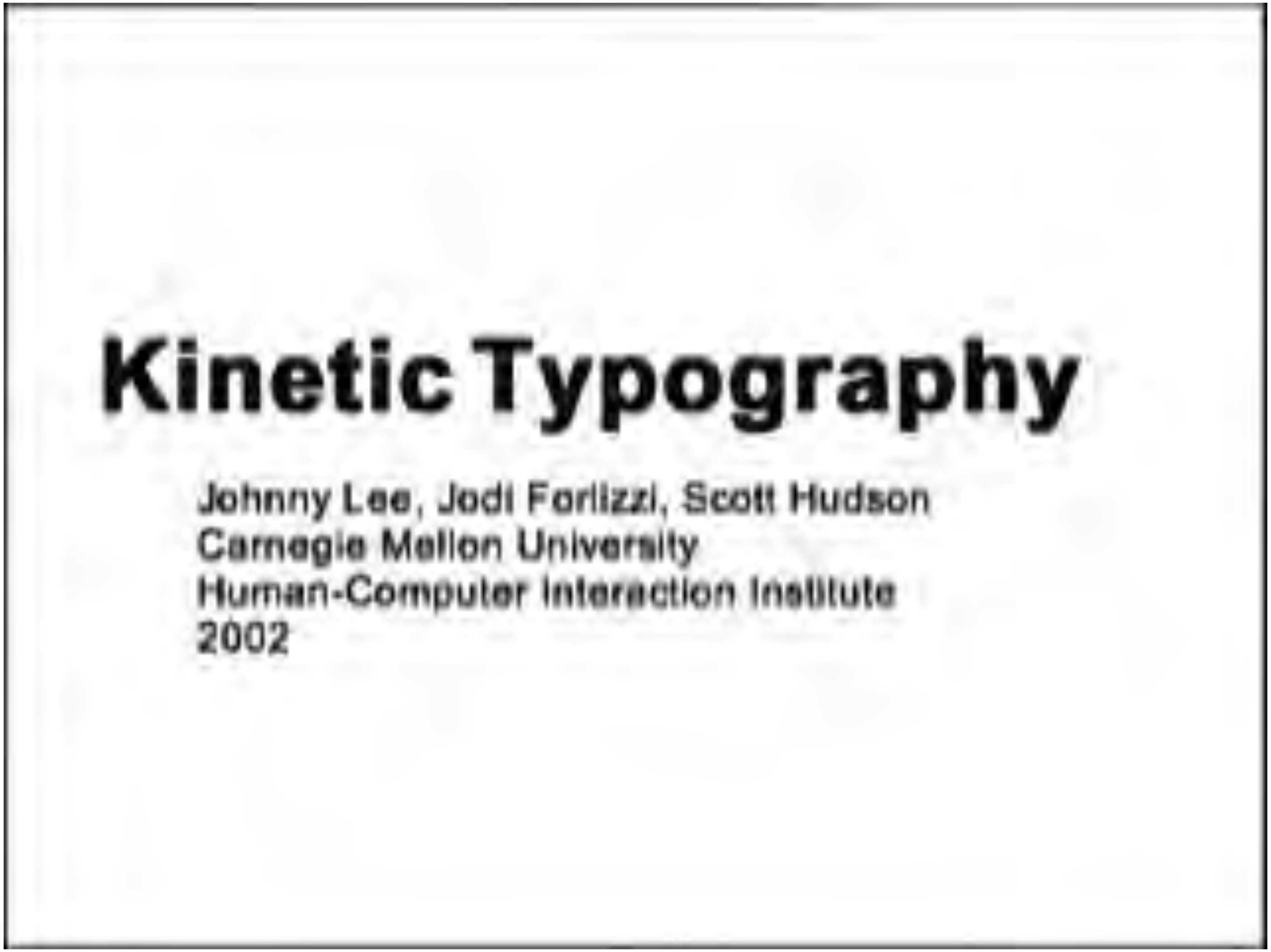
Kinetic Typography Engine



Kinetic Typography

Johnny Lee, Jodi Forlizzi, Scott Hudson
Carnegie Mellon University
Human-Computer Interaction Institute
2002

