CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 01:
Introduction and
Personal Informatics

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

DESIGN
USE
BUILD

What Is This Course?

Time for a Door Quiz:

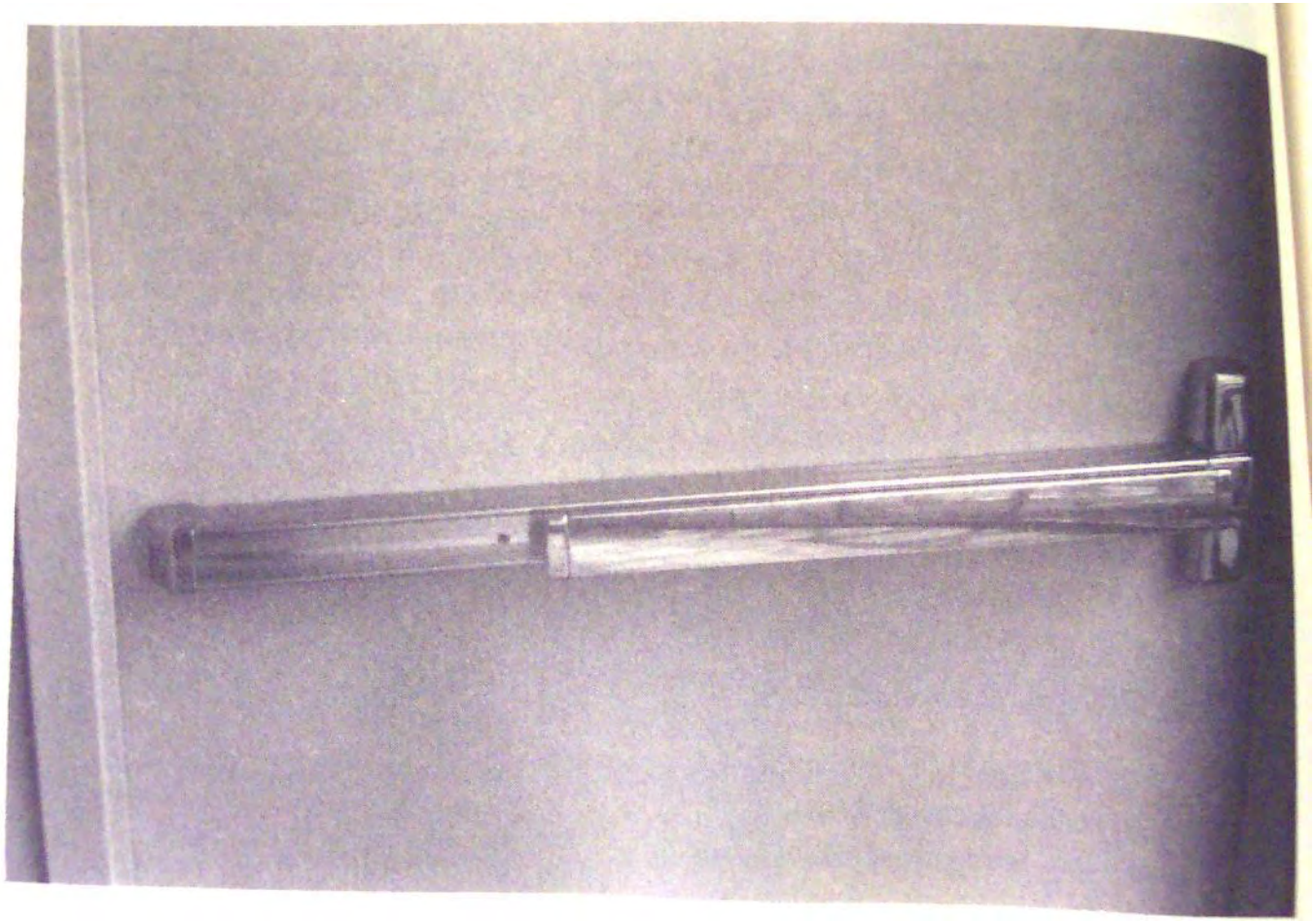
Say out loud what action you use to open the door

Push

Pull

Door Quiz

Door Quiz



Door Quiz

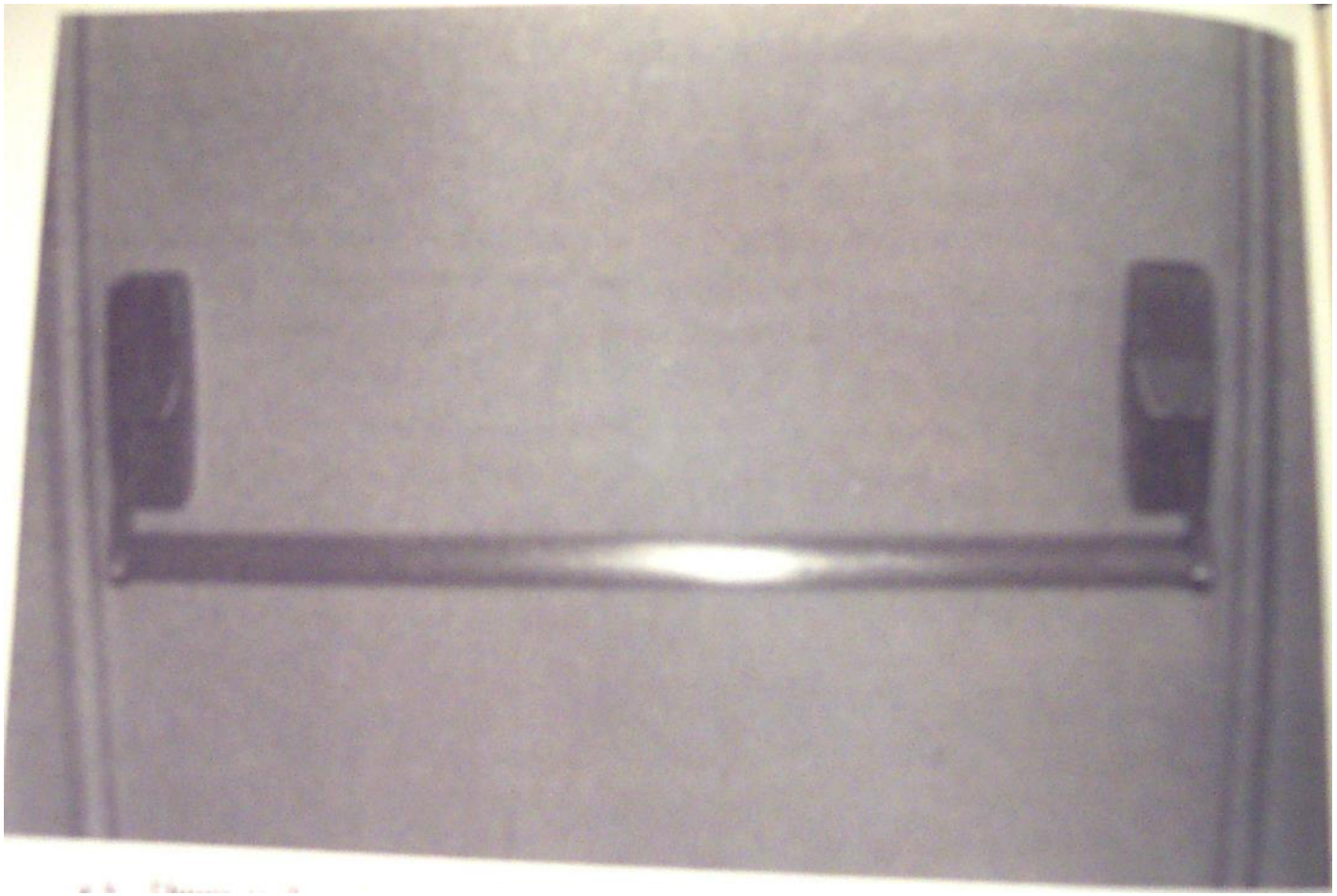
Door Quiz

Door Quiz

Door Quiz

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

Door Quiz



Door Quiz

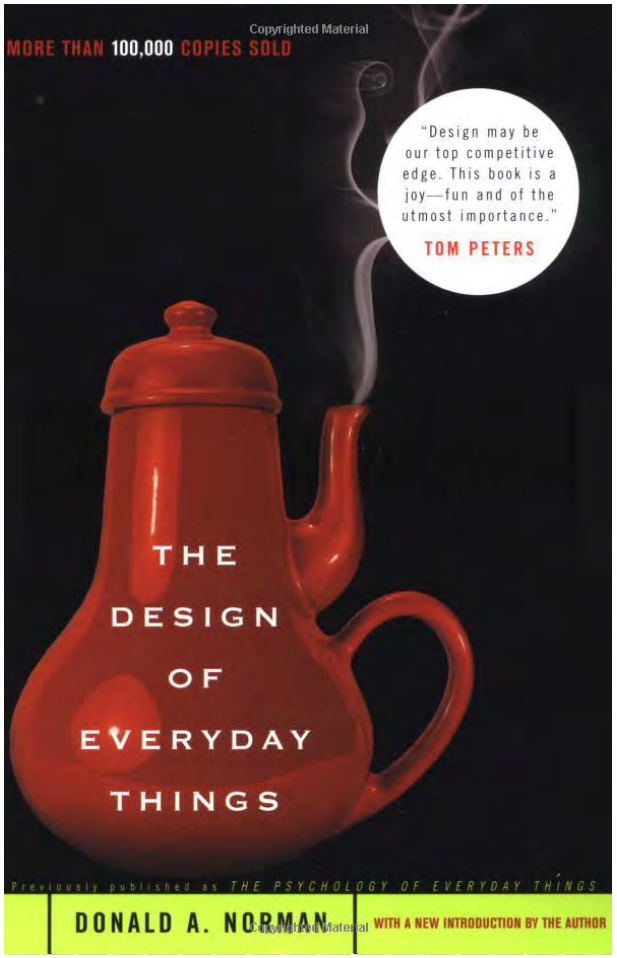
What is so Special about Computers?

Nothing! It is about good designs and bad designs

We 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



Signs Do Not Help

Signs Do Not Help

What is so Special about Computers?

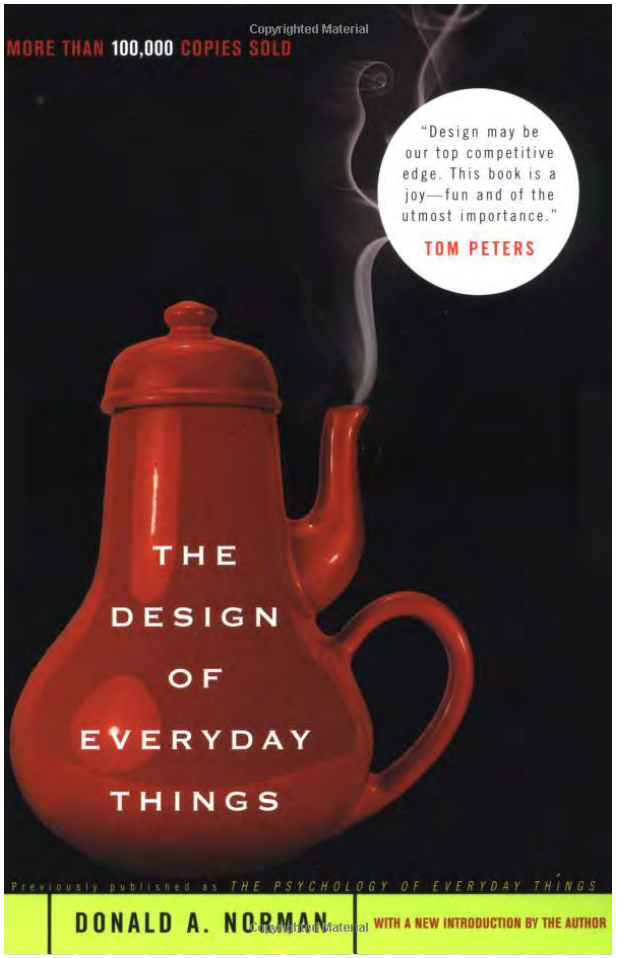
Yet we blame ourselves

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

> “Enlightened trial and error succeeds over the planning of the lone genius” – Peter Skillman, IDEO

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

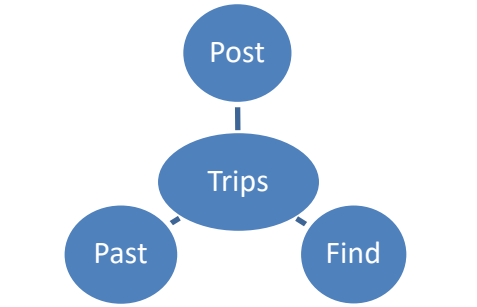
Design Research & Task Analysis

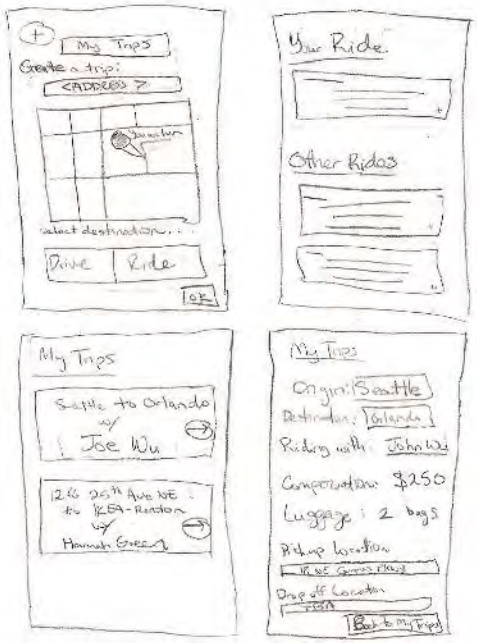
Observe practices and understand needs

Consumester

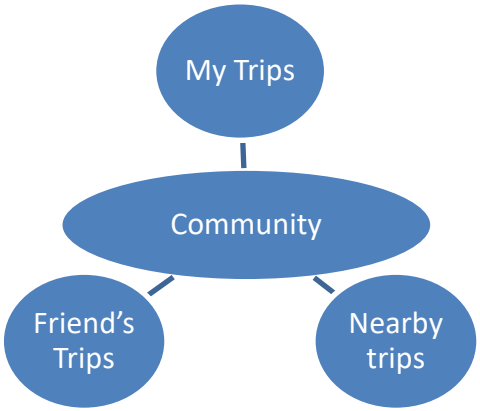
FoodWatch

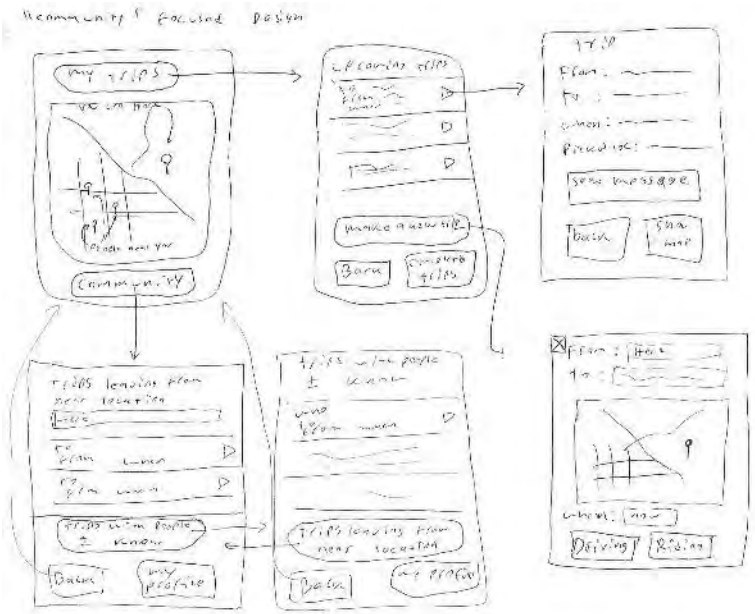
Sketching & Storyboarding



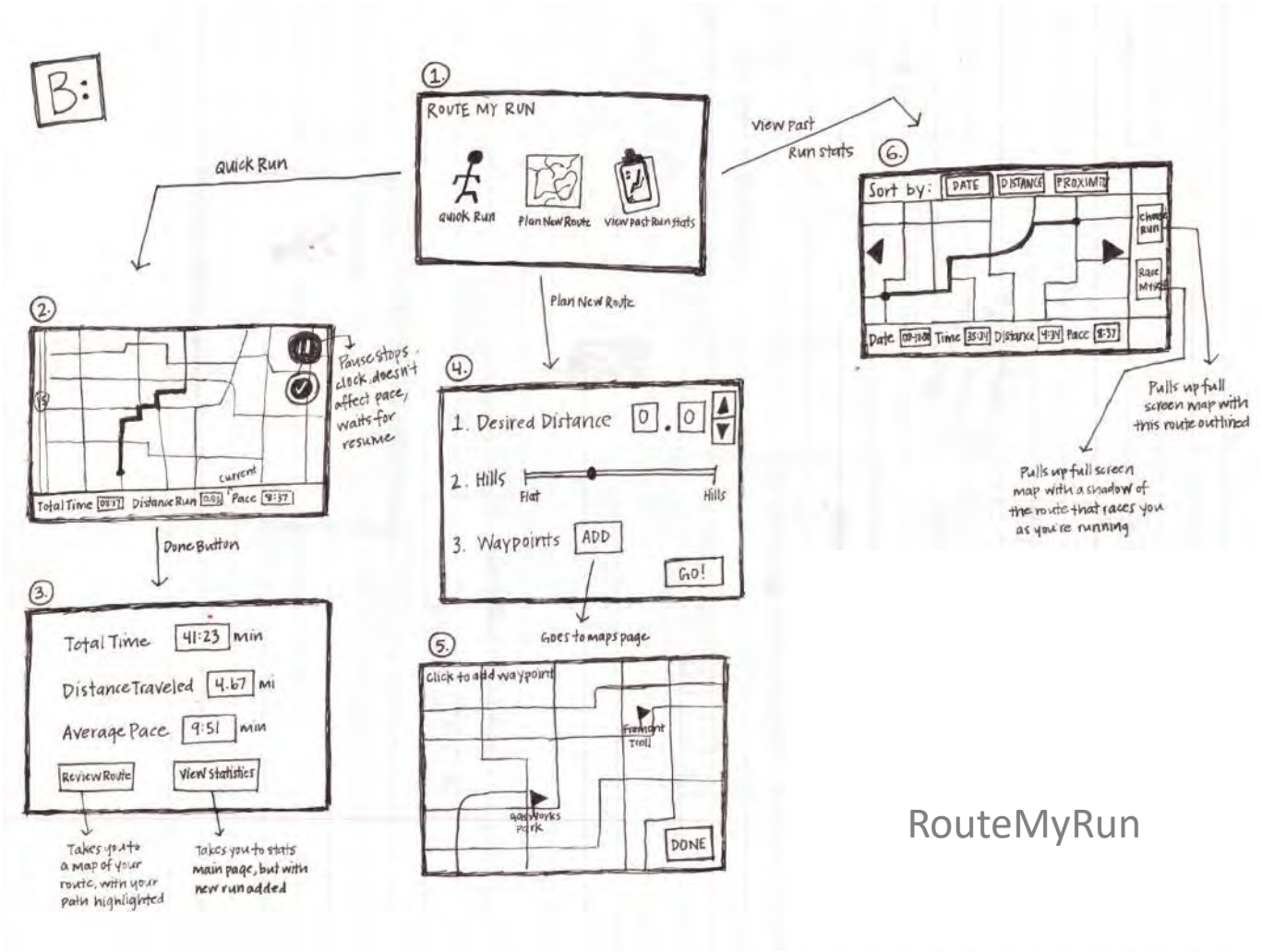


RideAlong



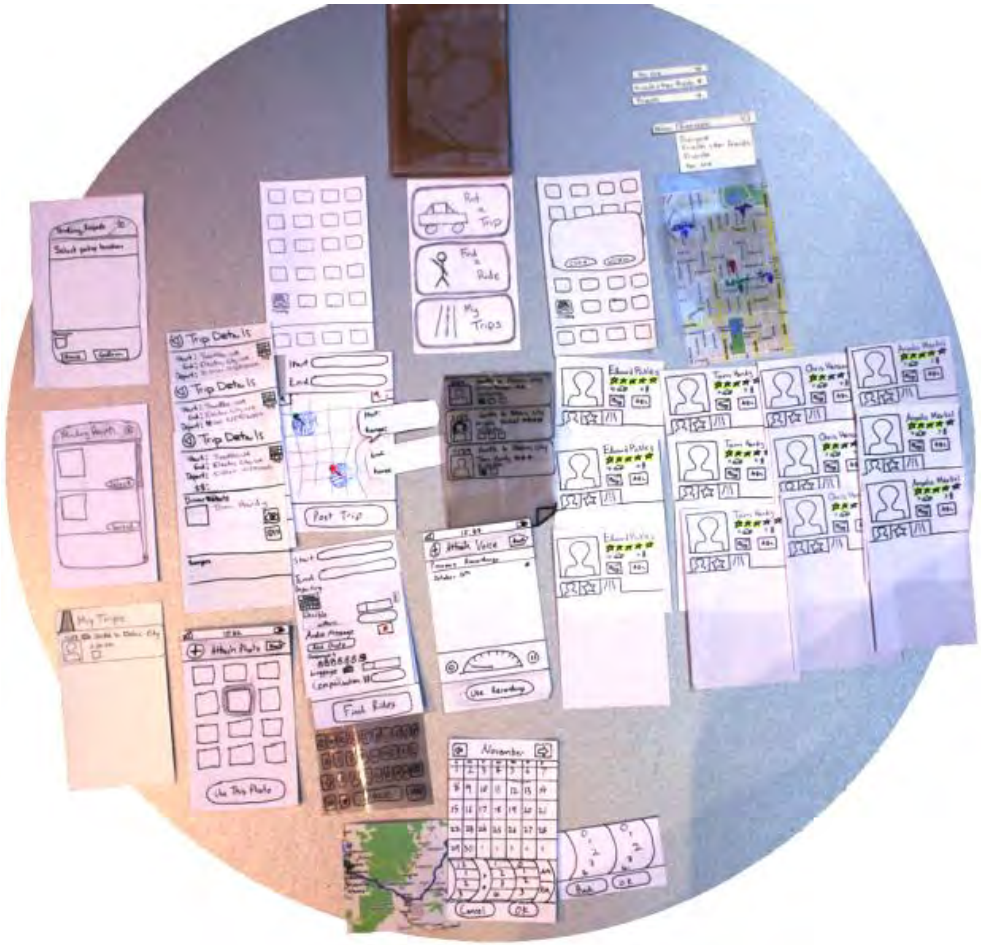


Sketching & Storyboarding



RouteMyRun

Low-Fidelity Prototyping & Testing



RideAlong

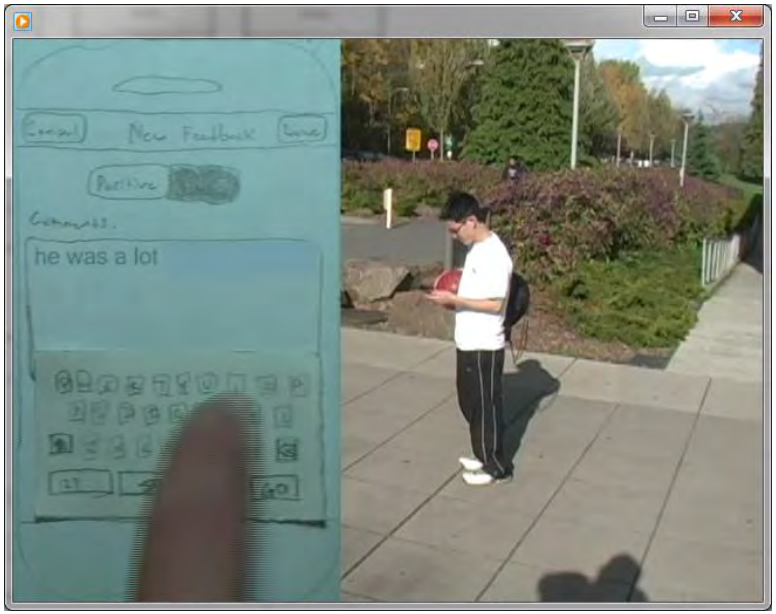
Digital Mockup

Balance

.calm

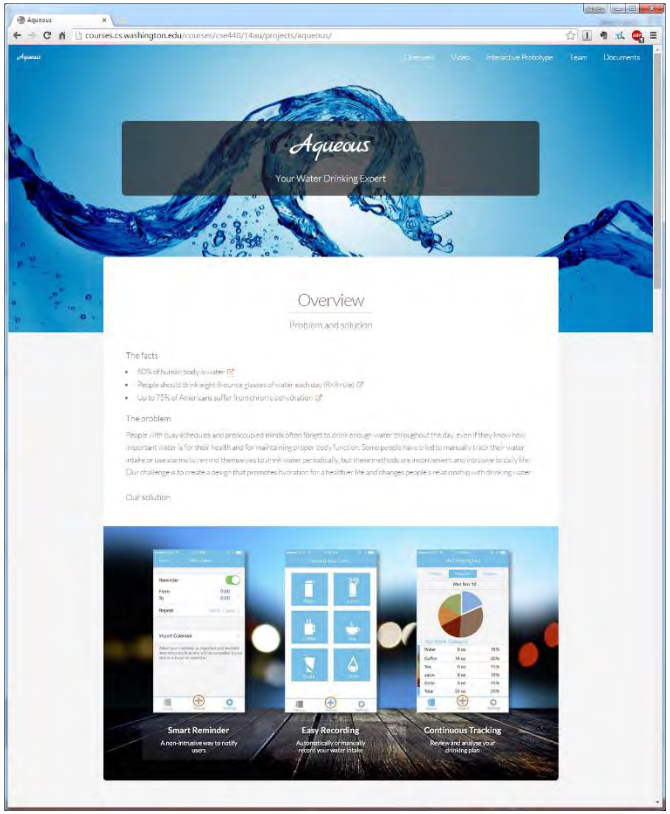
Video Prototypes

GetOut



PickUp

Learn by Example from Prior Projects



Autumn 2014 - Aqueous:

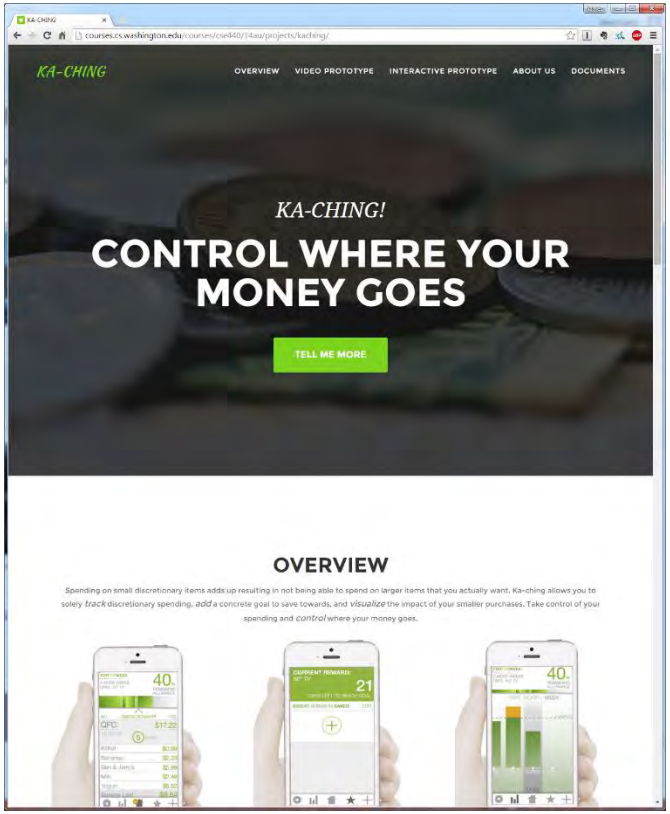
https://courses.cs.washington.edu/courses/cse440/14au/projects/aqueous/

Learn by Example from Prior Projects

Autumn 2014 - IEP Connect:

https://courses.cs.washington.edu/courses/cse440/14au/projects/iepconnect/

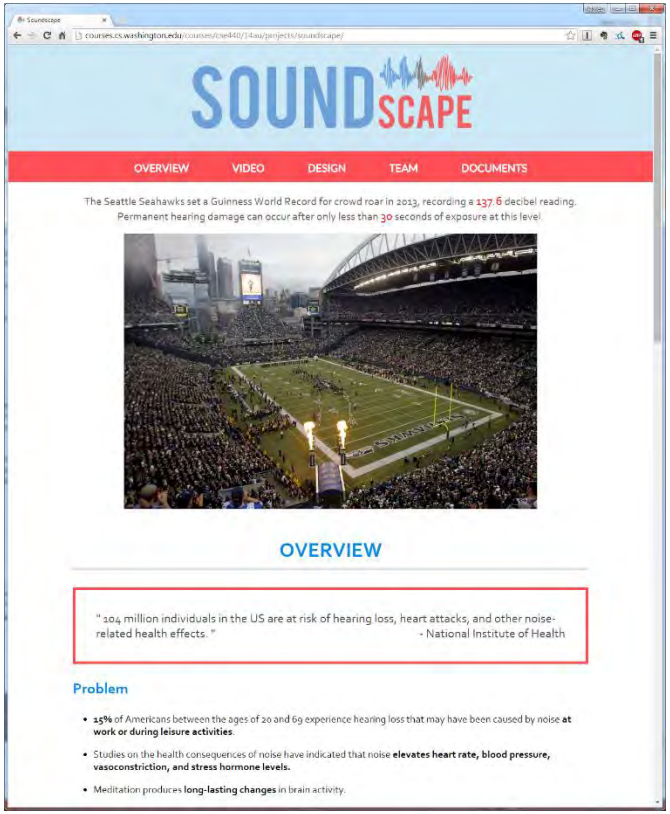
Learn by Example from Prior Projects



Autumn 2014 - Ka-Ching:

https://courses.cs.washington.edu/courses/cse440/14au/projects/kaching/

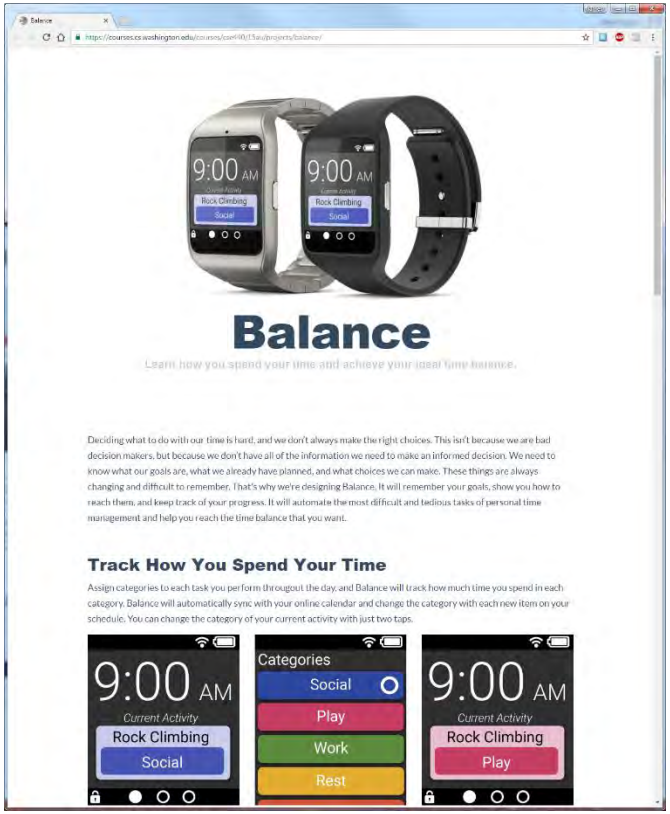
Learn by Example from Prior Projects



Autumn 2014 - Soundscape:

https://courses.cs.washington.edu/courses/cse440/14au/projects/soundscape/

Learn by Example from Prior Projects



Autumn 2015 - Balance:

https://courses.cs.washington.edu/courses/cse440/15au/projects/balance/

Learn by Example from Prior Projects

Autumn 2015 - Neat:

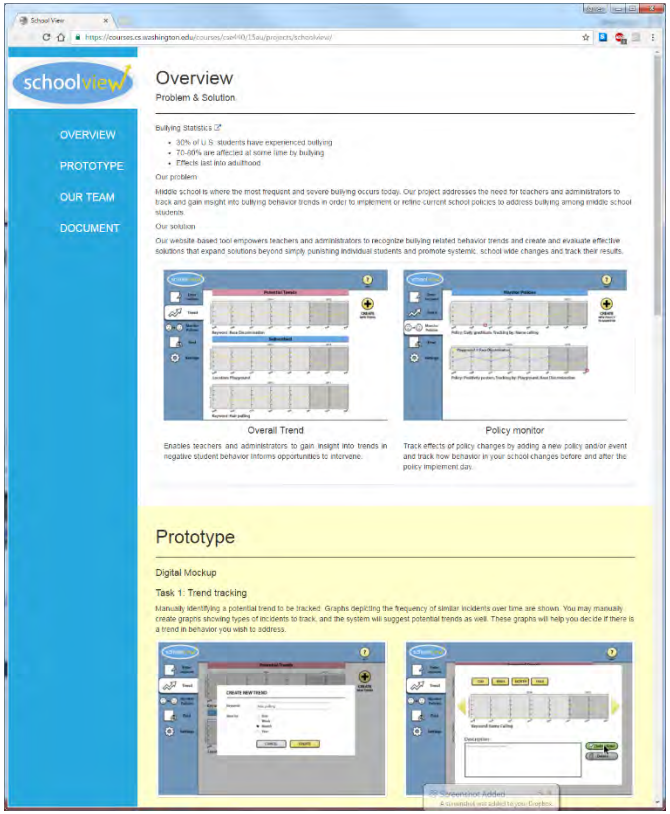
https://courses.cs.washington.edu/courses/cse440/15au/projects/neat/

Learn by Example from Prior Projects

Autumn 2015 - Poliscope:

https://courses.cs.washington.edu/courses/cse440/15au/projects/poliscope/

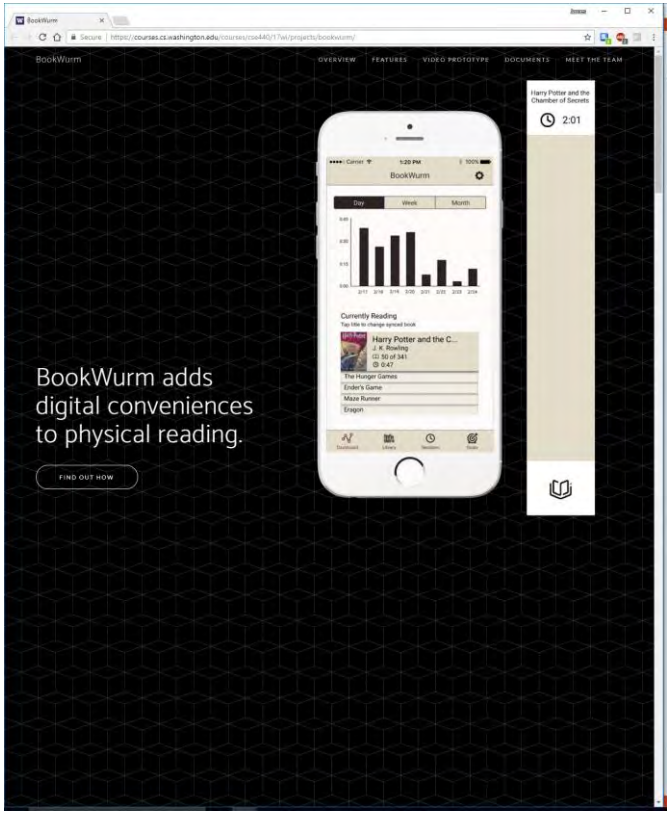
Learn by Example from Prior Projects



Autumn 2015 - School View:

https://courses.cs.washington.edu/courses/cse440/15au/projects/schoolview/

Learn by Example from Prior Projects



Winter 2017 - BookWurm:

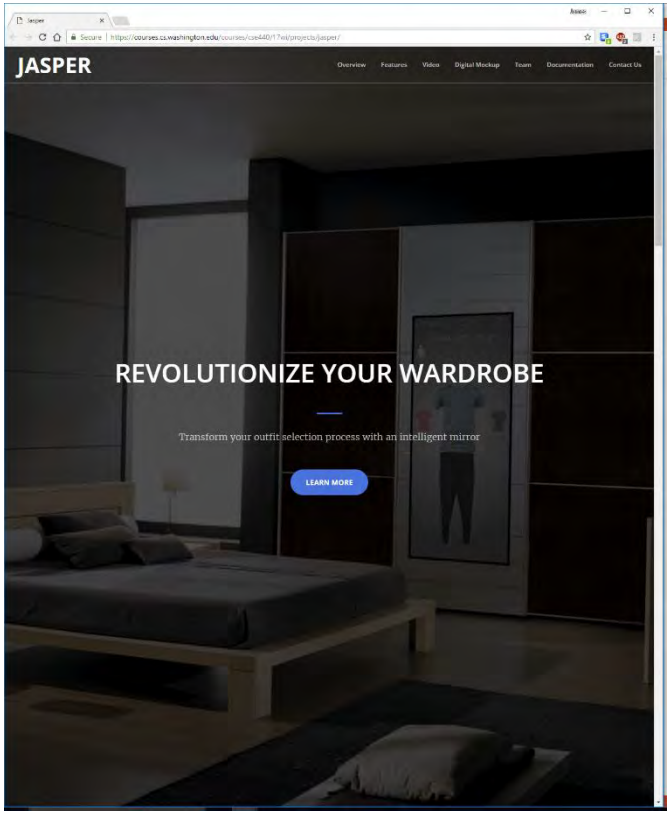
https://courses.cs.washington.edu/courses/cse440/17wi/projects/bookwurm/

Learn by Example from Prior Projects

Winter 2017 - Dash:

https://courses.cs.washington.edu/courses/cse440/17wi/projects/dash/

Learn by Example from Prior Projects



Winter 2017 - Jasper:

https://courses.cs.washington.edu/courses/cse440/17wi/projects/jasper/

Learn by Example from Prior Projects

Winter 2017 - Wishing Well:

https://courses.cs.washington.edu/courses/cse440/17wi/projects/wishingwell/

Studio Time in Section and Lecture

This course is designed around rapid feedback

Section is primarily studio time with the staff

- Groups will be formed within section
- Your team always brings a milestone to studio
- Participation is a critical component of the course

Tuesday milestones

- Your team always has a milestone due
- Class may include project time or activity
- Seek feedback (e.g., via office hours)

Overview

HCI and the Project Sequence

Course Staff Introductions

Administrivia

Assignment 1: Project Proposal

- Assignment 1a: Due Tonight
- Assignment 1b: Due Monday Night

Some Reflection

Self-Tracking and Relevant Background

Who We Are

James Fogarty

Prefer: James / He / Him

Background

BS, Virginia Tech, 2000
PhD, Carnegie Mellon, 2006
Joined UW CSE, 2006
Professor, effective Autumn 2017

Brief Industrial Stints

IBM, 2000
IBM Research, 2003
Microsoft Research, 2007

Who We Are

Cross-Campus HCI

- DUB
- MHCID

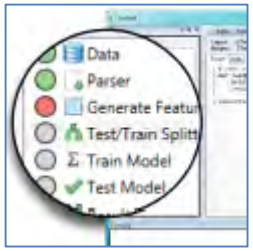
Cross-Campus Digital Health

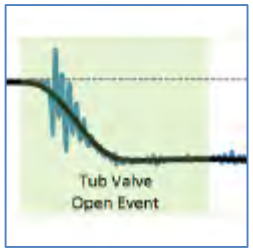
- UW Medicine Digital Health Advisory Committee
- UW Population Health Executive Committee

Teaching

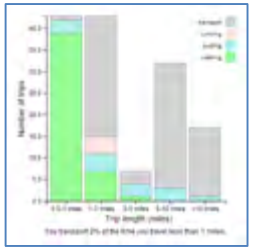
- CSE 440: Introduction to HCI
- CSE 441: Advanced HCI
- CSE 510: Advanced Topics in HCI
- CSEP 510: Human-Computer Interaction
- CSE 332: Data Structures

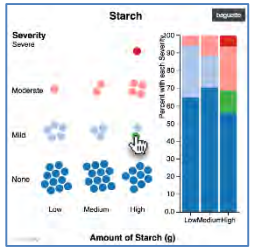
Who We Are

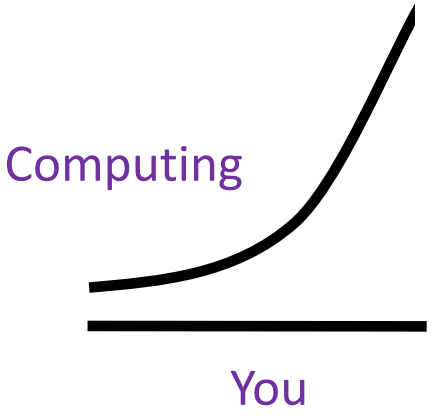

Data
Parser
Test/Train Split
Train Model
Test Model


Tub Valve
Open Event

110
Drag




Starch
Severity
Severe
Moderate
Mild
None
Low
Medium
High
Amount of Starch (g)


Computing
You

Who We Are

Kailey Chan

Prefer: Kailey / She / Her

Background

BA, Psychology, UW, 2016

MS, HCDE, UW, 2018

Research

Social Psychology (Social-Identity, Social Media)

Contextual Interfaces

Interests:

Cooking, Traveling, DIY Crafts, Dogs

Who We Are

Dhruv Jain

Prefer: DJ / He / Him

Background

B.Tech, IIT Delhi, 2013

MS, MIT Media Lab, 2016

PhD, UW, 2017 -

Research

Accessible Technologies

Augmented / Virtual Reality

Interests:

Scuba Diving (ah well…not anymore)

Who We Are

Nigini Oliveira

Prefer: Nigini / He / Him

Background

BS-MS, UFCG – Brazil, 2007

Entrepreneur/Lecturer, - 2012

PhD, UFCG (+UW), 2017

Research

Cross-Cultural Collaboration Design

Online Experimentation

Interests:

Literature, Bike Riding, Photography, Chatting, Coffee

Who We Are

Jihoon Suh

Prefer: Jihoon / He / Him

Background

BS, KAIST Industrial Design, 2016

MS, UW HCDE, 2018

Research

Spatial User Interfaces

Tangible Interaction

Interests:

Riding Boards (longboard, paddleboard, wakeboard)

Graffiti, Street Art (legal restrictions)

Who We Are

Christopher Seeds

Prefer: Chris / He / Him

Background:

BFA , Visual Communication Design,
Kent State University, 2010

Designer in Ohio & NYC, 2010–2016

MDes, UW SoA,AH,&D, 2018

Research:

Slow Design, Design + Storytelling

Interests:

Podcasts, My Boston Terrier, Concrete Things

Overview

HCI and the Project Sequence

Course Staff Introductions

Administrivia

Assignment 1: Project Proposal

- Assignment 1a: Due for Friday
- Assignment 1b: Due for Tuesday

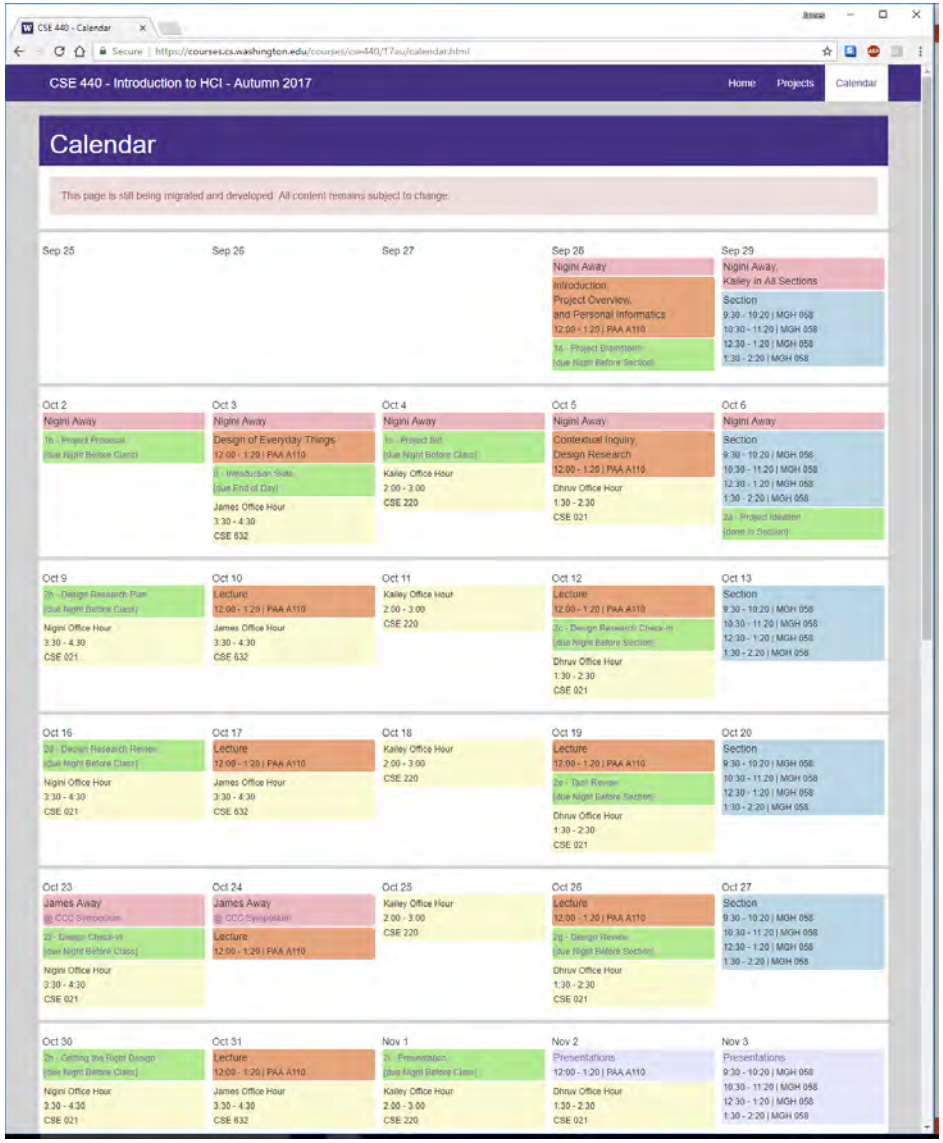
Some Reflection

Self-Tracking and Relevant Background

Staying in Touch

Web:	http://www.cs.washington.edu/440 You are responsible for calendar
Email Us:	cse440-staff [at] cs.washington.edu
Email:	You are responsible for course email list
Office Hours:	Posted on Calendar Also By Appointment
Canvas:	I hate Canvas so much but we have to use it for some things
Panopto:	I will probably mess it up at least once

Calendar Overview



GitHub Repository

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

https://github.com/uwcse440/web-cse440-au17/

You will contribute when posting your projects

You can otherwise contribute if you see the opportunity

Grading

We provide a grading scale, but it is subjective

- Design is subjective, and so is this course
- Wow us with your work, not with complaining

Entire project process is designed for feedback

- Milestone grades mean you did the milestone
- You still must act on feedback as part of continuing to refine and develop your project
- A focus on “doing the work” and “getting feedback” means final grades are more “quality of result”

Grading

Group Project: 65%

3% Assignment 1

21% Assignment 2: Getting the Right Design

Final Report 15%, Milestones 6%

14% Assignment 3: Getting the Design Right

Final Report 10%, Milestones 4%

15% Assignment 4: Communicating the Design

Website 5%, Video Prototype 5%, Poster 5%

12% Presentations

Getting the Right Design 5%,
Getting the Design Right 5%, Individual 2%

Exam: 25%

Individual Readings: 5%

Participation: 5%

Submissions

Many assignments are due “night before class”

Canvas will operationalize this as 11:59pm

A bit more slack, but definitely “before I wake up”

We need your submissions as part of
our preparation for in-class feedback

“Day of class”, “just before class”, or “in class”
are all unacceptable, risking zero credit

Do not use this to undermine team work

“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 assignment

Additional resources will be made available

- If you find others you want to share, email us

Overview

HCI and the Project Sequence

Course Staff Introductions

Administrivia

Assignment 1: Project Proposal

- Assignment 1a: Due for Friday
- Assignment 1b: Due for Tuesday

Some Reflection

Self-Tracking and Relevant Background

Project Proposal Schedule

Project Brainstorm Due Tonight

- Brainstorming in Section Friday

Project Proposal Due Monday Night

- Sponsored Projects Posted Tuesday

Project Bids Due Wednesday Night

- Groups Assigned Thursday
- Group Brainstorming in Section Friday

Assignment 1a: Project Brainstorm

You have an assignment due tonight:

https://courses.cs.washington.edu/courses/cse440/17au/assignments/assignment1/

Propose 3 project domains, problems, goals:

- These are starting points for brainstorming

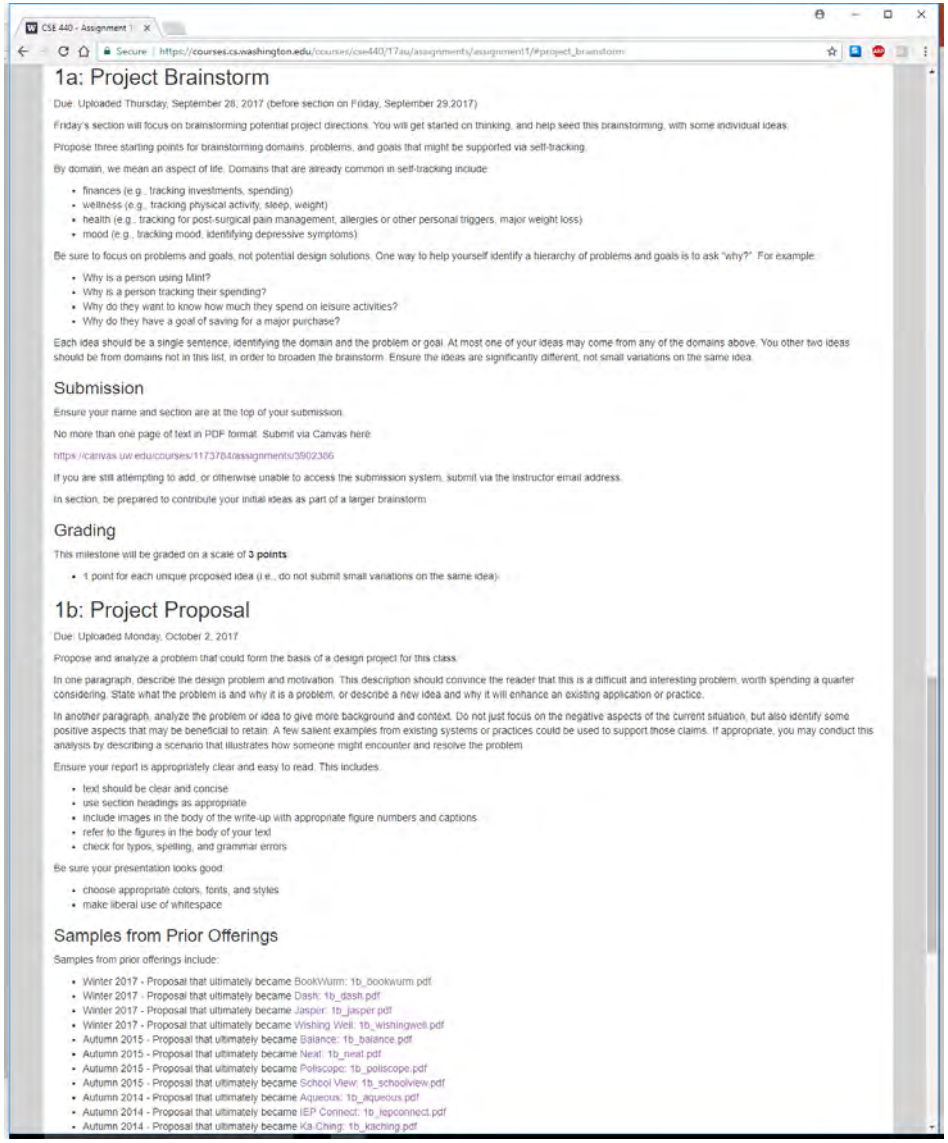
Submit online:

- This proves that you did your preparation
- If unable to access Canvas, submit via email

Bring to section Friday:

- You have a lot more brainstorming ahead of you

Assignment 1a: Project Brainstorm



CSE 440 - Assignment 1

Secure | https://courses.cs.washington.edu/courses/cse440/17au/assignments/assignment1/#project_brainstorm

1a: Project Brainstorm

Due: Uploaded Thursday, September 28, 2017 (before section on Friday, September 29,2017)

Friday's section will focus on brainstorming potential project directions. You will get started on thinking, and help seed this brainstorming, with some individual ideas.

Propose three starting points for brainstorming domains, problems, and goals that might be supported via self-tracking.

By domain, we mean an aspect of life. Domains that are already common in self-tracking include:

- finances (e.g., tracking investments, spending)
- wellness (e.g., tracking physical activity, sleep, weight)
- health (e.g., tracking for post-surgical pain management, allergies or other personal triggers, major weight loss)
- mood (e.g., tracking mood, identifying depressive symptoms)

Be sure to focus on problems and goals, not potential design solutions. One way to help yourself identify a hierarchy of problems and goals is to ask "why?". For example:

- Why is a person using Mint?
- Why is a person tracking their spending?
- Why do they want to know how much they spend on leisure activities?
- Why do they have a goal of saving for a major purchase?

Each idea should be a single sentence, identifying the domain and the problem or goal. At most one of your ideas may come from any of the domains above. You other two ideas should be from domains not in this list, in order to broaden the brainstorm. Ensure the ideas are significantly different, not small variations on the same idea.

Submission

Ensure your name and section are at the top of your submission.

No more than one page of text in PDF format. Submit via Canvas here:

https://canvas.uw.edu/courses/1173784/assignments/3902386

If you are still attempting to add, or otherwise unable to access the submission system, submit via the instructor email address.

In section, be prepared to contribute your initial ideas as part of a larger brainstorm.

Grading

This milestone will be graded on a scale of **3 points**:

- 1 point for each unique proposed idea (i.e., do not submit small variations on the same idea).

1b: Project Proposal

Due: Uploaded Monday, October 2, 2017

Propose and analyze a problem that could form the basis of a design project for this class.

In one paragraph, describe the design problem and motivation. This description should convince the reader that this is a difficult and interesting problem, worth spending a quarter considering. State what the problem is and why it is a problem, or describe a new idea and why it will enhance an existing application or practice.

In another paragraph, analyze the problem or idea to give more background and context. Do not just focus on the negative aspects of the current situation, but also identify some positive aspects that may be beneficial to retain. A few salient examples from existing systems or practices could be used to support those claims. If appropriate, you may conduct this analysis by describing a scenario that illustrates how someone might encounter and resolve the problem.

Ensure your report is appropriately clear and easy to read. This includes:

- text should be clear and concise
- use section headings as appropriate
- include images in the body of the write-up with appropriate figure numbers and captions
- refer to the figures in the body of your text
- check for typos, spelling, and grammar errors

Be sure your presentation looks good:

- choose appropriate colors, fonts, and styles
- make liberal use of whitespace

Samples from Prior Offerings

Samples from prior offerings include:

- Winter 2017 - Proposal that ultimately became BookWurm: 1b_bookwurm.pdf
- Winter 2017 - Proposal that ultimately became Dash: 1b_dash.pdf
- Winter 2017 - Proposal that ultimately became Jasper: 1b_jasper.pdf
- Winter 2017 - Proposal that ultimately became Wishing Well: 1b_wishingwell.pdf
- Autumn 2015 - Proposal that ultimately became Balance: 1b_balance.pdf
- Autumn 2015 - Proposal that ultimately became Neat: 1b_neat.pdf
- Autumn 2015 - Proposal that ultimately became Poliscope: 1b_poliscope.pdf
- Autumn 2015 - Proposal that ultimately became School View: 1b_schoolview.pdf
- Autumn 2014 - Proposal that ultimately became Aqueous: 1b_aqueous.pdf
- Autumn 2014 - Proposal that ultimately became IEP Connect: 1b_iepconnect.pdf
- Autumn 2014 - Proposal that ultimately became Ka-Ching: 1b_kaching.pdf

Assignment 1b: Project Proposal

You have an assignment due Monday night:

https://courses.cs.washington.edu/courses/cse440/17au/assignments/assignment1/

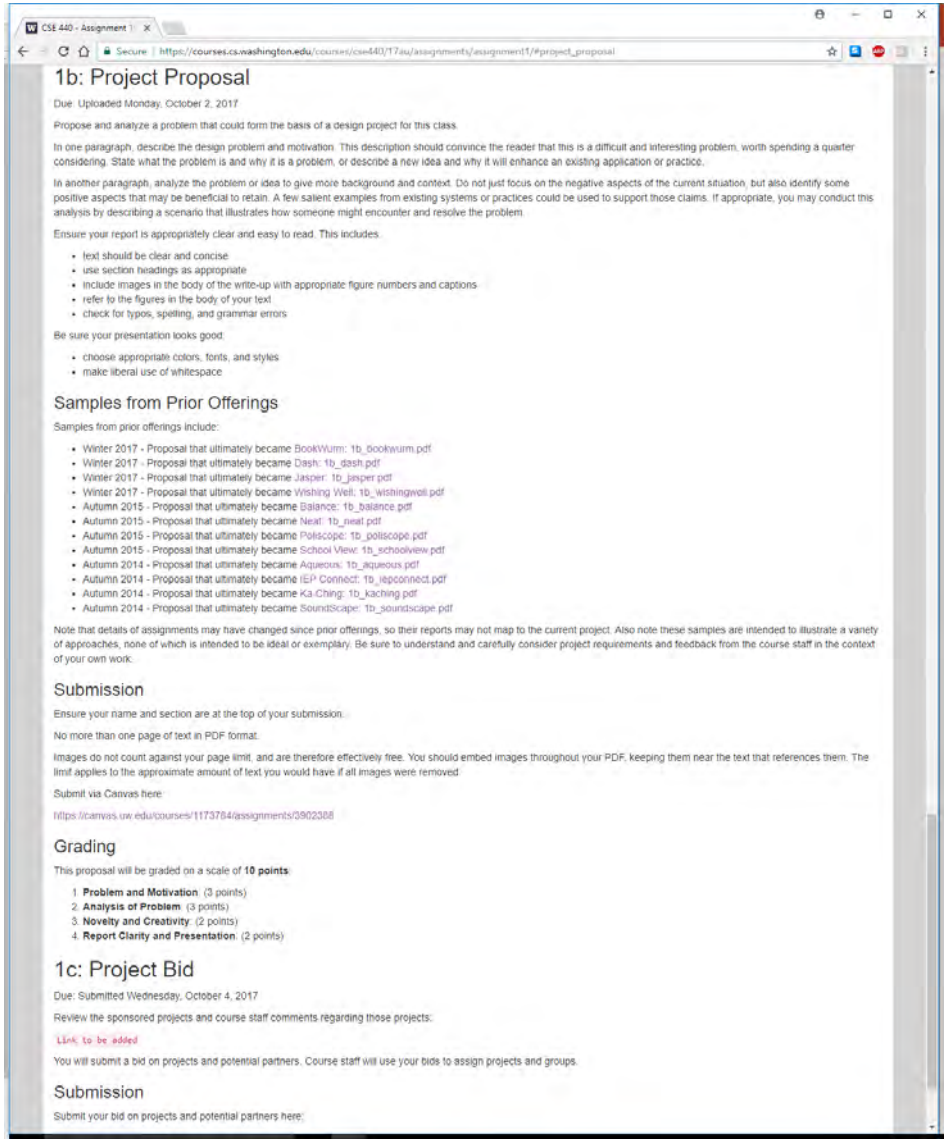
One page of text:

- Problem and Motivation
- Analyze the problem or idea (e.g., a scenario)

Submit online:

- Sponsored Projects will be posted for bidding

Assignment 1b: Project Proposal



CSE 440 - Assignment 1 | Secure | https://courses.cs.washington.edu/courses/cse440/17au/assignments/assignment1/#project_proposal

1b: Project Proposal

Due: Uploaded Monday, October 2, 2017

Propose and analyze a problem that could form the basis of a design project for this class.

In one paragraph, describe the design problem and motivation. This description should convince the reader that this is a difficult and interesting problem, worth spending a quarter considering. State what the problem is and why it is a problem, or describe a new idea and why it will enhance an existing application or practice.

In another paragraph, analyze the problem or idea to give more background and context. Do not just focus on the negative aspects of the current situation, but also identify some positive aspects that may be beneficial to retain. A few salient examples from existing systems or practices could be used to support those claims. If appropriate, you may conduct this analysis by describing a scenario that illustrates how someone might encounter and resolve the problem.

Ensure your report is appropriately clear and easy to read. This includes:

- text should be clear and concise
- use section headings as appropriate
- include images in the body of the write-up with appropriate figure numbers and captions
- refer to the figures in the body of your text
- check for typos, spelling, and grammar errors

Be sure your presentation looks good:

- choose appropriate colors, fonts, and styles
- make liberal use of whitespace

Samples from Prior Offerings

Samples from prior offerings include:

- Winter 2017 - Proposal that ultimately became BookWurm: 1b_bookwurm.pdf
- Winter 2017 - Proposal that ultimately became Dash: 1b_dash.pdf
- Winter 2017 - Proposal that ultimately became Jasper: 1b_jasper.pdf
- Winter 2017 - Proposal that ultimately became Wishing Well: 1b_wishingwell.pdf
- Autumn 2015 - Proposal that ultimately became Balance: 1b_balance.pdf
- Autumn 2015 - Proposal that ultimately became Neat: 1b_neat.pdf
- Autumn 2015 - Proposal that ultimately became Poliscope: 1b_poliscope.pdf
- Autumn 2015 - Proposal that ultimately became School View: 1b_schoolview.pdf
- Autumn 2014 - Proposal that ultimately became Aqueous: 1b_aqueous.pdf
- Autumn 2014 - Proposal that ultimately became IEP Connect: 1b_iepconnect.pdf
- Autumn 2014 - Proposal that ultimately became Ka-Ching: 1b_kaching.pdf
- Autumn 2014 - Proposal that ultimately became SoundScape: 1b_soundscape.pdf

Note that details of assignments may have changed since prior offerings, so their reports may not map to the current project. Also note these samples are intended to illustrate a variety of approaches, none of which is intended to be ideal or exemplary. Be sure to understand and carefully consider project requirements and feedback from the course staff in the context of your own work.

Submission

Ensure your name and section are at the top of your submission.

No more than one page of text in PDF format.

Images do not count against your page limit, and are therefore effectively free. You should embed images throughout your PDF, keeping them near the text that references them. The limit applies to the approximate amount of text you would have if all images were removed.

Submit via Canvas here:

https://canvas.uw.edu/courses/1173784/assignments/3902388

Grading

This proposal will be graded on a scale of **10 points**:

1. **Problem and Motivation**: (3 points)
2. **Analysis of Problem**: (3 points)
3. **Novelty and Creativity**: (2 points)
4. **Report Clarity and Presentation**: (2 points)

1c: Project Bid

Due: Submitted Wednesday, October 4, 2017

Review the sponsored projects and course staff comments regarding those projects:

Link to be added

You will submit a bid on projects and potential partners. Course staff will use your bids to assign projects and groups.

Submission

Submit your bid on projects and potential partners here:

Overview

HCI and the Project Sequence

Course Staff Introductions

Administrivia

Assignment 1: Project Proposal

- Assignment 1a: Due for Friday
- Assignment 1b: Due for Tuesday

Some Reflection

Self-Tracking and Relevant Background

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 some aspects of what the CSE curriculum has taught you is important

It will be what you make it

People Really Get It

"Very good class that every engineer should have to take. Good perspectives and made me think outside my comfort zone."

"The focus on projects and fieldwork was very well suited to my learning style. I greatly enjoyed this format. The theory and techniques taught in class were directly applicable to the projects we were doing and were usually timed very well. That is, usually the topics presented in lecture were relevant to the current deliverable or the next deliverable."

People Really Get It

"I can't believe I'm saying this, but I found the lectures a huge part of what I learned in this course. They were useful and organized, and each one had a clear message and topic. The assignments were an excellent extension of these themes."

"Fieldwork and iterative assignments really taught me how important the design process is."

Group Work is Hard Work

"the project placed groups in a realistic situation and forced us to work together effectively and practice relevant concepts/strategies"

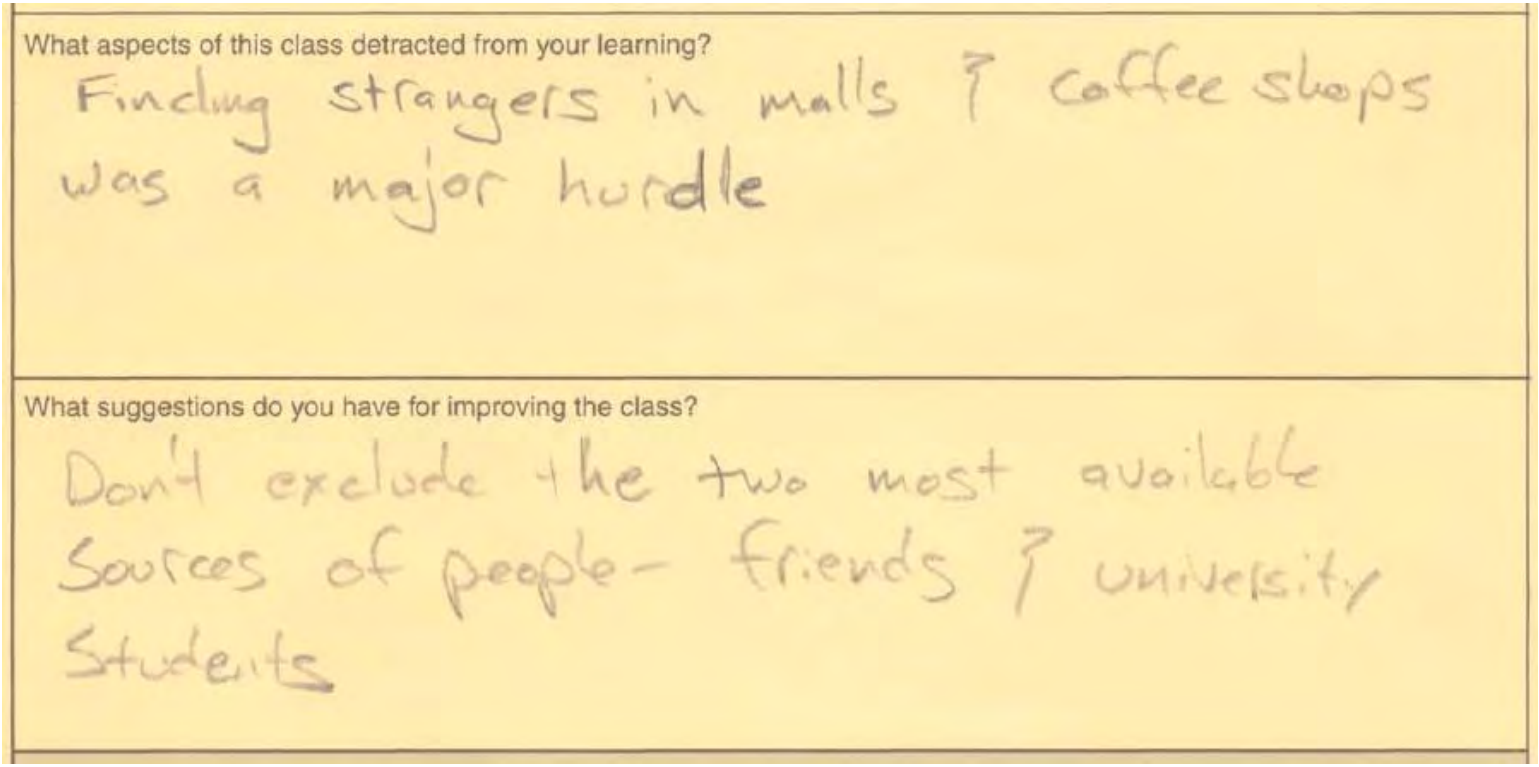
"The group work was distracting because of the lack of unity and sense of purpose. We all had different priorities and purposes for taking the class and this made it really hard to be on the same page for the project which was the biggest part of this class."

Group Work is Hard Work

"Have groups do a team charter - outlining what they expect from one another as teammates. I took a project management course and when working in a group with individuals you've never worked with, the team charter may help break the ice easier when everyone can say what their expectations are."

"… I think that working effectively as a team was the most challenging part of this class …"

And it is not for Everybody



What aspects of this class detracted from your learning?

Finding strangers in malls & coffee shops was a major hurdle

What suggestions do you have for improving the class?

Don't exclude the two most available sources of people- friends & university students

Adding and Dropping

Attempting to Add

- Must talk to me after class
- Will email today, attempt to finalize quickly
- Must enforce a hard enrollment cap

Considering Dropping

- Do so before we assign teams, and tell us

Section switch availability

- We may need help in balancing sections

Overview

HCI and the Project Sequence

Course Staff Introductions

Administrivia

Assignment 1: Project Proposal

- Assignment 1a: Due for Friday
- Assignment 1b: Due for Tuesday

Some Reflection

Self-Tracking and Relevant Background

Thousands of Health Monitoring Apps

Activity and Medical Sensing Devices

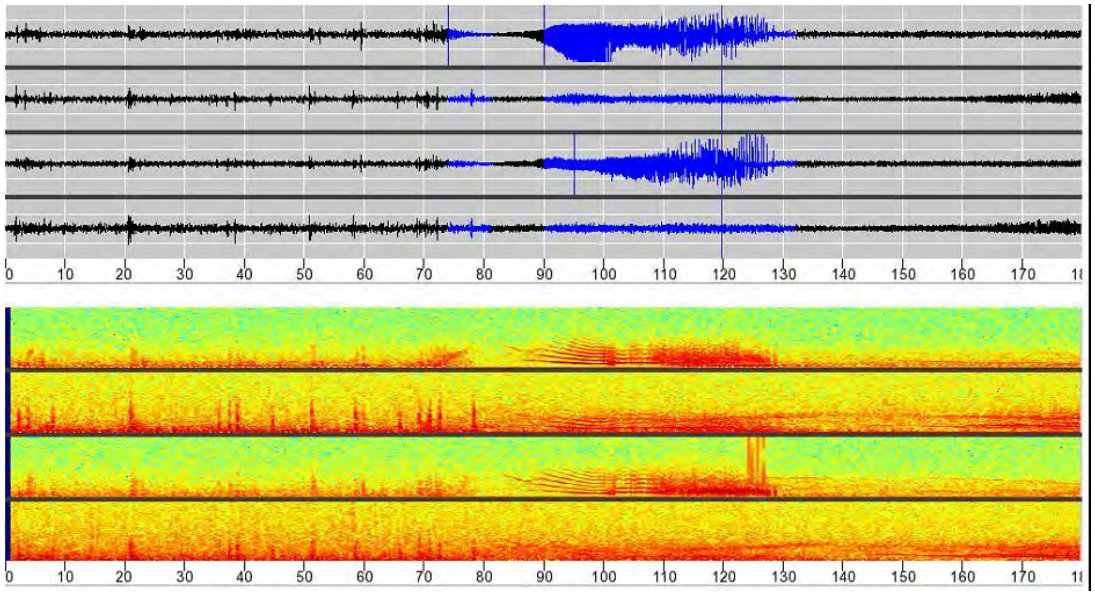
Blood glucose meter

Thermometer

Blood pressure monitor

Heart rate monitor

Medical Implants



NeuroPace

Sustainability Tracking

Kill A Watt

Belkin
WeMo Water

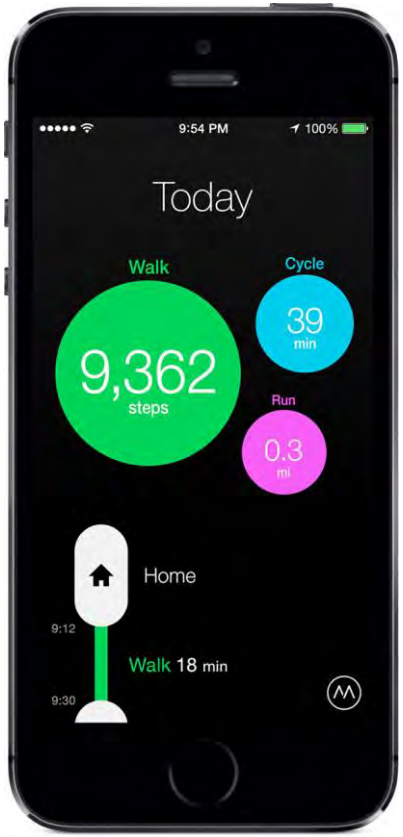
Automatic

Location and Activity

FitBit

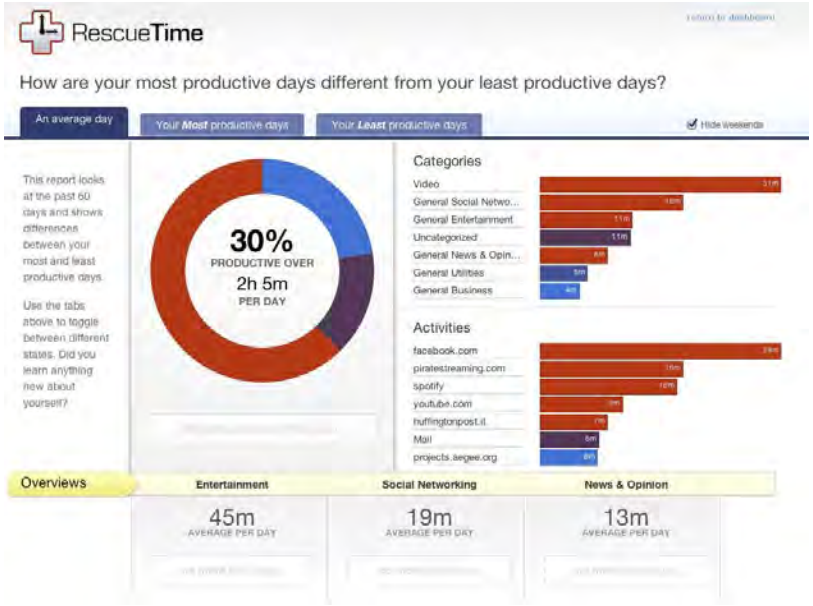
Garmin

FitBark



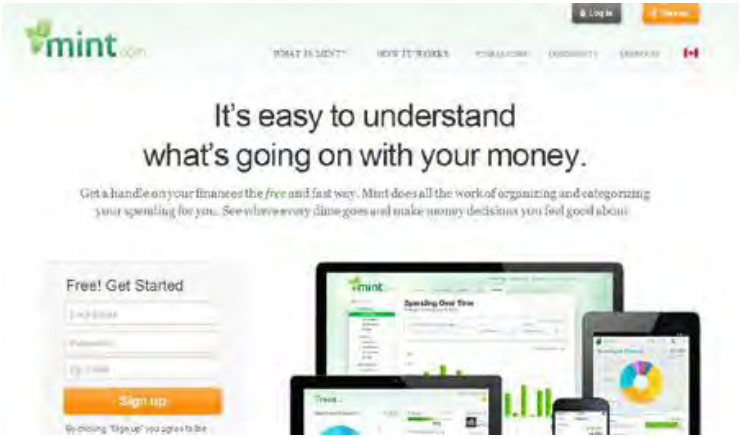
Moves

Time Tracking



RescueTime

Finances



Mint

You Need a Budget

Background in Personal Informatics

Some Definitions

What is the Point?

What is the Problem?

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

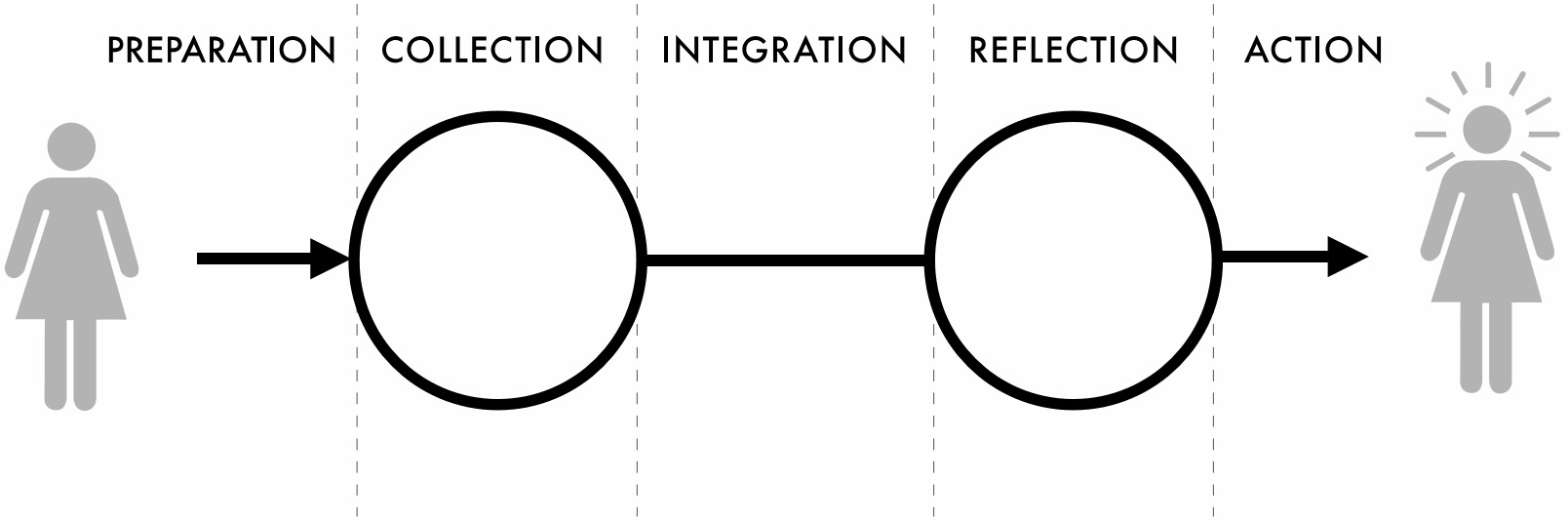
Benjamin Franklin

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

万歩計

Five-Stage Model of Personal Informatics



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"

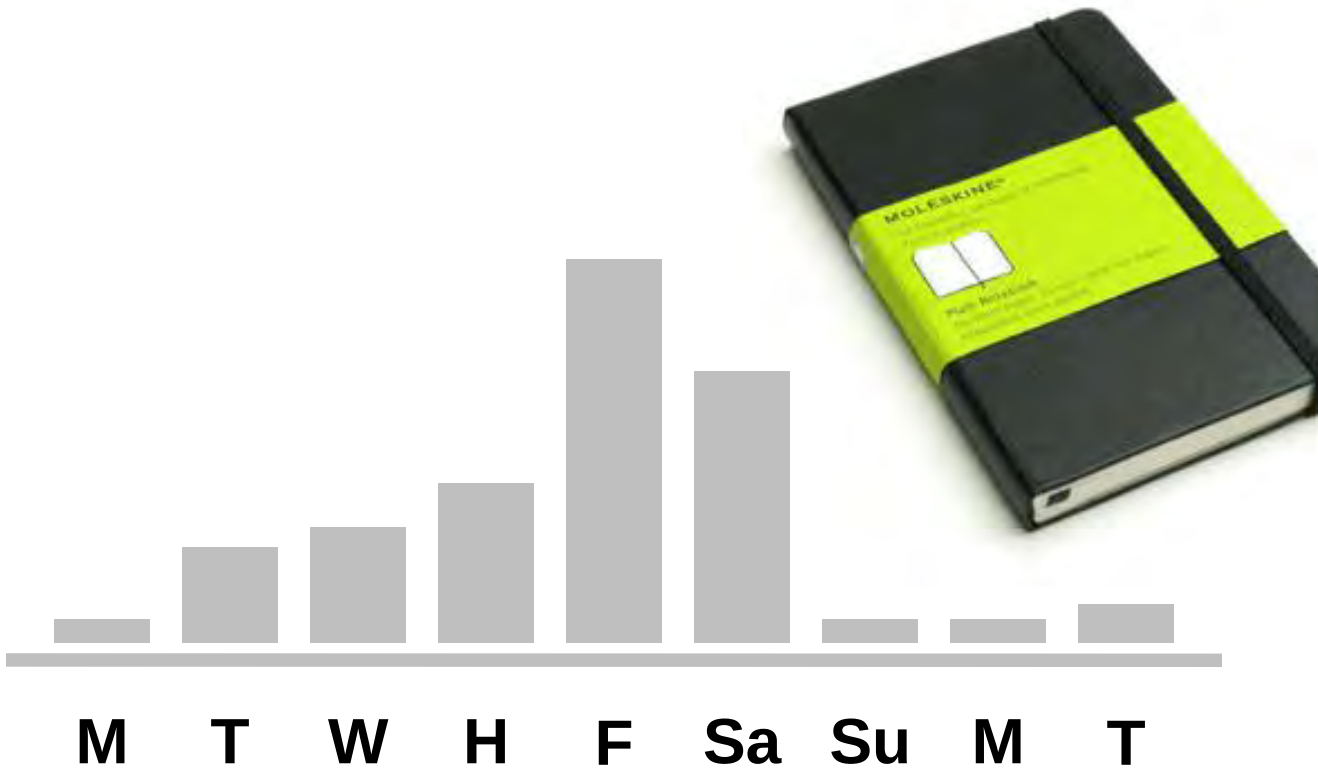
Preparation

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

Collection

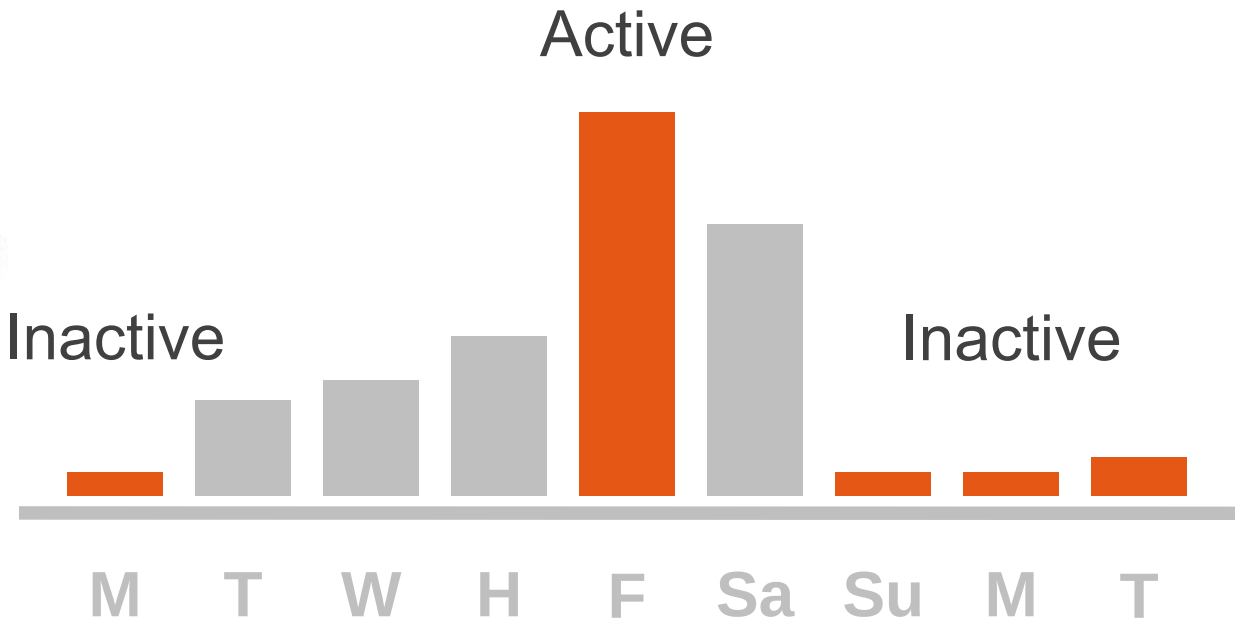
Li I., Dey A., Forlizzi J. *CHI 2010.*
"A Stage-Based Model of Personal Informatics Systems"

Integration



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

Reflection



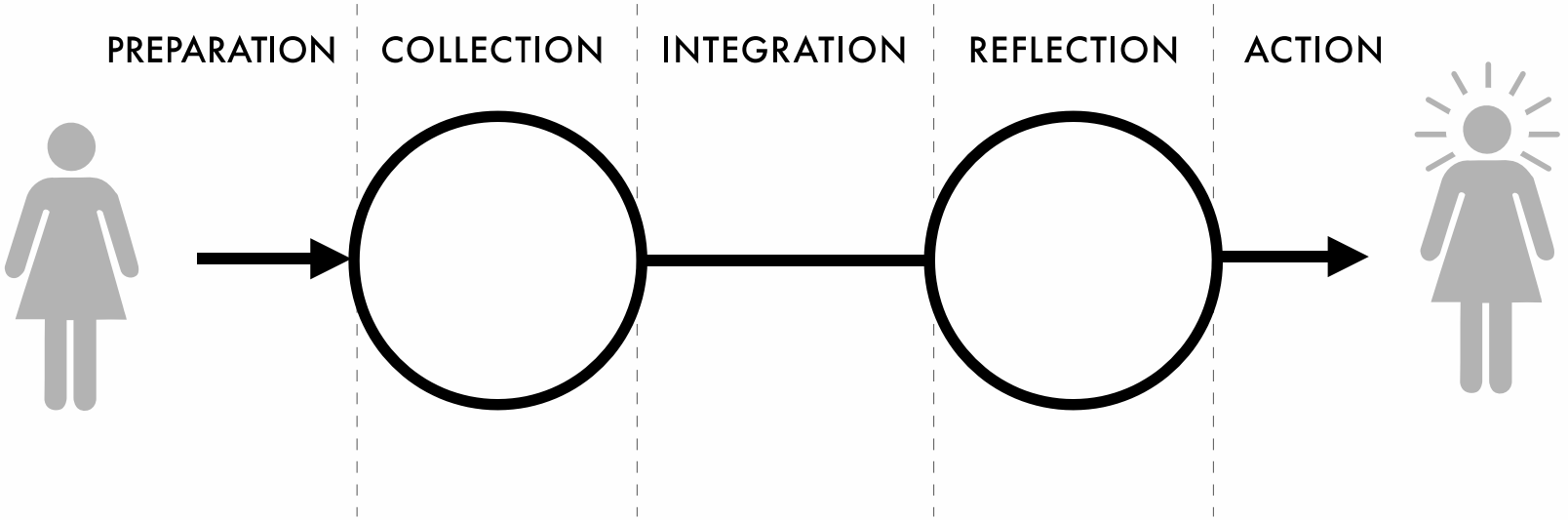
Li I., Dey A., Forlizzi J. *CHI 2010.*
"A Stage-Based Model of Personal Informatics Systems"

Action

Walk in park instead of watching TV

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

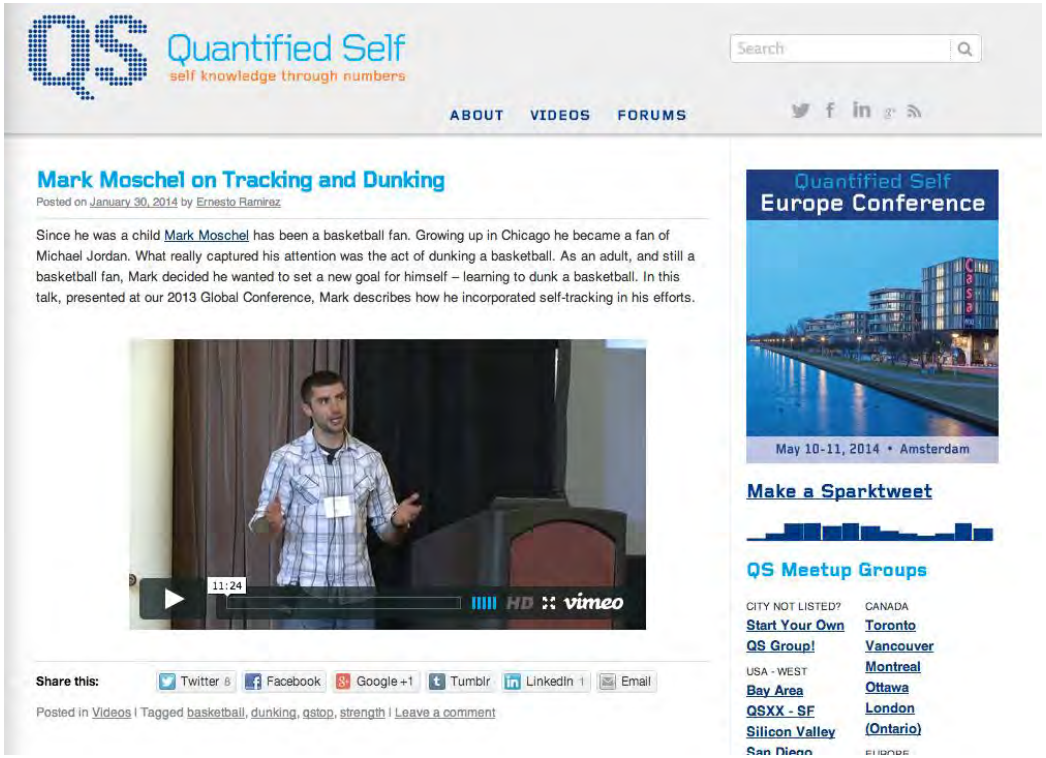
Five-Stage Model of Personal Informatics



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

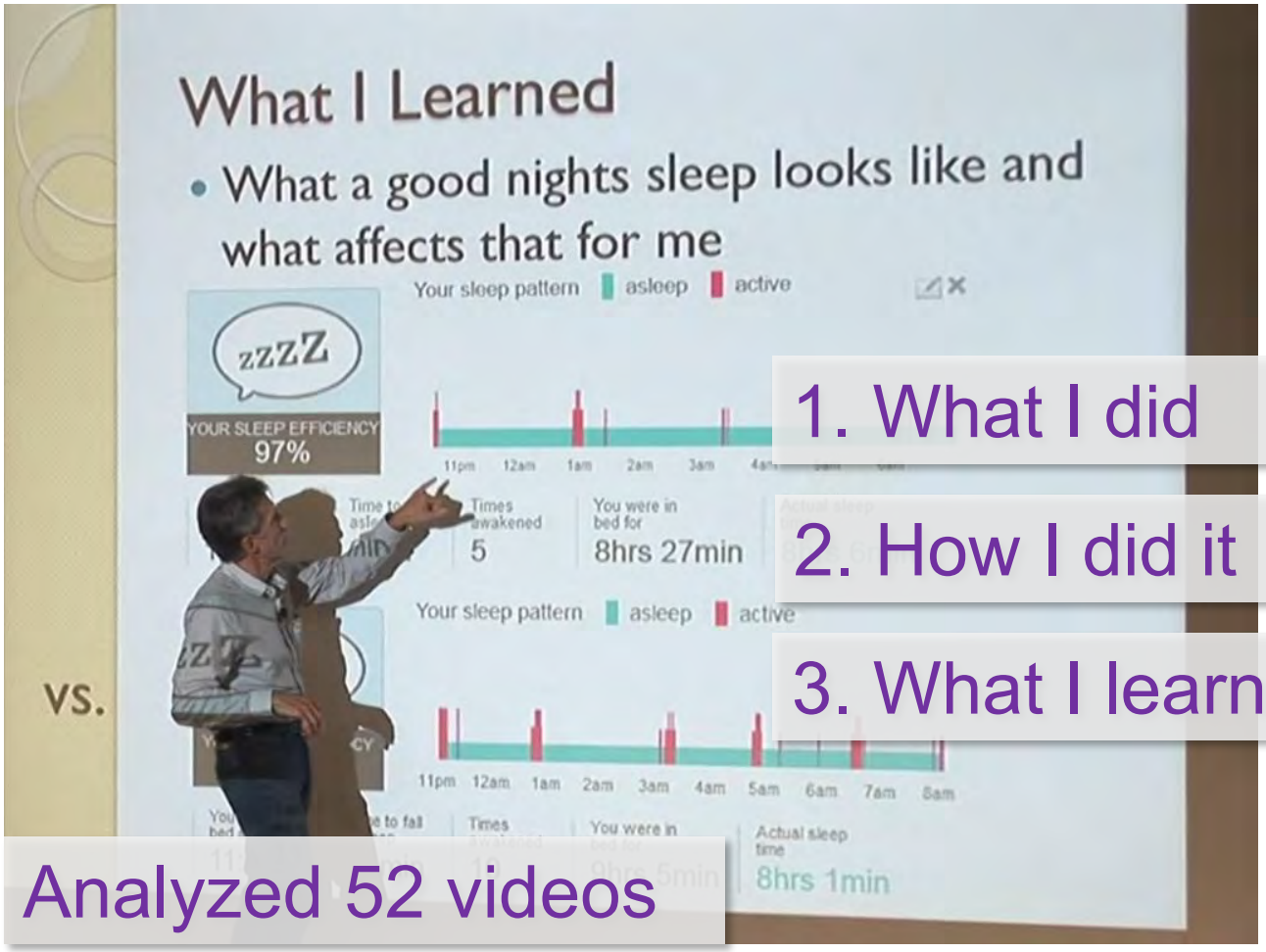
What is the Problem?

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



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"

Quantified Self Talk Format



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

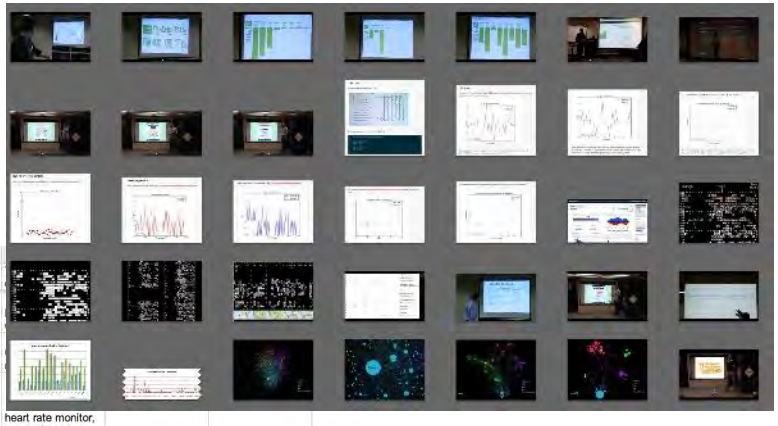
Analyzed 52 videos

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"

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

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"

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

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"

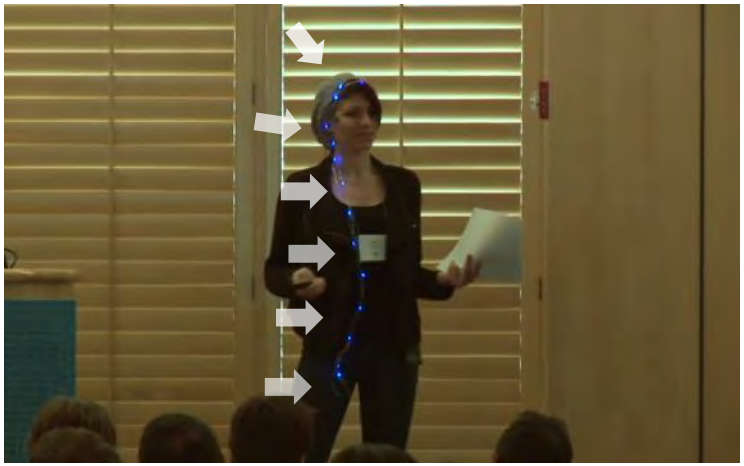
Data Collection and Exploration Tools

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)

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"

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.
"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

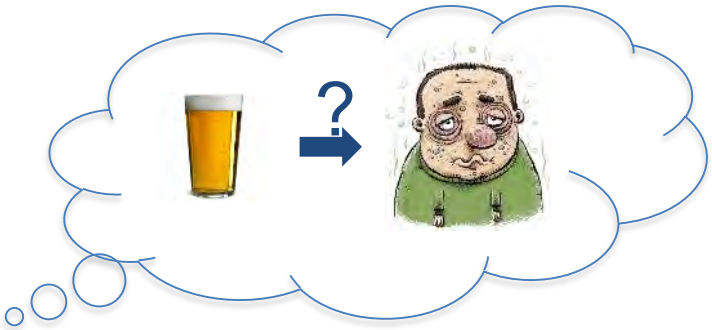
Missing information on how to improve outcome

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"

Barriers and Negative Nudges

"It was too time consuming and tedious. I also did not know what to enter if I ate out, so I often did not enter data and that compounded. I also felt embarrassed to do it in front of friends so I stopped."

Negative Nudges:

Contrasting difficulty of entry

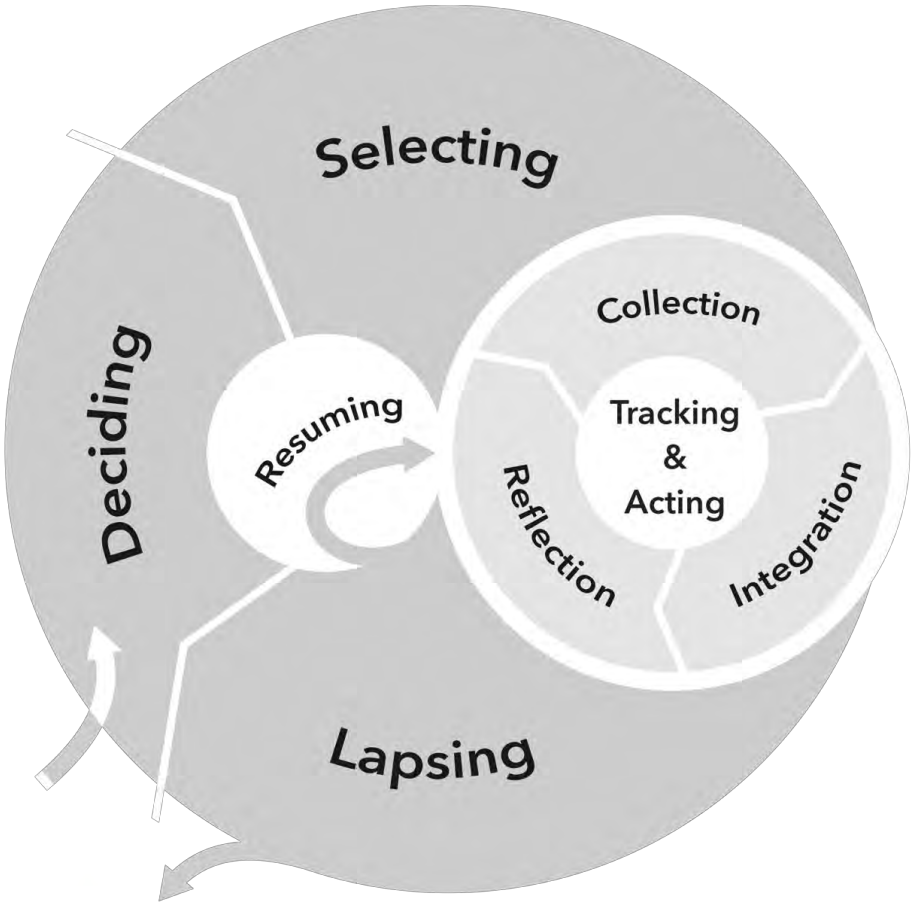
Judgment and choosing not to journal

Stigma and journaling

Lack or decline in social support

Felicia Cordeiro, Daniel A. Epstein, Edison Thomas, Elizabeth Bales, Arvind K. Kagannathan, Gregory D. Abowd, James Fogarty. CHI 2015. Barriers and Negative Nudges: Exploring Challenges in Food Journaling

A Model of Lived Informatics



Extends 5-stage model to surface additional opportunities and challenges in lifecycle

Returning to a tool (e.g., short/long lapse)

Changing tools (e.g., due to burden)

Changing goals (e.g., due to discovery)

Daniel A. Epstein, An Ping, James Fogarty, Sean Munson. UbiComp 2015.
A Lived Informatics Model of Personal Informatics

Your Challenge

People invest tremendous effort for little value, are frustrated by failure

Do better, help people achieve their goals, solve real problems

Go beyond the data fetish

- Understand the problems people face
- Find the role for interactive technology

Your Challenge

Explore **tracking beyond the self**:

Many forms:

- wearable sensors, phone and watch applications, appliances and artifacts in the environment, hybrid

Many social contexts:

- co-located relationships, remote relationships, communities organizing, seeking help from peers, seeking help from experts

New forms of interaction:

- conversational interfaces, tangible interfaces, ubiquitous computing interfaces

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-staff [at] cs.washington.edu

Attempting to Add

Submit this form to me:

http://tiny.cc/UWCSE440

I will coordinate with CSE advising about majors

Be sure that you and I have communicated before you leave today

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 01:
Introduction and
Personal Informatics

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

DESIGN
USE
BUILD

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 02:
Design Diamond

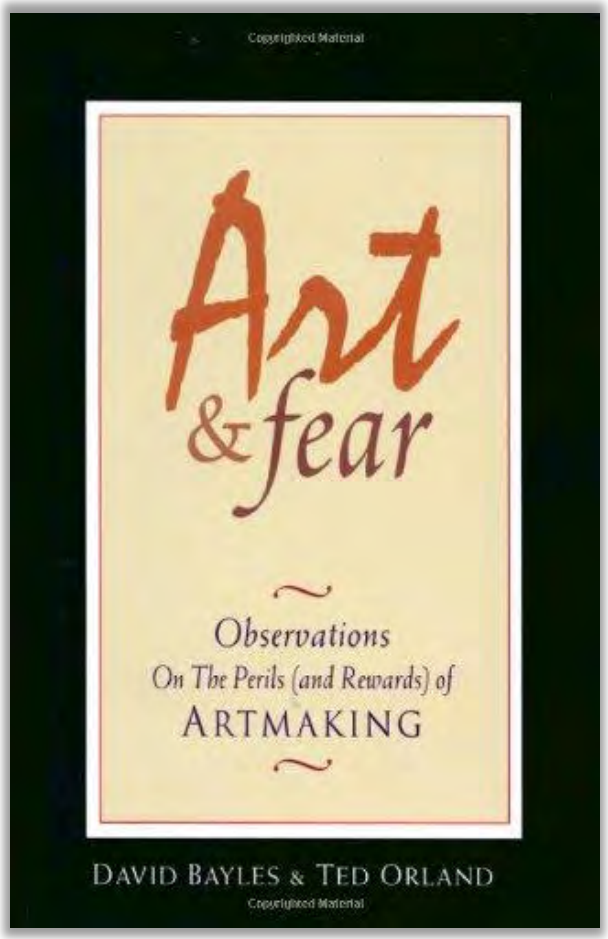
Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

DESIGN
USE
BUILD

Quantity versus Quality



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

Bayles and Orland, 2001

Quantity versus Quality

The quantity class produces better pots. Why?

Bayles and Orland, 2001

Quantity versus Quality

The quantity class produces better pots. Why?

"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

Today

Administrative

- Assignment 0
- Assignment 1c: Project Bid
- Section Balance and Movement
- Denny 303 on Tuesday 10/10

The Design Diamond

- Examining a Design Process
- Sketching and Prototypes

Assignment 0: Flash Card

Name

formal, preferred, pronouns

Majors/Minors

career goals

Year

1,2,3,4,5,6,…

Hometown

Interesting Fact or
“What I did on my …”

Submit PDF via Canvas

Project Status and Assignments

Proposals to be “Funded” and Posted for Bidding

- Bidding Tomorrow, Team Formation Thursday
- Please Watch Your Email During This Process

Looking Forward

- Ideation on Friday in Section
- 2b: Design Research Plan due Tuesday 1/17
- 2c: Design Research Check-In due Friday 1/20
- 2d: Design Research Review due Tuesday 1/24

Other Assignments

- Assignment 0 Due Thursday
- Reading 1 Posted, Due Thursday

Section Balance and Movement

9:30 Section: 12 people

10:30 Section: 15 people

11:30 Section: 14 people

12:30 Section: 13 people

Project bidding will include “bid with section” and “bid in another section”, to allow moving

A “switch section” bid dominates your other bids

Most of you will bid “No Desire to Switch”

Denny 303 on Tuesday 10/10

Today

Administrative

- Assignment 0
- Assignment 1c: Project Bid
- Section Balance and Movement
- Denny 303 on Tuesday 10/10

The Design Diamond

- Examining a Design Process
- Sketching and Prototypes

Objectives

Be able to:

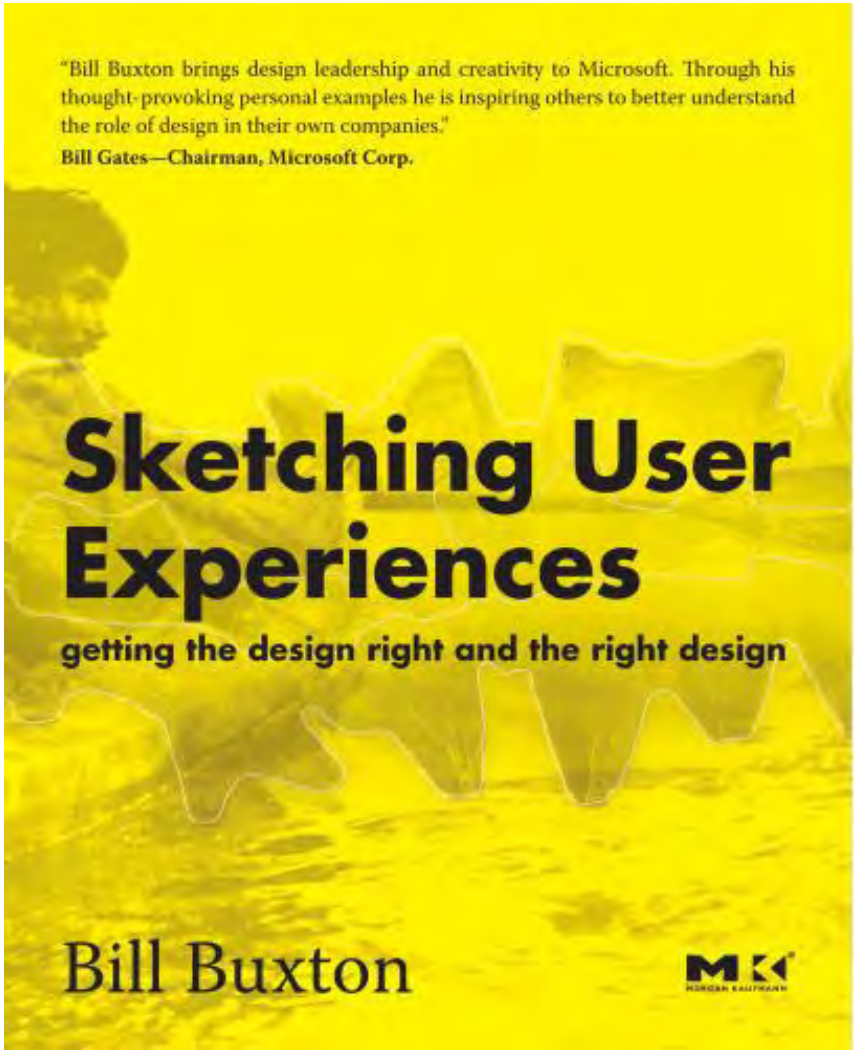
Describe an iterative design process

Describe the design diamond model of design, its implications, and how it can break down

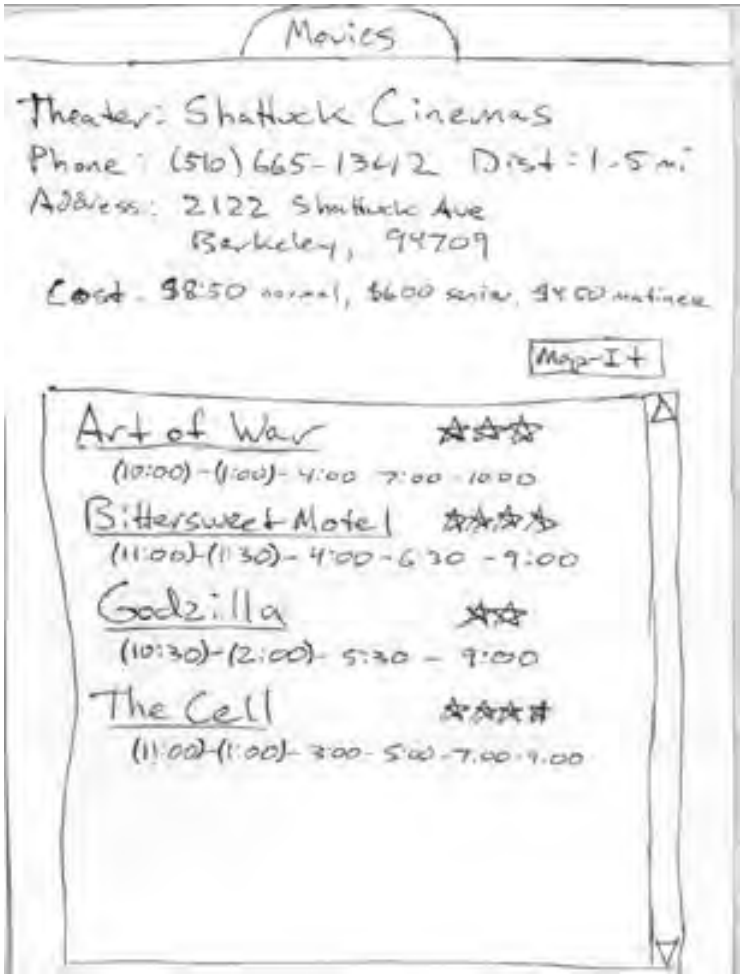
Describe properties of a sketch versus a prototype

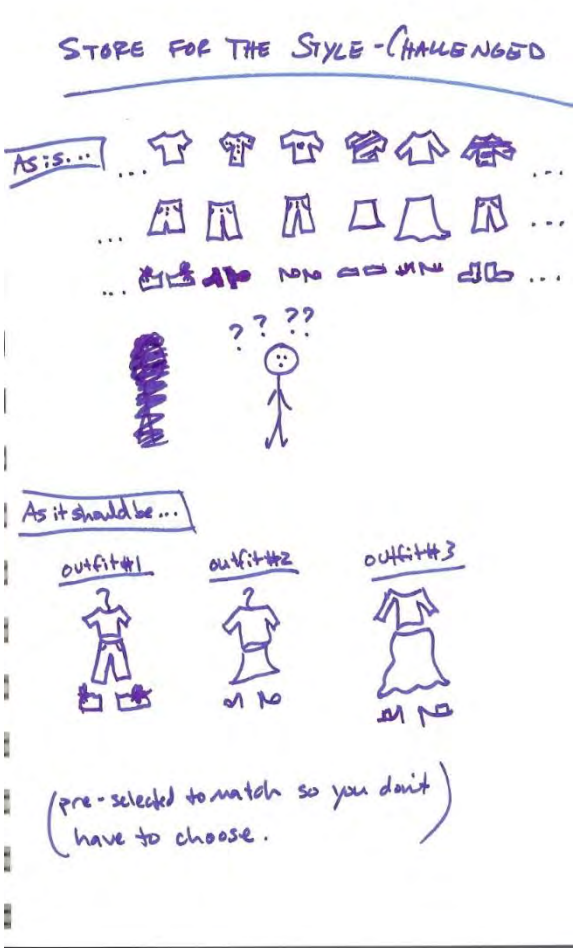
Differentiate examples of sketches from prototypes

Sketching User Experiences

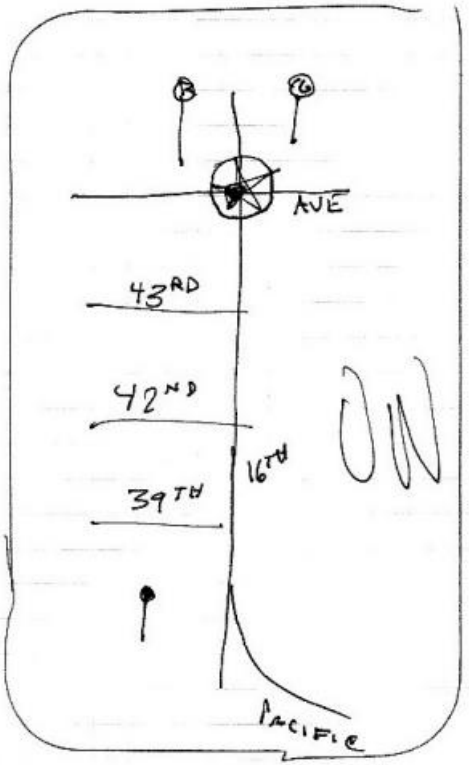


Sketching

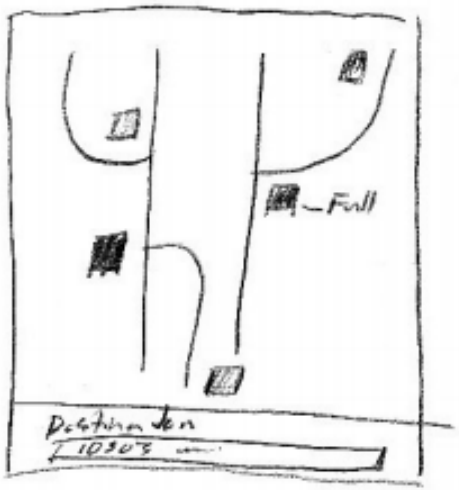

Movies
Theater: Shattuck Cinemas
Phone: (510) 665-1342 Dist: 1.5 mi
Address: 2122 Shattuck Ave
Berkeley, 94709
Cost - $8.50 normal, $6.00 senior, $4.00 matinee
Map-It
Art of War ☆☆☆
(10:00)-(1:00)-4:00-7:00-10:00
Bittersweet Motel ☆☆☆☆
(11:00)-(1:30)-4:00-6:30-9:00
Godzilla ☆☆
(10:30)-(2:00)-5:30-9:00
The Cell ☆☆☆½
(11:00)-(1:00)-3:00-5:00-7:00-9:00


STORE FOR THE STYLE-CHALLENGED
As is...
As it should be...
outfit#1
outfit#2
outfit#3
(pre-selected to match so you don't have to choose.)

Sketching

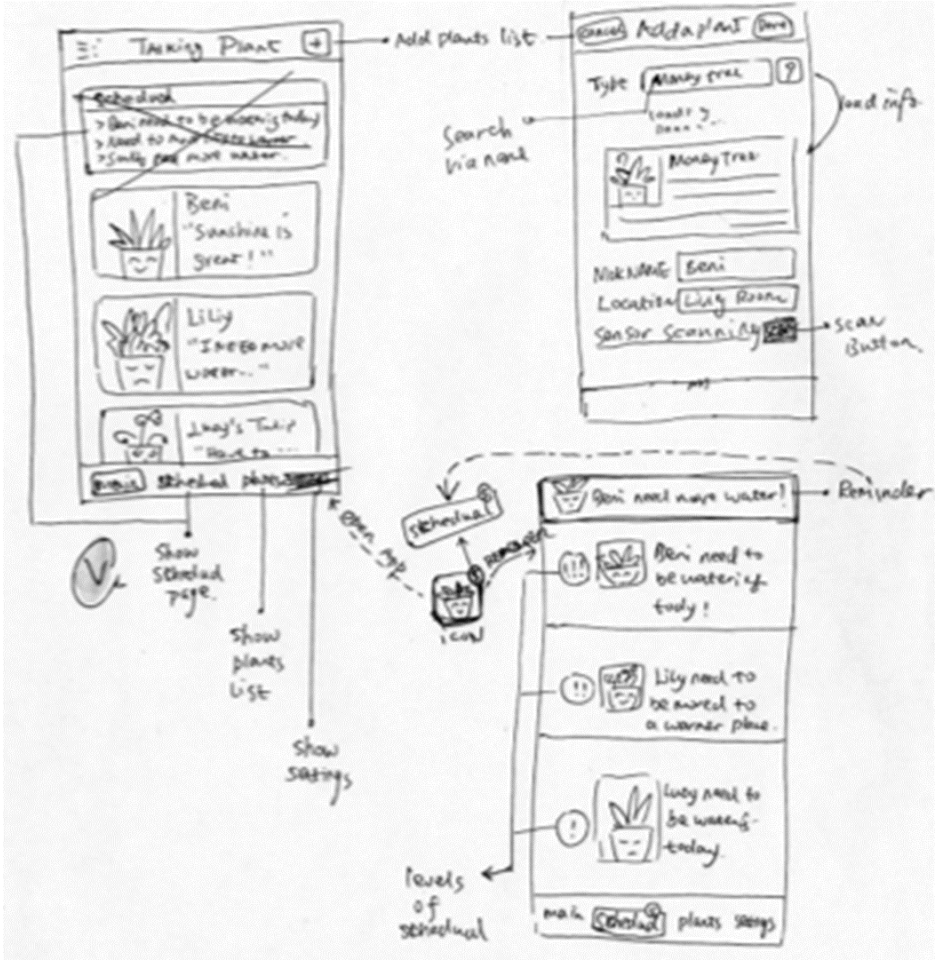


MAP SHOWING PARKING AVAILIBILITY BASED ON INPUTTED DATA, INPUTTED ON MAP



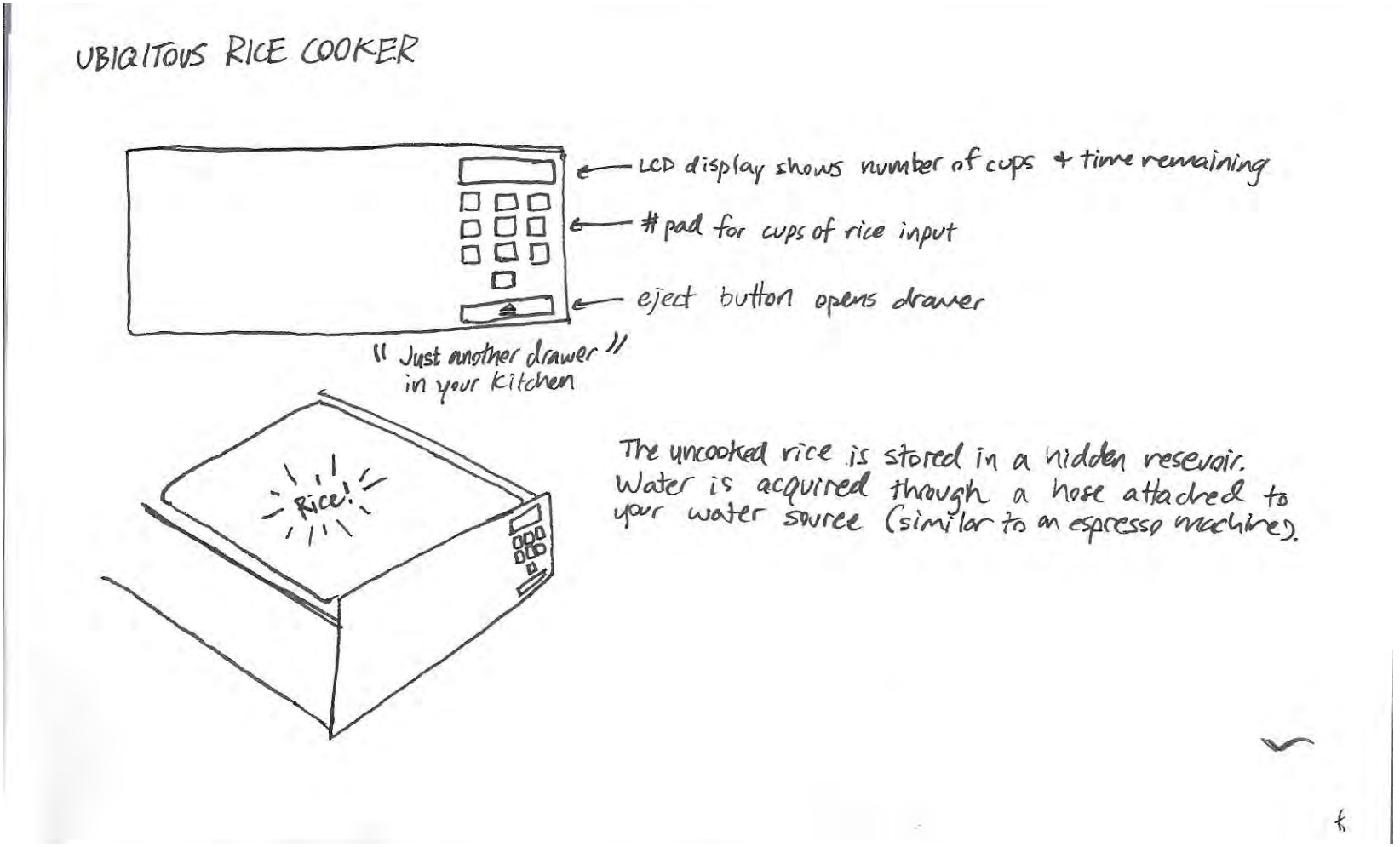
- different colors
- high lights availability
-

Sketching



Talking Plant
Add plants list
Add a plant
Type
Money tree
Search via name
Money Tree
Beni
"Sunshine is great!"
Lily
Lily
Beni
Location
Living Room
Sensor Scanning
Scan Button
Show Schedual page
Show plants list
Show Settings
Schedual
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
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
Rice!
The uncooked rice is stored in a hidden reservoir. Water is acquired through a hose attached to your water source (similar to an espresso machine).

Sketching

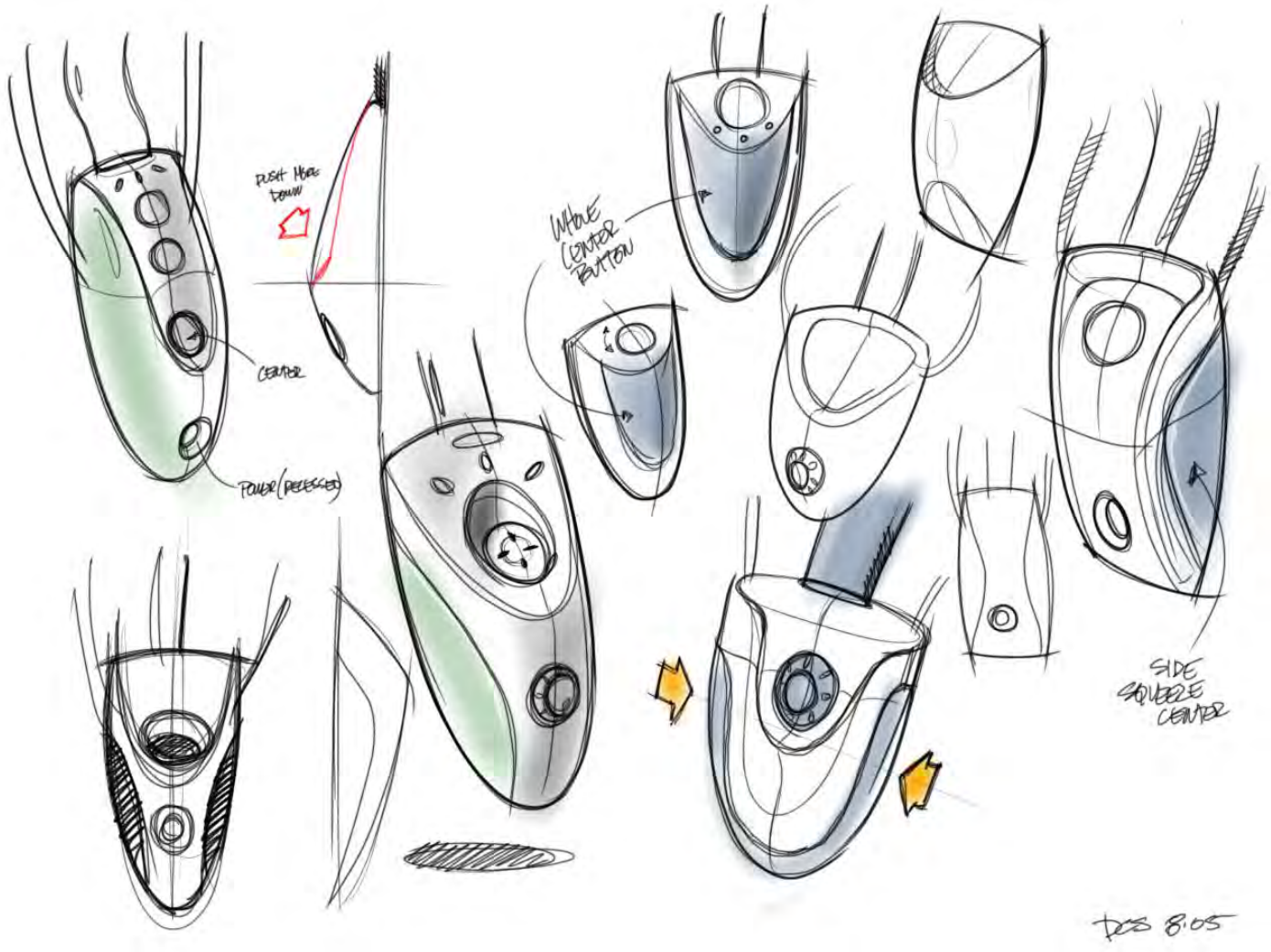
A process that enables you to

think through ideas and

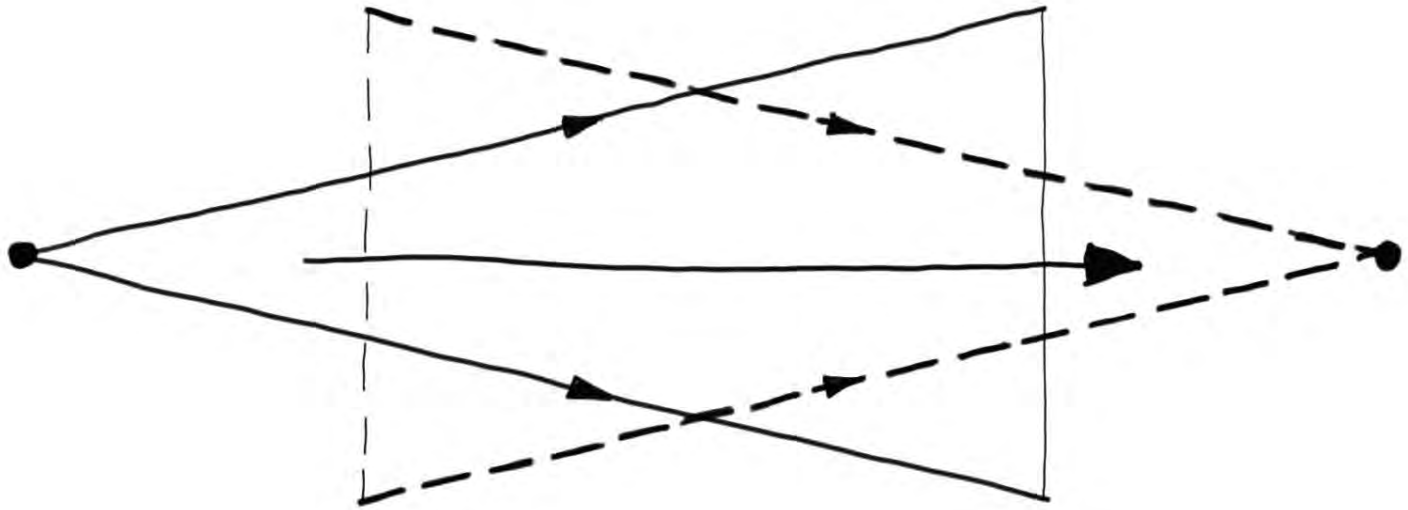
convey design ideas to others

very early in the design phase

Quintessential Activity of Design



Design as Choice



IDEO's Deep Dive (ABC News, 1999)

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

ABC News and IDEO's Deep Dive

Things to see in this video:

- brainstorming
- design research
- sketching
- critique

Why build a shopping cart with no bottom?

A highly iterative design process
with a variety of intermediate artifacts

IDEO's Deep Dive (ABC News, 1999)

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

IDEO’s Deep Dive (ABC News, 1999)

IDEO’s Deep Dive (ABC News, 1999)

IDEO's Deep Dive (ABC News, 1999)

IDEO's Deep Dive (ABC News, 1999)

IDEO's Deep Dive (ABC News, 1999)

IDEO’s Deep Dive (ABC News, 1999)

IDEO’s Deep Dive (ABC News, 1999)

IDEO’s Deep Dive (ABC News, 1999)

IDEO’s Deep Dive (ABC News, 1999)

Perfect Shopping Cart?

Perfect Shopping Cart?

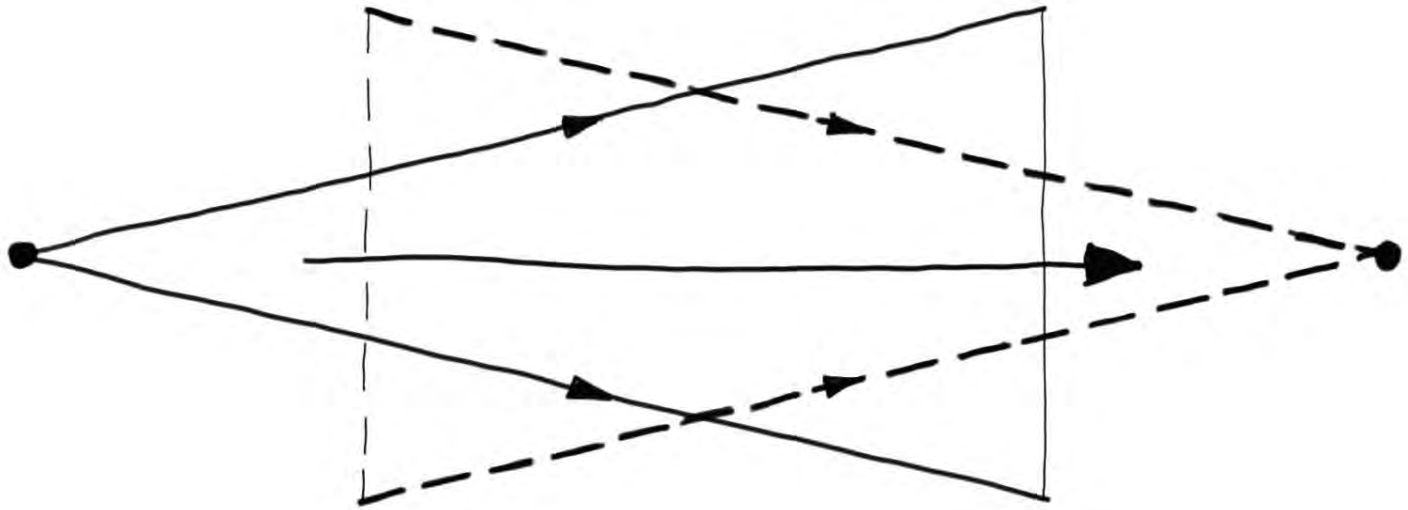
Several design flaws

- Kids will slide and fall out of that seat
- Where to put bags of dog food, cases of beer?
- Hook design with reusable bags
- Self-scanning challenges with theft

Focus on the design process

- Designs always have limitations and tradeoffs

Design as Choice



Design as Choice

In the diamond, what are two openings for creativity?

Why is your design research so important?

Sketching in Design (2007)

“Design as Choice”

“the creativity that you bring to enumerating meaningfully distinct options from which to choose”

Sketching in Design (2007)

“Design as Choice”

“the creativity that you bring to defining the criteria, or heuristics, according to which you make your choices”

Design as Choice

In the diamond, what are two openings for creativity?

- Palette of choices
- Heuristics to choose

Why is your design research so important?

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

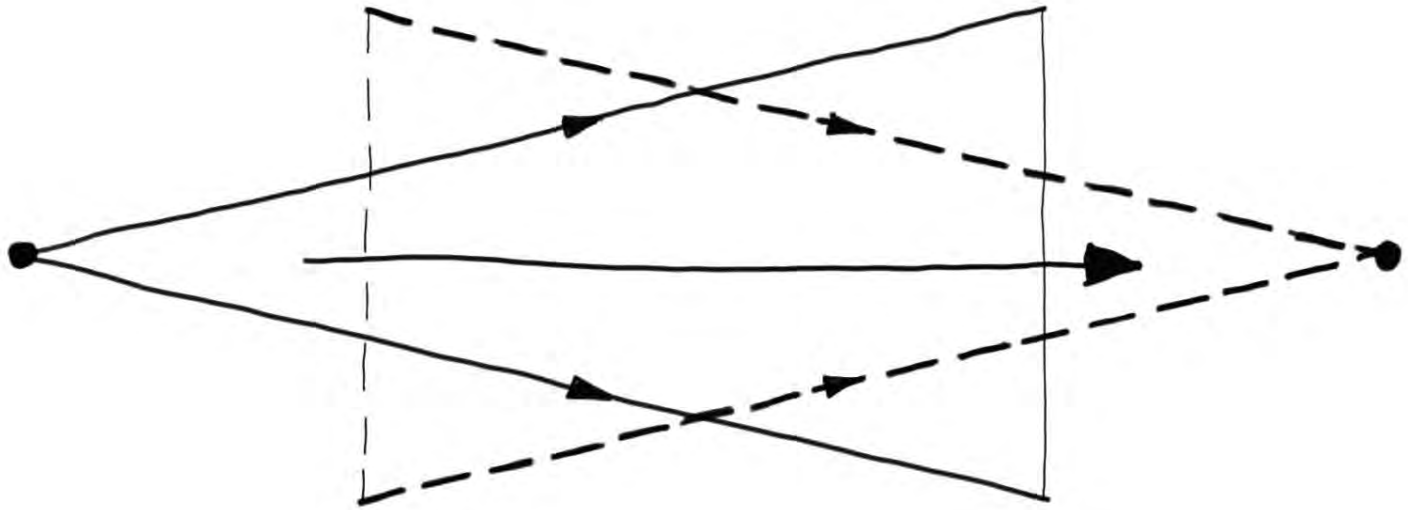
Design as Choice

Elaboration

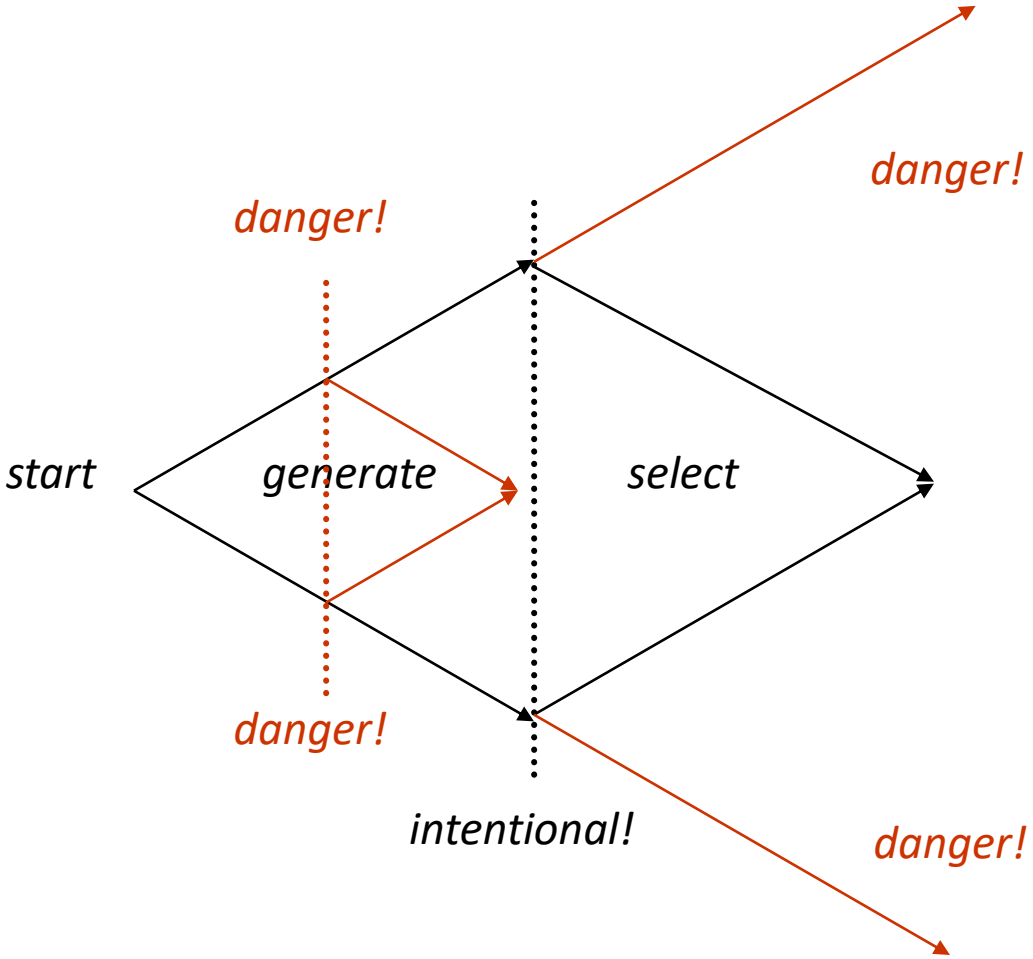
palette of choices

Reduction

heuristics to choose



The Design Diamond



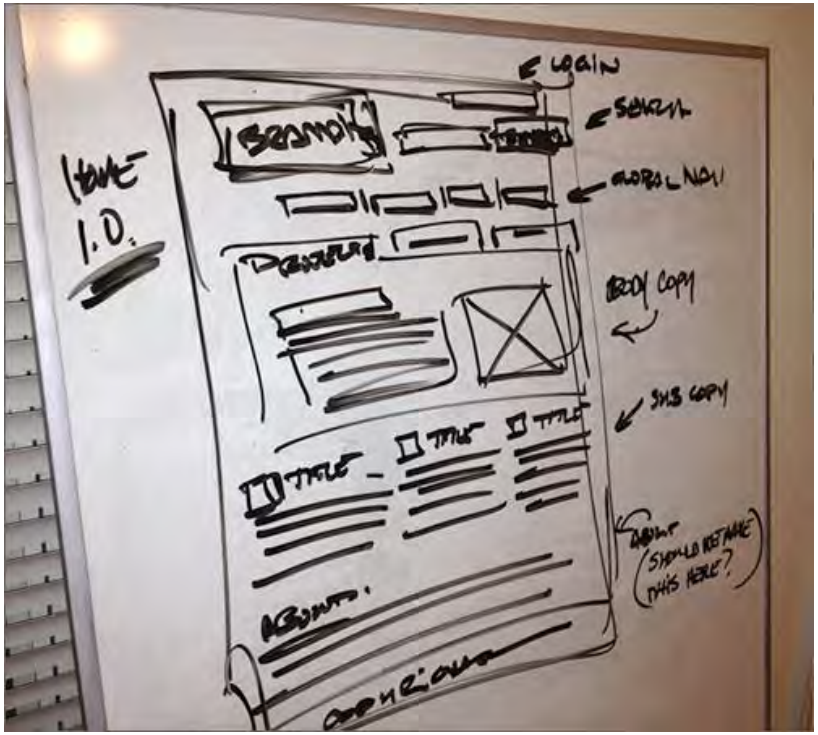
Properties of Sketches

Quick
Timely
Inexpensive
Disposable
Plentiful
Clear Vocabulary

Distinct Gesture
Minimal Detail
Appropriate Refinement
Suggest and Explore
Ambiguous

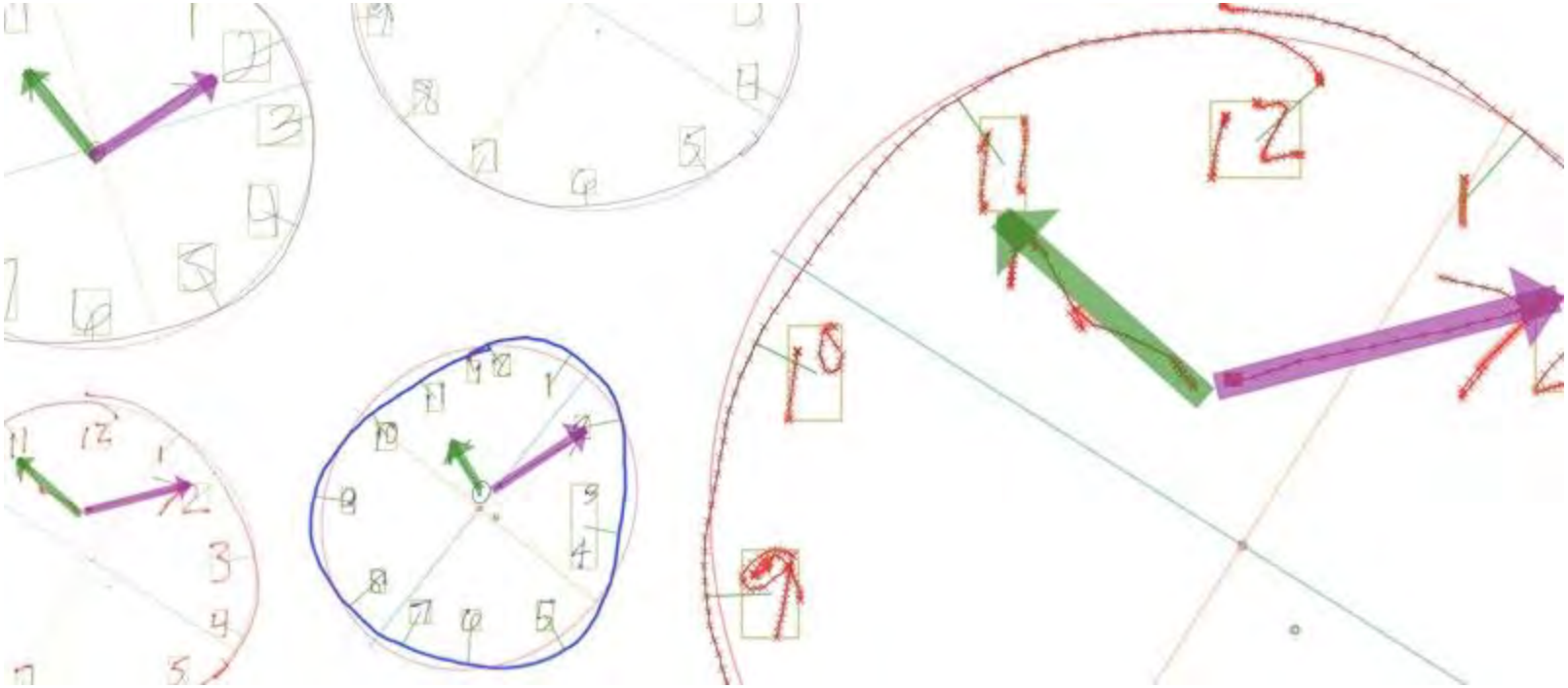
Quick

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



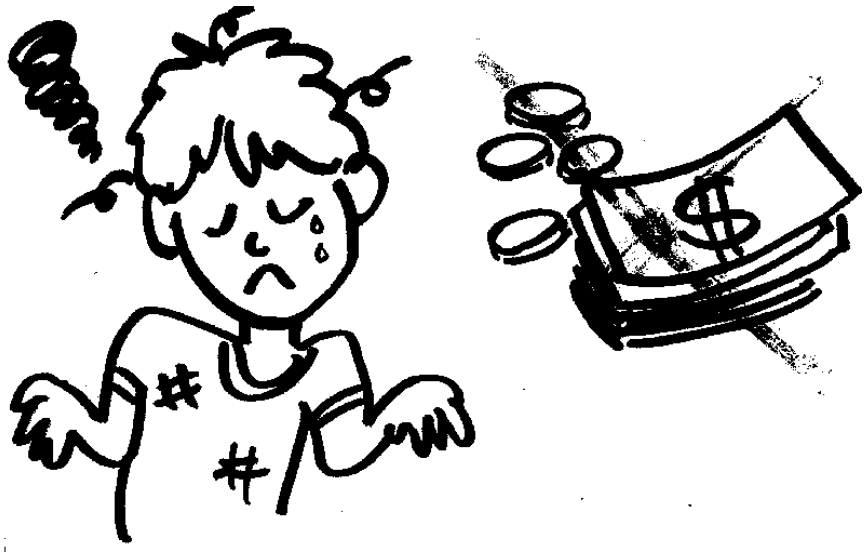
Timely

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

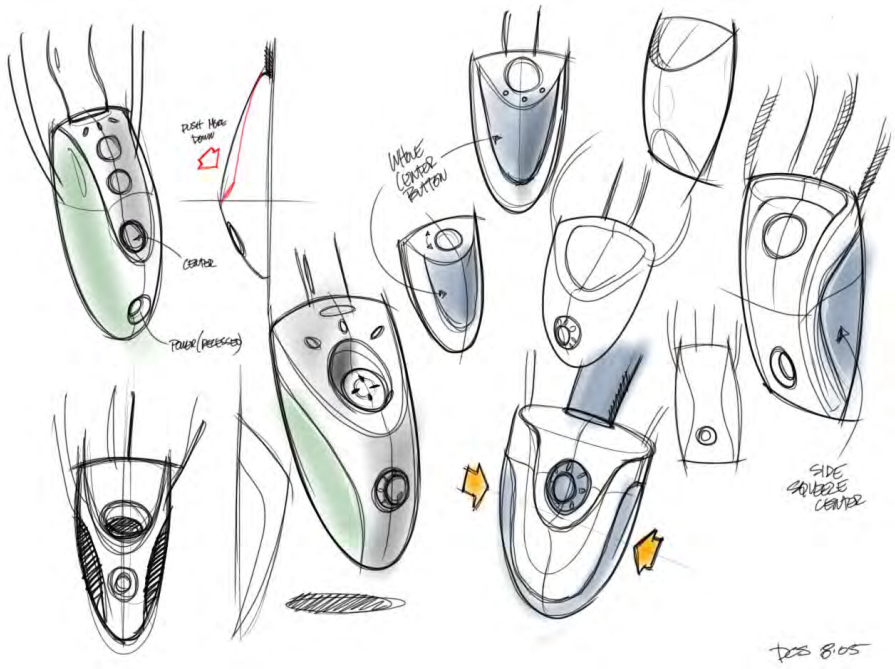
Investment is in the process,
not the physical sketch

But they are not "worthless"

Plentiful

Sketches do not exist in isolation

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

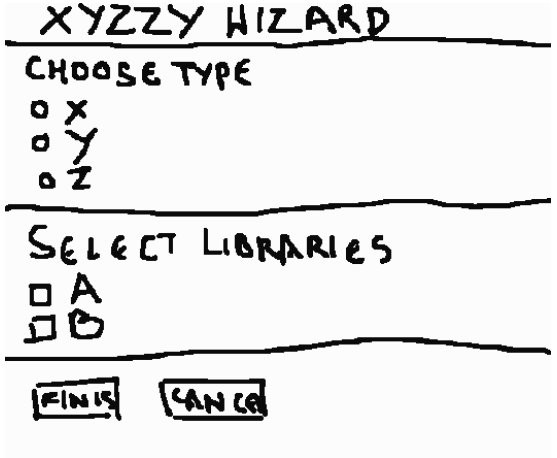


Clear Vocabulary

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

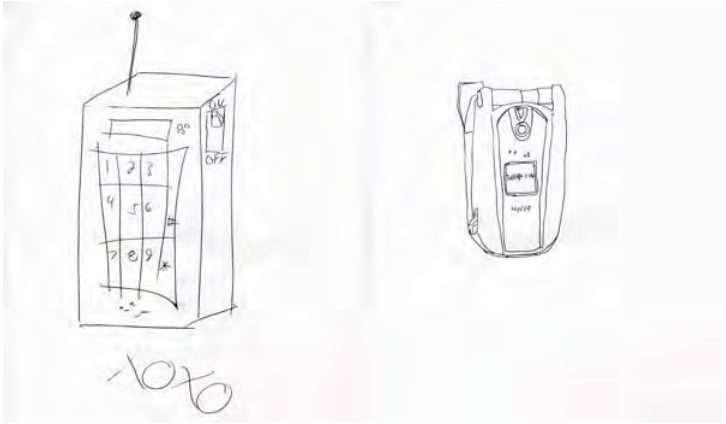
Physical sketches have their own vocabulary



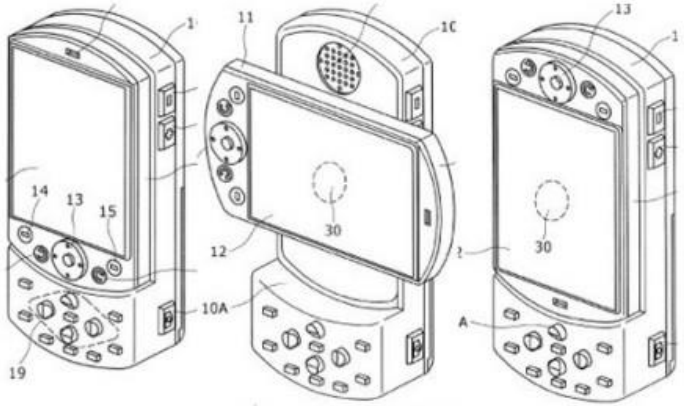
Distinct Gesture

Fluidity of sketches gives them
a sense of openness and freedom

Opposite of engineering drawing,
which is tight and precise

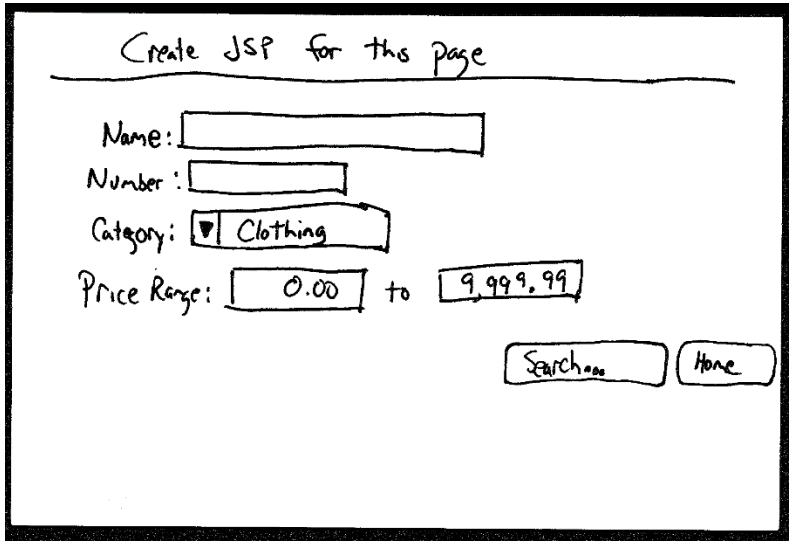


vs.

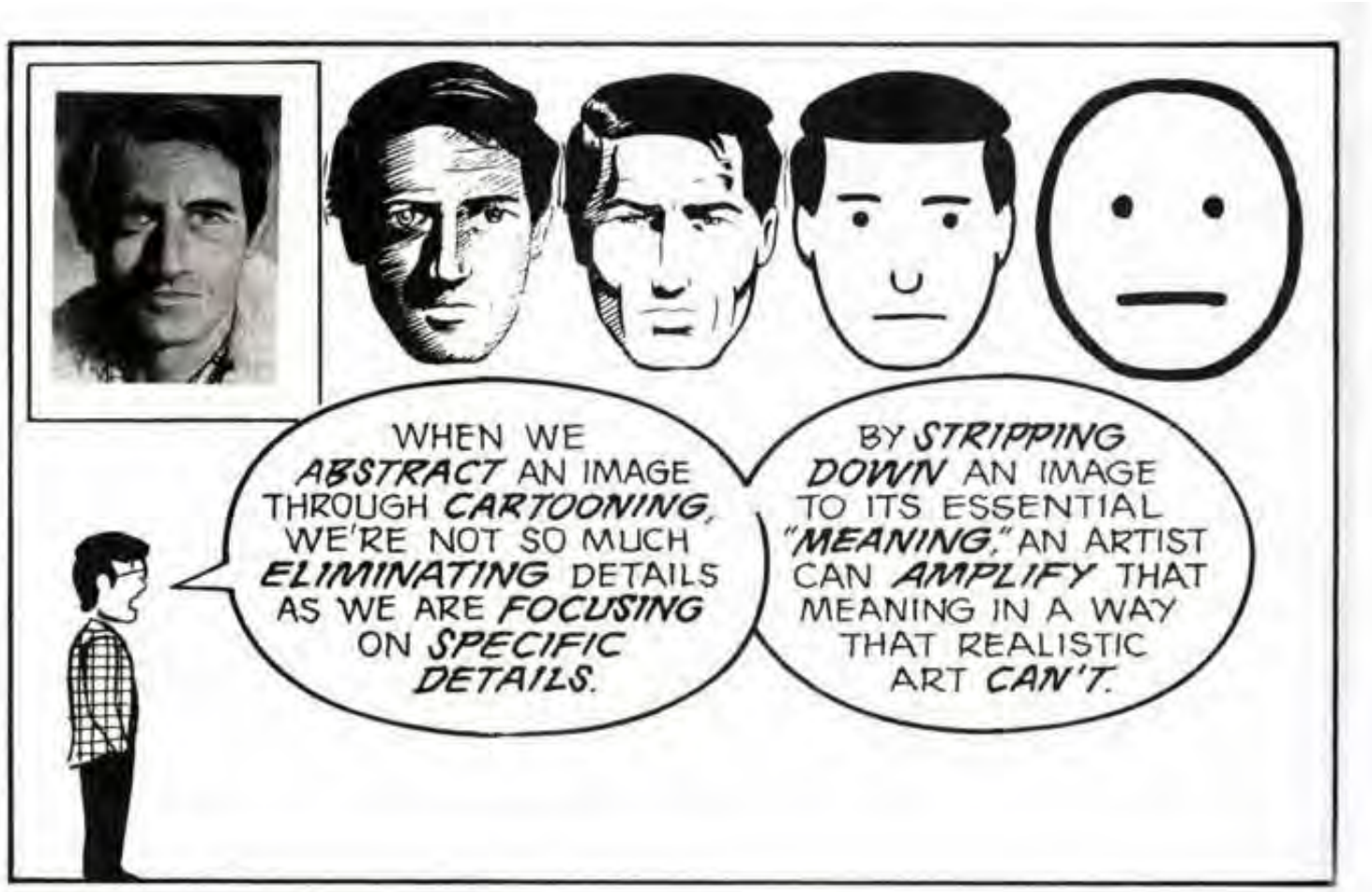


Minimal Detail

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



Minimal Detail

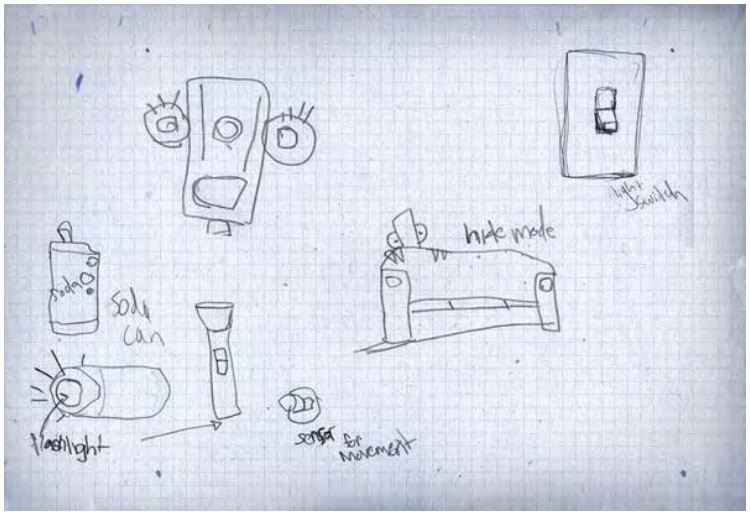


Appropriate Degree of Refinement

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, make the sketch look 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

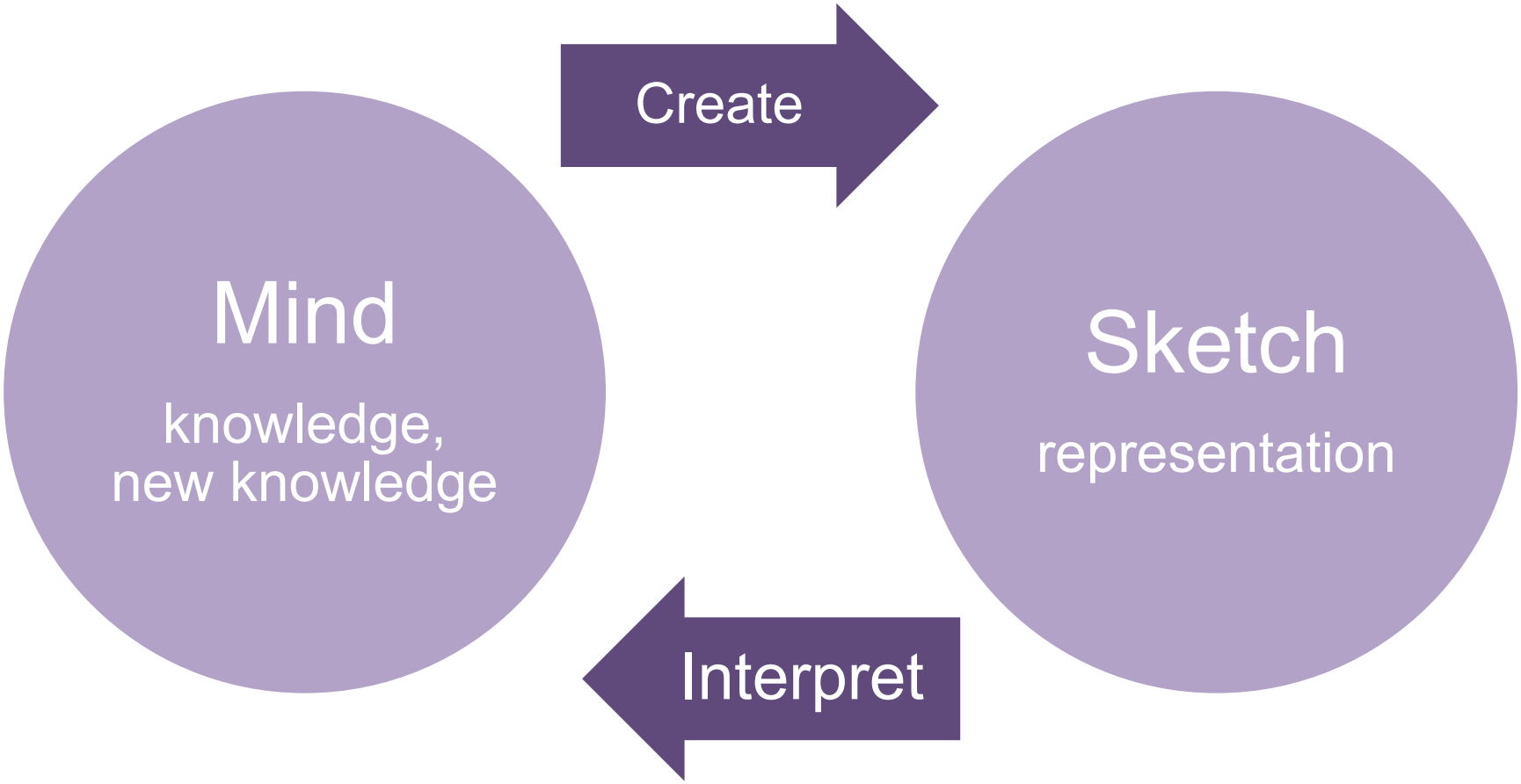
Ambiguity

Intentionally ambiguous

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

Sketches have holes

Sketching as Conversation



Requires ambiguity

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

ABC News and IDEO's Deep Dive

Sketching is Not Defined by Ink

Although sketching can often be done in ink, these properties can be found in other forms

Those other forms are therefore sketches

Sketching the Mouse

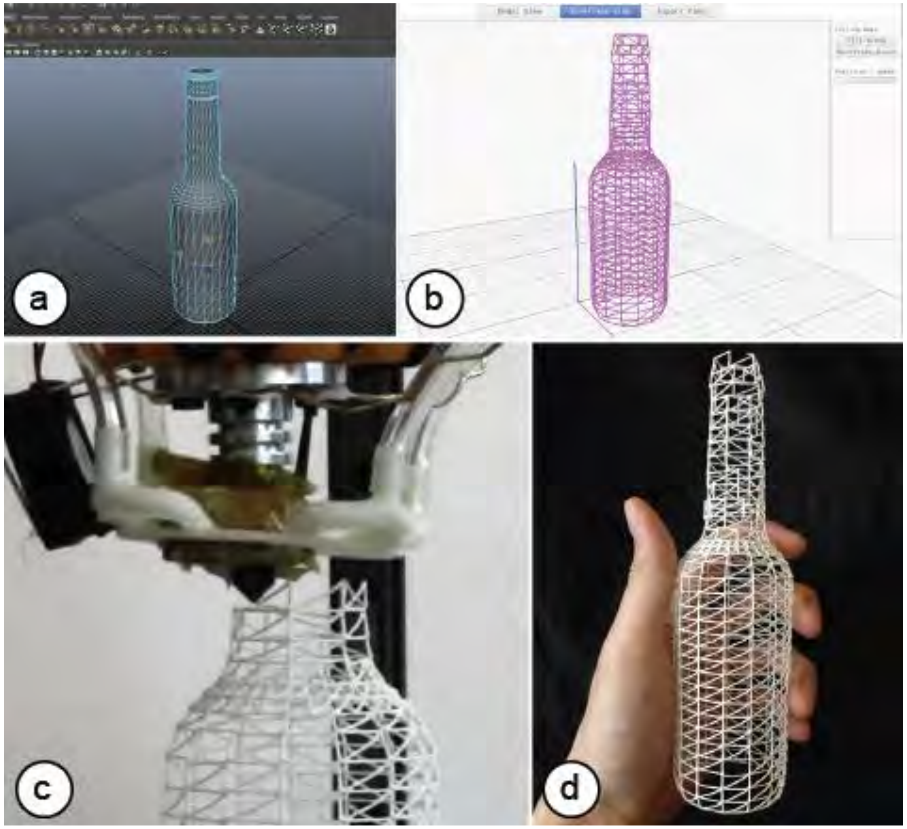
Making the Macintosh:
http://www-sul.stanford.edu/mac/index.html

Sketching the Mouse

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

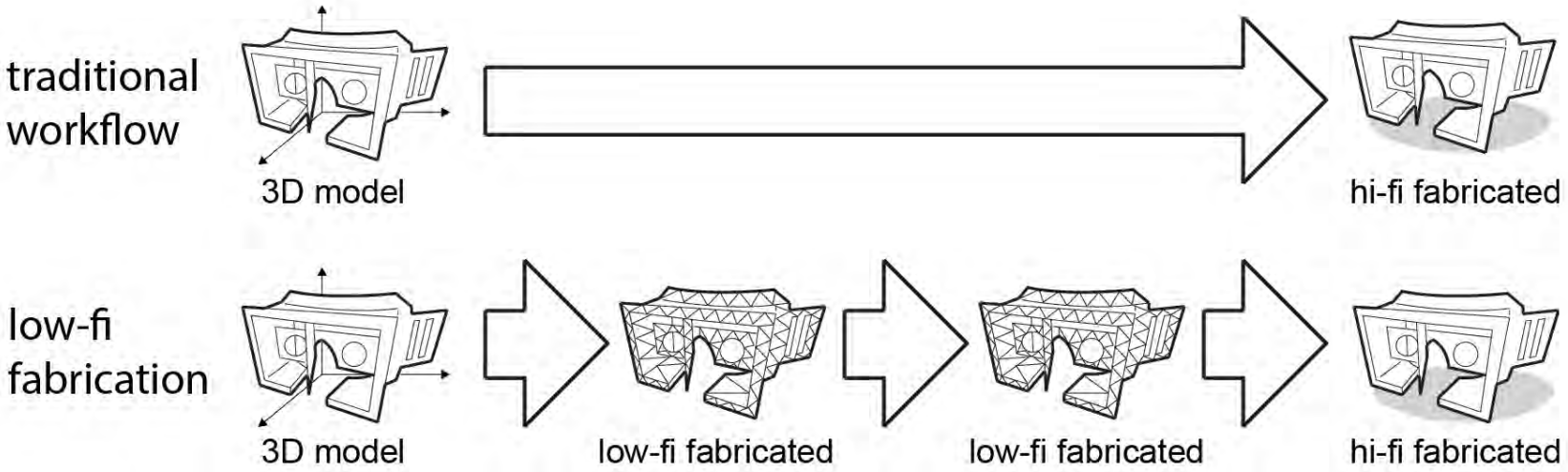
Physical Sketching

Physical Sketching



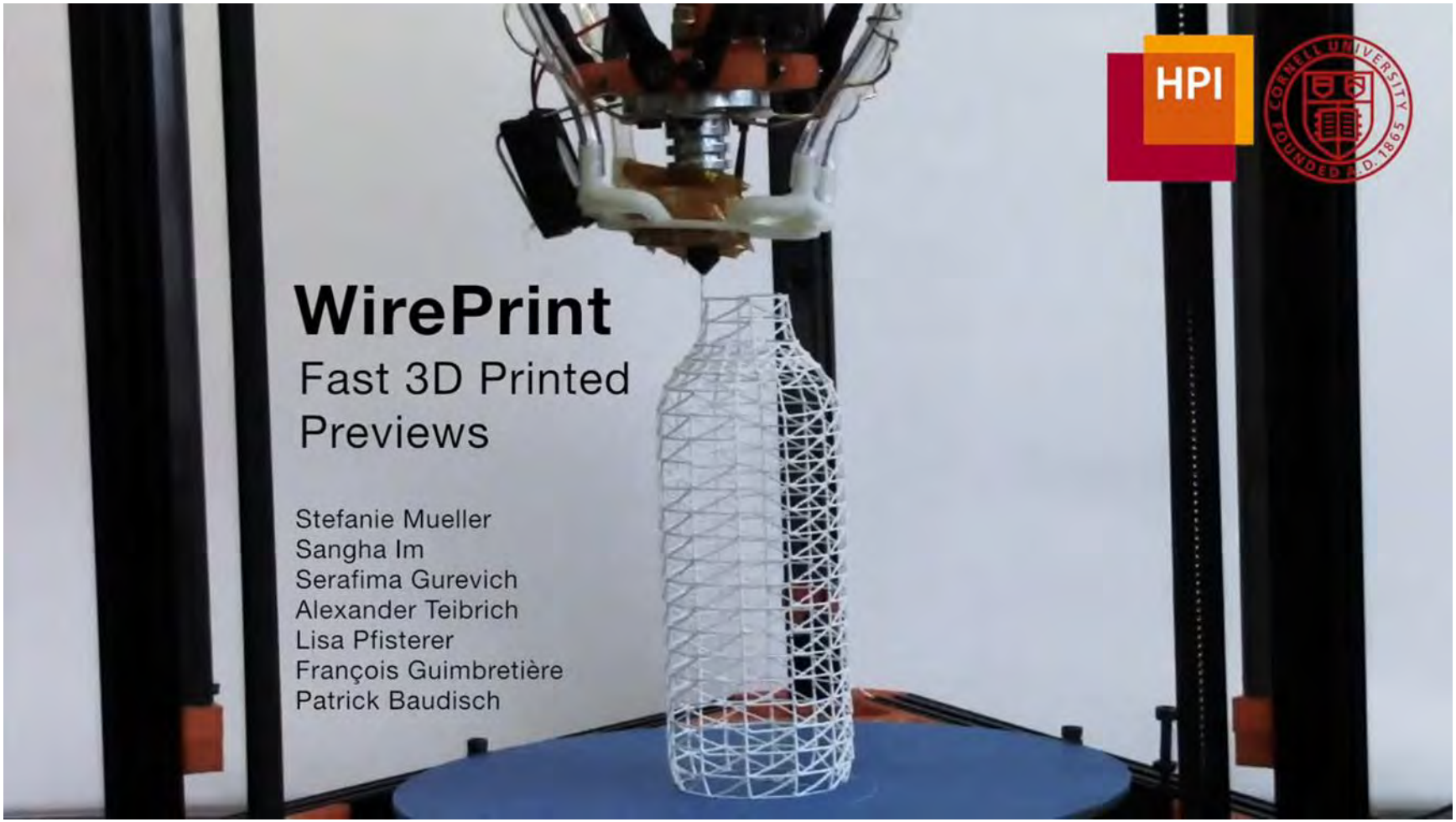
Mueller, WirePrint, UIST 2014

Physical Sketching



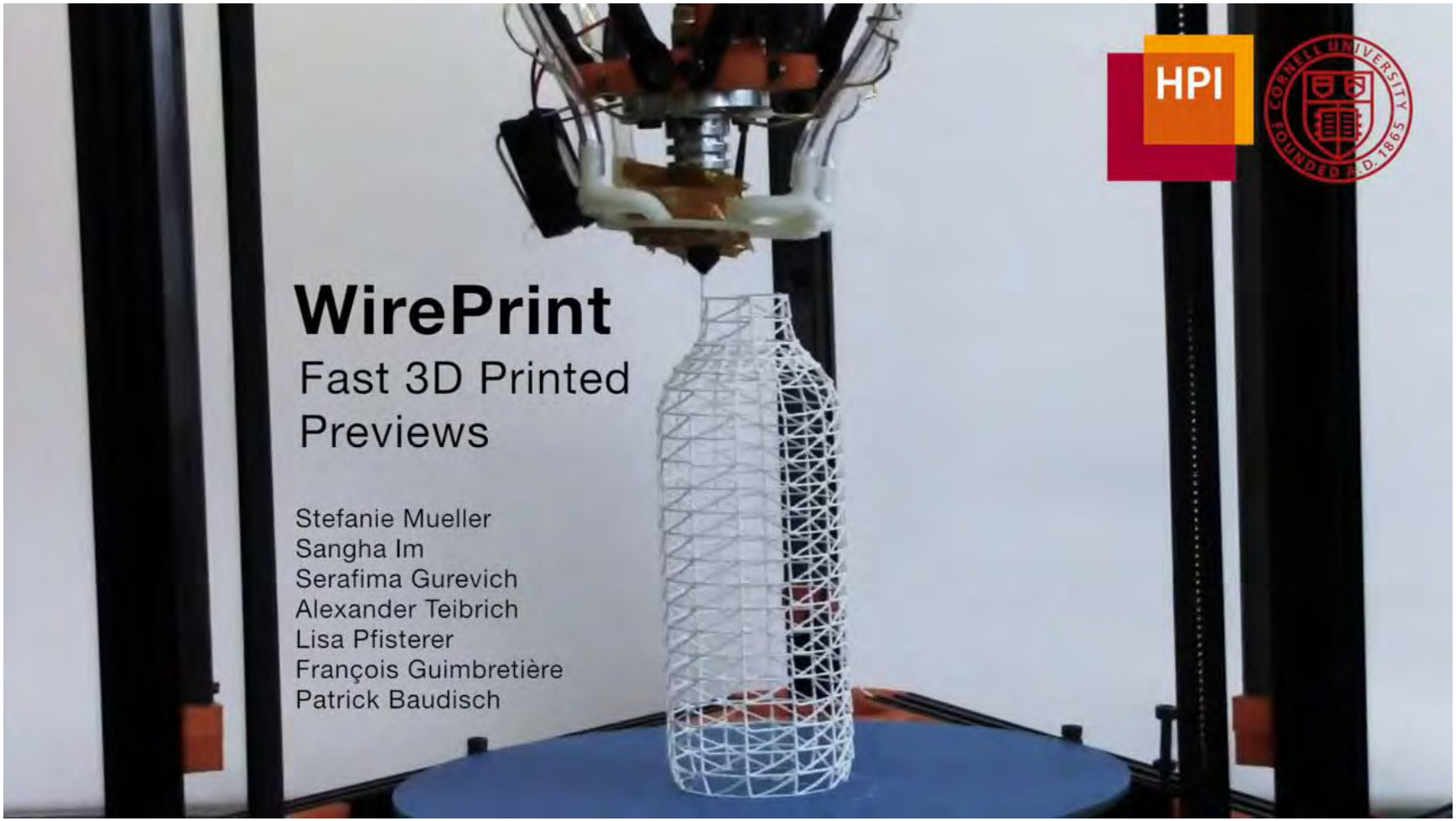
Mueller, WirePrint, UIST 2014

WirePrint (2014)



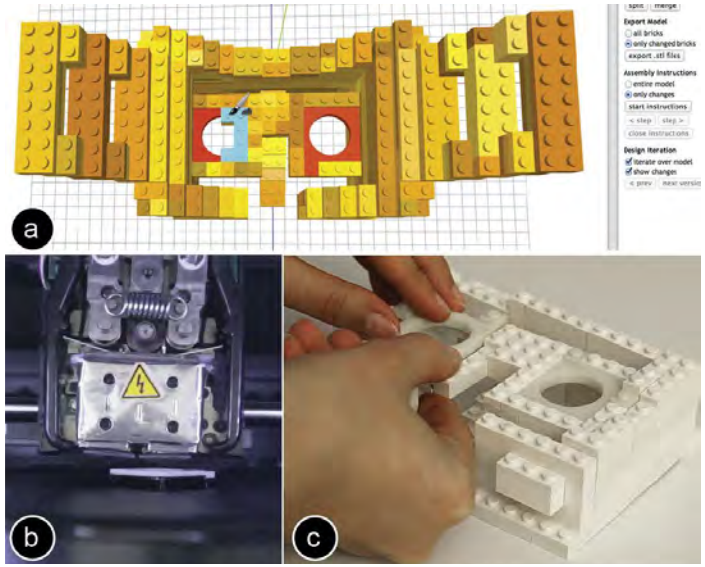
Mueller, WirePrint, UIST 2014

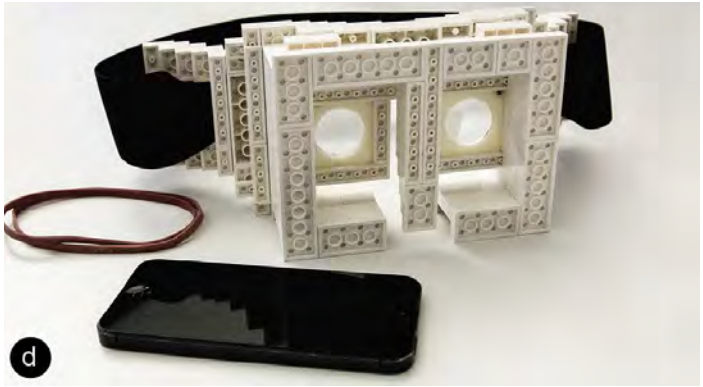
WirePrint (2014)



Mueller, WirePrint, UIST 2014

Physical Sketching





Mueller, Fabrickation, CHI 2014

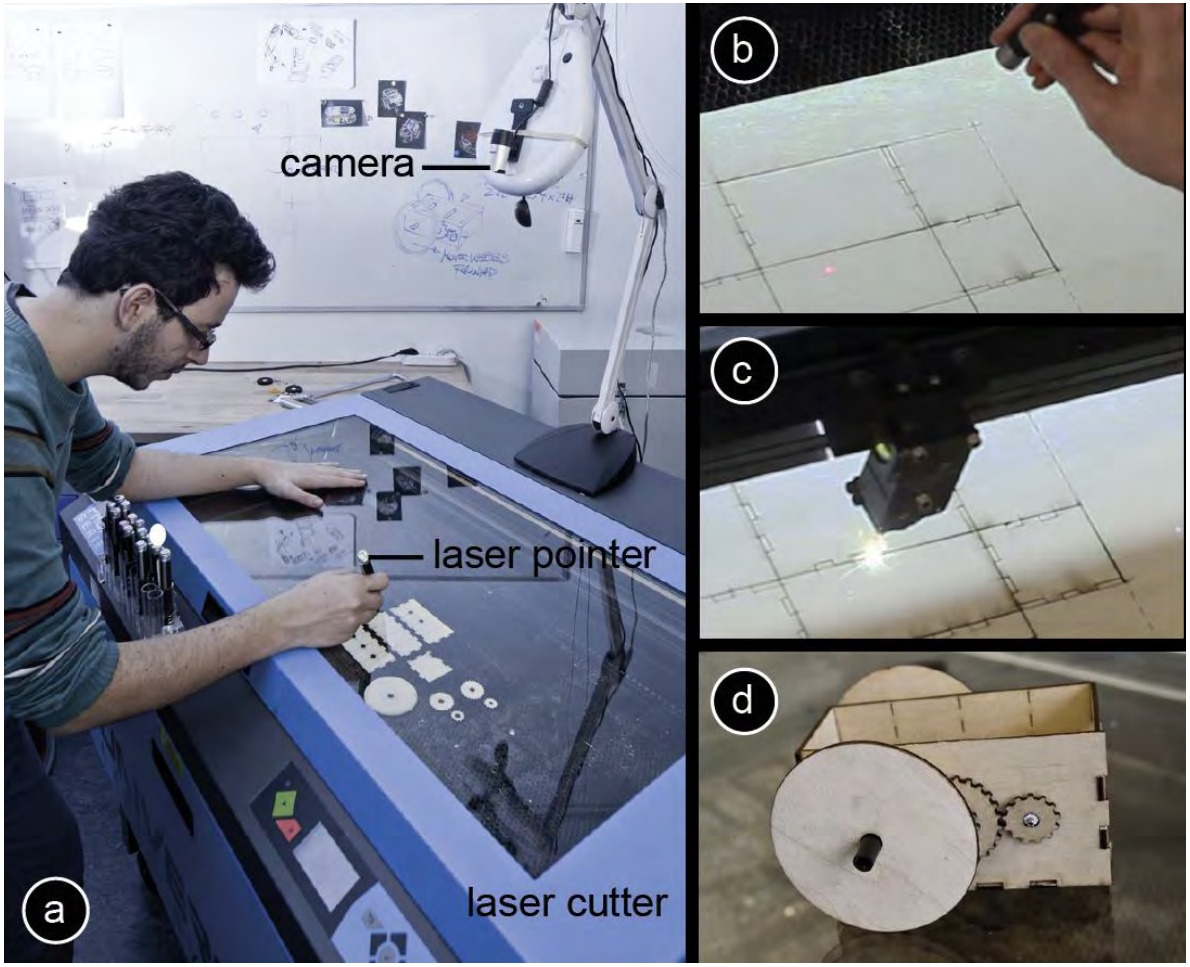
faBrickation (2014)

Mueller, Fabrickation, CHI 2014

faBrickation (2014)

Mueller, Fabrickation, CHI 2014

Physical Sketching



Mueller, Constructable, CHI 2012

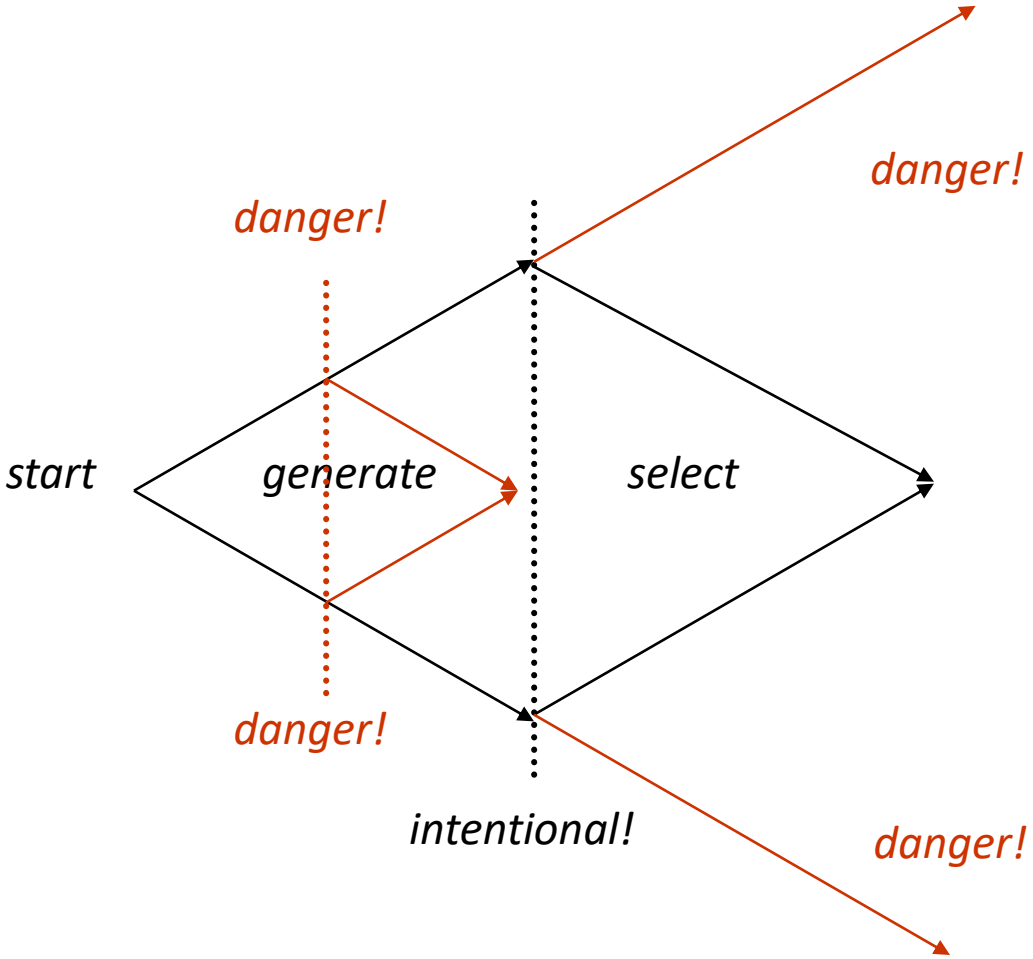
Constructable (2012)

Mueller, Constructable, CHI 2012

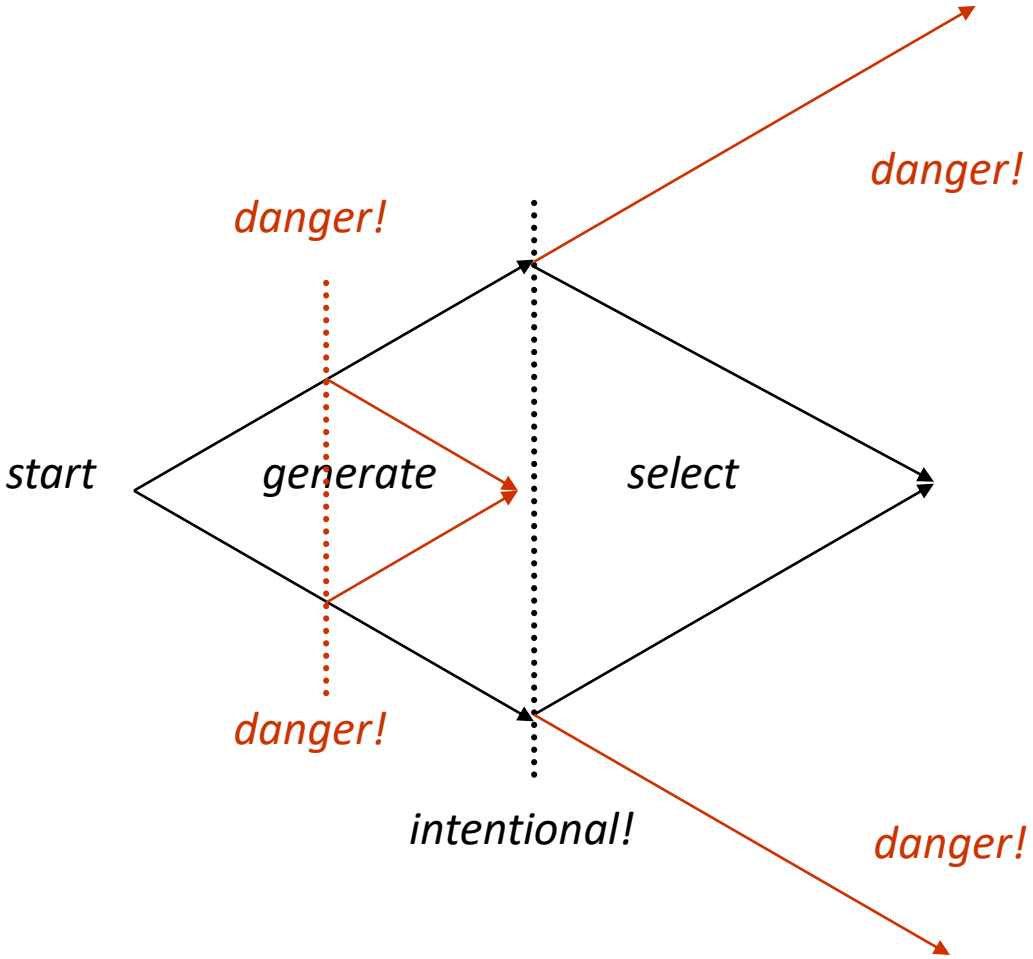
Constructable (2012)

Mueller, Constructable, CHI 2012

The Design Diamond



Idea Oscillation



Critiquing Sketches is Important

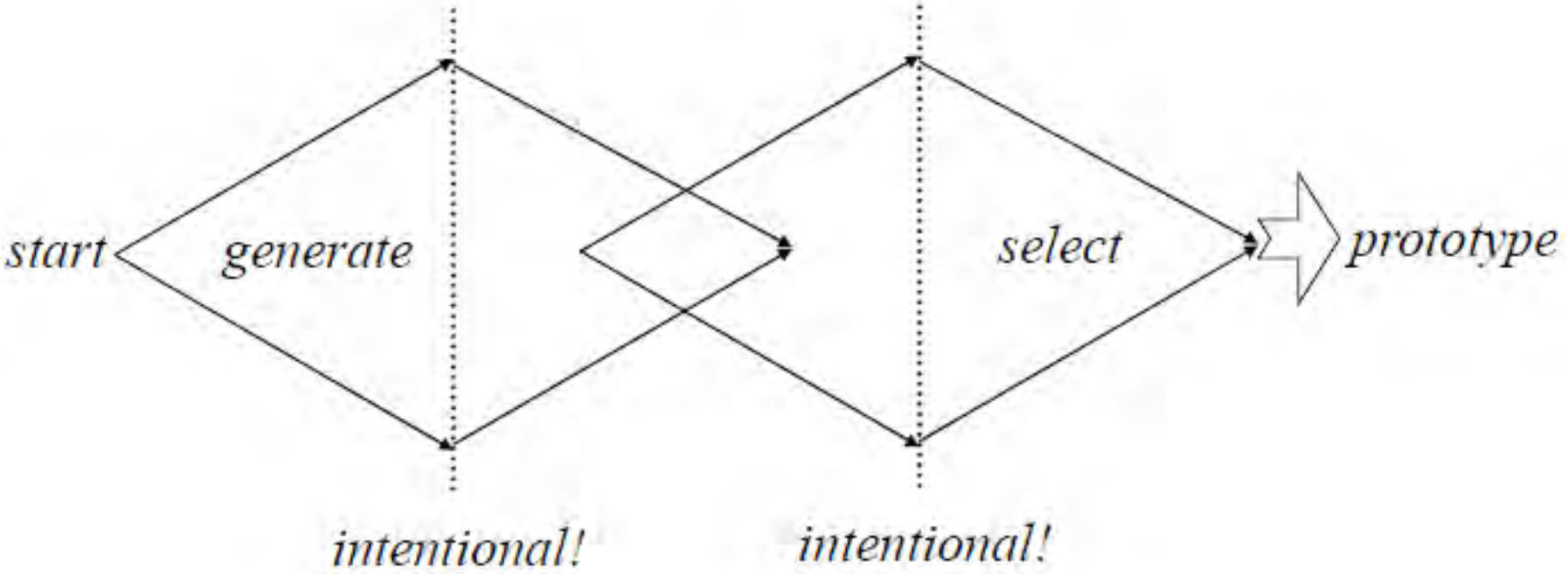
Ideas are both good and bad

- 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

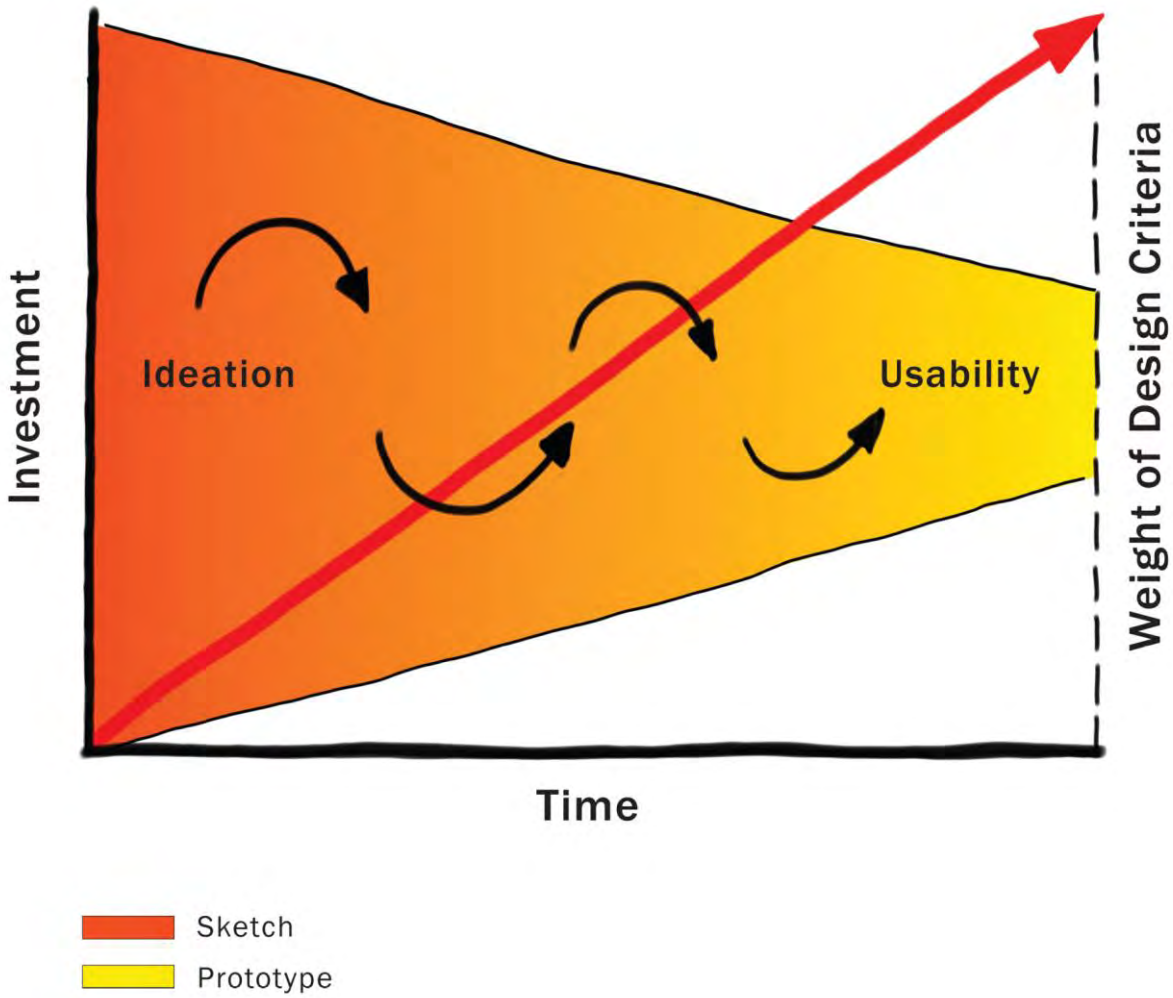
Feedback can turn a good idea into a great idea

Sketching generates too many ideas to implement

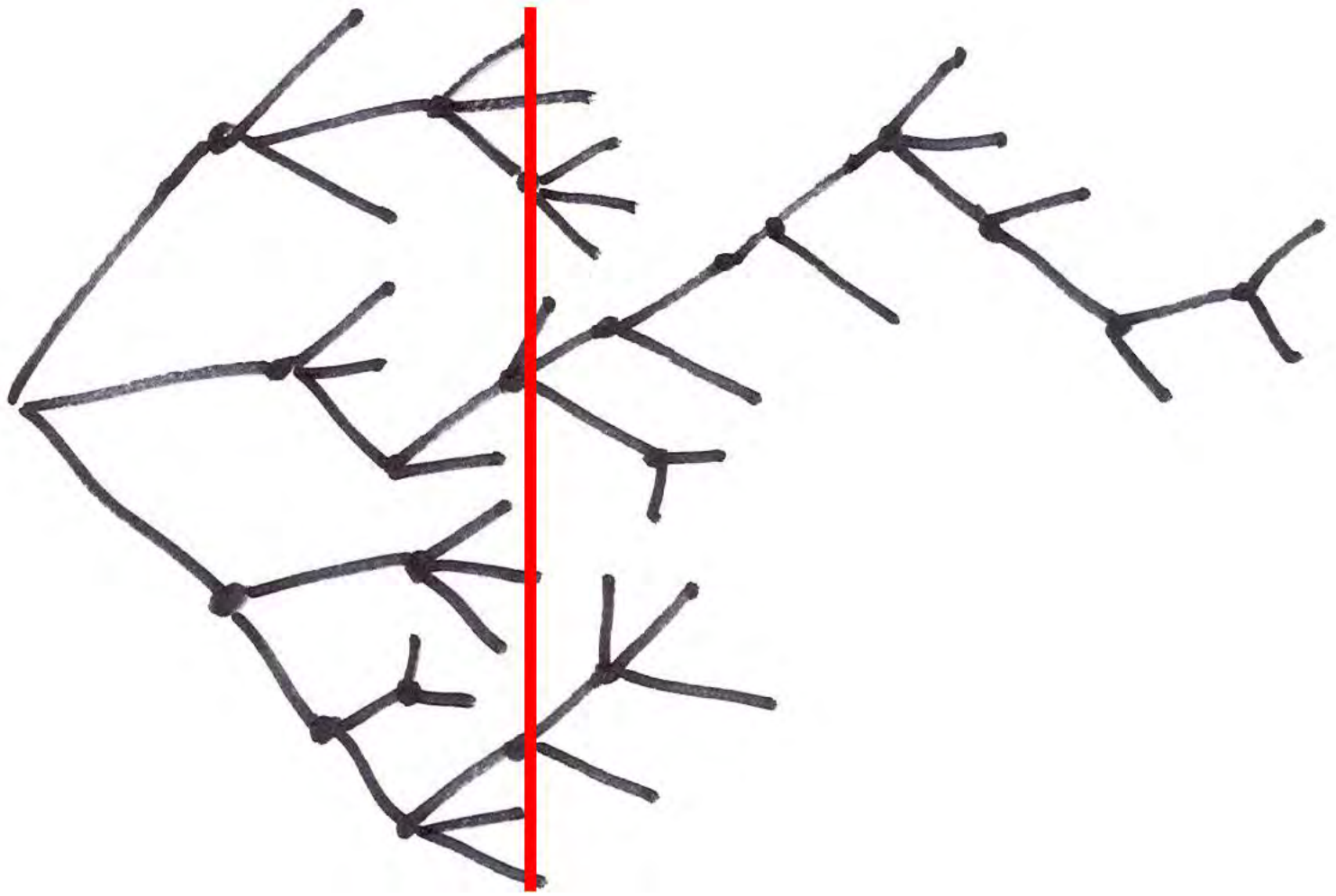
Idea Oscillation



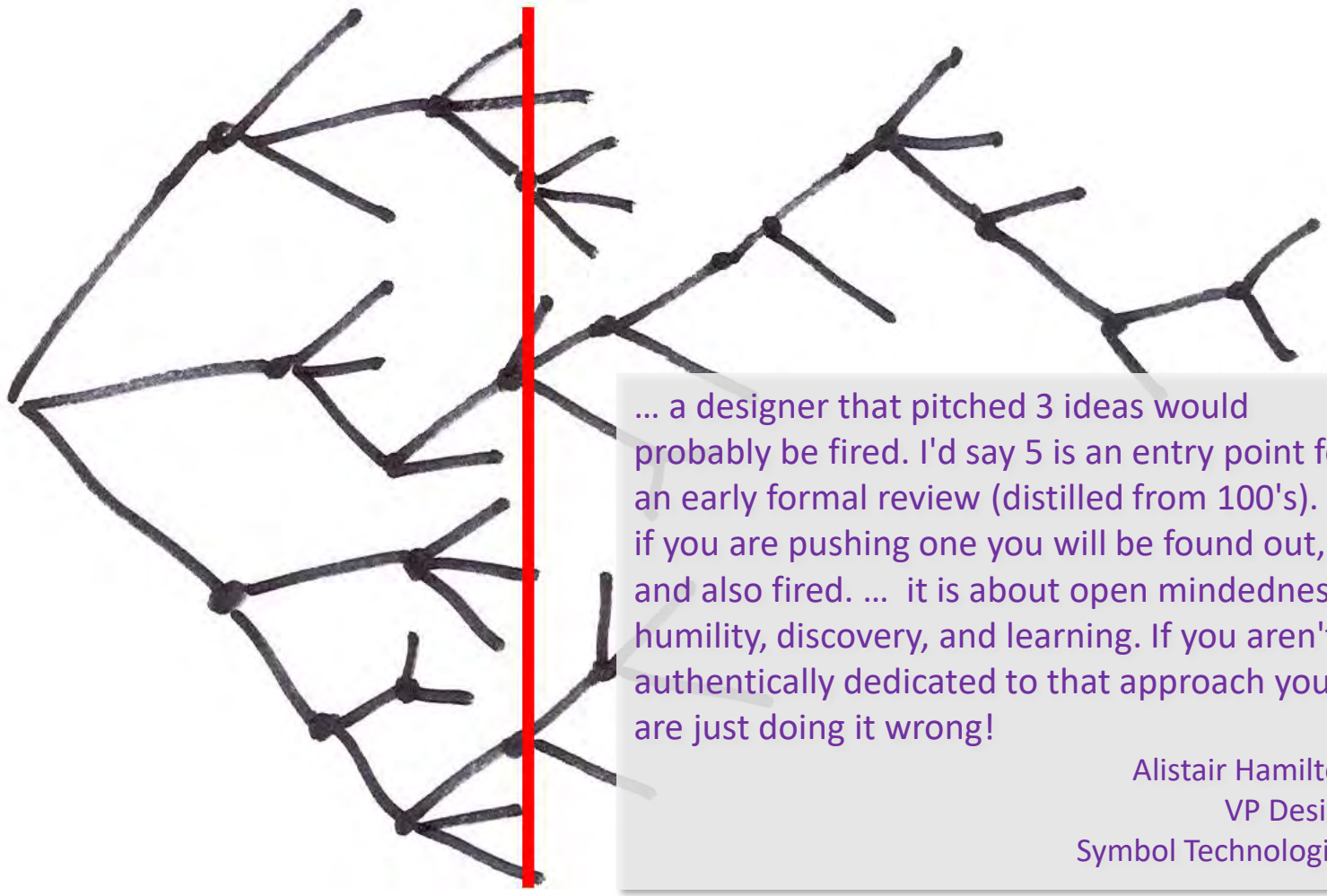
Iteration Toward a Design



Exploration of Alternatives



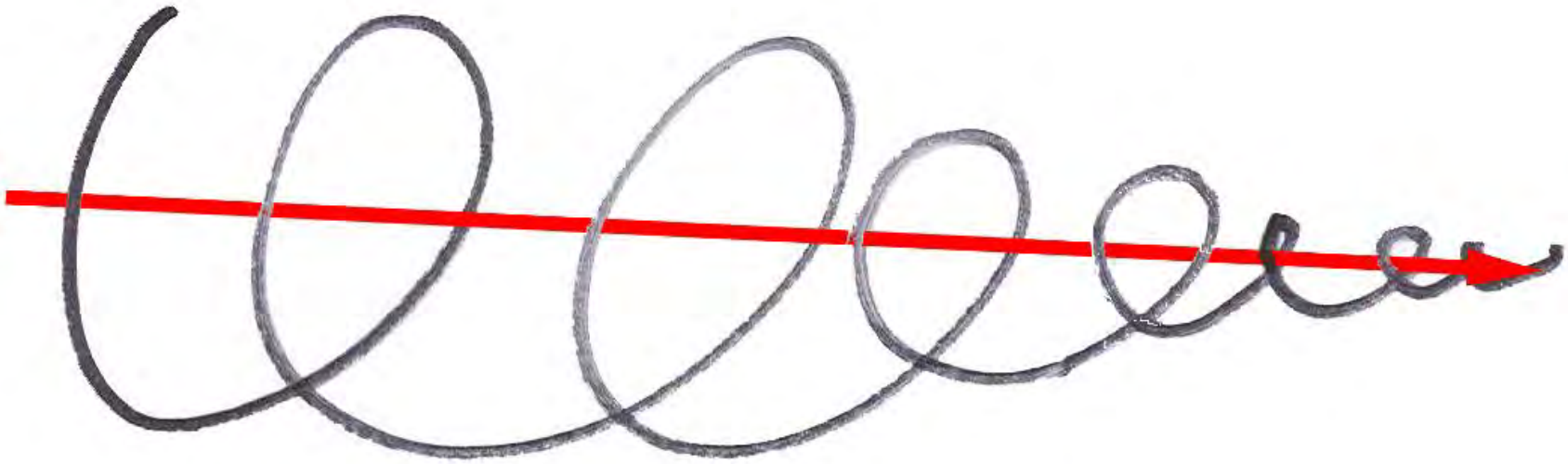
Exploration of Alternatives



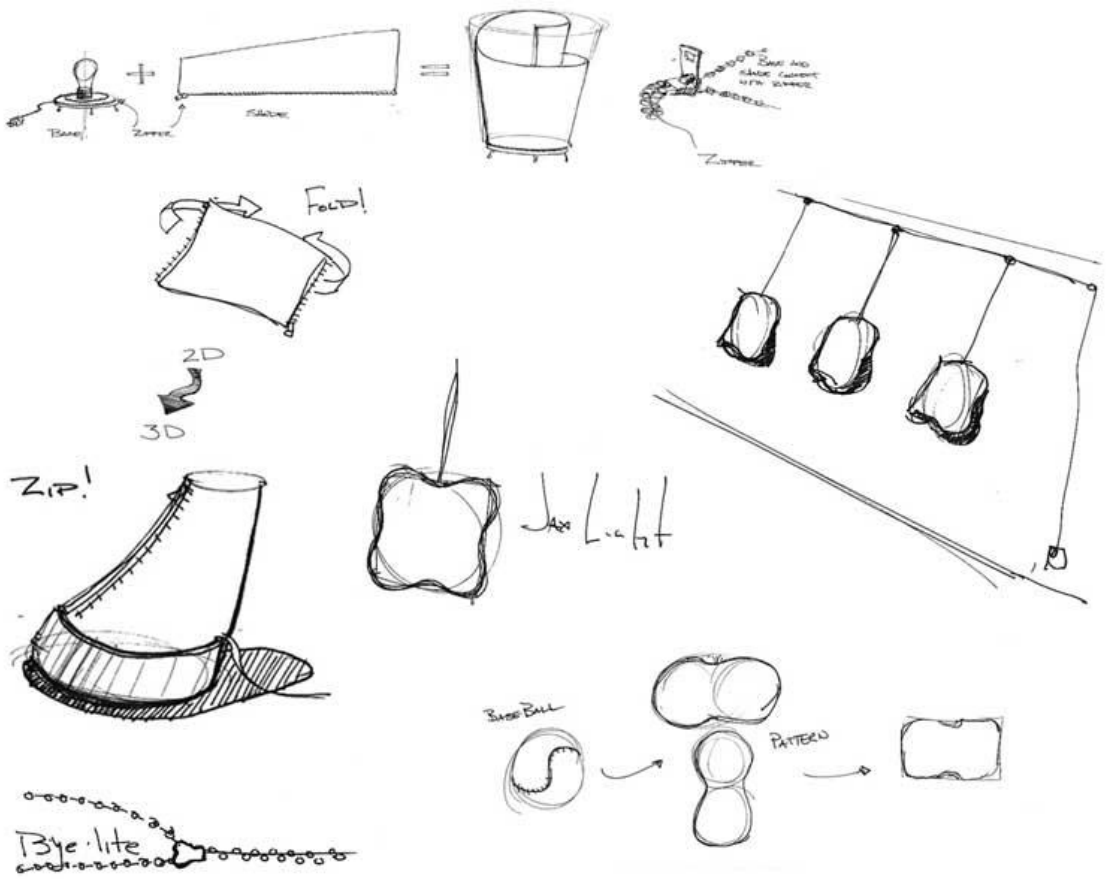
… a designer that pitched 3 ideas would probably be fired. I'd say 5 is an entry point for an early formal review (distilled from 100's). … if you are pushing one you will be found out, and also fired. … it is about open mindedness, humility, discovery, and learning. If you aren't authentically dedicated to that approach you are just doing it wrong!

Alistair Hamilton
VP Design
Symbol Technologies

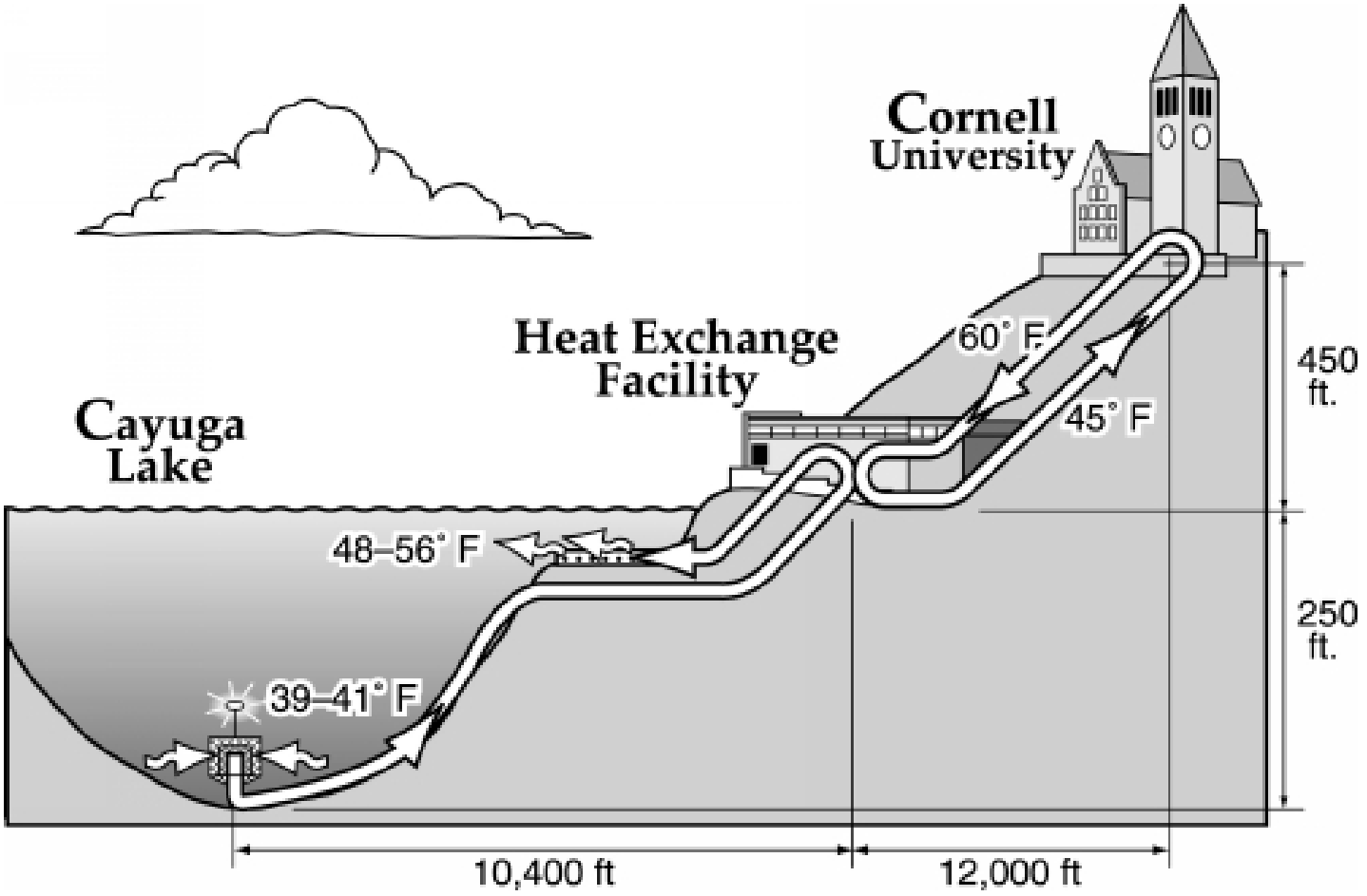
The Converging Path



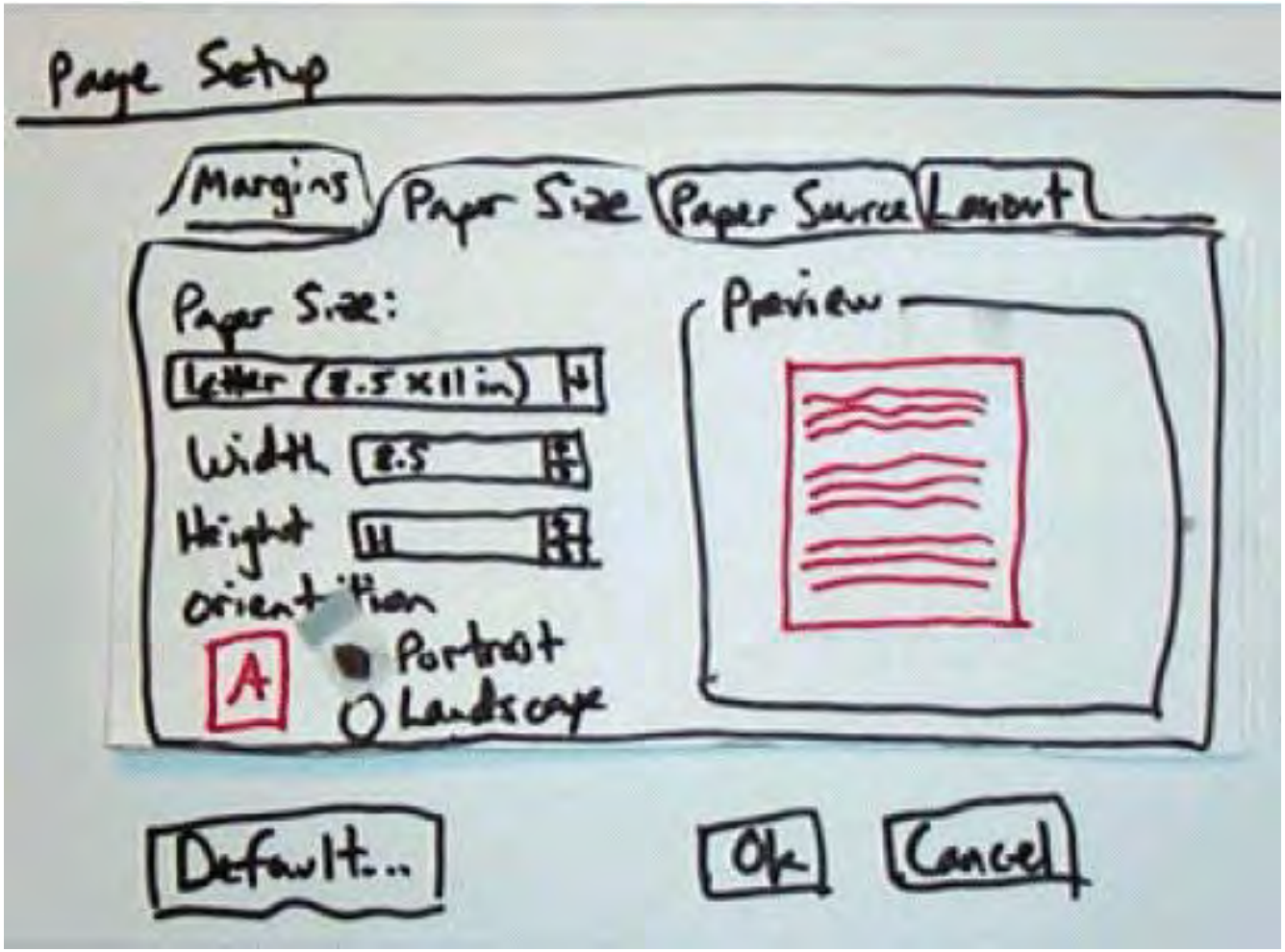
Is this a sketch? Why or why not?