Kinetic Typography Engine



Kinetic Typography

Johnny Lee, Jodi Forlizzi, Scott Hudson
Carnegie Mellon University
Human-Computer Interaction Institute
2002

Kinetic Typography Engine

Goals of Kinetic Type

- Emotional content
- Creation of characters
- Direction of attention

Based on existing work

Animation Composition

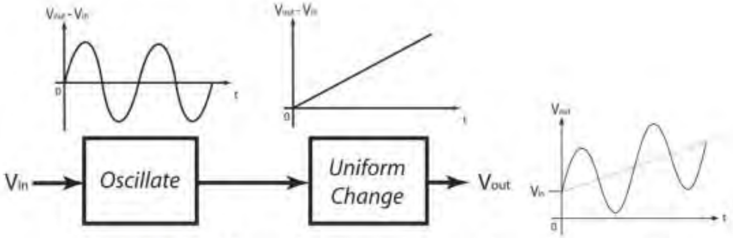


Figure 6. Waveform addition by chaining”

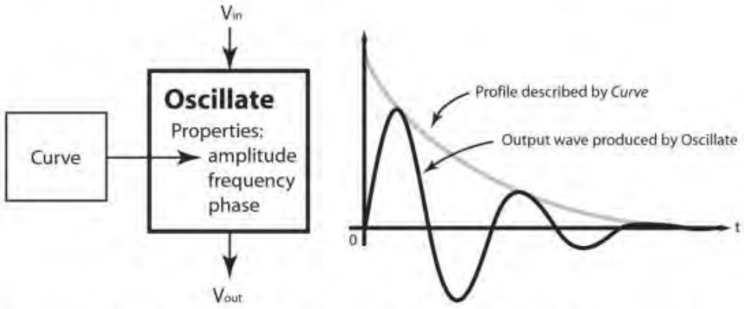


Figure 7. Waveform scaling by functional composition with amplitude

Animation Case Study

Prefuse: A Toolkit for Interactive Information Visualization

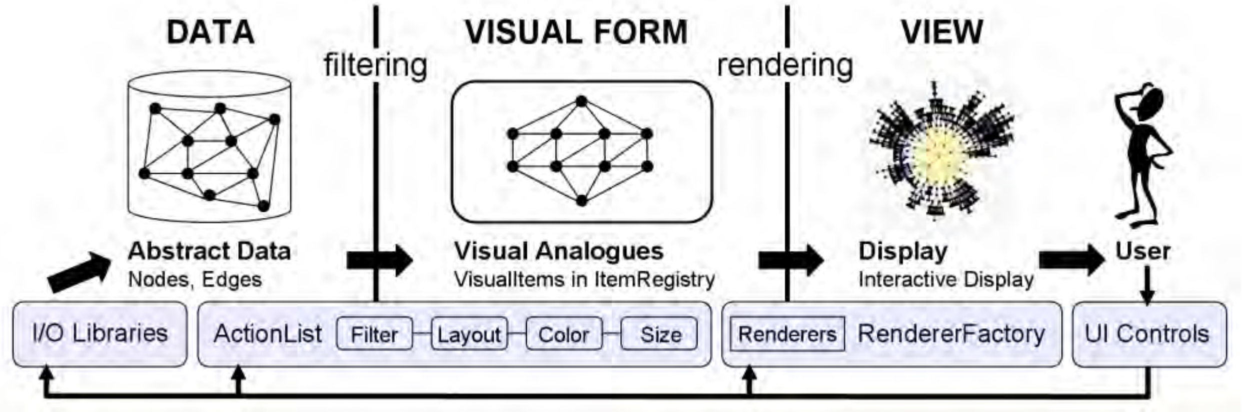
Heer et al, 2005

http://dx.doi.org/10.1145/1054972.1055031

D3: Data-Driven Documents

Bostock et al, 2011

http://dx.doi.org/10.1109/TVCG.2011.185



Tools and Interfaces

Why Interface Tools?