Is this a sketch? Why or why not?



Is this a sketch? Why or why not?

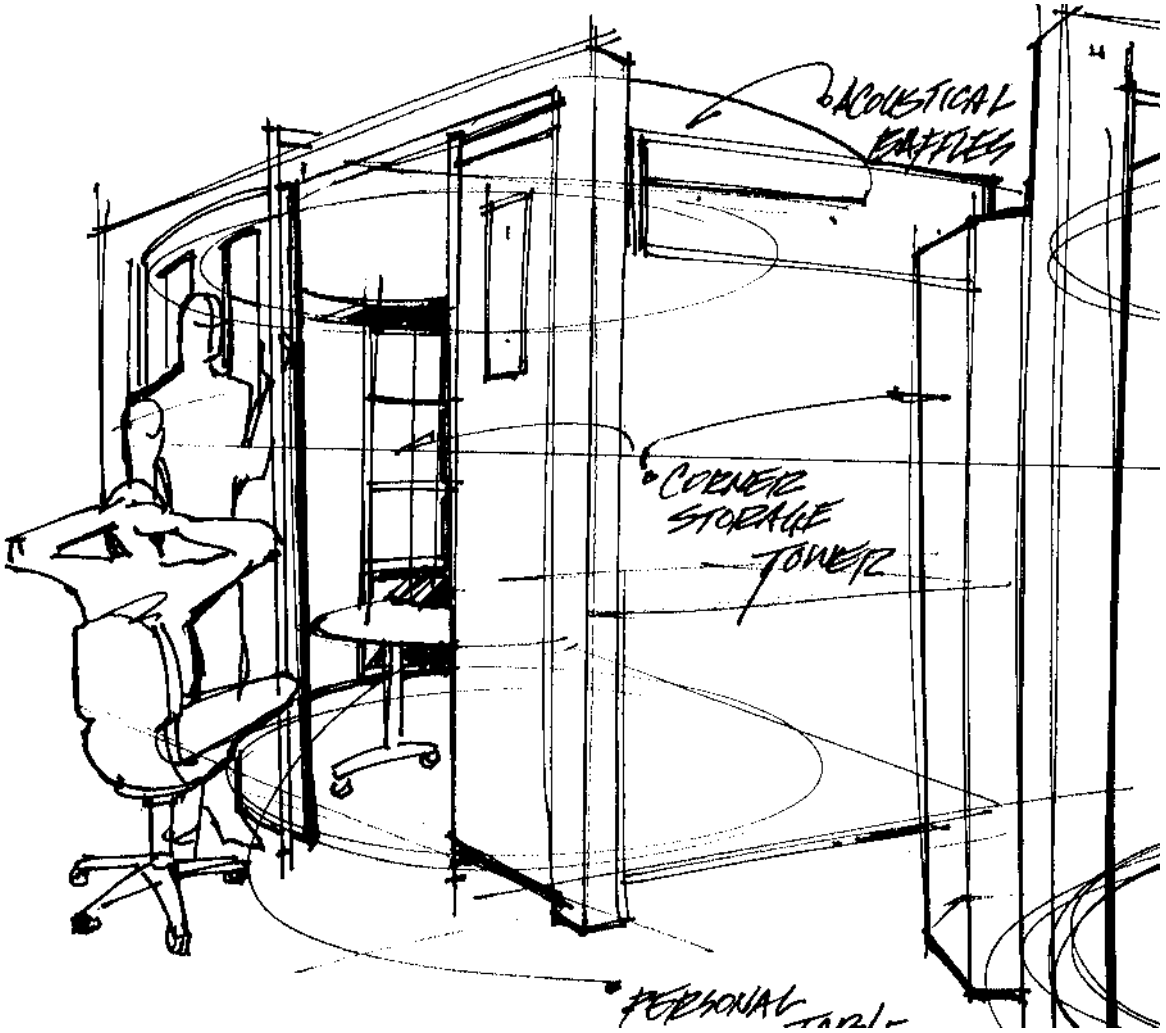


Is this a sketch? Why or why not?

Is this a sketch? Why or why not?

Is this a sketch? Why or why not?

Is this a sketch? Why or why not?



Is this a sketch? Why or why not?

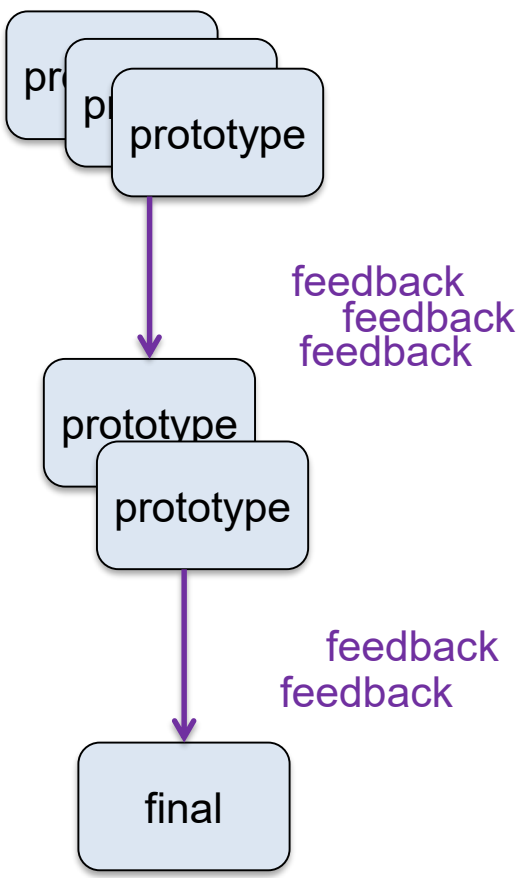
Some Evidence

Task:

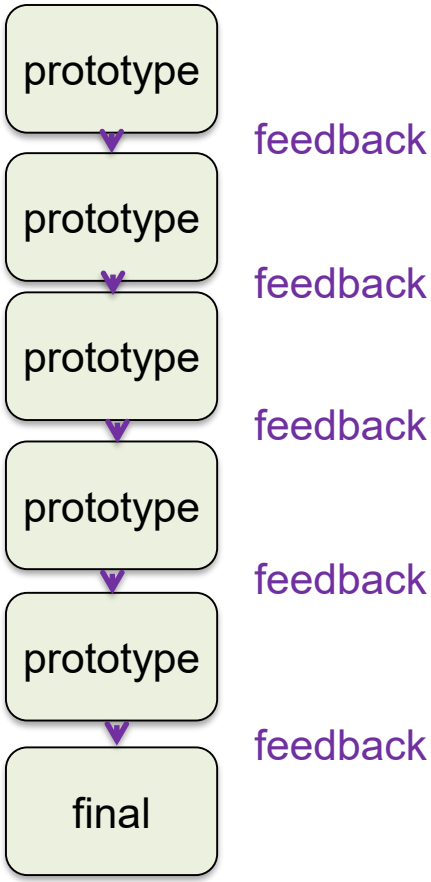
Create a web banner ad for Ambidextrous magazine.

Dow et al. TOCHI 2010.

Feedback in Parallel or Serial



Parallel condition



Serial condition

Dow et al. TOCHI 2010.

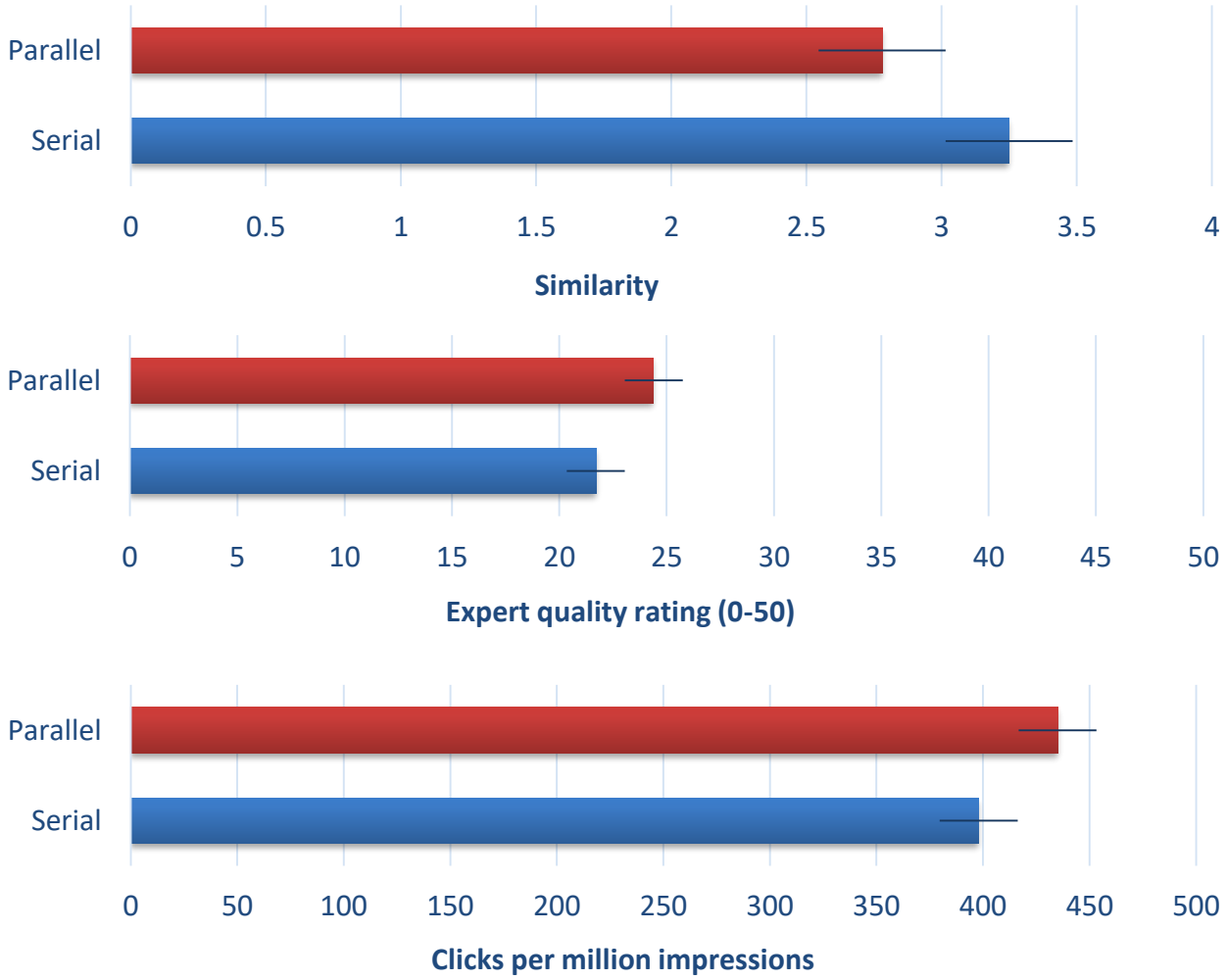
Procedure

serial prototyping condition

parallel prototyping condition

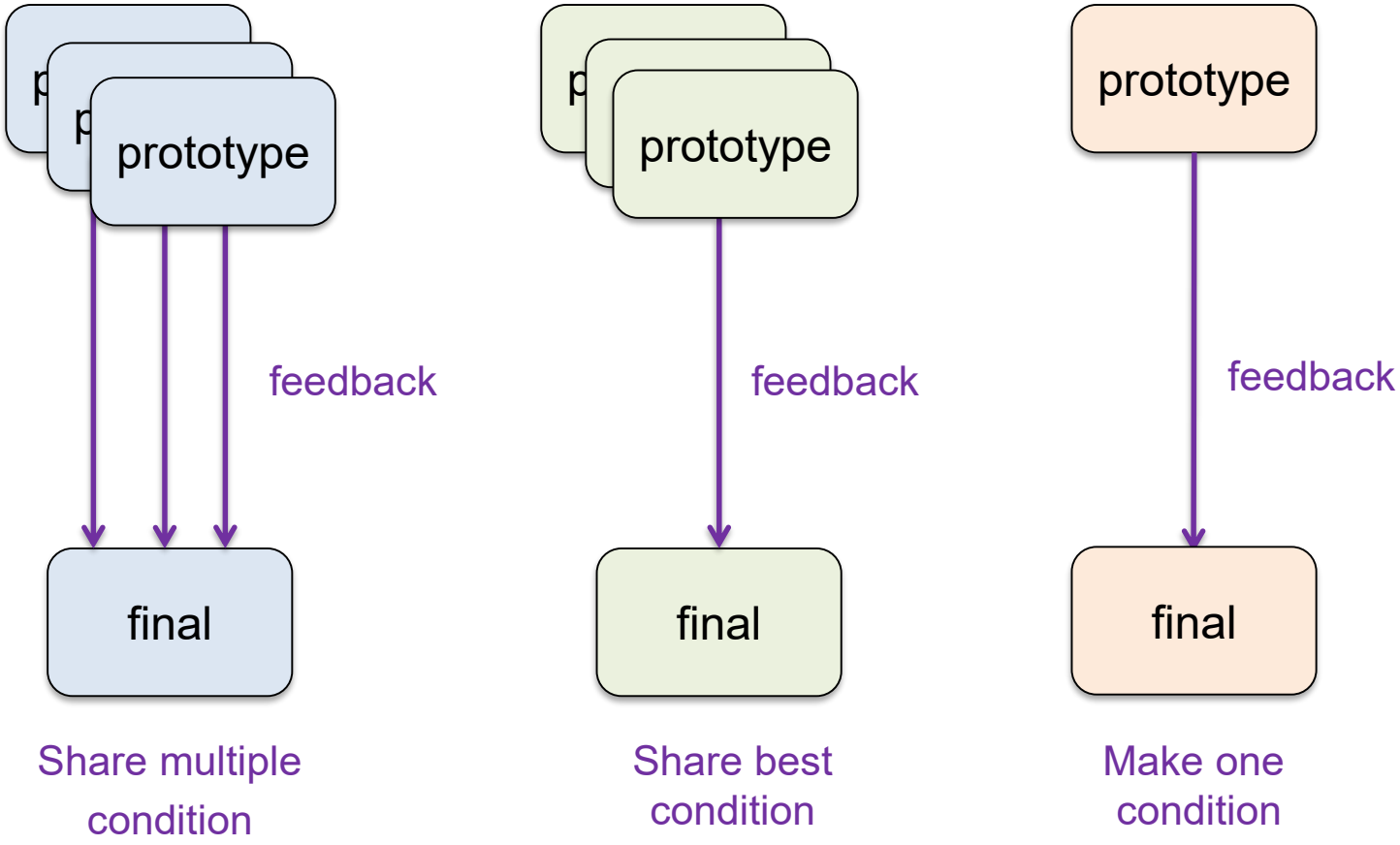
Dow et al. TOCHI 2010.

Parallel: more diverse, better, more clicks



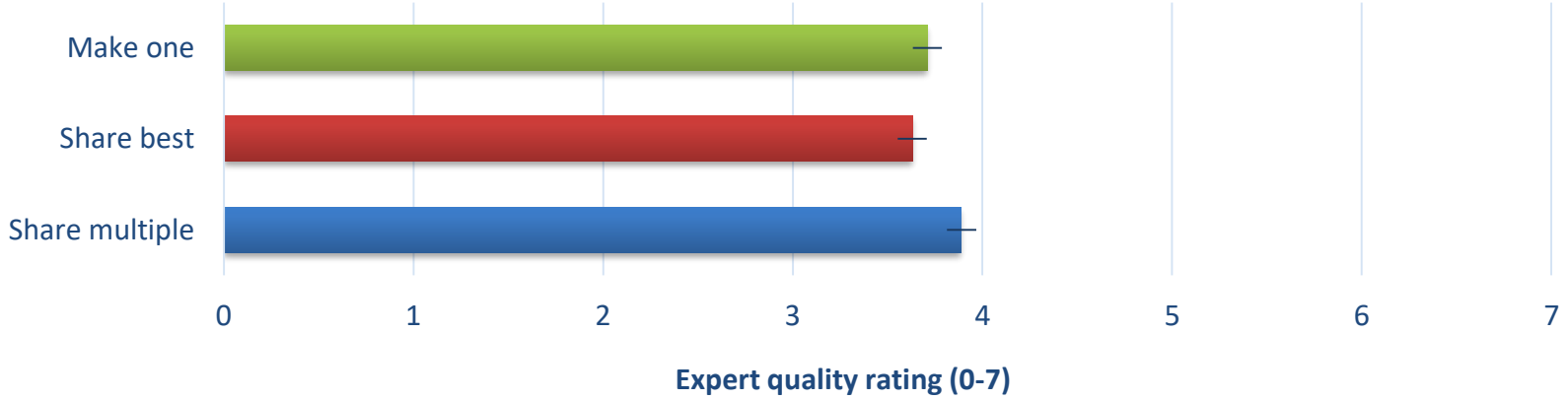
Dow et al. TOCHI 2010.

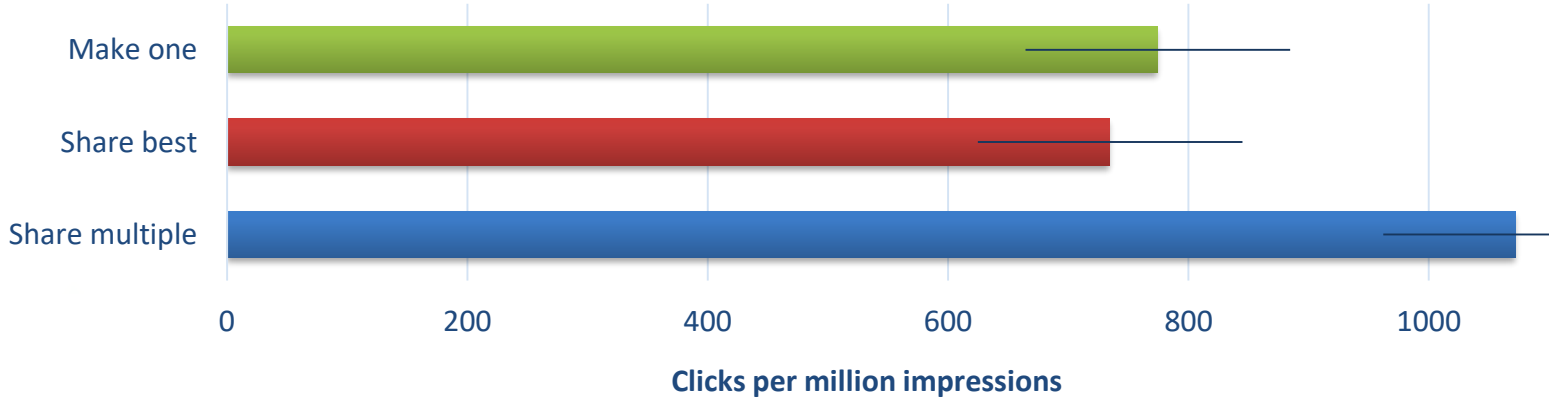
Share one or share your best?



Dow et al. TOCHI 2010.

Share Multiple: better, more clicks





Dow et al. TOCHI 2010.

Some Evidence

Greater divergence in designs

- Prevents sticking with the first idea
- Allows mashing ideas together

Alternatives facilitate feedback

- Enable comparison
- Can improve tone of critique

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 02:
Design Diamond

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

DESIGN
USE
BUILD

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 03:
Contextual Inquiry
and Design Research

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

Amazing Color Changing Card Trick

Why did I show you that?

Why did I show you that?

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

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

Easy to make mistaken assumptions

Today

Administrative

- Project Status
- Denny 303 on Tuesday 10/10

Contextual Inquiry and Design Research

- Ethnographic Principles
- Contextual Inquiry Principles and Practice
- Additional Design Research Methods

Project Team Formation

Project Status and Assignments

Team Formation Today

- Reading 1 Due Today
- Team Ideation in Section Tomorrow

Looking Forward

- 2b: Design Research Plan due Monday 10/9
- 2c: Design Research Check-In due Thursday 10/12
- 2d: Design Research Review due Monday 10/16

Denny 303 on Tuesday 10/10

Objectives

Be able to:

Enumerate and describe ethnographic principles.

Describe master/apprentice relationship in contextual inquiry, contrast it to other relationships with a participant.

Enumerate and describe contextual inquiry principles.

Describe stages of a contextual inquiry, including withdrawal and return.

Give examples of other design research methods, be able to consider how they might be applied to different design research needs.

Today

Administrative

- Project Status
- Denny 303 on Tuesday 10/10

Contextual Inquiry and Design Research

- Ethnographic Principles
- Contextual Inquiry Principles and Practice
- Additional Design Research Methods

Project Team Formation

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

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

Four Ethnographic Principles

Natural settings

Holism

Descriptive

Member point-of-view

Four Ethnographic Principles

Natural Settings

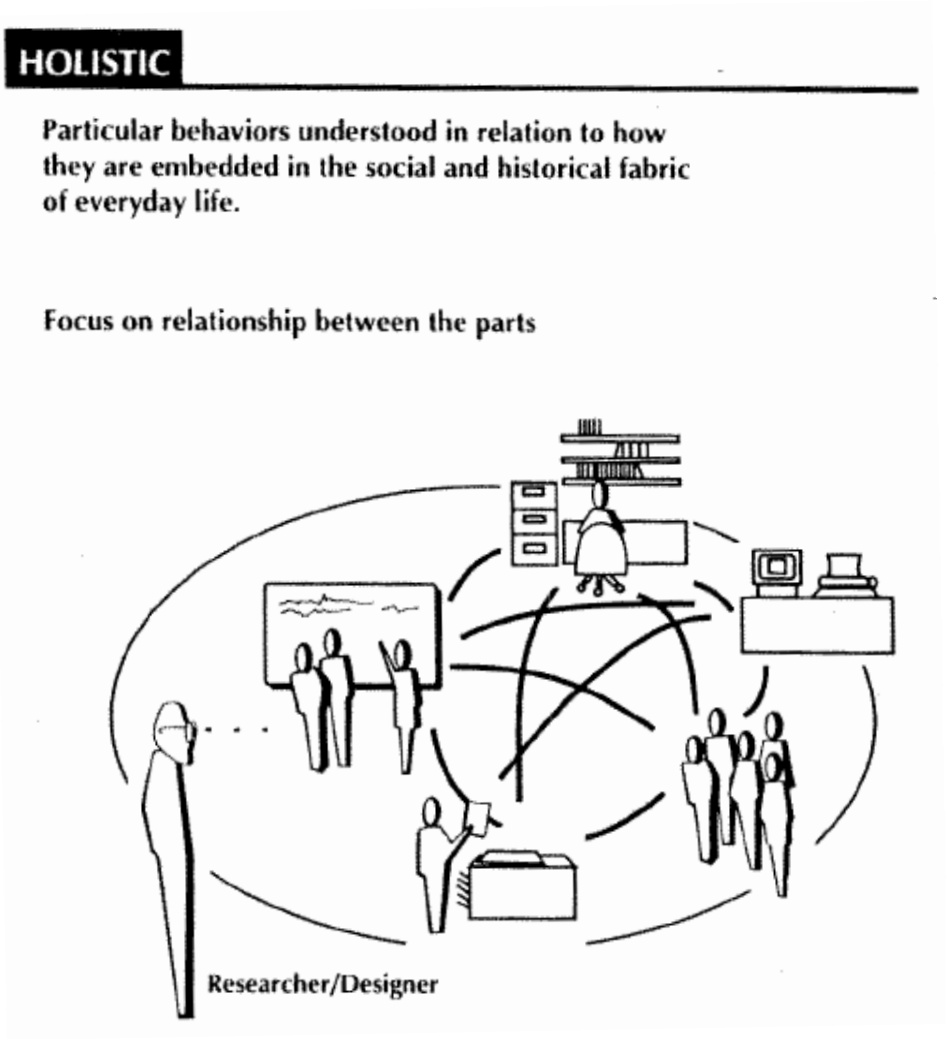
- Conducted in the setting of the participant
- Focus on naturally occurring, everyday action
- Cannot use laboratory, experimental settings, or a phone call to gather this type of data

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.

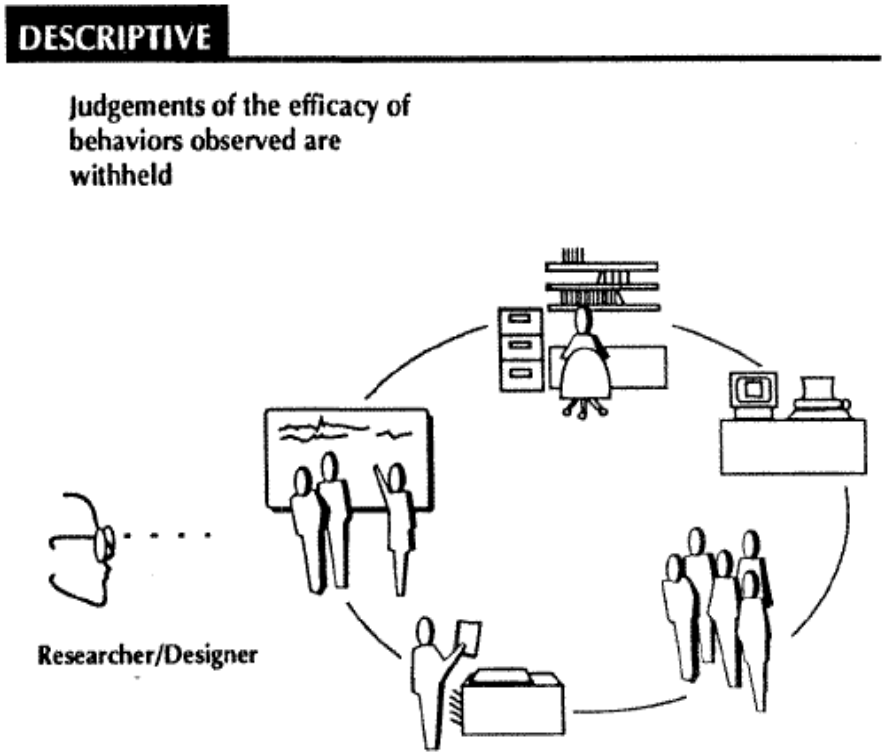


Four Ethnographic Principles

Descriptive

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

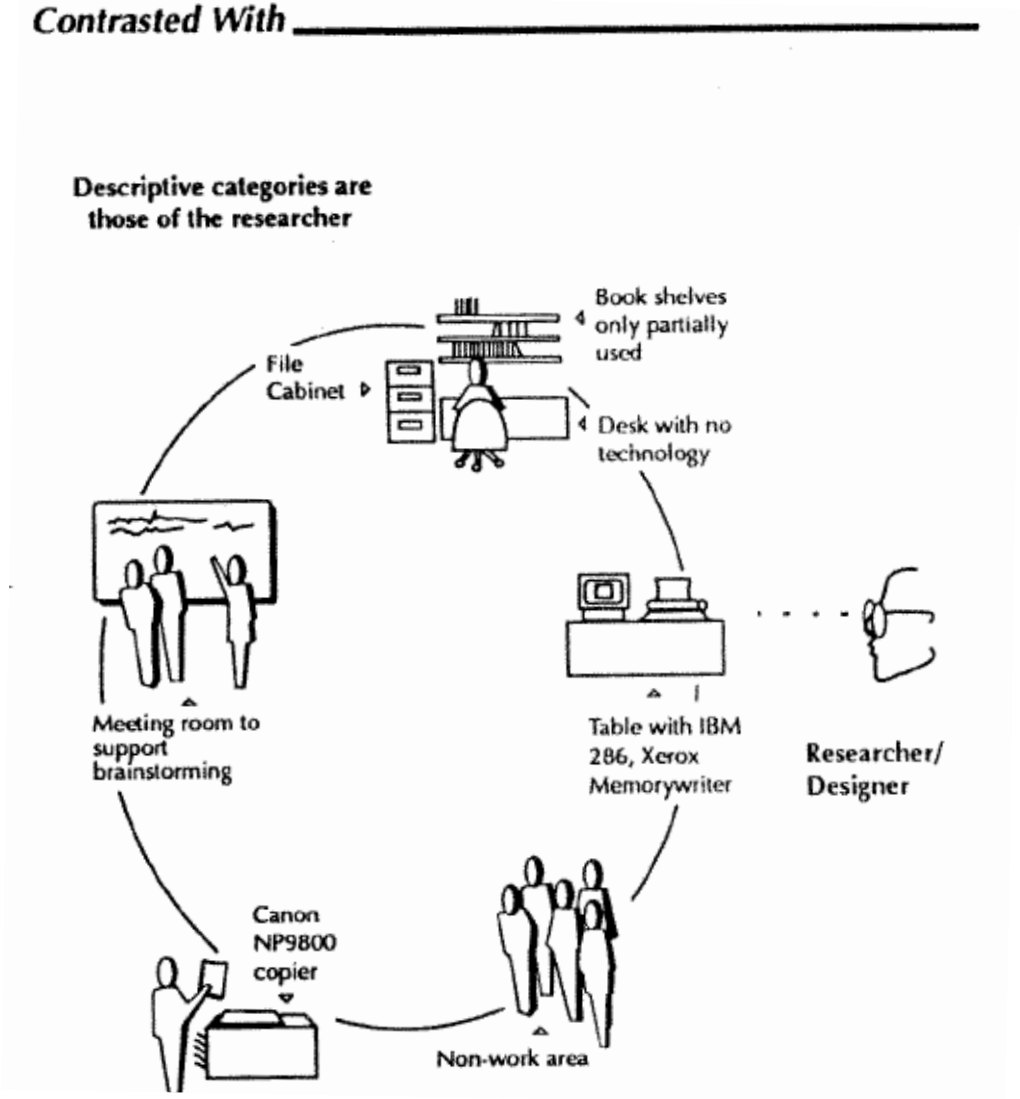
Defer judgment.



Four Ethnographic Principles

Member
Point-of-View

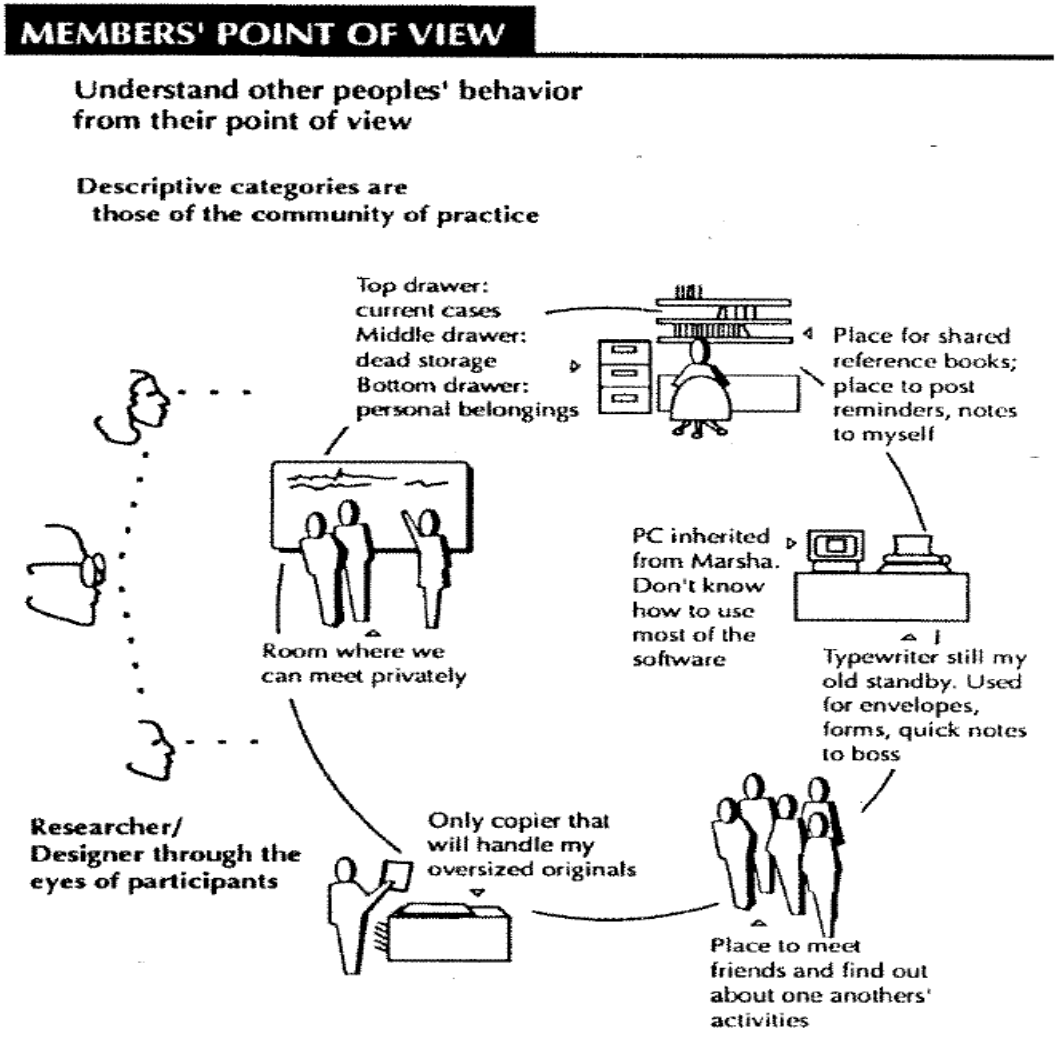
See through participant eyes in order to grasp how they interpret and act in their world.



Four Ethnographic Principles

Member
Point-of-View

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



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

- Sometimes “ethnographically inspired methods”

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

Today

Administrative

- Project Status
- Denny 303 on Tuesday 10/10

Contextual Inquiry and Design Research

- Ethnographic Principles
- Contextual Inquiry Principles and Practice
- Additional Design Research Methods

Project Team Formation

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 researcher develops understanding

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

This is not simple correctness, nor only about respect, it is a mindset that matters for being open

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
the next question from their list

When all the questions are answered,
the interview is complete

This would support gaining phenomenological understanding if you knew what questions to ask

Implying you have phenomenological understanding

What is your relationship?

In a master/apprentice relationship:

- The master is doing stuff
- The master explains what they are 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 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)

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

Not Quite Master/Apprentice

In a contextual inquiry relationship:

- The participant is doing stuff
- The participant explains what they are doing
- The researcher offers an interpretation
- The participant agrees or corrects

Partners

- Not really an interview
- Not really an apprentice

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?”

Context

Imagine studying how a student writes a paper

Why not just ask?

Context

Imagine studying how a student writes a paper

Why not just ask?

May not remember details

- Getting roommate to read drafts

May skip critical difficulties

- Trouble locating references on the Web

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

If cannot observe, 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 do not know what will turn out to be important

Apprenticeship model tilts power back too far

- You are not there to learn the skill

Interviewer should create a partnership

- Alternate between watching and probing

Withdrawal and Return

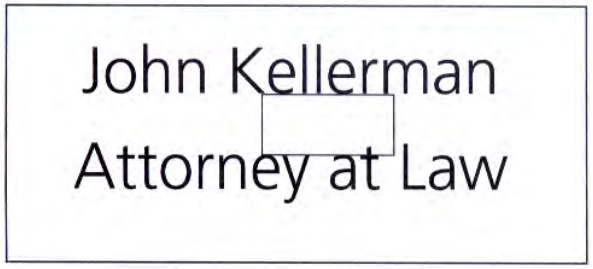
Key in partnership

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



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

Do not squash design ideas if they arise

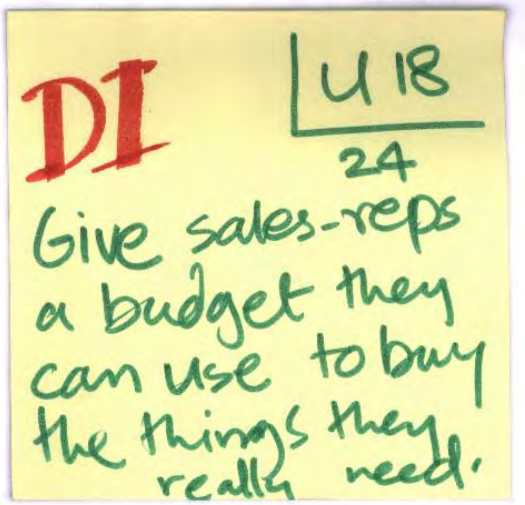
This is design, not dispassionate science

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



Partnership

Avoiding Other Relationship Models

Interviewer / Interviewee

- You are not there to get a list of questions answered

Expert / Novice

- You are not 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” – probably no, just being polite
- “Yes, but…” or “Yes, and” – depends 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

Brainstorm and define your focus

Focus

- Focus defines the point of view
  - Clear focus steers the conversation
  - Everyone in the team has 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

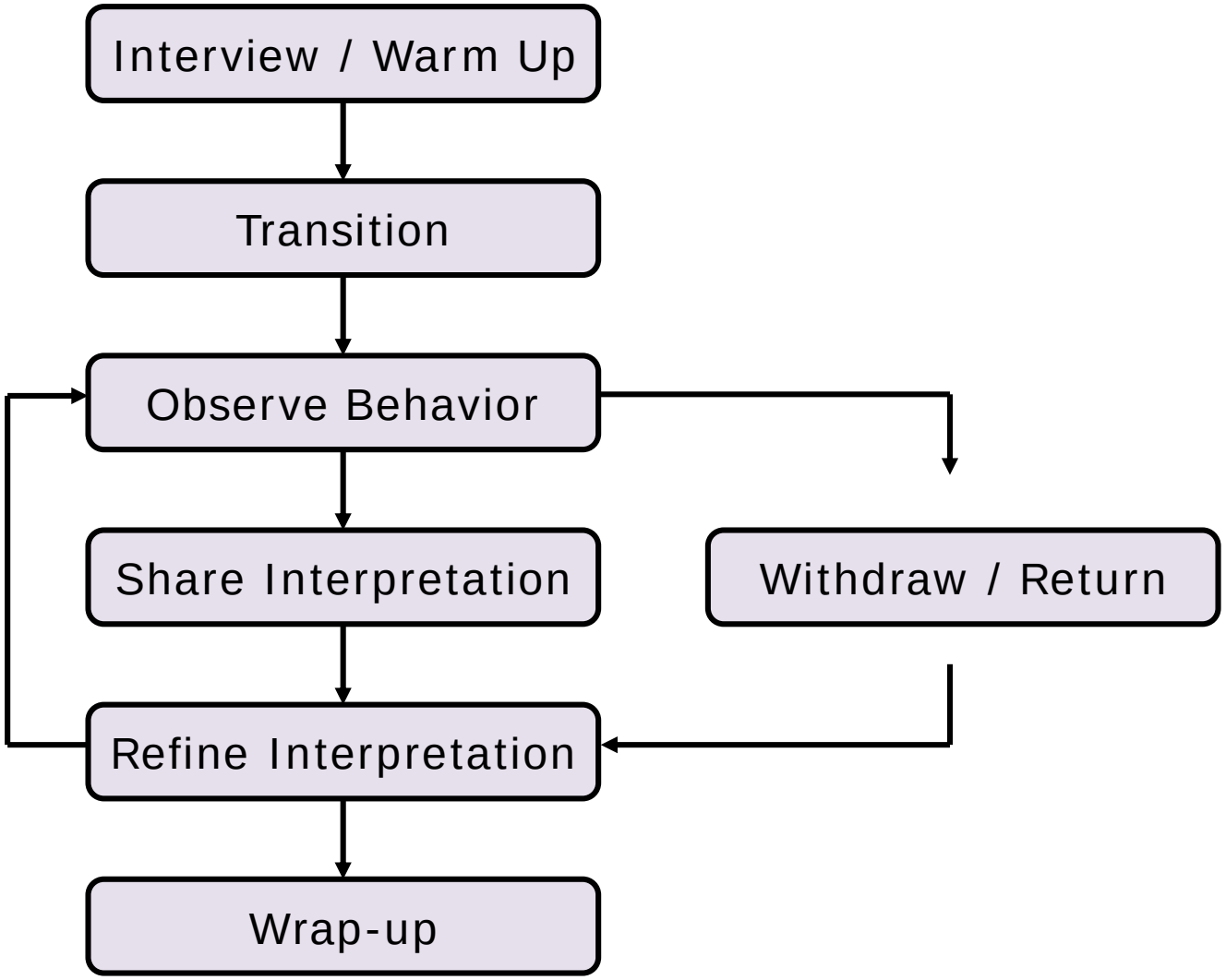
Nods

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

What you do not know

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

The Stages of a Contextual Inquiry



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

Being too pushy with interpretation

- If you ignore corrections, participant will shut down

How to Screw it Up

With the wrong person

- They need to be willing to partner with you

Turning it into a regular interview

- If you could have done it in a coffee shop, then you did not do a contextual inquiry

Multiple people present

- Can be good if they talk, surface their thoughts
- Bad if they do not talk, are not forthright

How to Screw it Up

- Overly disrupting the task
  - If you change the task, your data is less useful
  - Withdrawal and return, maybe on a schedule
  - Retrospective methods might be necessary
  - (e.g., going through artifacts, prior critical incident)
- Being stuck in your focus
  - Important to have a focus,
    expectations of what you expect to be important
  - But you learn by attending to misconceptions

When All Else Fails

Remember Master/Apprentice

Remember Context

Remember Withdraw & Return

Affinity Diagrams

Generated during group session

Each observation, idea, note to a post-it

Notes are hierarchically organized into themes, based on project focus

Today

Administrative

- Project Status
- Denny 303 on Tuesday 10/10

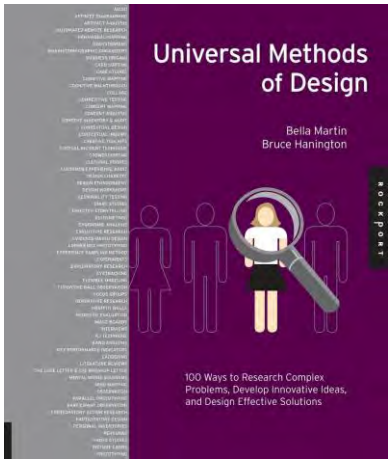
Contextual Inquiry and Design Research

- Ethnographic Principles
- Contextual Inquiry Principles and Practice
- Additional Design Research Methods

Project Team Formation

Many Design Research Methods

Many other design research methods are available, with different strengths

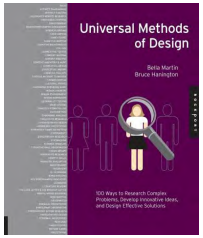


Often apply multiple methods for complementary perspectives

Fundamental goal remains to gain design insight through improved understanding of problems

Interviews

Method 48



Similar to contextual inquiry,
but lacking context of direct observation

- Set a focus, record, take notes, have two people

Can be Structured / Semi-Structured

- Avoid leading questions

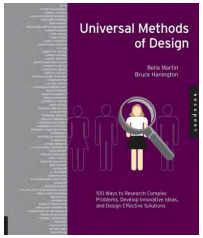
Interpret responses

- Repeat and rephrase, probe terms and concepts
- "can you give an example", "tell me more",
  "what do you mean", "why was that important"
- Ask when it did not happen as expected

Pair with questionnaires for depth / to humanize

Focus Groups

Method 43



Moderated conversation among peers

- Moderator helps establish this, participants share experiences, wants/needs

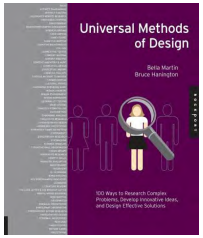
Researcher benefits from their conversations

Prompts discussion topics

- Explanations of problems in status quo
- Underlying emotions in a process
- Desires / disagreements for new designs

Diary Study

Method 30



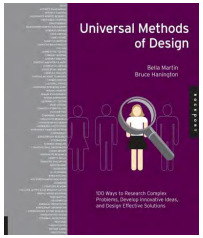
Participants keep a diary

- Possibly as primary data
- Possibly to create mindfulness before interview

timeout

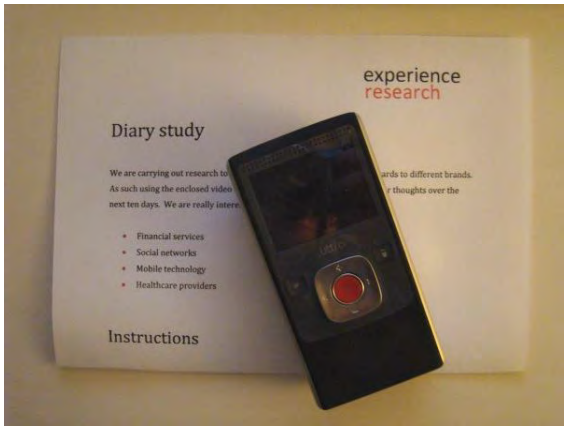
Diary Study

Method 30



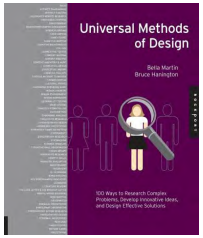
Participants keep a diary

- Possibly as primary data
- Possibly to create mindfulness before interview



Diary Study

Method 30

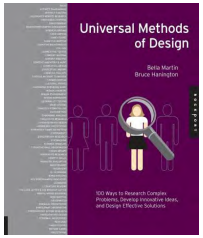


Participants keep a diary

- Possibly as primary data
- Possibly to create mindfulness before interview

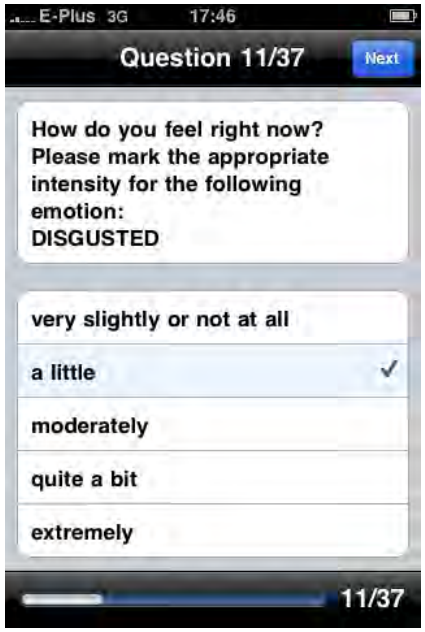
Experience Sampling

Method 37



Emerges from “beeper study” method

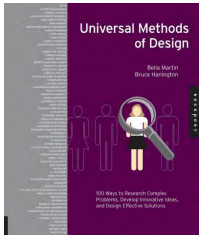
- Can be random, can be context-aware
- Can gather self-report, photos, sensor data



Many Design Research Methods

Personal Inventories

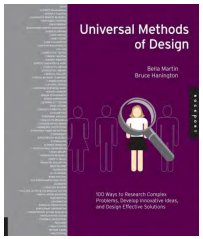
Method 62



"collections of artifacts
selected by the participant"

Cultural Probes

Method 24



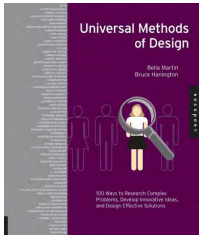
"materials designed to inspire
people to thoughtfully consider
personal context and circumstance"

"maps … asked the elderly to mark zones for
meeting others, being alone, dreaming…"

Many Design Research Methods

Behavior Mapping

Method 06

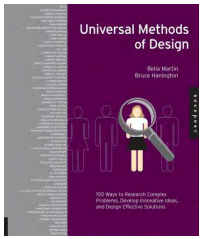


"place-centered mapping"

"individual-centered mapping / traces"

Graffiti Wall

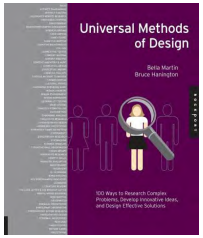
Method 45



"candid feedback on behaviors and perceptions of current spaces"

Shadowing

Method 76



"observational method that involves tracking somebody in their role"

> "not intended to be covert … however subtle instances might be completed in public spaces …"

Useful reminder to be thoughtful and safe

> multiple groups have been asked to leave
>
> be safe, be mindful of people

Value Sensitive Design

To be useful or usable is not the same as supporting important human values

Examples?

Value Sensitive Design

To be useful or usable is not the same as supporting important human values

Examples?

Independence
Privacy
Trust
Accountability
Ownership and Property
Fairness
Freedom from Bias
Human Safety
Universal Access
Sustainability

Value Suitabilities

Value Sensitive Design is an interactional theory

- Values are not inherent in a given technology
- But a technology is not value neutral

- Some technologies are more suitable than others for supporting given values

Value Sensitive Design investigates stakeholders, values, and value suitabilities

- Direct and indirect stakeholders

Tripartite Method

Conceptual Investigations

- Analyses of the values involved in a system

Technical Investigations

- Identify or develop technical mechanisms
- Investigate suitability to support values

Empirical Investigations

- Investigate who the stakeholders are, which values are important to them, and how they prioritize these values

Today

Administrative

- Project Status
- Denny 303 on Tuesday 10/10

Contextual Inquiry and Design Research

- Ethnographic Principles
- Contextual Inquiry Principles and Practice
- Additional Design Research Methods

Project Team Formation

Project Status and Assignments

Team Formation Today

- Reading 1 Due Today
- Team Ideation in Section Tomorrow

Looking Forward

- 2b: Design Research Plan due Monday 10/9
- 2c: Design Research Check-In due Thursday 10/12
- 2d: Design Research Review due Monday 10/16

Denny 303 on Tuesday 10/10

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 03:
Contextual Inquiry
and Design Research

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 04:
Critique

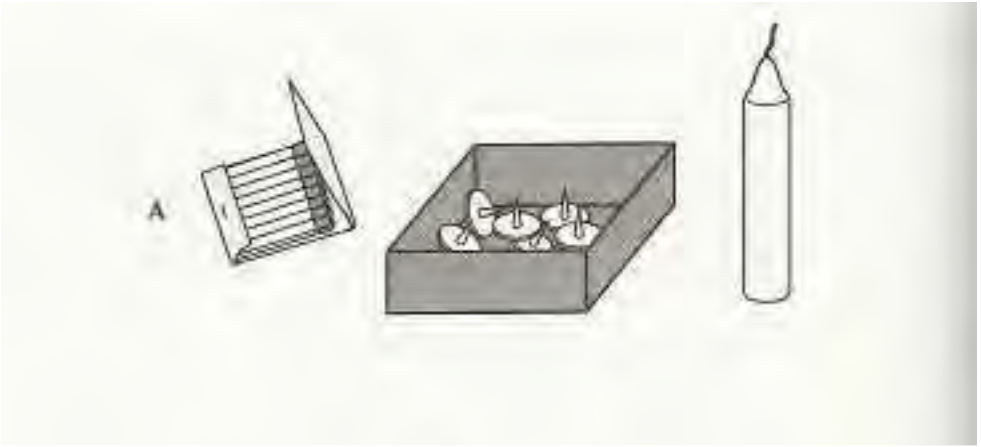
Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

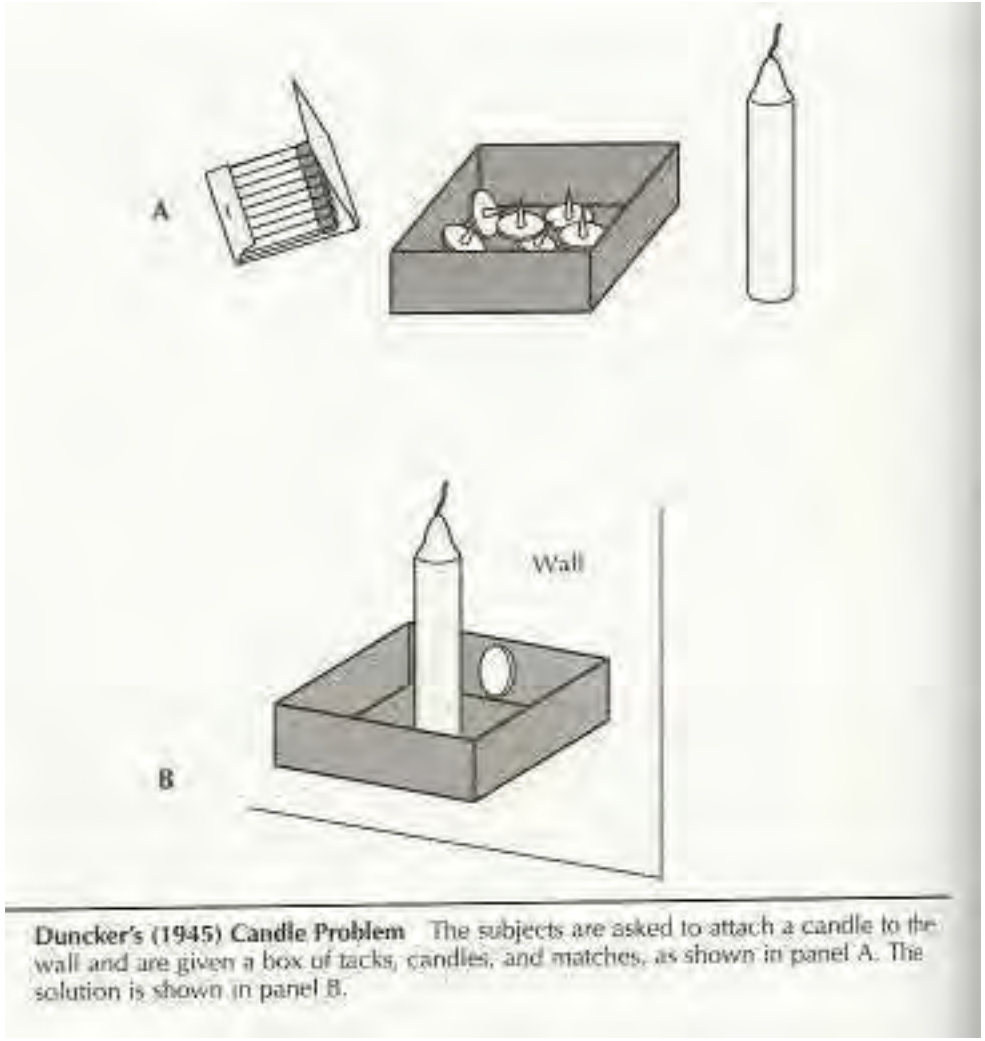
DESIGN
USE
BUILD

Functional Fixedness



https://en.wikipedia.org/wiki/Functional_fixedness

Functional Fixedness



Duncker's (1945) Candle Problem The subjects are asked to attach a candle to the wall and are given a box of tacks, candles, and matches, as shown in panel A. The solution is shown in panel B.

https://en.wikipedia.org/wiki/Functional_fixedness

$5 Challenge

Teams of students “funded” with $5

- Allowed several days to plan
- After they open the envelope, allowed two hours
- Make as much money as possible

https://www.psychologytoday.com/blog/creativityrulz/200908/the-5-challenge

$5 Challenge

Teams of students “funded” with $5

- Allowed several days to plan
- After they open the envelope, allowed two hours
- Make as much money as possible

Lottery tickets, car washes

https://www.psychologytoday.com/blog/creativityrulz/200908/the-5-challenge

$5 Challenge

Teams of students “funded” with $5

- Allowed several days to plan
- After they open the envelope, allowed two hours
- Make as much money as possible

Lottery tickets, car washes

Line waiting service, bicycle tire pressure check

- Evolved with experience (e.g., pagers, donations)

https://www.psychologytoday.com/blog/creativityrulz/200908/the-5-challenge

$5 Challenge

Teams of students “funded” with $5

- Allowed several days to plan
- After they open the envelope, allowed two hours
- Make as much money as possible

Lottery tickets, car washes

Line waiting service, bicycle tire pressure check

- Evolved with experience (e.g., pagers, donations)

Winner made $650…

https://www.psychologytoday.com/blog/creativityrulz/200908/the-5-challenge

Why Critique?

Critique helps evaluate early, often, and cheaply

- Applicable to artifacts of many types
- Compare to other expert inspection methods

You are not your own worst critic

- We collectively know more than any one of us
- It is hard to see past your own decisions
- Design requires getting past our own infatuation

A design can feel like our love, our baby…

Learning to Give and Receive Critique

You will learn to both give and receive critique

- Each is important
- Each is a skill developed through practice

Many activities will consist of group critiques

- Each group will present an artifact
- Other class members and staff will offer critique

Starting today with critique of
Assignment 2b: Design Research Plan

Why Critique?

Critique is not just for design

- It applies to many artifacts and domains

Examples?

Why Critique?

Critique is not just for design

- It applies to many artifacts and domains

Examples?

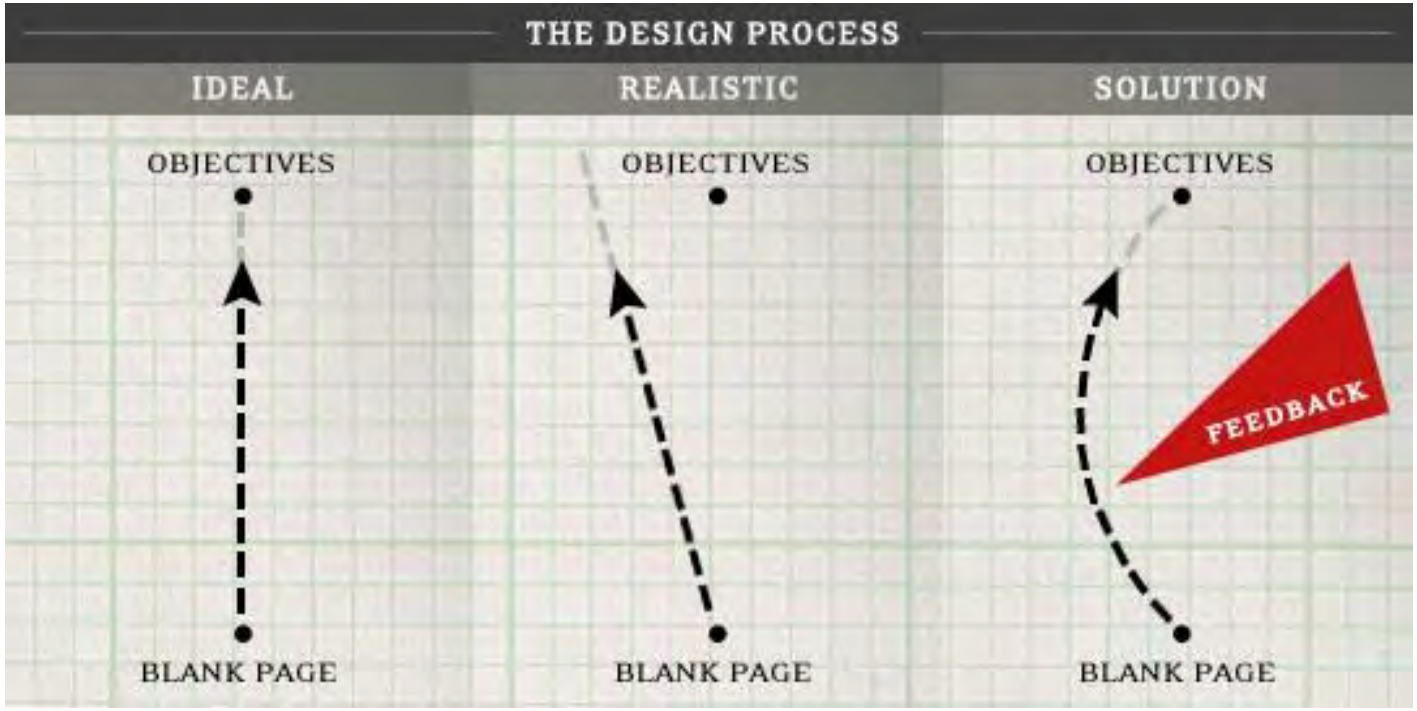
- visual art, writing, design, code (i.e., code review)

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

We do not insist on deploying flawed code…

Critique is About Improvement



http://alistapart.com/article/design-criticism-creative-process

What is Critique?

Critique is a method for feedback

It is not just a list of complaints

1. Presenters sit down with critics
2. Quickly explain their artifacts
   (e.g., less than 2 minutes)
3. Critics give feedback, ask questions
4. Presenters respond,
   take notes on what is discussed

Critique is Neither Criticism nor Design

Seriously, not just a list of complaints

Critics offer honest feedback

Both positive and negative

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

It is then presenter's responsibility to sort through feedback, decide what is important, how to act

> You must take notes for later review

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 and your rationale for the current design

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

- What you show invites different forms of feedback
- Verbally indicate what kind of feedback you want, but also provide an artifact of appropriate form

- This course will guide you in a variety of forms

Tips for Presenters

Design your critique:

1) establish clear roles

Presenter: presenting, not convincing

Audience: understand problem and context, ask lots of questions

Facilitator: watch schedule, stay on agenda, take notes to help presenter, ask key steps for moving forward

https://medium.com/facebook-design/critique-is-an-important-part-of-any-design-process-whether-you-work-as-part-of-a-team-or-solo-ef3dcb299ce3

Tips for Presenters

Design your critique:

2) ensure agreement on the problem

State the problem and context for feedback

I am showing [early/mid/late] work
Around [the problem]
Because [why it's a problem]
And am looking for feedback around [specific focus for feedback]

State what is not the current focus

Ensure understanding and check for clarity

https://medium.com/facebook-design/critique-is-an-important-part-of-any-design-process-whether-you-work-as-part-of-a-team-or-solo-ef3dcb299ce3

Tips for Presenters

Design your critique:

3) focus on feedback, not criticism

Criticism	Critique
passes judgement	poses questions
finds fault	uncovers opportunity
is personal	is objective
is vague	is concrete
tears down	builds up
is ego-centric	is altruistic
is adversarial	is cooperative
belittles the designer	improves the design

https://medium.com/facebook-design/critique-is-an-important-part-of-any-design-process-whether-you-work-as-part-of-a-team-or-solo-ef3dcb299ce3

Tips for Presenters

Design your critique:

4) keep laptops and phones put away

Exception for the presenter,
but prefer paper whenever possible

Exception for the facilitator / note taker

https://medium.com/facebook-design/critique-is-an-important-part-of-any-design-process-whether-you-work-as-part-of-a-team-or-solo-ef3dcb299ce3

Tips for Presenters

Keep an eye out for design rationale

- You probably made some decisions without thinking through good reasons at the time
- Critique can help give a rationalization for past decisions as you explain the artifact to others

Exploit failure

- A “failed” artifact should teach you about the design space, what won’t work, and why
- The goal is to improve, this requires failure

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 can help the conversation go smoothly

- Can give you a question to ask when you do not have one, provide a way to ask that is productive and less likely to create defensive reaction

Tips for Critics: Hamburger Method

"Bun, meat, bun"

Bun:

- Something fluffy and nice

Meat:

- How to improve

Bun:

- Something fluffy and nice

Not a "shit sandwich"

Positives need to be genuine, enable learning from both positive and negative aspects of the artifact

Tips for Critics: I Like, I Wish, What If

I Like:

- Lead with something nice

I Wish:

- Often leading from what you like

What If:

- An idea to spark further conversation, better than: “I think you should have…” or “Why didn’t you …”
- Gives the presenter benefit of the doubt if they did already think of your idea, can present rationale

Tips for Critics: Socratic Method

Identify an aspect of the design and ask “Why?”

- Can be good if unsure what else to say
- Forces presenter to give, or develop, explanations for design decisions, which can help build up the design rationale
- Not fundamentally negative, hard to get defensive

Tips for Critics

- Limit your use of personal pronouns (e.g., “you”)
  - Critique is about the artifact, not the designer
- A designer deserves honest feedback
  - Both positive and negative
  - Including clarity and rationale
- Help with actionable suggestions
  - But it is not your design
  - Perhaps several possible ways of thinking

Summary

- Fall out of love with the things you build
  - Let others help you see past the infatuation
- Get feedback early, often, and cheaply
- Focus on improvement
  - In brainstorming, we were not *criticizing*
  - In critique, we are not *defending*
- You will learn to both give and receive critique
  - If you are having difficulty, please come talk to us

Design Research Plan Critique

With your group, find another group

- Decide which group will present first
- Swap half the audience group to another table

Present your Design Research Plan

- Decide who is taking notes
- Remind project context
- Present proposed methods
- Present details via design research artifact

Design Research Plan Critique

Some things to look for:

Are questions open enough,
avoiding the presumption of a particular design?

Are questions specific enough,
offering a potential to gain new insights?

Are there other participants to consider?

Are there other methods to consider?

Is the proposal feasible for 1 to 2 weeks?

Considering an Effective Critique

Is there a set agenda for work being shown?

Are there clearly defined roles in each session?

Has the facilitator kept conversation focused?

Have presenters accurately shared the scope of their problem?

Did everyone in the room understand the problem framework, enough where each person felt equipped to ask questions?

Was feedback provided in the form of questions or criticism?

Did the critique feel like a cooperated effort to improve a design, problem outline, or individual process?

https://medium.com/facebook-design/critique-is-an-important-part-of-any-design-process-whether-you-work-as-part-of-a-team-or-solo-ef3dcb299ce3

Resources

On Critique

Four Things Working at Facebook Has Taught Me About Design Critique

https://medium.com/facebook-design/critique-is-an-important-part-of-any-design-process-whether-you-work-as-part-of-a-team-or-solo-ef3dcb299ce3

How to Survive a Critique: A Guide to Giving and Receiving Feedback

http://www.aiga.org/how-to-survive-a-critique

On Interviewing

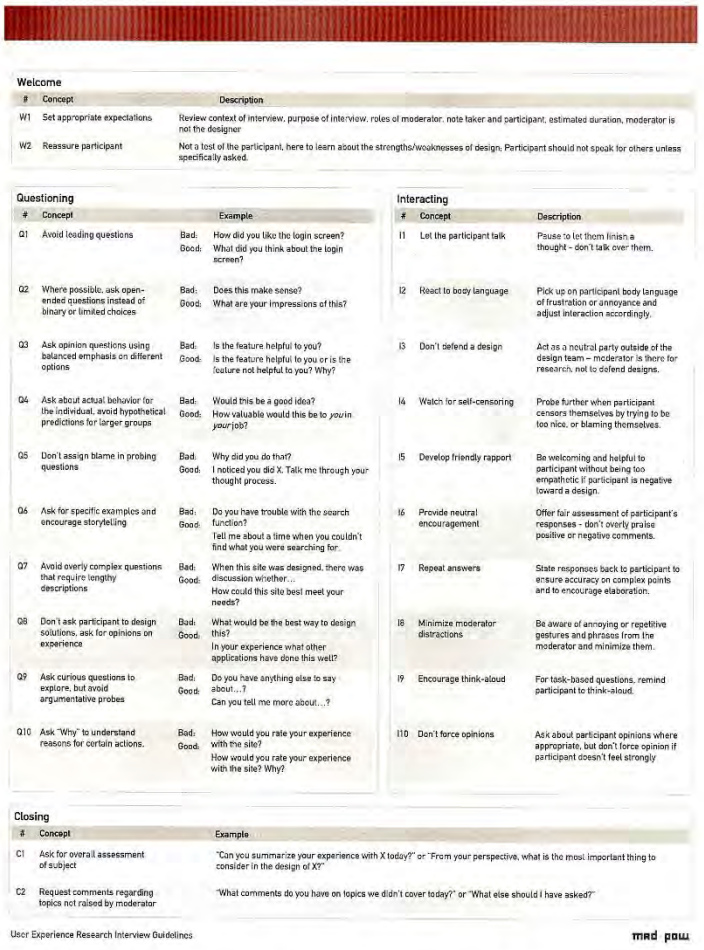
User Interview Techniques: Guidelines for Obtaining Better Results

https://canvas.uw.edu/files/44191347/download?download_frd=1

Resources

Guidelines for design research interviews

Structured in a format to use for critique of the interview process itself



Welcome

#	Concept	Description
W1	Set appropriate expectations	Review context of interview, purpose of interview, roles of moderator, note taker and participant, estimated duration, moderator is not the designer
W2	Reassure participant	Not a test of the participant, here to learn about the strengths/weaknesses of design. Participant should not speak for others unless specifically asked.

Questioning

#	Concept		Example
Q1	Avoid leading questions	Bad: Good:	How did you like the login screen? What did you think about the login screen?
Q2	Where possible, ask open-ended questions instead of binary or limited choices	Bad: Good:	Does this make sense? What are your impressions of this?
Q3	Ask opinion questions using balanced emphasis on different options	Bad: Good:	Is the feature helpful to you? Is the feature helpful to you or is the feature not helpful to you? Why?
Q4	Ask about actual behavior for the individual, avoid hypothetical predictions for larger groups	Bad: Good:	Would this be a good idea? How valuable would this be to *you* in *your* job?
Q5	Don't assign blame in probing questions	Bad: Good:	Why did you do that? I noticed you did X. Talk me through your thought process.
Q6	Ask for specific examples and encourage storytelling	Bad: Good:	Do you have trouble with the search function? Tell me about a time when you couldn't find what you were searching for.
Q7	Avoid overly complex questions that require lengthy descriptions	Bad: Good:	When this site was designed, there was discussion whether… How could this site best meet your needs?
Q8	Don't ask participant to design solutions, ask for opinions on experience	Bad: Good:	What would be the best way to design this? In your experience what other applications have done this well?
Q9	Ask curious questions to explore, but avoid argumentative probes	Bad: Good:	Do you have anything else to say about…? Can you tell me more about…?
Q10	Ask "Why" to understand reasons for certain actions.	Bad: Good:	How would you rate your experience with the site? How would you rate your experience with the site? Why?

Interacting

#	Concept	Description
I1	Let the participant talk	Pause to let them finish a thought – don't talk over them.
I2	React to body language	Pick up on participant body language of frustration or annoyance and adjust interaction accordingly.
I3	Don't defend a design	Act as a neutral party outside of the design team – moderator is there for research, not to defend designs.
I4	Watch for self-censoring	Probe further when participant censors themselves by trying to be too nice, or blaming themselves.
I5	Develop friendly rapport	Be welcoming and helpful to participant without being too empathetic if participant is negative toward a design.
I6	Provide neutral encouragement	Offer fair assessment of participant's responses – don't overly praise positive or negative comments.
I7	Repeat answers	State responses back to participant to ensure accuracy on complex points and to encourage elaboration.
I8	Minimize moderator distractions	Be aware of annoying or repetitive gestures and phrases from the moderator and minimize them.
I9	Encourage think-aloud	For task-based questions, remind participant to think-aloud.
I10	Don't force opinions	Ask about participant opinions where appropriate, but don't force opinion if participant doesn't feel strongly

Closing

#	Concept	Example
C1	Ask for overall assessment of subject	"Can you summarize your experience with X today?" or "From your perspective, what is the most important thing to consider in the design of X?"
C2	Request comments regarding topics not raised by moderator	"What comments do you have on topics we didn't cover today?" or "What else should I have asked?"

User Experience Research Interview Guidelines

mad pow

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 04:
Critique

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

DESIGN
USE
BUILD

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 05:
Task Analysis

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

DESIGN
USE
BUILD

The Homer

Project Status

Looking Forward

- 2c: Design Research Check-In due Tonight
- 2d: Design Research Review due Monday 10/16
- 2e: Task Review due Thursday 10/19
- 2f: Design Check-In (3x4) Due Monday 10/23
- 2g: Design Review (1x2) Due Thursday 10/26
- “Getting the Right Design” Report and Presentation

Other Assignments

- Readings to be Posted Soon

CSE Colloquium Today

Design at Large: real-world, large scale, and sometimes disruptive

Scott Klemmer (UCSD)
Host: Froehlich
Paul G. Allen School Distinguished Lecture
Thursday, October 12, 2017, 3:30 pm
EEB-105
Maps and directions

Abstract

In recent years, my group--and probably many of you--have experienced a dramatically-increased ability to do Design at Large: creating research that is widely-used by real people and learning a ton from the experience. When moving from designing artifacts in the lab to designing experiences at large we inevitably shift to studying complex sociotechnical systems. A lot of the behavior is emergent, and sometimes completely unexpected. The successes in this new world are tremendously exciting, but like all creative endeavors, there are lots of flops. One source of failure is that designers often receive guidance that's based on faith rather than insight. This leads to designs that 'solve' nonexistent problems, miss important needs, hold onto misguided assumptions for too long, or waste time relearning known insights. To help sketch where a shift to Design at Large may take us, I'll share insights from our research systems and their real-world usage, experiences with online learning, former students' adventures, and what we're up to in the Design Lab.

Bio

Scott is a Professor of Cognitive Science and Computer Science & Engineering at UC San Diego, where he co-founded the Design Lab. He previously served as Associate Professor of Computer Science at Stanford, where he co-directed the HCI Group, held the Bredt Faculty Scholar chair, and was a founding participant in the d.school. He has a PhD in CS from Berkeley and a dual BA in Art-Semiotics and Computer Science from Brown (with work at RISD). His former graduate students include leading professors, researchers, & founders. He leads the Interaction Design Specialization on Coursera; it introduced peer assessment to online education. He has been awarded the Katayanagi Emerging Leadership Prize, Sloan Fellowship, NSF CAREER award, Microsoft Research New Faculty Fellowship, and Nine best-paper or honorable mention awards. He is program co-chair of Learning@Scale '18, on the editorial board of HCI and TOCHI; was program co-chair for UIST, the CHI systems area, and HCIC. He advises university design programs globally. Organizations worldwide use his group's open-source design tools and curricula.

Design Research Reminders

You are not doing science

- You seek design insight,
  not knowledge, truth, or generality

Do the best design work you can

- May find that self-tracking is not the opportunity
- We designed the project sequence, but be flexible

Capture and keep your raw work products

- Dedicate a note keeper, consider recording
- Our collection is minimal, but you will want them

Structure of Section and Critique

Focus on peer feedback and learning

- Bring your artifacts, be ready to present them
- Bring paper, keep the laptops put away

Critique progression

- Reminder of your project
- What you have done
- What you have learned
- Your plan going forward
- Feedback from peers / staff
- Questions you have for peers / staff

Structure of Section and Critique

With 3 Project Groups:

- 2 groups in peer critique
- 1 group with course staff
- Rotate at about 12 minutes

With 4 Project Groups:

- 2 groups in peer critique
- 2 groups each with member of course staff
- Rotate at about 17 minutes

Time at end to huddle, follow up with anybody

Developing Insight Is Hard

Design research yields a lot of data

- Does not reduce to a statistical test

Need to get from data to design insight

- But this is fundamentally difficult

Data
????
Insight

Although project sequence separates research from design ideas, you will be exploring ideas as your do the research

Objectives

Be able to:

Describe how taking different perspectives on design research data can help to surface design insights.

Given design research data, be able to analyze that data in terms of people and their tasks.

Describe personas, their purpose, how and why we emphasize design research data in their creation.

Define and describe relationships between tasks, personas, and scenarios.

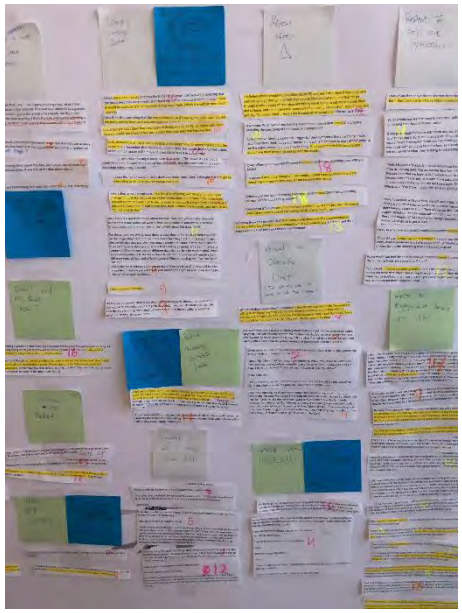
Affinity Diagrams

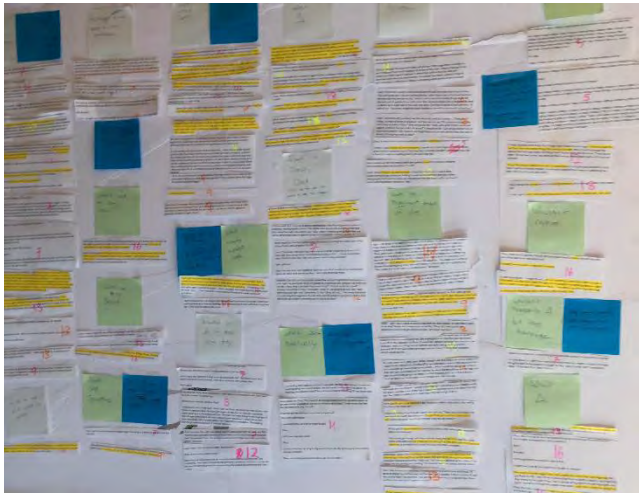
Generated during group session

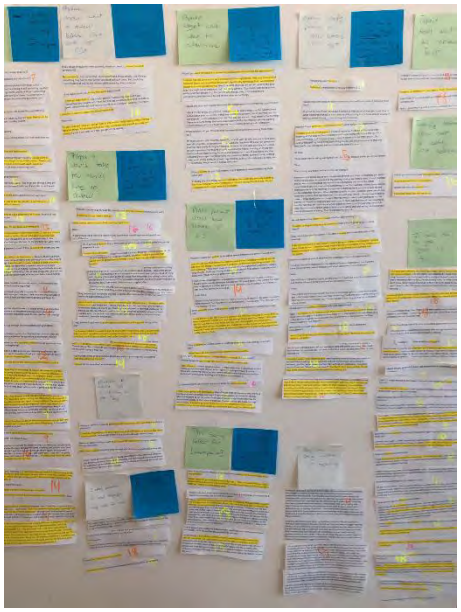
Each observation, idea, note to a post-it

Notes are hierarchically organized into themes, based on project focus

Affinity Diagrams







Affinity Diagrams

Developing Models

Distilling models that summarize data

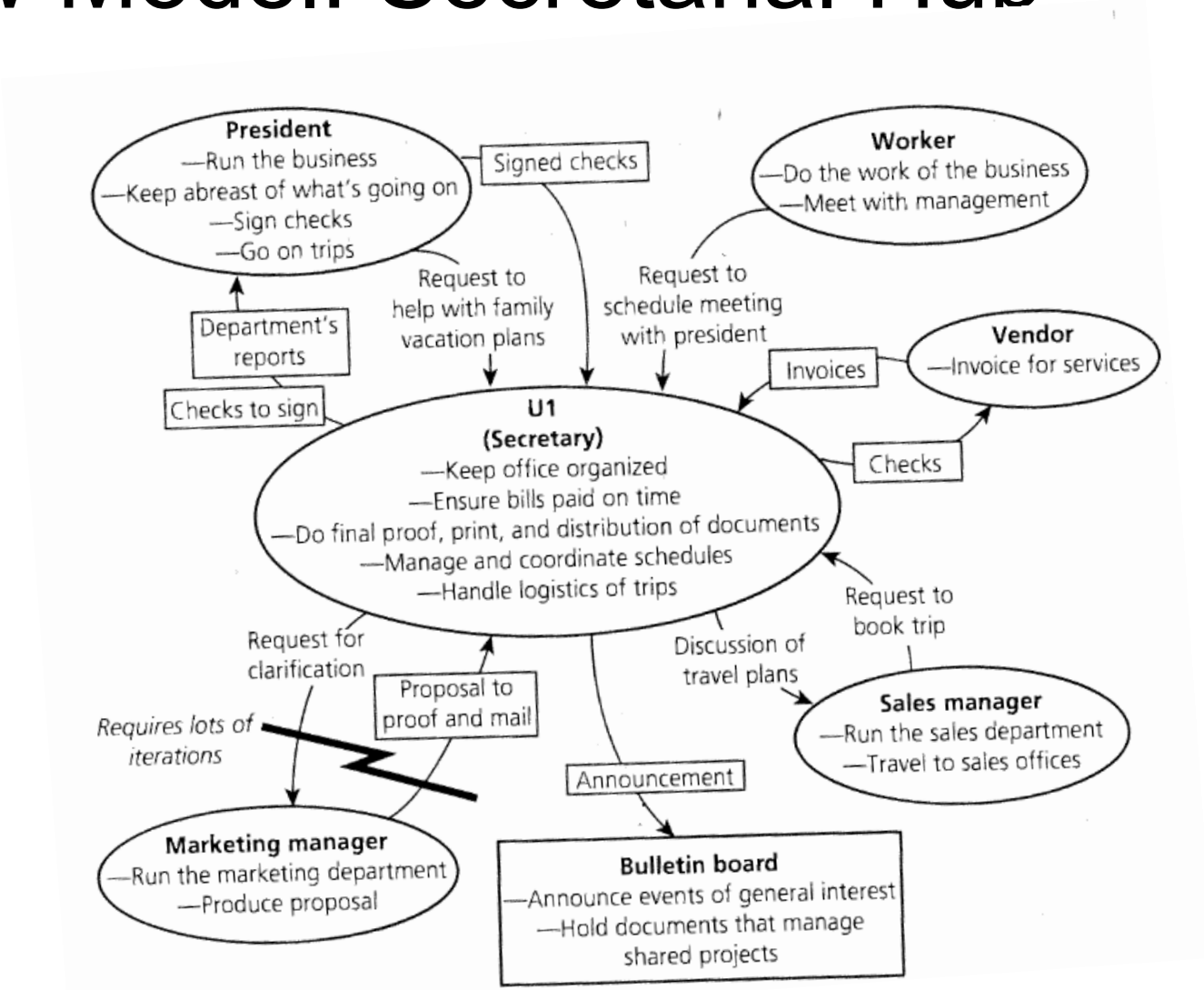
- Highlights gaps in understanding
- Identify breakdowns and workarounds

Many types of models

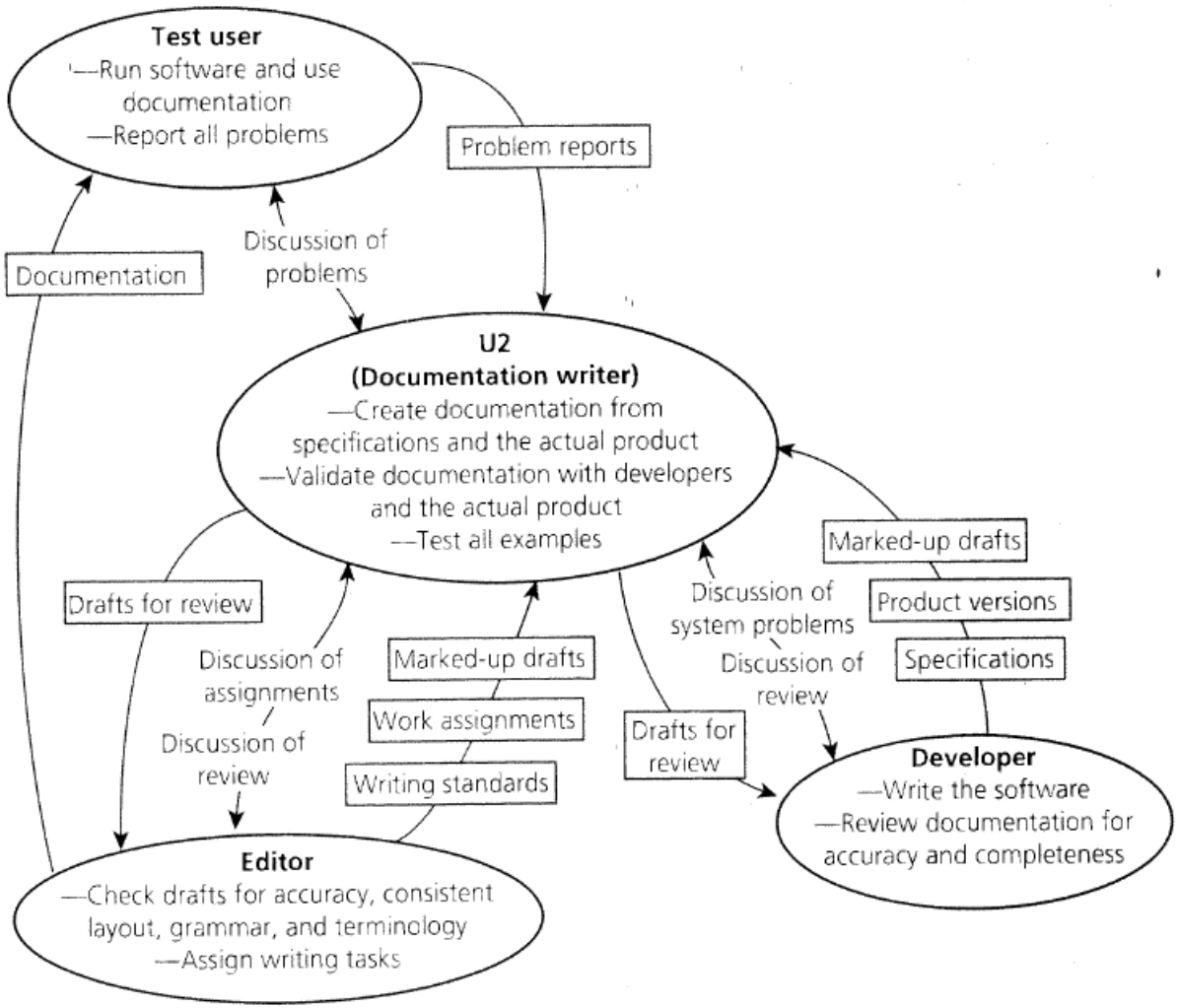
- e.g., Flow, Sequence, Artifact, Cultural, Physical
- None is perfect, they highlight different things

No model is perfect or guarantees insight

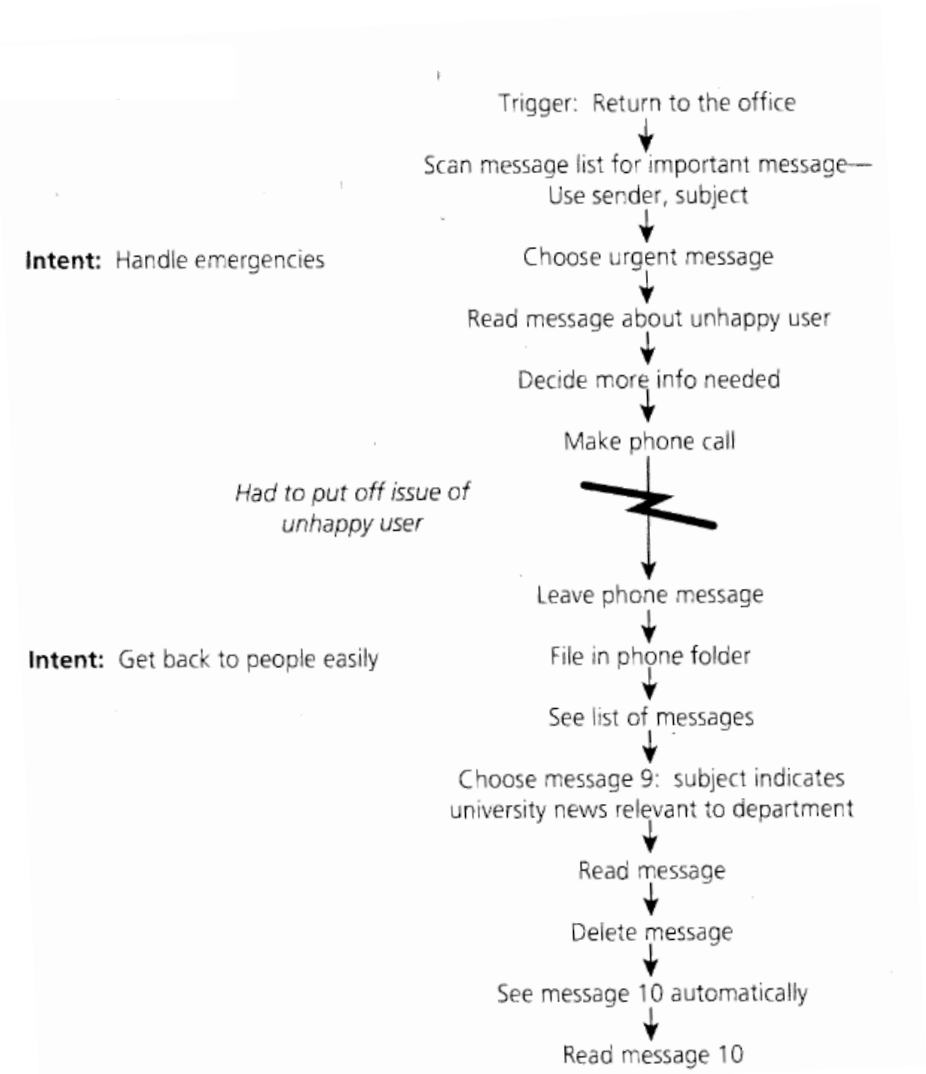
Flow Model: Secretarial Hub



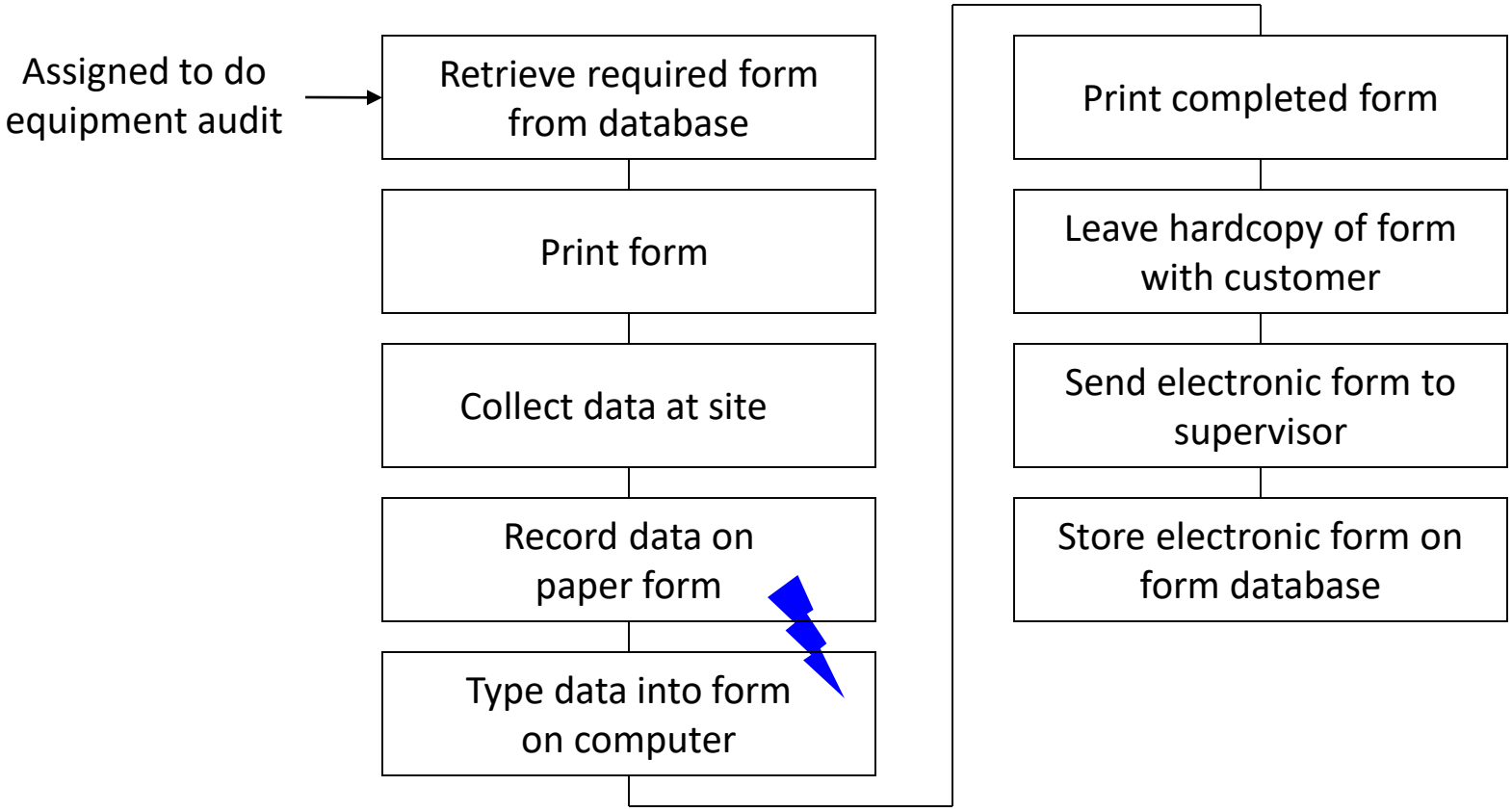
Flow Model: Creative Work



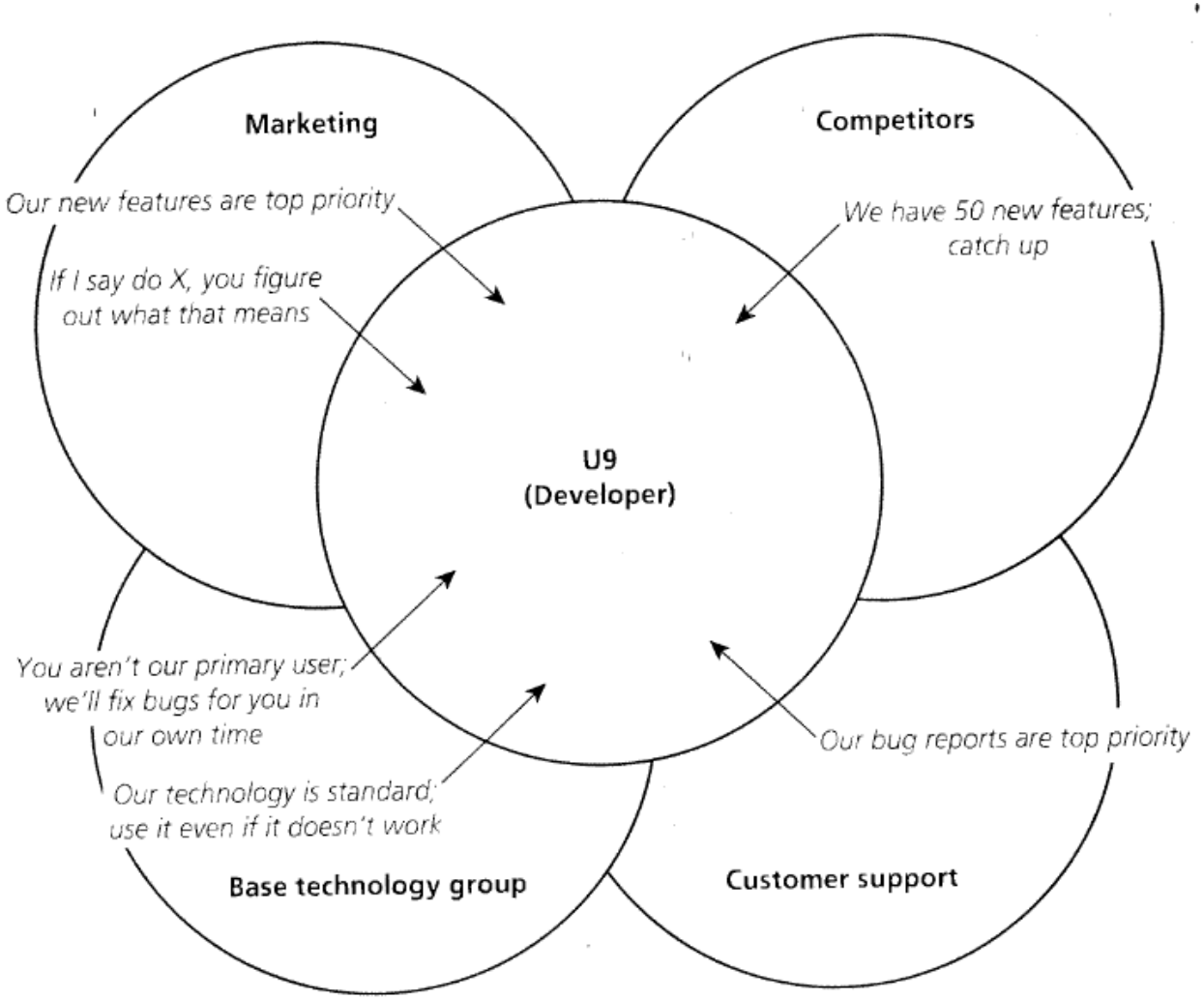
Sequence Model: Doing Email



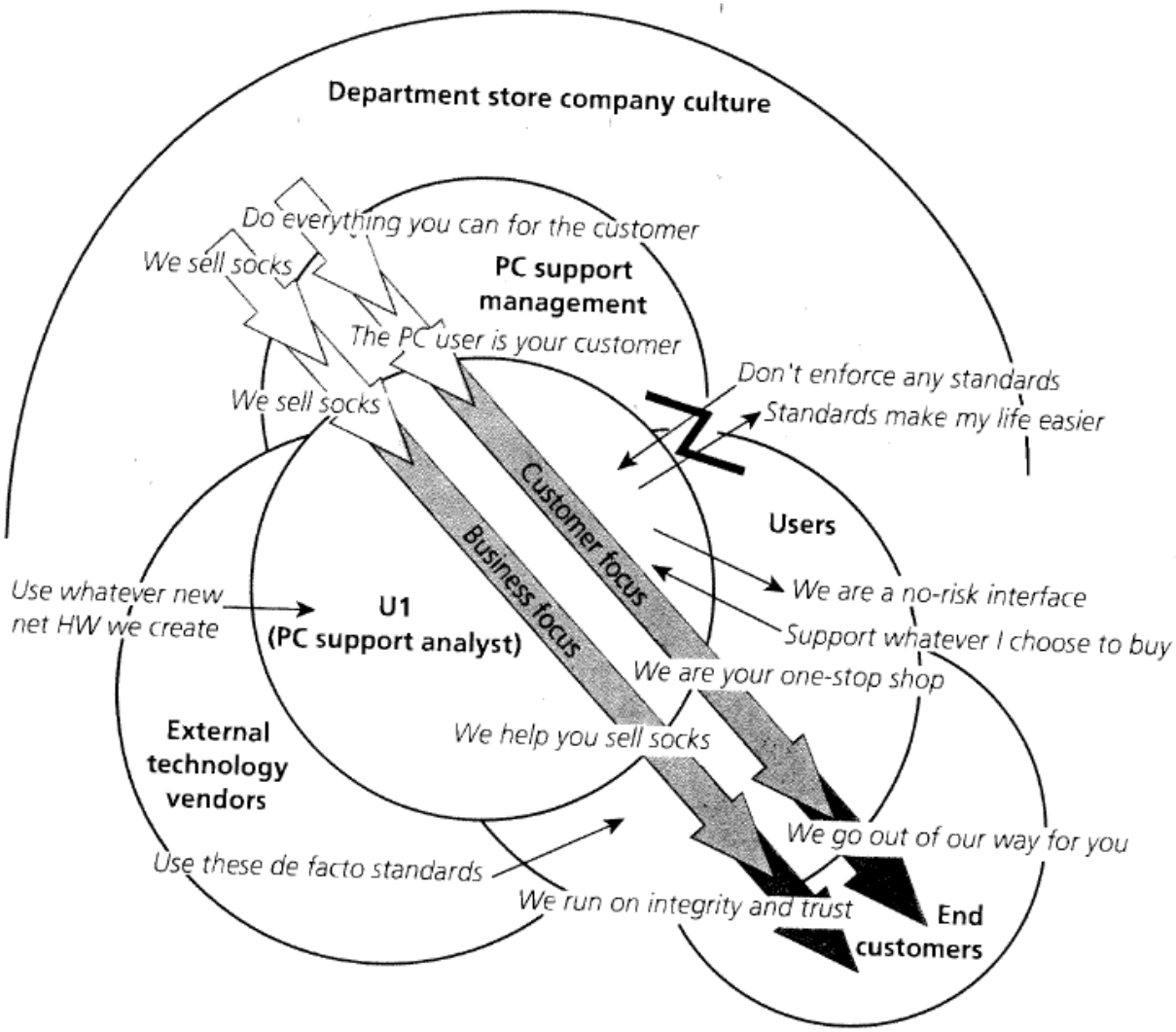
Sequence Model: Equipment Audit



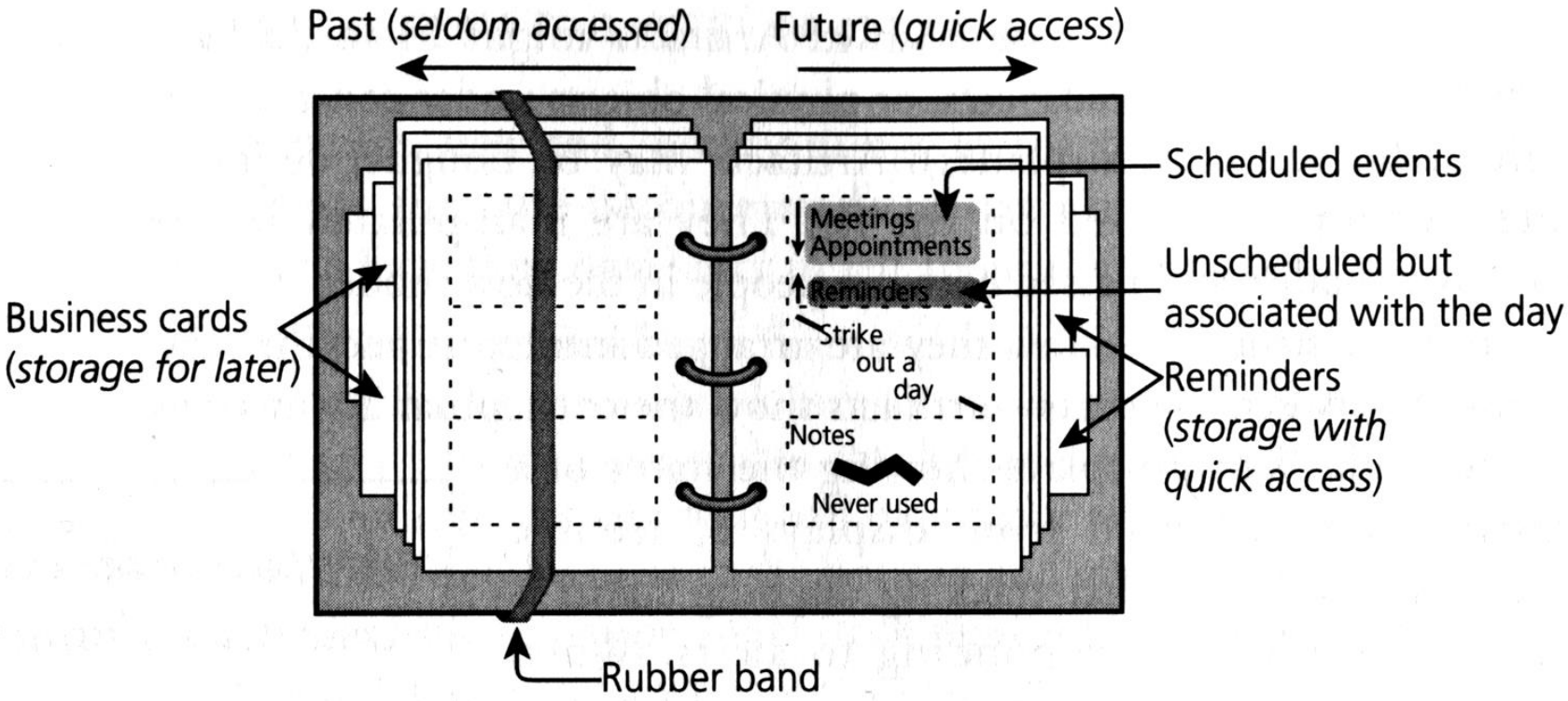
Cultural Model: Developer



Cultural Model: Department Store

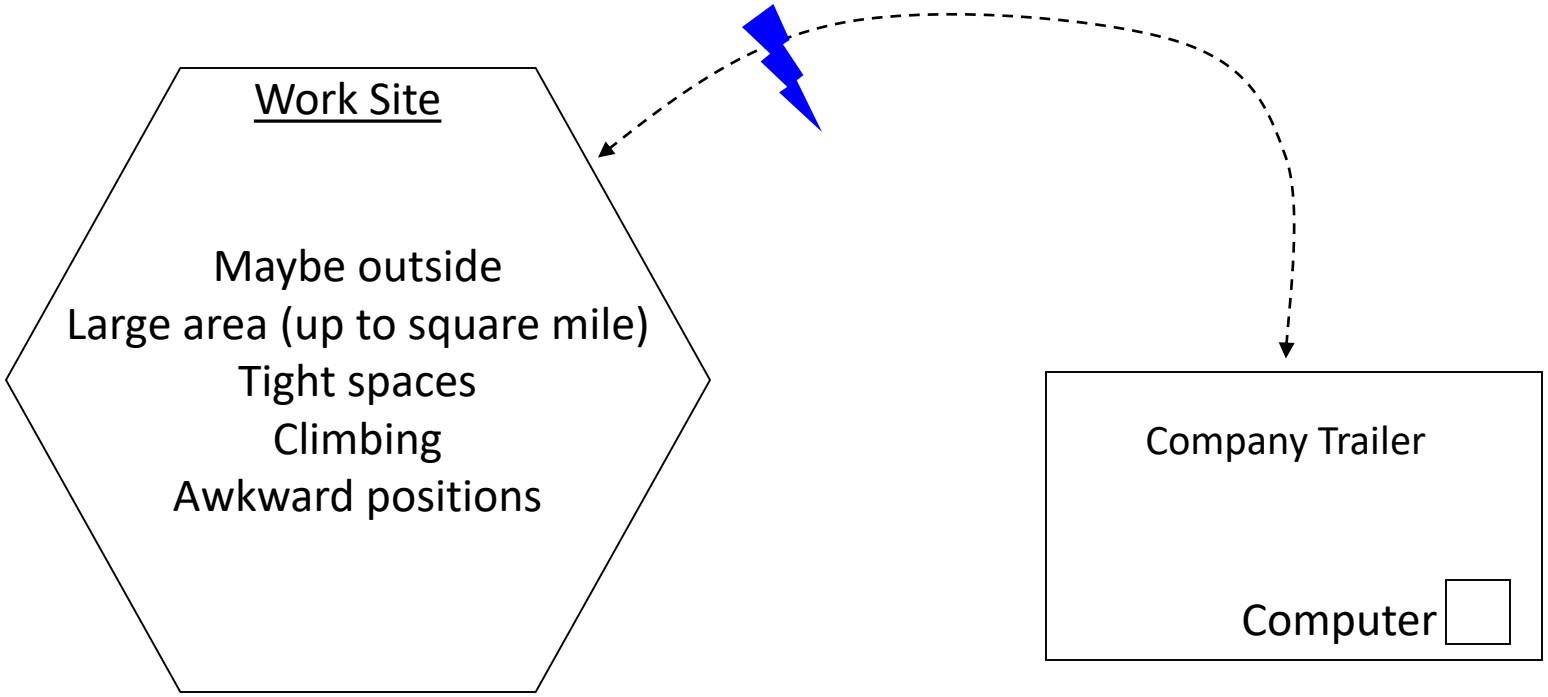


Artifact Model: Calendar



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.



Designing with Tasks

We will primarily emphasize designing with tasks

Tasks Matter

System will fail if:

- It is inappropriate for the person
- It does not meet a person's needs

Your contextual inquiries will emphasize getting to know people and their needs

Can you then just make 'good' interfaces?

Why Task Analysis?

‘Good’ has to be interpreted in the context of use

- Might be acceptable in office, but not for play
- Infinite variety of tasks and customers

Guidelines are too vague to be generative

- e.g., “give adequate feedback”
- Can be used to critique, but not to generate

Design is often about tradeoffs

Example of gestures to navigate display

Why Task Analysis?

Task analysis is a lens on the information you obtain through design research methods

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

Project sequence orders 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 people & data?
What other tools do people have?
How do people 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 more defined

Broad products need several typical consumers

Background

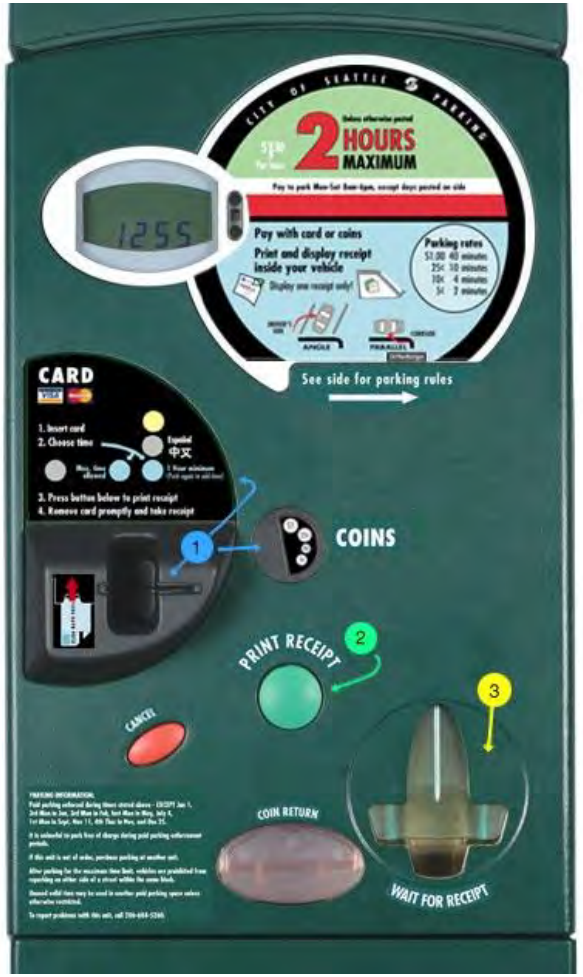
Existing systems, training

Skills

Work habits and preferences

Physical characteristics and abilities

Cards
Coins


CITY OF SEATTLE PARKING
2 HOURS MAXIMUM
Pay with card or coins
Print and display receipt inside your vehicle
Parking rates
See side for parking rules
CARD
1. Insert card
2. Choose time
3. Press button below to print receipt
4. Remove card promptly and take receipt
COINS
PRINT RECEIPT
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

Seattle Parking Meter

Who is going to use the system?

Skills?

May know how to put cards into ATM

Work habits and preferences?

Park several times a week, a month, a year

Physical characteristics and abilities?

Varying heights, do not make it too high or too low

Anything else?

Qdoba soda machine

PARK, PAY & DISPLAY

Parking Pay Station Instructions

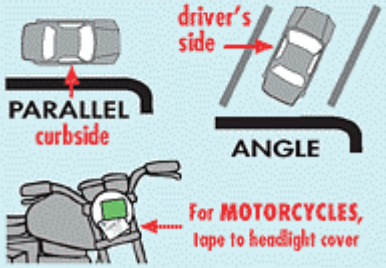
Insert card and push **BLUE** button to buy time **OR** **Insert coins** to buy time

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



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

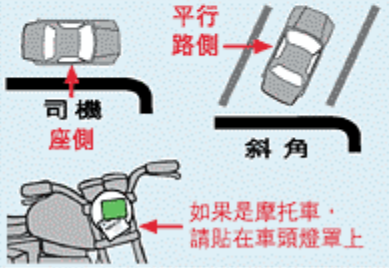
插入卡並按藍色按鈕購買時間，或投入硬幣購買時間

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，以便在任何眯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



有問題嗎？請致電 684-ROAD (7623)
paystations@seattle.gov
SDOT
Seattle Department of Transportation

ĐẬU XE, TRẢ TIỀN & DÁN BIÊN NHẬN

Hướng Dẫn về Trạm Trả Tiền Đậu Xe

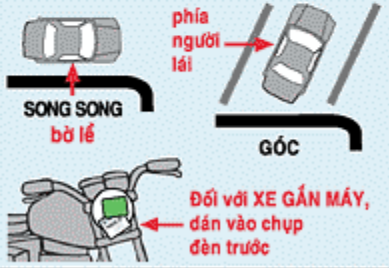
Đút thẻ vào và bấm nút **XANH** để mua giờ **HOẶC** **Bỏ tiền các** để mua giờ

Bấm nút **XANH** để in biên nhận

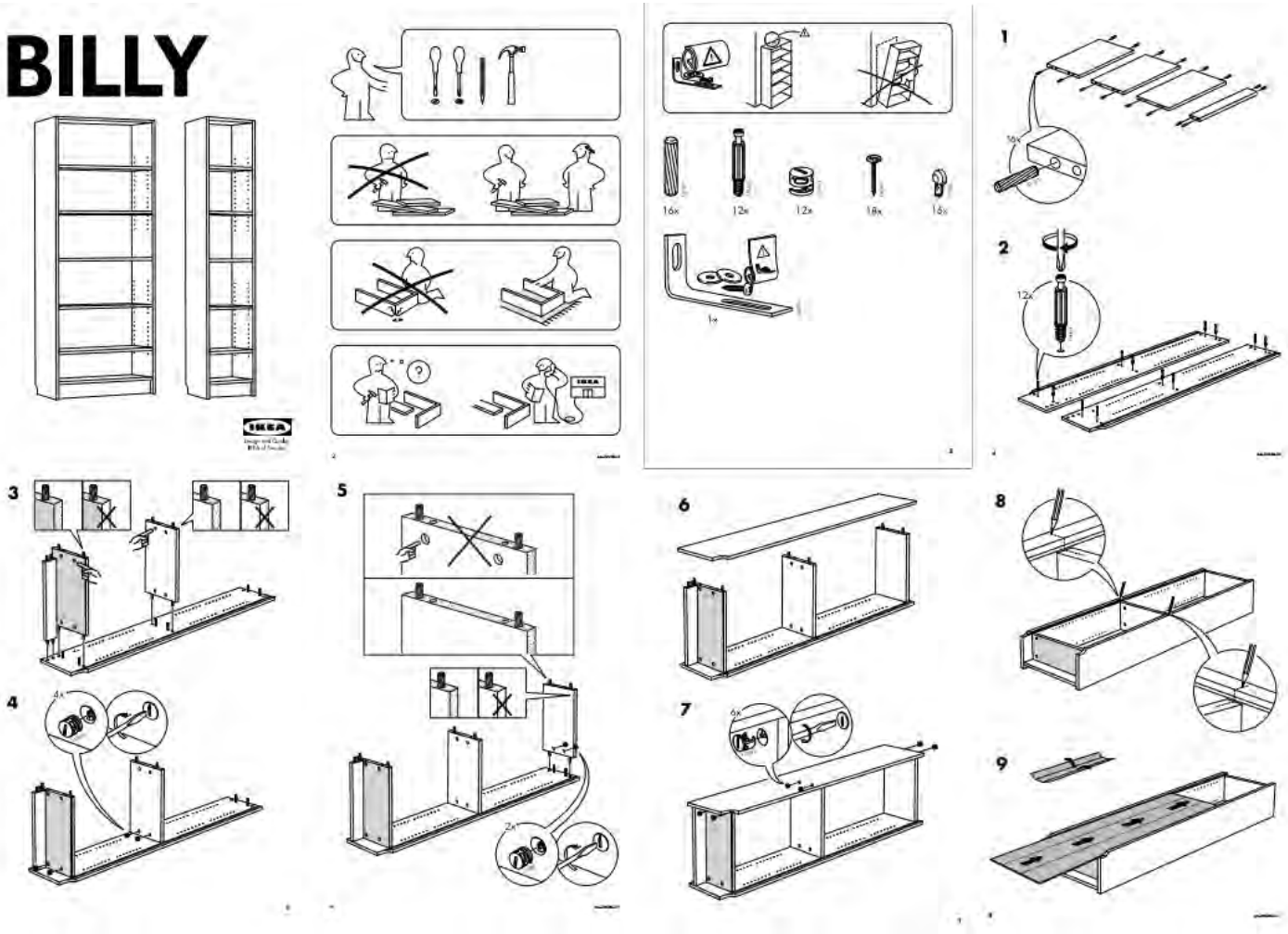
Rút nhanh thẻ ra chờ biên nhận và dán đúng cách

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

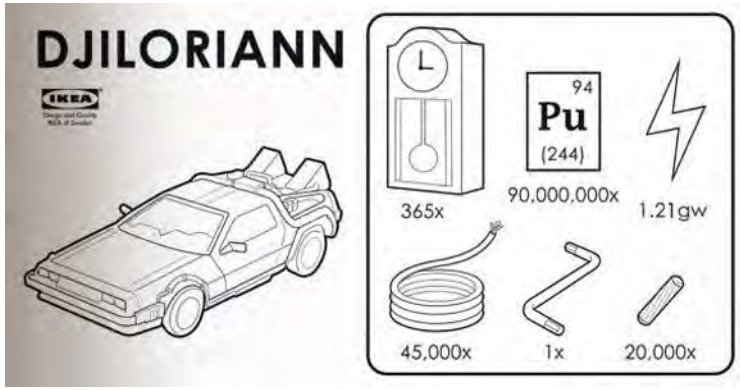
Dùng miếng dán mặt sau có thể gỡ ra để dán biên nhận vào MẶT TRONG cửa kính bằng trước



Thắc Mắc? Hãy gọi số 684-ROAD (7623)
paystations@seattle.gov
SDOT
Seattle Department of Transportation



There are limits, a tradeoff in this design


DJILORIANN
IKEA
365x
94
Pu
(244)
90,000,000x
1.21gw
45,000x
1x
20,000x

HÖUSS
IKEA
4x
1x
4x
7,450x
1x
1x

Coolant Low

Cruise Control

Dashboard Illumination

Defroster Front

Defroster Rear

Diesel Preheat

Door Power Lock

Door Open

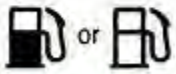
Emissions Malfunction

Fan Operation

Fresh Air

Fog Light Front

Fog Light Rear



Fuel Gauge or Low

Hazard Lights

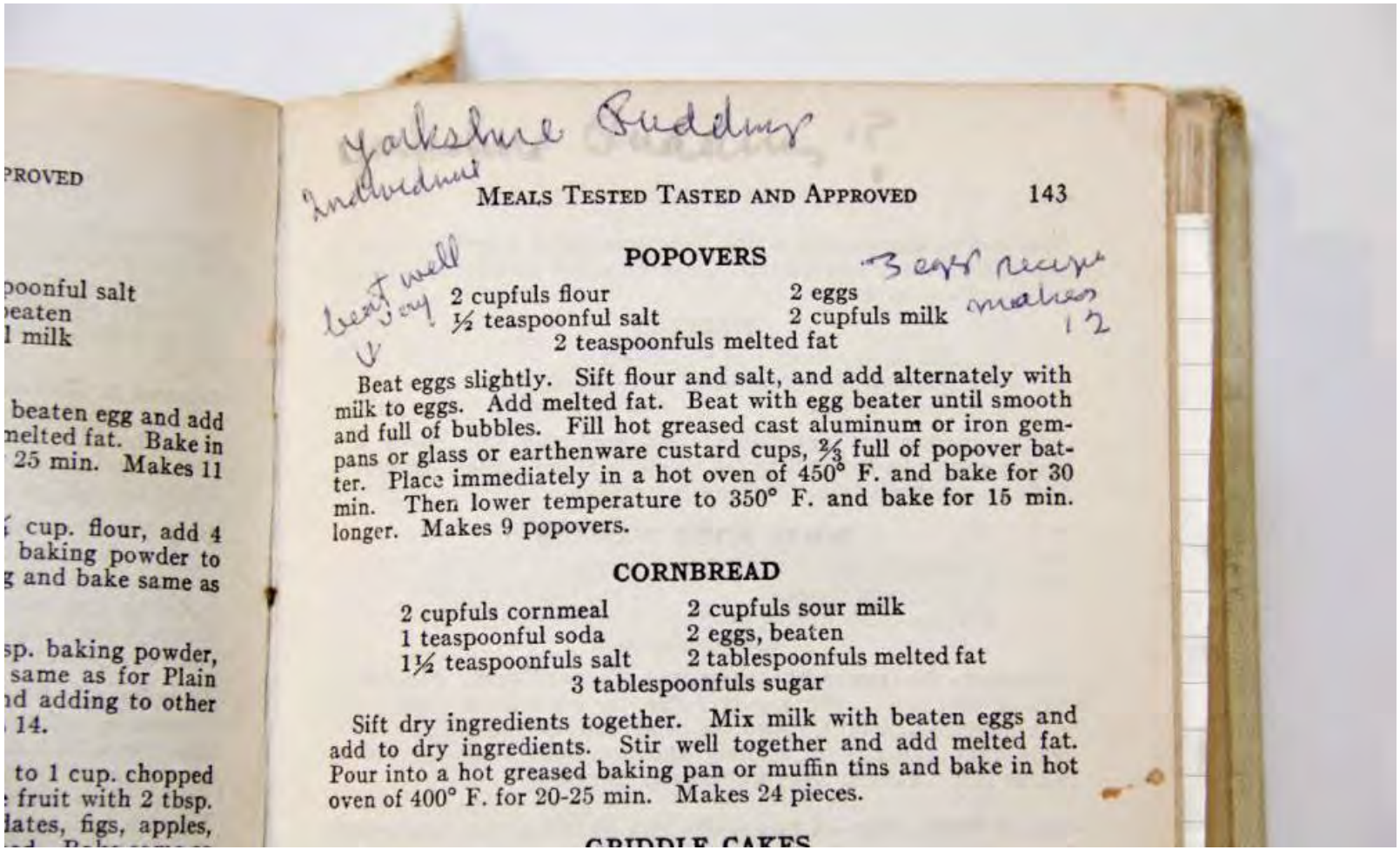
Question 2 and Question 3

What tasks do they now perform?
What tasks are desired?

Important for both automation and new functionality
Relative importance of tasks?
Observe people, 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's insurance takes longer than most



Yorkshire Puddings

Individual

POPOVERS

beat well very

3 eggs recipe makes 12

2 cupfuls flour	2 eggs
½ teaspoonful salt	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	2 cupfuls sour milk
1 teaspoonful soda	2 eggs, beaten
1½ teaspoonfuls salt	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 a person need to know?

Do they need training?

academic

general knowledge / skills

special instruction / training

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 people & 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?

Does this relationship change over time?

Patient-provider curation example, Fitbit example

Question 7

What other tools does a person 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?

Question 8

How do people communicate with each other?

Who communicates with whom?

About what?

Follow lines of the organization? Against it?

Old Email Adoption Example, Contrasted to Current Expectations

Question 9

How often are the tasks performed?

Frequent use likely remember more details

Infrequent use may need more help

Even for simple operations

Make these tasks possible to accomplish

Which function is performed

Most frequently?

By which people?

Optimizing for these will improve perception of performance

Careful about initial use scenario

Question 10

What are the time constraints on the tasks?

What functions will people be in a hurry for?

Which can wait?

Is there a timing relationship between tasks?

Target example, versus Pregnancy in Web Search

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?

Plantr Task Analysis

Example abbreviated task analysis

- Be sure to see other examples on website

As with models, no question promises insight

Plantr Task Analysis

1. Who is going to use the system?

Anyone who owns indoor plants is a potential user of Plantr. All of the plant owners that we interviewed forgot to water their plants at some point regardless of age, experience, and background. Even Lucy, who spent most of her time at home because she worked from home, struggled with timely watering.

Plantr Task Analysis

2. What are the currently possible tasks?

When people purchase a plant, they often look up information about the proper lighting and temperature conditions for their plants. Additionally, people must find out how much and how frequently to water and fertilize their plants.

Plantr Task Analysis

3.What are currently unavailable, desired tasks?

People want a way to remember to water and care for their plants. Forgetting to water plants was the most cited reason for plant death, and the only task that participants in our inquiries mentioned completing on a regular basis.

Plantr Task Analysis

4.How are tasks learned?

Most people learned how to take care of their plants through trial and error. Some consulted the Internet, nursery staff, or friends for more information on plant care.

Plantr Task Analysis

5.Where are the tasks performed?

Tasks like watering and fertilizing are performed at the plant's location. People keep plants in their workplace, like Jack, or at home, like Lucy and Caroline. Getting information about plant care was performed in a variety of places. People who consult the Internet could be anywhere with a platform that supports web browsing. Those who go to the nursery to talk to plant experts are required to go to a specific location to talk to someone in person.

Plantr Task Analysis

6.What is the relationship between a person and data?

We identified three different types of data: a plant's current state, information about plants, and data that reflects the person's plant care history.

A plant's current state is data on the moisture level of its soil and the general appearance of the plant (e.g., color, stiffness/limpness of leaves). People use this information to determine the plant's needs. Caroline and Lucy watered their plants when the soil felt dry or the leaves began to droop.

Plantr Task Analysis

6.What is the relationship between a person and data?

People consulted various plant care information databases when they wanted to know how to care for their plants.

People used their personal history of plant care to determine how to take care of plants. Caroline said that she used to underwater plants, but she learned from her mistake and now tries to water them more often. People also base their buying decisions based upon their plant care history. Caroline noted that she tries to buy plants that require minimal water.

Plantr Task Analysis

7.What other tools do people have?

Caroline, Lucy, Jack, and Kacy all have phones and computers.
People also have a water source, pots, and soil for their plants.
Most people probably have access to a nursery or library.

Plantr Task Analysis

8.How do people communicate with each other?

Plant owners communicate on online forums and message boards. People who happen to be in the nursery at the same time might talk to each other about plant care. Likewise, people who have friends with indoor plants may share plant care tips.

Plantr Task Analysis

9.How often are the tasks performed?

Watering is performed with a frequency between twice a week (Jack) and twice a month (Caroline). Fertilizing is performed less frequently, between once every two weeks to once every three months. Plants do not become sick often enough to make a good estimate about how often people try to get help.

Plantr Task Analysis

10. What are time constraints on the tasks?

Plants must be watered with some regularity, so if people do not water their plants for long enough, the plants will start to die. Likewise, if plants are in need of attention for other reasons - pH imbalance, environment too dry - and they do not receive attention within some amount of time, they will die. Watering, caring, and learning how to care for a plant takes time. People who are very busy might not have the time or attention required for plant care.

Plantr Task Analysis

11. What happens when things go wrong?

When plants became "sick", people take action, seek help, or ignore the problem until the plant dies. When people forget to water plants, they usually notice that the plant needs water and give it water. Sometimes people may not realize that a plant needs water until it is too late.

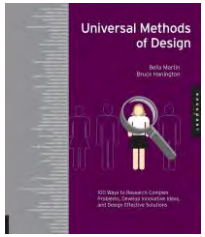
Combine with Other Methods

Personas

Concept Mapping

Competitive Analysis

Method 63



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

Personas

Archetypal character meant to represent a group of people in a role who share common goals, attitudes, and behaviors when interacting with a particular product or service

"This is what I need in order to do my job."

NAME: Vivica Parker

AGE: 32

OCCUPATION: Journalist

PROFILE:
Born in Washington, DC
Lives and works in New York City (far from family)
Lives by herself in a small apartment
Has a driver's license
Calls parents and older brother on weekends
Works for an online art magazine and is currently in charge of writing a blog about graffiti. In order to do that she needs to do the following tasks:

- **Walk/drive around the city**
- **Take pictures**
- **Talk with artists and keep record of that info (place, time, people)**
- **Work day/night**
- **Share the collected information with editor and magazine's readers**

To do her job, usually carries notebooks, camera and cell phone to keep in touch with her editor.

INTERESTS:
Amateur theater actress since she was 23
Travel and merge in different cultures
Architecture

ACTIVITIES:
Did research on ancient Egyptian architecture
Member of the Art Society of NY

TECH EXPERIENCE:
Basic knowledge about operating systems
Uses the Internet frequently either for personal or business purposes

TECH ATTITUDE:
Always open to new technology, but she feels annoyed with complex applications and discards them very often
Tends to feel numb using the latest high-tech gadgets and needs time to get used to them

GOALS & SITUATED BLOGGING NEED:
Needs to keep track of her location and time when she (a) finds and photographs graffiti and street art for her blog and (b) conducts audio interviews of artists and enthusiasts
Needs to have a quick way of keeping track of content gathered from separate locations in order to post articles before editorial deadlines

Personas

Purpose

Empathy: characters to engage and relate to

Focus: can focus on specific people and needs,
versus always attempting to design for everybody

Communication: conveys range of data,
can help make assumptions more explicit

Multiple Types

Primary, Secondary, Supplemental,

Customer, Served, Negative

Personas

Goals

Life Goals: personal aspirations

e.g., to retire before the age of 50

Experience Goals: how to feel with a product

e.g., to be competent while using the product

End Goals: tangible outcomes with a design

e.g., to be updated about finances over last month

Personas

Roles

- Personas do not necessarily equal roles
  - e.g., parent, doctor, programmer, actor
- People can have multiple roles
- People in a role can have different needs and goals
  - e.g., new programmer vs. experienced programmer
  - e.g., parent of 1 vs. parent of 8
  - e.g., oncologist vs. podiatrist

Personas

Critical to avoid using stereotypes as personas

> “The whole point in creating personas is to get past our personal opinions and presuppositions."
>
> Goodwin, 2002

Not a substitute for design research, but a tool for summarizing and conveying that research

- Collect design research data
- Segment people
- Create personas for segments

Personas

Parxat Practical

Primary Motivation to acquire phone:
I got my mobile phone to make calls when I am away from work or home

Associated motivations:
I got a good price on my phone and mobile phones are cheaper than landlines

Personal Profile

"Mobile phones are part of your communications its like eyes and ears"

For Parxat, mobile phones have provided a key way to stay in contact with work, family and friends.

He owns and manages a small computer game club with eight computers. His club does not yet have internet or a landline; however, he would like to add the internet and more computers when he can afford them.

Currently, Parxat maintains all of the computers but knows he may need help with some computer problems in the future. Other club owners that he has known have had to shut down after two to three years because the equipment has broken down and the owners cannot get the old equipment fixed or afford new. Right now he is not sure who he would ask for help if one of his computers needed maintenance that he could not perform himself.

Parxat has always relied heavily on a system of personal recommendations when looking for professional services. He feels that one should "*trust the advice of friends because they are to be trusted.*"

Parxat's Goals for MoSoSo Directory

- Would seek recommendations for professional help such as plumbers and computer maintenance
- Would like to create a public recommendation for his computer club
- Groups he would join or create
  - Family
  - Clients from his computer club
  - Friends through work

Key Significant Differences

Uses the phone for work calls
Bought his mobile phone (not a gift)
Tech savvy compared to other groups

Personal Information

Age: 43 years
Profession: Owns and manages computer game club with eight computers
Lives: In the capital city of Bishkek
Home Life: Lives with his wife and two sons
Russian: Can speak and read fluently
Primary Home Language: Kyrgyz
Primary Work Language: Russian
Schooling: He has a degree in economics focused on finance and credit from Kyrgyzstan Slavonic University
Income: 5200 soms a month (approx $140.00)

Technical Information

Internet Use: Yes, at least occasionally
- **Length of use**: 36 months
- **Use how often:** 1-2 days a week
- **Where use:** Most often at a friend's internet cafe

Computer User: Yes
- **How often:** Several times a day at work

Cable or Satellite TV: Yes
Home Landline: Yes

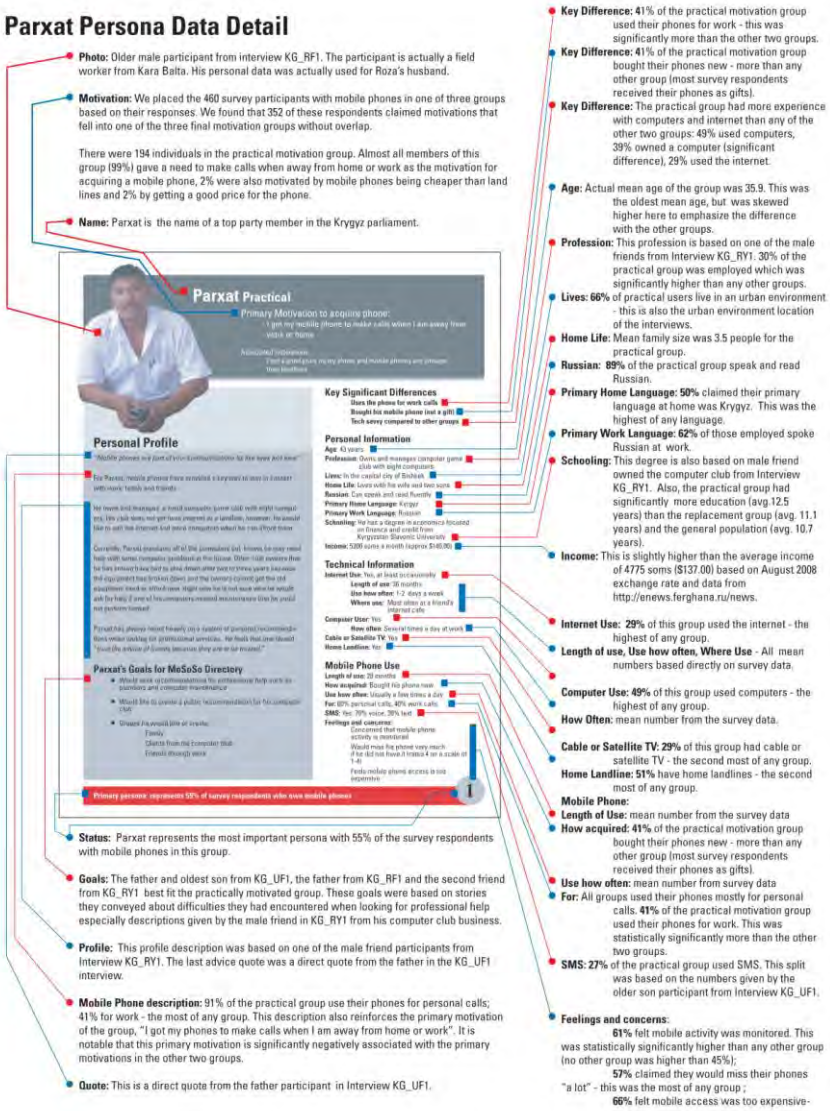
Mobile Phone Use

Length of use: 28 months
How acquired: Bought his phone new
Use how often: Usually a few times a day
For: 60% personal calls, 40% work calls
SMS: Yes: 70% voice, 30% text
Feelings and concerns:
- Concerned that mobile phone activity is monitored
- Would miss his phone very much if he did not have it (rated 4 on a scale of 1-4)
- Feels mobile phone access is too expensive

Primary persona: represents 55% of survey respondents who own mobile phones

1

Personas


Parxat Persona Data Detail
Photo: Older male participant from interview KG_RF1. The participant is actually a field worker from Kara Balta. His personal data was actually used for Roza's husband.
Motivation: We placed the 460 survey participants with mobile phones in one of three groups based on their responses. We found that 352 of these respondents claimed motivations that fell into one of the three final motivation groups without overlap.
There were 194 individuals in the practical motivation group. Almost all members of this group (99%) gave a need to make calls when away from home or work as the motivation for acquiring a mobile phone, 2% were also motivated by mobile phones being cheaper than land lines and 2% by getting a good price for the phone.
Name: Parxat is the name of a top party member in the Krygyz parliament.
Parxat Practical
Primary Motivation to acquire phone:
Personal Profile
Parxat's Goals for MeSoSo Directory
Key Significant Differences
Personal Information
Technical Information
Mobile Phone Use
Primary persona represents 55% of survey respondents who own mobile phones
Status: Parxat represents the most important persona with 55% of the survey respondents with mobile phones in this group.
Goals: The father and oldest son from KG_UF1, the father from KG_RF1 and the second friend from KG_RY1 best fit the practically motivated group. These goals were based on stories they conveyed about difficulties they had encountered when looking for professional help especially descriptions given by the male friend in KG_RY1 from his computer club business.
Profile: This profile description was based on one of the male friend participants from Interview KG_RY1. The last advice quote was a direct quote from the father in the KG_UF1 interview.
Mobile Phone description: 91% of the practical group use their phones for personal calls; 41% for work - the most of any group. This description also reinforces the primary motivation of the group, "I got my phones to make calls when I am away from home or work". It is notable that this primary motivation is significantly negatively associated with the primary motivations in the other two groups.
Quote: This is a direct quote from the father participant in Interview KG_UF1.
Key Difference: 41% of the practical motivation group used their phones for work - this was significantly more than the other two groups.
Key Difference: 41% of the practical motivation group bought their phones new - more than any other group (most survey respondents received their phones as gifts).
Key Difference: The practical group had more experience with computers and internet than any of the other two groups: 49% used computers, 39% owned a computer (significant difference), 29% used the internet.
Age: Actual mean age of the group was 35.9. This was the oldest mean age, but was skewed higher here to emphasize the difference with the other groups.
Profession: This profession is based on one of the male friends from Interview KG_RY1. 30% of the practical group was employed which was significantly higher than any other groups.
Lives: 66% of practical users live in an urban environment - this is also the urban environment location of the interviews.
Home Life: Mean family size was 3.5 people for the practical group.
Russian: 89% of the practical group speak and read Russian.
Primary Home Language: 50% claimed their primary language at home was Krygyz. This was the highest of any language.
Primary Work Language: 62% of those employed spoke Russian at work.
Schooling: This degree is also based on male friend owned the computer club from Interview KG_RY1. Also, the practical group had significantly more education (avg.12.5 years) than the replacement group (avg. 11.1 years) and the general population (avg. 10.7 years).
Income: This is slightly higher than the average income of 4775 soms ($137.00) based on August 2008 exchange rate and data from http://enews.ferghana.ru/news.
Internet Use: 29% of this group used the internet - the highest of any group.
Length of use, Use how often, Where Use - All mean numbers based directly on survey data.
Computer Use: 49% of this group used computers - the highest of any group.
How Often: mean number from the survey data.
Cable or Satellite TV: 29% of this group had cable or satellite TV - the second most of any group.
Home Landline: 51% have home landlines - the second most of any group.
Mobile Phone:
Length of Use: mean number from the survey data
How acquired: 41% of the practical motivation group bought their phones new - more than any other group (most survey respondents received their phones as gifts).
Use how often: mean number from survey data
For: All groups used their phones mostly for personal calls. 41% of the practical motivation group used their phones for work. This was statistically significantly more than the other two groups.
SMS: 27% of the practical group used SMS. This split was based on the numbers given by the older son participant from Interview KG_UF1.
Feelings and concerns:
61% felt mobile activity was monitored. This was statistically significantly higher than any other group (no other group was higher than 45%);
57% claimed they would miss their phones "a lot" - this was the most of any group ;
66% felt mobile access was too expensive-

Personas

Shirin Social

Primary Motivation to acquire phone:
I like people to reach me at all times

Associated motivations:
My friends all have mobile phones

Personal Profile

"We just talk to our friends....things like did you hear that this or that happened - in our communication rumors are the official news, and gossip works"

For Shirin, keeping in contact with friends is the most important thing about mobile phones.

She is a full time student (junior) at American University of Central Asia (AUCA), studying business administration. She also works part time as a bartender in a cafe .

Shirin is part of an unregistered student association at school that organizes cultural and historical meetings at a local cafe. She also enjoys arranging parties for her friends.

She is interested in social networking applications on the internet, but has found it boring, stating" *the first time is interesting then you get bored because you already know everybody."*

Shirin's Goals for MoSoSo Directory

- Would use the service most to create groups of friends
- Would like to broadcast messages to particular groups or to tell people where there will be social gatherings
- Would like to retrieve messages from other members of a group
- Groups she would join or create
  - Family
  - Friends from work and school
  - Associations through her unregistered student organization

Key Significant Differences

- **Uses the phone to primarily to call friends**
- **Least likely to feel mobile access is too expensive**
- **Somewhat tech savvy**

Personal Information

Age: 20 years
Profession: Student and works part time as a bartender in a local cafe
Lives: In the capital city of Bishkek
Home Life: Lives with her dad and an older brother. She also has around 30 cousins in towns.
Russian: Can speak and read fluently
Primary Home Language: Kyrgyz
Primary Work Language: Kyrgyz
Schooling: She is a full time student (junior) at the American University of Central Asia studying business administration
Income: 2000 soms a month (approx $55.00)

Technical Information

Internet Use: Yes, at least occasionally
- **Length of use**: 33 months
- **Use how often:** About once a week
- **Where use:** Most often at an internet cafe

Computer User : Yes
- **How often:** A few times a week at school

Cable or Satellite TV: Yes
Home Landline: Yes

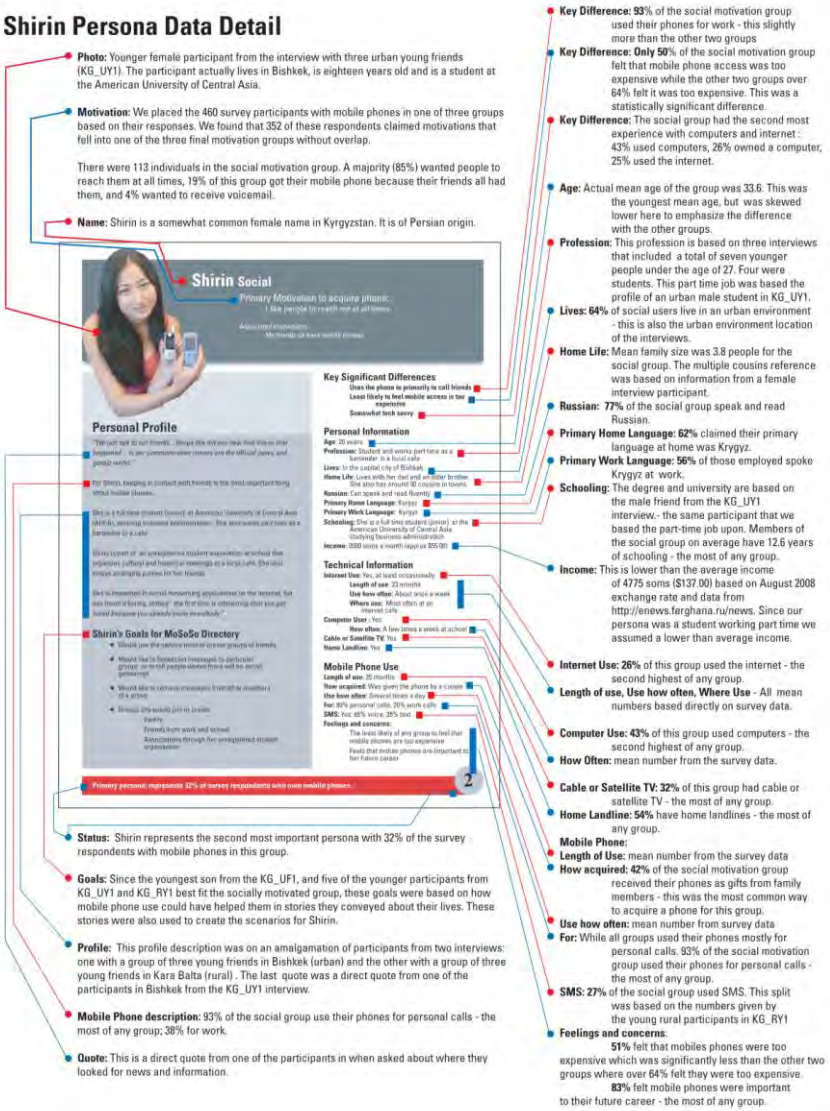
Mobile Phone Use

Length of use: 25 months
How acquired: Was given the phone by a cousin
Use how often: Several times a day
For: 80% personal calls, 20% work calls
SMS: Yes: 65% voice, 35% text
Feelings and concerns:
- The least likely of any group to feel that mobile phones are too expensive
- Feels that mobile phones are important to her future career

Primary persona: represents 32% of survey respondents who own mobile phones

2

Personas


Shirin Persona Data Detail
Photo: Younger female participant from the interview with three urban young friends (KG_UY1). The participant actually lives in Bishkek, is eighteen years old and is a student at the American University of Central Asia.
Motivation: We placed the 460 survey participants with mobile phones in one of three groups based on their responses. We found that 352 of these respondents claimed motivations that fell into one of the three final motivation groups without overlap.
There were 113 individuals in the social motivation group. A majority (85%) wanted people to reach them at all times, 19% of this group got their mobile phone because their friends all had them, and 4% wanted to receive voicemail.
Name: Shirin is a somewhat common female name in Kyrgyzstan. It is of Persian origin.
Shirin Social
Primary Motivation to acquire phone:
Personal Profile
Shirin's Goals for MoSoSo Directory
Key Significant Differences
Personal Information
Technical Information
Mobile Phone Use
Primary persona: represents 32% of survey respondents who own mobile phones.
Status: Shirin represents the second most important persona with 32% of the survey respondents with mobile phones in this group.
Goals: Since the youngest son from the KG_UF1, and five of the younger participants from KG_UY1 and KG_RY1 best fit the socially motivated group, these goals were based on how mobile phone use could have helped them in stories they conveyed about their lives. These stories were also used to create the scenarios for Shirin.
Profile: This profile description was on an amalgamation of participants from two interviews: one with a group of three young friends in Bishkek (urban) and the other with a group of three young friends in Kara Balta (rural) . The last quote was a direct quote from one of the participants in Bishkek from the KG_UY1 interview.
Mobile Phone description: 93% of the social group use their phones for personal calls - the most of any group; 38% for work.
Quote: This is a direct quote from one of the participants in when asked about where they looked for news and information.
Key Difference: 93% of the social motivation group used their phones for work - this slightly more than the other two groups
Key Difference: Only 50% of the social motivation group felt that mobile phone access was too expensive while the other two groups over 64% felt it was too expensive. This was a statistically significant difference.
Key Difference: The social group had the second most experience with computers and internet : 43% used computers, 26% owned a computer, 25% used the internet.
Age: Actual mean age of the group was 33.6. This was the youngest mean age, but was skewed lower here to emphasize the difference with the other groups.
Profession: This profession is based on three interviews that included a total of seven younger people under the age of 27. Four were students. This part time job was based the profile of an urban male student in KG_UY1.
Lives: 64% of social users live in an urban environment - this is also the urban environment location of the interviews.
Home Life: Mean family size was 3.8 people for the social group. The multiple cousins reference was based on information from a female interview participant.
Russian: 77% of the social group speak and read Russian.
Primary Home Language: 62% claimed their primary language at home was Krygyz.
Primary Work Language: 56% of those employed spoke Krygyz at work.
Schooling: The degree and university are based on the male friend from the KG_UY1 interview.- the same participant that we based the part-time job upon. Members of the social group on average have 12.6 years of schooling - the most of any group.
Income: This is lower than the average income of 4775 soms ($137.00) based on August 2008 exchange rate and data from http://enews.ferghana.ru/news. Since our persona was a student working part time we assumed a lower than average income.
Internet Use: 26% of this group used the internet - the second highest of any group.
Length of use, Use how often, Where Use - All mean numbers based directly on survey data.
Computer Use: 43% of this group used computers - the second highest of any group.
How Often: mean number from the survey data.
Cable or Satellite TV: 32% of this group had cable or satellite TV - the most of any group.
Home Landline: 54% have home landlines - the most of any group.
Mobile Phone:
Length of Use: mean number from the survey data
How acquired: 42% of the social motivation group received their phones as gifts from family members - this was the most common way to acquire a phone for this group.
Use how often: mean number from survey data
For: While all groups used their phones mostly for personal calls. 93% of the social motivation group used their phones for personal calls - the most of any group.
SMS: 27% of the social group used SMS. This split was based on the numbers given by the young rural participants in KG_RY1
Feelings and concerns:
51% felt that mobiles phones were too expensive which was significantly less than the other two groups where over 64% felt they were too expensive.
83% felt mobile phones were important to their future career - the most of any group.

Personas

Roza Replacement

Primary Motivation to acquire phone:
I have no home phone

Associated motivations:
It takes too long to get a home phone

Personal Profile

"There are only so many services provided, but not enough for middle class people... it would be nice if there was the one server that gave the information about everything that was needed for marshukas (buses) and other things."

For Roza, who does not have a landline at home, a mobile phone is a very important device that allows her to stay in contact with her friends and family; however, she would like to see more affordable mobile phone services for "middle class" people like her.

There is only one landline in a community building in her village that closes at 5 PM every day.

While Roza herself is not tech savvy, she does not use the internet or computers. However, she recognizes the importance of technology for her daughters, and would like to have a computer at home while they are in school.

Roza and her husband rely on their friends and family to find specialist to complete services they need. Recently, she needed to find a mechanic and used her social network, stating *"...it's better to find someone through your friends."*

Roza's Goals for MoSoSo Directory

- Would be more likely to seek a recommendation for services than to make one
- Would want to access the service without using text
- Would like to find recommendations for professional services from other members of a group
- Groups she would join
  - Family
  - Neighbors
  - May look in the public area for professional services

Key Significant Differences

Least likely to use the phone for work
Lives in a rural area
Not tech savvy

Personal Information

Age: 35 years
Profession: Housewife - her husband is a driver for an agricultural corporation (for 23 years)
Lives: In Ceragulak, a rural village
Home Life: Lives with her husband, son and two daughters
Russian: Can speak and read Russian
Primary Home Language: Kyrgyz
Primary (Husband's)Work Language: Kyrgyz
Schooling: Completed secondary school
Income: (Husband's income) 4200 soms a month (approx $110.00)

Technical Information

Internet Use?: No
Computer User? : No, but she would like to get a computer for her two daughters who are still in school
Cable or Satellite TV: No
Home Landline: No

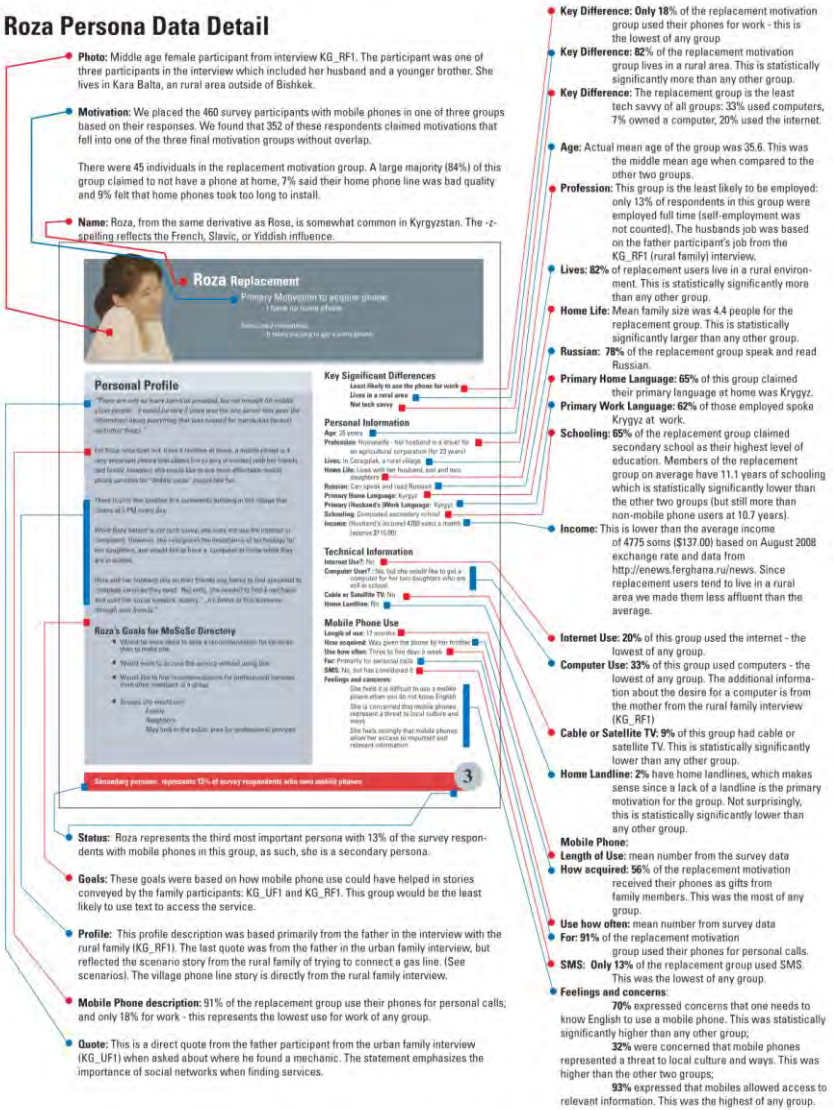
Mobile Phone Use

Length of use: 17 months
How acquired: Was given the phone by her brother
Use how often: Three to five days a week
For: Primarily for personal calls
SMS: No, but has considered it
Feelings and concerns:
- She feels it is difficult to use a mobile phone when you do not know English
- She is concerned that mobile phones represent a threat to local culture and ways
- She feels strongly that mobile phones allow her access to important and relevant information

Secondary persona: represents 13% of survey respondents who own mobile phones

3

Personas


Roza Persona Data Detail
Photo: Middle age female participant from interview KG_RF1. The participant was one of three participants in the interview which included her husband and a younger brother. She lives in Kara Balta, an rural area outside of Bishkek.
Motivation: We placed the 460 survey participants with mobile phones in one of three groups based on their responses. We found that 352 of these respondents claimed motivations that fell into one of the three final motivation groups without overlap.
There were 45 individuals in the replacement motivation group. A large majority (84%) of this group claimed to not have a phone at home, 7% said their home phone line was bad quality and 9% felt that home phones took too long to install.
Name: Roza, from the same derivative as Rose, is somewhat common in Kyrgyzstan. The -z- spelling reflects the French, Slavic, or Yiddish influence.
Roza Replacement
Primary Motivation to acquire phone:
I have no home phone
Personal Profile
Roza's Goals for MoSoSo Directory
Key Significant Differences
Personal Information
Technical Information
Mobile Phone Use
Secondary persona: represents 13% of survey respondents who own mobile phones
3
Status: Roza represents the third most important persona with 13% of the survey respondents with mobile phones in this group, as such, she is a secondary persona.
Goals: These goals were based on how mobile phone use could have helped in stories conveyed by the family participants: KG_UF1 and KG_RF1. This group would be the least likely to use text to access the service.
Profile: This profile description was based primarily from the father in the interview with the rural family (KG_RF1). The last quote was from the father in the urban family interview, but reflected the scenario story from the rural family of trying to connect a gas line. (See scenarios). The village phone line story is directly from the rural family interview.
Mobile Phone description: 91% of the replacement group use their phones for personal calls; and only 18% for work - this represents the lowest use for work of any group.
Quote: This is a direct quote from the father participant from the urban family interview (KG_UF1) when asked about where he found a mechanic. The statement emphasizes the importance of social networks when finding services.
Key Difference: Only 18% of the replacement motivation group used their phones for work - this is the lowest of any group
Key Difference: 82% of the replacement motivation group lives in a rural area. This is statistically significantly more than any other group.
Key Difference: The replacement group is the least tech savvy of all groups: 33% used computers, 7% owned a computer, 20% used the internet.
Age: Actual mean age of the group was 35.6. This was the middle mean age when compared to the other two groups.
Profession: This group is the least likely to be employed: only 13% of respondents in this group were employed full time (self-employment was not counted). The husbands job was based on the father participant's job from the KG_RF1 (rural family) interview.
Lives: 82% of replacement users live in a rural environment. This is statistically significantly more than any other group.
Home Life: Mean family size was 4.4 people for the replacement group. This is statistically significantly larger than any other group.
Russian: 78% of the replacement group speak and read Russian.
Primary Home Language: 65% of this group claimed their primary language at home was Krygyz.
Primary Work Language: 62% of those employed spoke Krygyz at work.
Schooling: 65% of the replacement group claimed secondary school as their highest level of education. Members of the replacement group on average have 11.1 years of schooling which is statistically significantly lower than the other two groups (but still more than non-mobile phone users at 10.7 years).
Income: This is lower than the average income of 4775 soms ($137.00) based on August 2008 exchange rate and data from http://enews.ferghana.ru/news. Since replacement users tend to live in a rural area we made them less affluent than the average.
Internet Use: 20% of this group used the internet - the lowest of any group.
Computer Use: 33% of this group used computers - the lowest of any group. The additional information about the desire for a computer is from the mother from the rural family interview (KG_RF1)
Cable or Satellite TV: 9% of this group had cable or satellite TV. This is statistically significantly lower than any other group.
Home Landline: 2% have home landlines, which makes sense since a lack of a landline is the primary motivation for the group. Not surprisingly, this is statistically significantly lower than any other group.
Mobile Phone:
Length of Use: mean number from the survey data
How acquired: 56% of the replacement motivation received their phones as gifts from family members. This was the most of any group.
Use how often: mean number from survey data
For: 91% of the replacement motivation group used their phones for personal calls.
SMS: Only 13% of the replacement group used SMS. This was the lowest of any group.
Feelings and concerns:
70% expressed concerns that one needs to know English to use a mobile phone. This was statistically significantly higher than any other group;
32% were concerned that mobile phones represented a threat to local culture and ways. This was higher than the other two groups;
93% expressed that mobiles allowed access to relevant information. This was the highest of any group.

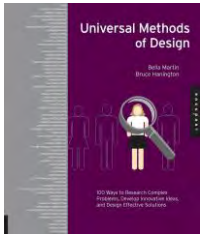
Combine with Other Methods

Personas

Concept Mapping

Competitive Analysis

Method 16

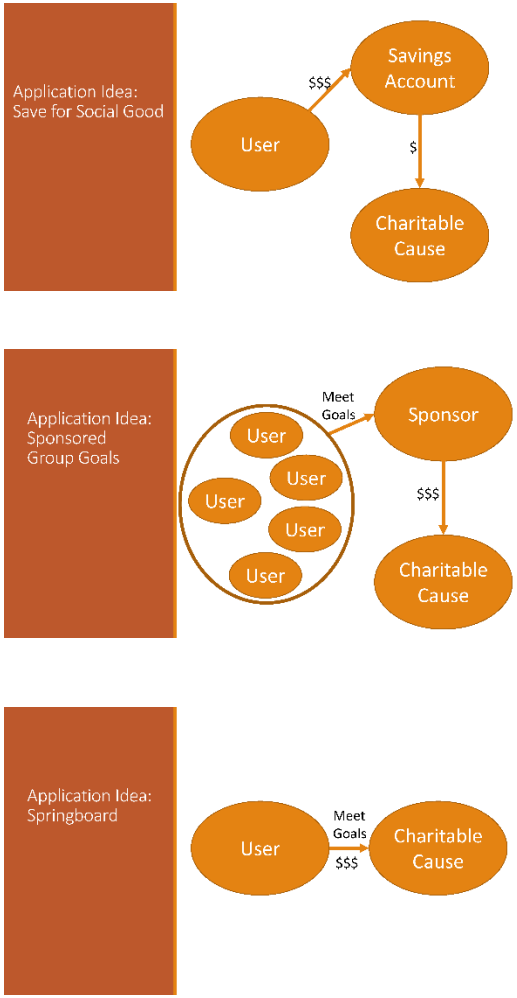


Combine with Other Methods

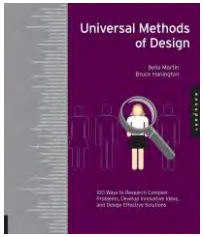
Personas

Concept Mapping

Competitive Analysis



Method 16

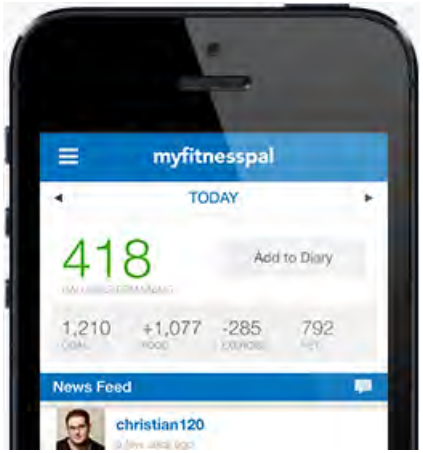


Combine with Other Methods

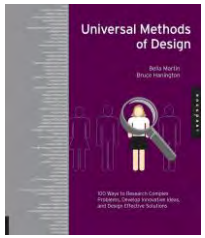
Personas

Concept Mapping

Competitive Analysis



Method 15



Project Status

Looking Forward

- 2c: Design Research Check-In due Tonight
- 2d: Design Research Review due Monday 10/16
- 2e: Task Review due Thursday 10/19
- 2f: Design Check-In (3x4) Due Monday 10/23
- 2g: Design Review (1x2) Due Thursday 10/26

Selecting Tasks

- Real tasks people have faced or requested
  - as supported by your design research
  - collect any necessary materials
- Should provide reasonable coverage
  - compare check list of functions to tasks
- Mixture of simple and complex tasks
  - easy tasks (common or introductory)
  - moderate tasks
  - difficult tasks (infrequent or for power use)

What Should Tasks Look Like?

- Say what person wants to do, but not how
  - allows comparing different design alternatives
- Be specific, stories based in concrete facts
  - say who person is (e.g., using personas or profiles)
    - design can really differ depending on who
    - give ‘names’ (allows referring back with more info later)
    - characteristics of person (e.g., job, expertise)
  - story forces us to fill in description with details
- Sometimes describe a complete “accomplishment”
  - forces us to consider how features work together

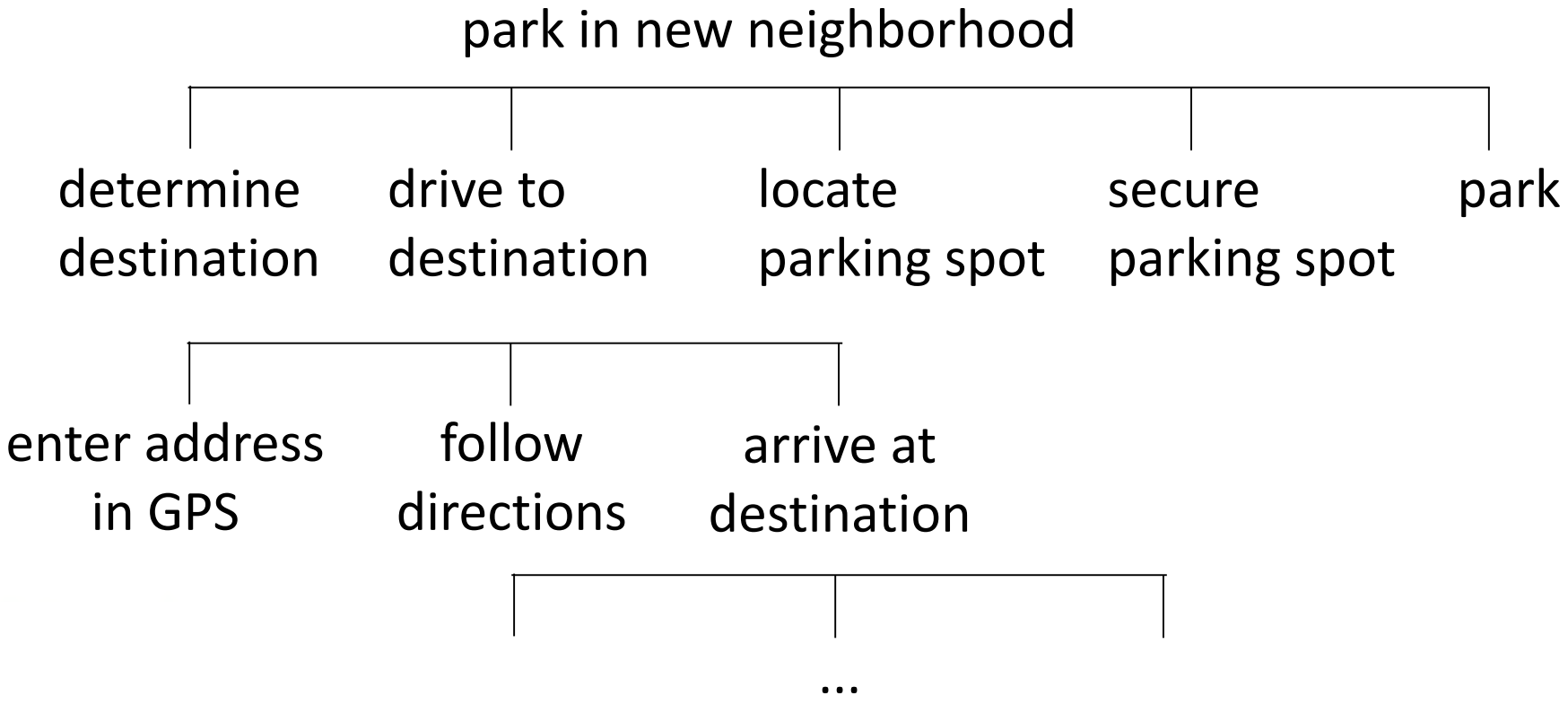
filename task example

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 his phone's GPS for directions. He leaves the apartment with his roommates at 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.

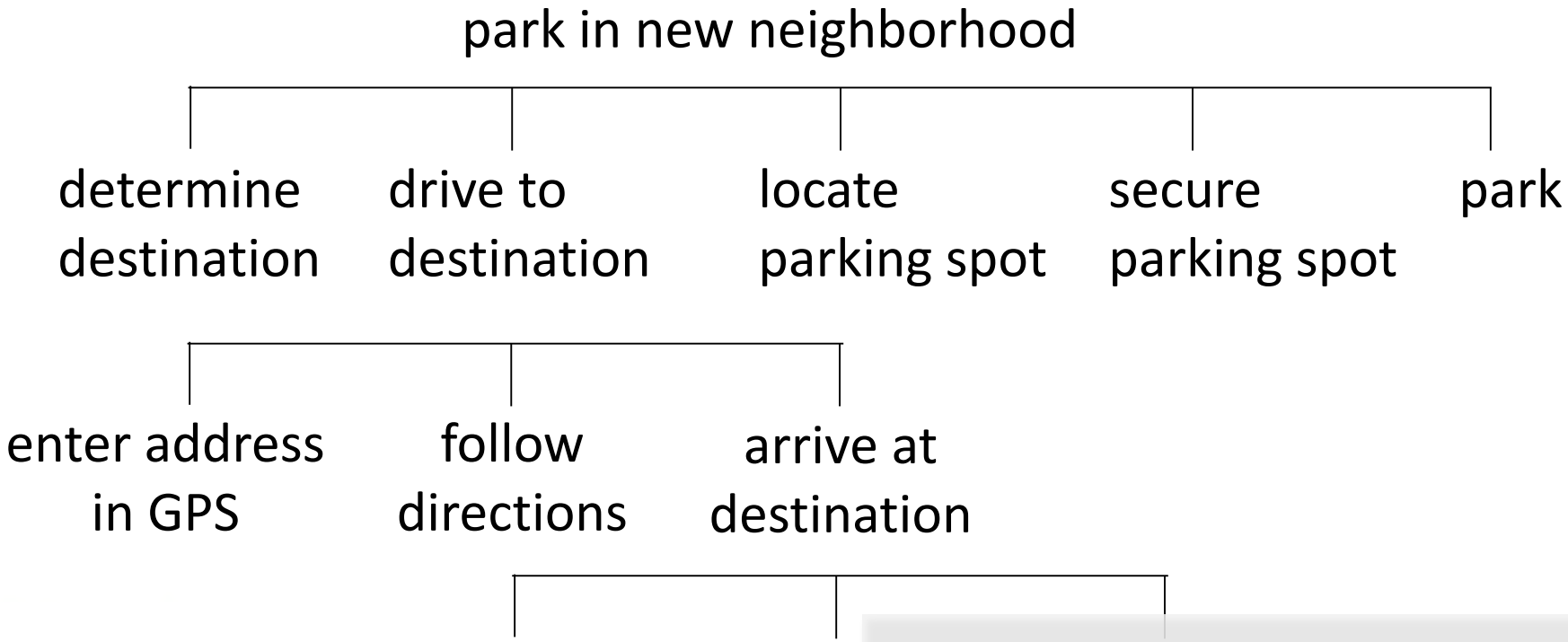
Hierarchical Task Analysis

Steps of the task execution (detailed in a hierarchy)



Hierarchical Task Analysis

Steps of the task execution (detailed in a hierarchy)



Using Tasks in Design

Write up a description of tasks

formally or informally

run by people and rest of the design team

get more information where needed

Manny is in the city at a restaurant and would like to call his friend Sherry to see when she will be arriving. She called from a friend's house while he was in the bus tunnel, so he missed her call. He would like to check his missed calls and find the number to call her back.

Using Tasks in Design

Rough out an interface design

discard features that do not support your tasks

or add a real task that exercises that feature

major elements and functions, not too detailed

hand sketched

Produce scenarios for each task

what person does and what they see

step-by-step performance of task

illustrate using storyboards

Scenarios

Scenarios are design specific, tasks are not

Scenarios force us to

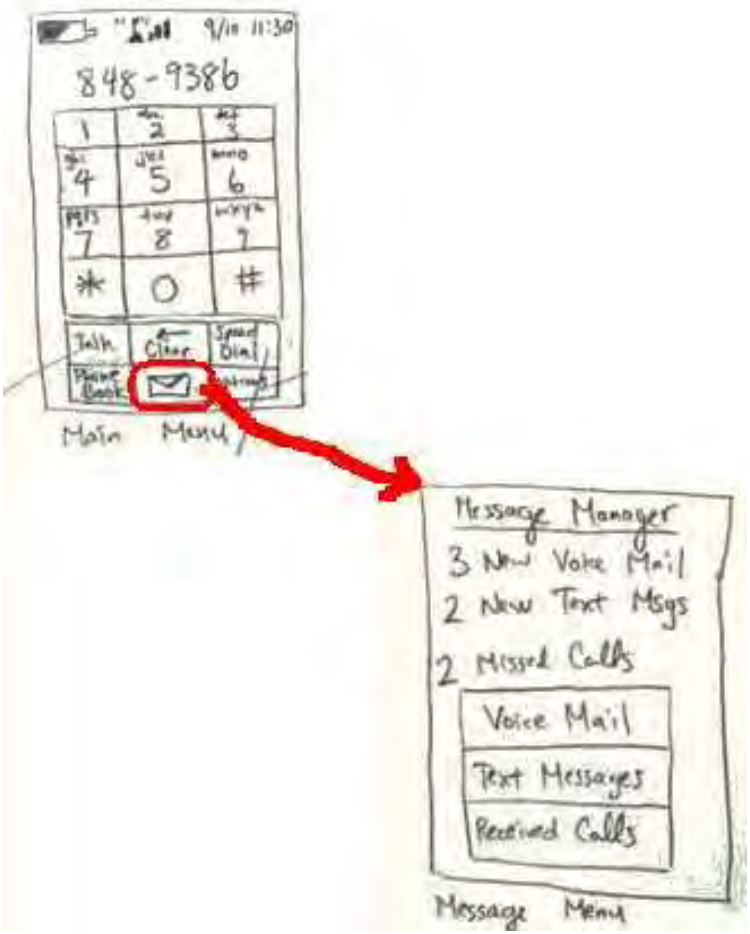
show how things work together

settle arguments with examples

but these are only examples,
and may need to look beyond flaws

Show people storyboards

topic for next Thursday



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

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
- Park Friday night in Ballard
- Park at the airport

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 05:
Task Analysis

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

DESIGN
USE
BUILD

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 06:
Design of
Everyday Things

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

DESIGN
USE
BUILD

2-Pack
SOFT GRIP
SCISSORS SET
2 BOX

Project Status

Looking Forward

- 2d: Design Research Review due last night
- 2e: Task Review due Thursday 10/19
- 2f: Design Check-In (3x4) Due Monday 10/23
- 2g: Design Review (1x2) Due Thursday 10/26
- “Getting the Right Design” Report and Presentation

Other Assignments

- All Reading Assignments Now Posted
- Reading 2 Due this Saturday 10/21
- Reading 5 Can Be Done Anytime, Sooner is Better

Denny 303 on Tuesday 10/24

James Away on Tuesday 10/24

Today

Finish with tasks, personas, and scenarios

Review core design terminology

Selecting Tasks

- Real tasks people have faced or requested
  - as supported by your design research
  - collect any necessary materials
- Should provide reasonable coverage
  - compare check list of functions to tasks
- Mixture of simple and complex tasks
  - easy tasks (common or introductory)
  - moderate tasks
  - difficult tasks (infrequent or for power use)

What Should Tasks Look Like?

- Say what person wants to do, but not how
  - allows comparing different design alternatives
- Be specific, stories based in concrete facts
  - say who person is (e.g., using personas or profiles)
    - design can really differ depending on who
    - give ‘names’ (allows referring back with more info later)
    - characteristics of person (e.g., job, expertise)
  - story forces us to fill in description with details
- Sometimes describe a complete “accomplishment”
  - forces us to consider how features work together

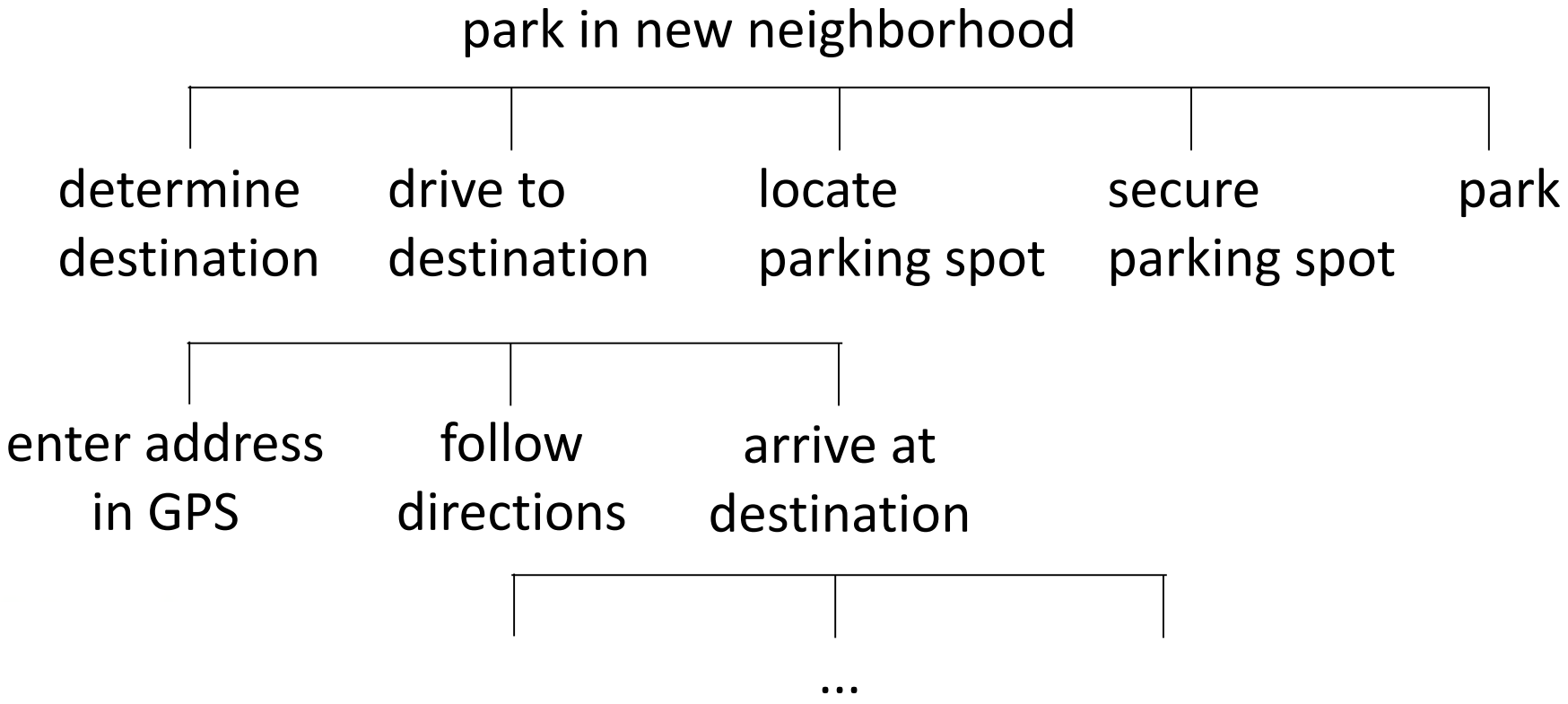
filename task example

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 his phone's GPS for directions. He leaves the apartment with his roommates at 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.

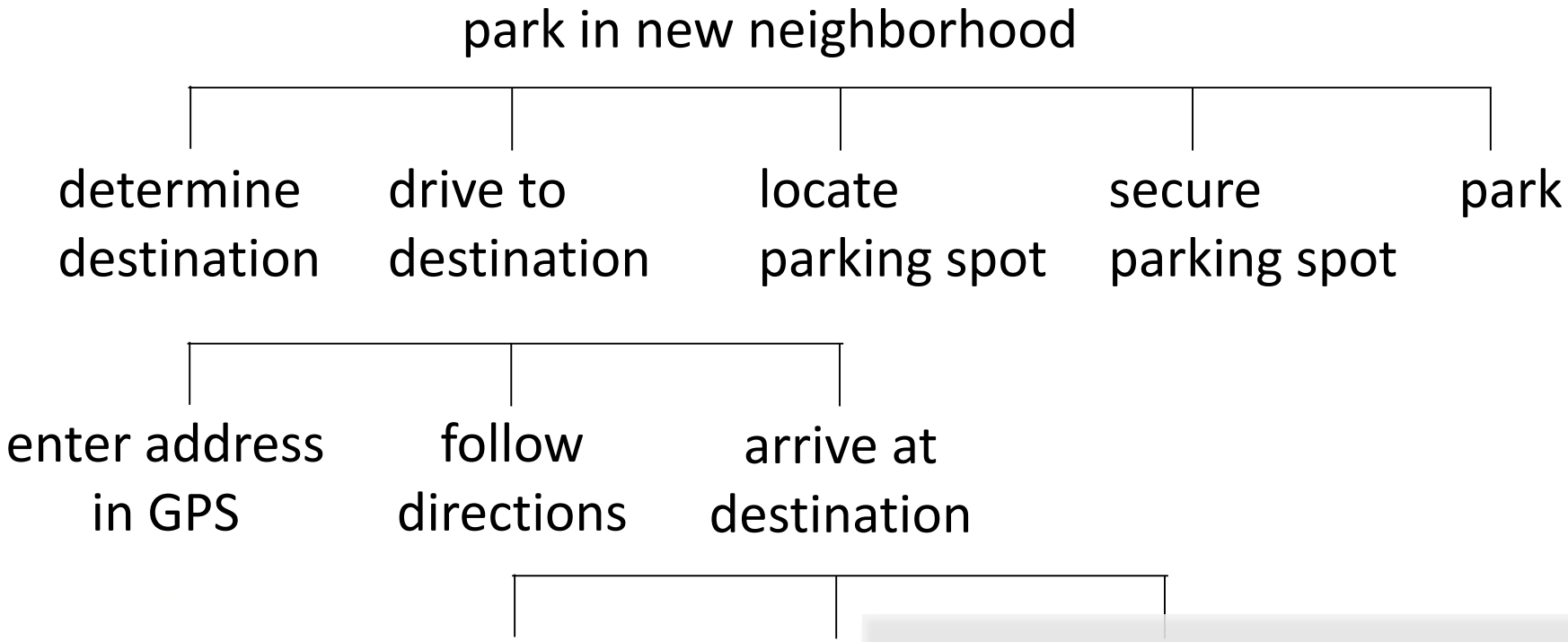
Hierarchical Task Analysis

Steps of the task execution (detailed in a hierarchy)



Hierarchical Task Analysis

Steps of the task execution (detailed in a hierarchy)



Using Tasks in Design

Write up a description of tasks

formally or informally

run by people and rest of the design team

get more information where needed

Manny is in the city at a restaurant and would like to call his friend Sherry to see when she will be arriving. She called from a friend's house while he was in the bus tunnel, so he missed her call. He would like to check his missed calls and find the number to call her back.

Using Tasks in Design

Rough out an interface design

discard features that do not support your tasks

or add a real task that exercises that feature

major elements and functions, not too detailed

hand sketched

Produce scenarios for each task

what person does and what they see

step-by-step performance of task

illustrate using storyboards

Scenarios

Scenarios are design specific, tasks are not

Scenarios force us to

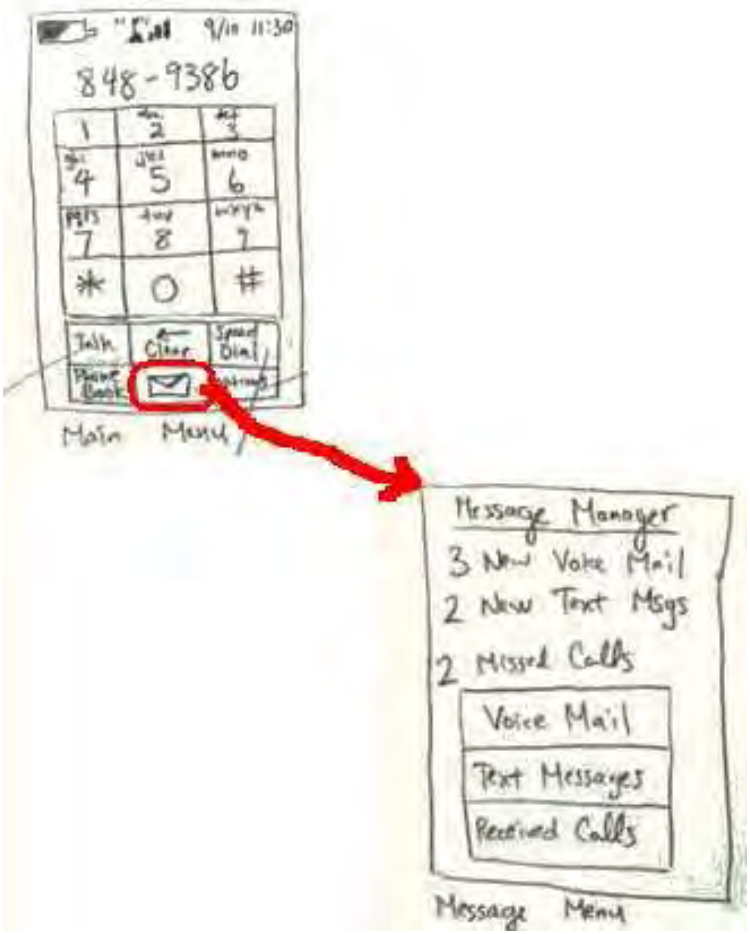
show how things work together

settle arguments with examples

but these are only examples,
and may need to look beyond flaws

Show people storyboards

topic for next Thursday



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

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
- Park Friday night in Ballard
- Park at the airport

Today

Finish with tasks, personas, and scenarios

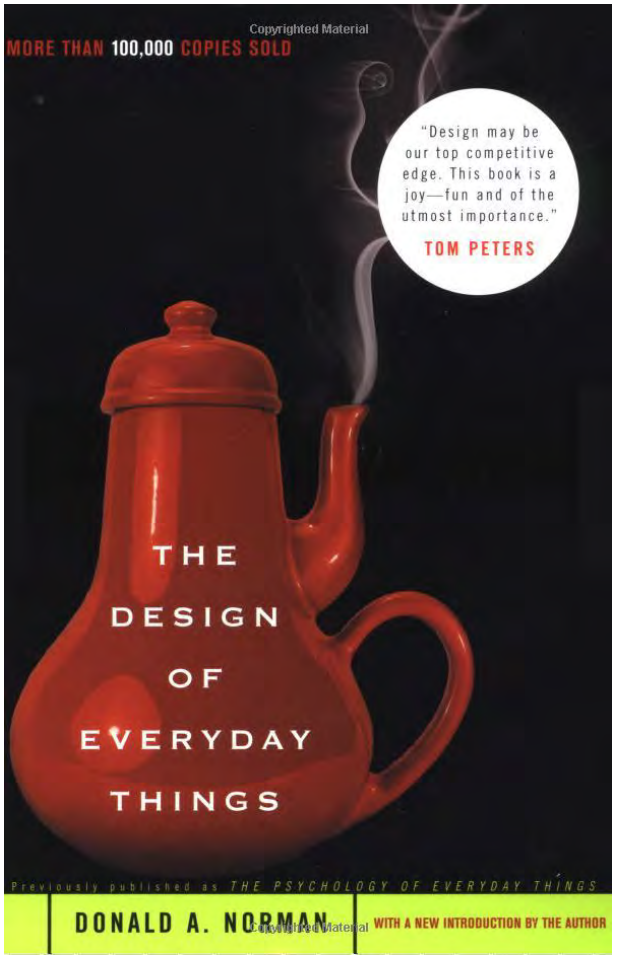
Review core design terminology

Design Terminology

Design of Everyday Things reviews a common and useful vocabulary of design

We will use these in feedback and conversations without even realizing that we are doing it

You should know these terms and recognize them in practice



Objectives

Be able to:

Describe Norman's execution-evaluation cycle, including the Gulfs of Execution and Evaluation.

Define implementation, manifest, and mental models, describe their relationships and how they are created.

Describe and identify examples of affordances, including false and hidden affordances.

Describe and identify examples of metaphors.

Objectives

Be able to:

In terms of mental models, describe and differentiate affordances, metaphors, and idioms.

Describe and identify examples of visibility, constraints, and mappings.

In terms of mental models, describe and identify examples of consistency, including internal and external consistency.

In terms of mental models, describe the effect of modes.

Norman's Execution-Evaluation Cycle

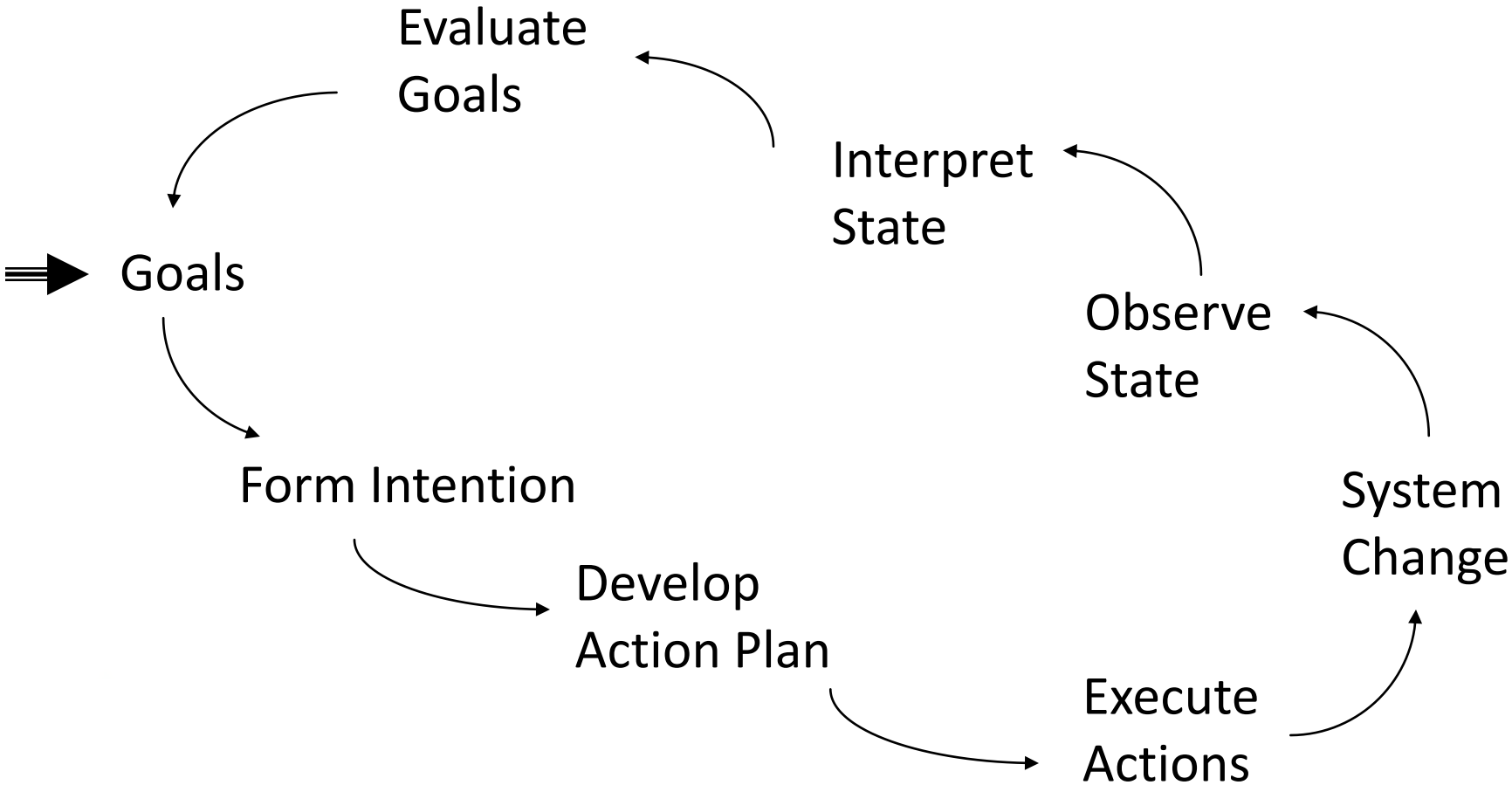
1. Establish the goal.
2. Form the intention.
3. Specify the action sequence.
4. Execute the action sequence.
5. Perceive the system state.
6. Interpret the system state.
7. Evaluate the system state with respect to the goals and intentions.

Revise Goals

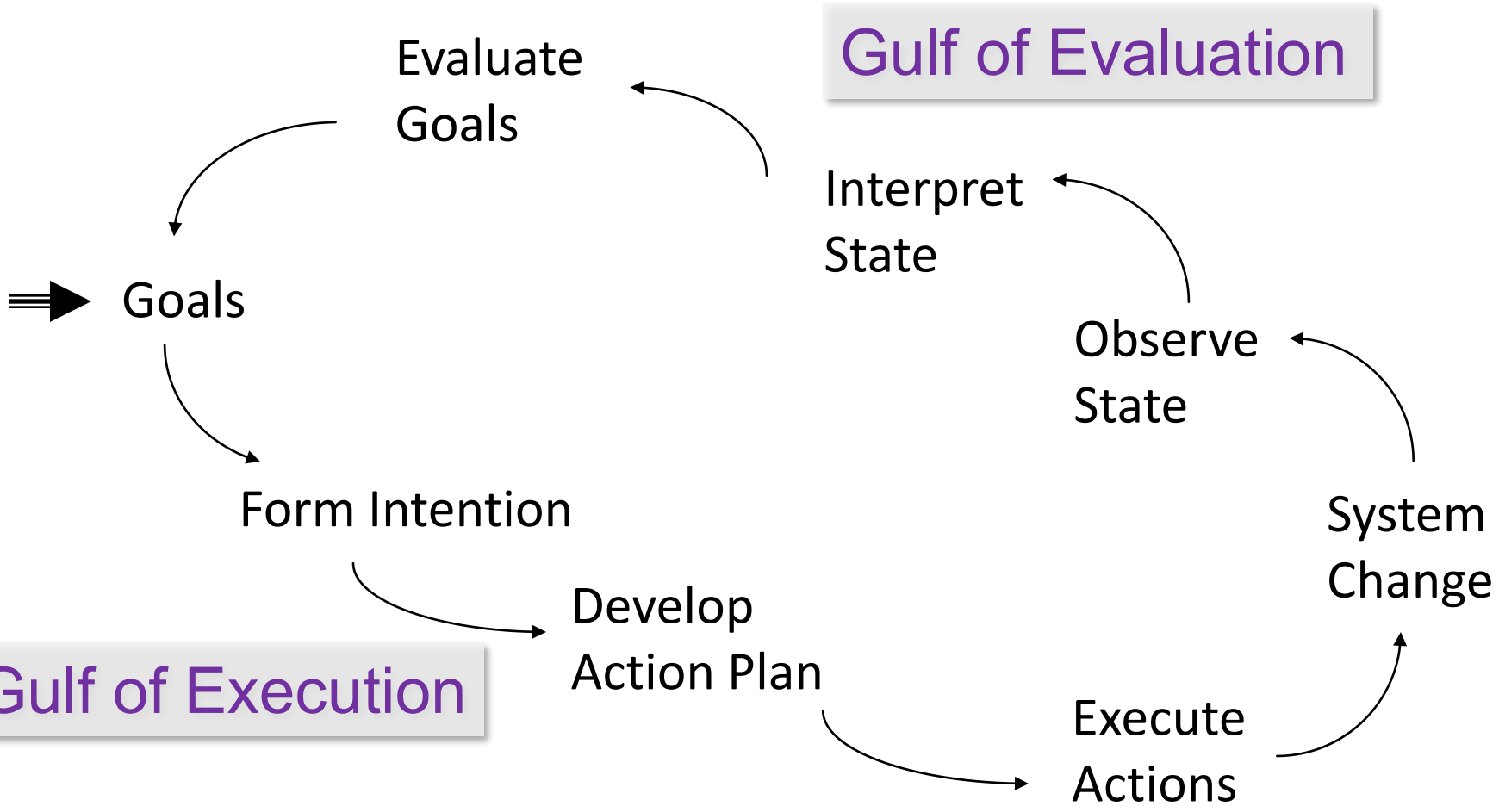
Turning on the Light

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



Norman's Execution-Evaluation Cycle



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

(Design Model, Designer's Conceptual Model)

Manifest Model

How it presents itself

(System Image)

Mental Model

How a person thinks it works

(User Model, User's Conceptual Model)

Cooper's Mental Model Terminology

Implementation Model

How it works

(Design Model, Designer's Conceptual Model)

Manifest Model

How it presents itself

(System Image)

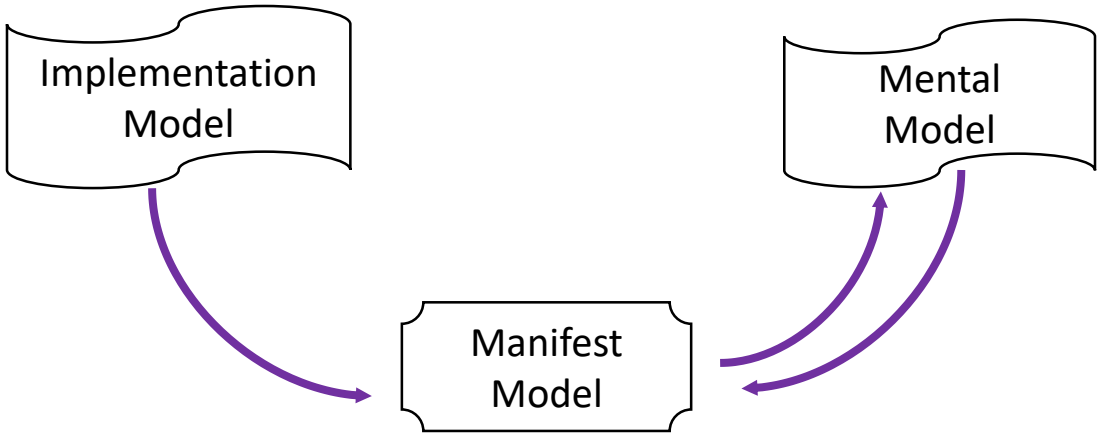
Mental Model

How a person thinks it works

(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

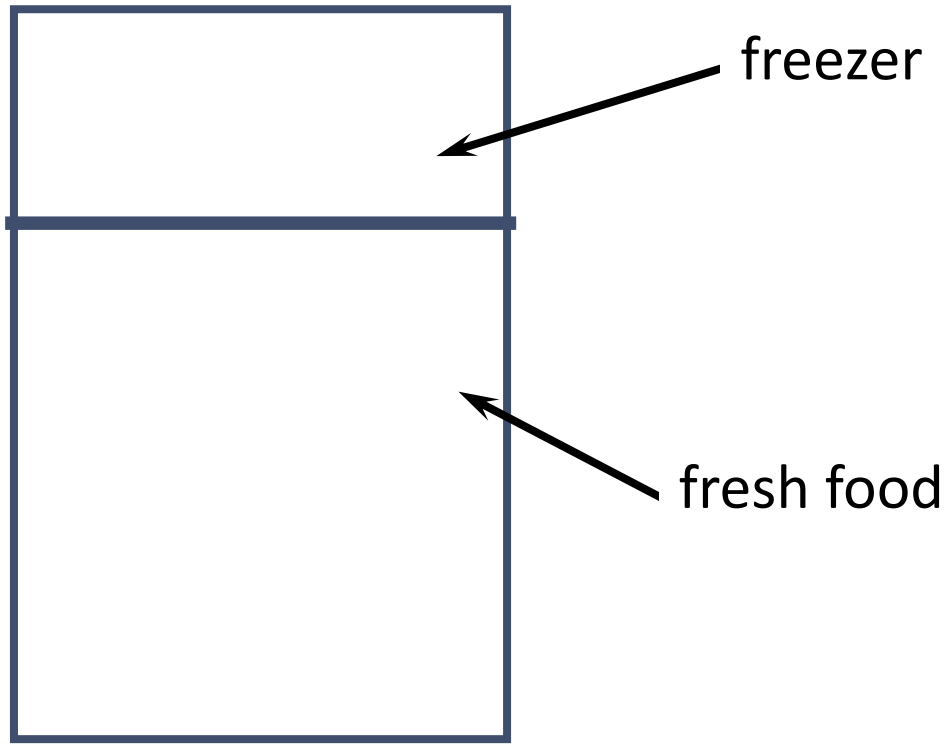
- Person forms their model based on interaction

People struggle until model matches manifest model

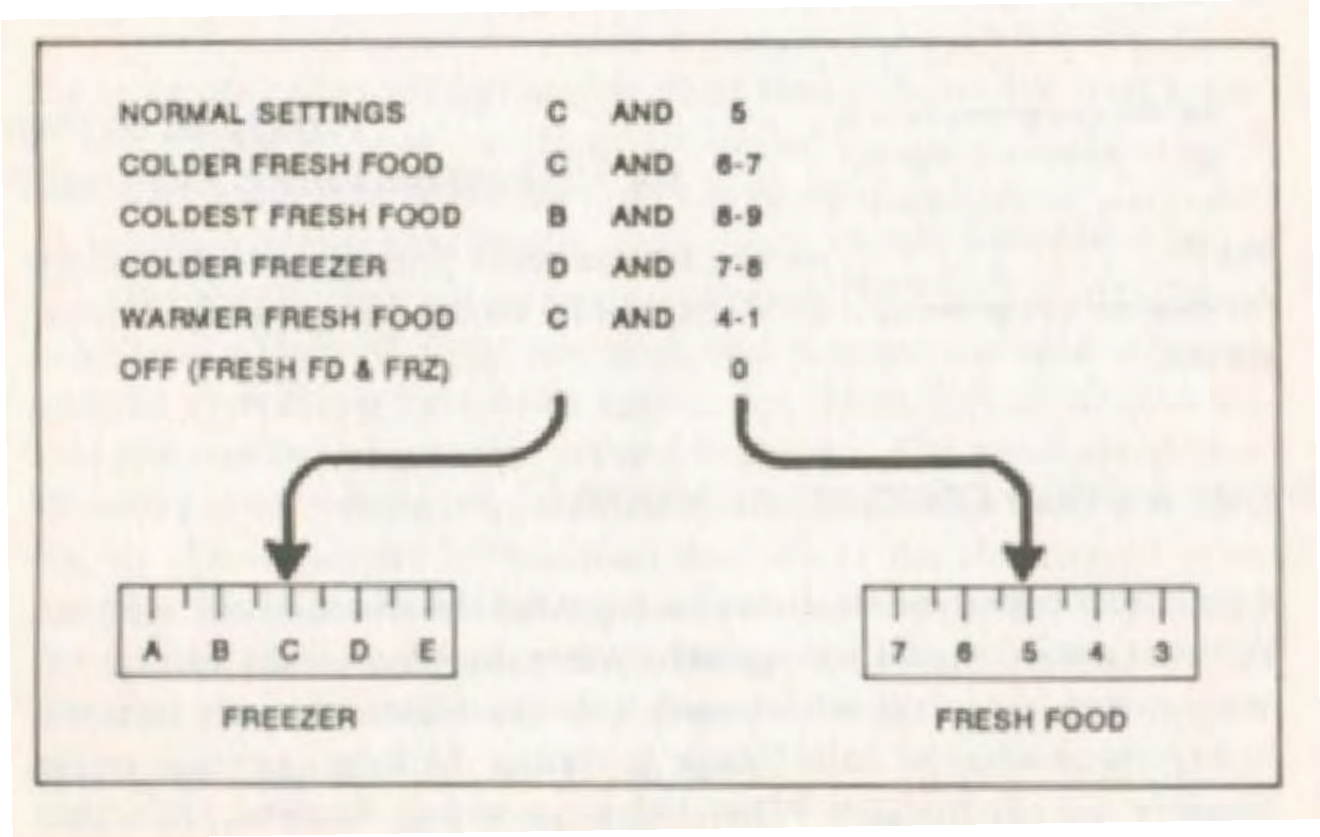
- Update mental model in response to breakdowns
- Matching the implementation model is not necessary

Mental Models

Problem: freezer too cold, fresh food just right

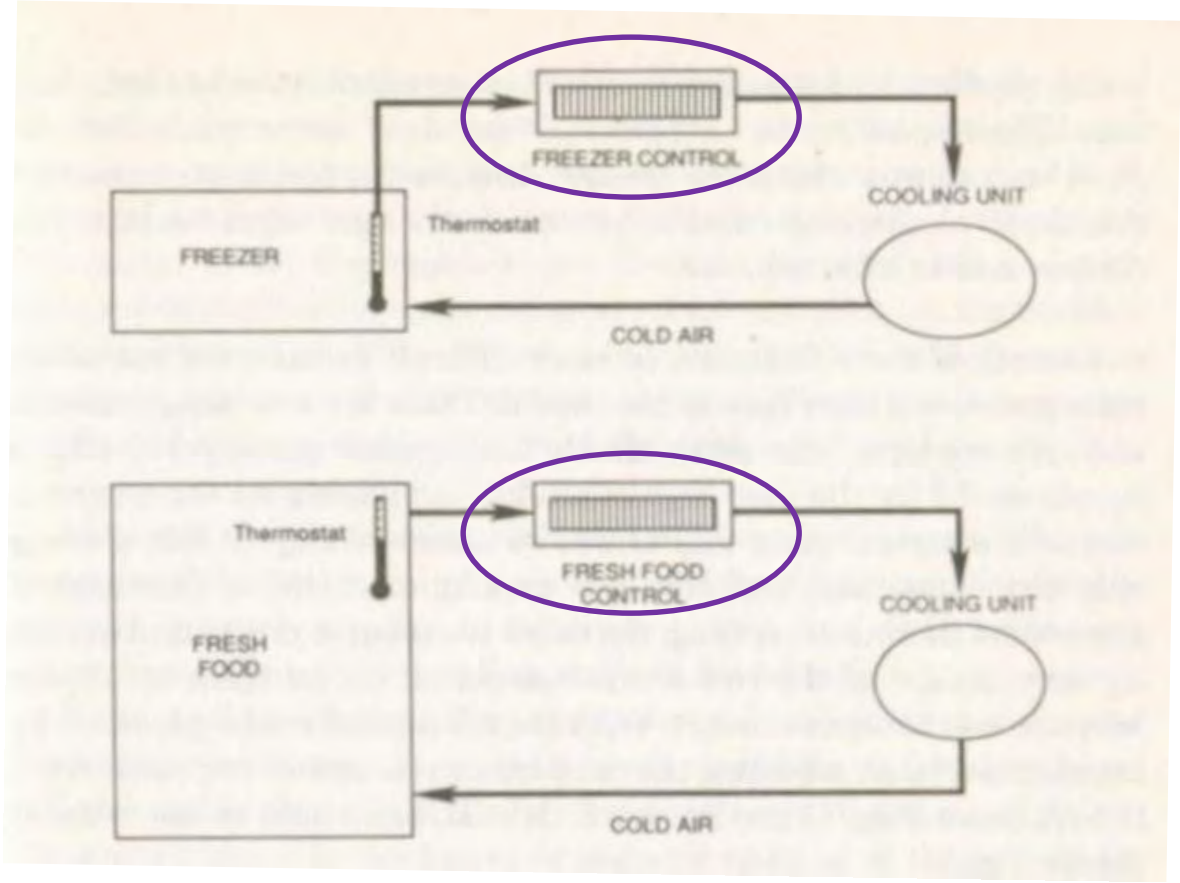


Manifest Model



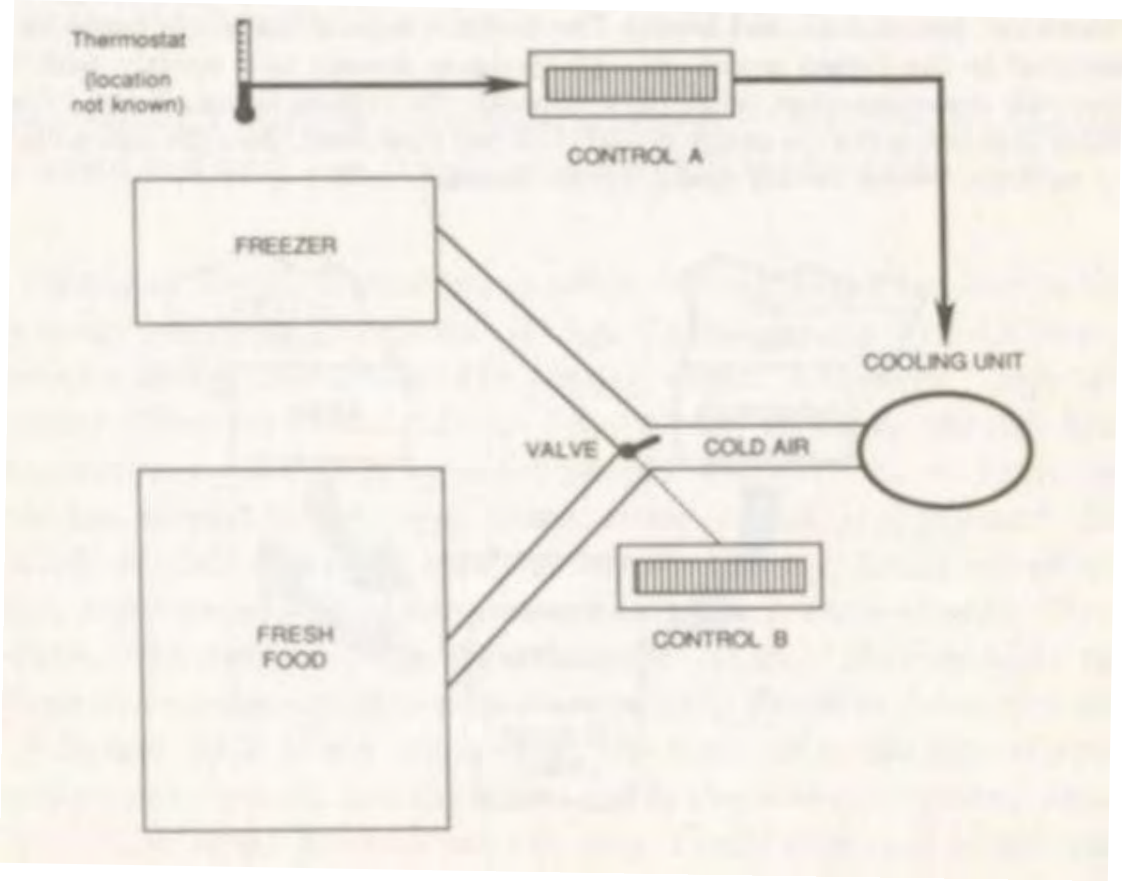
What if I want to make just the freezer warmer?