Case Study of Model-View-Controller

Case Study of Animation

Sapir-Whorf Hypothesis

Thoughtfulness in Tools

Sapir-Whorf Hypothesis

Language is not simply a way of voicing ideas, but is the very thing which shapes those ideas

Tools not only make it easy to build certain types of software, they push you to think in terms of the types of software they can support

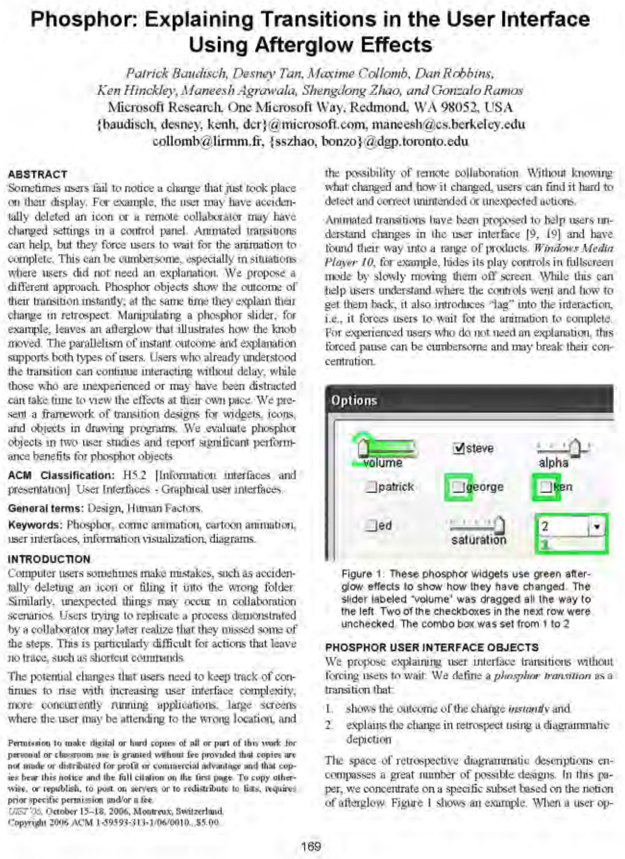
You must be aware of this when choosing tools, designing applications, and creating new tools

Animation Case Study

Phosphor: Explaining Transitions in the User Interface Using Afterglow Effects

Baudisch et al, 2006

http://dx.doi.org/10.1145/1166253.1166280



Phosphor: Explaining Transitions in the User Interface Using Afterglow Effects

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ABSTRACT

Sometimes users fail to notice a change that just took place on their display. For example, the user may have accidentally deleted an icon or a remote collaborator may have changed settings in a control panel. Animated transitions can help, but they force users to wait for the animation to complete. This can be cumbersome, especially in situations where users did not need an explanation. We propose a different approach. Phosphor objects show the outcome of their transition instantly; at the same time they explain their change in retrospect. Manipulating a phosphor slider, for example, leaves an afterglow that illustrates how the knob moved. The parallelism of instant outcome and explanation supports both types of users. Users who already understood the transition can continue interacting without delay, while those who are inexperienced or may have been distracted can take time to view the effects at their own pace. We present a framework of transition designs for widgets, icons, and objects in drawing programs. We evaluate phosphor objects in two user studies and report significant performance benefits for phosphor objects.

ACM Classification: H5.2 [Information interfaces and presentation] User Interfaces - Graphical user interfaces.

General terms: Design, Human Factors.

Keywords: Phosphor, comic animation, cartoon animation, user interfaces, information visualization, diagrams.

INTRODUCTION

Computer users sometimes make mistakes, such as accidentally deleting an icon or filing it into the wrong folder. Similarly, unexpected things may occur in collaboration scenarios. Users trying to replicate a process demonstrated by a collaborator may later realize that they missed some of the steps. This is particularly difficult for actions that leave no trace, such as shortcut commands.

The potential changes that users need to keep track of continues to rise with increasing user interface complexity, more concurrently running applications, large screens where the user may be attending to the wrong location, and the possibility of remote collaboration. Without knowing what changed and how it changed, users can find it hard to detect and correct unintended or unexpected actions.

Animated transitions have been proposed to help users understand changes in the user interface [9, 19] and have found their way into a range of products. *Windows Media Player 10*, for example, hides its play controls in fullscreen mode by slowly moving them off screen. While this can help users understand where the controls went and how to get them back, it also introduces "lag" into the interaction, i.e., it forces users to wait for the animation to complete. For experienced users who do not need an explanation, this forced pause can be cumbersome and may break their concentration.

Figure 1: These phosphor widgets use green afterglow effects to show how they have changed. The slider labeled "volume" was dragged all the way to the left. Two of the checkboxes in the next row were unchecked. The combo box was set from 1 to 2.

PHOSPHOR USER INTERFACE OBJECTS

We propose explaining user interface transitions without forcing users to wait. We define a *phosphor transition* as a transition that:

1. shows the outcome of the change *instantly* and
2. explains the change in retrospect using a diagrammatic depiction

The space of retrospective diagrammatic descriptions encompasses a great number of possible designs. In this paper, we concentrate on a specific subset based on the notion of afterglow. Figure 1 shows an example. When a user op-

UIST '06, October 15–18, 2006, Montreux, Switzerland.

Phosphor

Animation can help people follow interface transitions

But the right speed is crucial

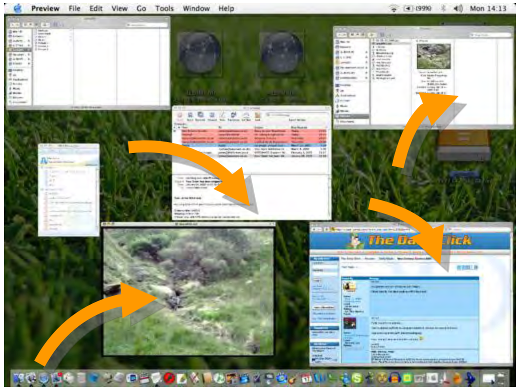
- Too fast increases error rate
- Too slow increases task time

The right speed depends on familiarity, distraction, etc.

- It cannot be determined

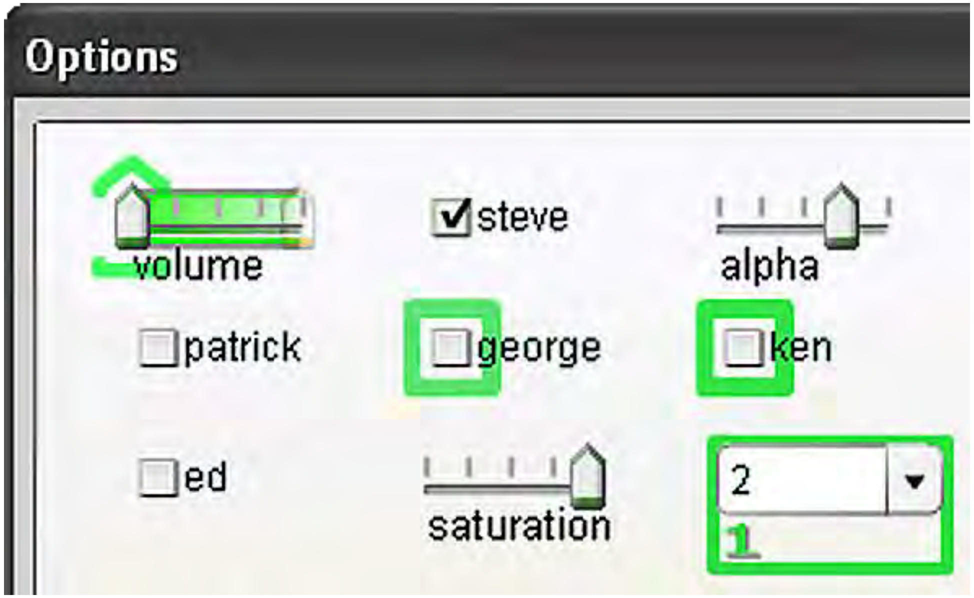
Windows Media Player

Apple Expose



Phosphor

Phosphor shows the outcome immediately, then explains the change in retrospect using a diagrammatic depiction