A Sensible Mental Model

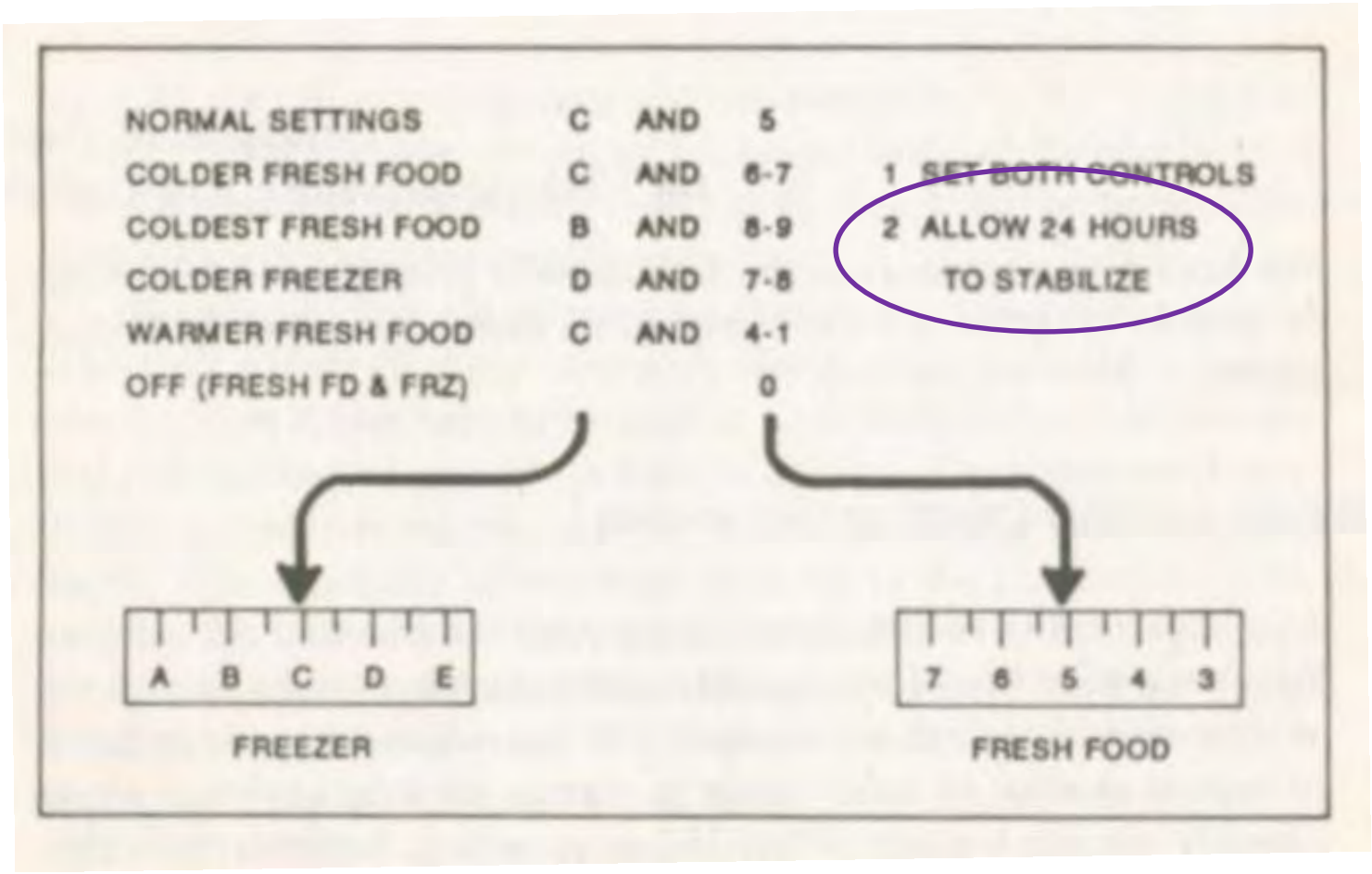


"The Freezer Control controls the freezer temperature and the Fresh Food Control controls the fresh food temperature"

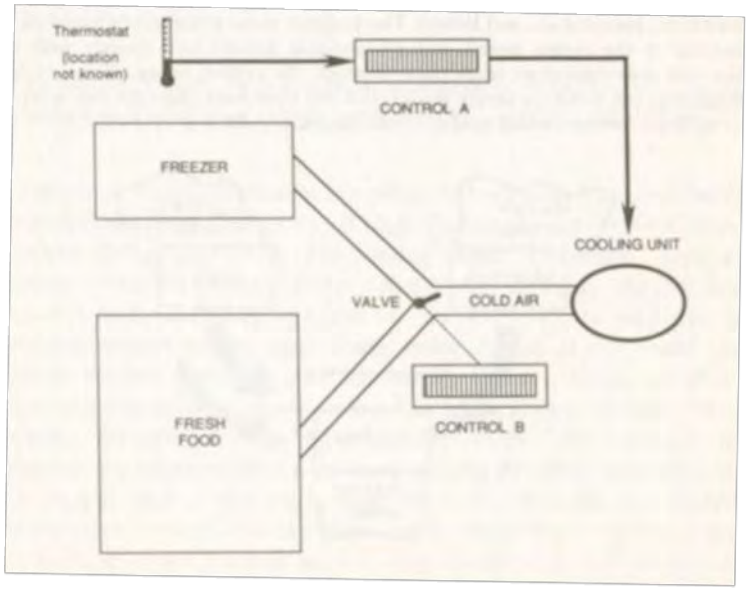
The Implementation Model



A Problem with Feedback



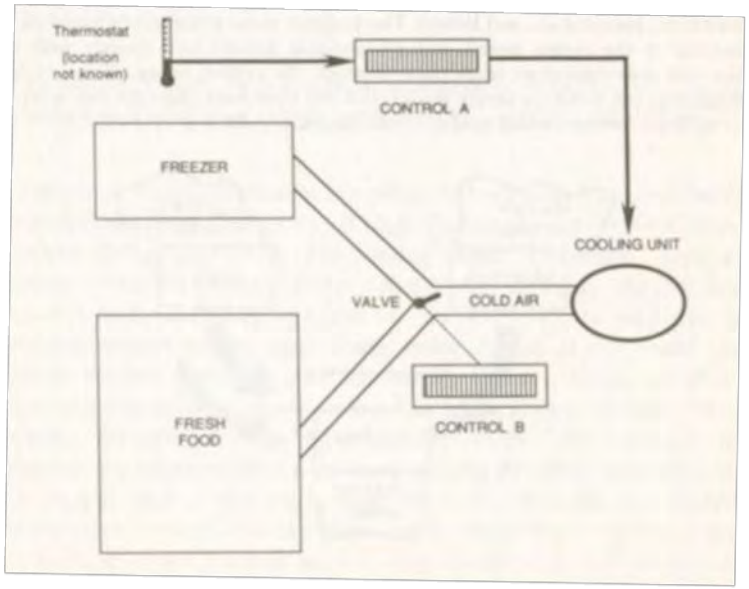
The Implementation Model



Why is there a problem?

Can you fix the problem?

The Implementation Model



"Design depends largely on constraints."
Charles Eames

Why is there a problem?

Cost constraints

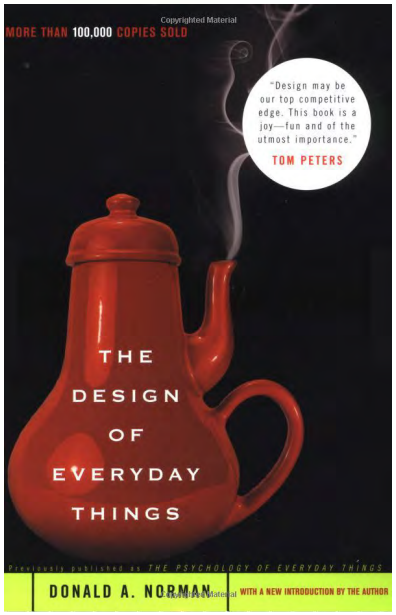
Can you fix the problem?

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
- Visibility
- Constraints
- Consistency
- Metaphors
- Knowledge in the World
- Mapping
- 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, 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.”

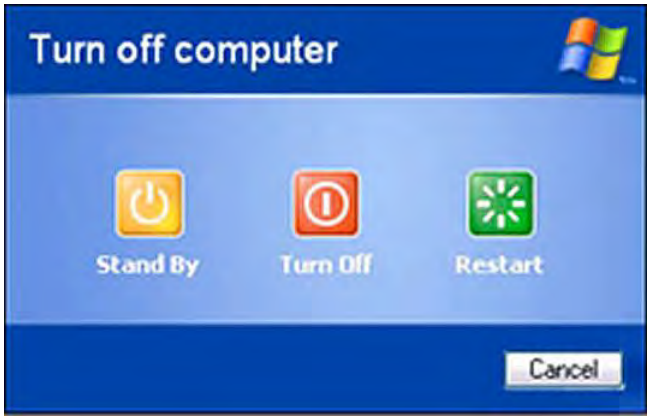
Norman

What's the Affordance?

Affordances

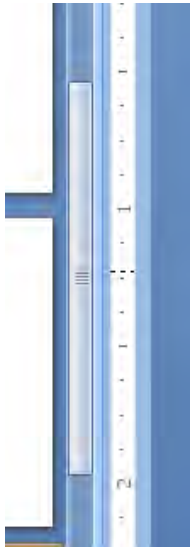
Affordances

Technology affordances are often based in affordances from the physical world



Affordances

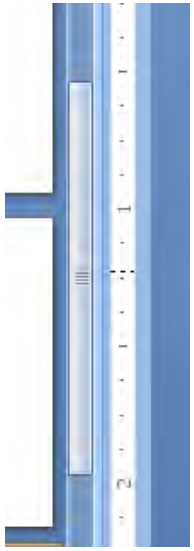
What is the affordance here?



Where does it come from?

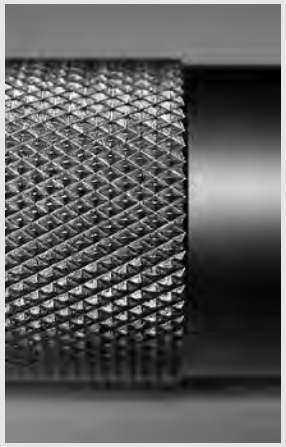
Affordances

What is the affordance here?



Where does it come from?

Knurling



Sequential Affordance

Acting on a perceptible affordance leads to information indicating new affordances

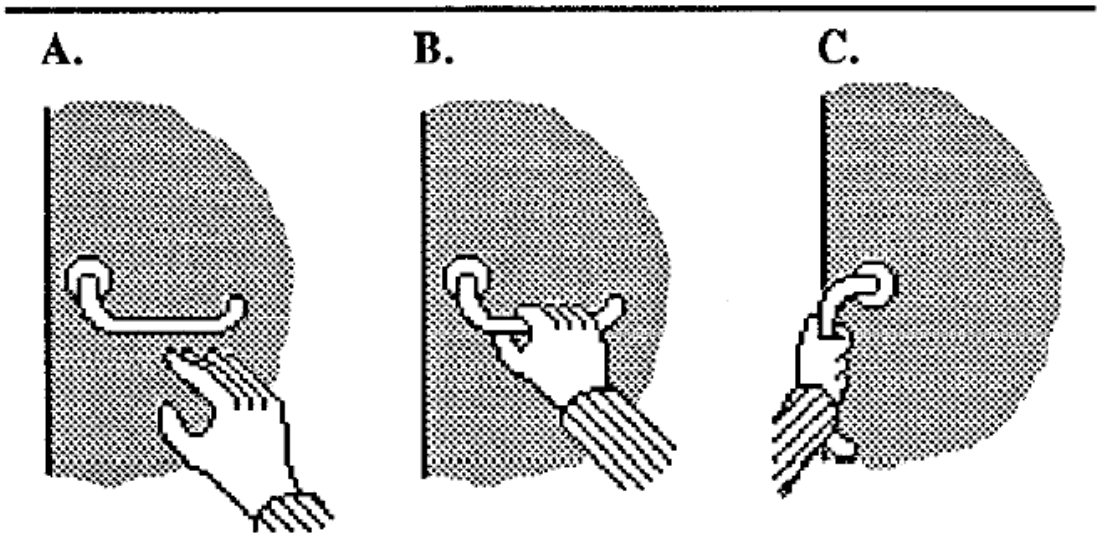
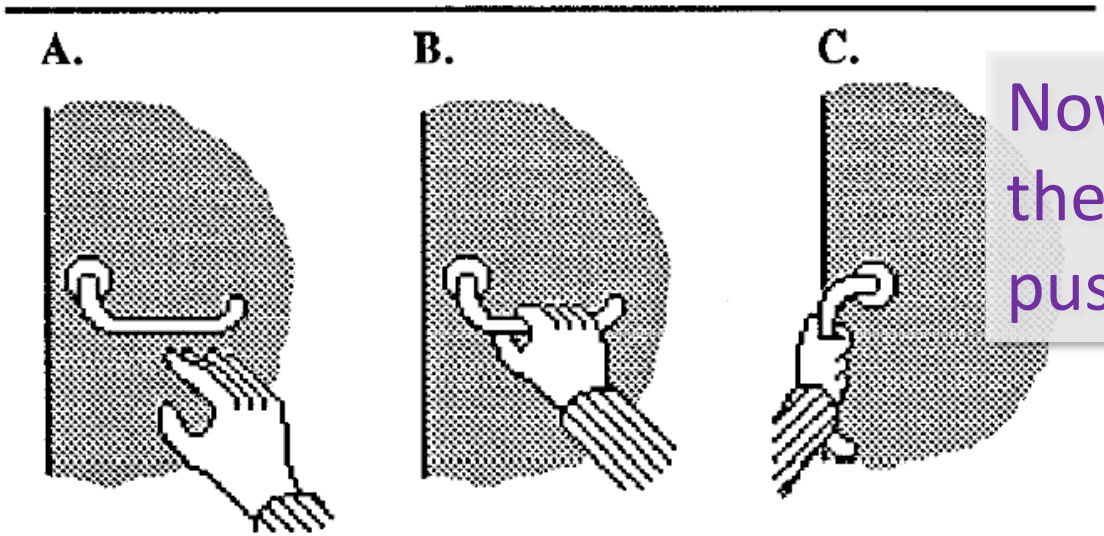


Figure 4. *Sequential affordances: one affordance leads to another. Visual information indicates grasping (A & B); tactile information indicates turning (B & C).*

Sequential Affordance

Acting on a perceptible affordance leads to information indicating new affordances



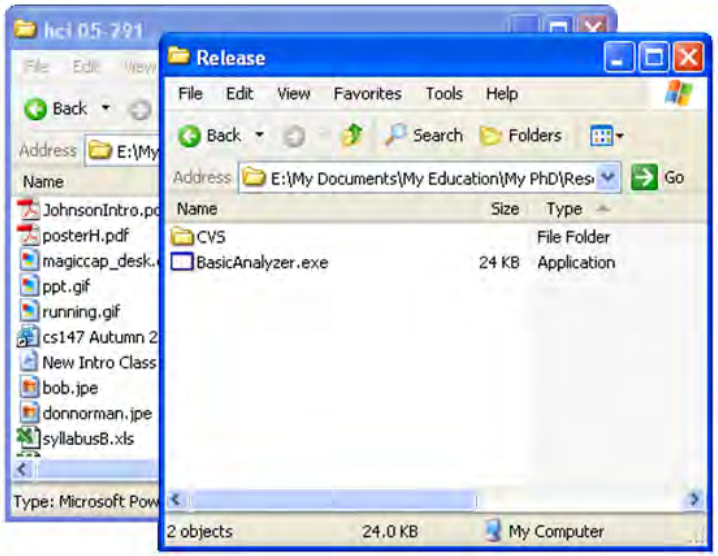
Now does the door push or pull?

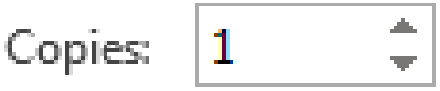
Figure 4. *Sequential affordances: one affordance leads to another. Visual information indicates grasping (A & B); tactile information indicates turning (B & C).*

Nested Affordances

Affordances due to spatial relationships revealing what actions can be done

Proximate to, contained in, part of





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

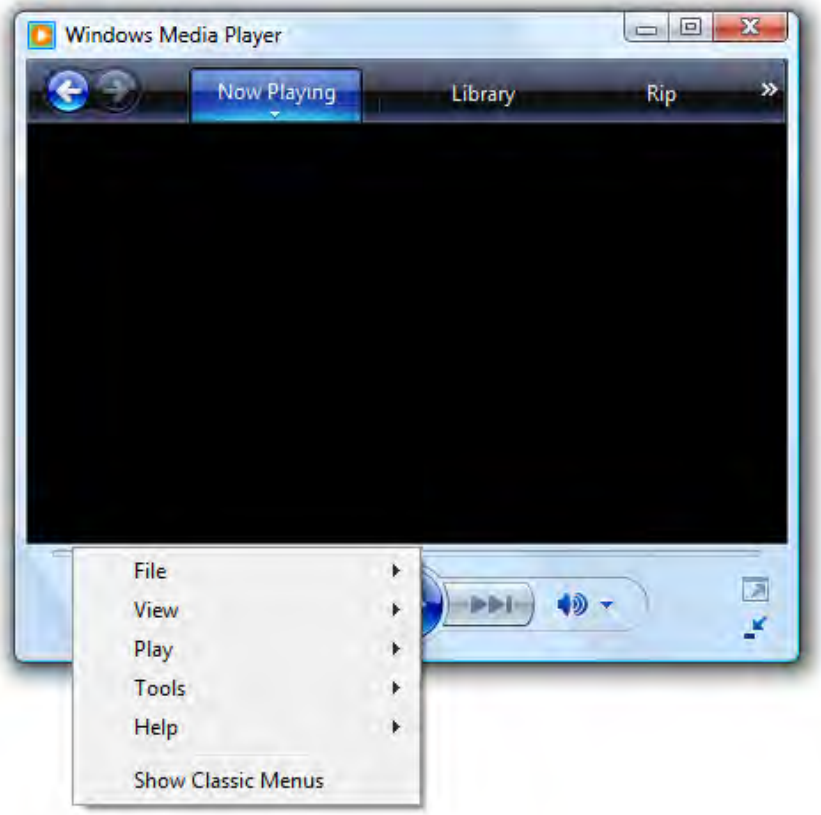
False Affordances

False Affordances

False Affordances

Hidden Affordances

When there is no perceptual information suggesting an actual intended use



Hidden Affordances

Hidden Affordances

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

I 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

Metaphors

Suggest an existing mental 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

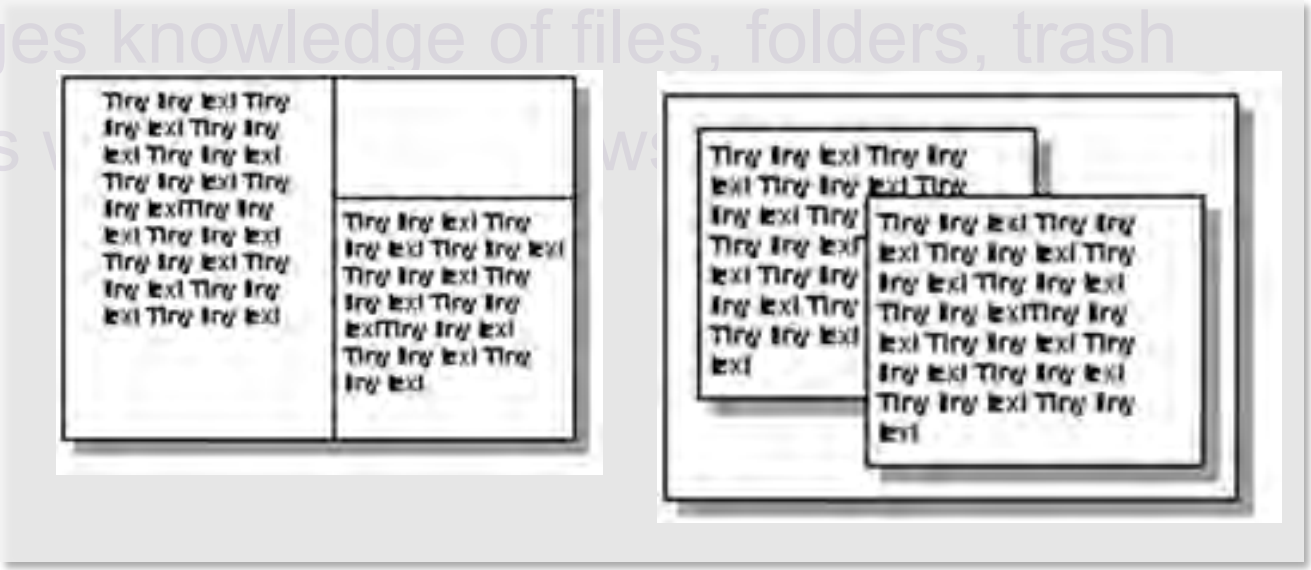
Metaphors

Suggest an existing mental model

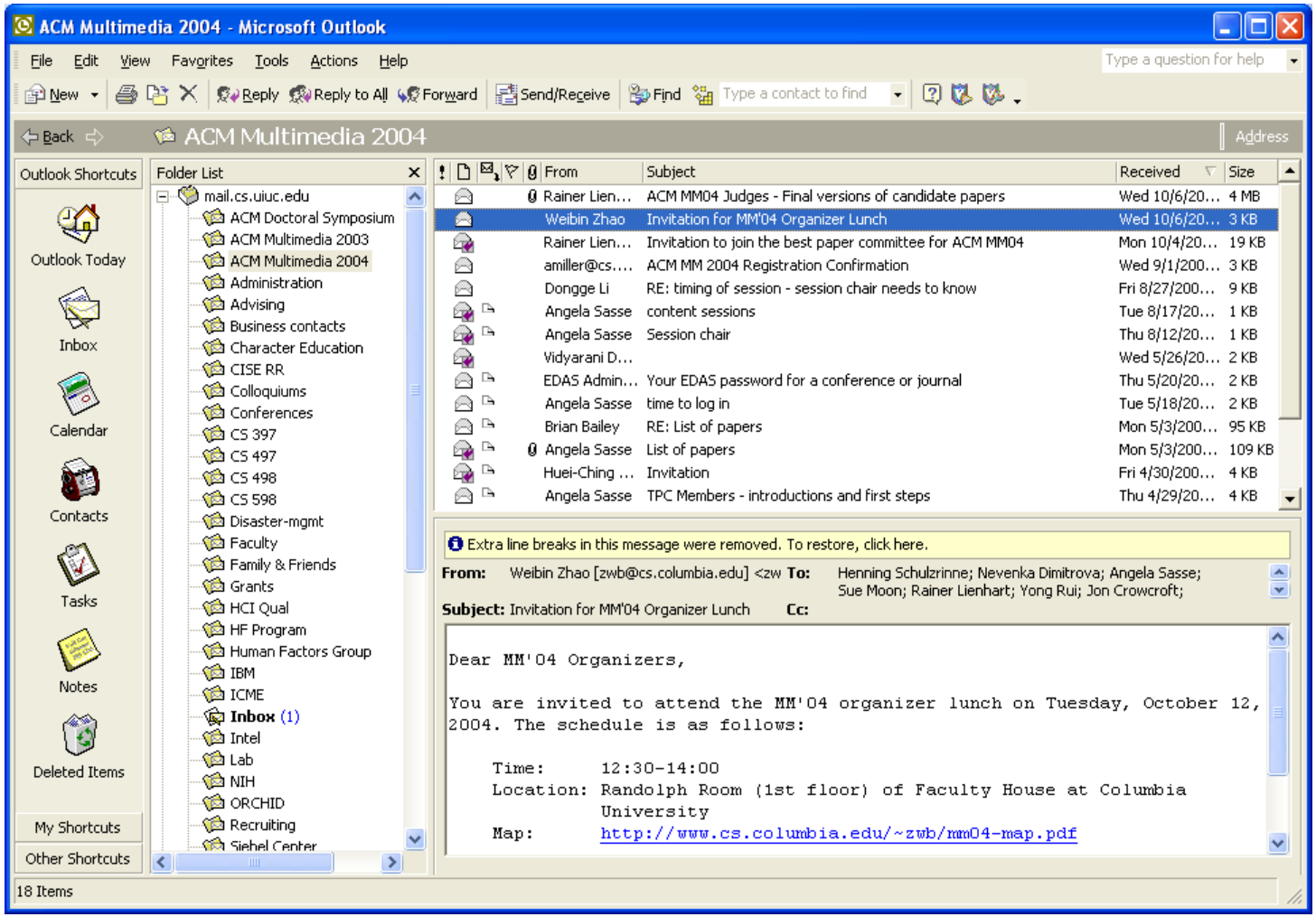
- “horseless carriages”, “iron horses”, “wireless”

Desktop metaphor

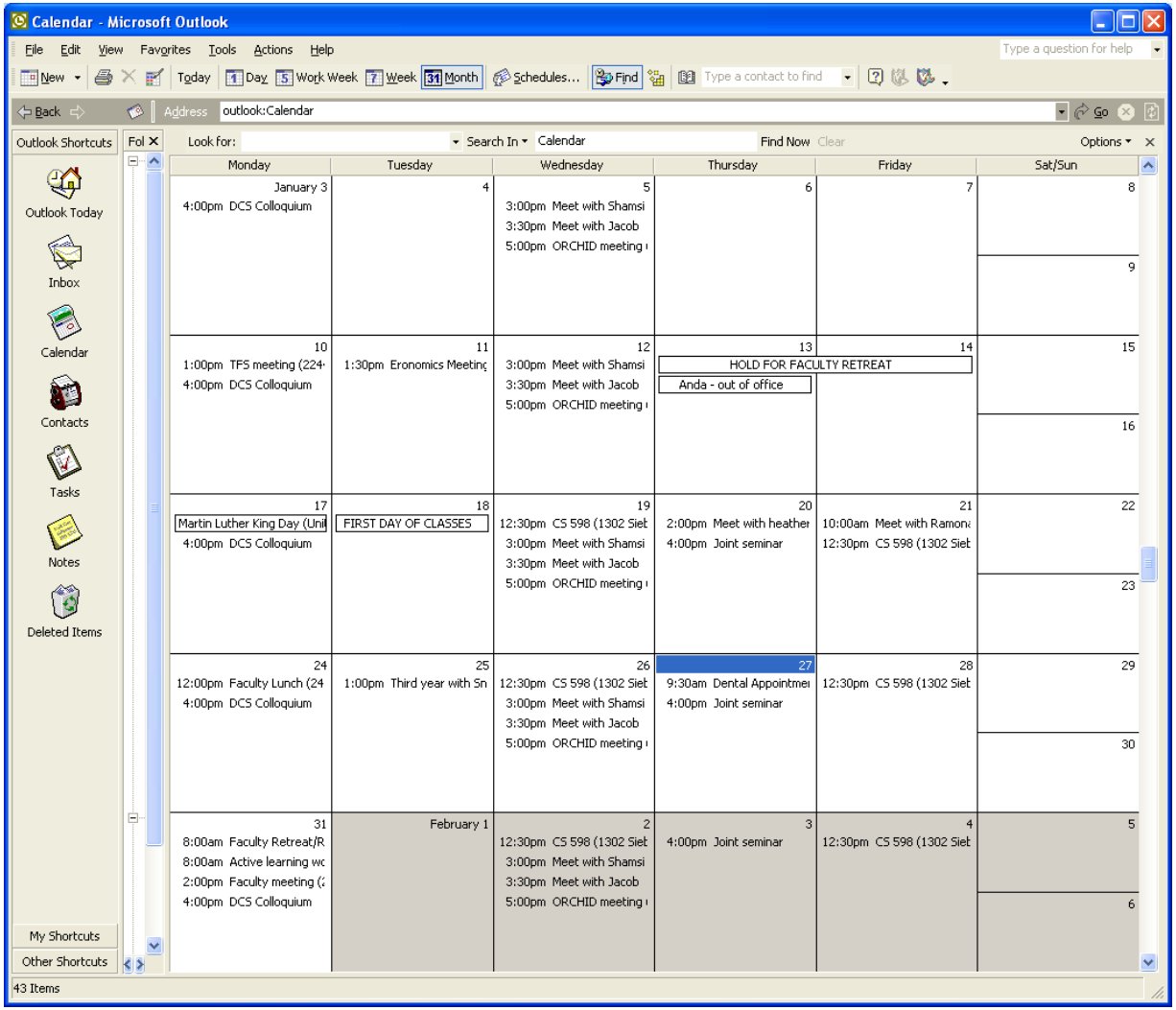
- Not an attempt to simulate a real desktop
- Leverages knowledge of files, folders, trash
- Explains



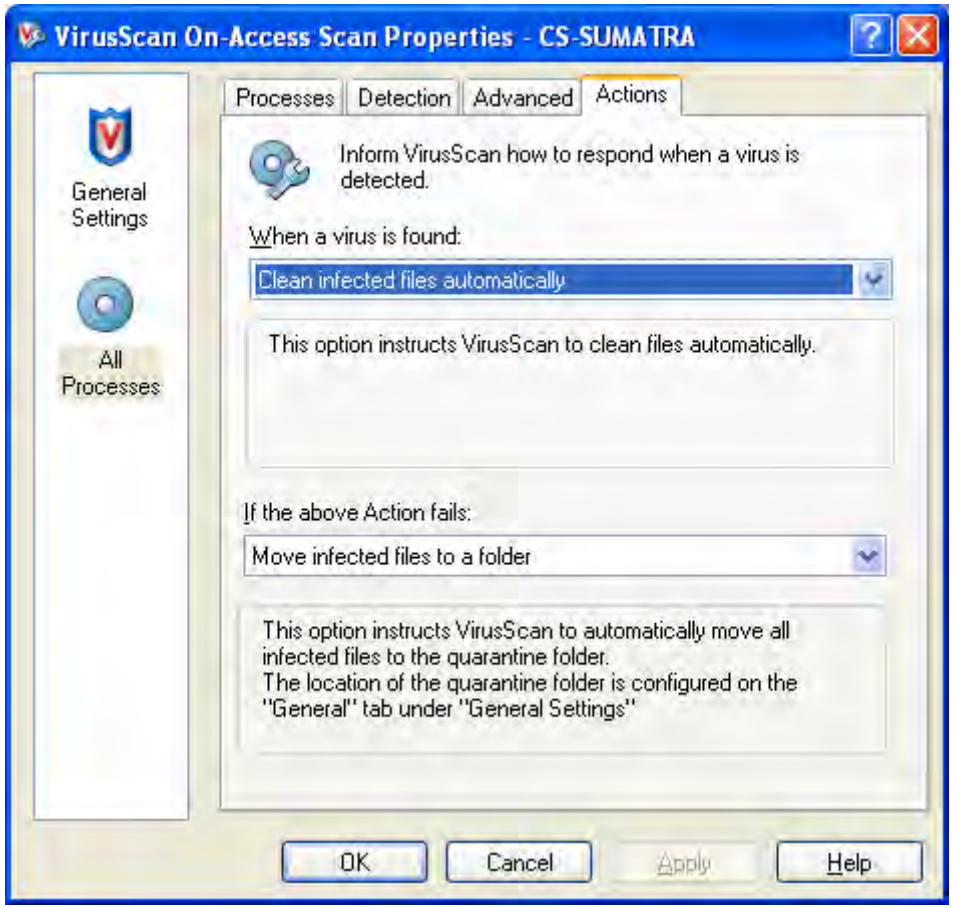
Mail Metaphor



Calendar Metaphor

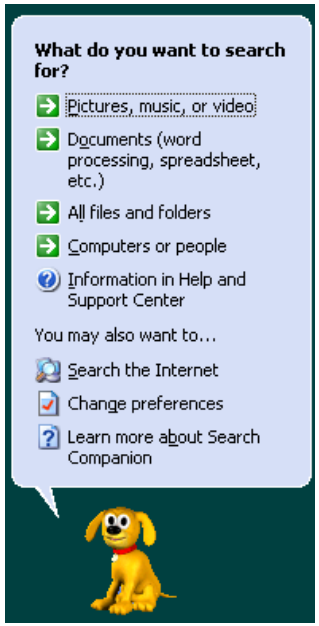


Health Metaphor



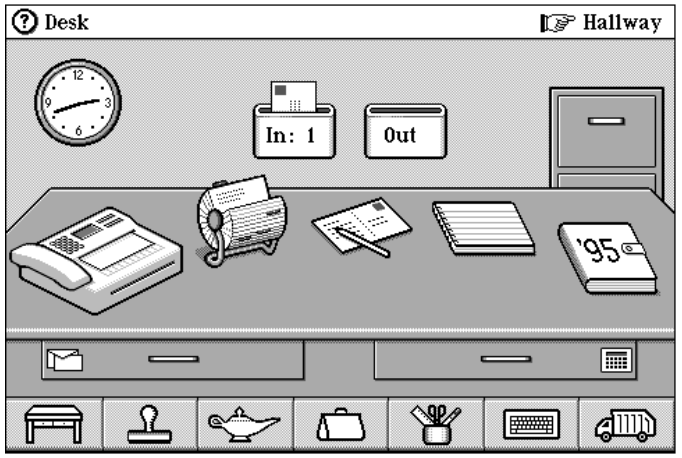
Shallow or Inappropriate Metaphors

Informs a small range of possibilities, or none at all



It is just a menu and a dialog box?

What does the living room add?



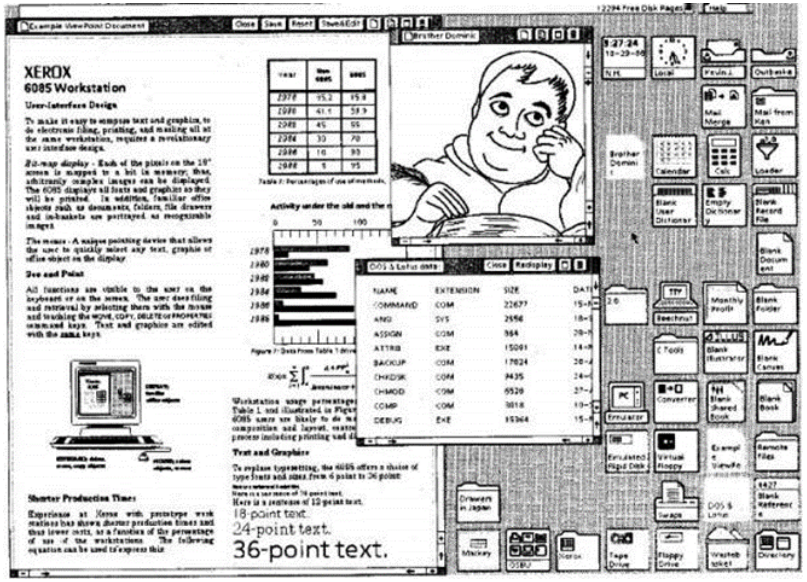
Magic Cap

Microsoft Bob

Mixed Metaphors

Two or more different metaphors coexist with some supposed relation

- The desktop metaphor
- Windows into content



Good? Bad?

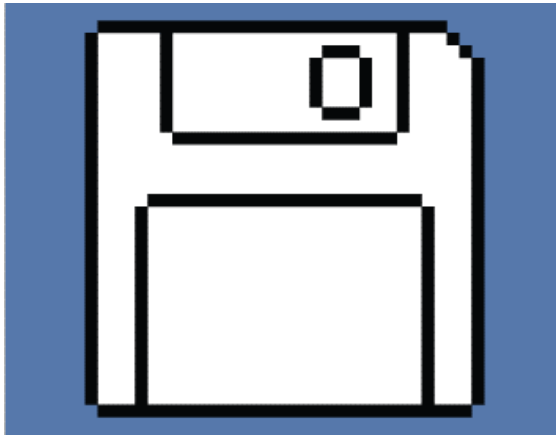
Neither? Both?

Windows are views into larger content regions

No desktop has windows

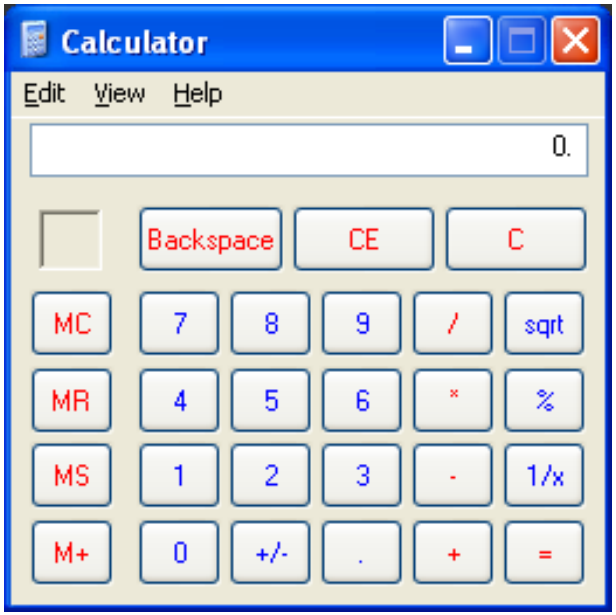
Broken Metaphors

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



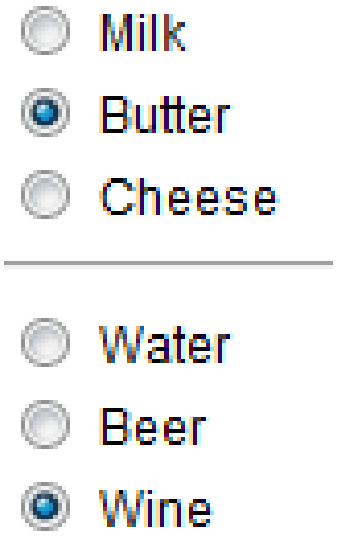
Mechanical-Age Metaphors

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



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

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, undermine interaction
- Can limit designer creativity
- Can reduce the advantages of software
- Can be “cute” at the expense of functional

Signifiers

“There are trails. There are behaviors. We know how to behave by watching the behavior of others, or if others are not there, by the trails they have left behind.”

“I call any physically perceivable cue a signifier, whether it is incidental or deliberate. A social signifier is one that is either created or interpreted by people or society, signifying social activity or appropriate social behavior.”

“Social signifiers replace affordances, for they are broader and richer, allowing for accidental signifiers as well as deliberate ones, and even for items that signify by their absence, as the lack of crowds on a train platform. The perceivable part of an affordance is a signifier, and if deliberately placed by a designer, it is a social signifier.”

Norman

Visibility

Phones

How do you

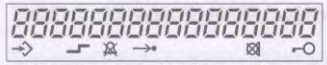
put somebody on hold

change volume

Visibility

Location of Controls

Display



(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.
ϟ	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).
▫	While storing a phone number in a LOWER memory location for the One-Touch Dialer, "▫" 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).
⊔	While programming function items, such as the dialing mode, "⊔" will flash as a cursor.

Preparation

Visibility

Changing Ringer Volume

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

Visibility

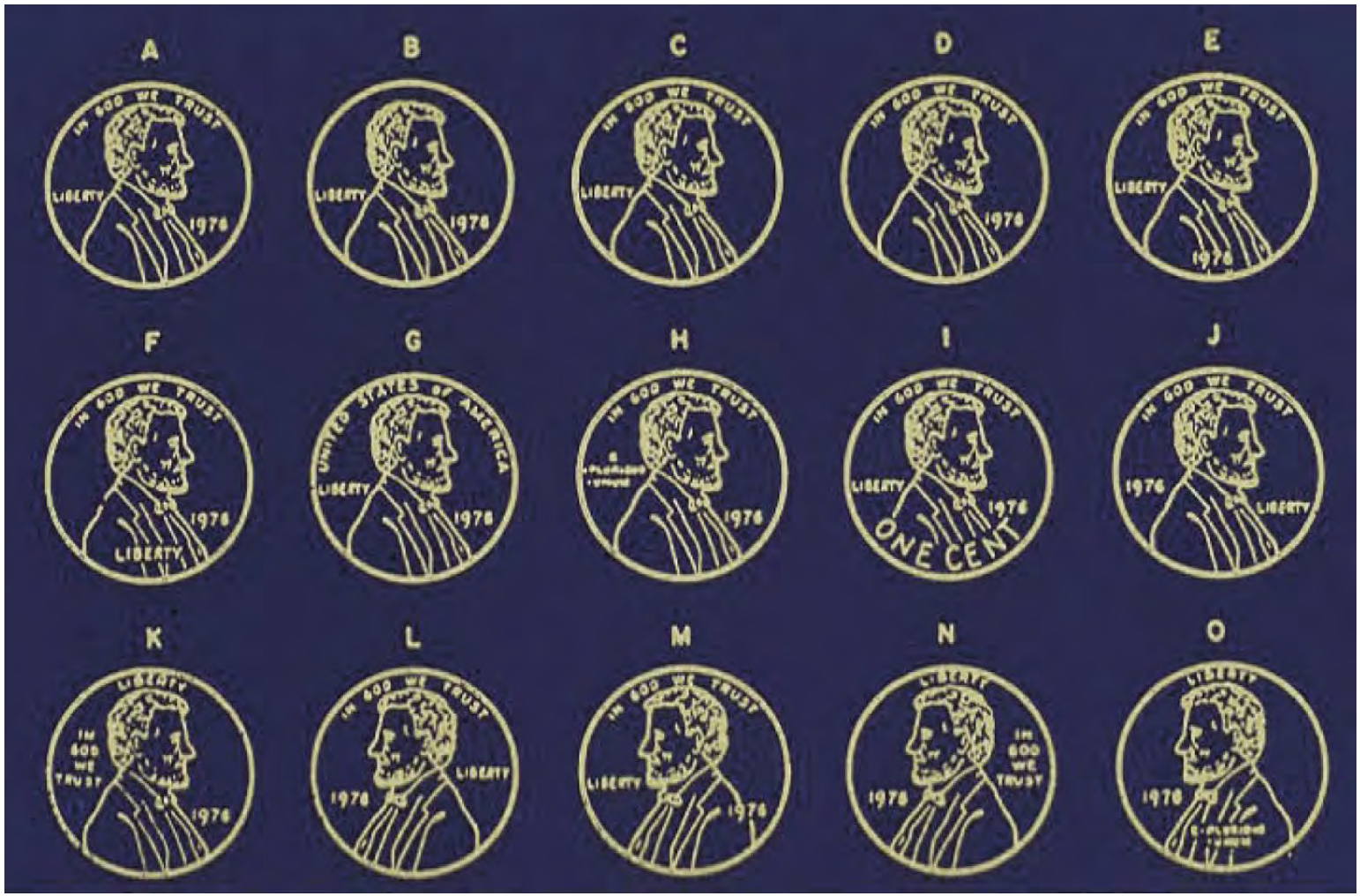
Controls available on watch with 3 buttons?

- Too many and they are not visible

Compare to controls on simple car radio

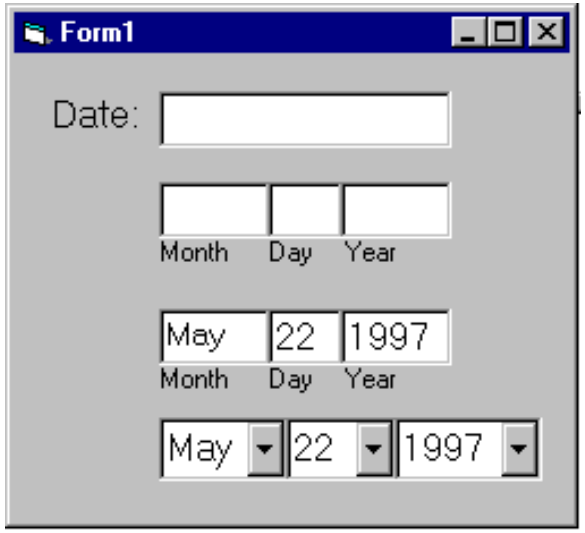
- Number of controls ≈ Number of functions
- Controls are labeled and grouped together

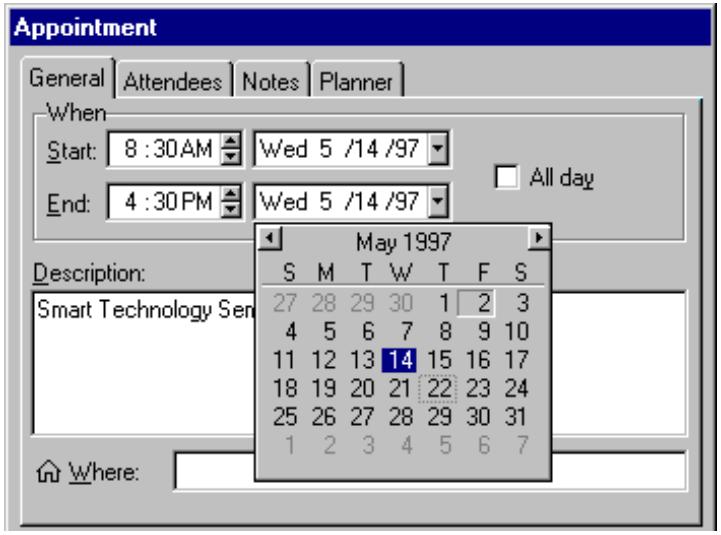
Knowledge in the World



Constraints

Prevent some actions while allowing others





Prevent errors before they can happen

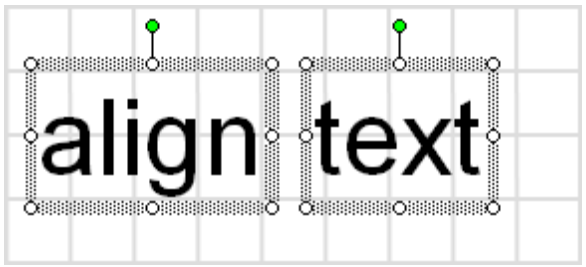
Disruptive error messages are a last resort

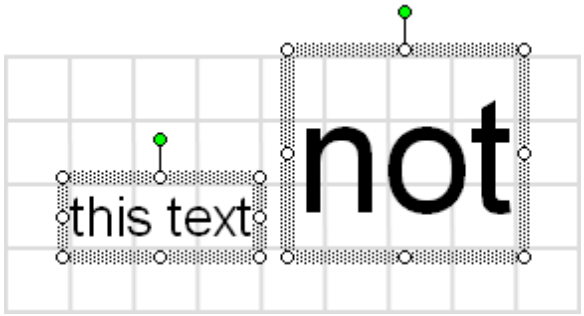
Constraints

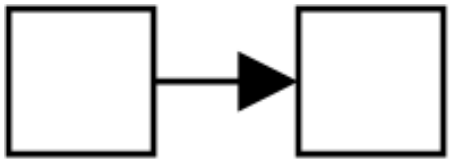
Constraints

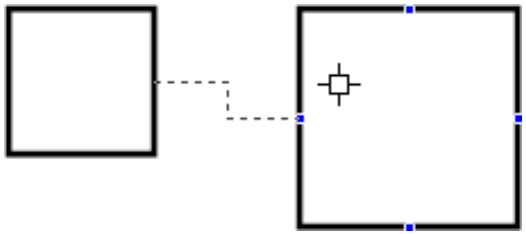
Constraints

Constraints





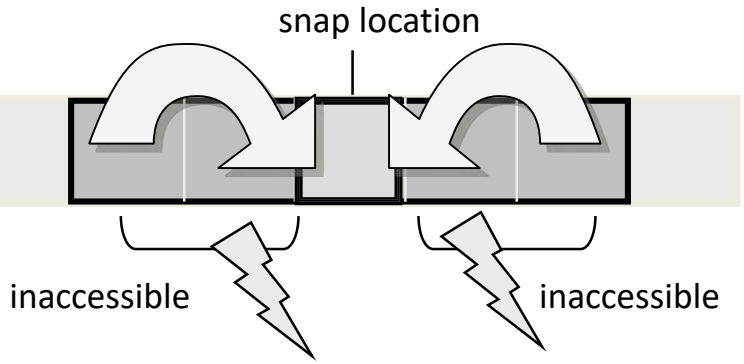




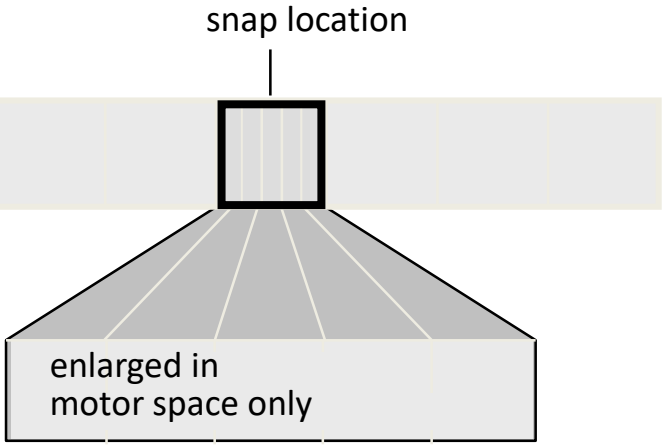
Baudisch et al., Snap-And-Go

Constraints

Traditional



Snap-And-Go



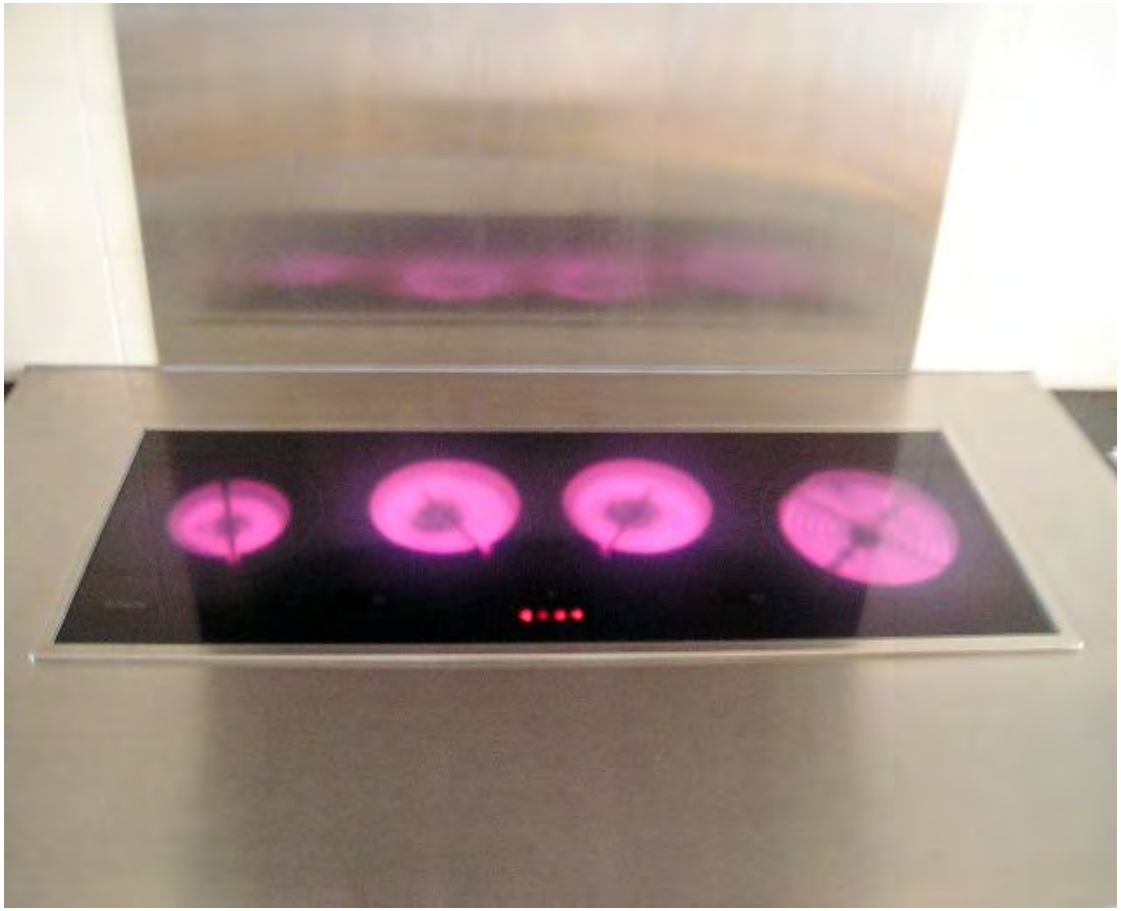
Baudisch et al., Snap-And-Go

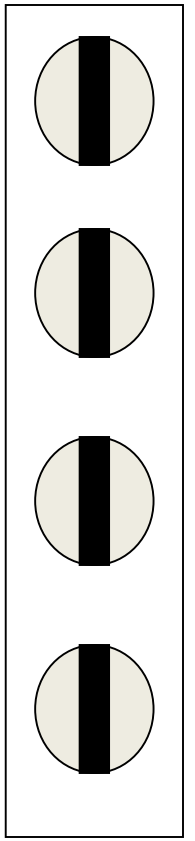
Mapping

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

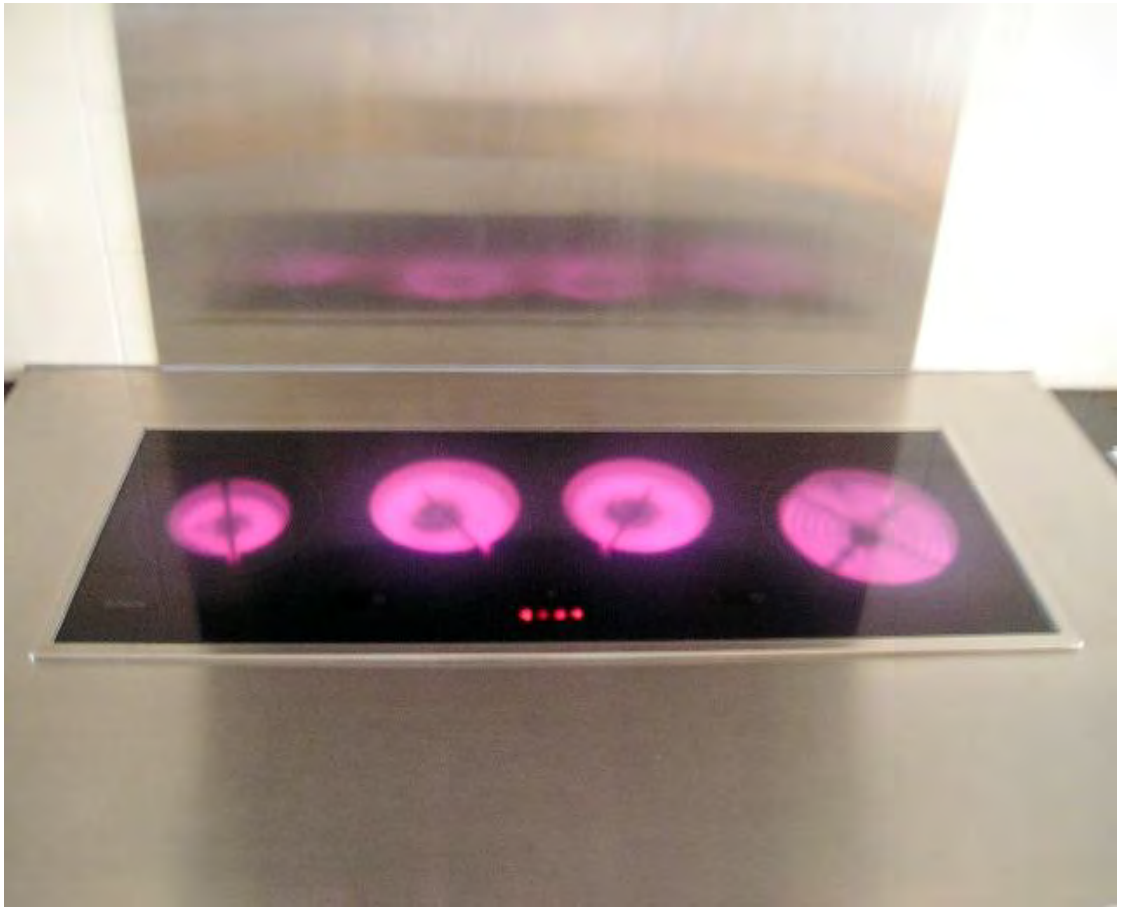
Minimize cognitive steps to transform action into effect, or perception into comprehension (i.e., execution and evaluation)

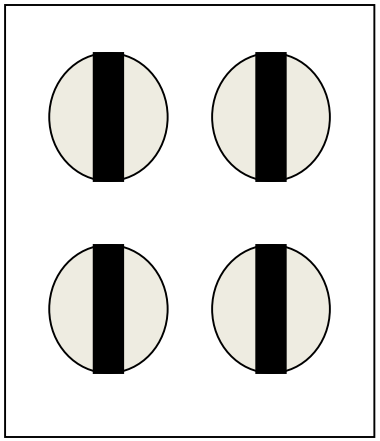
Very Bad Mapping





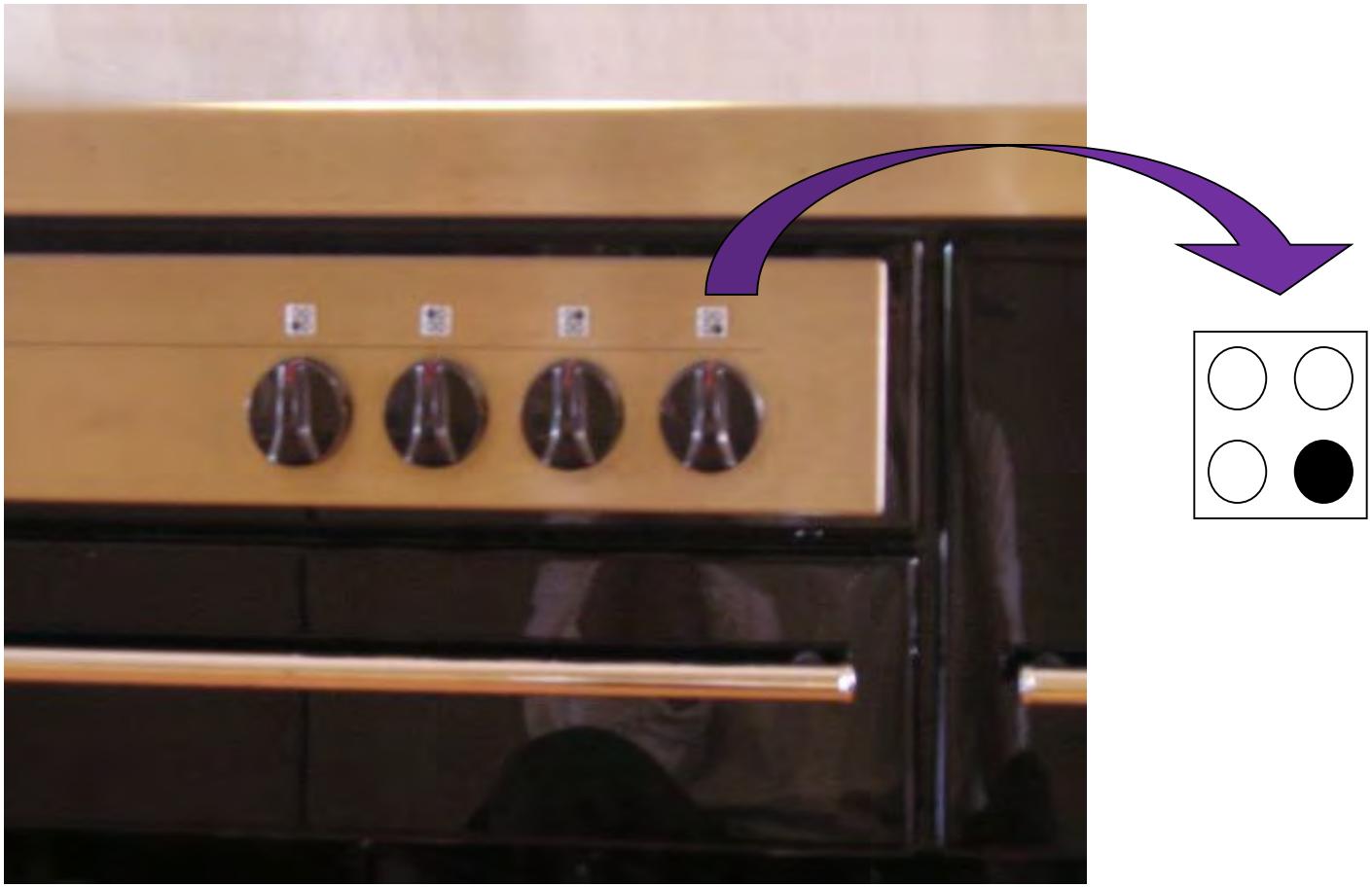
Slightly Better Mapping



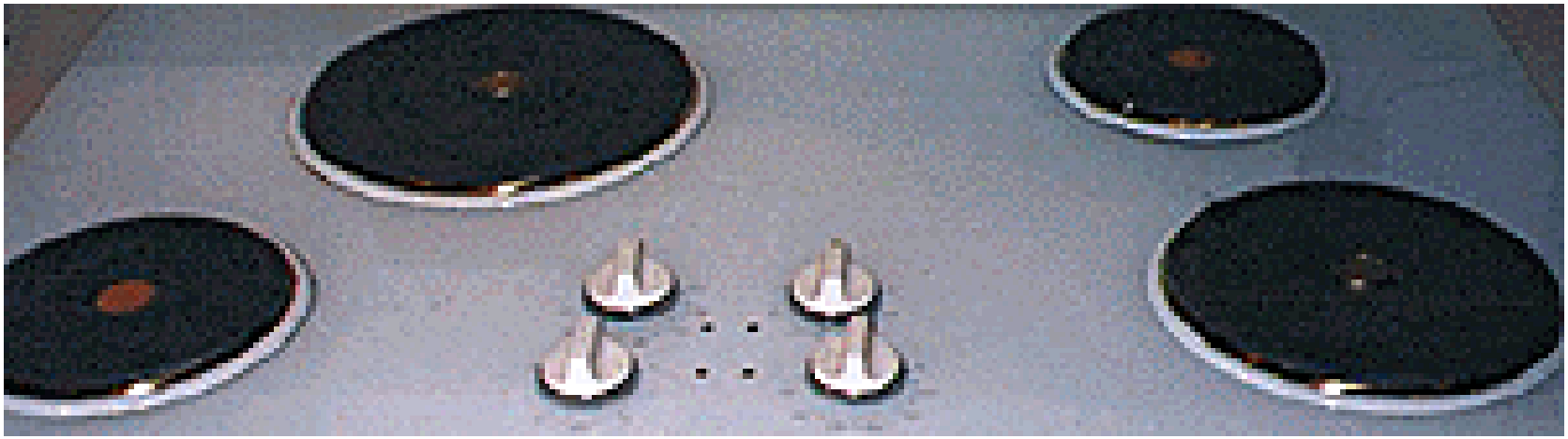


Good Mapping

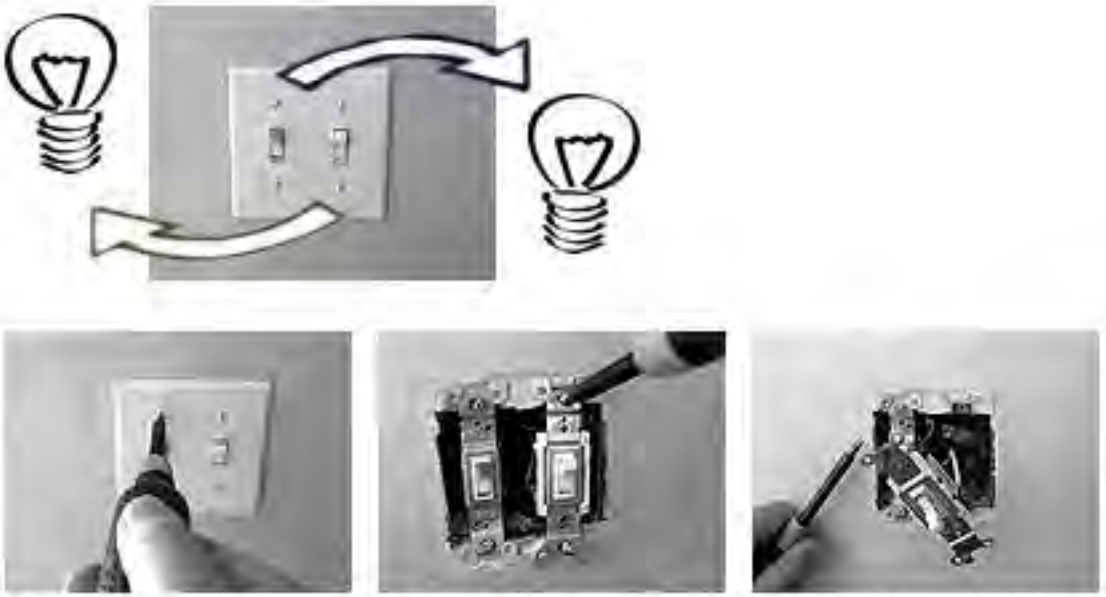
Not this Stove



Great Mapping



Mapping



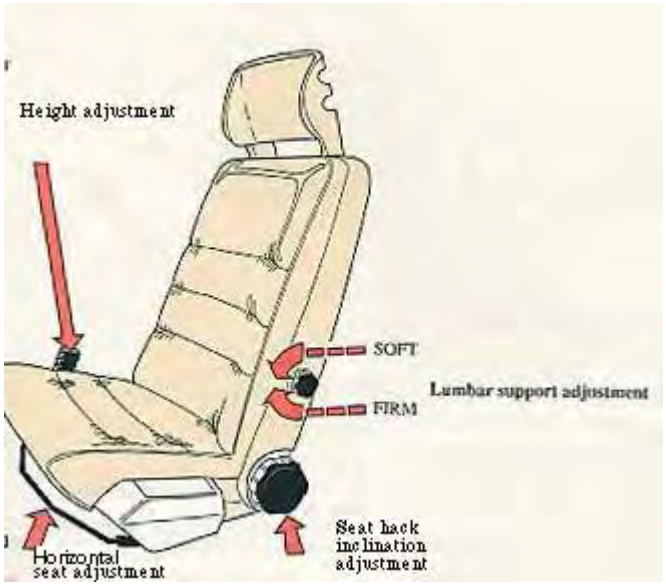
Removing the cover plate, then removing and swapping the switches.

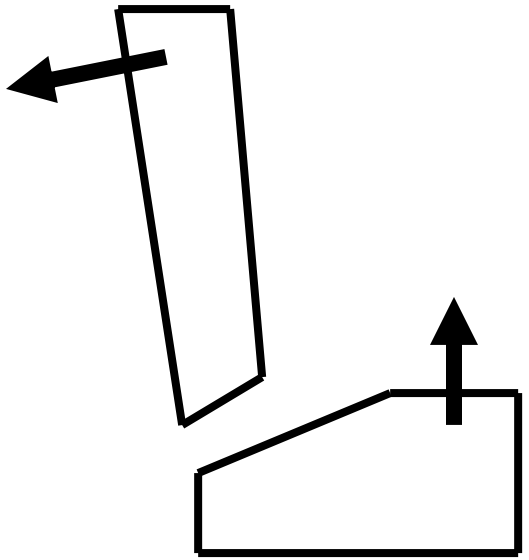
From http:/ /fivesketches.com/2009/11/natural-mapping-of-switches/

Mapping

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

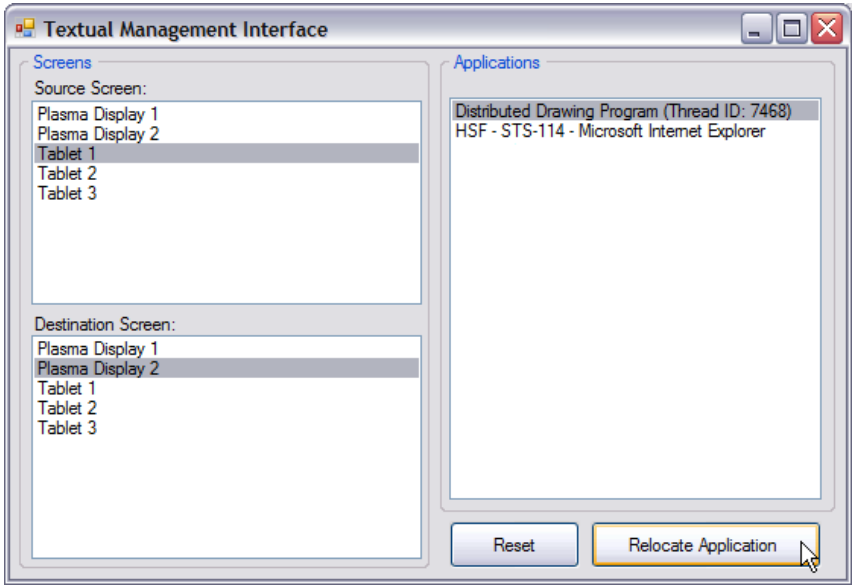
Mapping


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

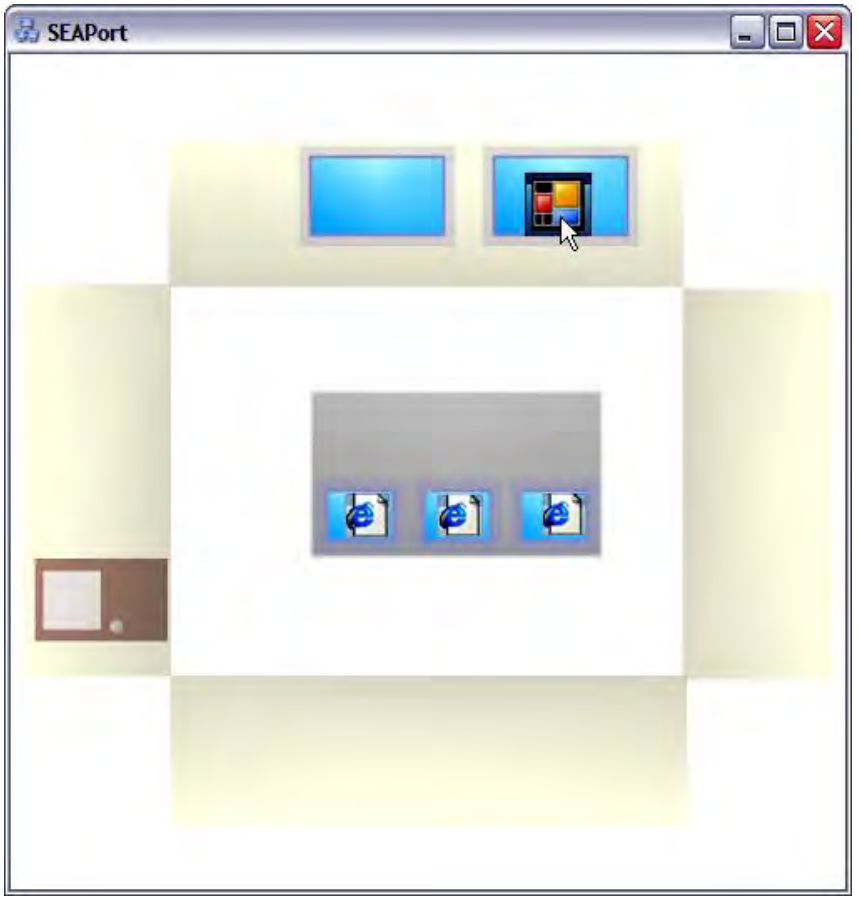


Mapping

ORCHID


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
Reset
Relocate Application

Mapping



Consistency

Interfaces should be meaningfully consistent

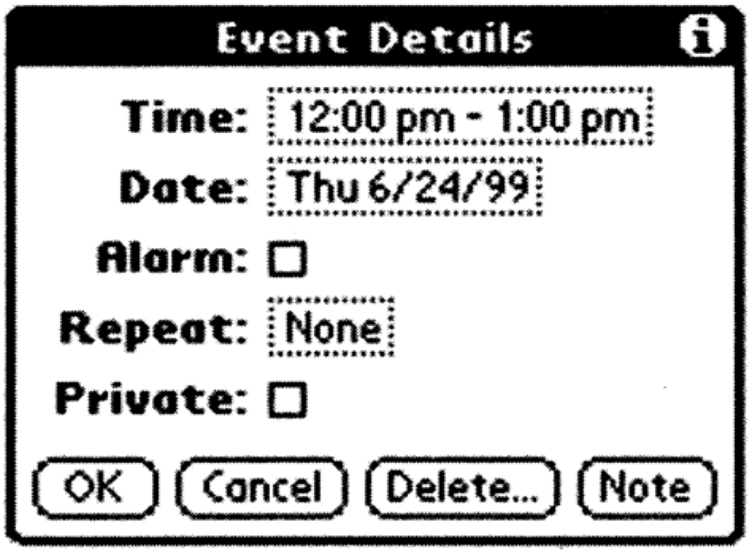
- Ubiquitous use of same keys for cut/copy/paste
- Helps in developing / applying a mental model

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

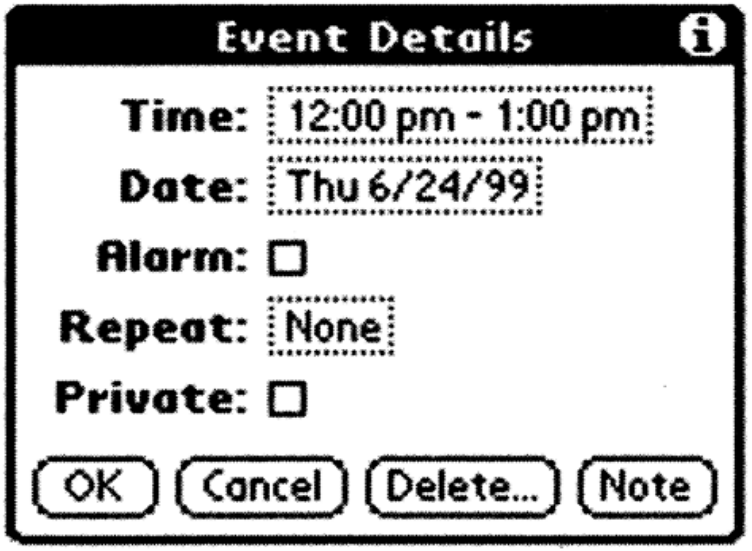
Is Consistent Always Better?

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



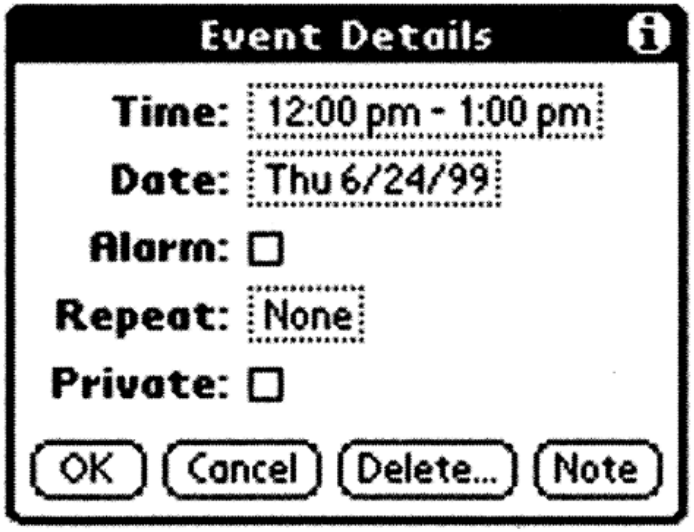
Is Consistent Always Better?

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



New is common, delete is not

Is Consistent Always Better?

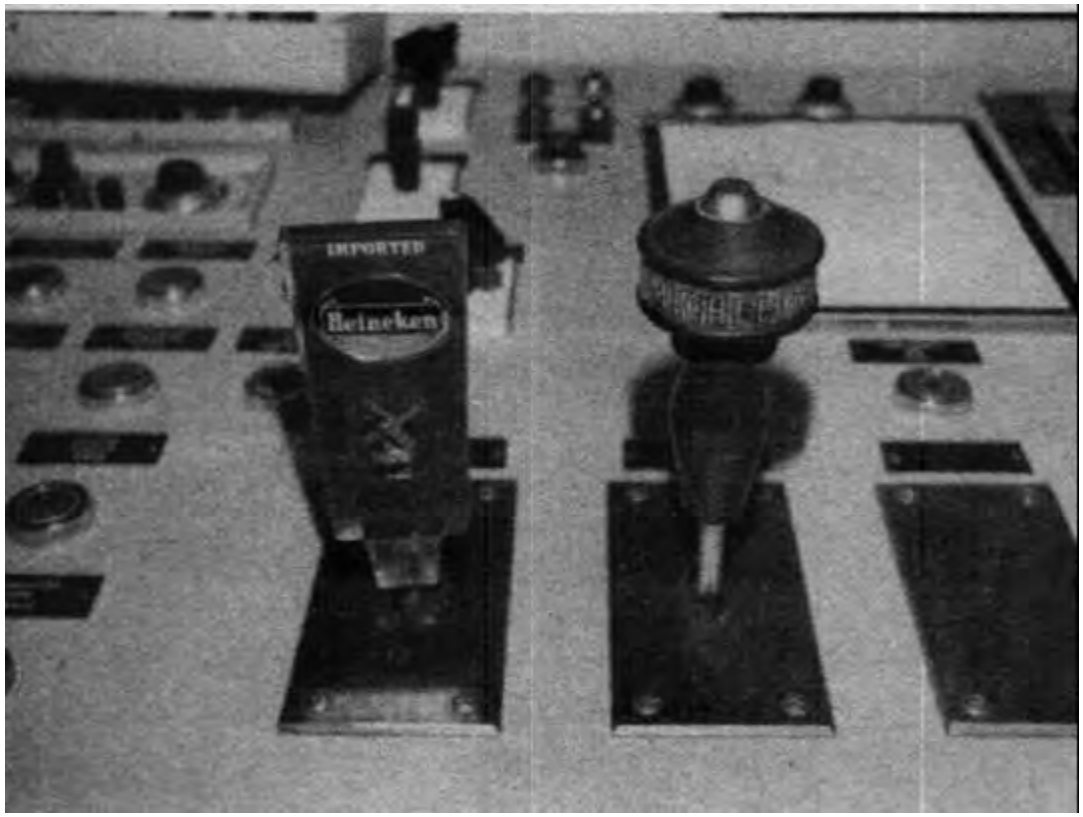


Original focus on consistency, later design for mobile form

Is Consistency Always Better?

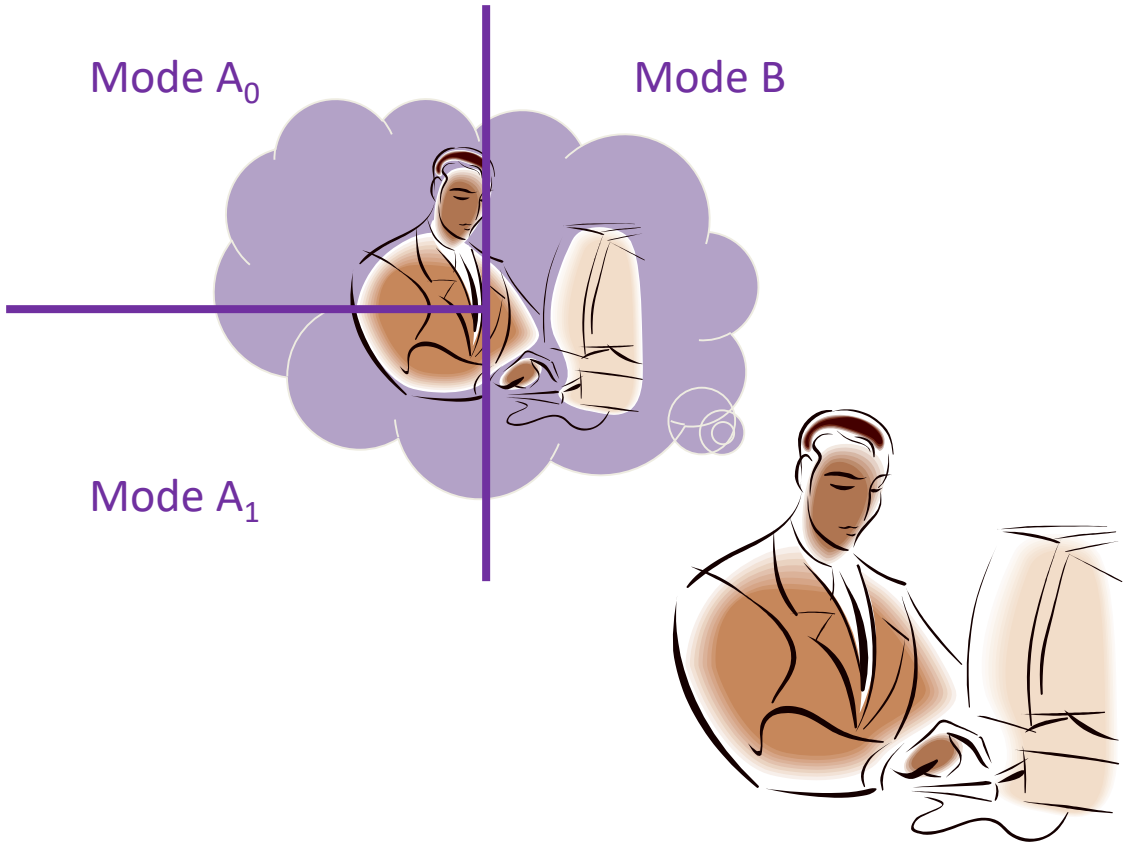
Is Consistency Always Better?

Is Consistency Always Better?



Modes

Modes force people to divide their model



Active versus Passive Modes

Active modes require constant action to maintain

- When that action has ended, 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

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 06:
Design of
Everyday Things

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

DESIGN
USE
BUILD

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 07:
Storyboarding and
Video Prototyping

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

Project Status

Looking Forward

- 2e: Task Review due Tonight
- 2f: Design Check-In (3x4) Due Monday 10/23
- 2g: Design Review (1x2) Due Thursday 10/26
- “Getting the Right Design” Report Due Monday 10/30
- “Getting the Right Design” Report Due Wednesday 11/1

Beware the Pitfall of “Splitting” Design Ideation

- It hurts, it hurts so much

Other Assignments

- Reading 2 Due this Saturday 10/21
- Reading 5 Can Be Done Anytime, Sooner is Better

Denny 303 on Tuesday 10/24

James Away on Tuesday 10/24

Design Research Review in Critique

In addition to current milestone, bring your design research review to next three critiques

- Helpful for “what in you research motivated this”
- Helpful for brainstorming other ideas with staff

Look back at design research in defining tasks

- For example, tensions you saw in research might suggest different design approaches

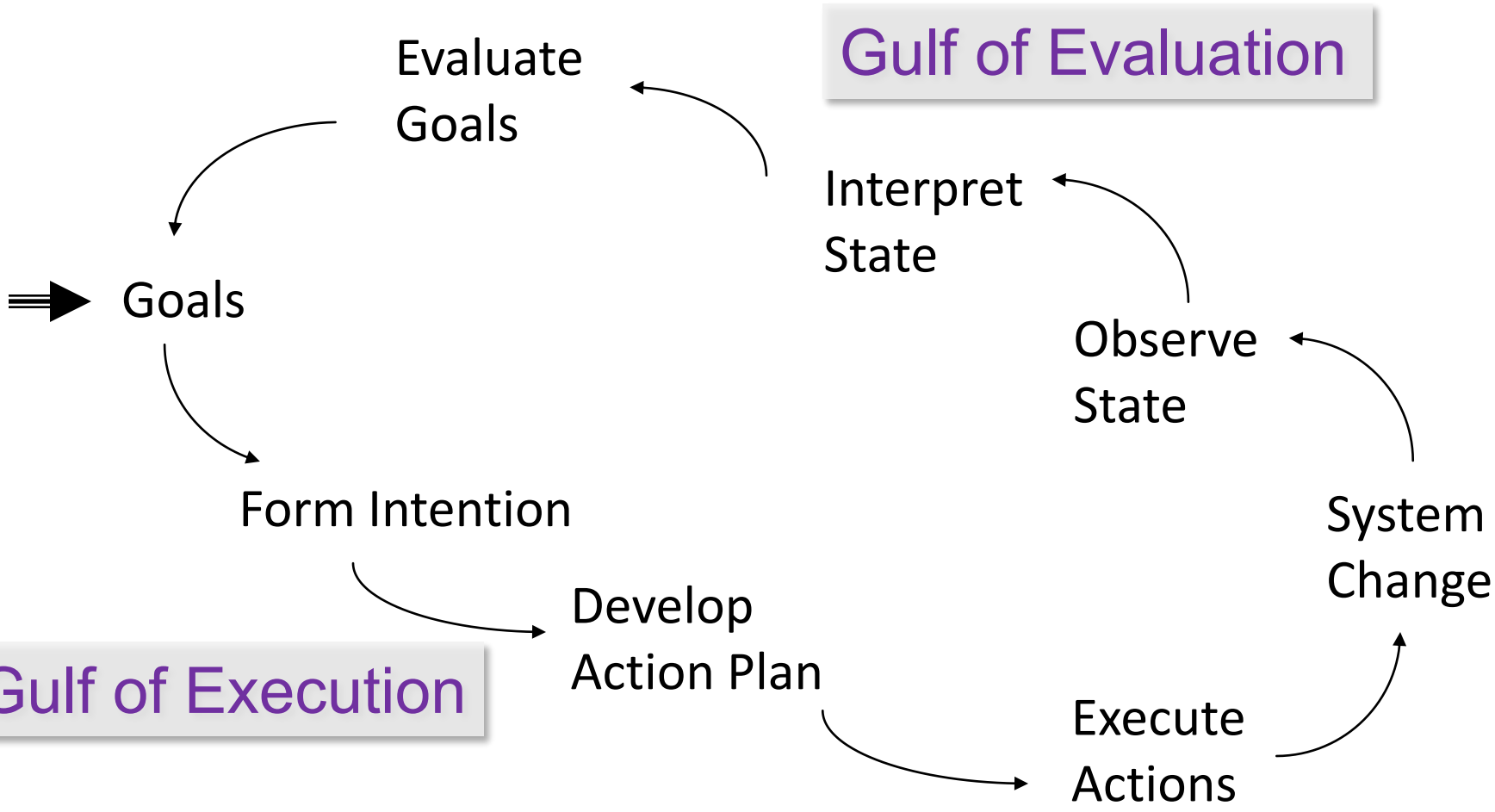
- A common task might be found in those approaches, with designs exploring different tradeoffs relative to that tension

Today

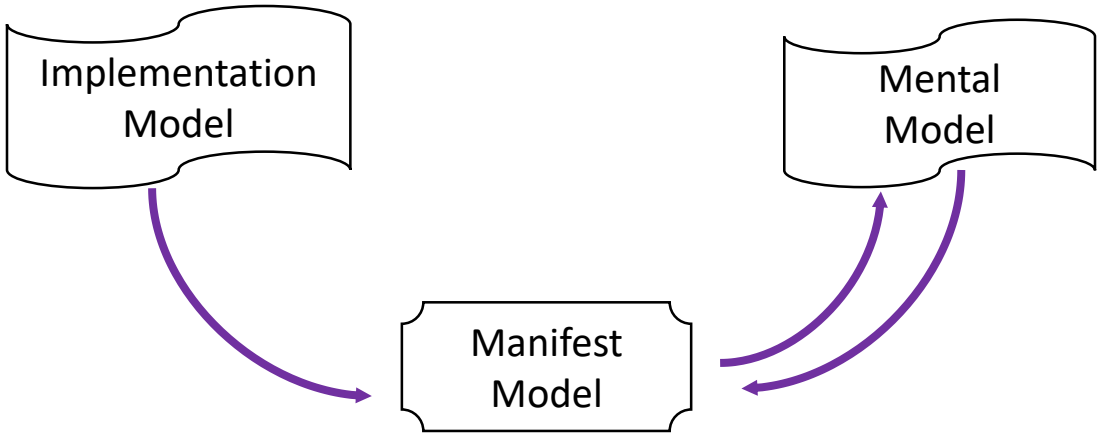
Finishing Design of Everything Things

Storyboarding and Video Prototyping

Norman's Execution-Evaluation Cycle



Manifest and Mental Models



Designer projects their model into an artifact

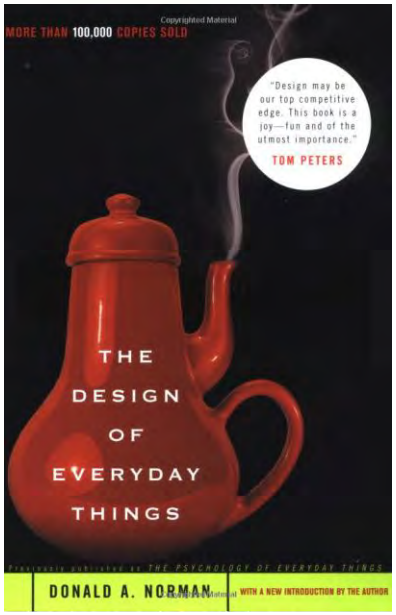
- Person forms their model based on interaction

People struggle until model matches manifest model

- Update mental model in response to breakdowns
- Matching the implementation model is not necessary

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:

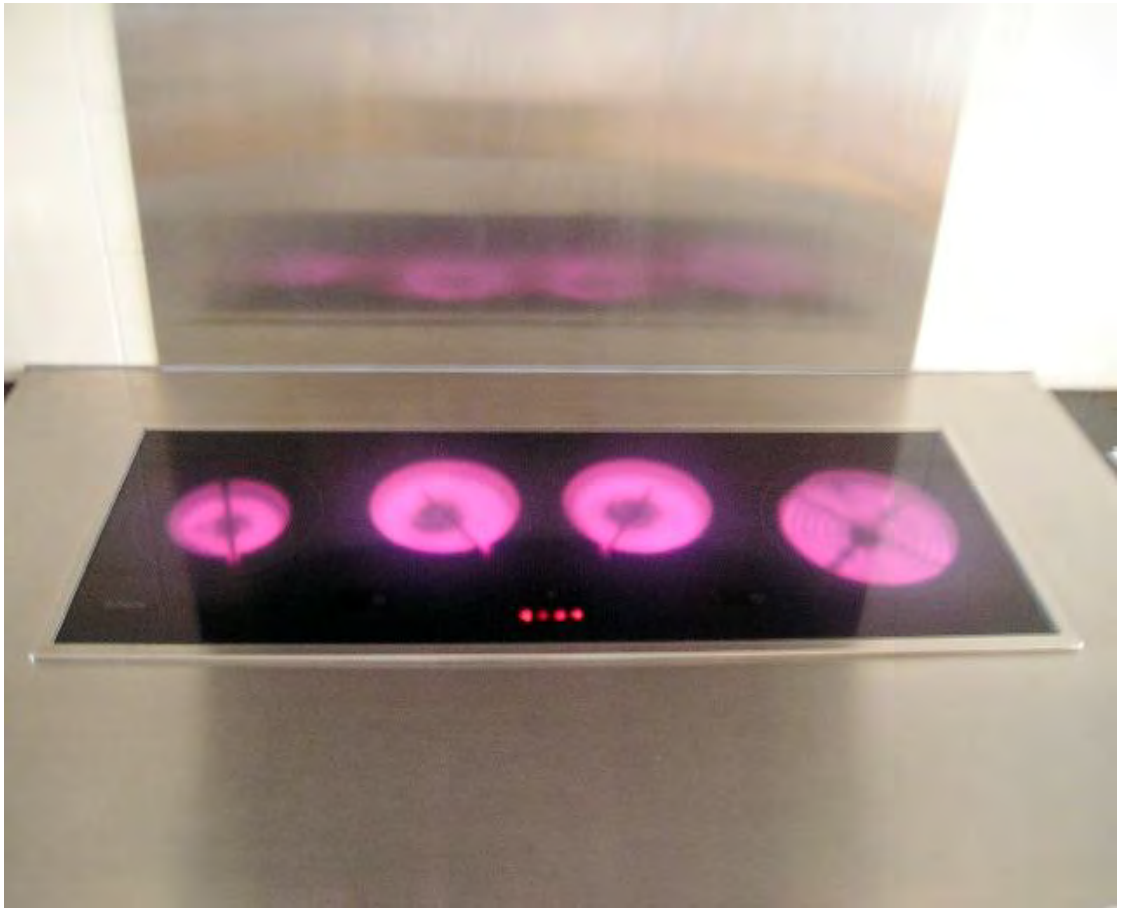
- Affordances
- Visibility
- Constraints
- Consistency
- Metaphors
- Knowledge in the World
- Mapping
- Modes

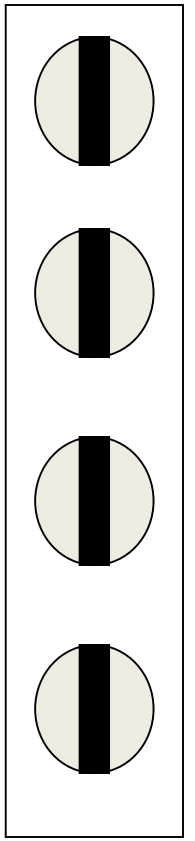
Mapping

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

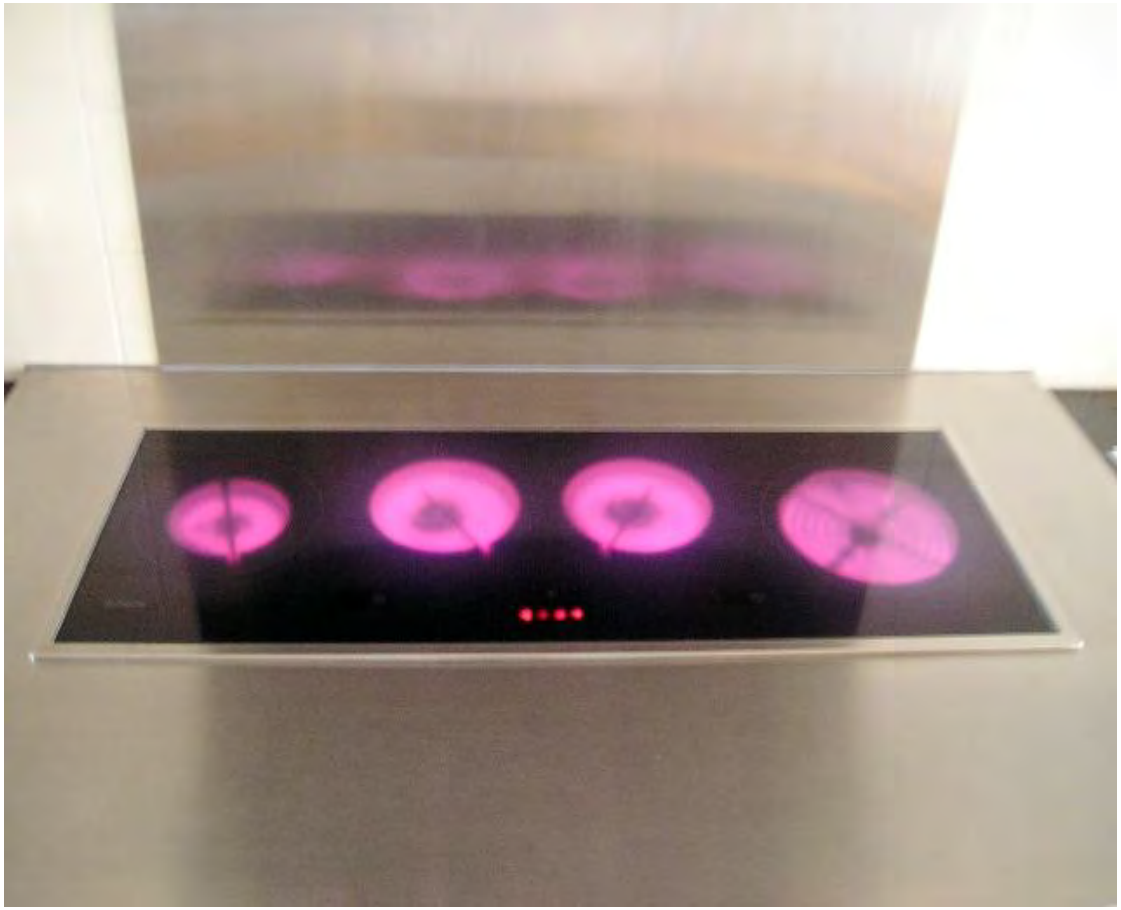
Minimize cognitive steps to transform action into effect, or perception into comprehension (i.e., execution and evaluation)

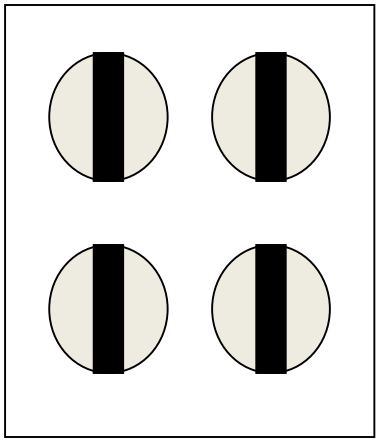
Very Bad Mapping





Slightly Better Mapping

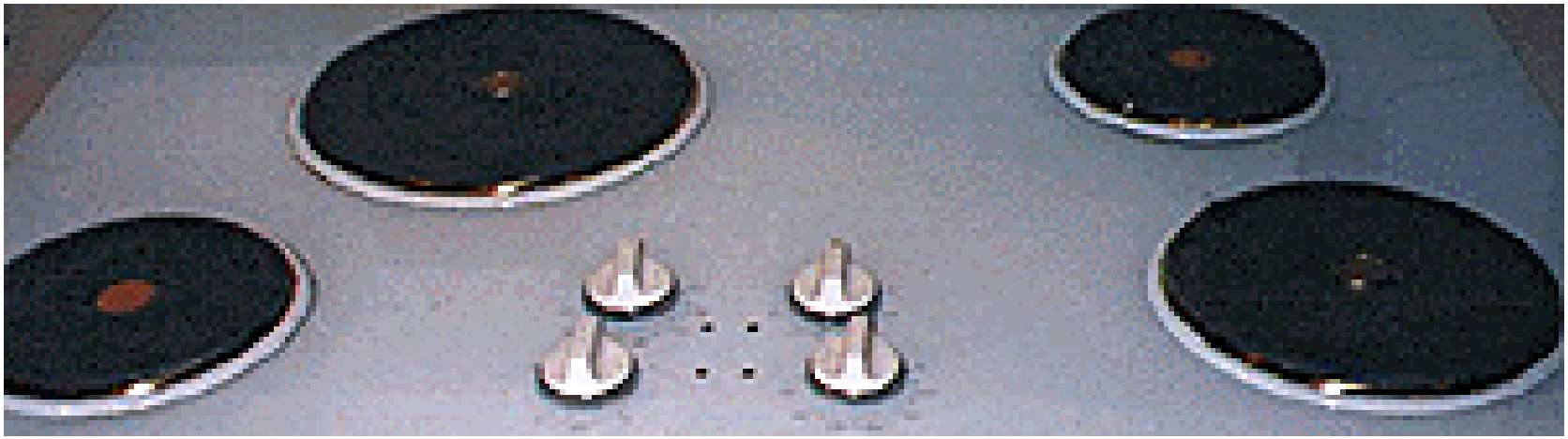




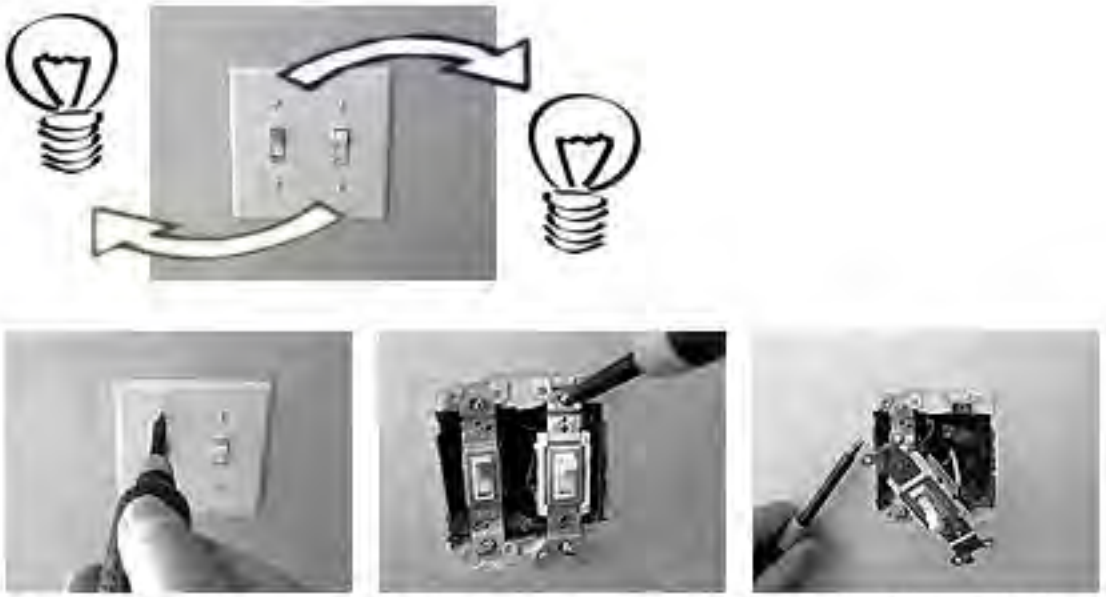
Good Mapping

Not this Stove

Great Mapping



Mapping



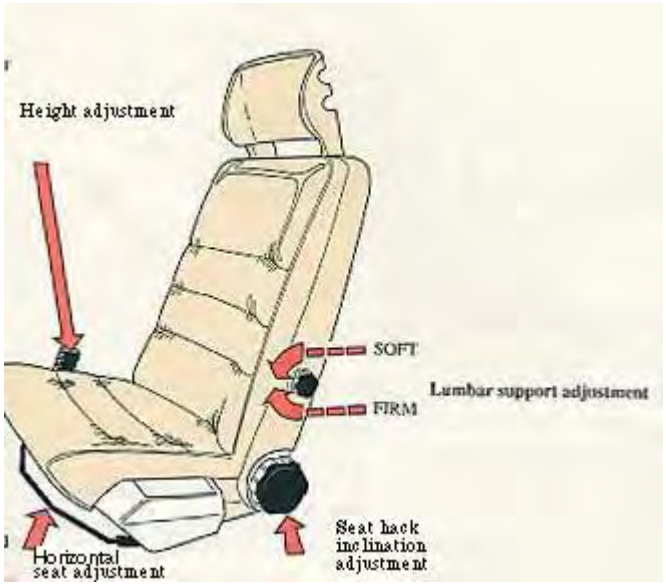
Removing the cover plate, then removing and swapping the switches.

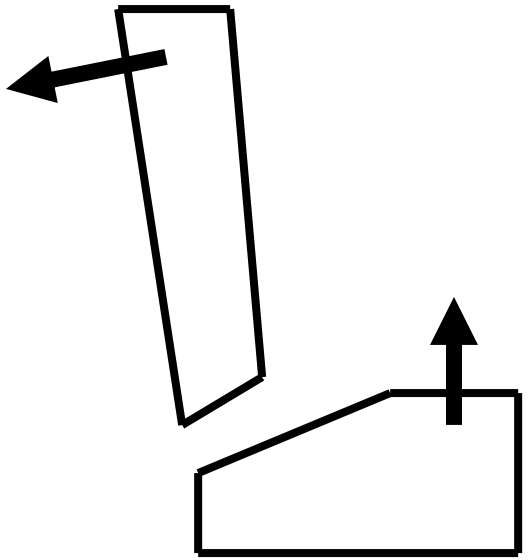
From http:/ /fivesketches.com/2009/11/natural-mapping-of-switches/

Mapping

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

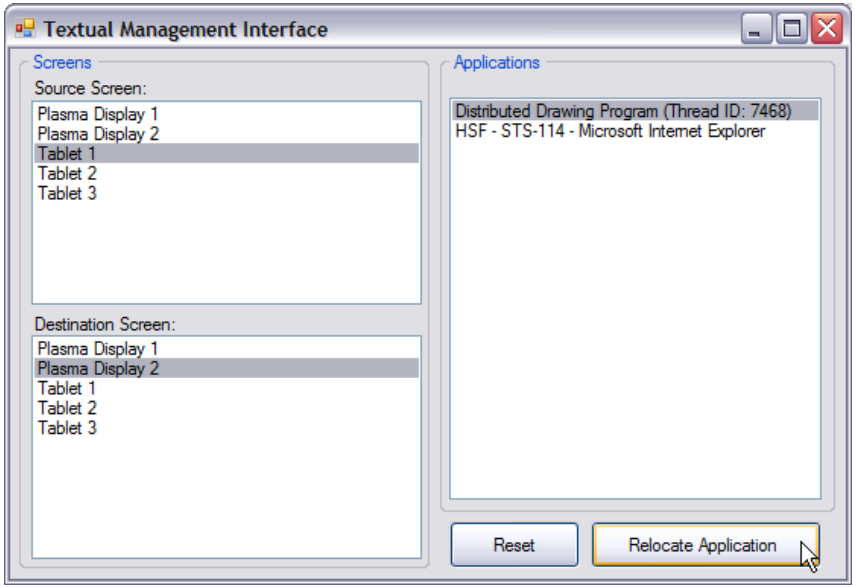
Mapping


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

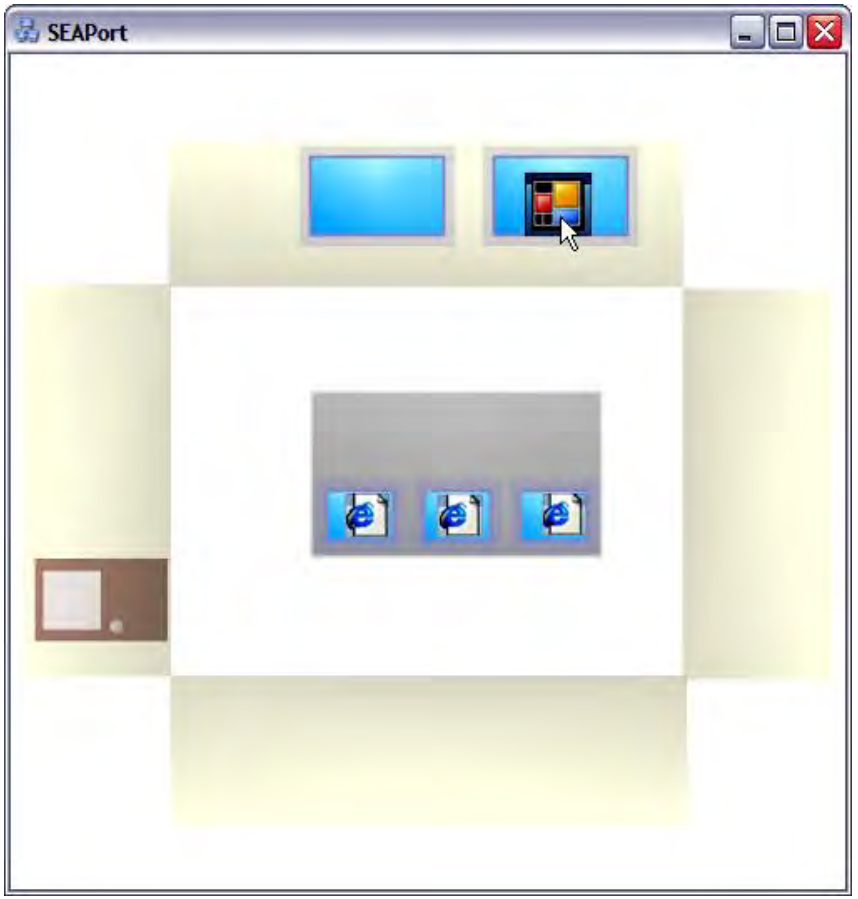


Mapping

ORCHID


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
Reset
Relocate Application

Mapping



Consistency

Interfaces should be meaningfully consistent

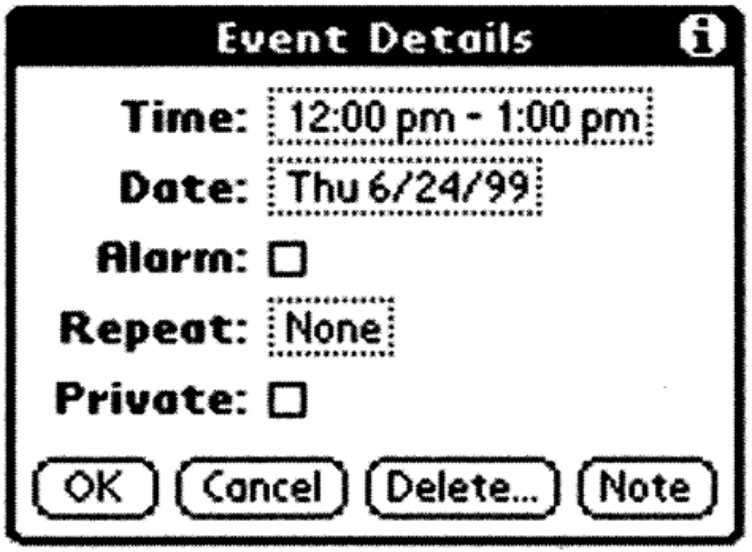
- Ubiquitous use of same keys for cut/copy/paste
- Helps in developing / applying a mental model

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

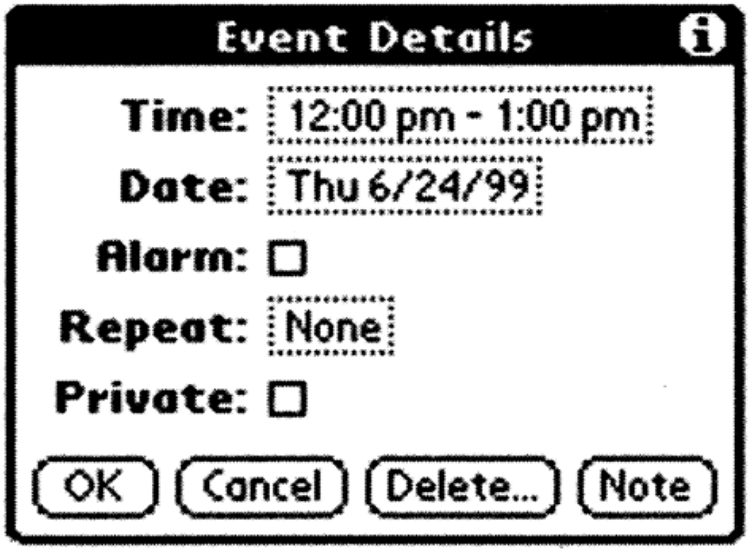
Is Consistent Always Better?

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



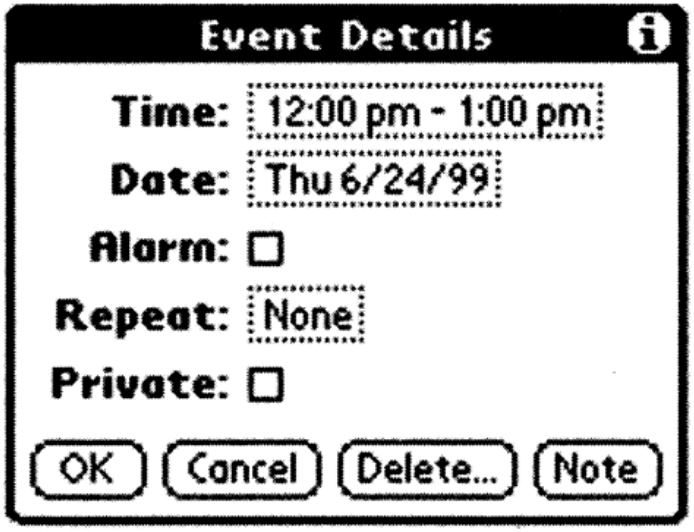
Is Consistent Always Better?

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



New is common, delete is not

Is Consistent Always Better?

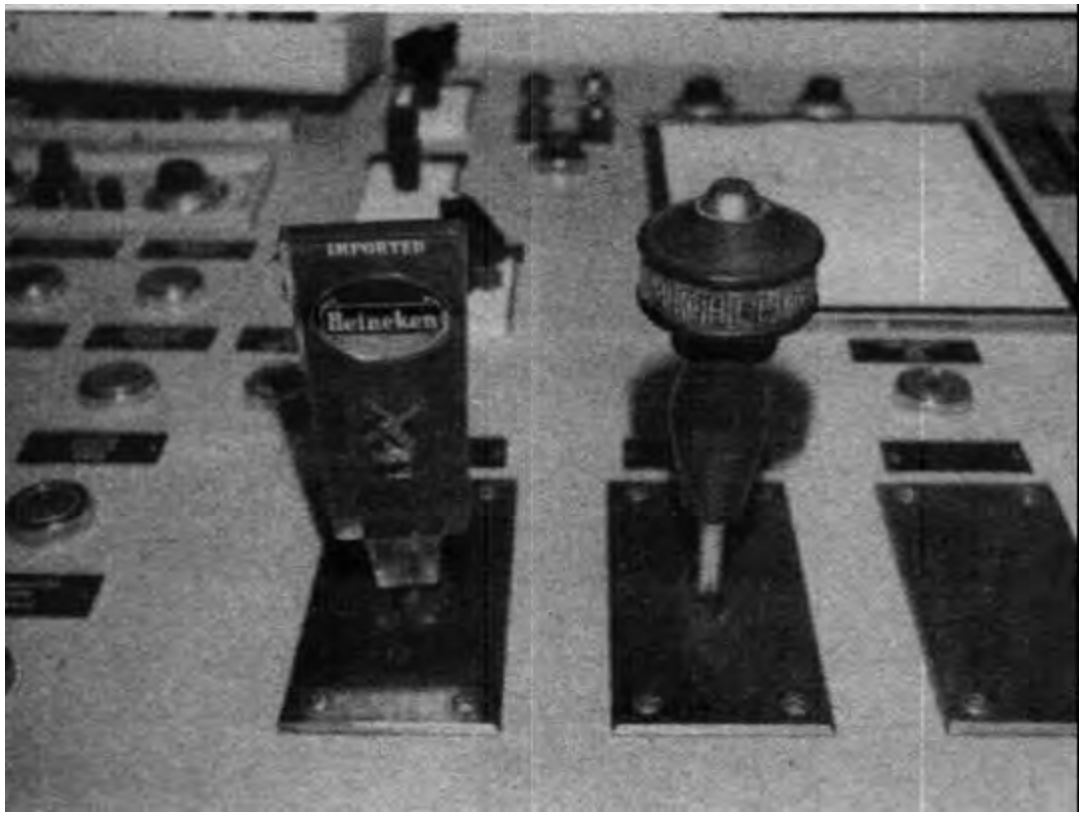


Original focus on consistency, later design for mobile form

Is Consistency Always Better?

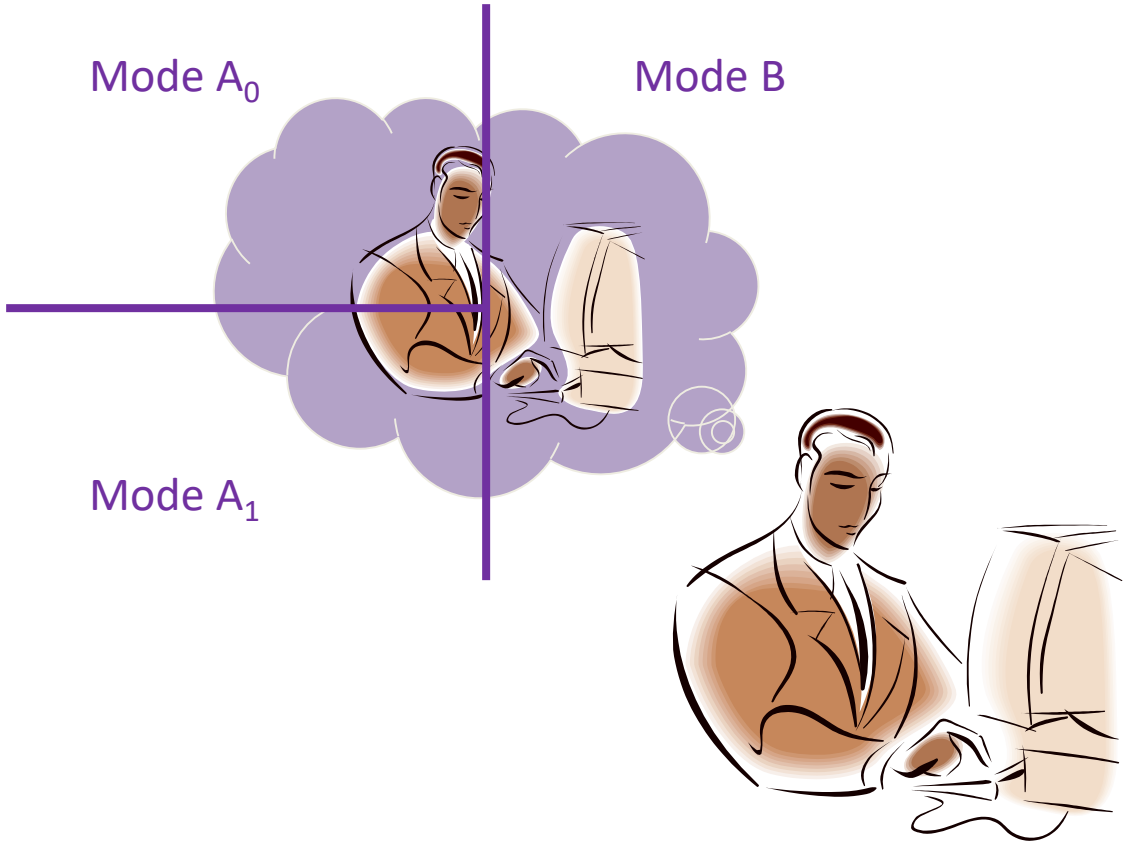
Is Consistency Always Better?

Is Consistency Always Better?



Modes

Modes force people to divide their model



Active versus Passive Modes

Active modes require constant action to maintain

- When that action has ended, 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

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

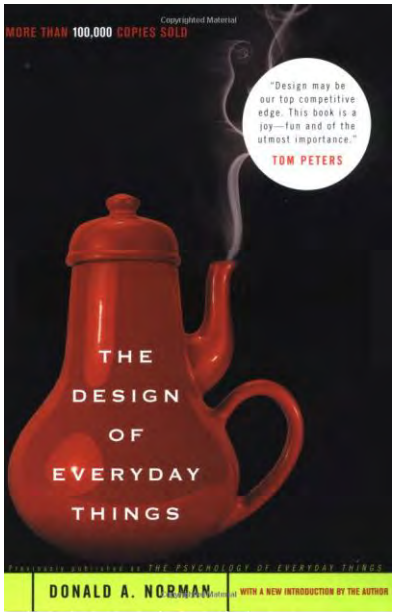
Exploit the power of constraints

Design for error

When all else fails, standardize

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
- Visibility
- Constraints
- Consistency
- Metaphors
- Knowledge in the World
- Mapping
- Modes

Today

Finishing Design of Everything Things

Storyboarding and Video Prototyping

Objectives

Be able to:

Describe purposes of storyboards,
as differentiated from sketches and prototypes

Describe varying purposes of video prototypes
(e.g., and why this name is a poor fit)

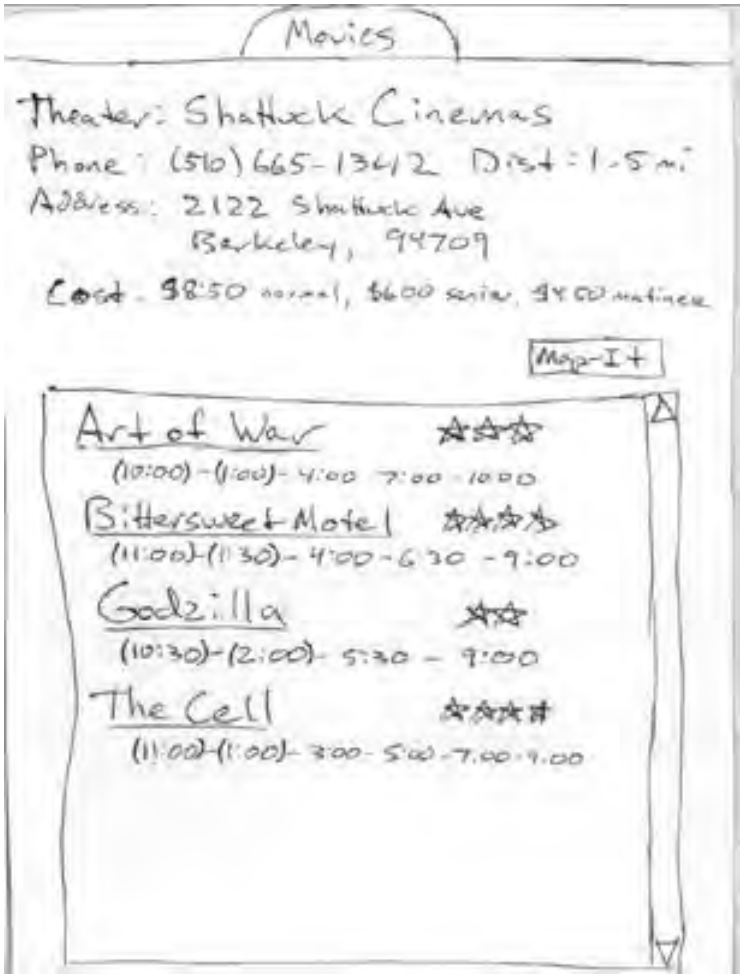
Tasks in Sketching and Design

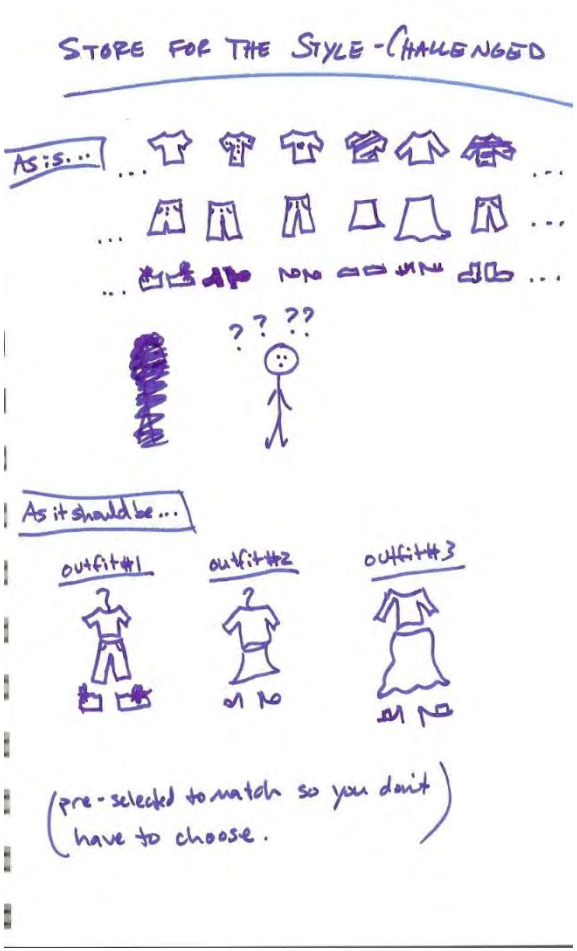
Tasks guide your exploration of a design

Creating scenarios for each task illustrates

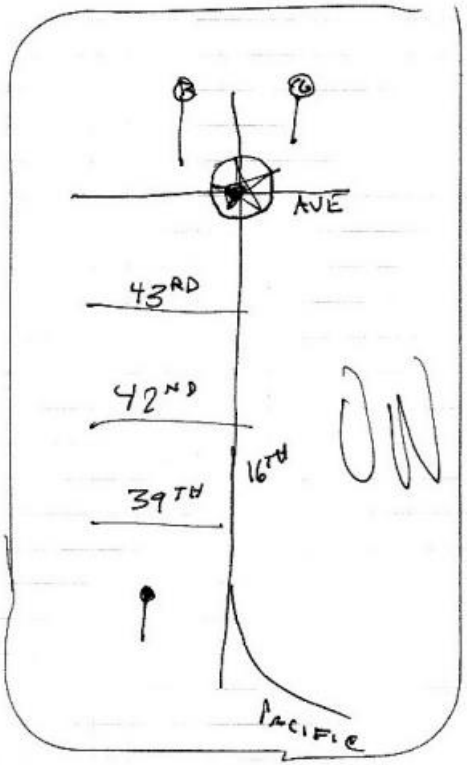
- what a person does
- what they see
- step-by-step performance of task with a design

Sketching

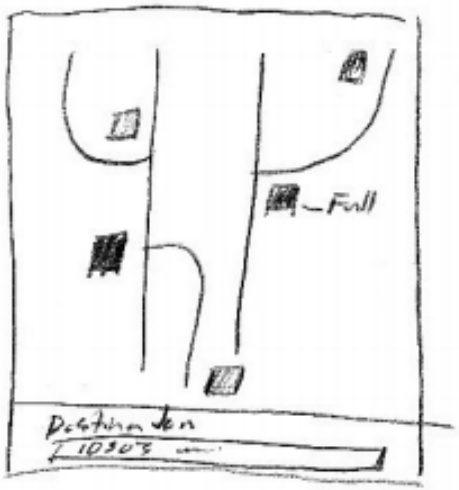

Movies
Theater: Shattuck Cinemas
Phone: (510) 665-1342 Dist: 1.5 mi
Address: 2122 Shattuck Ave
Berkeley, 94709
Cost - $8.50 normal, $6.00 senior, $4.00 matinee
Map-It
Art of War
(10:00)-(1:00)-4:00-7:00-10:00
Bittersweet Motel
(11:00)-(1:30)-4:00-6:30-9:00
Godzilla
(10:30)-(2:00)-5:30-9:00
The Cell
(11:00)-(1:00)-3:00-5:00-7:00-9:00


STORE FOR THE STYLE-CHALLENGED
As is...
As it should be...
outfit#1
outfit#2
outfit#3
(pre-selected to match so you don't have to choose.)

Sketching

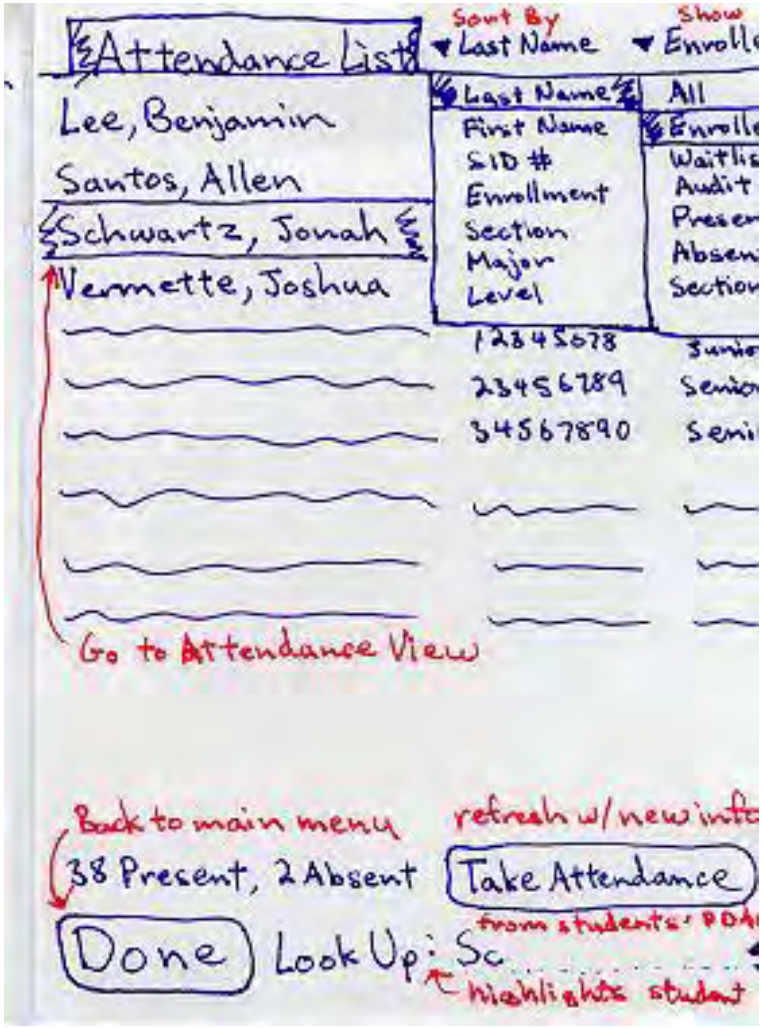


MAP SHOWING PARKING AVAILIBILITY BASED ON INPUTTED DATA, INPUTTED ON MAP

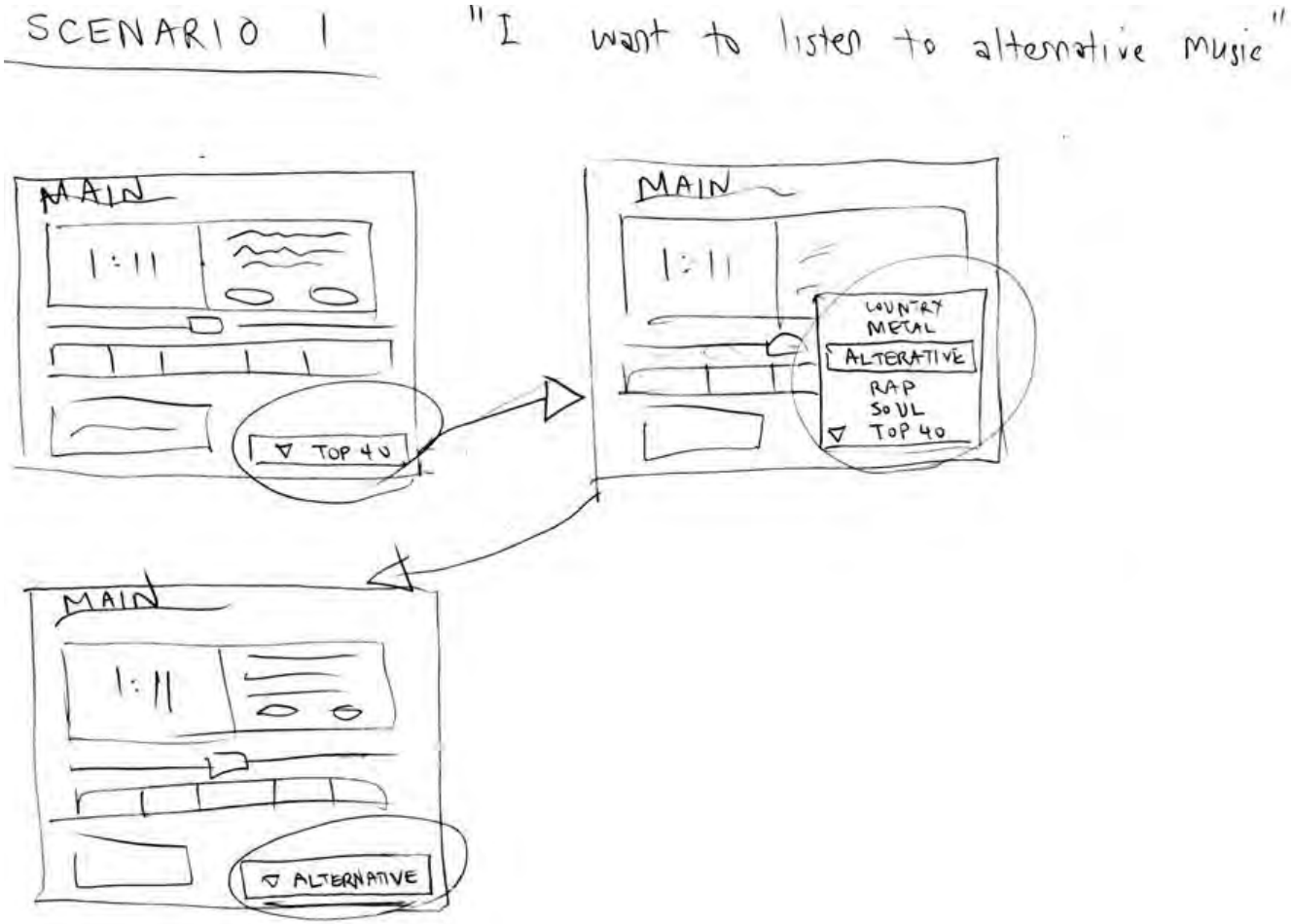


- different colors
- high lights availability
-

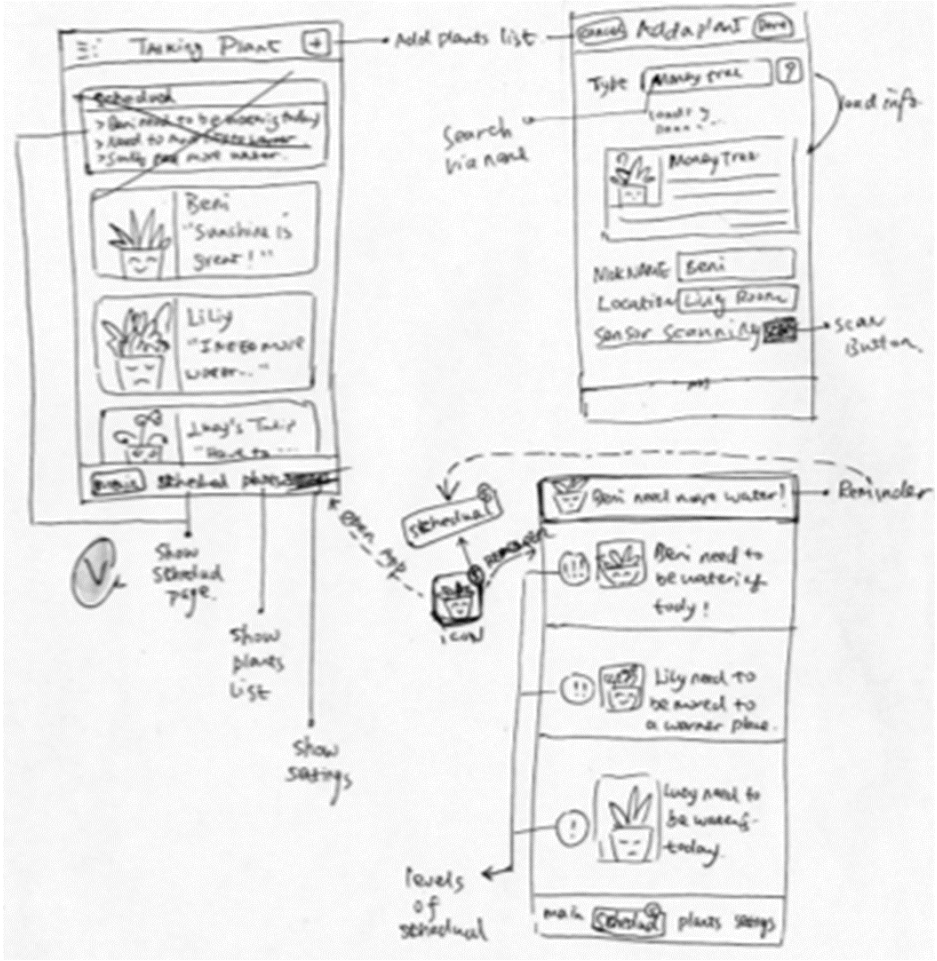
Sketching and Tasks



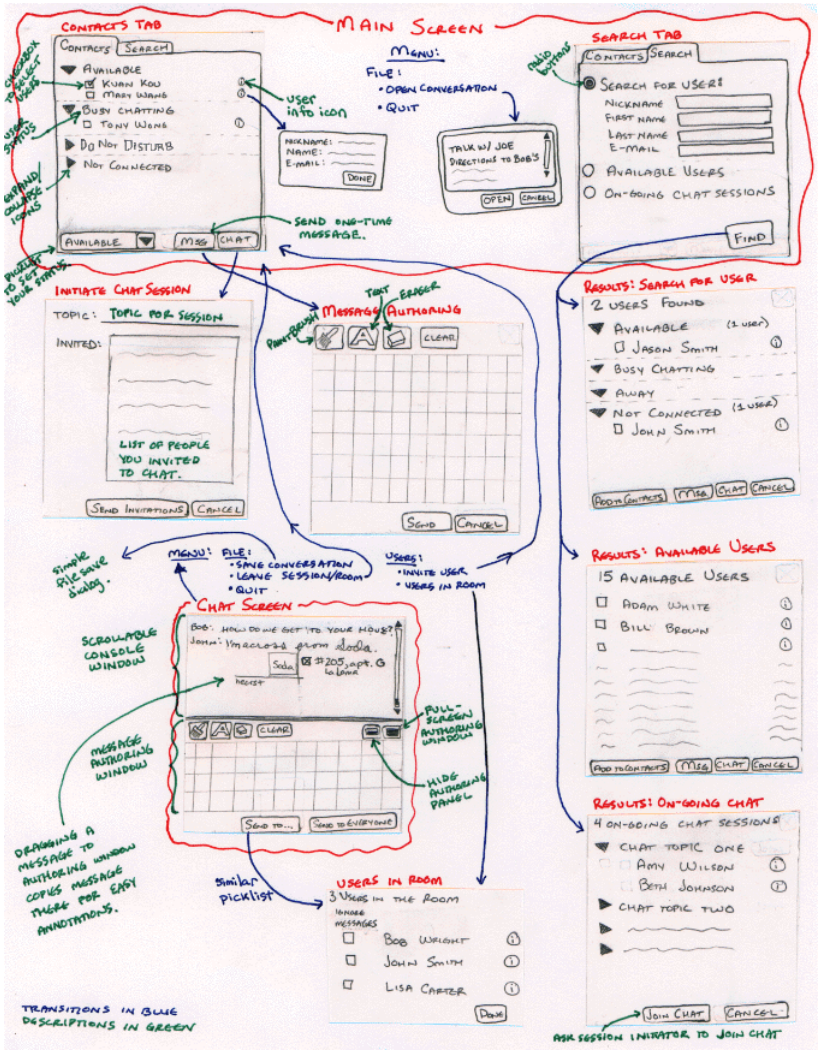
Sketching and Tasks



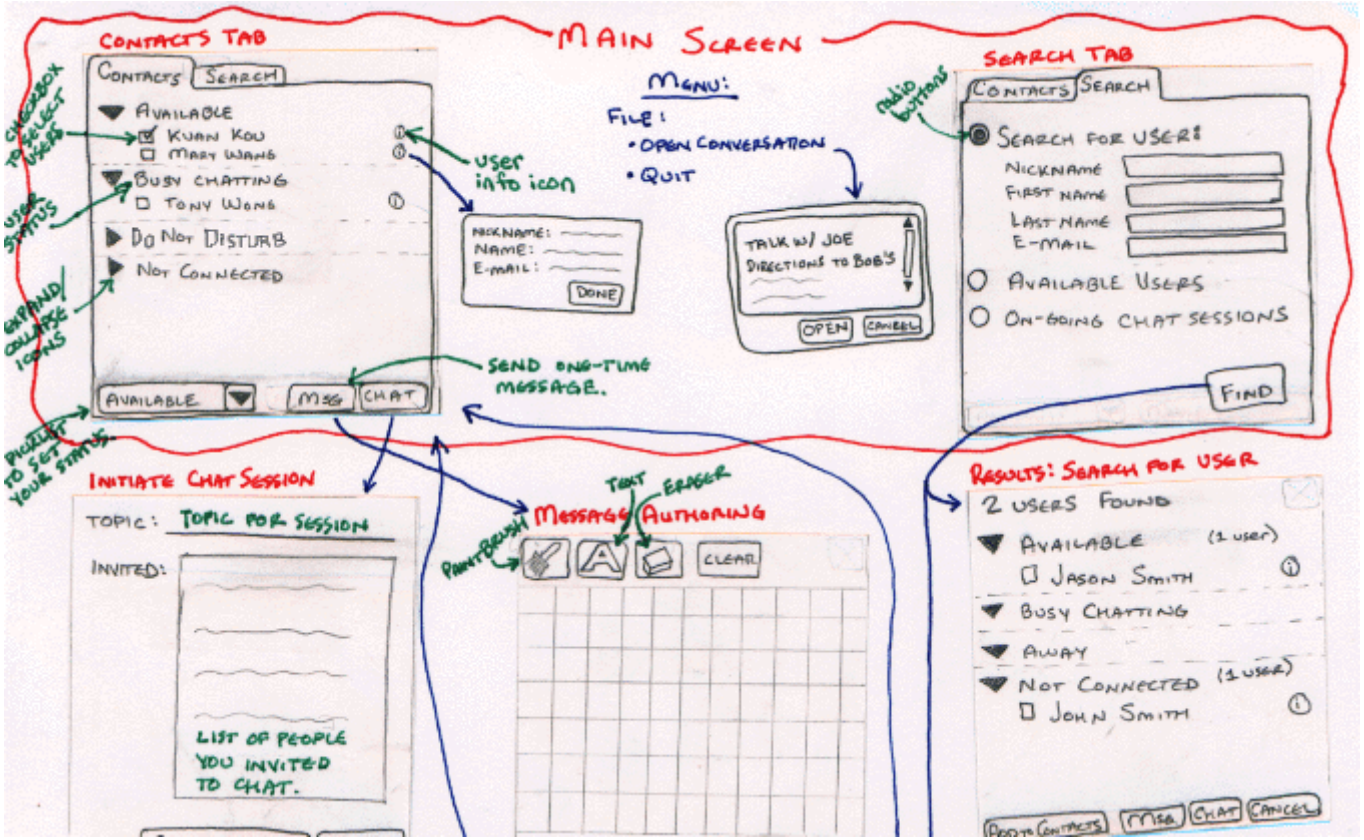
Sketching and Tasks



Sketching and Tasks



Sketching and Tasks

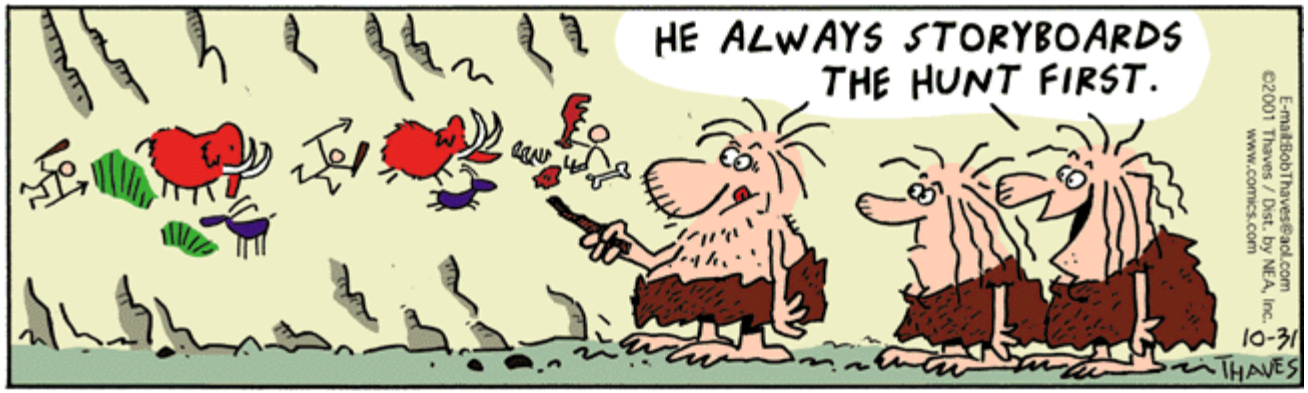


Illustrating Time

Storyboards come from film and animation

Give a “script” of important events

- leave out the details
- concentrate on the important interactions



Storyboards

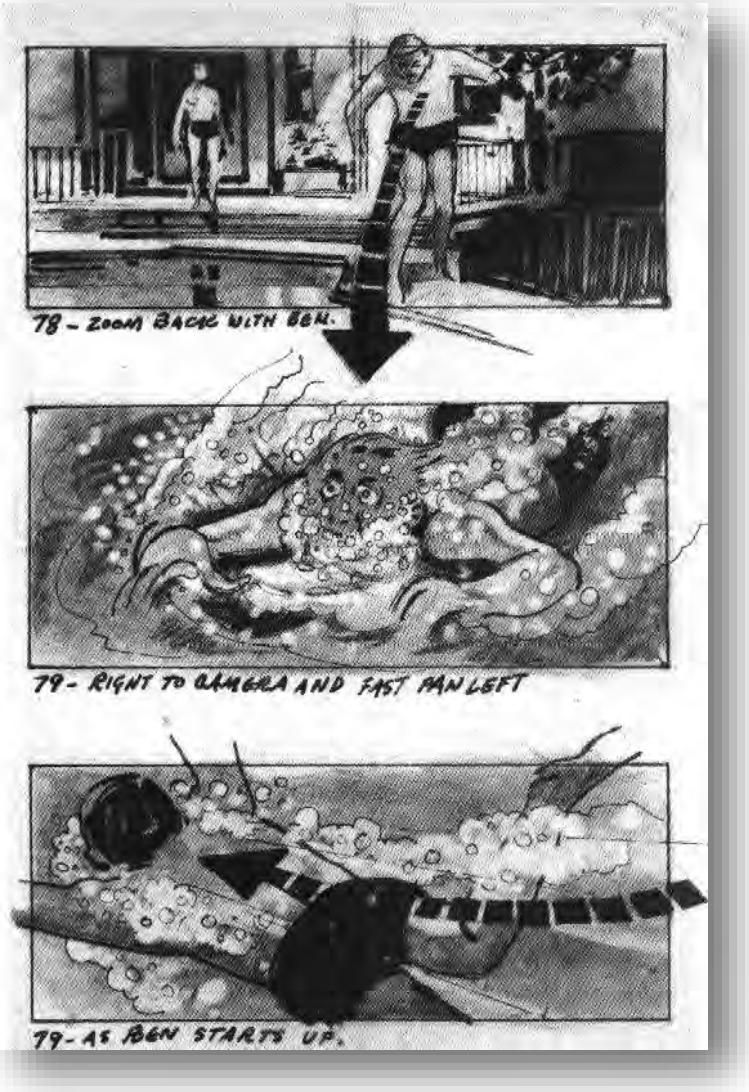
Can be used to explore

Much faster and less expensive to produce

Can therefore explore more potential approaches

Notes help fill in missing pieces of the proposal

Relative to film, these function as sketches



Storyboards

Can be used to convey

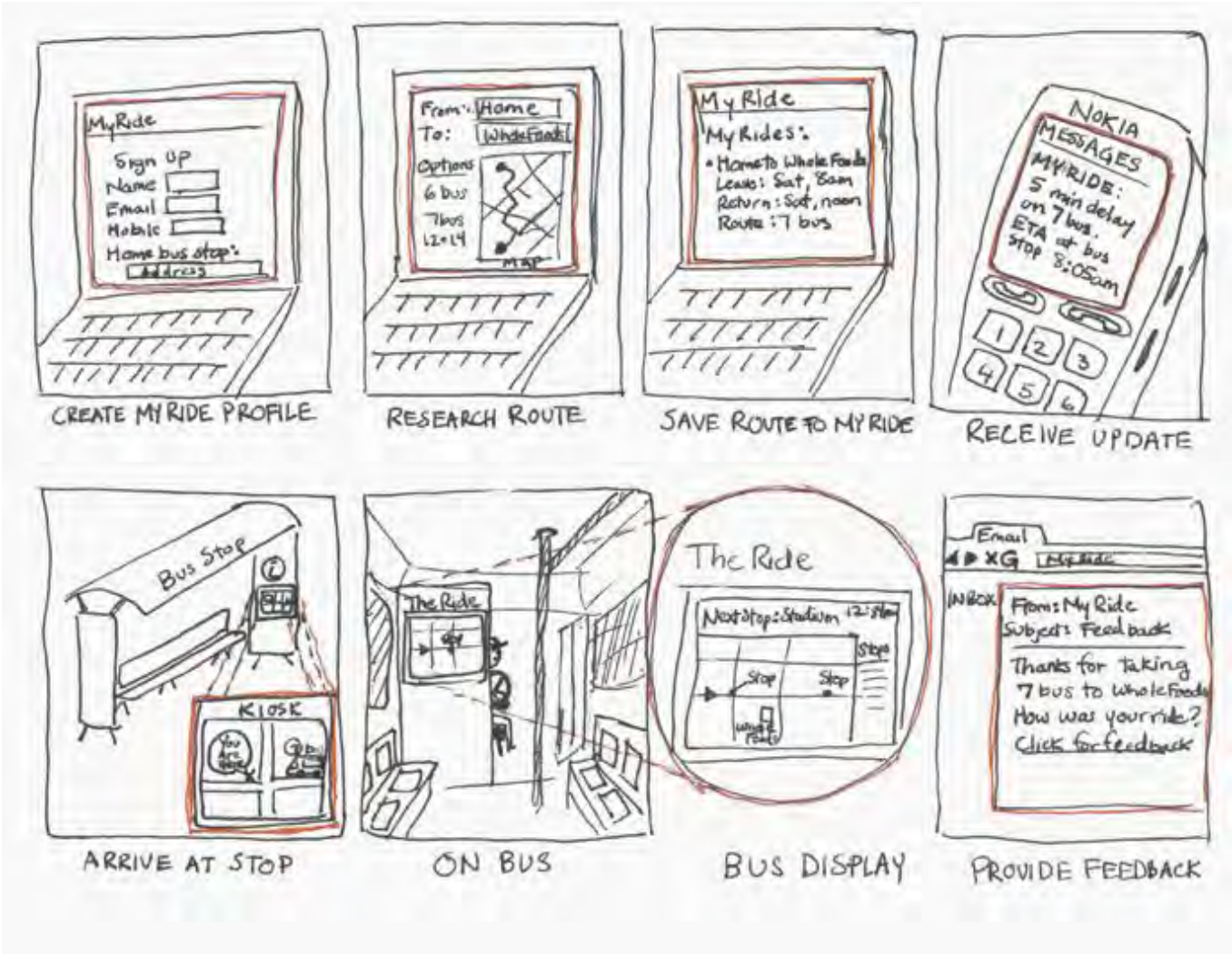
Effective storyboards can quickly convey information that would be difficult to understand in text

Imagine explaining this in text, for various audiences

Storyboards

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

Basic Storyboard



Storytelling

Stories have an audience

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

Stories need to match audience and purpose

Quesenberg and Brooks

Potential Purpose of a Story

Purpose allows choosing effective details

Stories have a purpose

- Share information about people, tasks, goals
- Giving insight into people who are not like us, convey details that might be lost in generalities
- Put a human face on analytic data
- Spark design concepts and encourage innovation
- Share ideas and persuade on potential value

Quesenberg and Brooks

Stories Provide Context

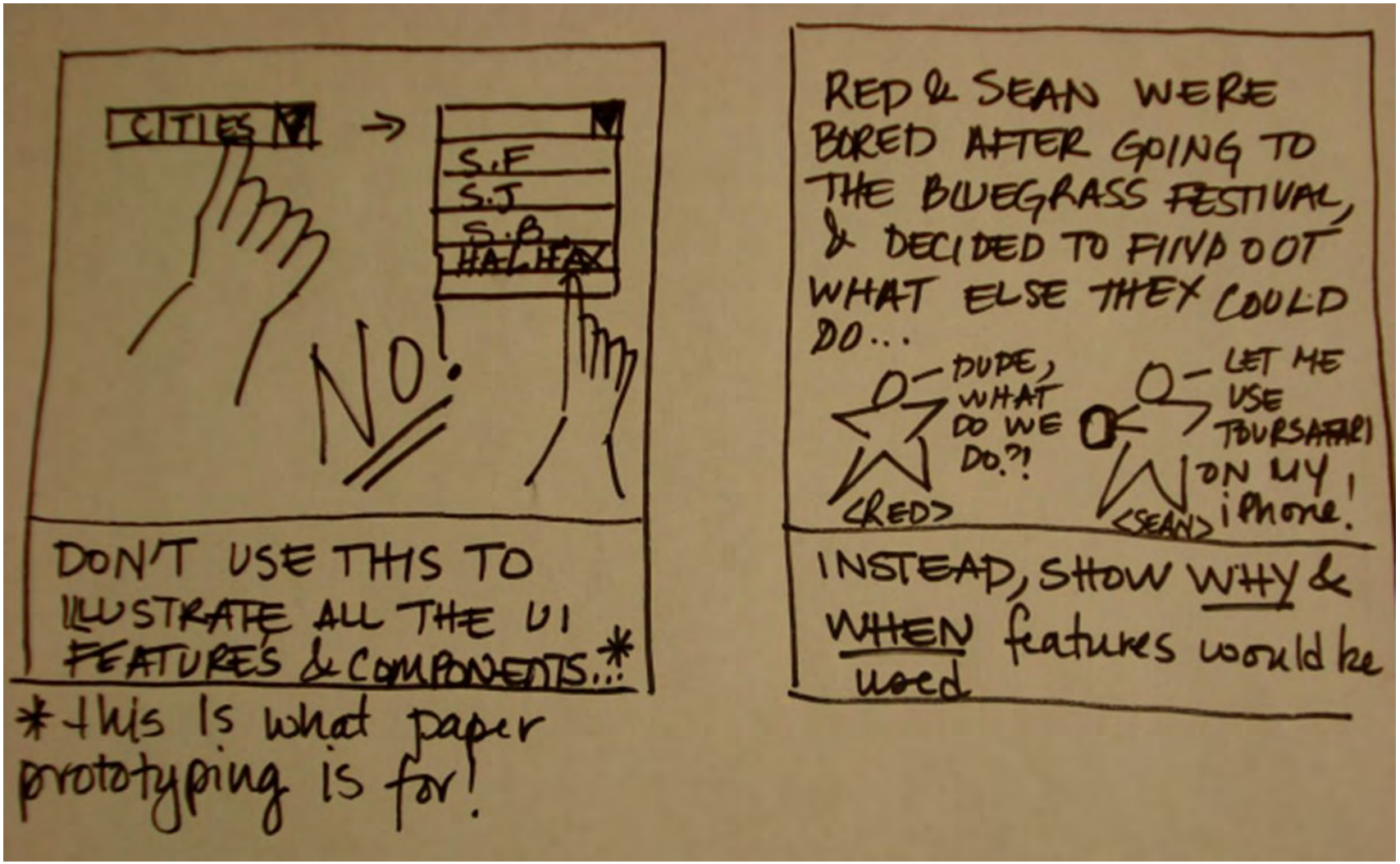
- Characters
  - Who is involved
- Setting
  - Environment
- Sequence
  - What task is illustrated
  - What leads a person to use a design
  - What steps are involved
- Satisfaction
  - What is the motivation
  - What is the end result
  - What need is satisified

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

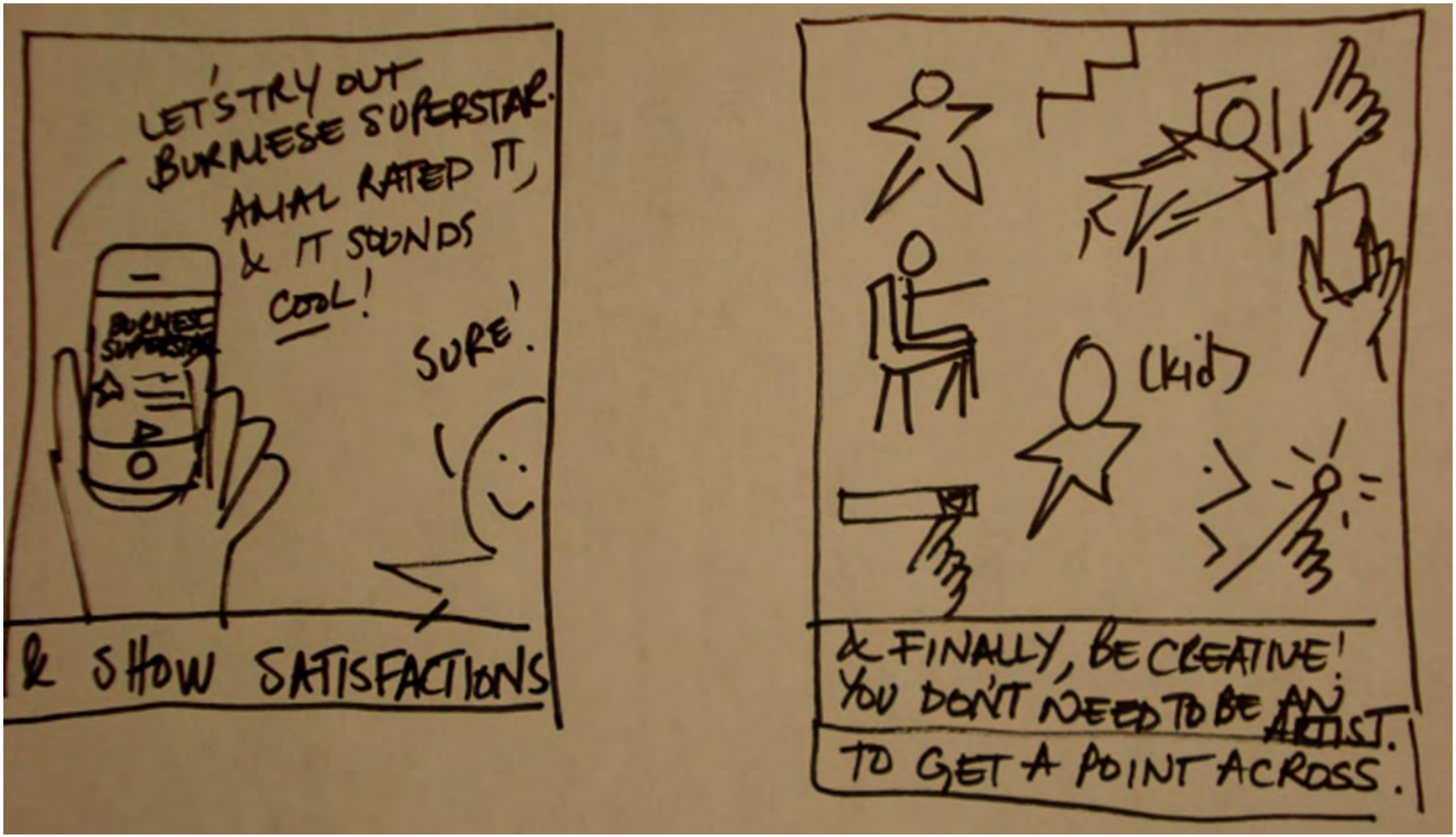
Can help surface details that might otherwise be ignored

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

Amal's Guide to Storyboarding



Amal's Guide to Storyboarding



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

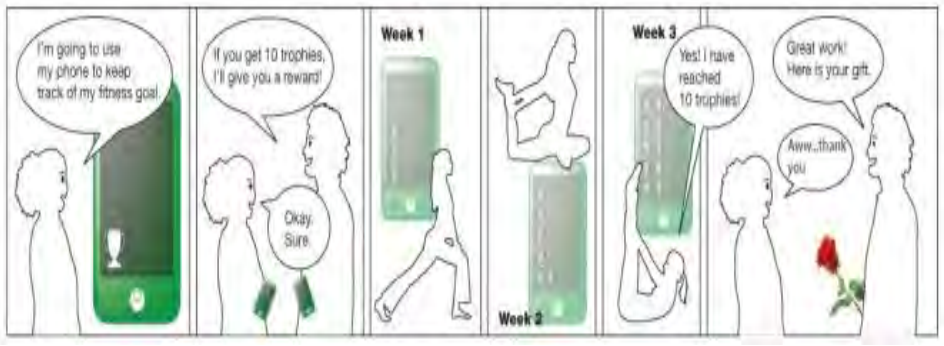
tl;dr

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

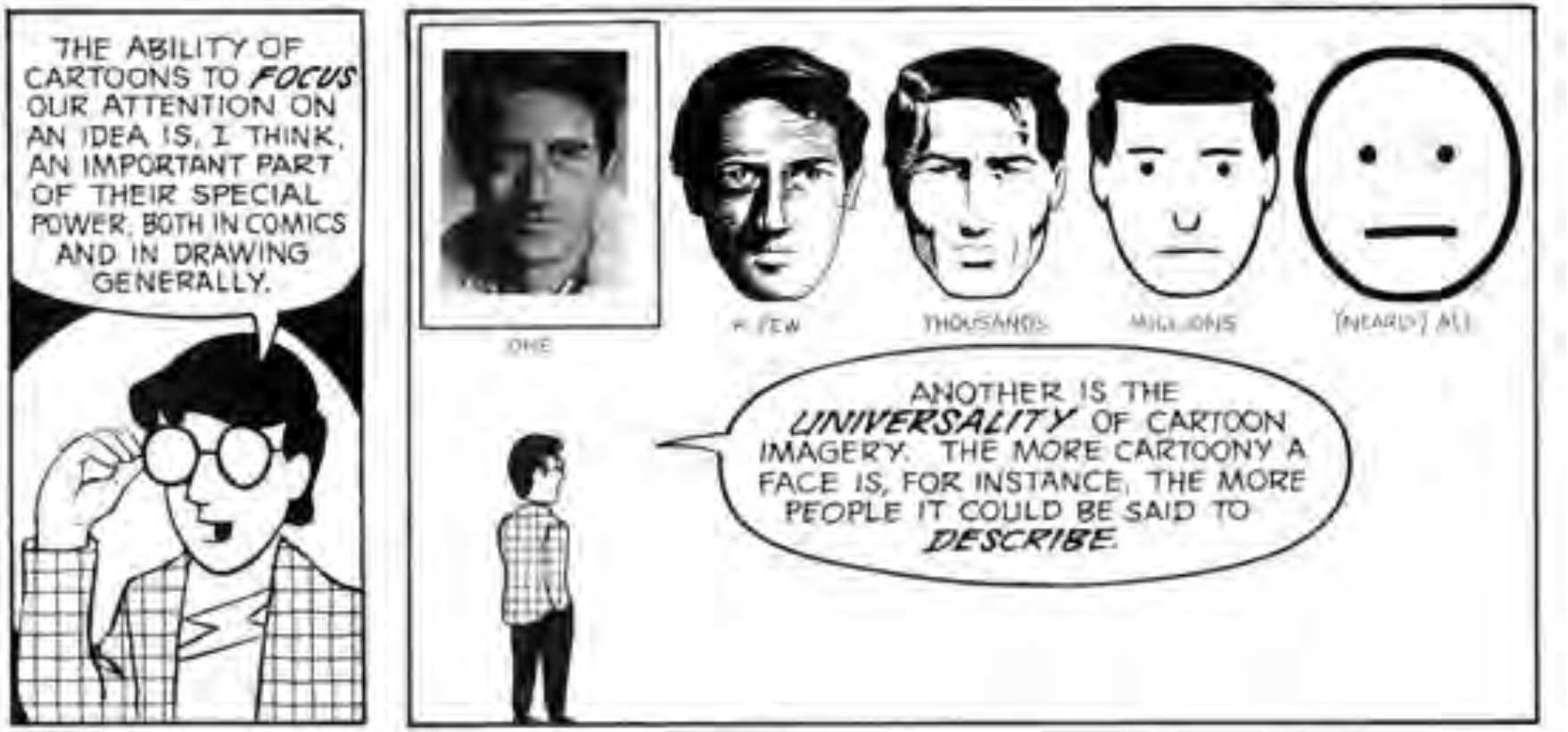


To better characterize design intuitions:
gather and analyze artifacts
semi-structured interviews
survey focused on identified elements

Truong et al, 2006

1. How Much Detail?

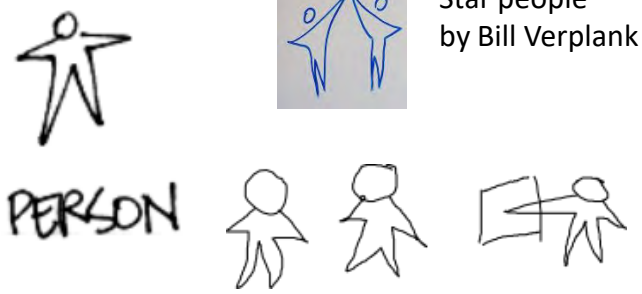
Guideline: too much detail can lose universality



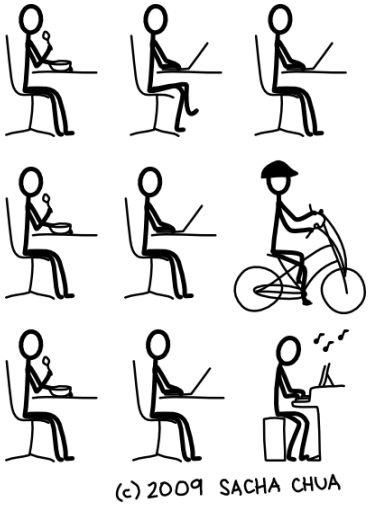
Scott McCloud

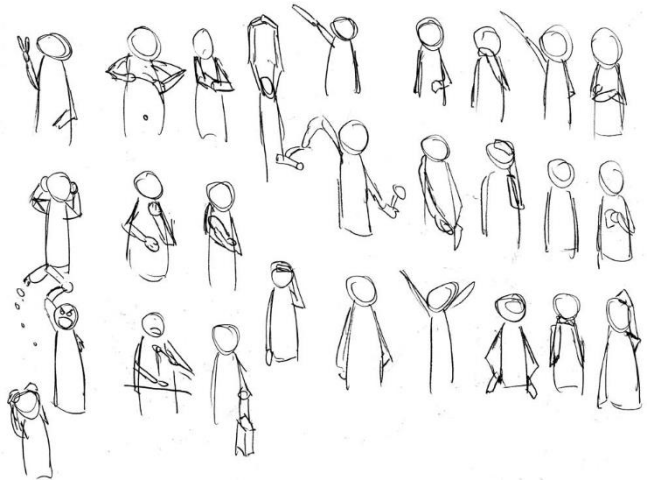
1. How Much Detail?

Sketching People

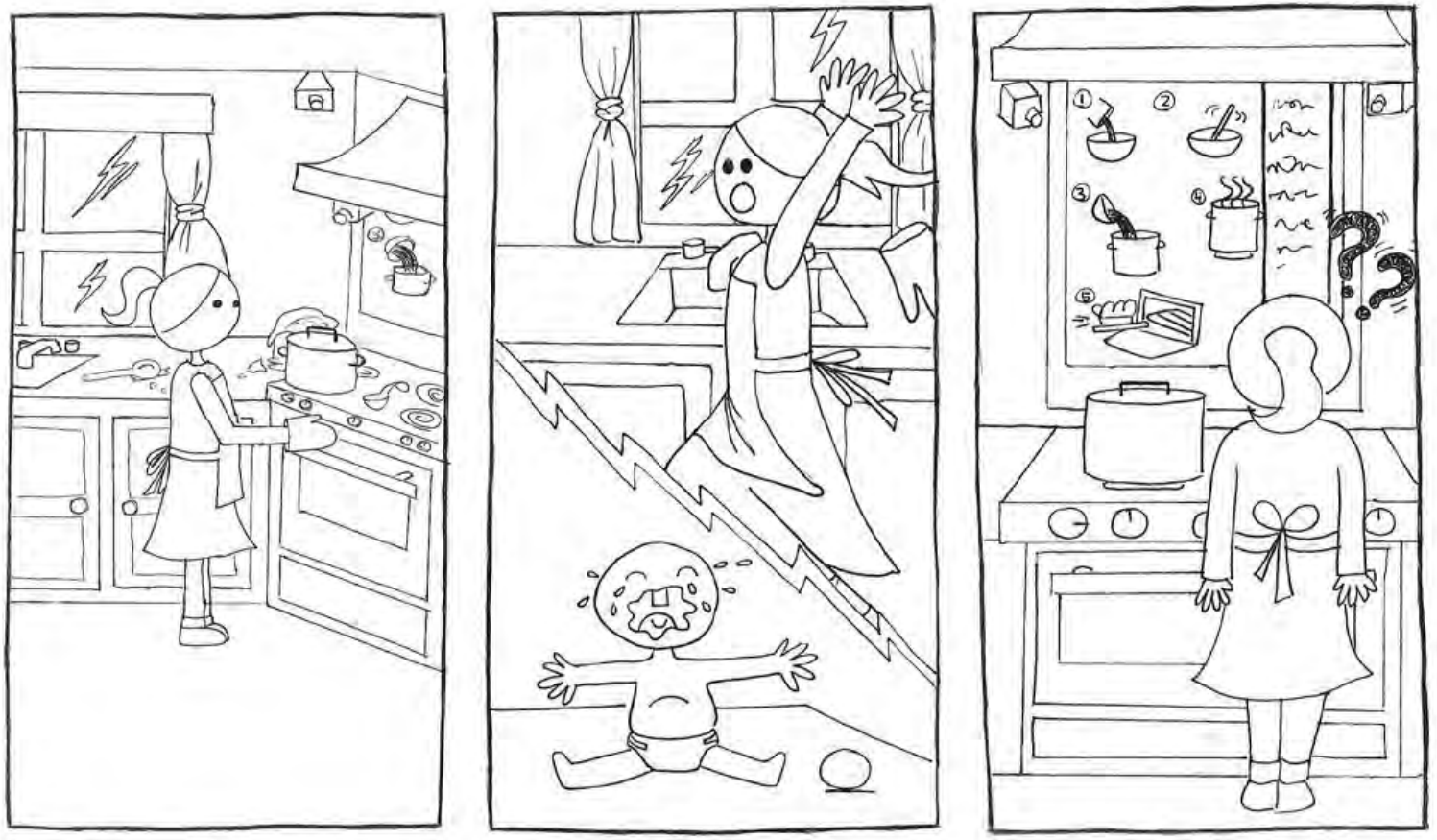


Star people
by Bill Verplank

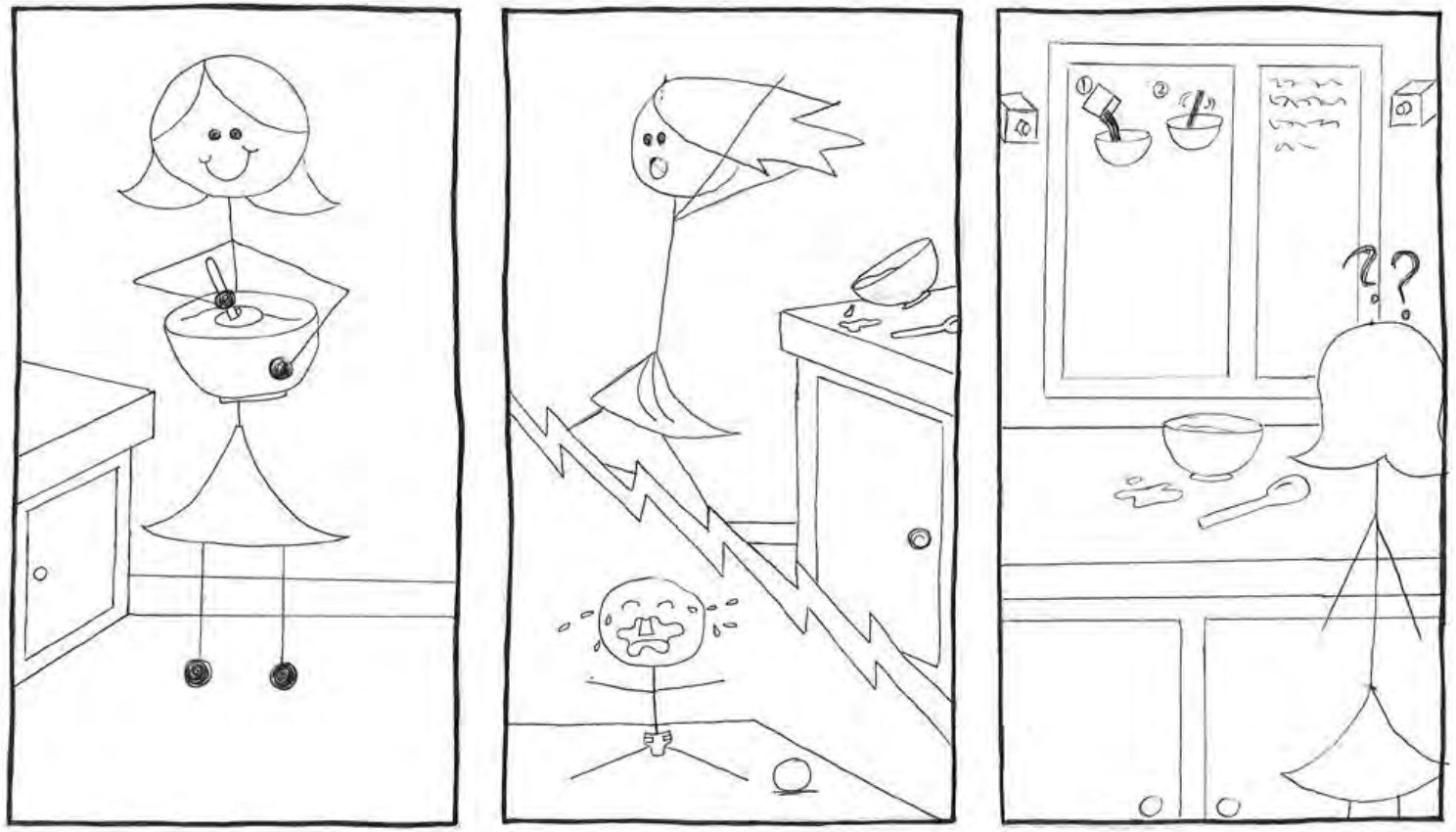




1. How Much Detail?



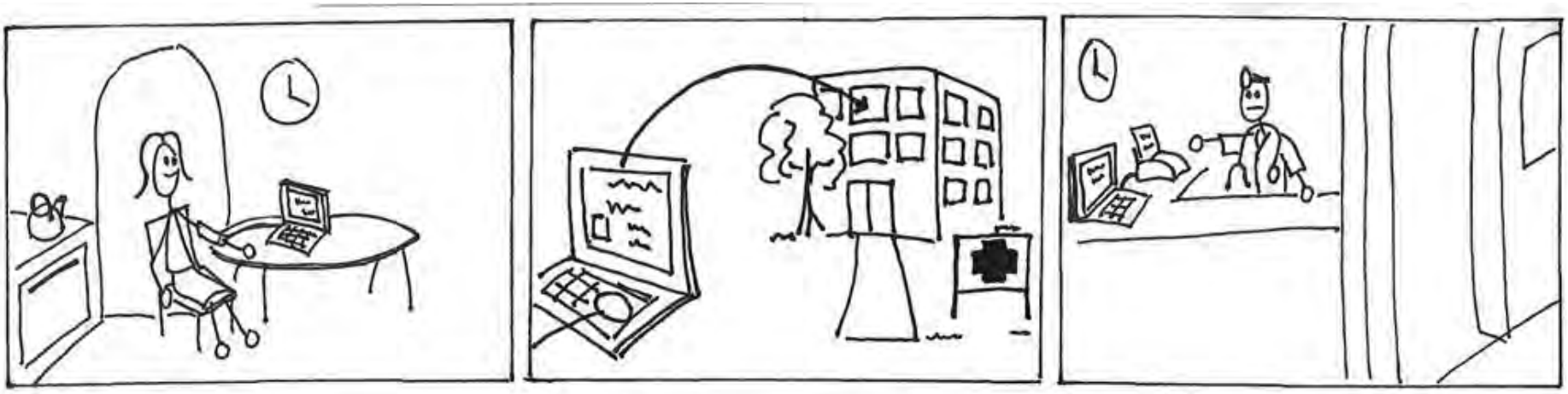
1. How Much Detail?



Unnecessary details distract from the story

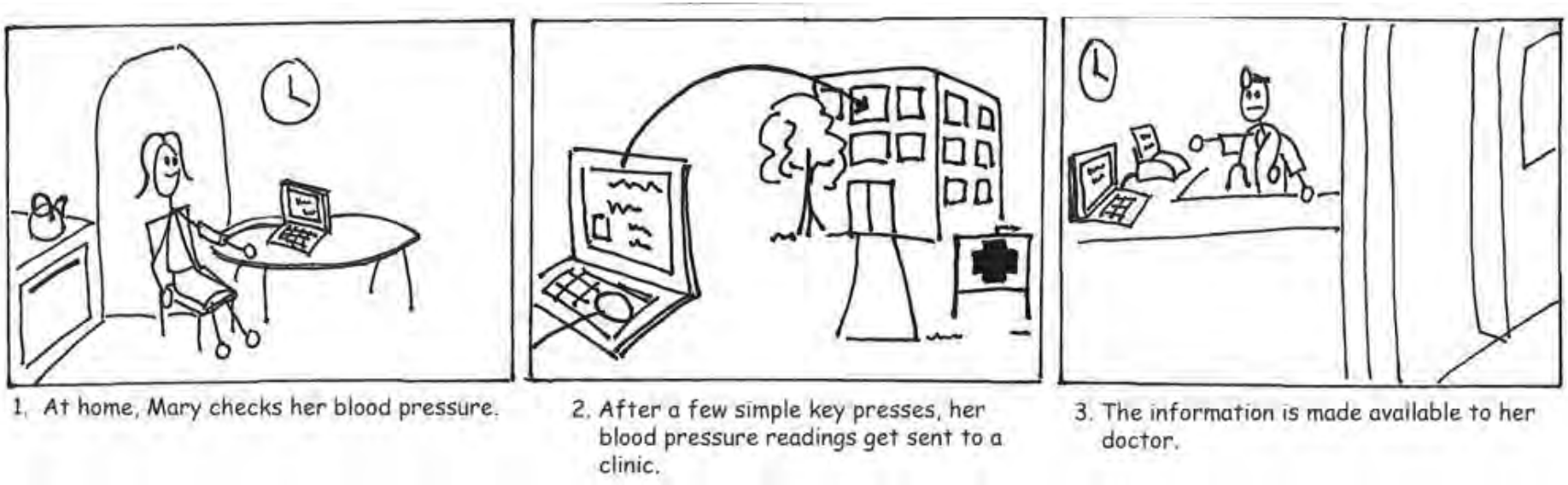
2. Use of Text

Guideline: It is often necessary, but keep it short



2. Use of Text

Guideline: It is often necessary, but keep it short

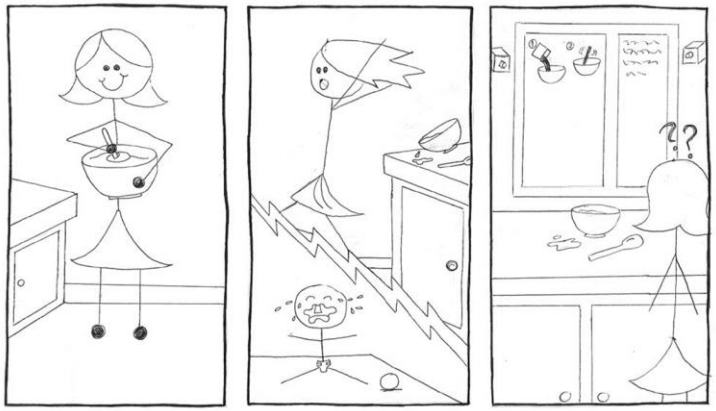


Short text is more effective, less likely to over-explain

Watch for cases where text induces weird biases

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?

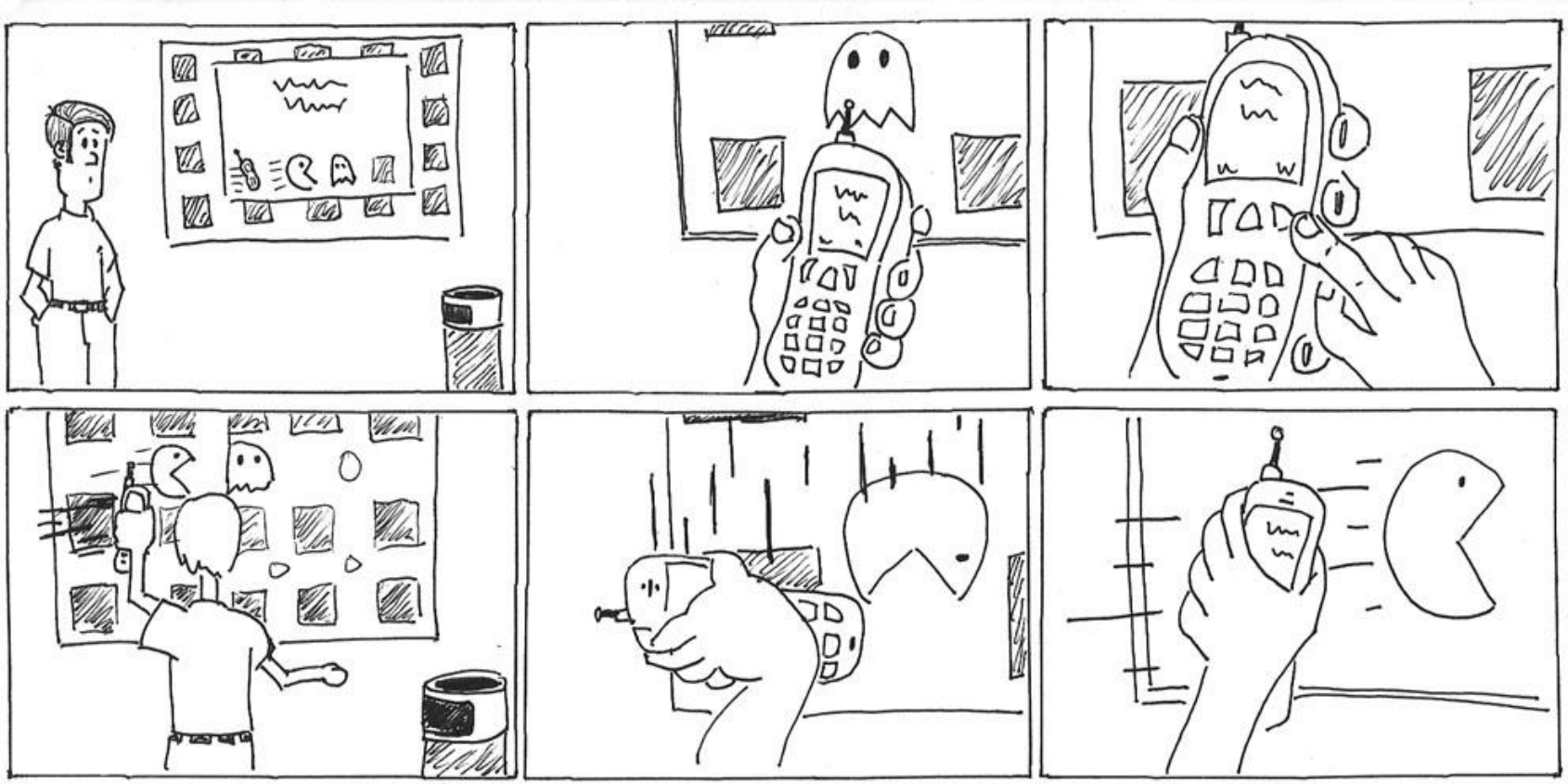
Guideline: 4-6 frames is ideal for end-users

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

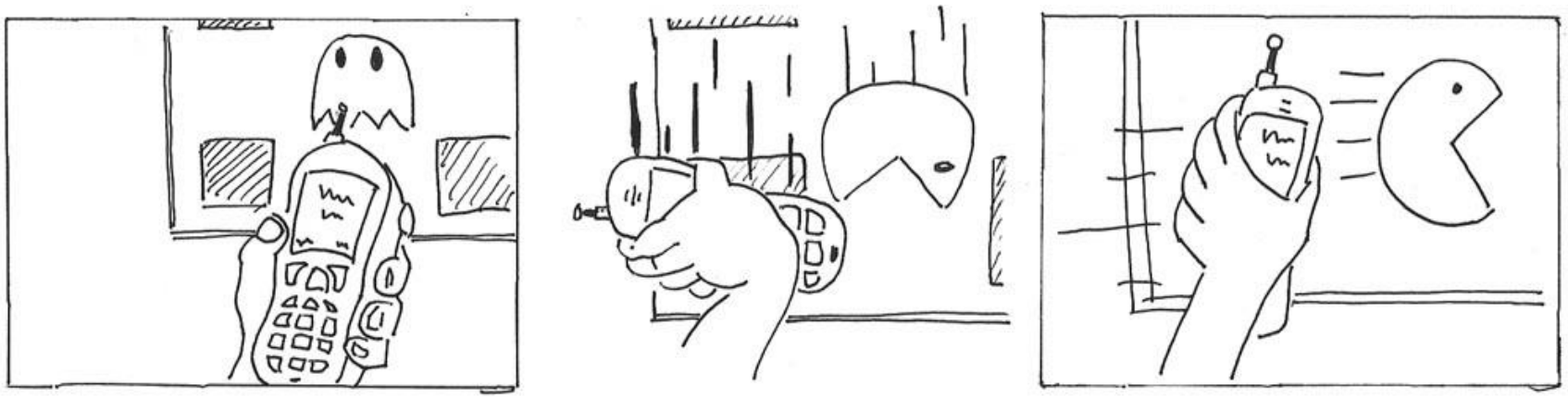
More is not always better

- May lose focus of story
- May lose attention

4. How many frames?



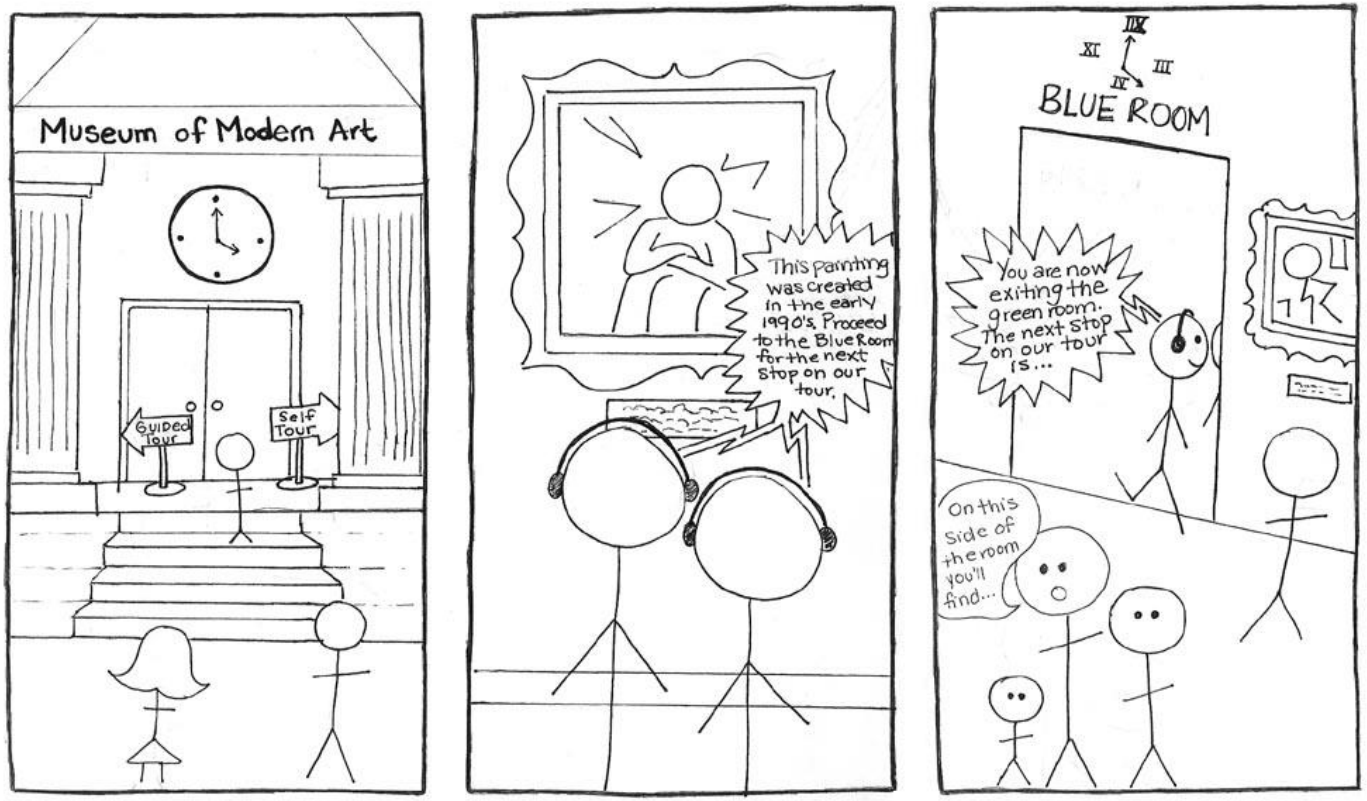
4. How many frames?



People found the extra panels were not needed

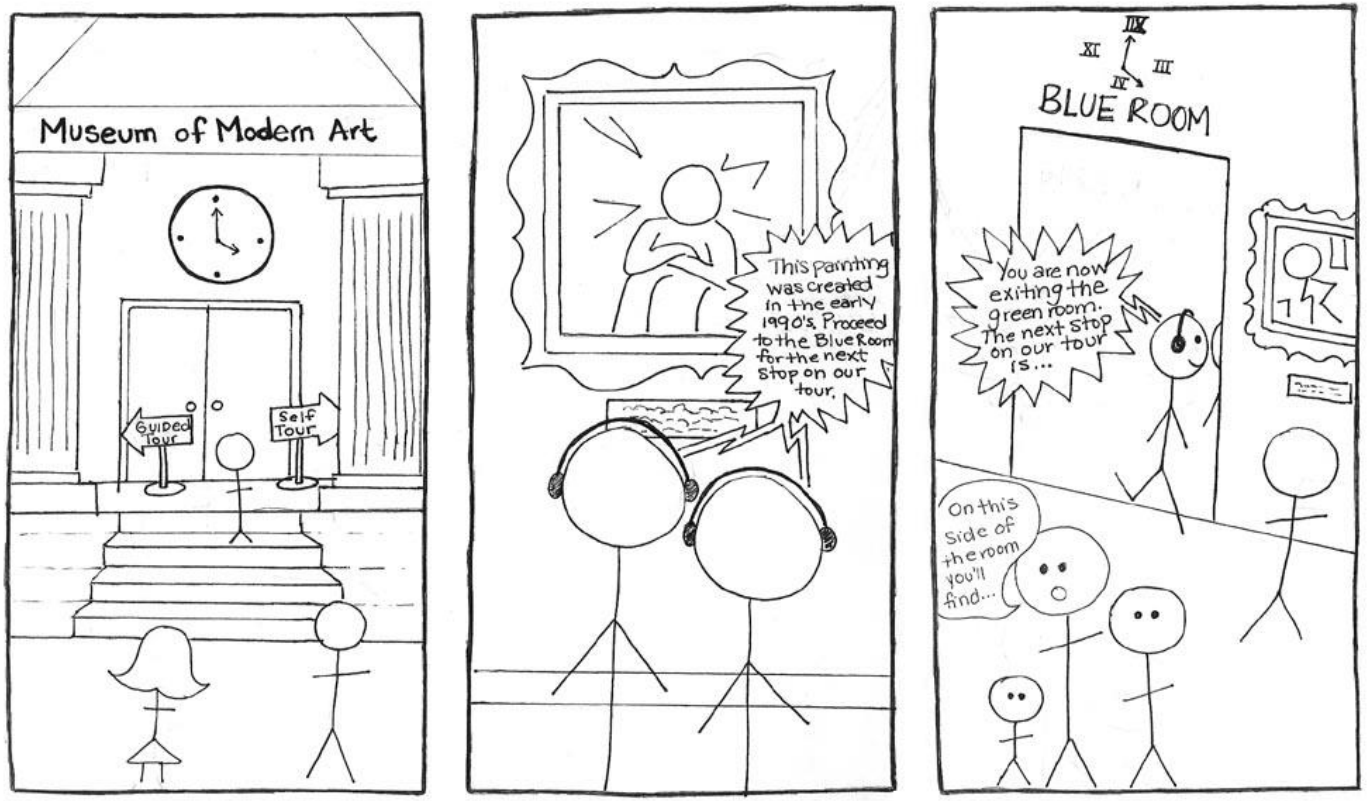
5. Passage of Time

Guideline: Only use if necessary to understand



5. Passage of Time

Guideline: Only use if necessary to understand



Inclusion of the clock distracts

Storyboards for Comparing Ideas

Authoritative

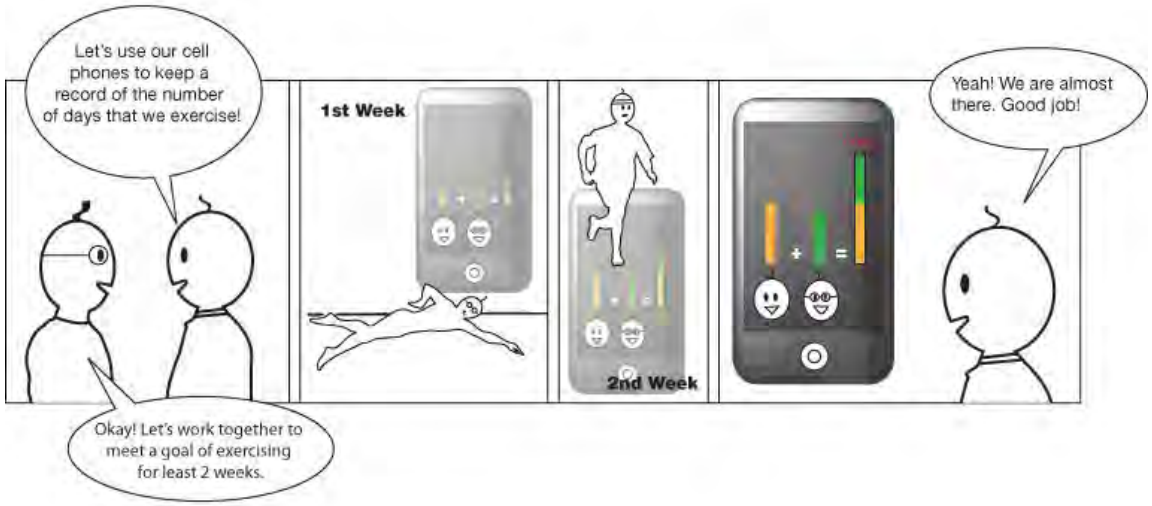
Cell phone is used to keep track of one's fitness goal.

Supportive

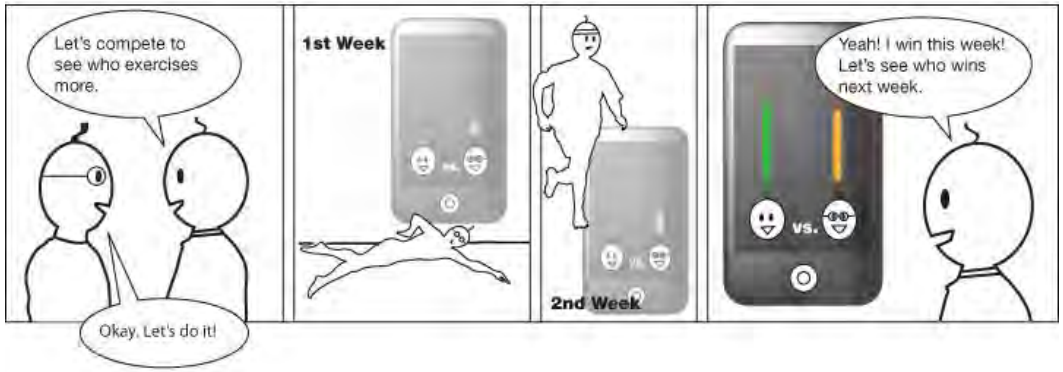
Cell phone is used to keep track of one's fitness goal.

Storyboards for Comparing Ideas

Cooperative

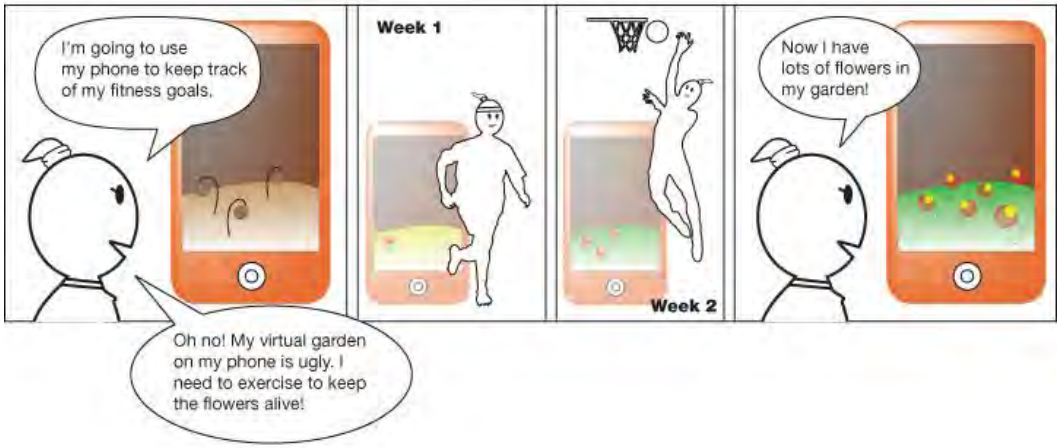


Competitive

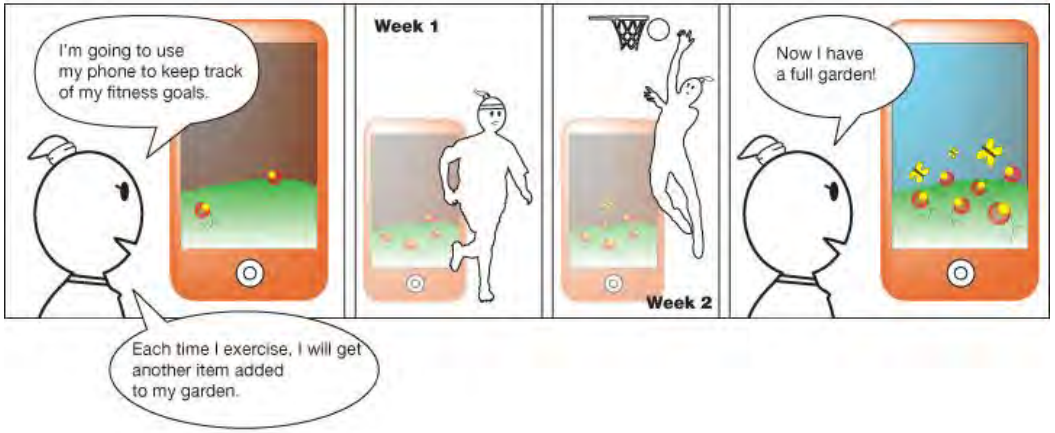


Storyboards for Comparing Ideas

Negative Reinforcement



Positive Reinforcement



Examples and Tricks in Storyboarding

This is also the focus of Reading 2

- Due Saturday night
  (not needed for Friday section)

Will go over these quickly, especially the videos

- You then view them outside of class

Drawing is Hard

Will a picture work instead?

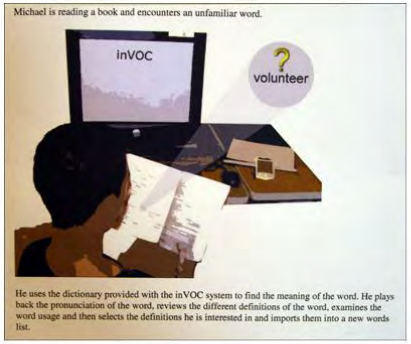
Existing Images from Other Sources

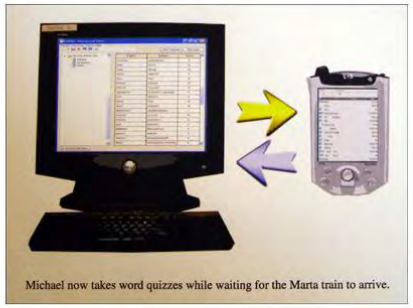
http://designcomics.org/

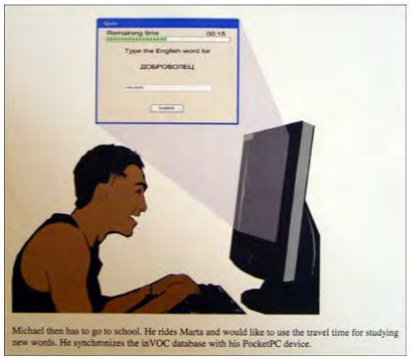
http://www.pdclipart.org/

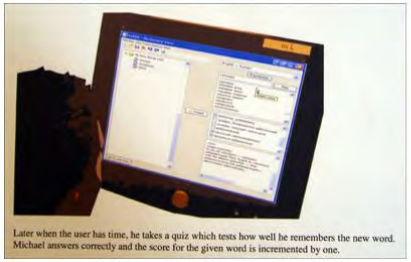
Blur Out Distracting Details

Using image editing software to simplify photos into sketches

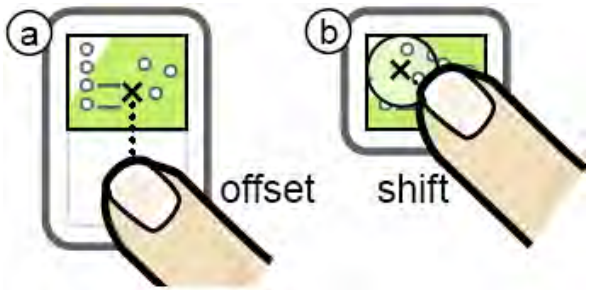


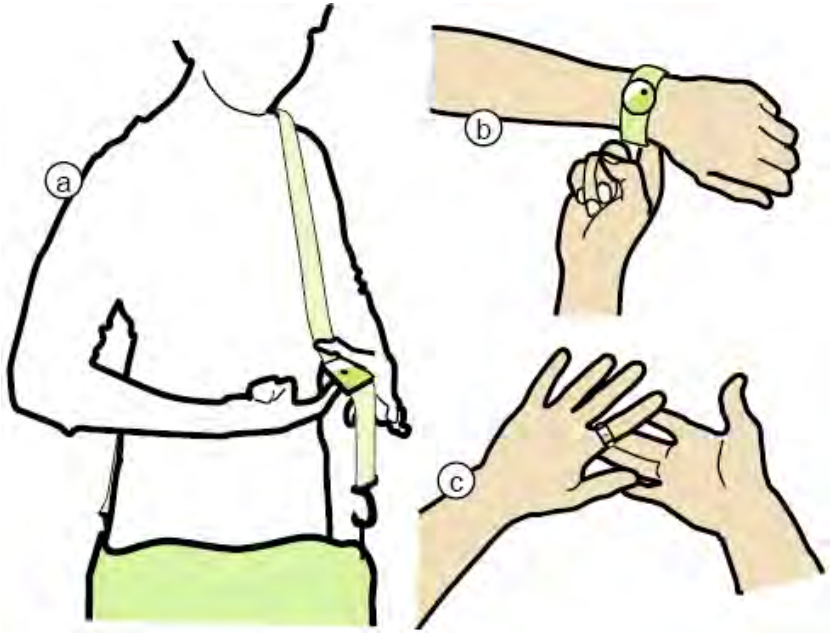






Tracing Photos

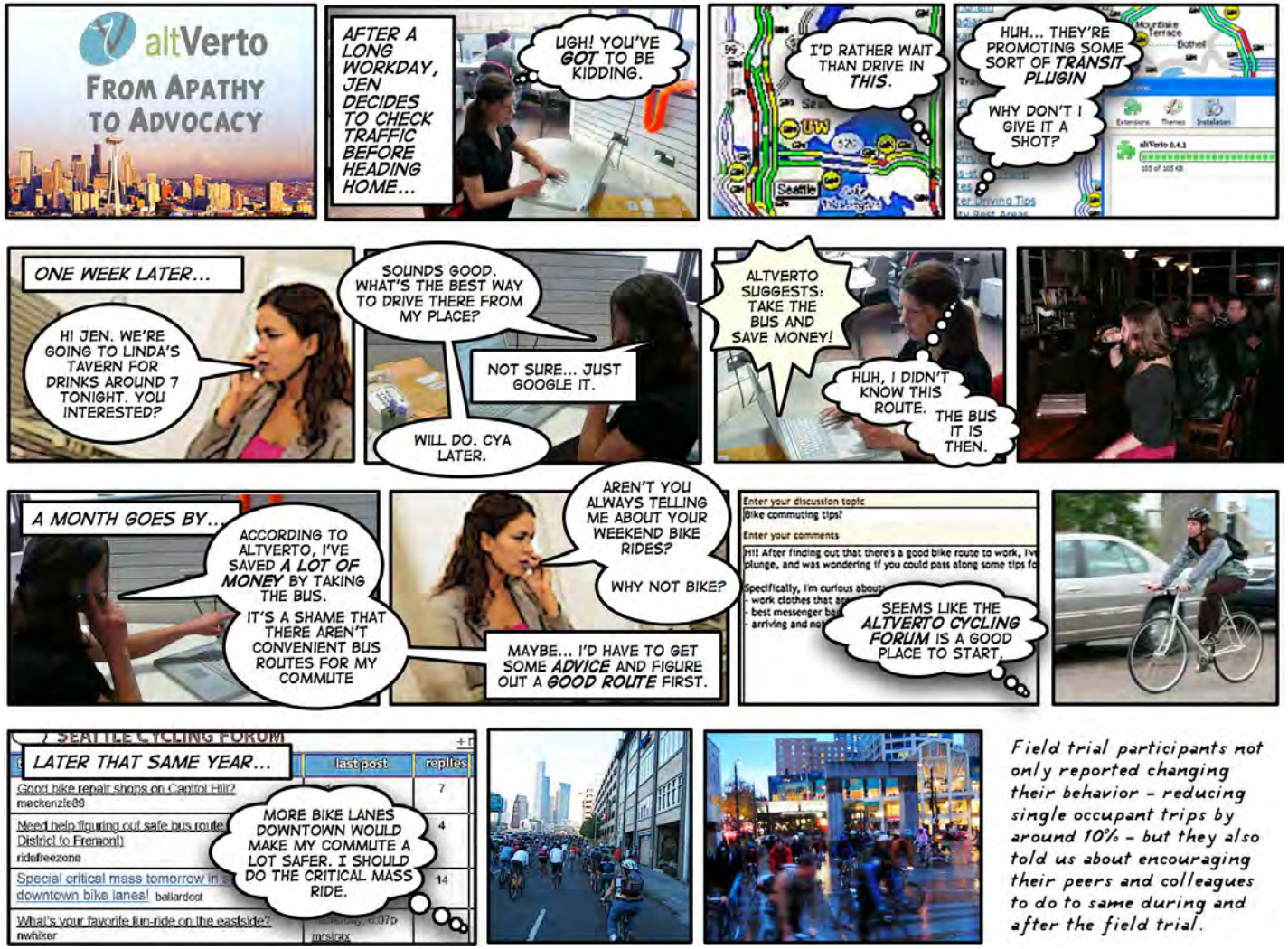




Baudisch and Chu, 2009

Comic Presentation

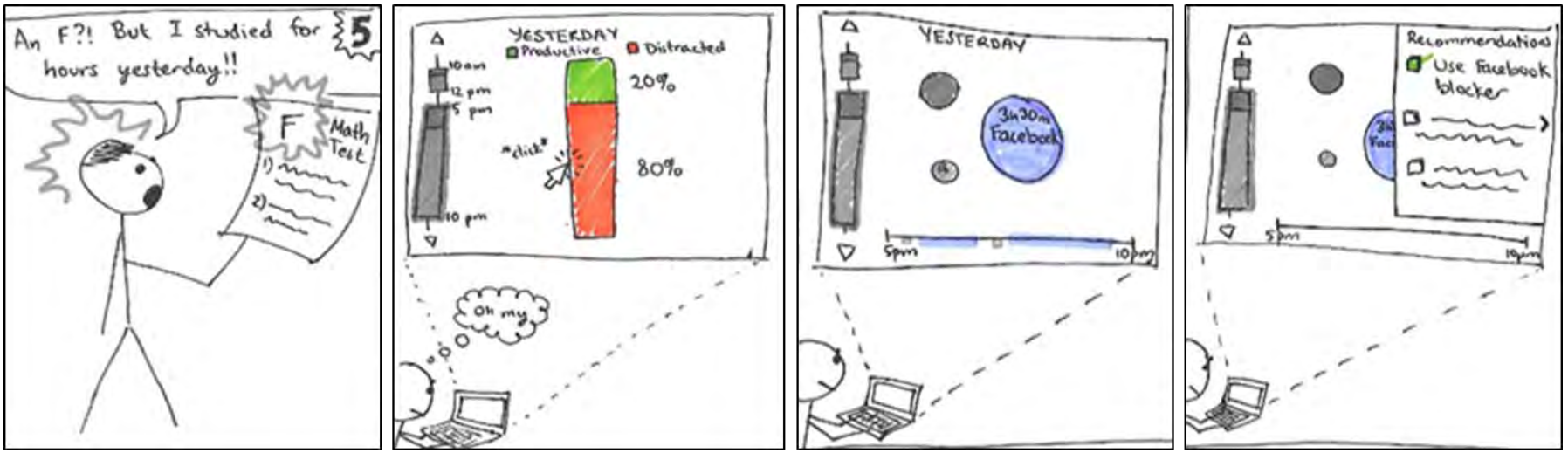
Thought bubbles argue for the design



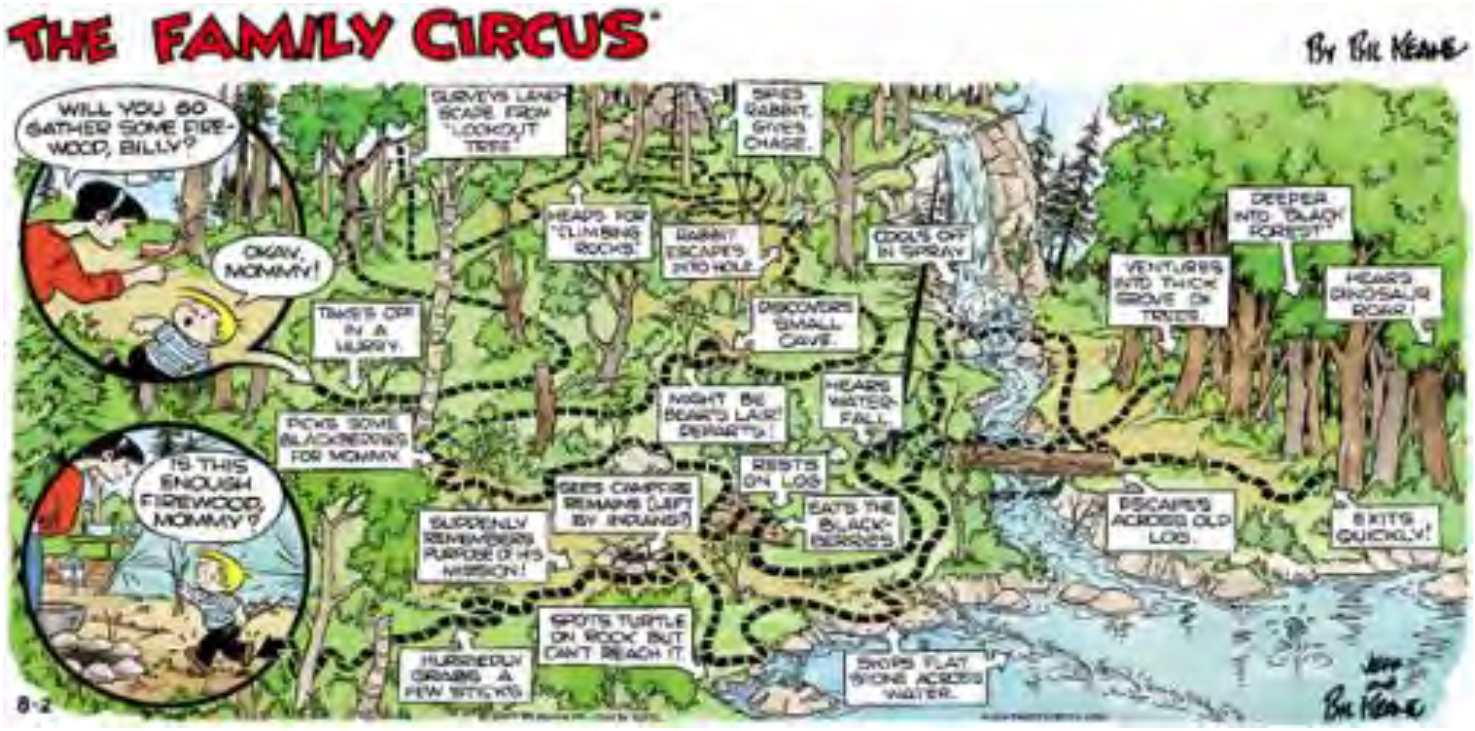
Field trial participants not only reported changing their behavior – reducing single occupant trips by around 10% – but they also told us about encouraging their peers and colleagues to do to same during and after the field trial.