☑ steve

☐ patrick

☐ george

☐ ken

☐ ed

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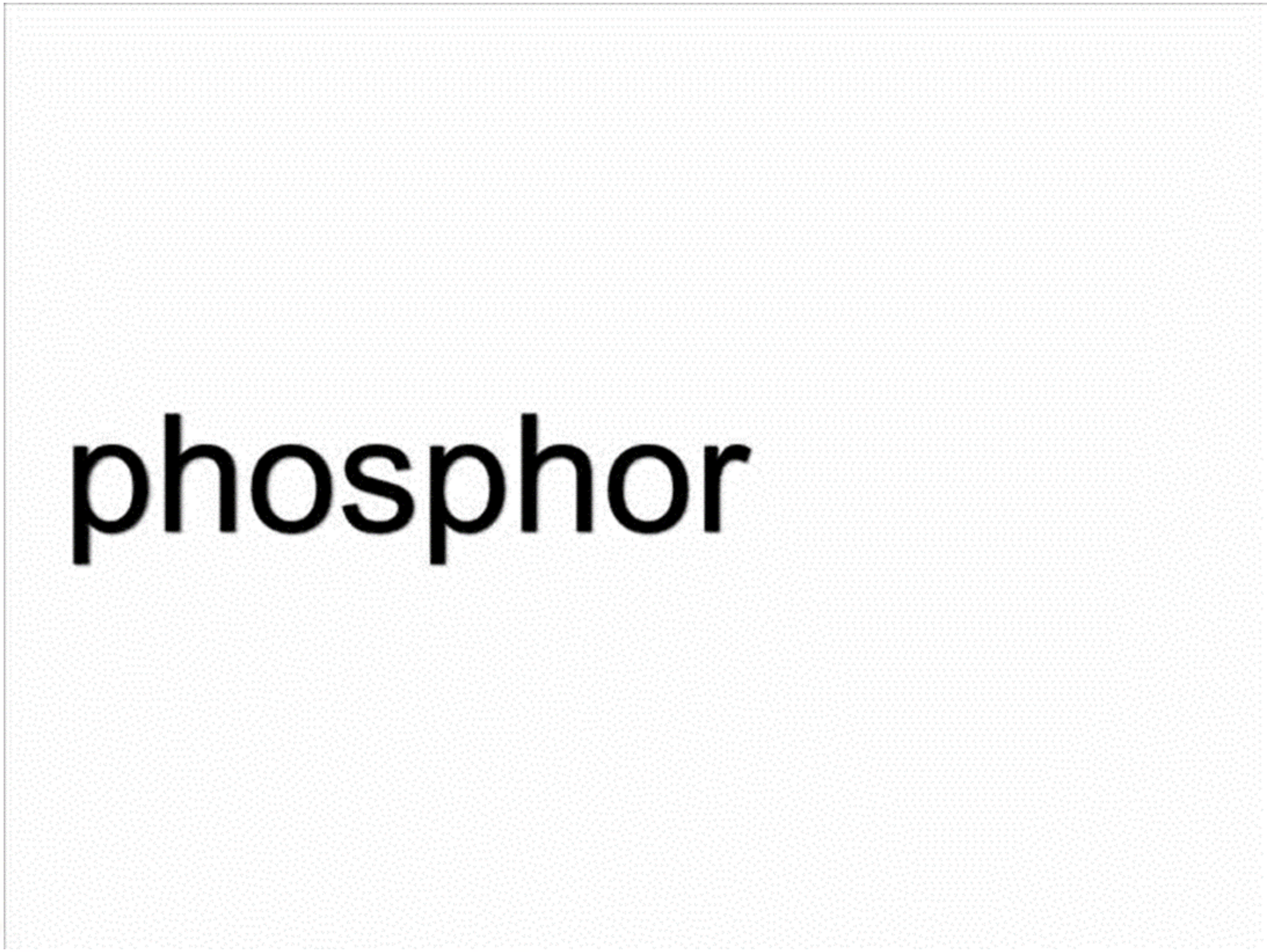
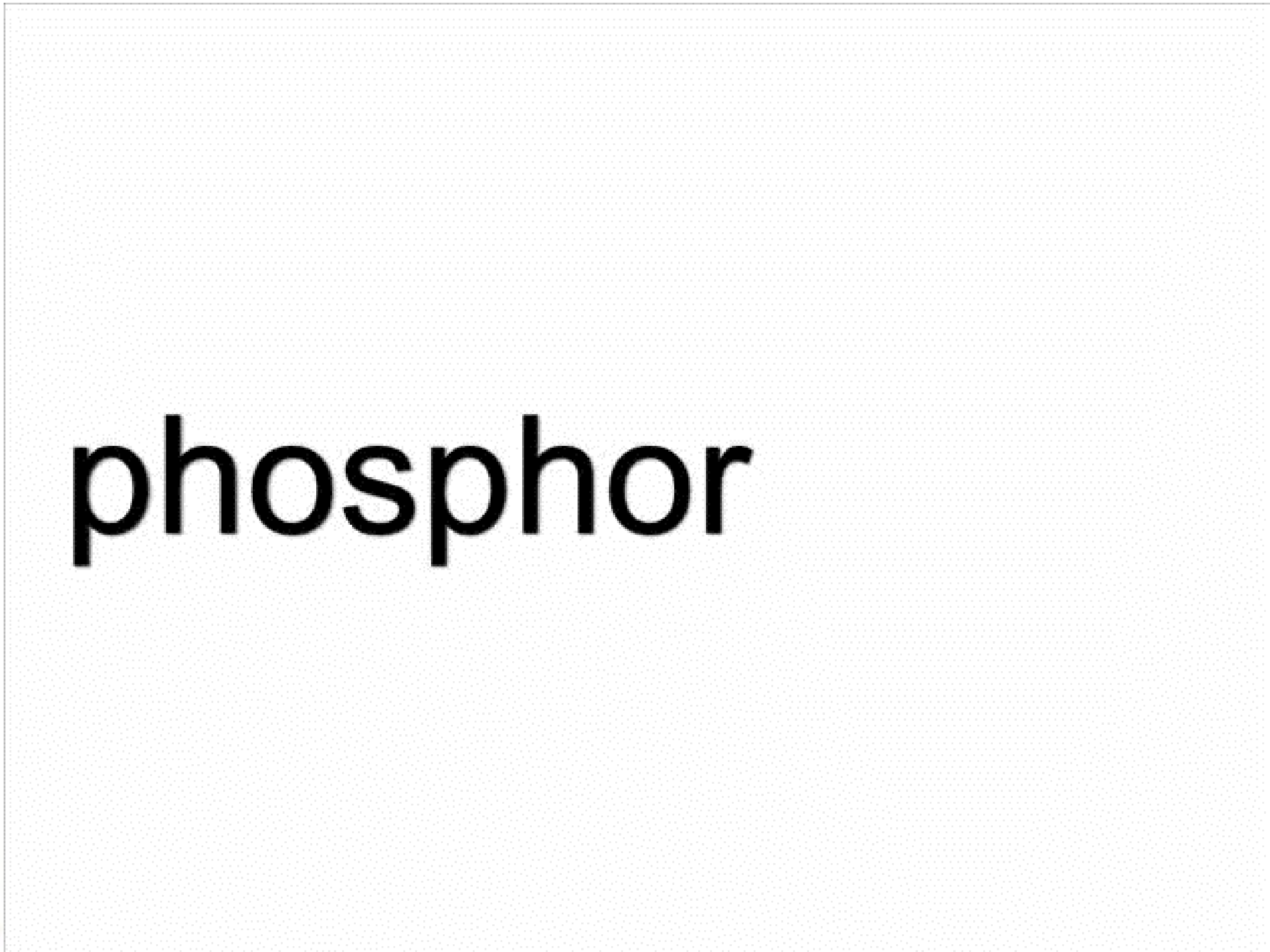
Phosphor



phosphor

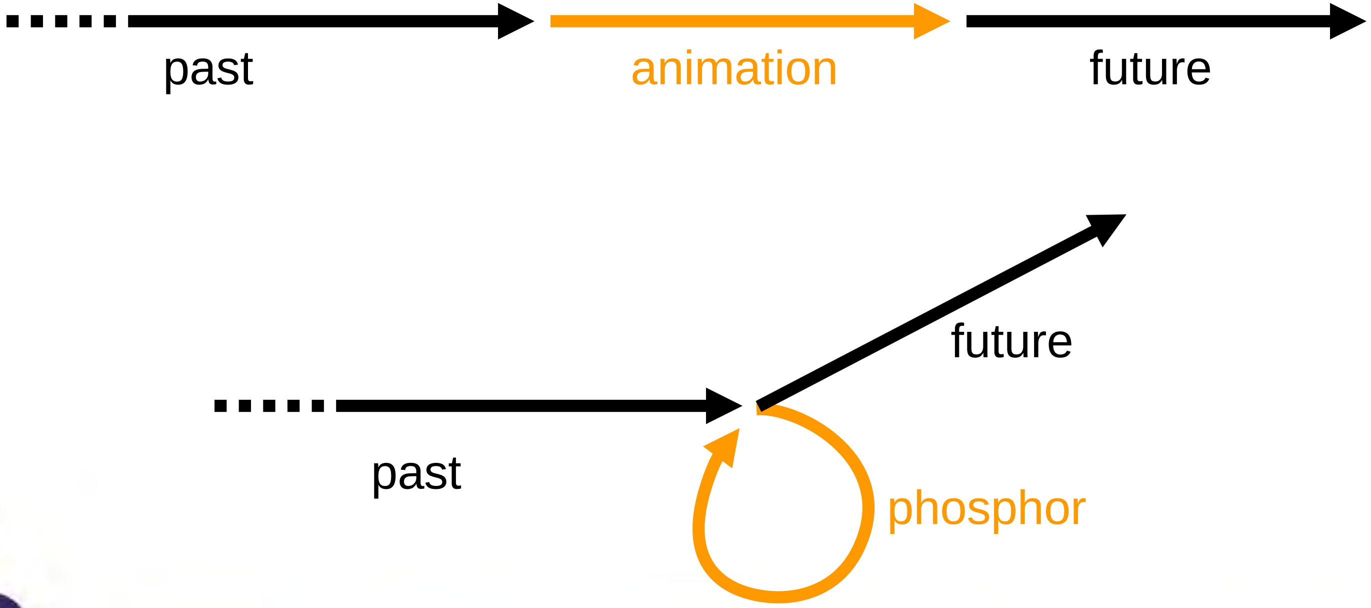
Phosphor



phosphor

Challenging Assumptions of Tools

Phosphor breaks from the assumptions that have evolved into current transition tools



Tools and Interfaces

Tools embody expertise and assumptions

Tools evolve based on emerging understanding of how to address categories of problems

Be conscious of your tool decisions

- Try to think about designs before tying to a tool
- Choose good and appropriate tools
- Understand what you are getting in a tool
- Push yourself to think outside the tool

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 15:
Interface Implementation

James Fogarty
Daniel Epstein
Brad Jacobson
King Xia

Tuesday/Thursday
10:30 to 11:50
MOR 234

dub
design:
use:
build:

University of Washington