Gukeisen et al, 2007

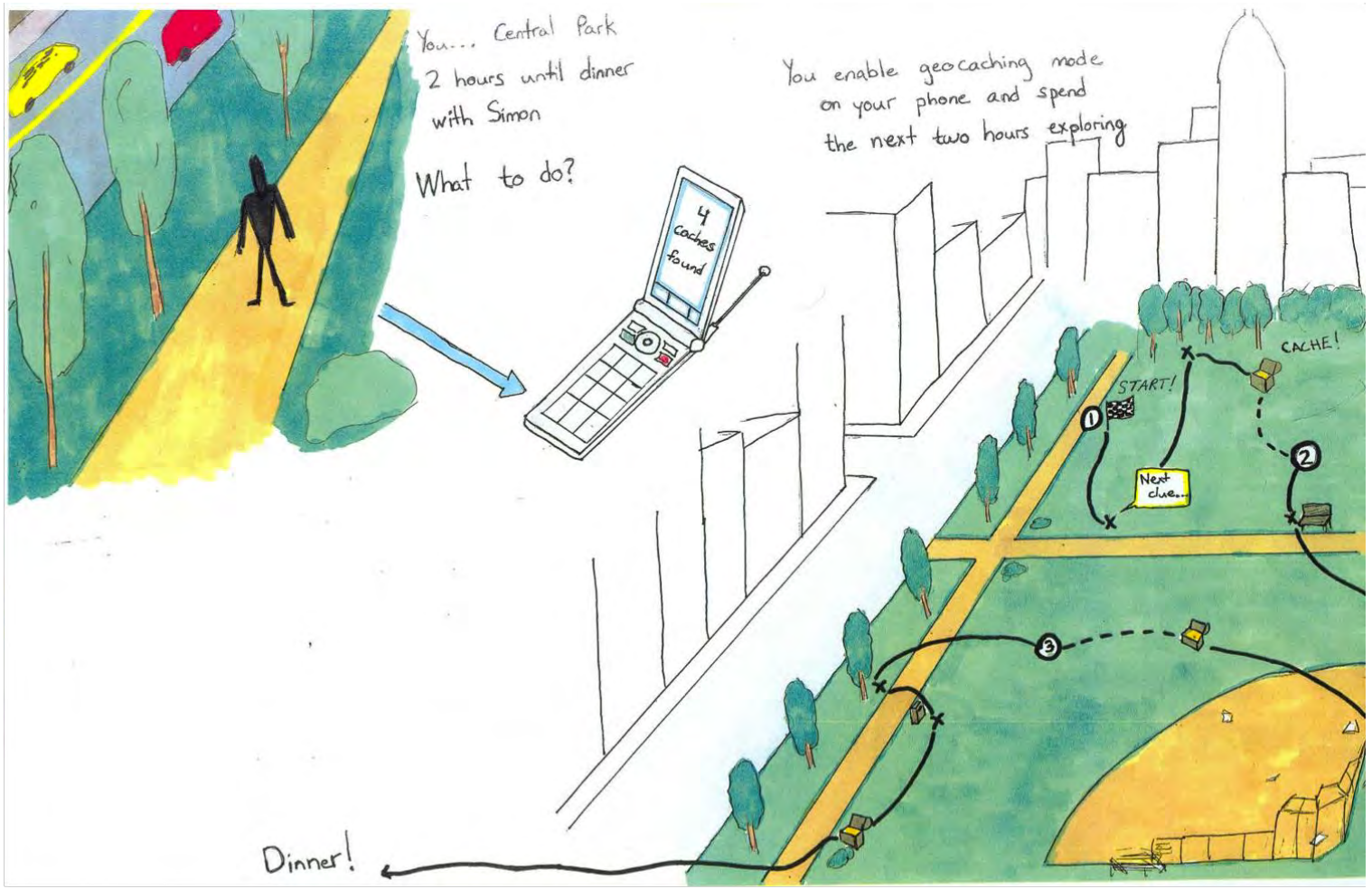
Selective Use of Color



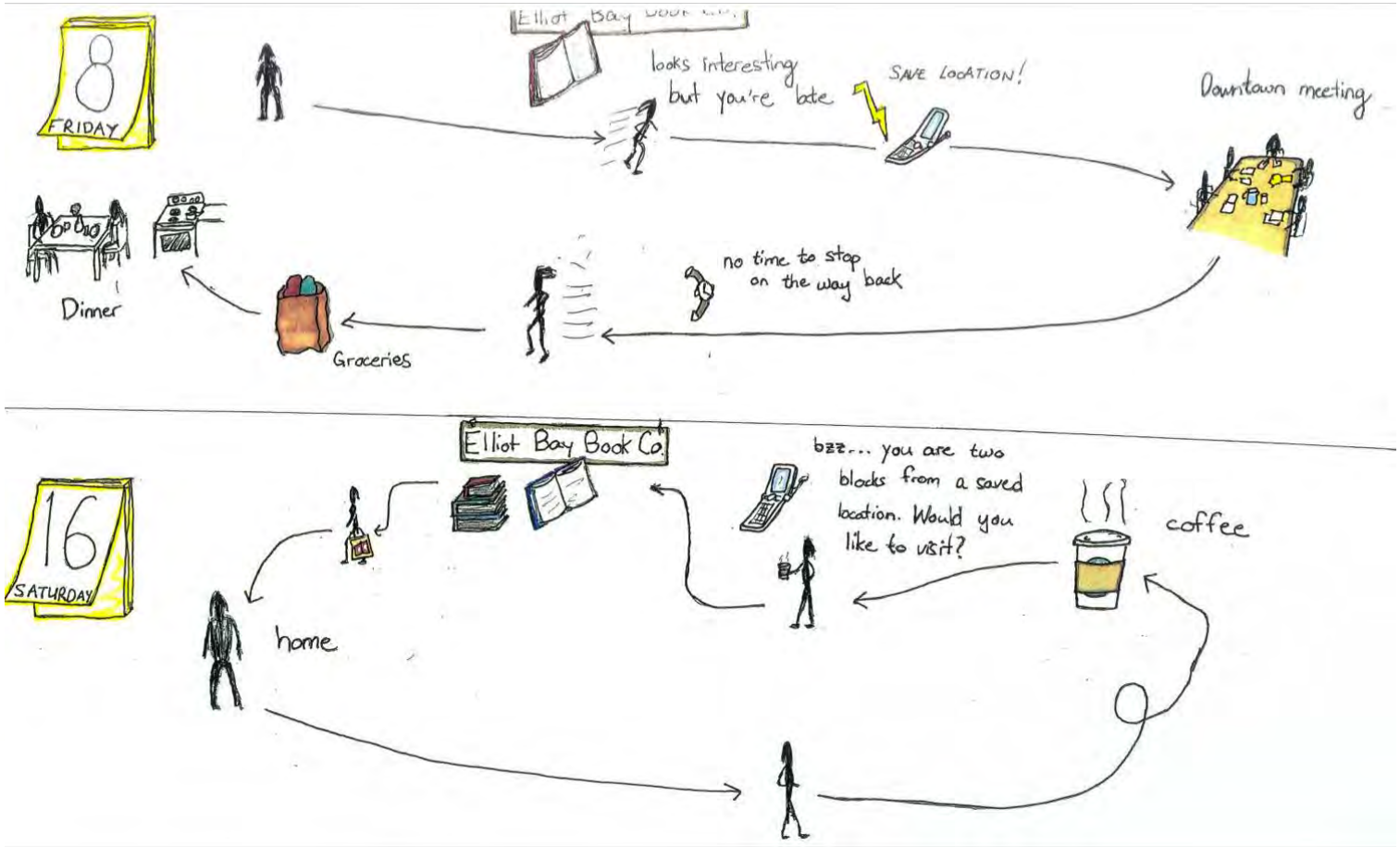
Route Maps


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

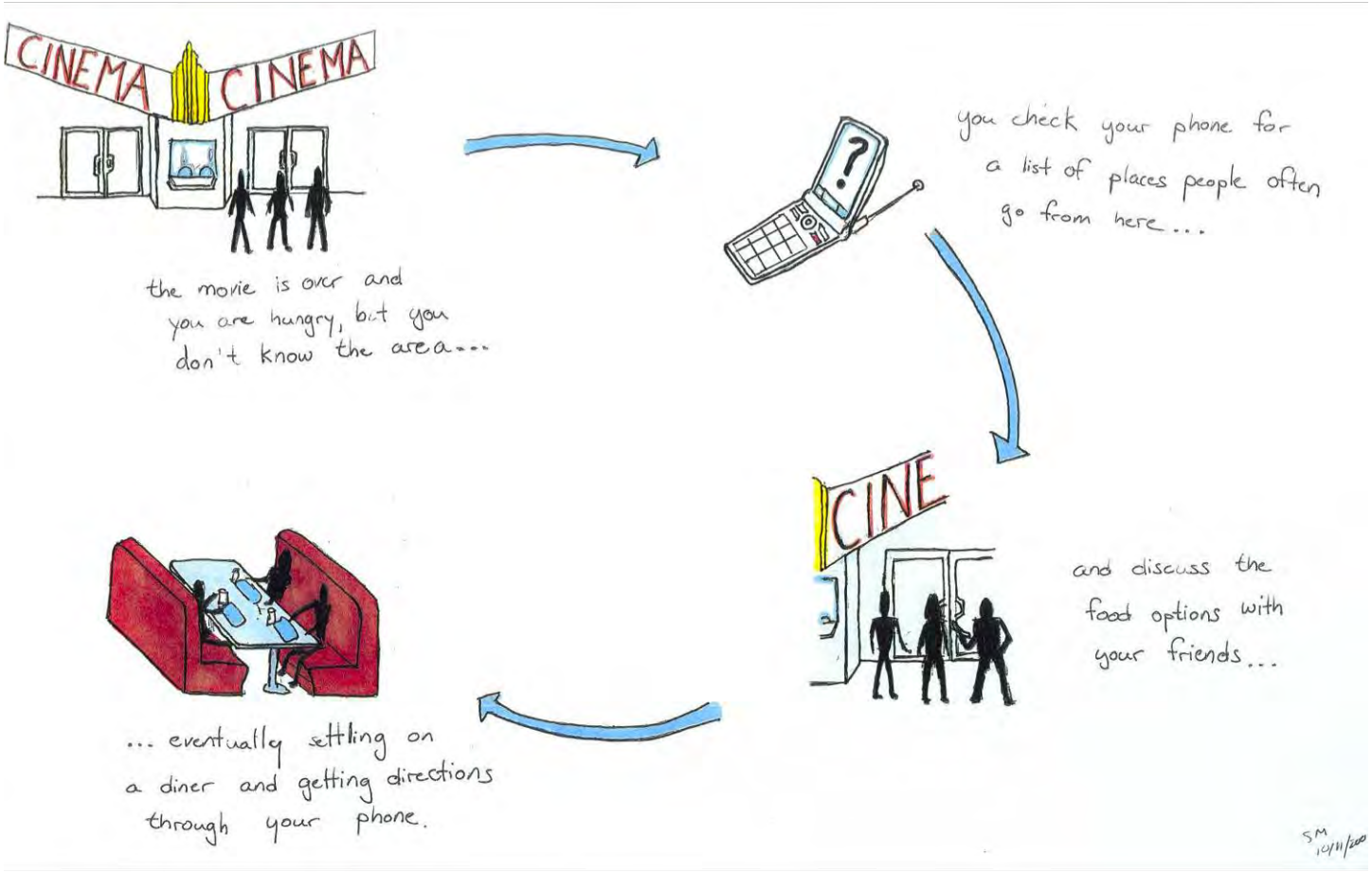
Route Maps


You... Central Park
2 hours until dinner
with Simon
What to do?
4 caches found
You enable geocaching mode
on your phone and spend
the next two hours exploring
START!
CACHE!
Next clue...
1
2
3
Dinner!

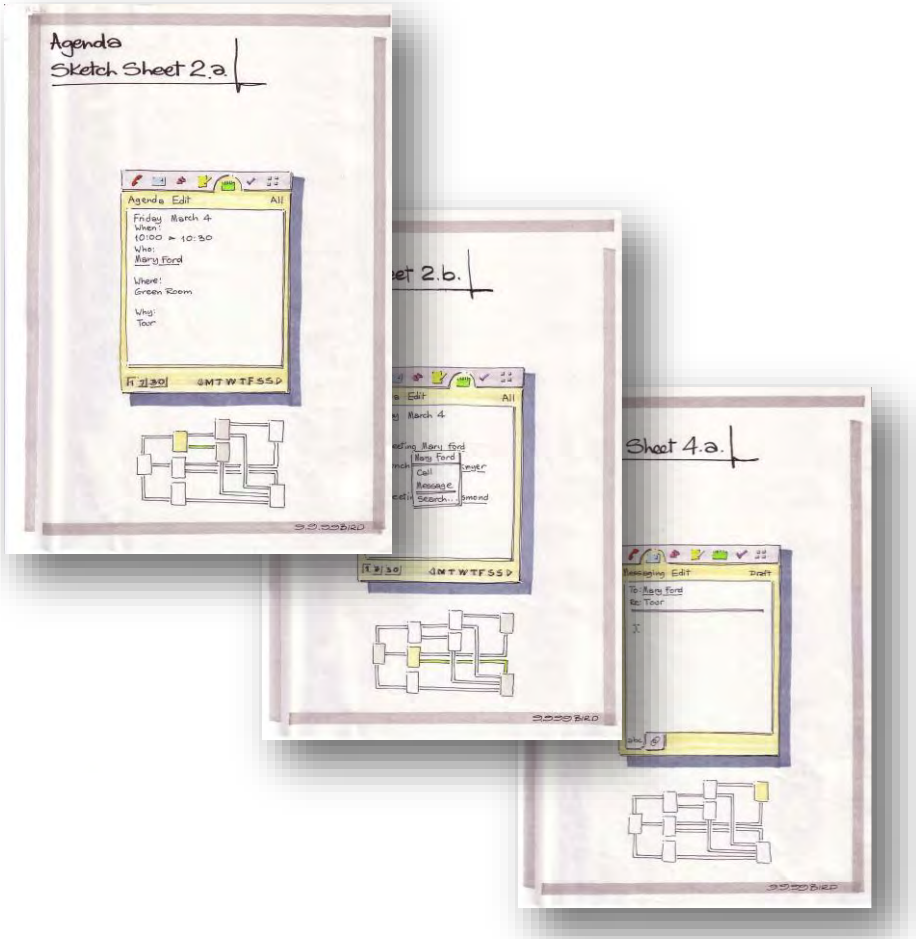
Route Maps

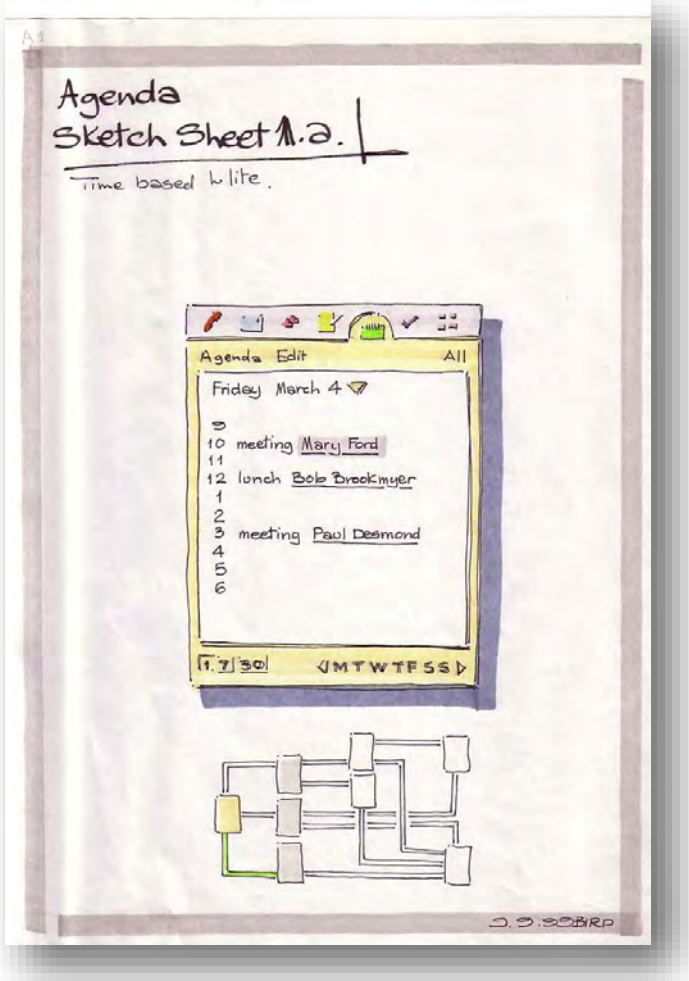

8
FRIDAY
looks interesting but you're late
SAVE LOCATION!
Downtown meeting
Dinner
Groceries
no time to stop on the way back
16
SATURDAY
Elliot Bay Book Co.
bzz... you are two blocks from a saved location. Would you like to visit?
coffee
home

Route Maps


CINEMA CINEMA
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...
CINE
and discuss the food options with your friends...
... eventually settling on a diner and getting directions through your phone.
SM 10/11/2000

Mapping the Space of Interaction





Ron Bird

Value of Animation or Video

Can illustrate critical timing

Can be more engaging than written or storyboard

Can help convey emotion (e.g., voice, music)

Can show interactive elements more clearly

Can be self-explanatory

If done well, can be an effective pitch

But you need to keep it quick and effective

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

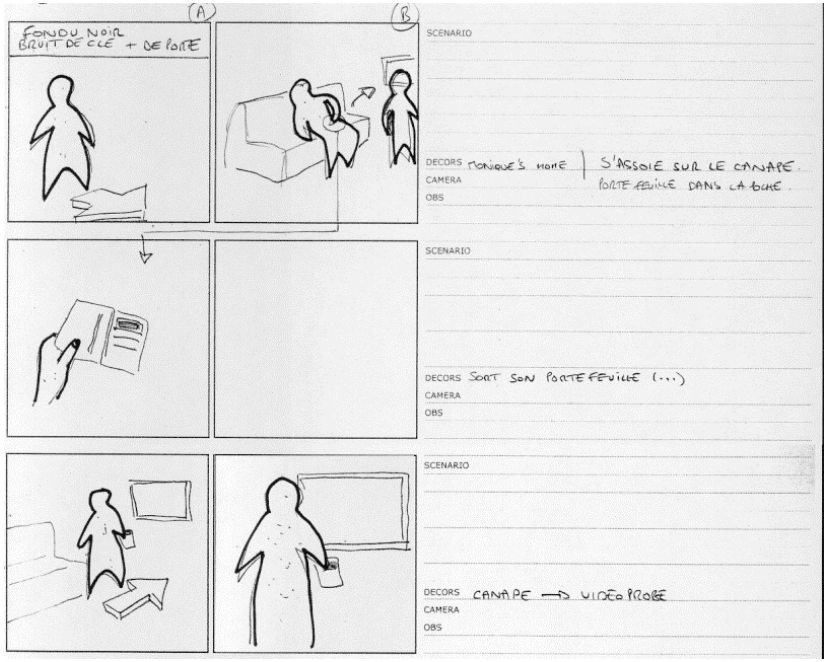
Review field data

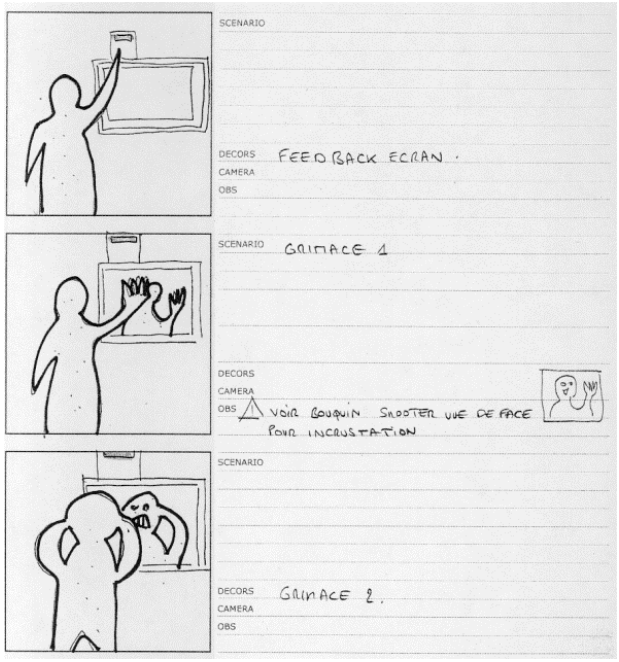
Review ideas from brainstorm

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





Steps to Create a Video Prototype

Shoot a video clip for each storyboard card

- Avoid editing in the camera, just shoot scenes

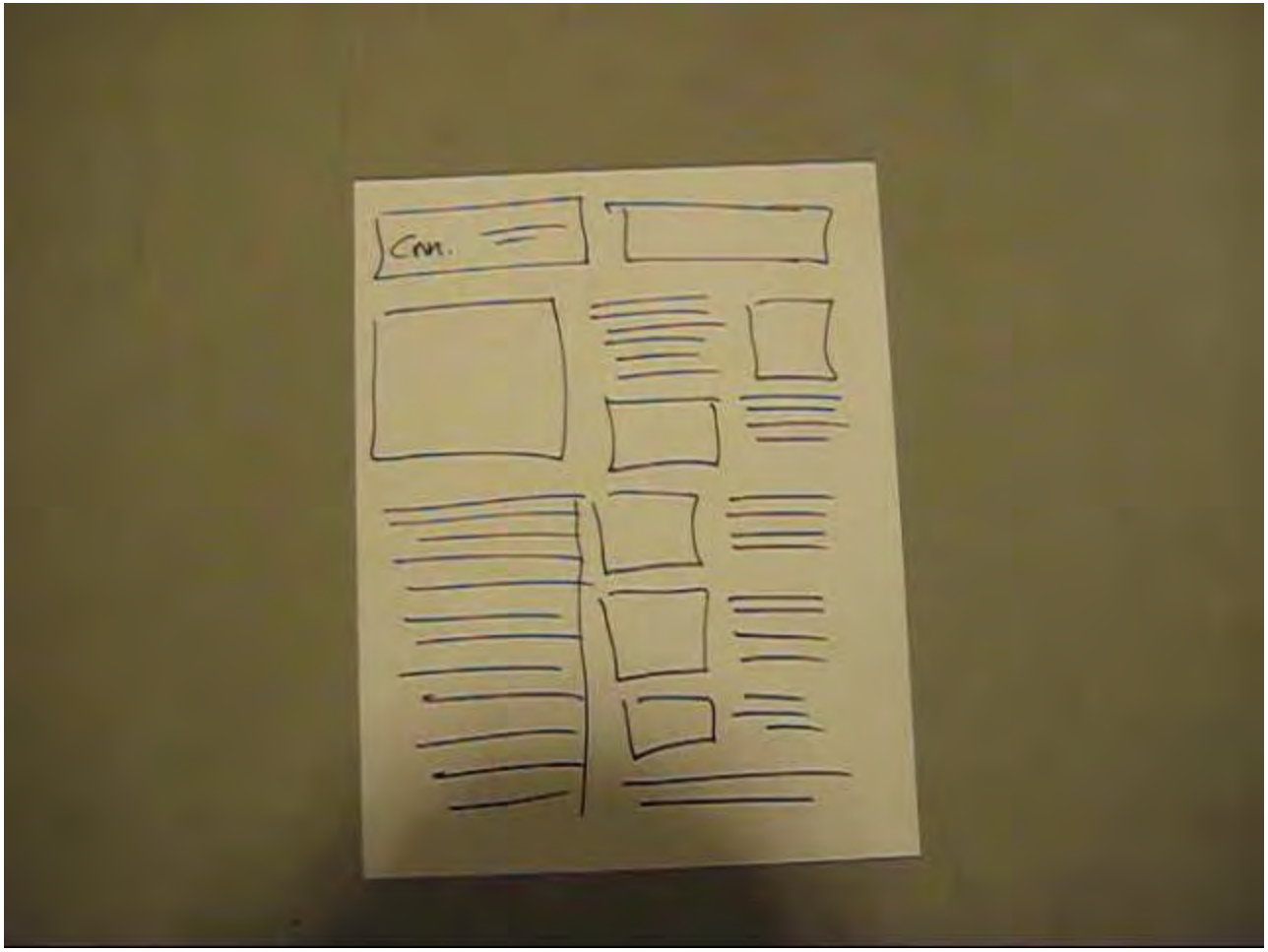
Use titles to separate clips

- Like a silent movie

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

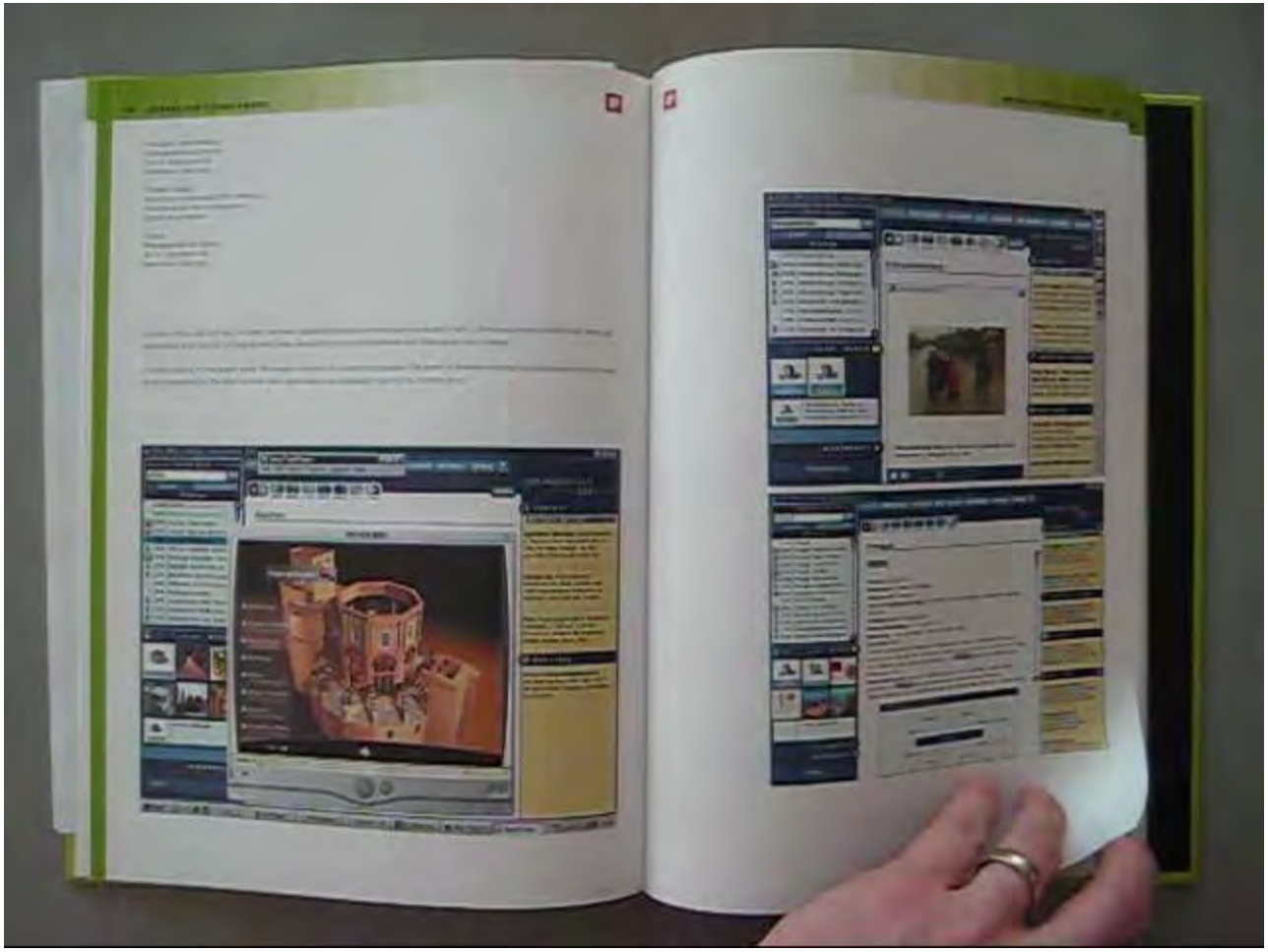
- If you make an error, just reshoot it

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

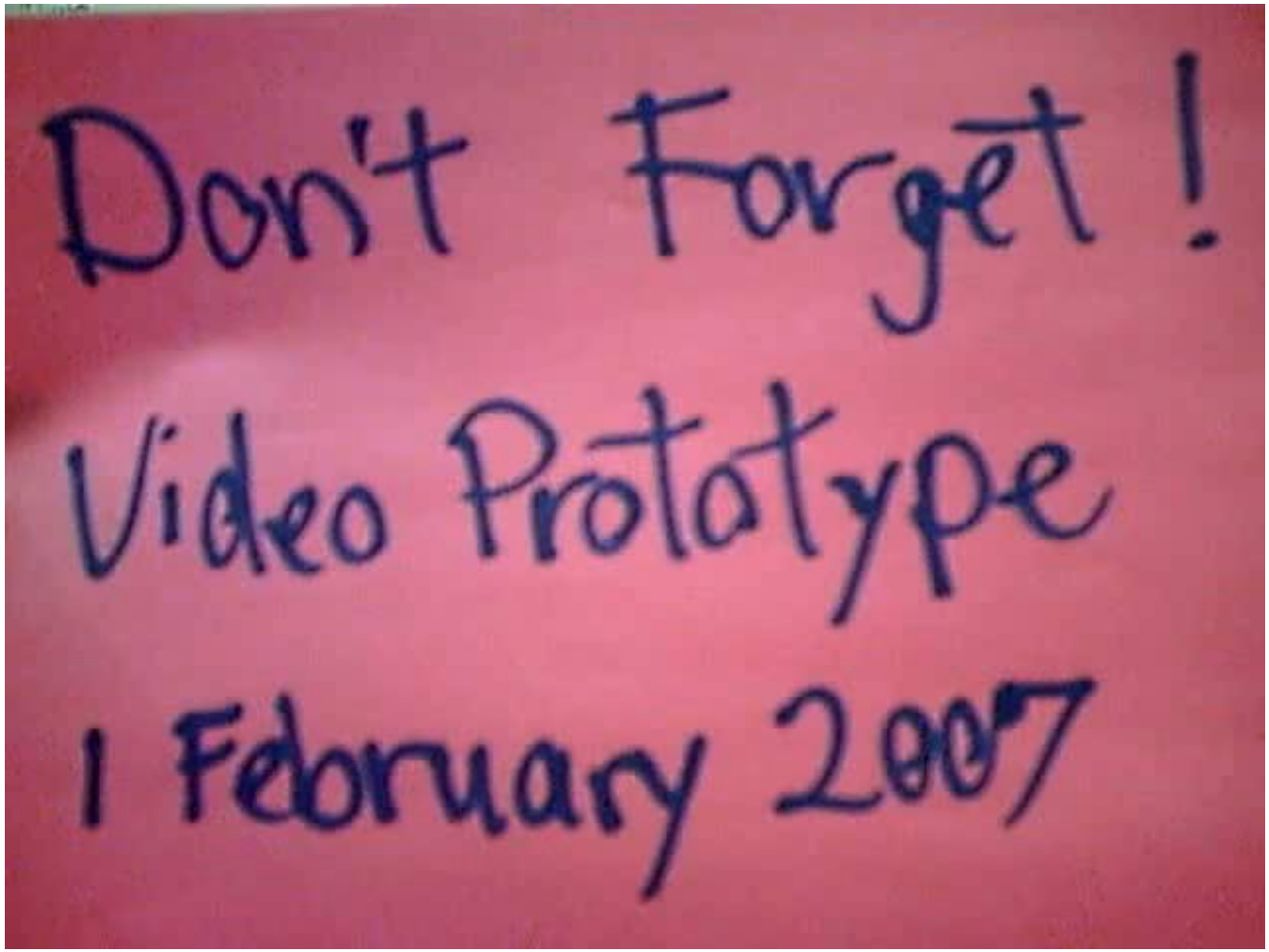
- “Consumester”

Narration, Pace, and Flair

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

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

Don’t Forget Version 3

Using Projectors and Simple Props

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

Watch for Pace and Scene Relevance

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

Lessons from Prior Video Prototypes

Split Presentation, Simple Effects

- “PickUp”

Still-Frame, More Effects

- “Graffiti Karma”

Split Presentation, Simple Effects

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

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

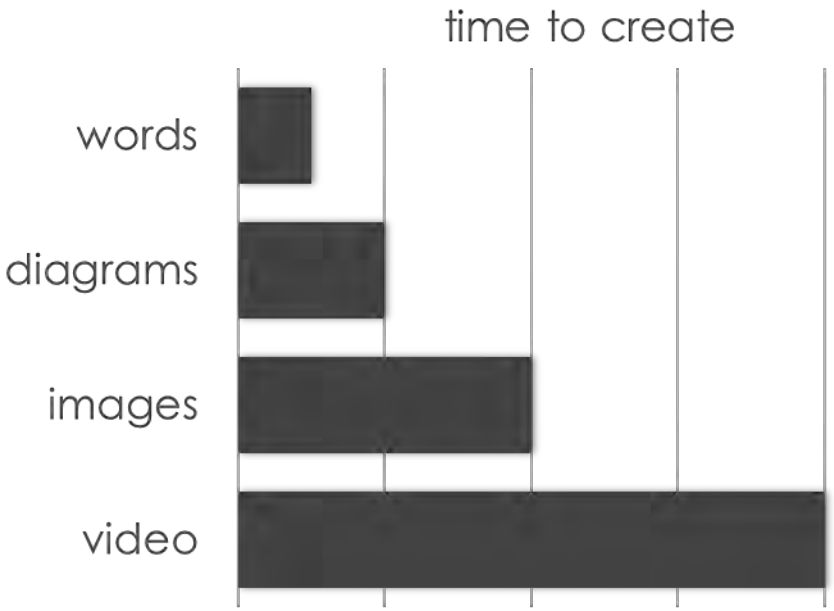
Playful while Keeping Pace

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

Reminder on Fidelity

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 Time: Stay Low Fidelity



Completely made-up bar length

But it is probably at least this bad

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?

Range of Purposes

Illustrating Low-Level Techniques

- Microsoft Surface examples convey timing

Illustrate Designs in Context, Convey Satisfaction

- Focus in this course

High-Level Visions

- StarFire
- Knowledge Navigator
- A Day Made of Glass

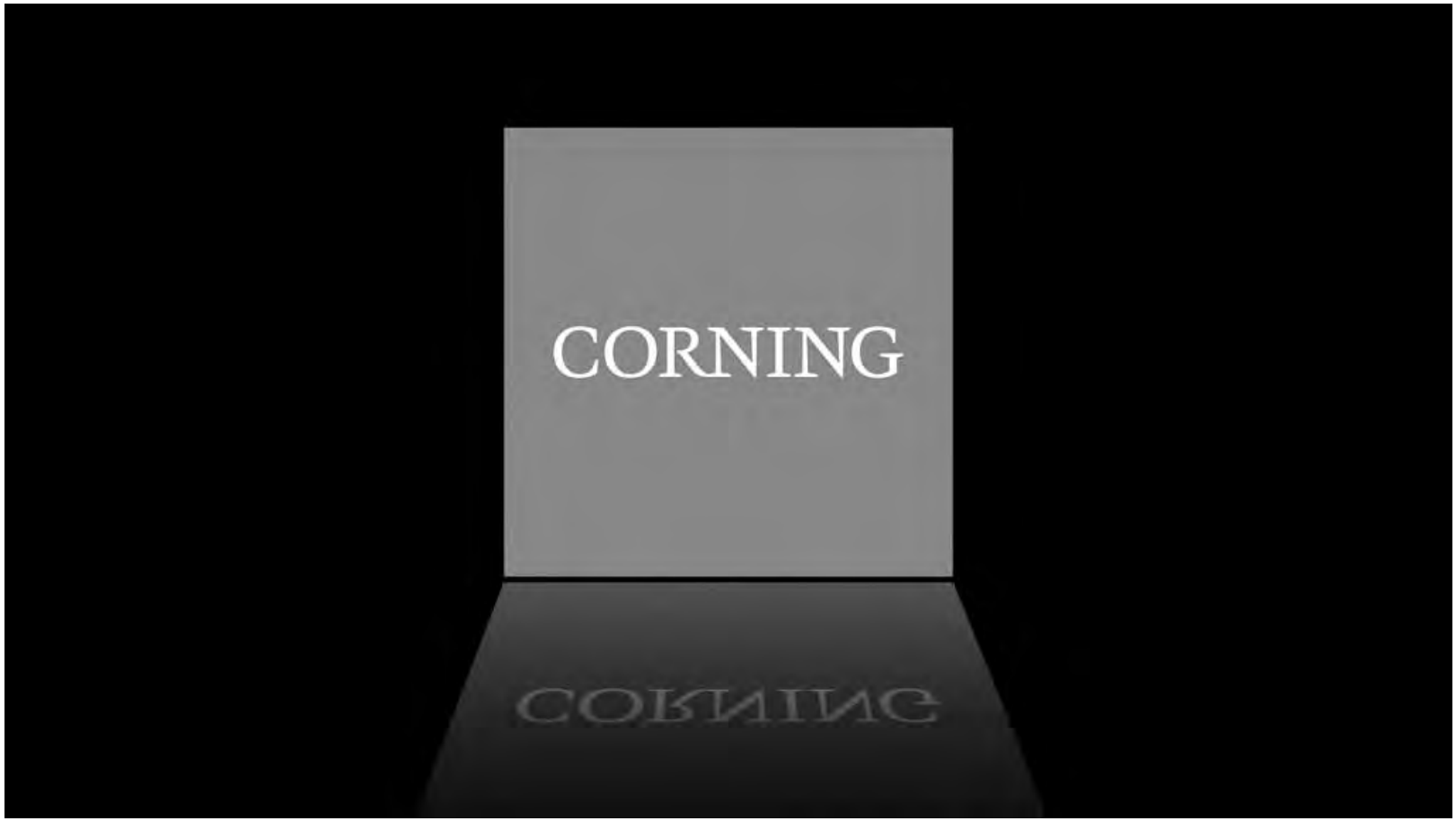
Sun's "Starfire" (1994)

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

Summary

Think about your audience

Think about your time constraints

Think about the purpose of your story

Think about options for effective presentation

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 07:
Storyboarding and
Video Prototyping

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 08:
Presentations,
Paper Prototyping,
Tasks in Testing

Tuesday / Thursday

12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

DESIGN
USE
BUILD

Project Status

Looking Forward

- 2g: Design Review (1x2) Due Tonight

- “Getting the Right Design”
- Report Due Monday 10/30
- Presentation Due Wednesday 11/1

Other Assignments

- Reading 3 Due Saturday 11/4
- Reading 4 Due Saturday 11/11, Sooner is Better
- Reading 5 Can Be Done Anytime, Sooner is Better

Presentations

Presentations Next Thursday / Friday

- 6 groups will present on Thursday
  - entire 9:30 and 10:30 sections
    (no 9:30 or 10:30 sections on Friday)
- Everybody attends Thursday
  - welcome in 12:30 and 1:30 sections on Friday
- Have thoughtful questions for other groups

Be sure you prepare and rehearse

- Team responsibility for the presentations
- PPT(X) or PDF, embed fonts, happy to “check”

Today

Tips for Effective Presentations

Paper Prototyping

Testing

Ethics in Testing

Tasks in Testing

Introduce Yourself

DisTrack

Refocus yourself

Graeme Britz	-	Project Manager
Max Suffel	-	Writer/User Researcher
Angela Suhardi	-	Writer/Designer
Jackie Chui	-	Writer/Designer
Bryan Djunaedi	-	Writer/Designer

Title
Image
Value Proposition

Koala

The recurring subscription management tool that let's you finally take control of your recurring services and payments.

Jen Kang • Vivian Yu • Si Liu • Brendan Lee

Contractions
Typos

Koala

The recurring subscription management tool that let's you finally take control of your recurring services and payments.

Jen Kang • Vivian Yu • Si Liu • Brendan Lee

Finding

Typography
Consistency

- **Reimbursement is a burden…**
  - More people, more difficult
- **Compiling shopping list**
  - mental note, notepad, or phone
- **Brand and price conscious**

Task

Typography
Consistency

1. Making list & budgeting
2. Choosing a store & transportation
3. Shopping
4. Purchasing
5. Storing groceries
6. Managing $$$ & requesting reimbursement

Summary

Widows
Orphans
Process vs. Results

-Iteration is key

-Understand how users think

-Better design ideas came from more out-of-the-box thinking

-Discretionary spending is easy but discretionary spending tracking is hard

-Users crave positive motivation

Widows
Orphans

Things to Do (Tasks)

1. Ability to record running statistics such as distance run, speed, number of runs, etc.
2. Share statistics with friends
3. Create running events and invite friends
4. Send mass notifications to friends for a spontaneous run
5. Find a SmartMatch (based on various criteria) to run with
6. Write and search for reviews on the route/experience

Widows
Orphans

Overall Problem: Joint Pain & Activity

- **Target Audience: Athletes**
  - Health conscious
  - Disciplined

- **Problem: Overexertion and aggravation of injury among athletes**

Sense Breaks

Running with Friends

Erica Putsche, Heidi So, Luke Chang, Linsen Wu

Too Much Text

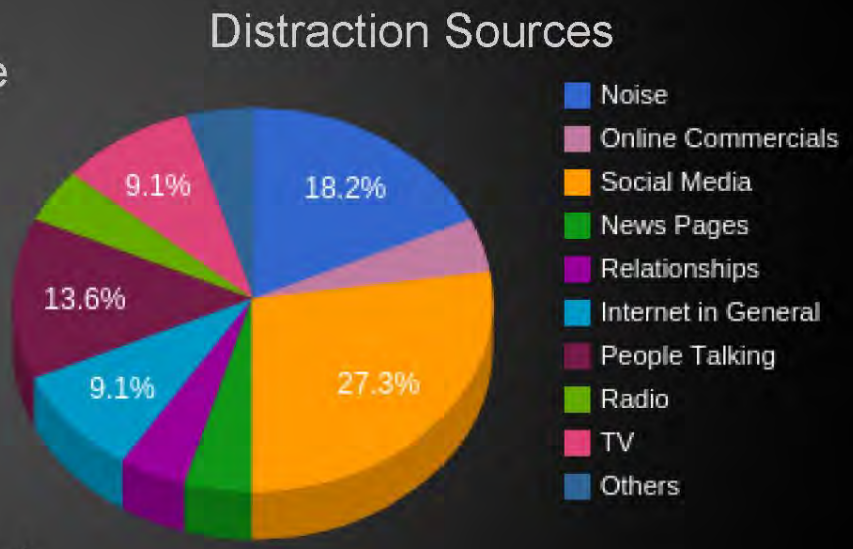
Contextual Inquiry - Insights

Johnson (20, undergraduate, CSE 006 Lab)
- Perception ≠ Observation
- Distracted by people talking and noise
- More focused at CSE Labs than at home

Steve (25, graduate, Mercer Court)
- Motivated by seeing people working
- Distracted by people and social media
- Takes breaks often

George (25, graduate, Odegaard Library)
- Turns notifications off while studying

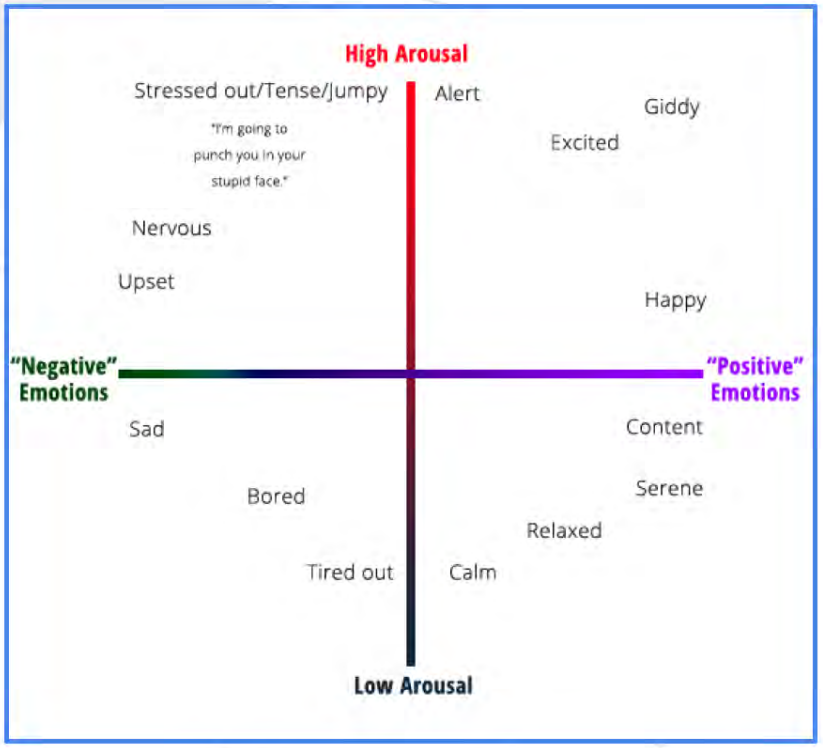
Group (4 undergraduates, Yunnie Bubble Tea)
- Distracted by each other and apps
- Use headphones (music) to focus



Too Much Text
Too Much "People"

Our three inquiries showed us:

1. People valued the insights acquired from a mood journal.
2. People thought journaling was a hassle.
3. People were interested in what triggers their mood
4. People want to share information with a mental health professional



Too Much Text

Design 1: Running separately
May add some motivation but does not provide the full experience of running with a companion

Design 2: Coordinating running events in advance
Tasks can be accomplished using Facebook events or other similar tools

Design 3: Spontaneous Running
Tasks are unique and they also address the concerns raised in our contextual inquiries. Our chosen design also provides us with an interesting opportunity to explore personal informatics

Summary

Too Much Text
"Process" Points Distract

- Iteration is key
- Understand how users think
- Better design ideas came from more out-of-the-box thinking
- Discretionary spending is easy but discretionary spending tracking is hard
- Users crave positive motivation

Having Too Much Text

If you can read it

- you probably will
- we probably will

Be conversational, engaged

- even when not talking

Notes are fine

- but do not read them

Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet. Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet. Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor

Consider lorem ipsum placeholders

Slide Counts as Guidelines
Cramming too Much

Parent Contextual Inquiry

Participants:

- Two parents whose children formerly had IEPs
- One parent with two children that currently have IEPs
- One guardian of a student with an IEP

The Process:

- "The lingo and paperwork are confusing, they come with 17 people and you are there by yourself."

Communication:

- "right now I come in doing all the communications to get information"

Tracking

Have the Right Text
"Overuse Injuries"

Overall Problem: Joint Pain & Activity

- **Target Audience: Athletes**
  - Health conscious
  - Disciplined

- **Problem: Overexertion and aggravation of injury among athletes**

Pictures are Good

Contextual Inquiry

- Dancers
  - Use of entire body
  - Diverse Injuries
- Observation
  - Warmup
  - Preventative Habits

Pictures are Good

Contextual Inquiry

4 Locations

- Odegaard Library
- CSE Undergraduate Labs
- Mercer Court
- Yunnie Bubble Tea (Ave)

3+1 Approaches

- Observation + Interview (3x)
- Interview-only (2x)
- In-group Interview (1x4)
- \+ Online Survey (16x)

Contextual Inquiry

Pictures are Good

- People do not want to be interrupted or distracted
- Most people do not have a liquid intake plan
- People often reach for soda, coffee, or other beverages when they feel thirsty

Pictures are Good

NounProject

Contextual Inquiry

Professional (20-40s)

Family

Undergrad Student

In-Line References Versus Bibliography Slide

15% of Americans between the ages of 20 and 69 experience hearing loss that may have been caused by **noise at work or during leisure activities.**

(http://www.nidcd.nih.gov/health/hearing/pages/noise.aspx)

Motivation of Participants

Very noisy work environment

Some control over exposure levels

Moderately noisy work environment

Lacks control of his noise exposure

Dartmouth student who is exposed to **noisy social environments** multiple days per week

Has control over exposure levels

Focus on the Right Thing

Contextual Inquiries

Suzzallo Library

Husky Union Building

Paccar Hall

One person still uses food journaling consistently and has a positive experience.
One person stopped food journaling because she reached her goal and had a nutritionist.
The third person loves taking pictures of her food and just seeing what she's been eating.
Had them take us through their process during mealtime, motivations, difficult, benefits

Watch the Selling

We can help

Short Tasks

Tasks

- Record mood reflections
- Discover triggers and warning signs
- Discover wellness strategies
- Planning for health
- Quick mood check-ins
- Aid your health professional

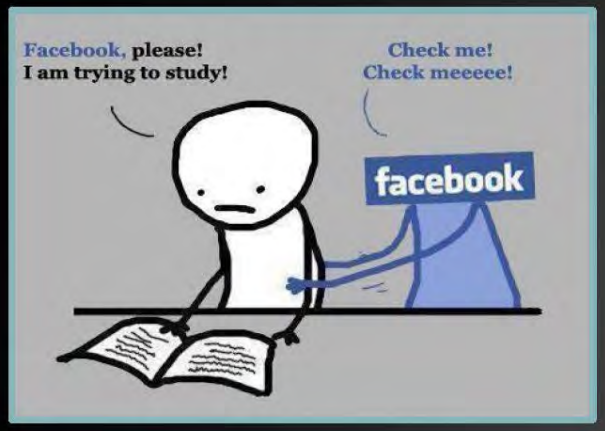
Short Tasks

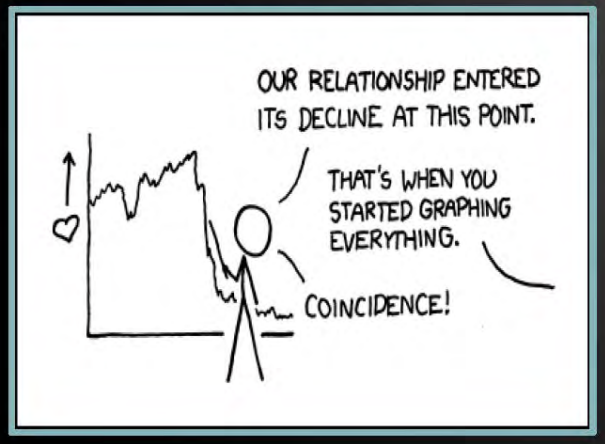
Tasks

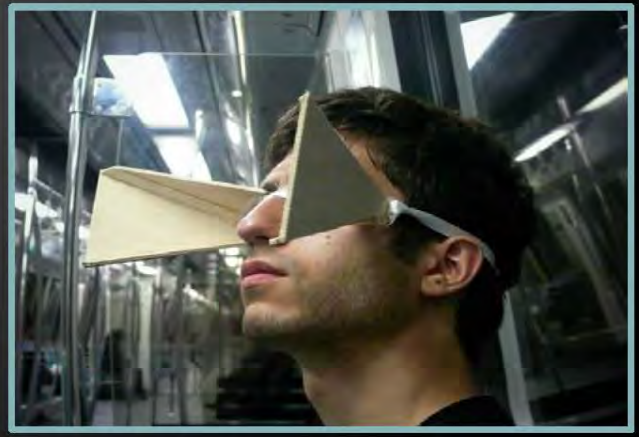
1. Engage a work session.
2. Record digital and non-digital behavior.
3. Prompt for taking breaks.
4. Reflect on recorded data relative to time and location.
5. Find a productive work place.
6. Find and implement methods/strategies to stay focused.

Distracting

Tasks







Speaking of Distractions

Whether correct or not, many things distract

- Plural possessive
- *a posteriori*

Anything else that might be distracting

- Too hilarious
- Too close to being inappropriate

Original Tasks

Current Tasks:

- Aggregate and collect all IEP information for continuity and stakeholder accessibility.
- Encourage communication between stakeholders.
- Connect with other parents who have children with similar disabilities.

New Tasks:

- Access mini lessons to support the developmental master of IEP tasks.
- Motivational rewards system to encourage students to be active in their IEP.
- IEP videos for parents to understand how to best advocate for their child.

Initial Tasks

Task Groups

1. Tracking liquid intake over time *(Easy)*
2. Education on hydration (Easy)
3. Convenient reminders to drink water *(Medium)*
4. Smart beverage suggestions *(Medium)*
5. Finding motivation for drinking water *(Hard)*
6. Accurate dehydration detection *(Hard)*

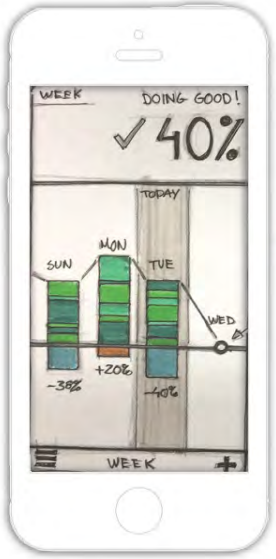
Verb as Task

Adjust budget between different categories.

Verb as Task

Designate spending as discretionary.

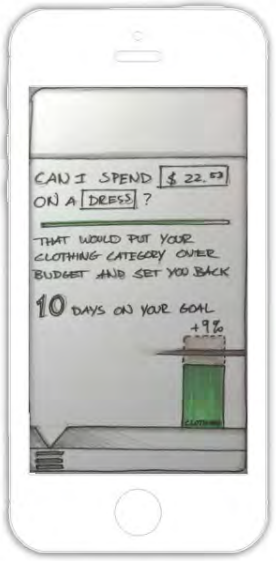
Verb as Task



Review spending **progress** compared to goals.

Account for **future** spending.

Prevent **unwanted** habitual spending.



Check if a potential purchase **fits the budget**.

Consistency of Emphasis

Many people make **general** budgeting goals.

Large items are monitored.

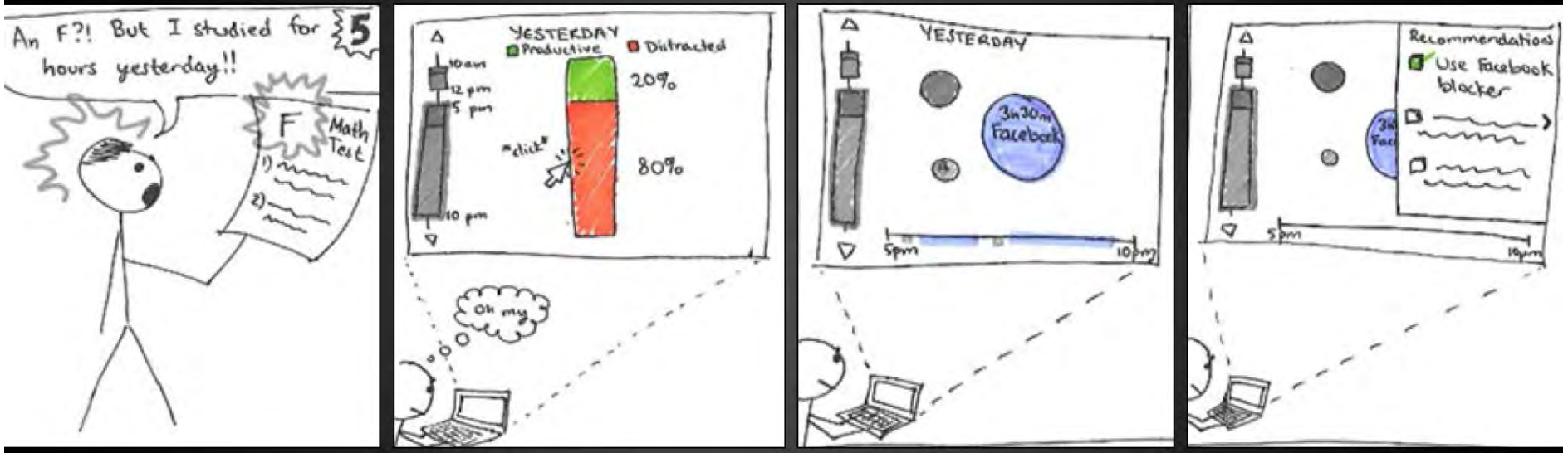
Small items cumulative impact **not considered**.

Challenging setting up budgets.

Complicated input leads to **less use**.

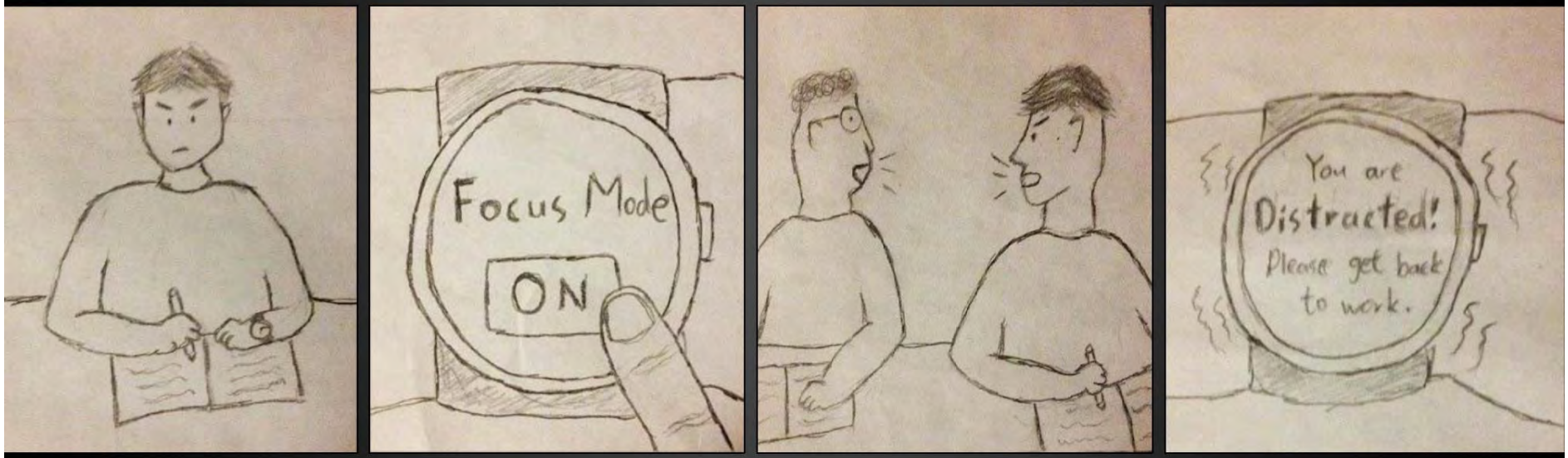
Consistency of Emphasis

Task: **Reflect** on recorded data relative to time and location



Consistency of Emphasis

Task: Find and implement methods/strategies to reduce distractions and increase focus



Design 1

Naming Designs

Pre-shopping

Naming Designs

Tracking Liquid Intake

Education on Hydration

Convenient Reminders

Smart Beverage Suggestions

Design 1

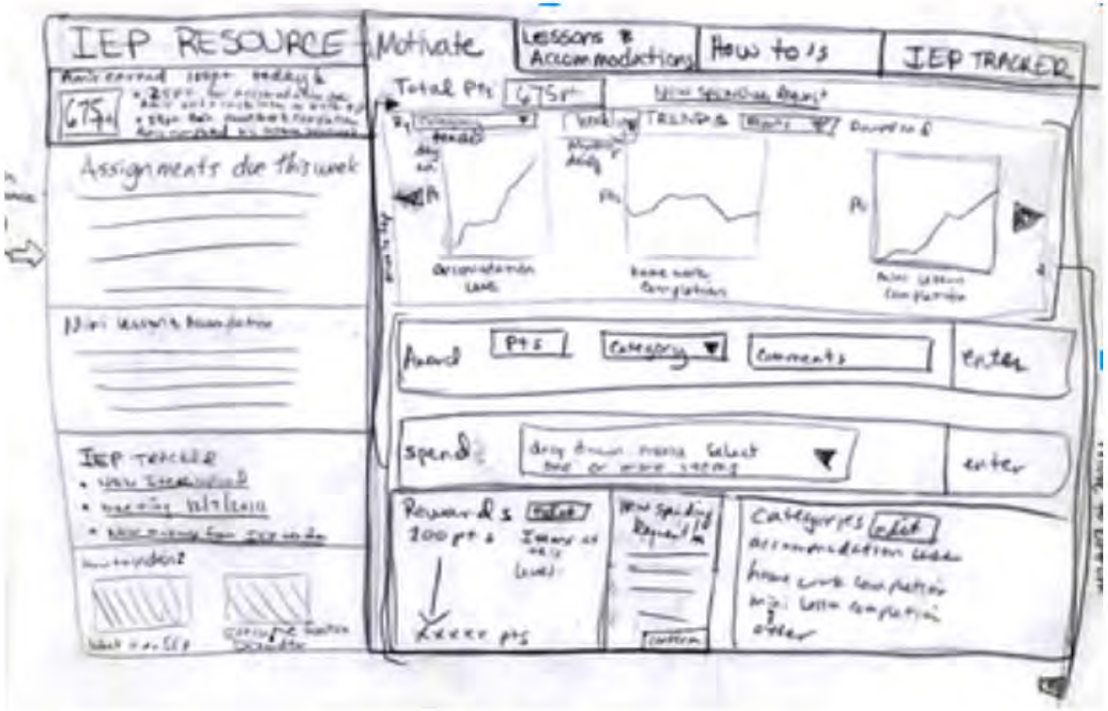
Sensor Ball with Mobile App

Naming Designs versus Slide Title
Hierarchy of Information

Sketch 3

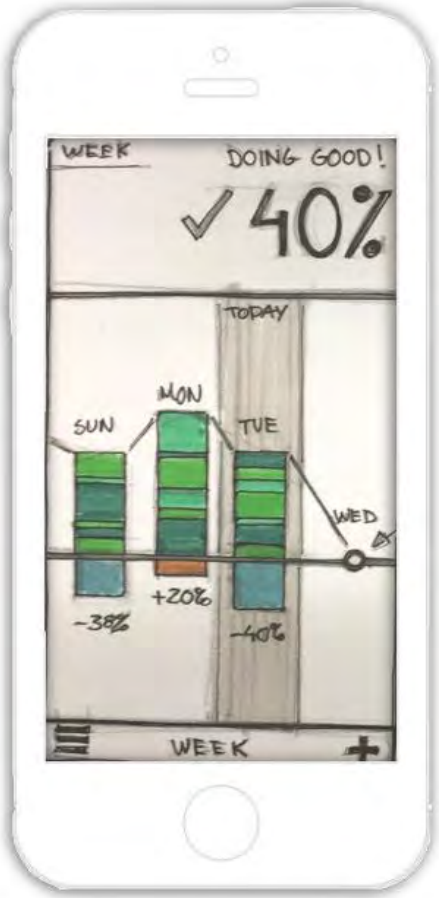
Main Focus:
- Student Motivation

Key Features:
- Mini lessons accessible for the student and parent to work on
- Points awarded for completion of task on the website
- Spending points for various rewards



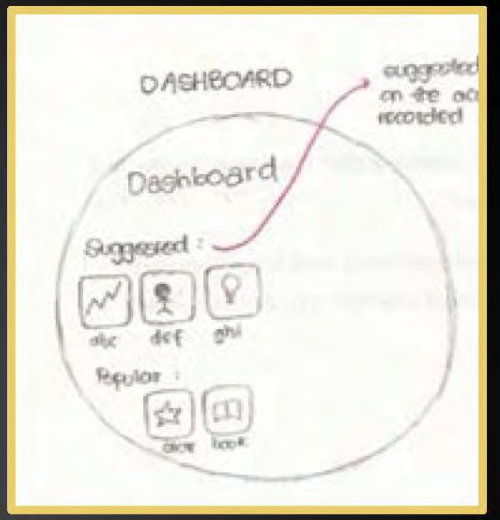
Design 1

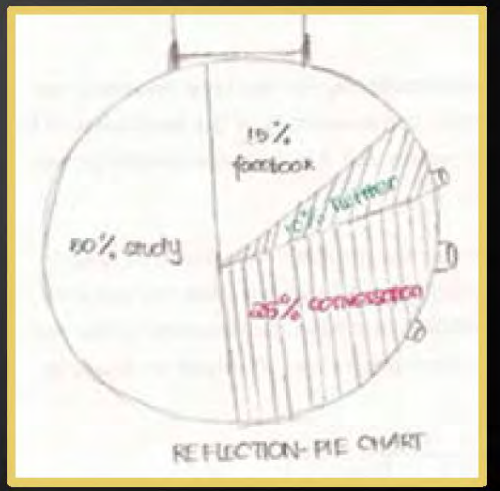
Legibility of Sketches



Blurry Images

Design 3





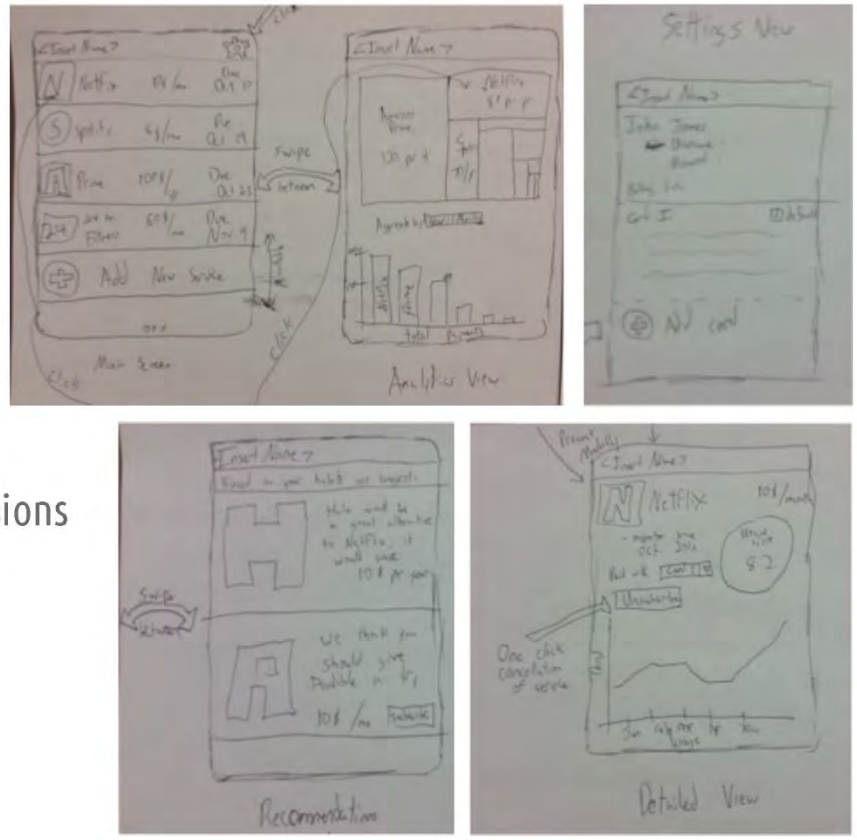
Low Contrast Images
Low Contrast Text

Updated Sketch

Two Tasks

- Recurring subscription management

- Insight and informed decisions



Tasks

Distracting Background

Categorize Time Spent

What qualifies as work or play?

Set Goals For Each Category

How much time should you spend on each activity?

Share Schedule and Free Time

Who should be notified?
Who is free right now?

Decide What To Do While Waiting

What can get accomplished within that time?

Adapt Correctly To Schedule Changes

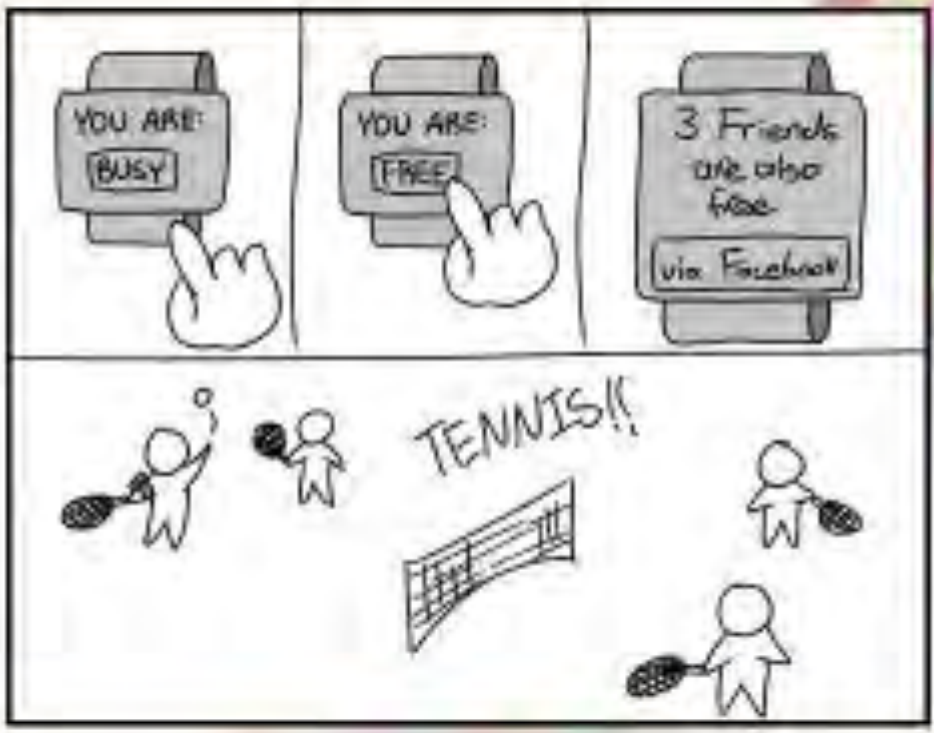
What can be pushed back and what has a solid deadline?

Get Reminders for Flexible Tasks

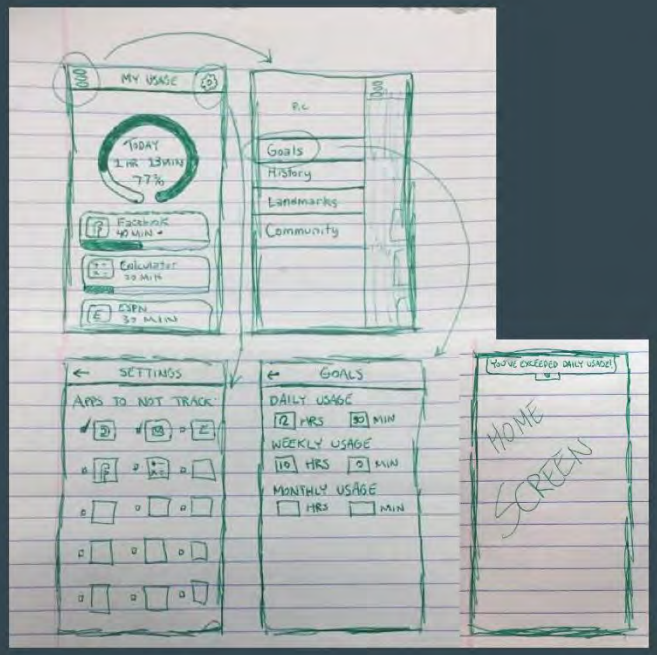
When is the best time for lunch?

Storyboards

Star People!
Hard to Follow
on a Single Slide



Selected Design



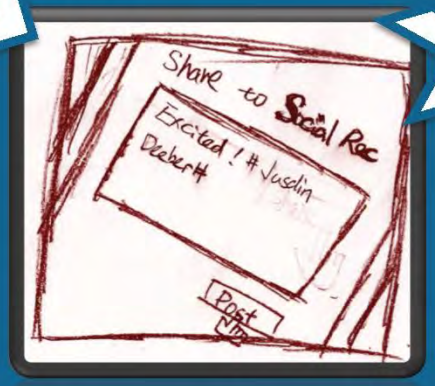
- Simplest overall design of the three
- Most aesthetically pleasing due to effective organization and spacing
- Easy way to set goals without any outside pressure on what you choose
- Firmly addresses the most important user need of tracking overall usage

Easier to Follow
Size / Clutter

Storyboard 2:

1. David likes the new song released recently, so he shares it on the SR app

2. When he posts it, he adds tags and defines the group of people he wants it to be seen



3. Daniel then gets a message showing that David likes the music

4. Daniel then messages David about his idea of the song

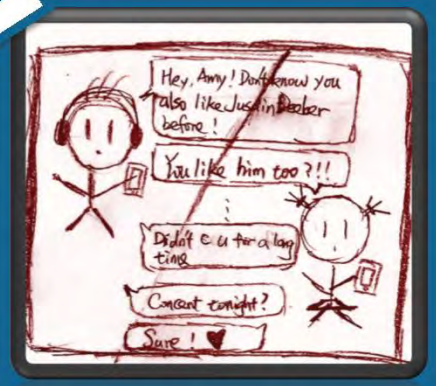
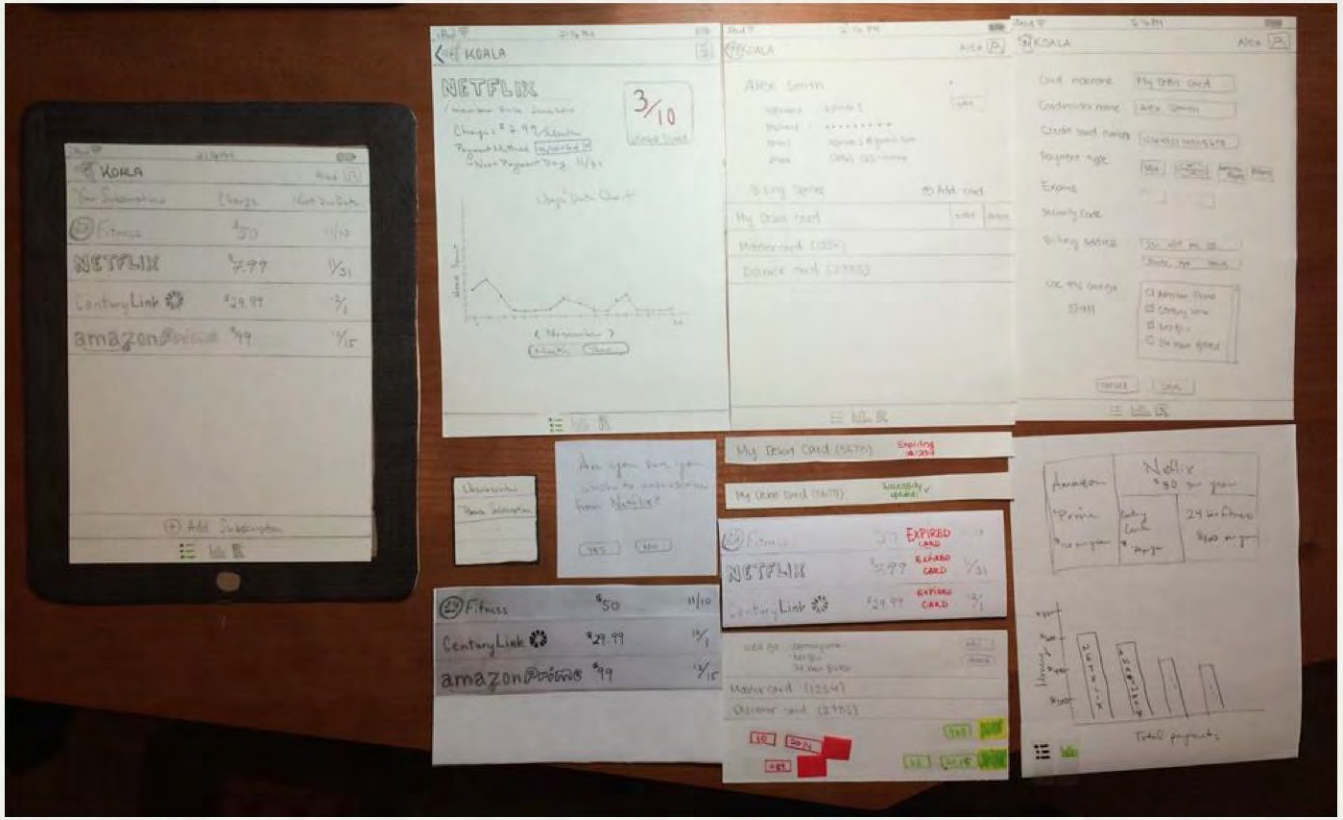


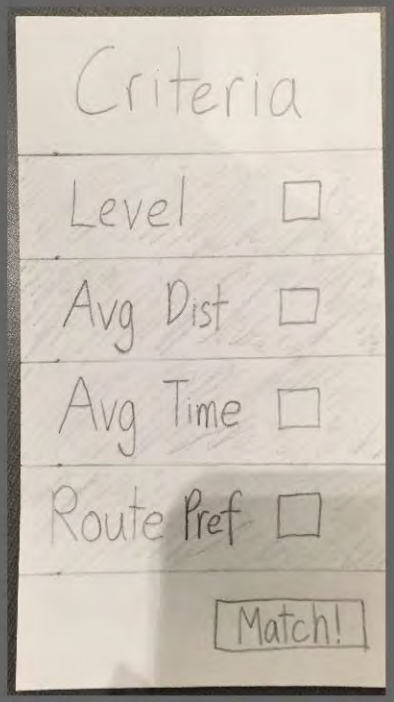
Image Contrast and Scale

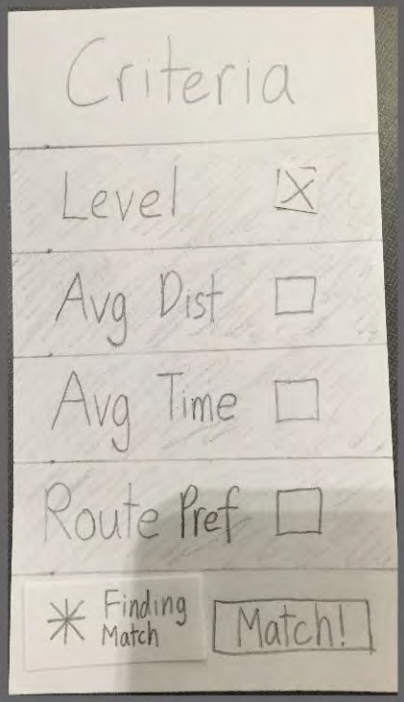
Initial Paper Prototype

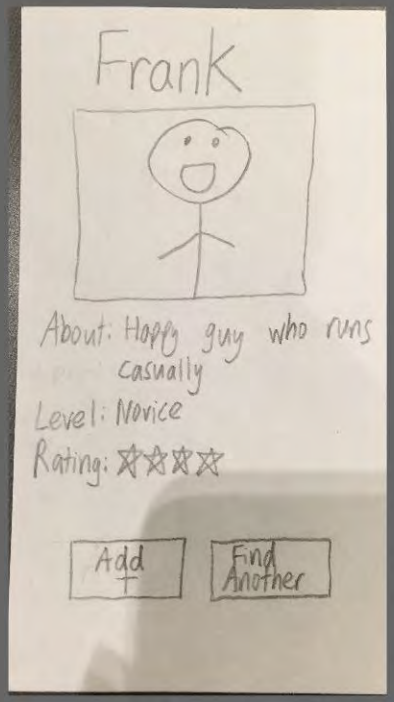


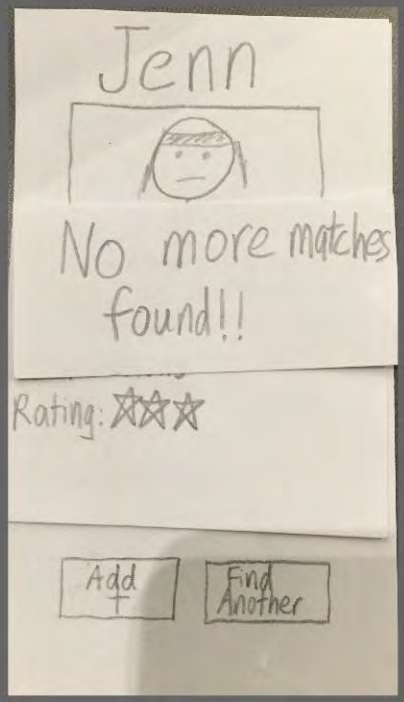
Initial Paper Prototype

Task 1: Finding a SmartMatch





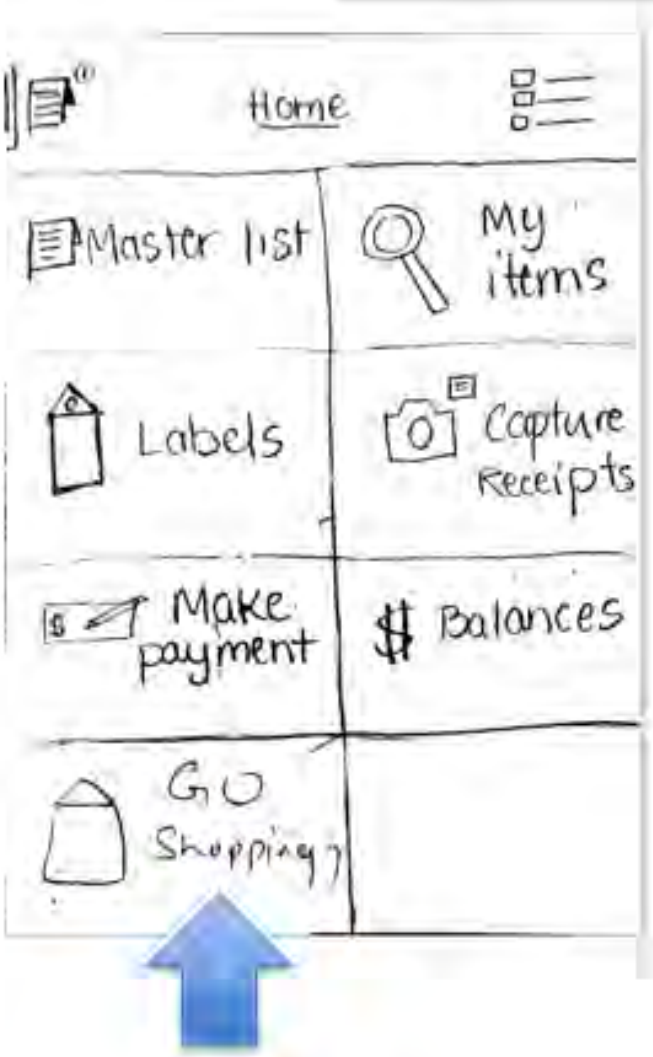




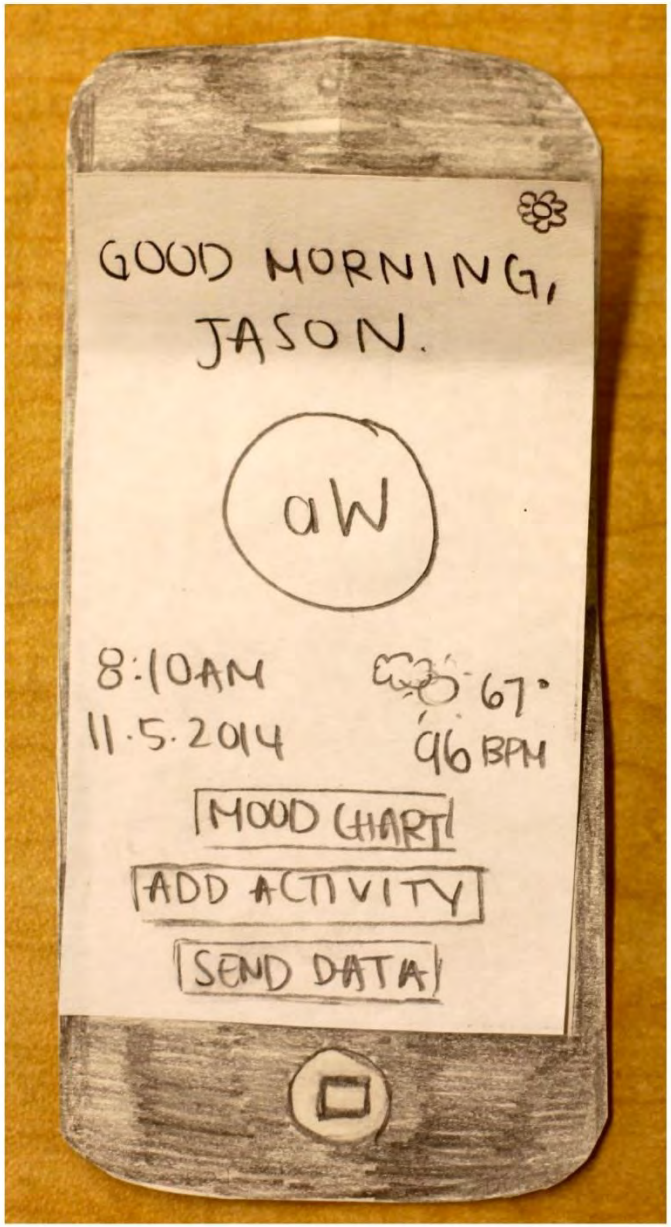
Testing - Results

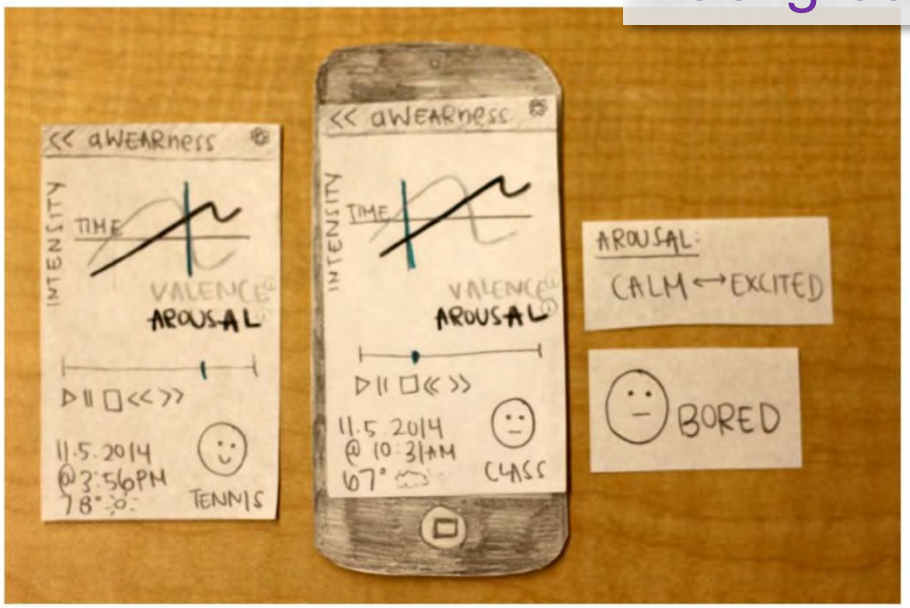
Artificially Increase Contrast

- **Heuristic Evaluation**
  - High Severity Issues
  - Example: "Go Shopping" mode was useless
- **User Testing**
  - High and Medium Severity Issues
  - Example: Takes too long to get to "Add Item"
- **Design Mockup Critique**
  - Low Severity and Aesthetic Issues
  - Example: Home screen too cluttered



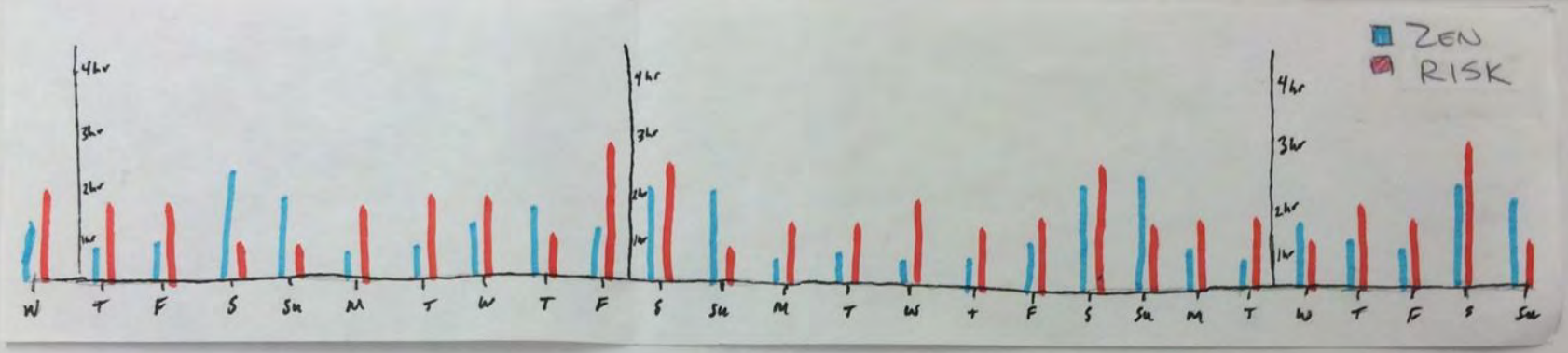
Background

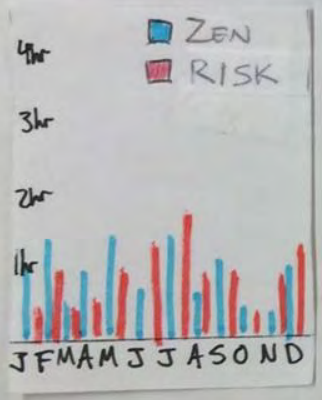

GOOD MORNING, JASON.
aW
8:10AM
11.5.2014
67°
96 BPM
MOOD CHART
ADD ACTIVITY
SEND DATA

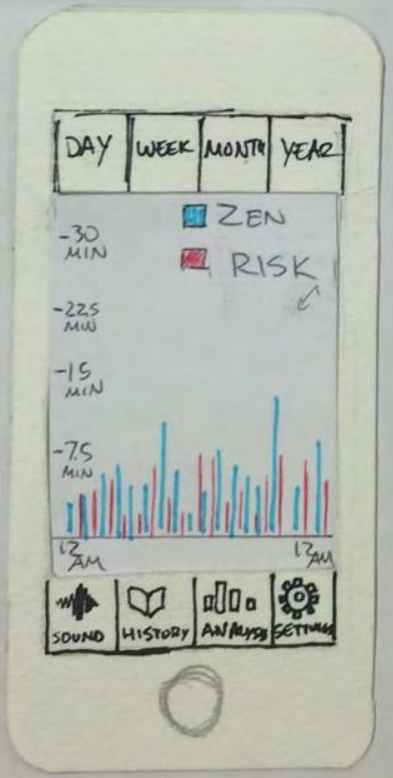

<< aWEARness
INTENSITY
TIME
VALENCE
AROUSAL
11.5.2014
@3:56PM
78°
TENNIS
<< aWEARness
INTENSITY
TIME
VALENCE
AROUSAL
11.5.2014
@10:31AM
67°
CLASS
AROUSAL:
CALM ↔ EXCITED
BORED

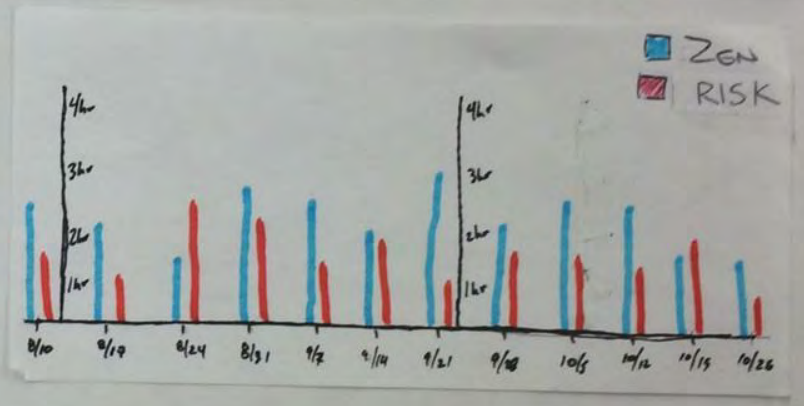
<< ADD ACTIVITY
Activity:
Starting date:
MM/DD/YY
Starting time:
HH : MM
AM
PM
Duration:
min
ADD
<< Calendar
Activity added
OK
<< Day
Wednesday November 12, 2014
3 Tennis Practice
6 Icecream Social

Background


ZEN
RISK
4hr
3hr
2hr
1hr
W T F S Su M T W T F S Su M T W T F S Su M T W T F S Su


ZEN
RISK
4hr
3hr
2hr
1hr
J F M A M J J A S O N D

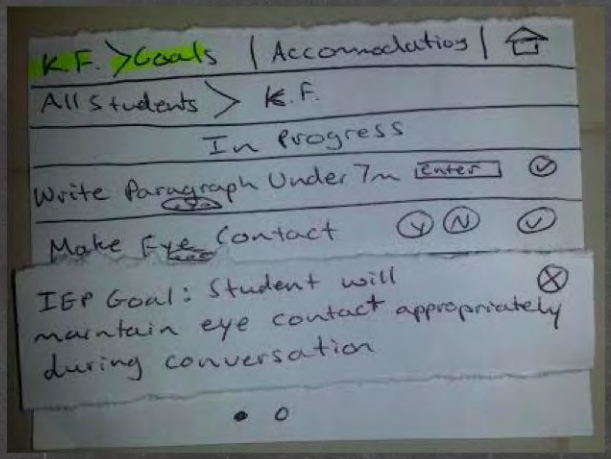

DAY
WEEK
MONTH
YEAR
ZEN
RISK
-30 MIN
-22.5 MIN
-15 MIN
-7.5 MIN
12 AM
12 AM
SOUND
HISTORY
ANALYSIS
SETTINGS

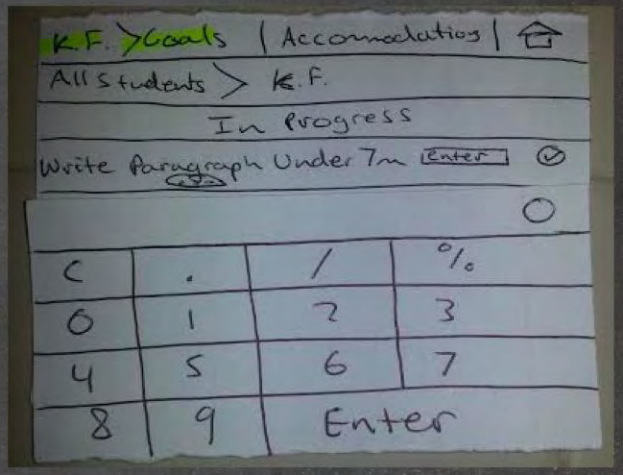

ZEN
RISK
4hr
3hr
2hr
1hr
8/10 8/17 8/24 8/31 9/7 9/14 9/21 9/28 10/5 10/12 10/19 10/26

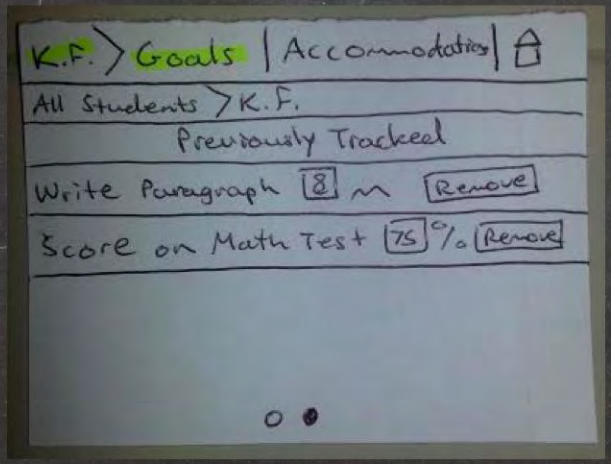
Final Paper Prototype

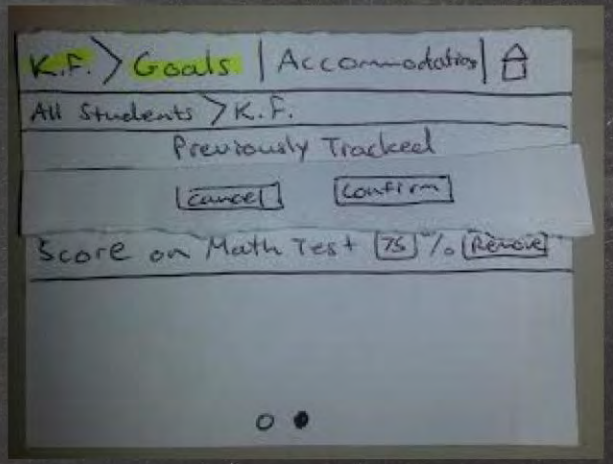
IEP-Connect Classroom

Many Screens on One Slide





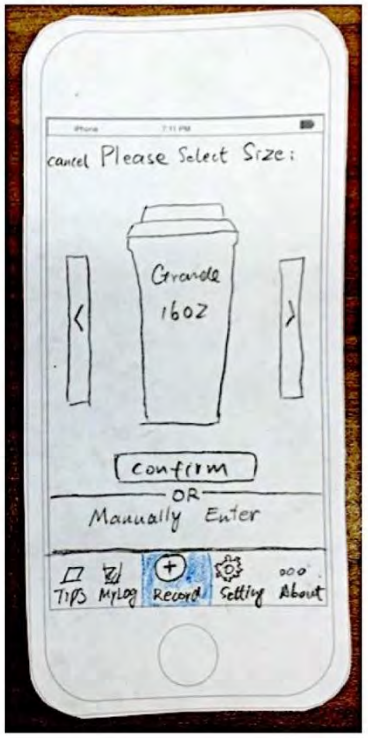


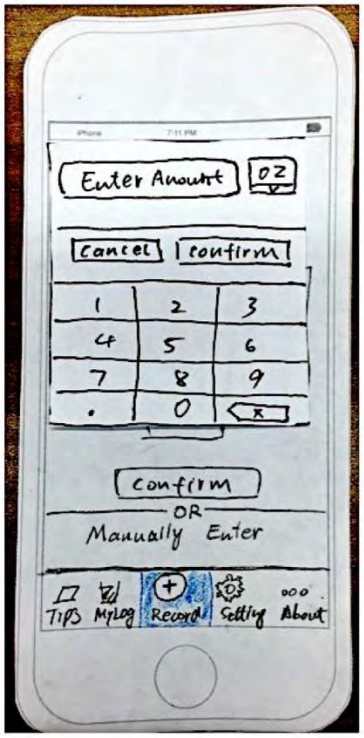


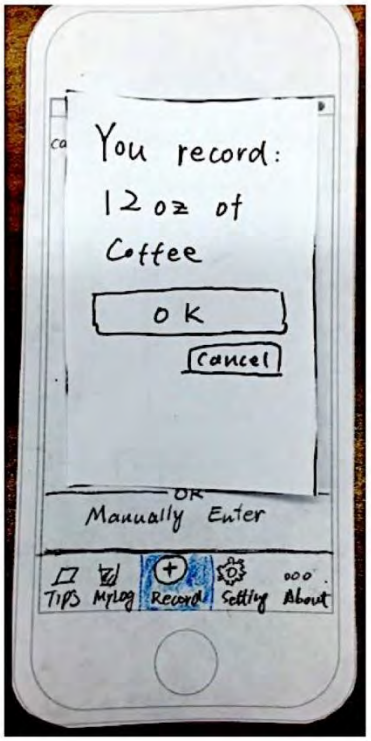
Final Paper Prototype

Task2 - Record Water Intake

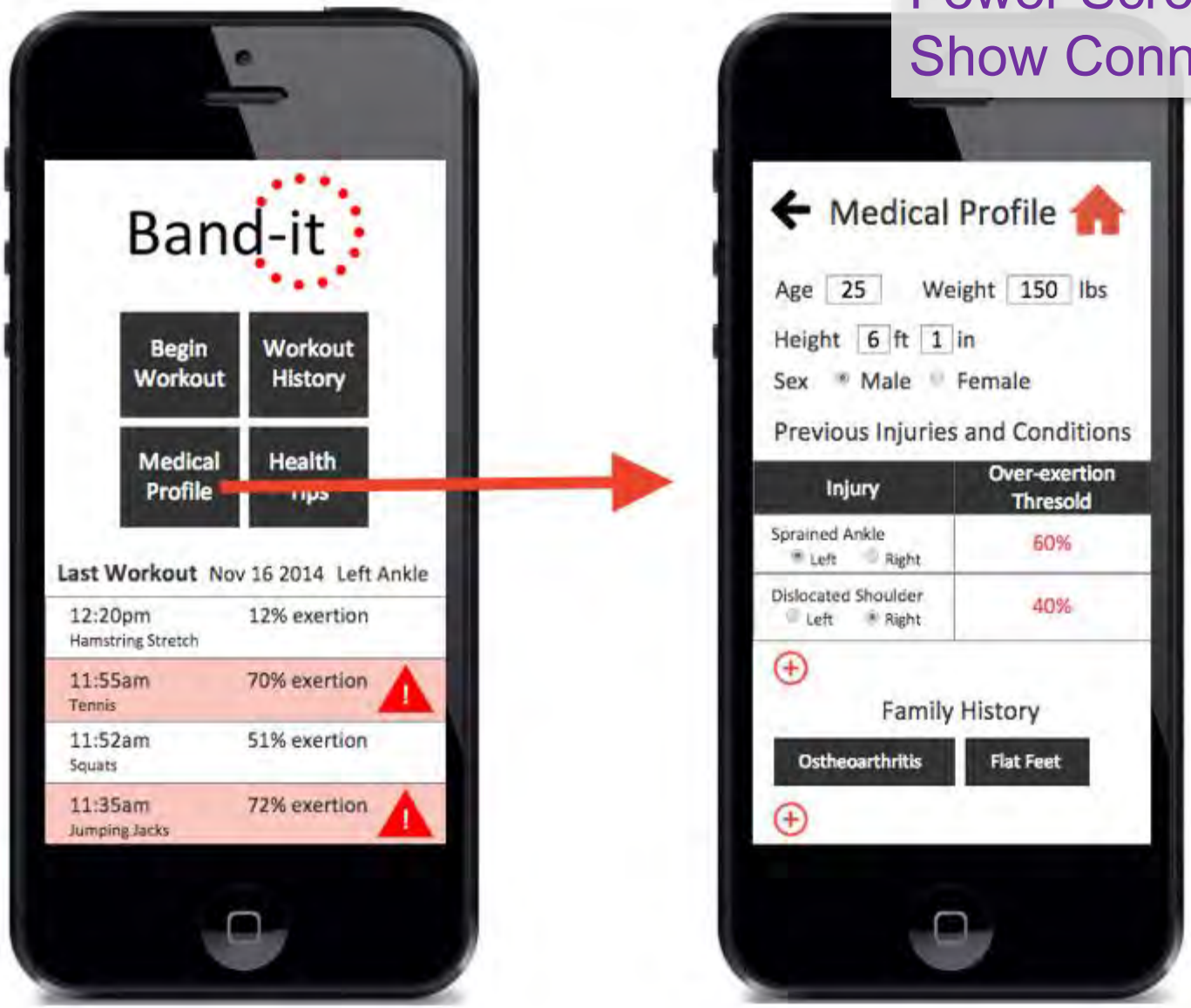
Many Screens on One Slide



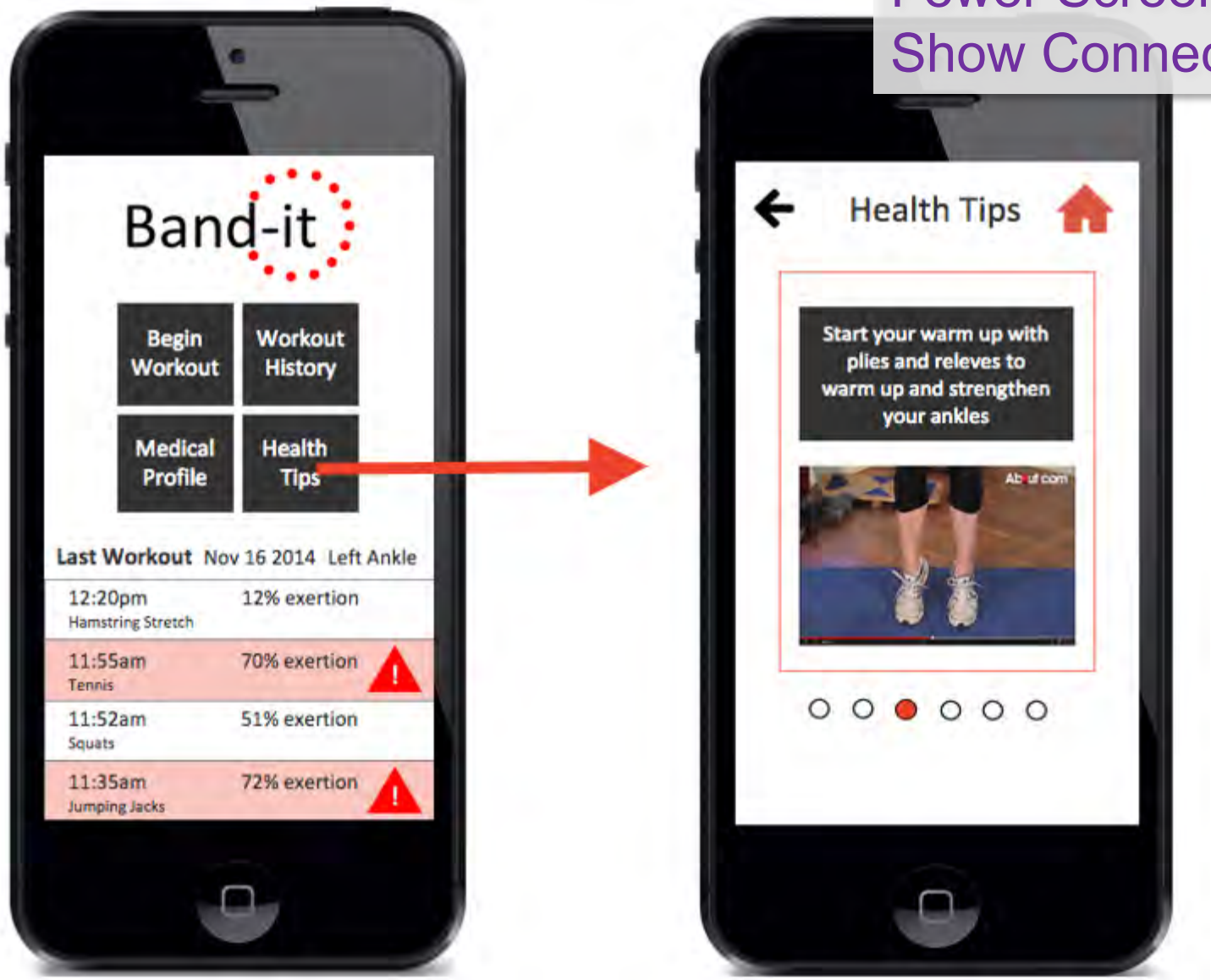




Fewer Screens, Show Connections

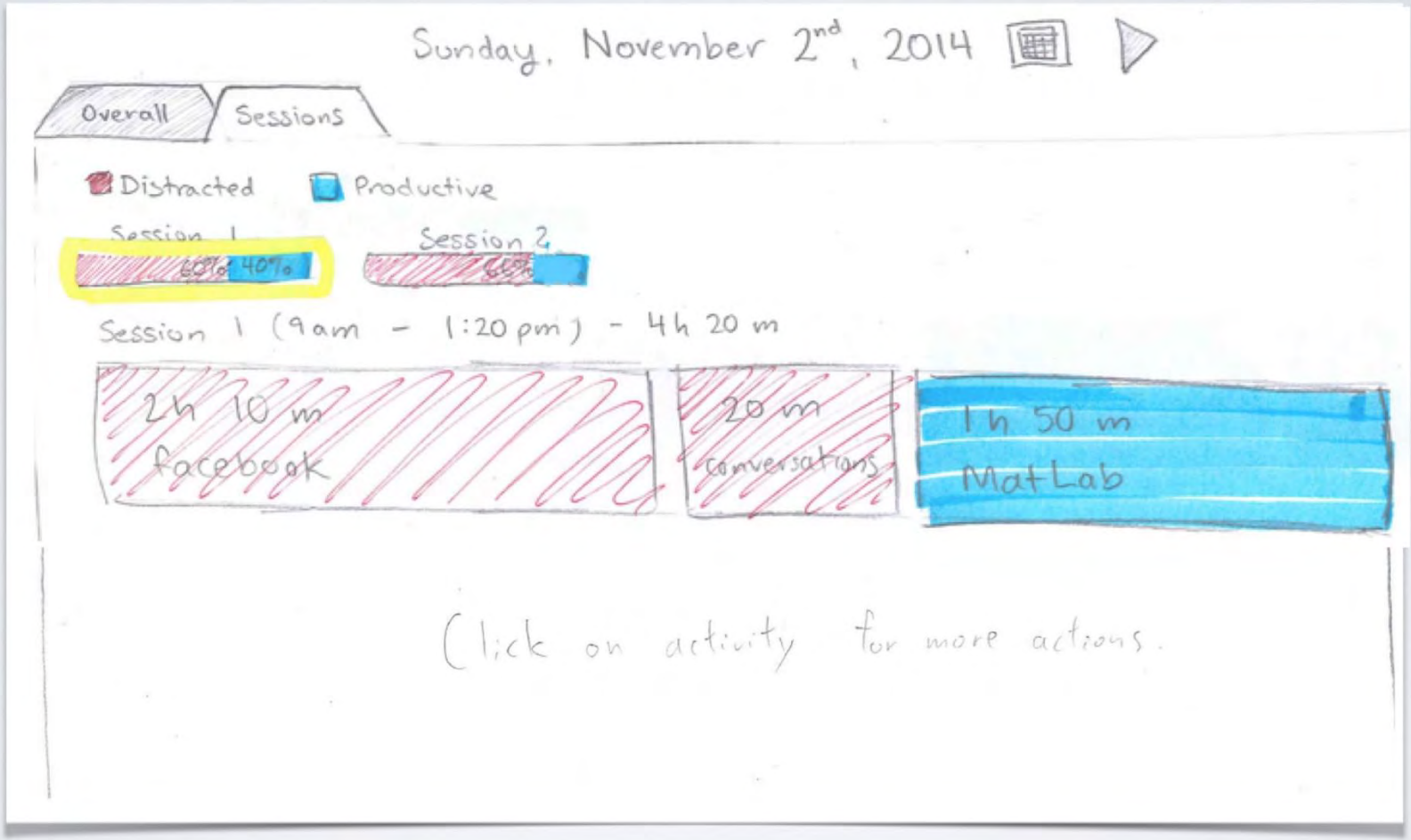


Fewer Screens, Show Connections



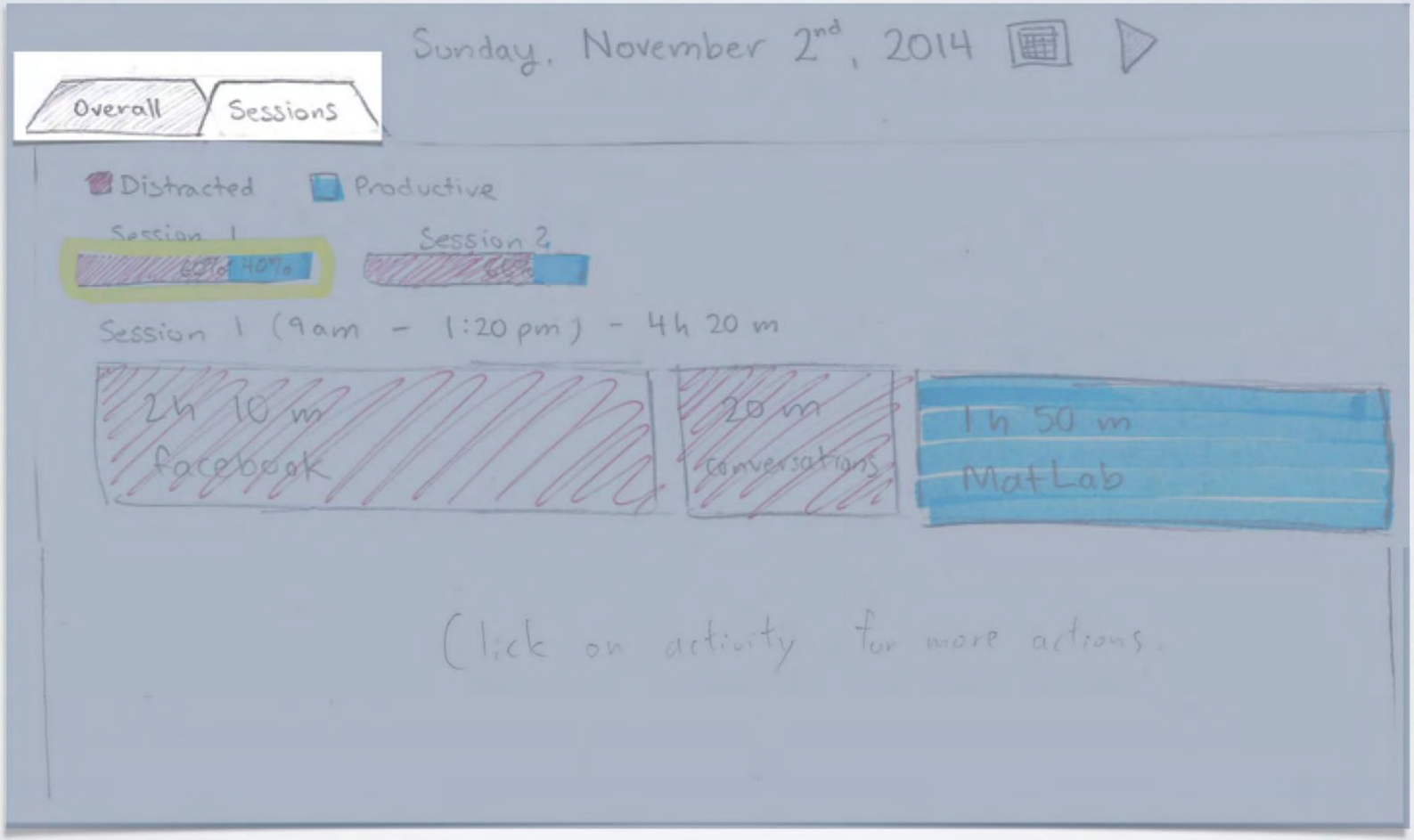
Highlighting

IMPROVED DESIGN



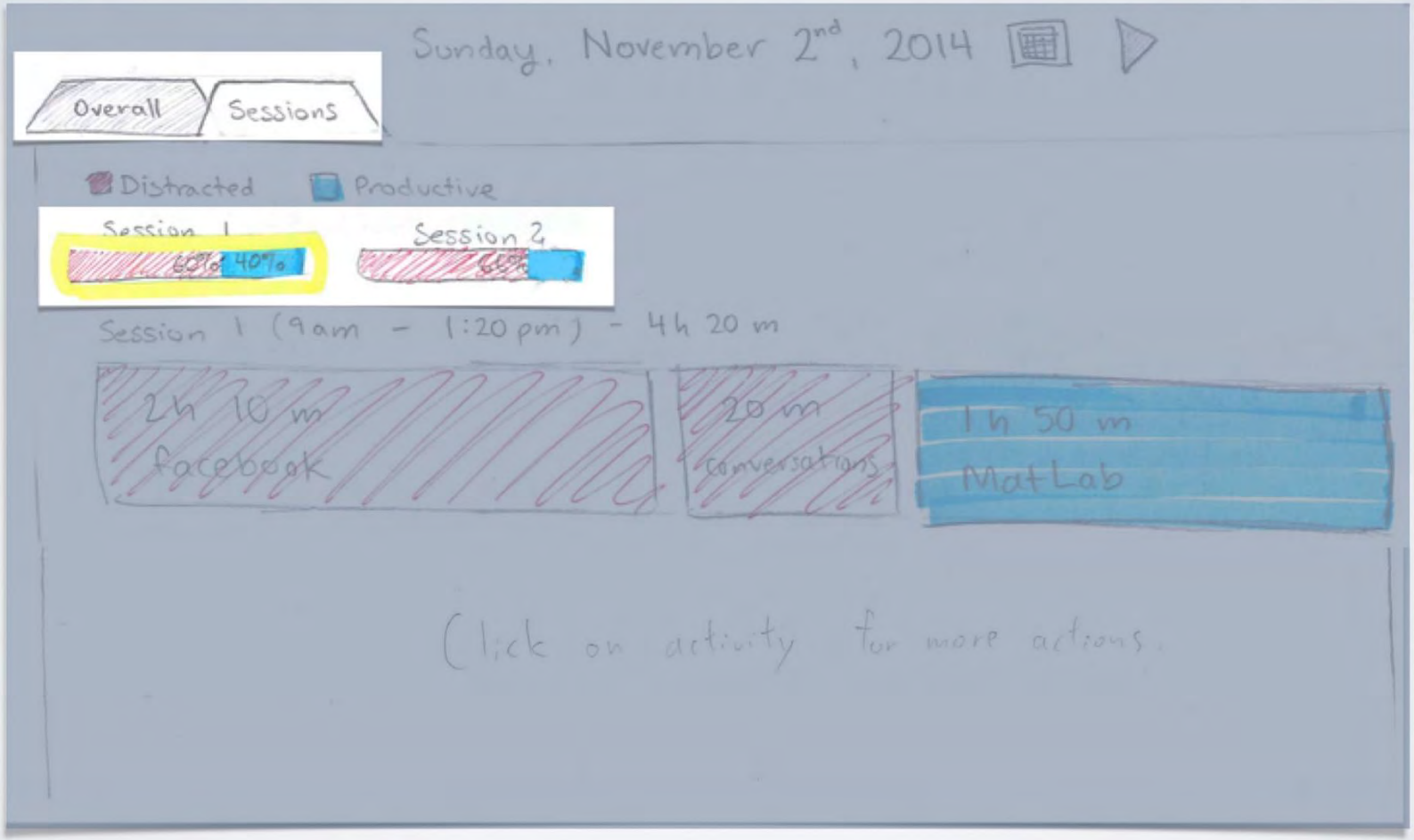
Highlighting

IMPROVED DESIGN



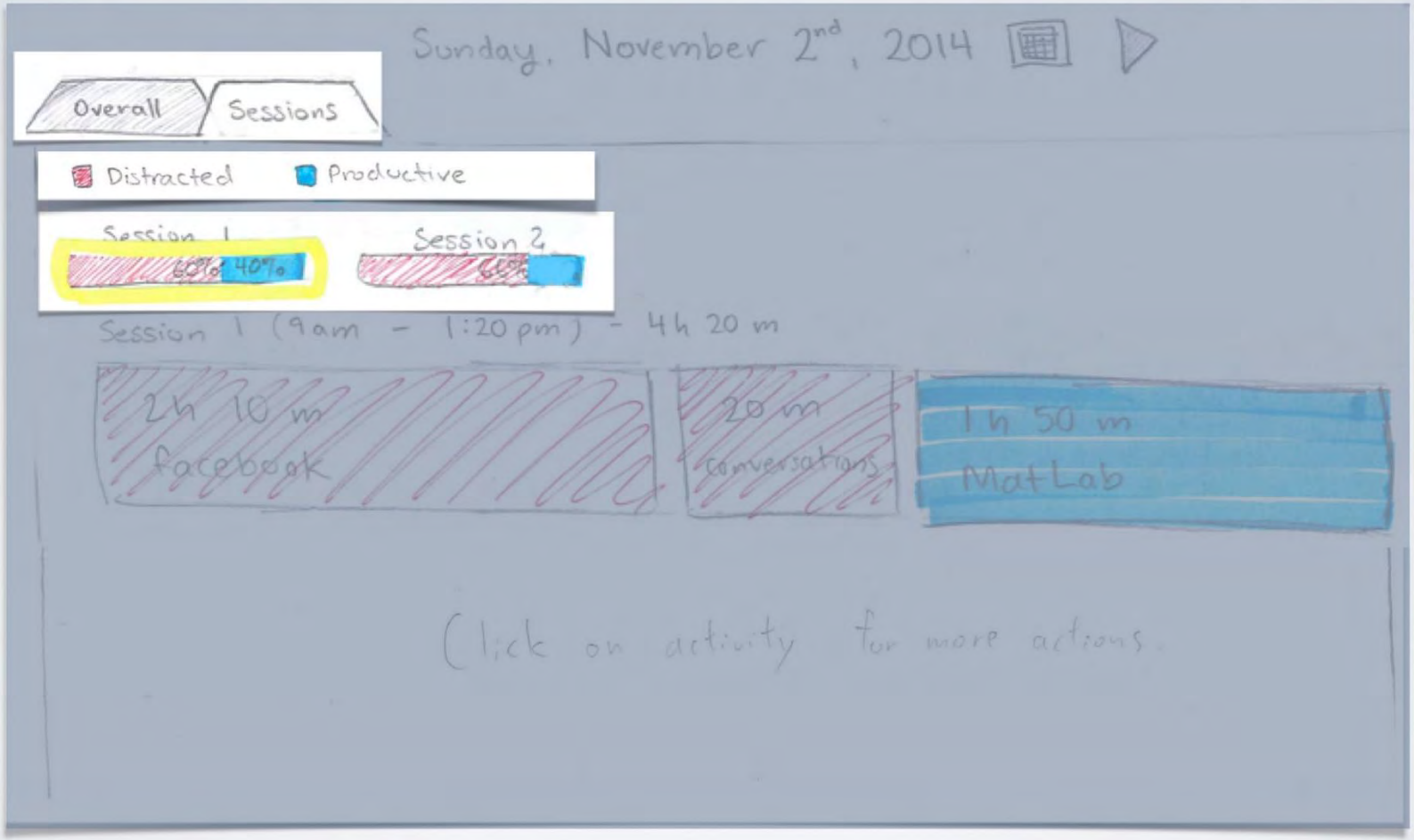
Highlighting

IMPROVED DESIGN



Highlighting

IMPROVED DESIGN



Highlighting

IMPROVED DESIGN

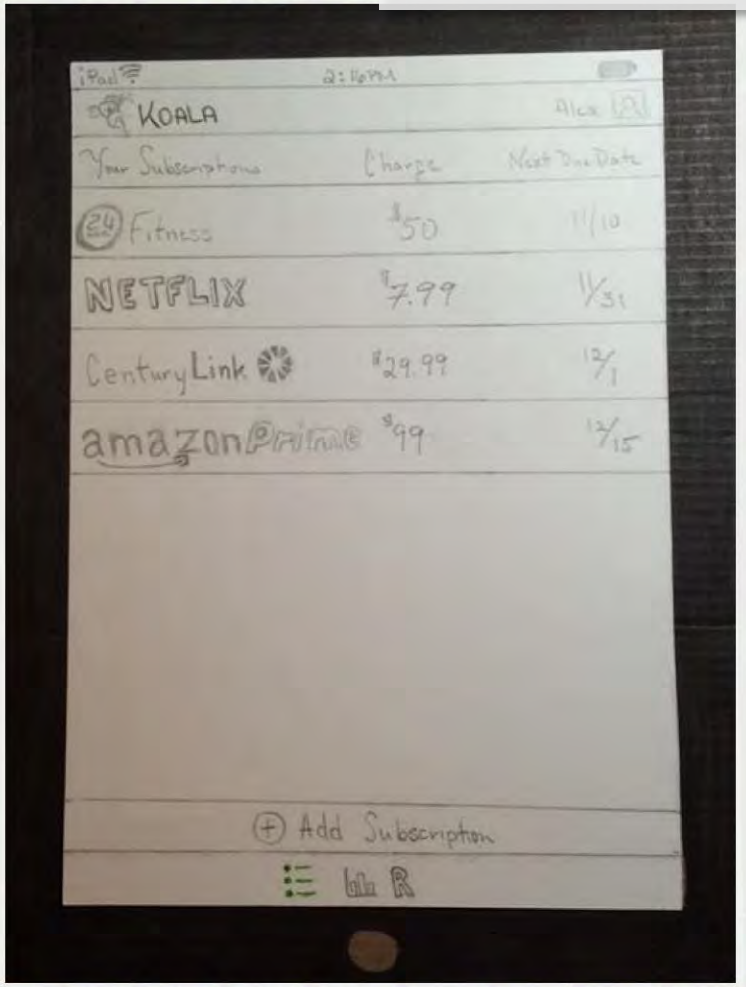
Highlighting

IMPROVED DESIGN

Initial Paper Prototype

Task 1: Is Netflix worth it?

1. **View the Koala homepage**
2. Navigate to Netflix Detailed View
3. View your Usage Score for Netflix
4. Go to Settings
5. Click “Unsubscribe”
6. Return to homepage

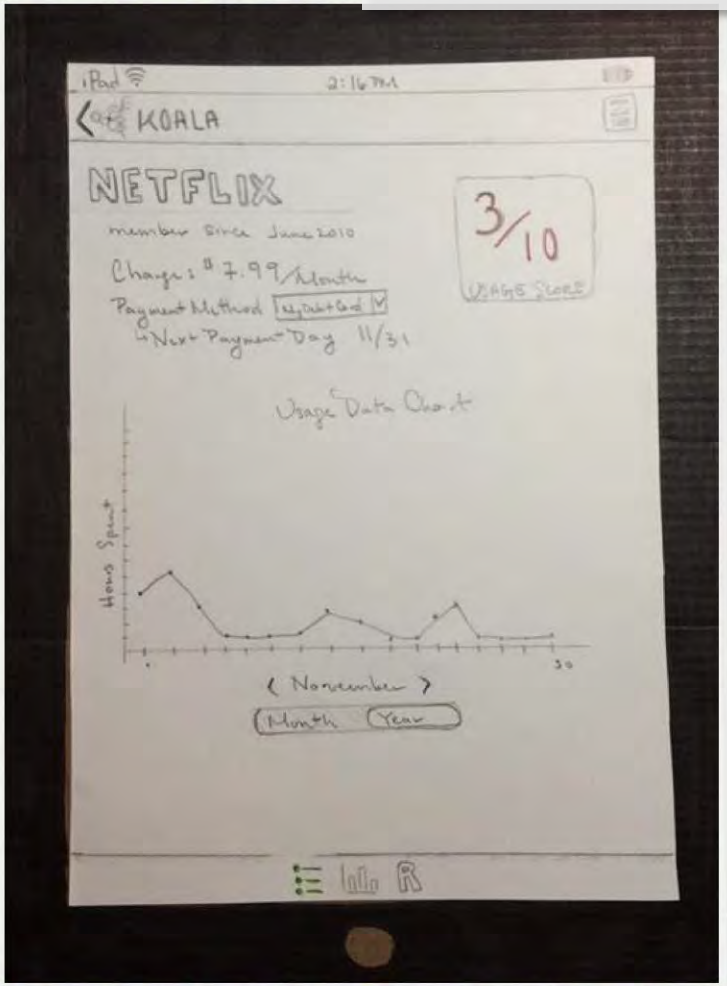


Transition as Animation

Initial Paper Prototype

Task 1: Is Netflix worth it?

1. View the Koala homepage
2. **Navigate to Netflix Detailed View**
3. View your Usage Score for Netflix
4. Go to Settings
5. Click “Unsubscribe”
6. Return to homepage

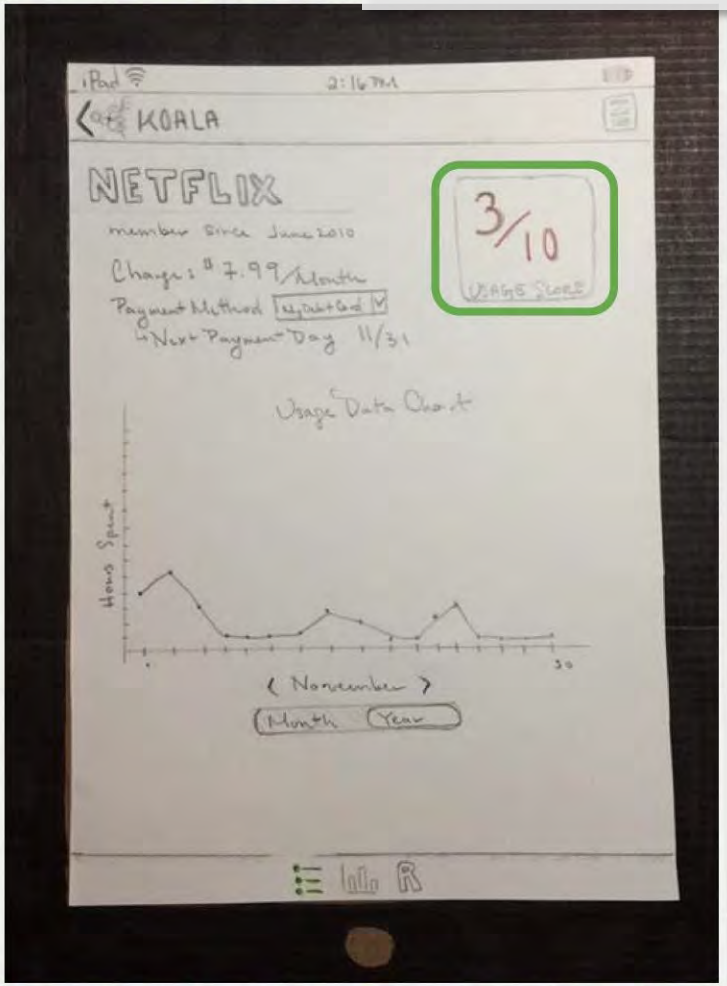


Transition as Animation

Initial Paper Prototype

Task 1: Is Netflix worth it?

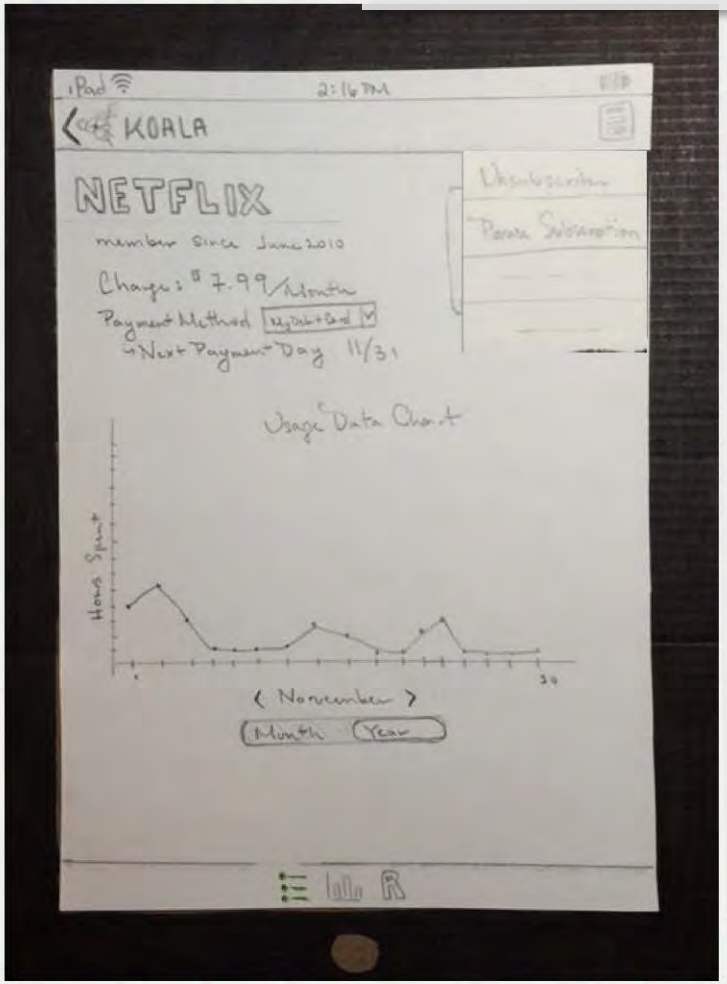
1. View the Koala homepage
2. Navigate to Netflix Detailed View
3. **View your Usage Score for Netflix**
4. Go to Settings
5. Click “Unsubscribe”
6. Return to homepage



Initial Paper Prototype

Task 1: Is Netflix worth it?

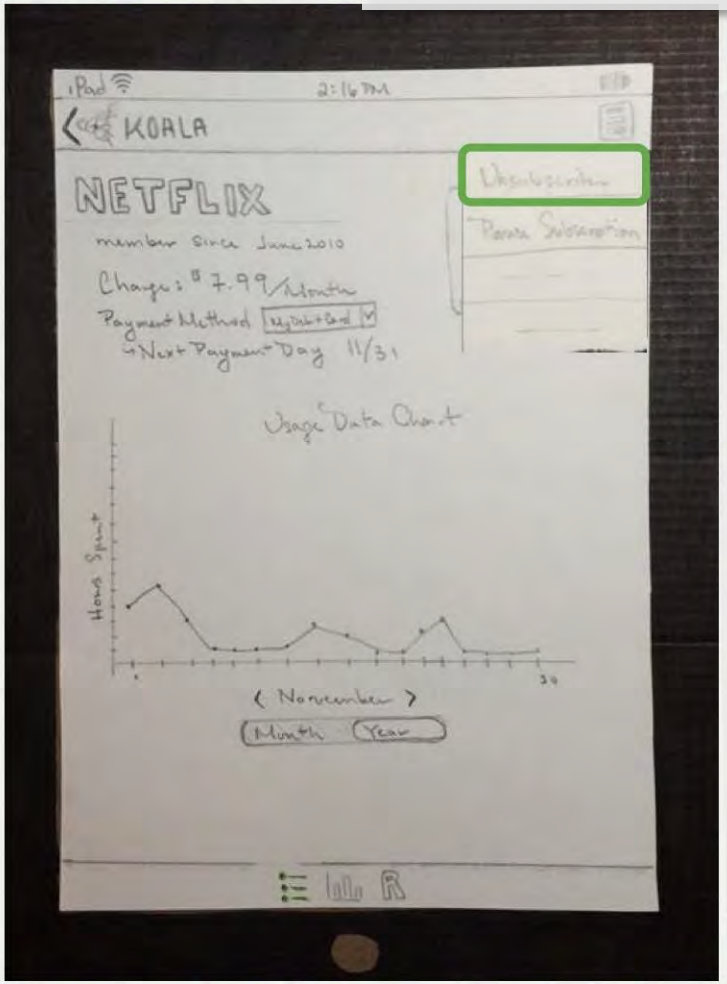
1. View the Koala homepage.
2. Navigate to Netflix Detailed View
3. View your Usage Score for Netflix
4. **Go to Settings**
5. Click “Unsubscribe”
6. Return to homepage



Initial Paper Prototype

Task 1: Is Netflix worth it?

1. View the Koala homepage.
2. Navigate to Netflix Detailed View
3. View your Usage Score for Netflix
4. Go to Settings
5. **Click "Unsubscribe"**
6. Return to homepage

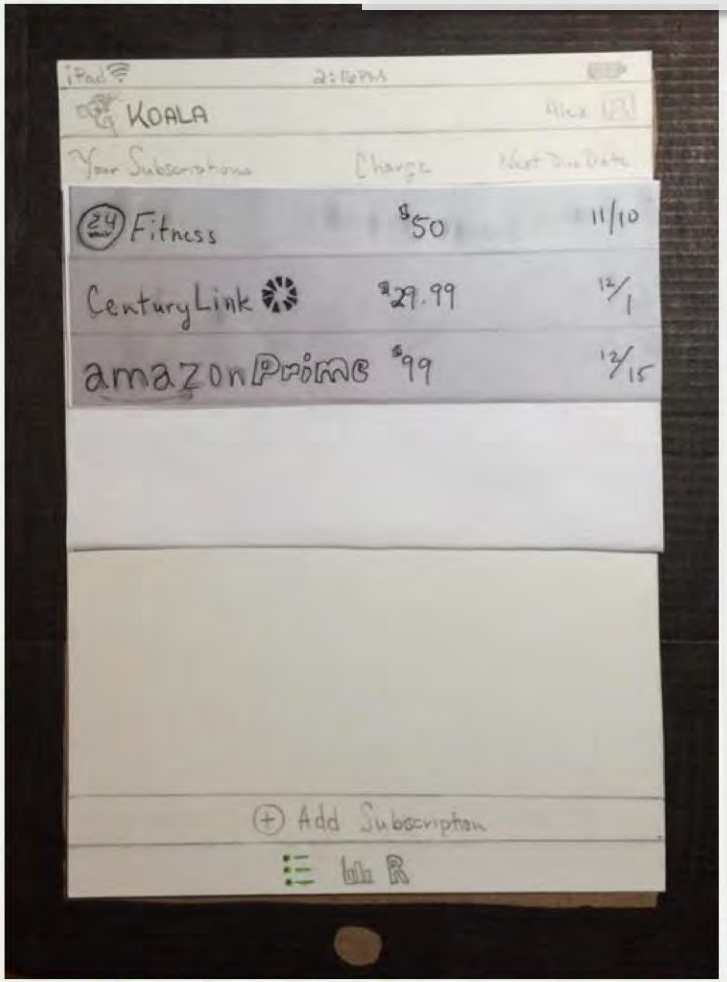


Transition as Animation

Initial Paper Prototype

Task 1: Is Netflix worth it?

1. View the Koala homepage.
2. Navigate to Netflix Detailed View
3. View your Usage Score for Netflix
4. Go to Settings
5. Click “Unsubscribe”
6. **Return to homepage**



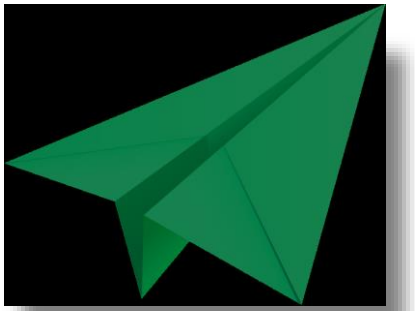
VIEWPROGRESS

Interface Animation

PROBLEM

Gratuitous Animation

~~LUNCH -$5.49~~
COFFEE **-$3.49**
MOVIES **-$11.20**
~~COFFEE -$3.89~~
~~ICE CREAM -$4.42~~
DINNER **-$7.79**
~~COFFEE -$4.89~~
BOWLING **-$10.20**
~~KIT KAT -$0.99~~
~~BRUNCH -$11.42~~
BEER **-$4.00**



Problem

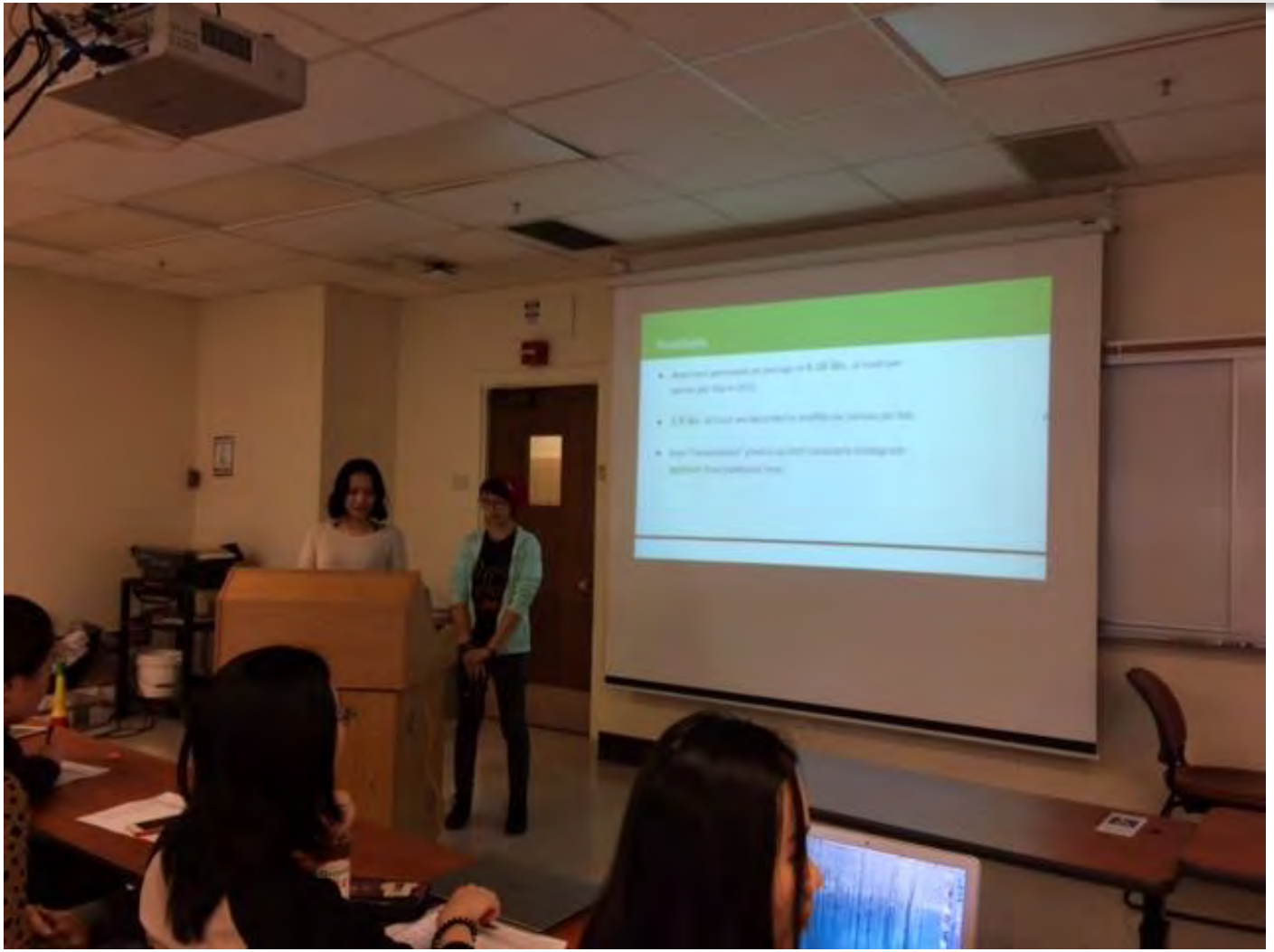
Check the Projector

A lack of awareness about the long-term implications of noise exposure

Finishing Slide

Delivery

Jessica and Jess



Timing

“An 8 minute time limit will be strictly enforced”

7:40	10:00
8:30	10ish
8:45	10:15
9:00	11:00
9:00	11:45
9:45	13:00

You have 7 minutes
We do not have this overflow

Today

Tips for Effective Presentations

Paper Prototyping

Testing

Ethics in Testing

Tasks in Testing

Objectives

Be able to:

In the language of sketching and prototyping, describe the purpose paper prototyping and the broader goal of low-fidelity prototyping

Describe stages of a usability test, discuss strategies and potential pitfalls in each stage

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

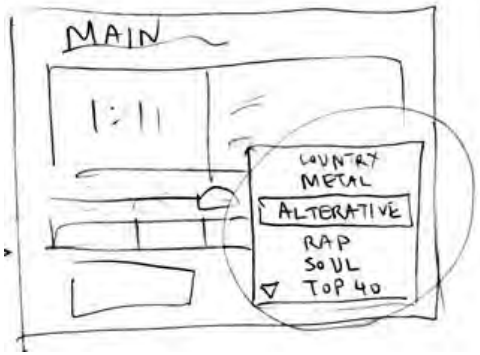
Fidelity in Prototyping

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

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

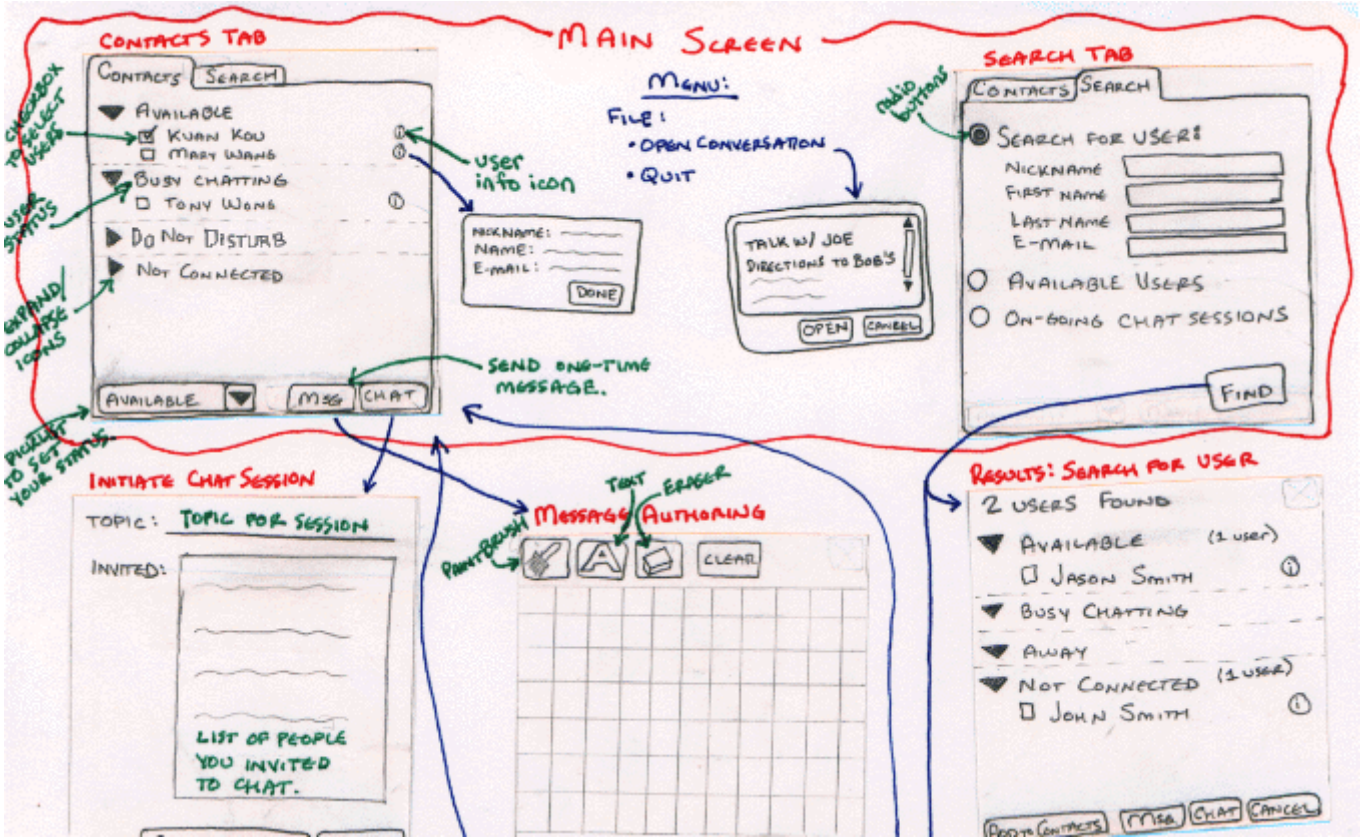
- Sketches → Evaluate → Iterate

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


CONTACTS TAB
MAIN SCREEN
SEARCH TAB
CONTACTS
SEARCH
AVAILABLE
KUAN KOU
MARY WANG
BUSY CHATTING
TONY WONG
DO NOT DISTURB
NOT CONNECTED
MENU:
FILE:
• OPEN CONVERSATION
• QUIT
USER INFO ICON
NICKNAME:
NAME:
E-MAIL:
DONE
TALK W/ JOE
DIRECTIONS TO BOB'S
OPEN
CANCEL
SEARCH FOR USER:
NICKNAME
FIRST NAME
LAST NAME
E-MAIL
AVAILABLE USERS
ON-GOING CHAT SESSIONS
FIND
AVAILABLE
MSG
CHAT
SEND ONE-TIME MESSAGE.
INITIATE CHAT SESSION
TOPIC: TOPIC FOR SESSION
INVITED:
LIST OF PEOPLE YOU INVITED TO CHAT.
MESSAGE AUTHORING
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

Basic Materials

Heavy, white paper

Index cards

Post-its

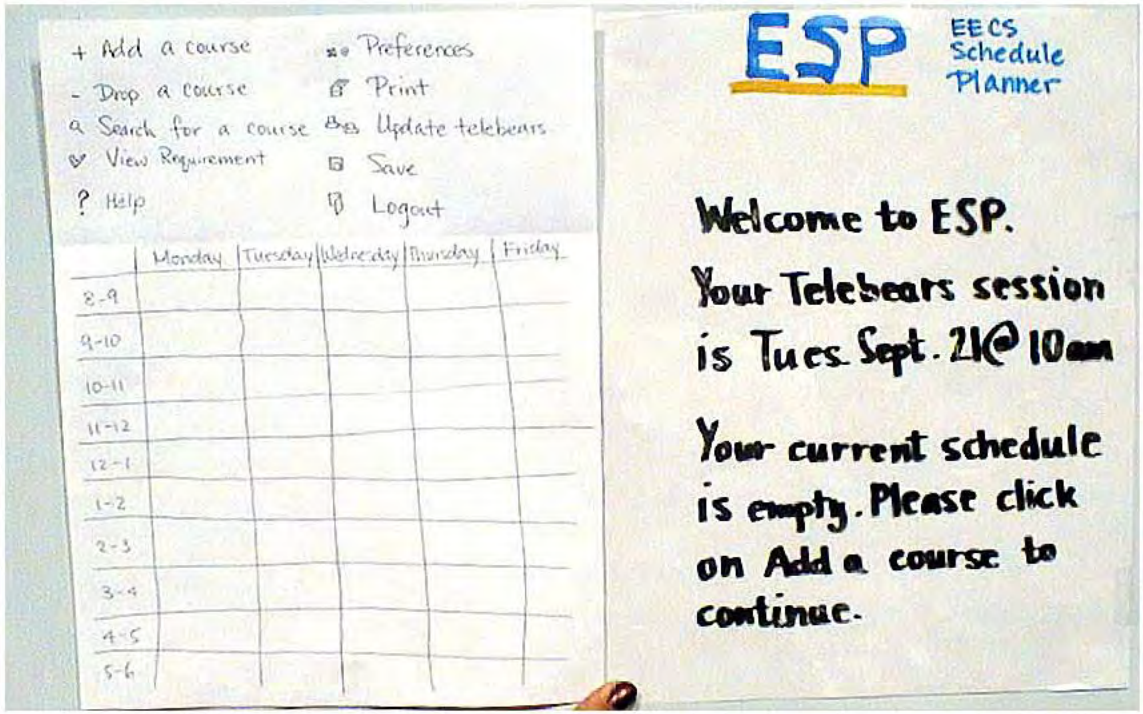
Tape, stick glue, correction tape

Pens and markers in many colors and sizes

Overhead transparencies

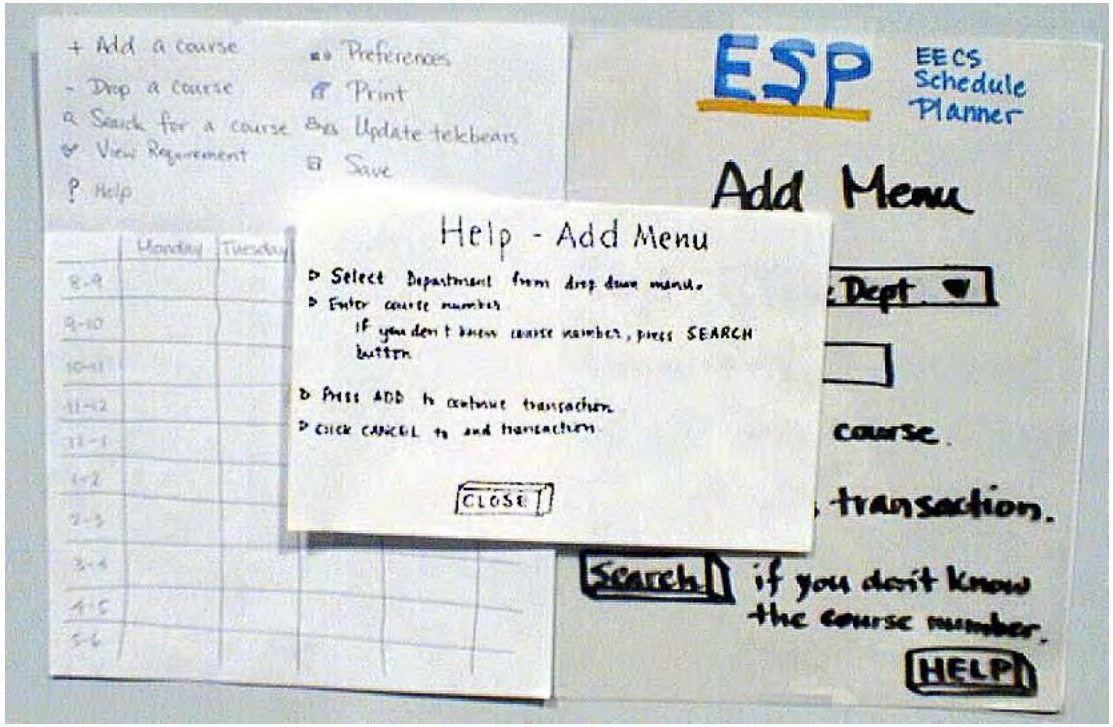
Scissors, X-Acto knife

Paper Prototype



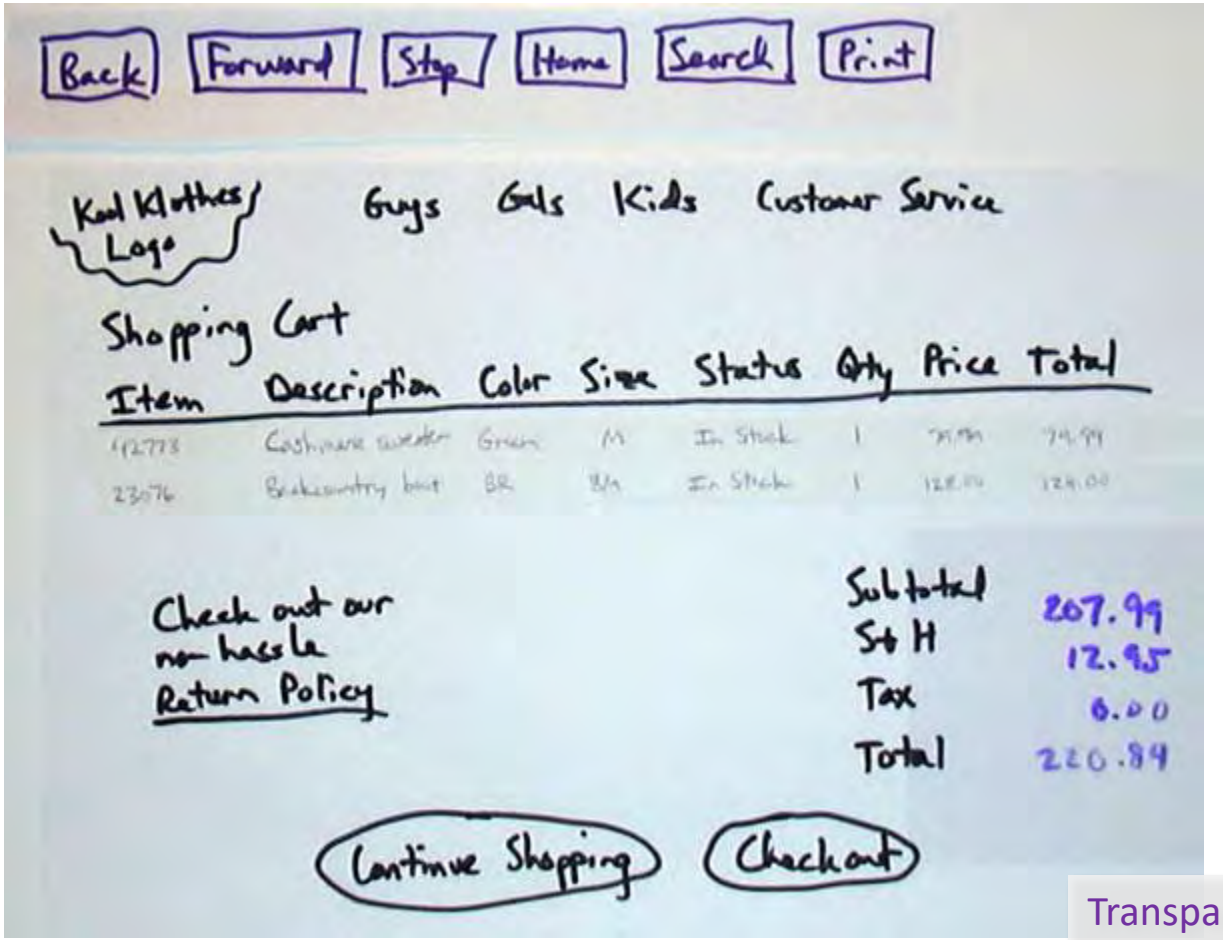
"Screen" faked with pre-constructed pieces

Paper Prototype



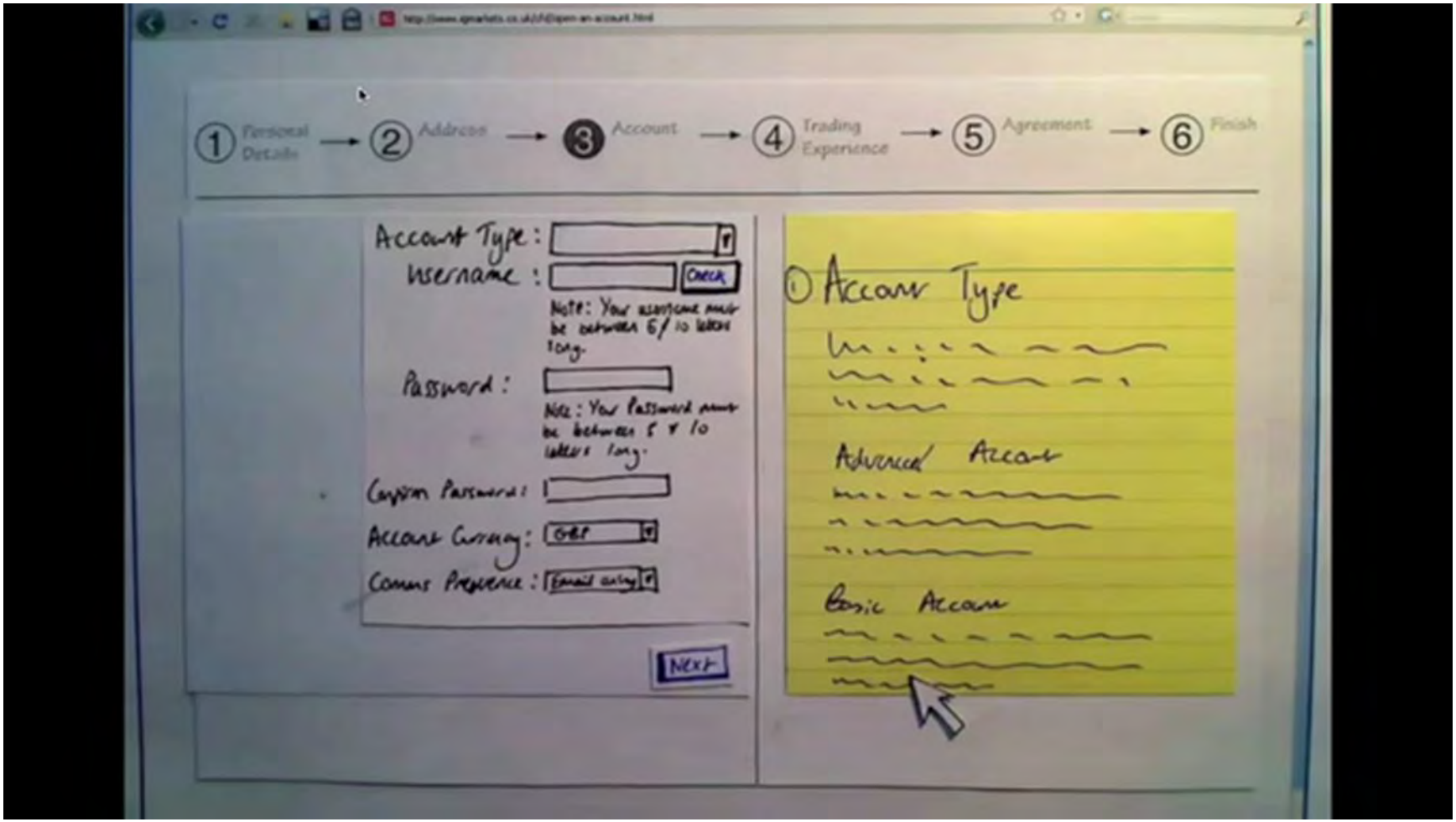
New pieces added in response to interaction

Paper Prototype

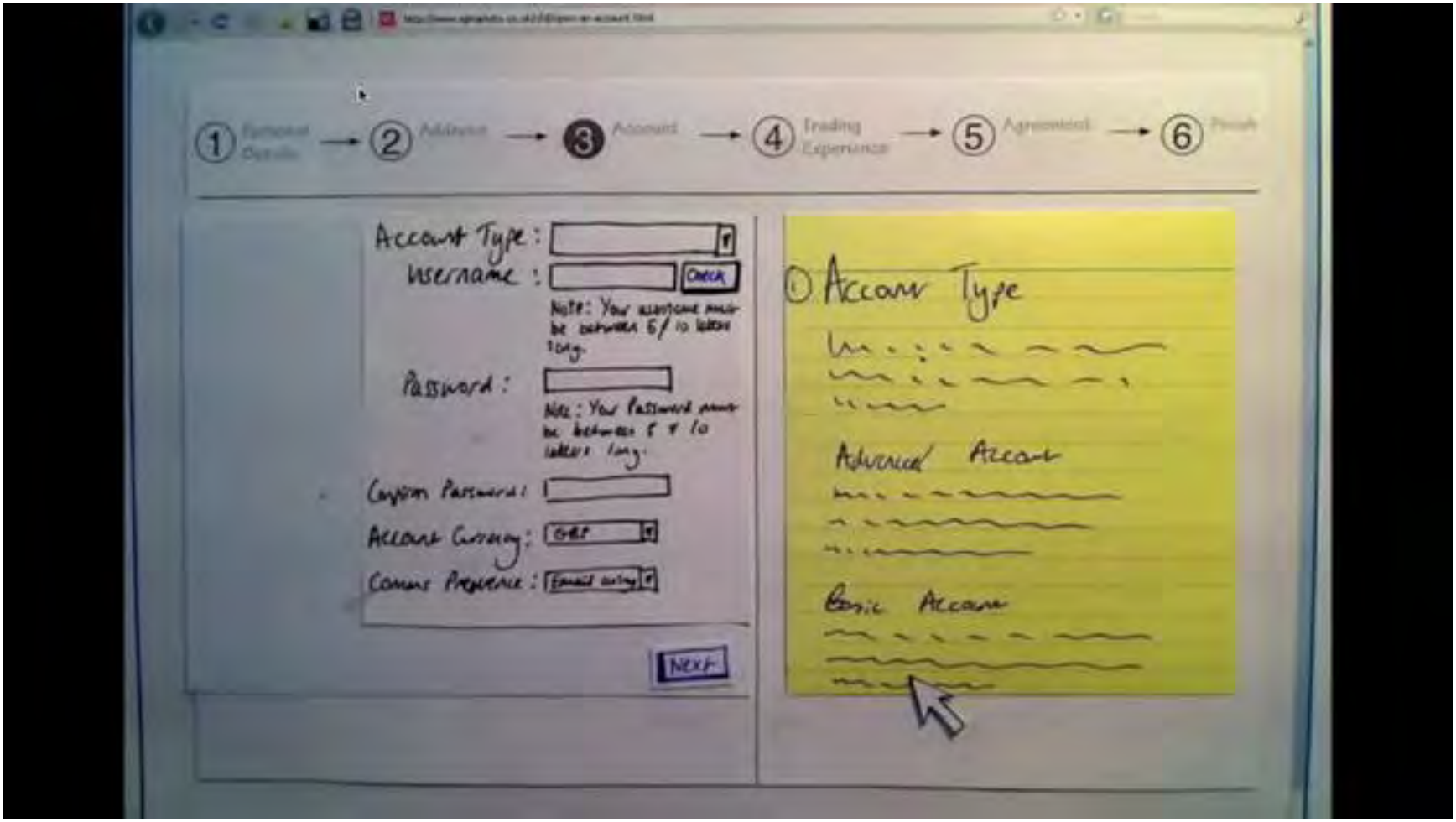


Transparencies allow flexible use of text

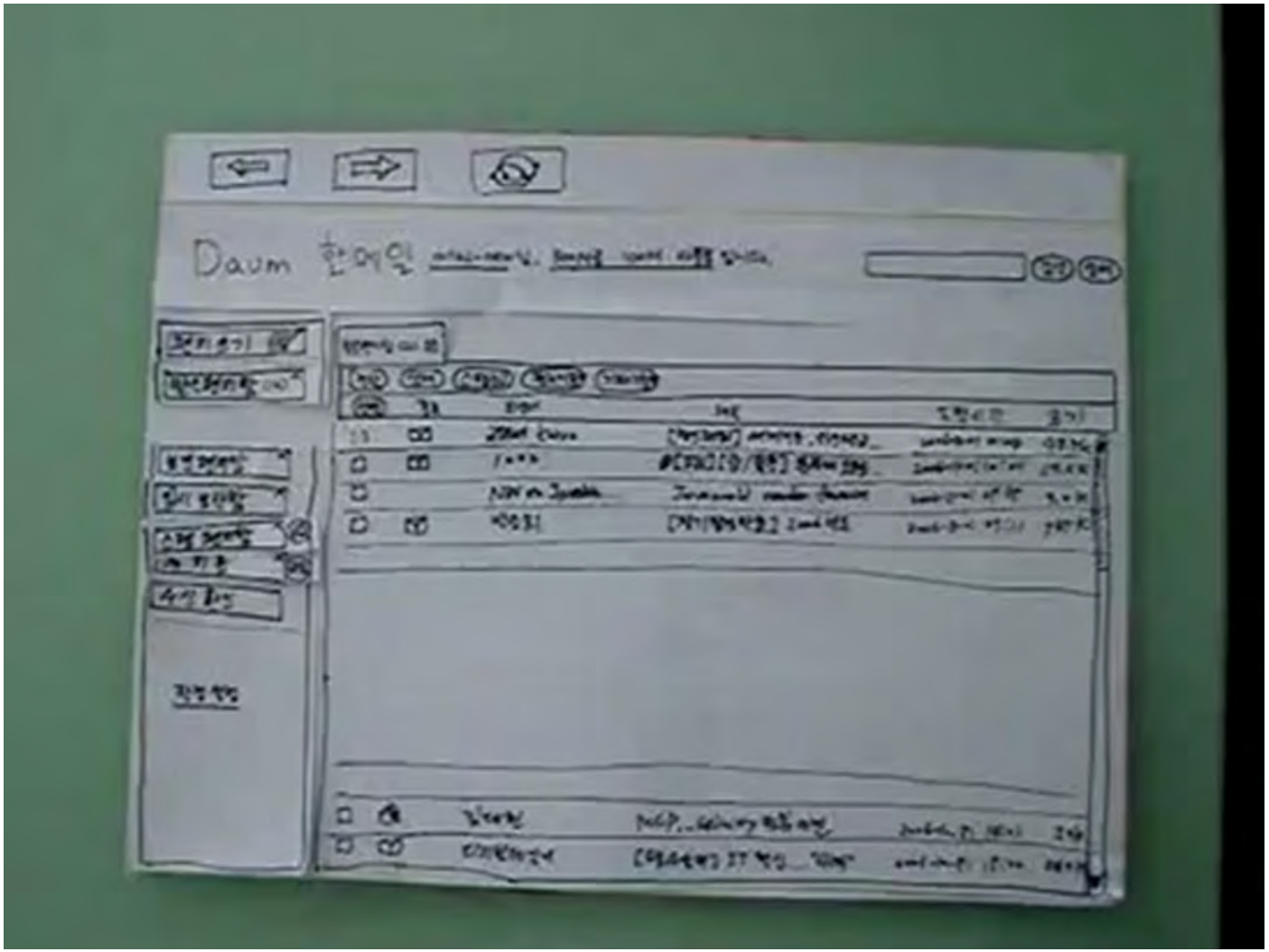
Paper Prototype as Communication



Paper Prototype as Communication



Paper Prototype as Evaluation

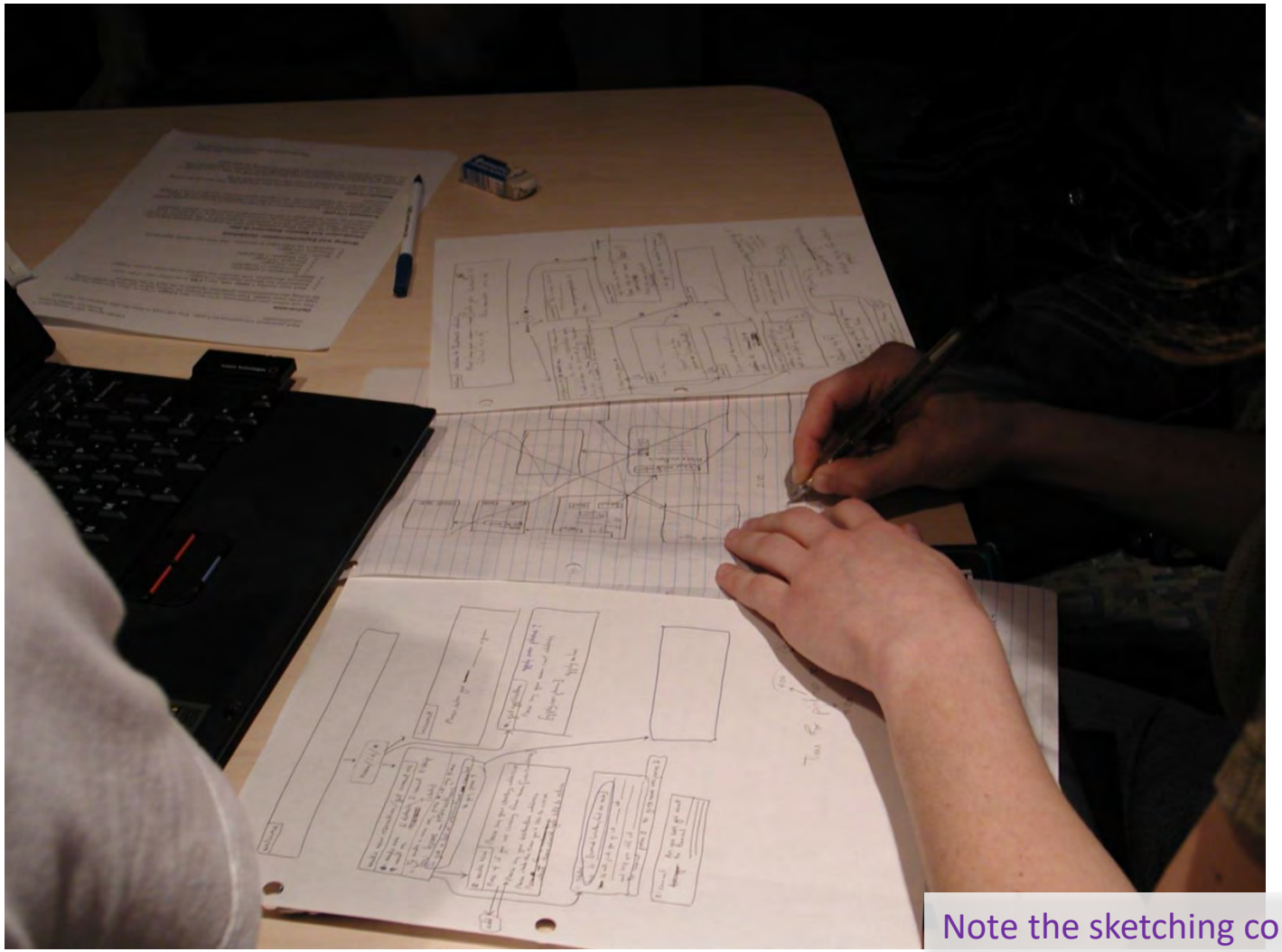


Paper Prototype as Evaluation

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

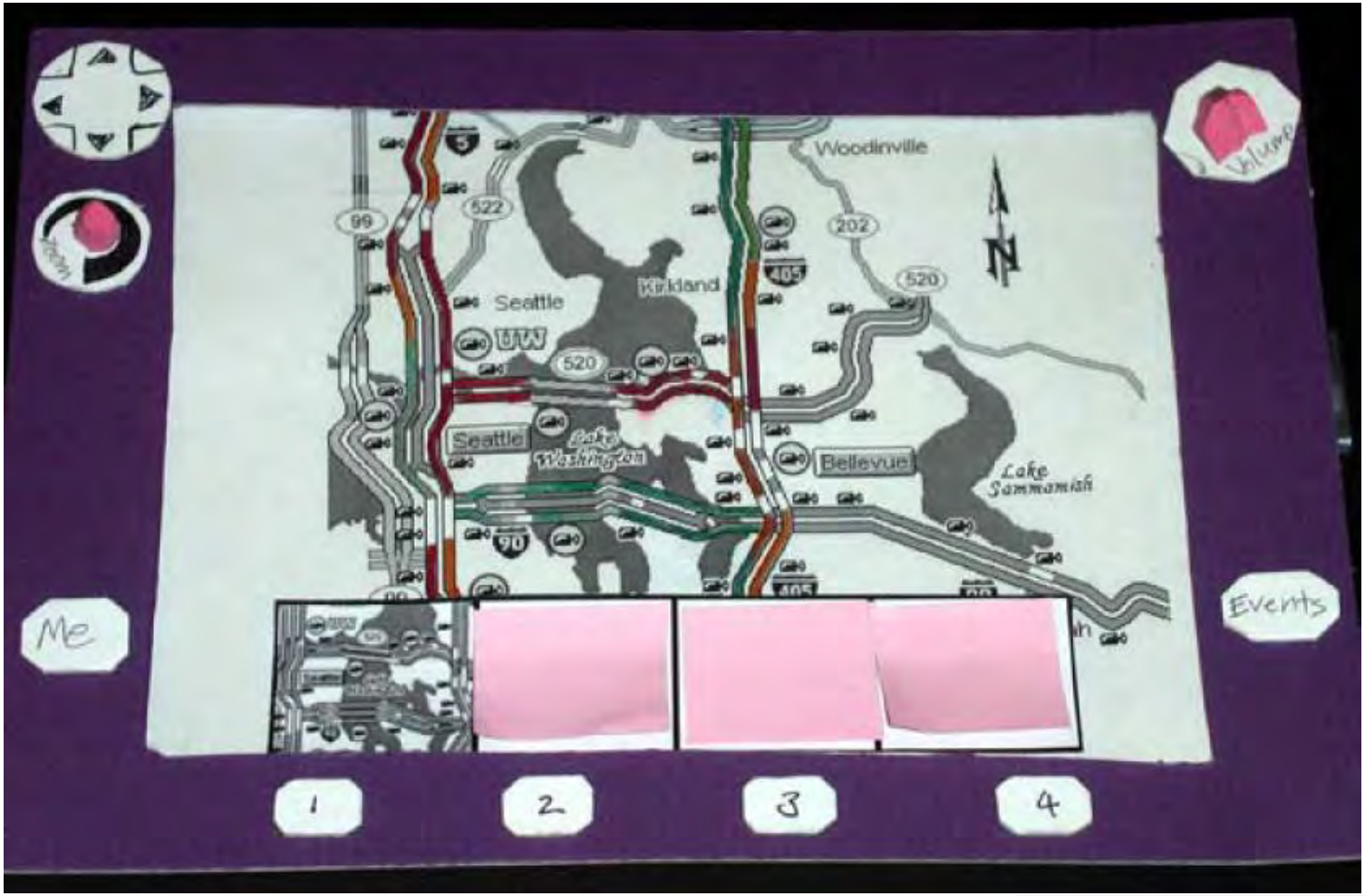
Constructing the Prototype

Planning what is needed given tasks

Constructing the Prototype

Prototyping physical form

Constructing the Prototype



Prototyping physical form

Constructing the Prototype

Remember your target platform constraints

Constructing the Prototype

Remember your target platform constraints

Today

Tips for Effective Presentations

Paper Prototyping

Testing

Ethics in Testing

Tasks in Testing

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 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 555-555-5555

Tasks can be chained to naturally lead to next

Stages of a Usability Test

Preparation

Introducing the Test

Conducting the Test

Debriefing

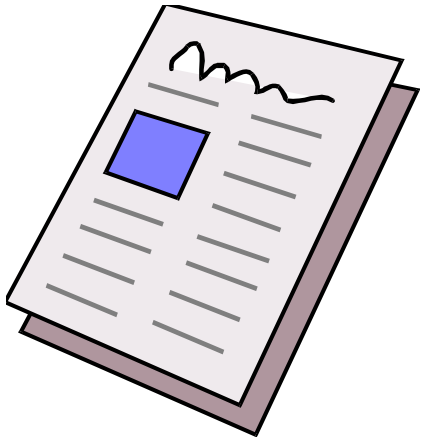
Analyzing the Data

Creating the Report

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 report of testing results

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

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."

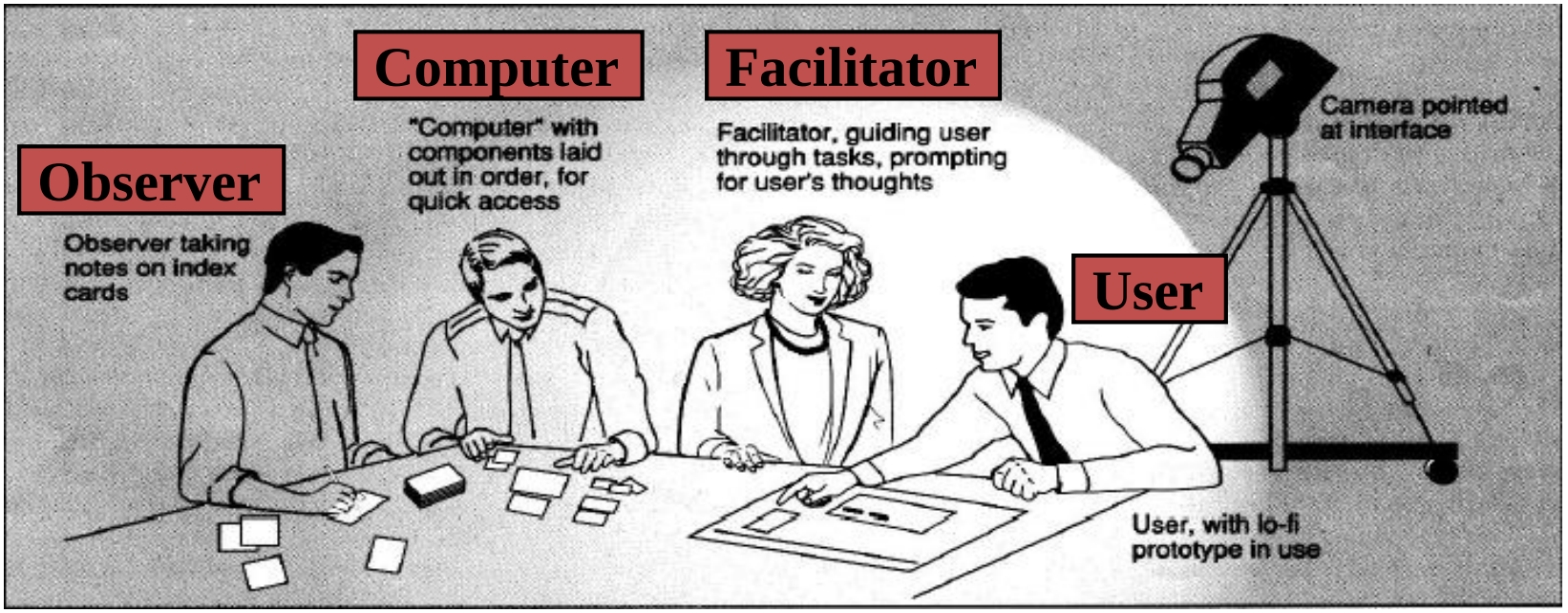
Introducing the Test

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

Careful Certain Temptations

Take a photo of your wireframe sketch

Add clickable areas and transitions between screens

"Use" the prototype on your own device

Today

Tips for Effective Presentations

Paper Prototyping

Testing

Ethics in Testing

Tasks in 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

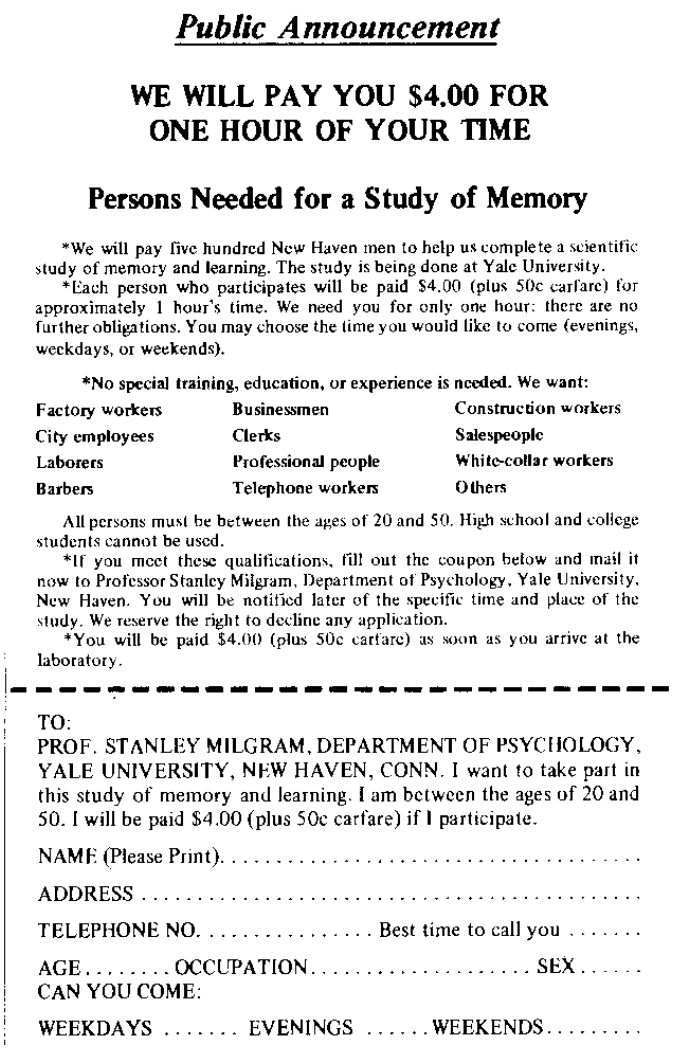
Human Subjects Approvals

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 . . . . . .

Today

Tips for Effective Presentations

Paper Prototyping

Testing

Ethics in Testing

Tasks in Testing

In-Class Design, Prototype, Test

Design and prototype a 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 design 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 the alarm via a touch panel.

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

Without 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

Have others help you “debug” them before testing

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 08:
Presentations,
Paper Prototyping,
Tasks in Testing

Tuesday / Thursday

12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

DESIGN
USE
BUILD

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 09:
Tasks in Testing,
Patterns

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

Project Status

Looking Forward

- “Getting the Right Design”
- Presentation Due Wednesday 11/1
- 3a: Paper Prototype (1x2) Due Monday 11/6

Other Assignments

- Reading 3 Due Saturday 11/4
- Reading 4 Due Saturday 11/11, Sooner is Better
- Reading 5 Can Be Done Anytime, Sooner is Better

Denny 303 on Tuesday 11/7

Presentations

Presentations Thursday / Friday

- 6 groups will present on Thursday
  - entire 9:30 and 10:30 sections
    (no 9:30 or 10:30 sections on Friday)
- Everybody attends Thursday
  - welcome in 12:30 and 1:30 sections on Friday
- Have thoughtful questions for other groups

Be sure you prepare and rehearse

- Limit 7 minutes
- Team responsibility for the presentations
- PPT(X) or PDF, embed fonts, happy to “check”

Today

Ethics in Testing

Tasks in Testing

Wizard of Oz Methods in Testing

Remote Testing

Patterns

Objectives

Be able to:

Describe why task design is important for usability testing, how poor tasks can mask problems

Describe the principle of Wizard of Oz testing, give examples of how technology can support it

Describe two high-level strategies for remote testing, limitations of hill-climbing in testing

Describe the benefit of design patterns, contrast them with guidelines or templates

Today

Ethics in Testing

Tasks in Testing

Wizard of Oz Methods in Testing

Remote Usability Testing

Patterns

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

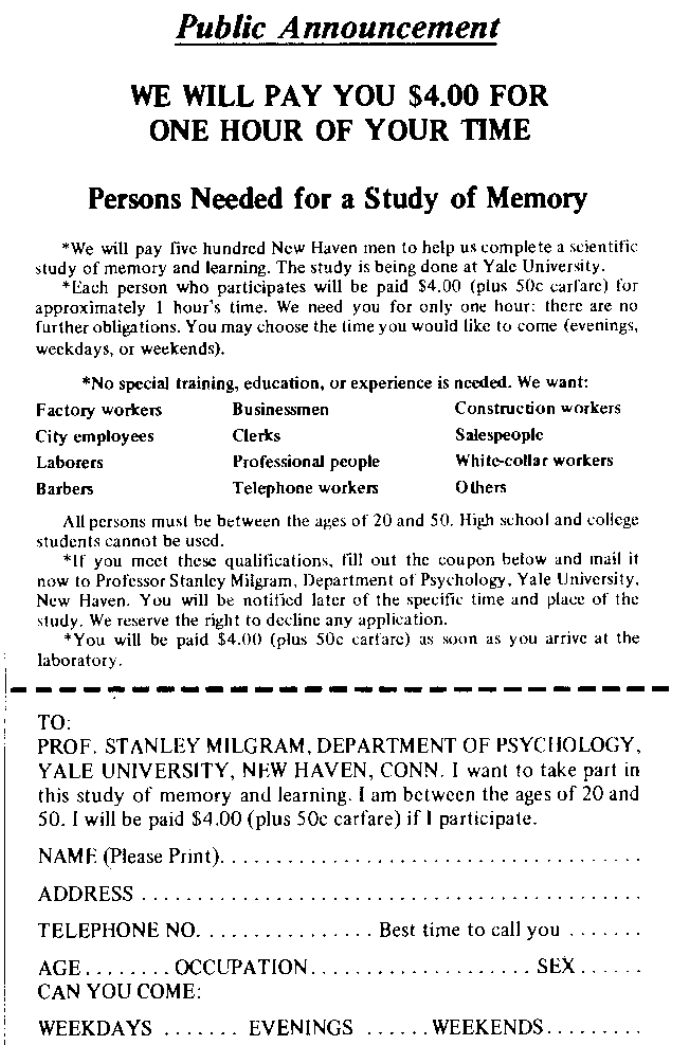
Human Subjects Approvals

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 . . . . . .

Today

Ethics in Testing

Tasks in Testing

Wizard of Oz Methods in Testing

Remote Usability Testing

Patterns

In-Class Design, Prototype, Test

Design and prototype a 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 design 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 the alarm via a touch panel.

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

Without 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

Have others help you “debug” them before testing

Today

Ethics in Testing

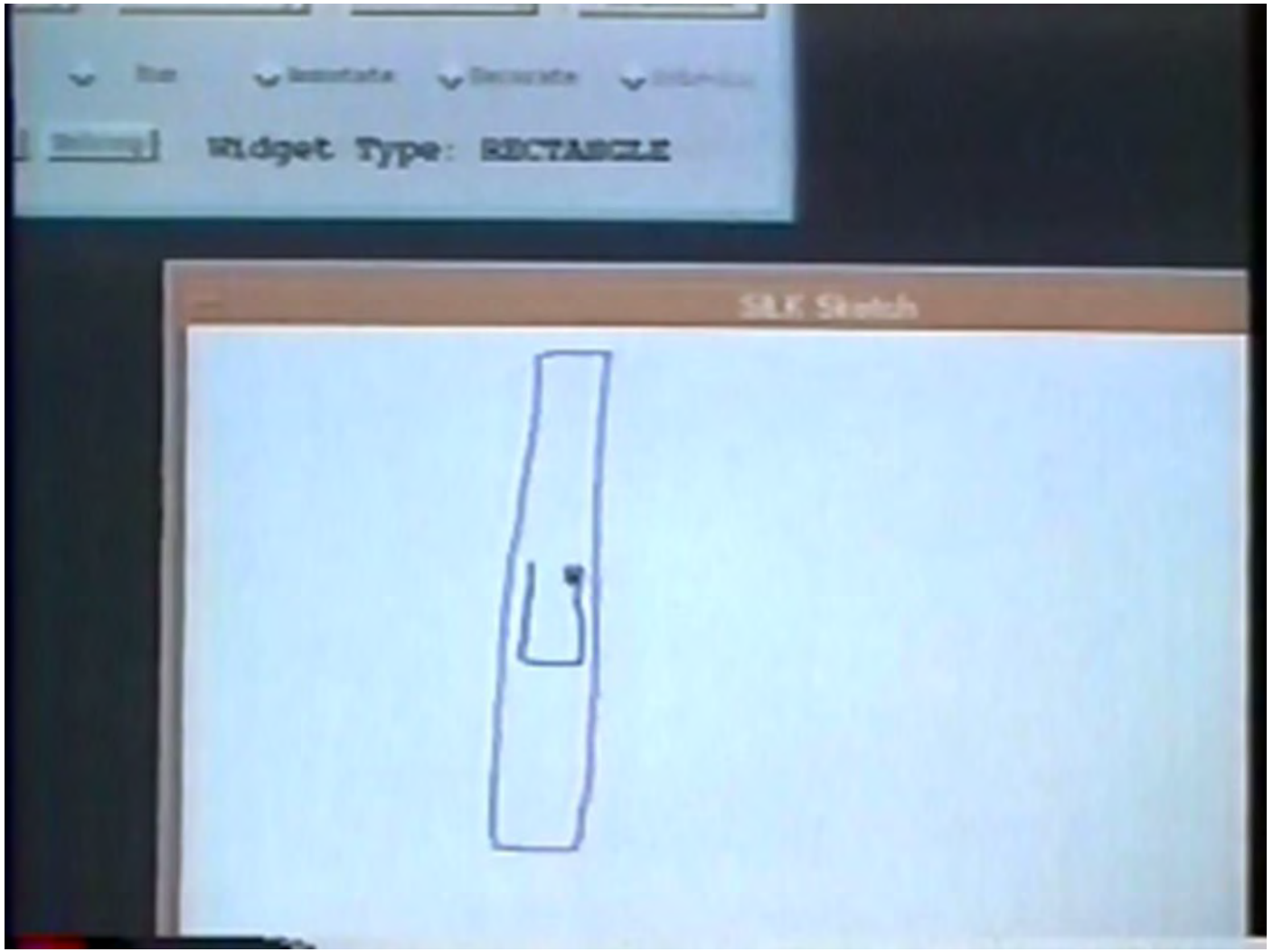
Tasks in Testing

Wizard of Oz Methods in Testing

Remote Usability Testing

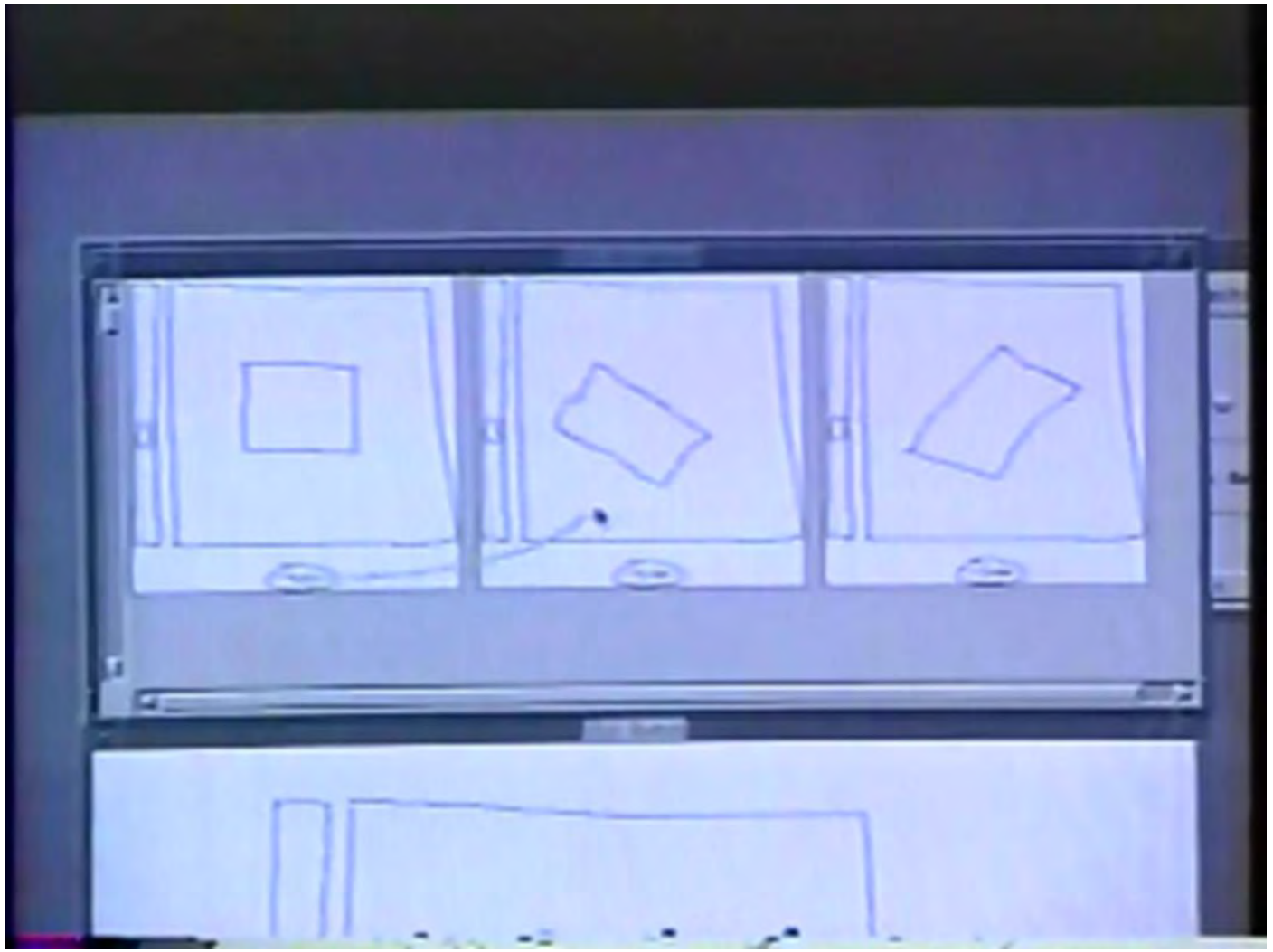
Patterns

SILK (1996)



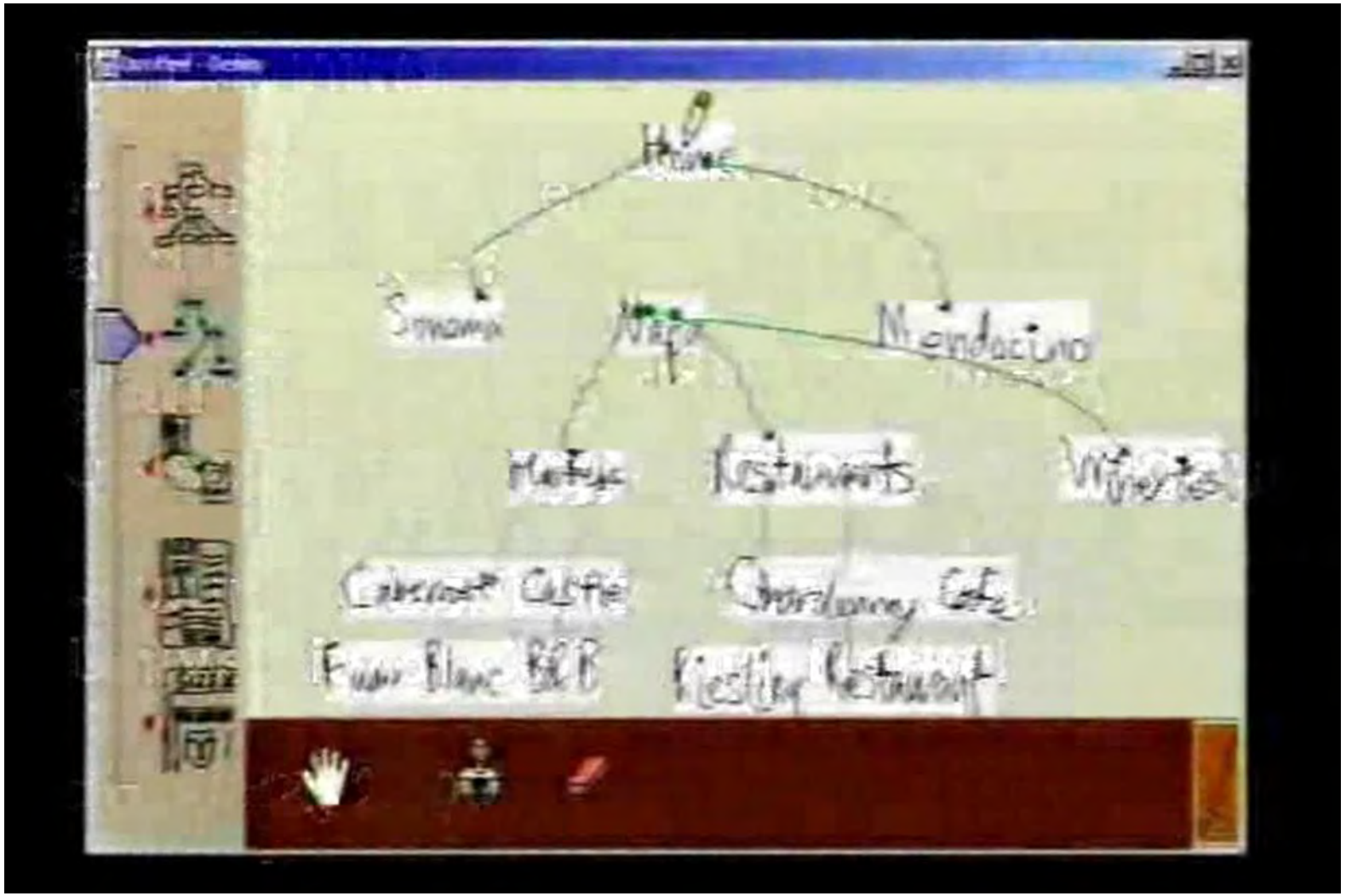
Informal Interaction

SILK (1996)



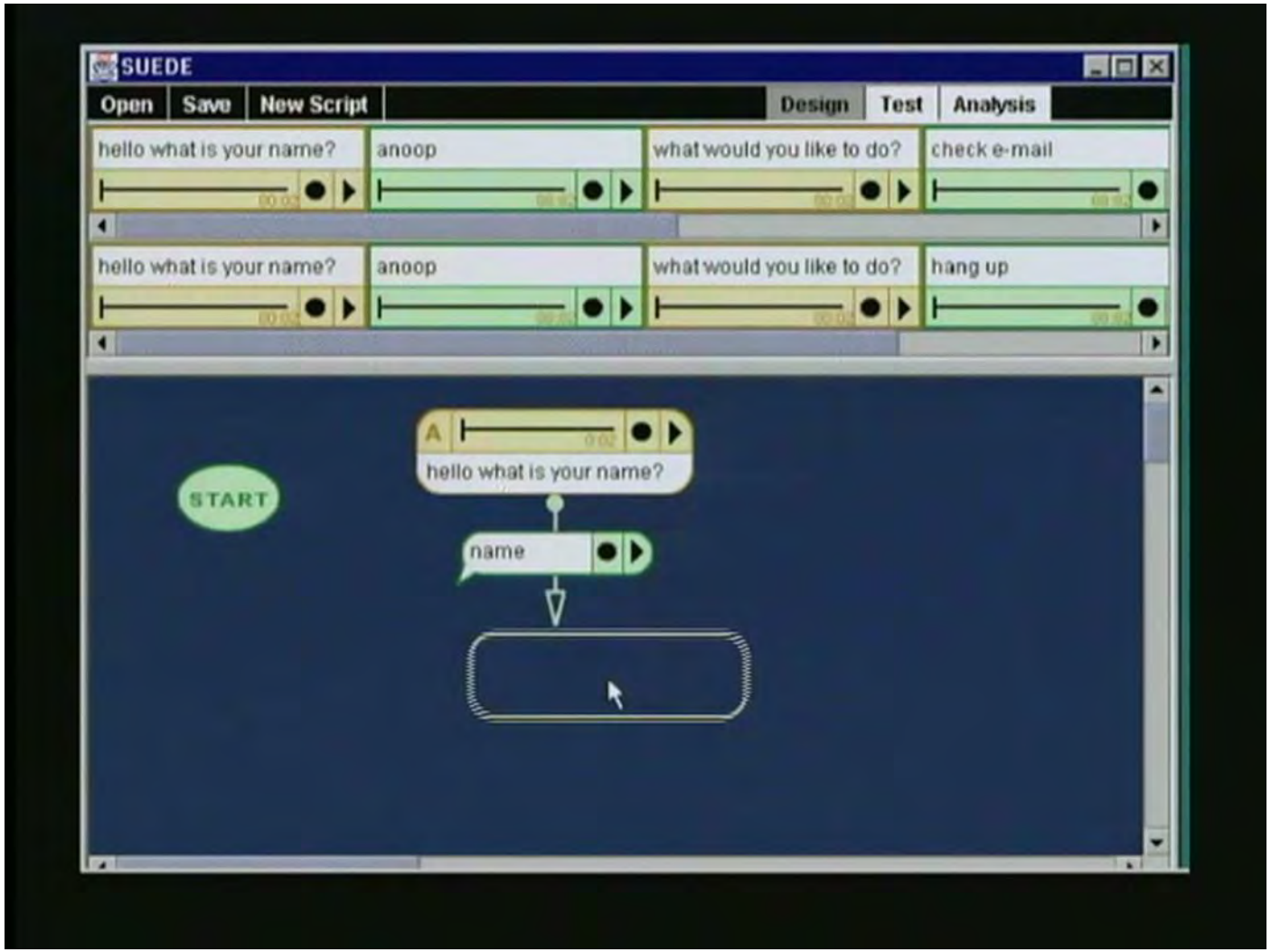
Migrate to Prototype, Storyboard-Based Programming

DENIM (2000)



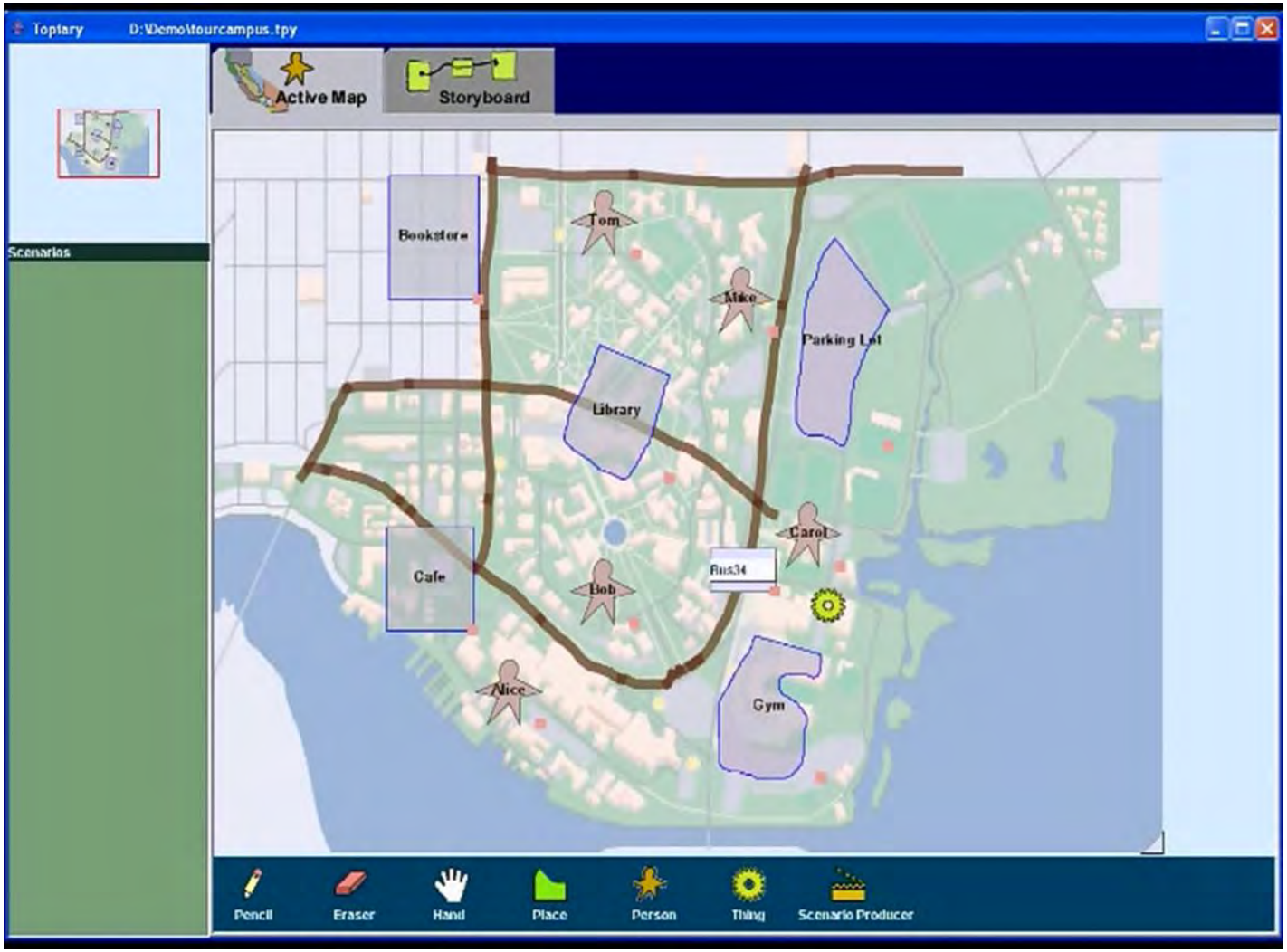
Early Stage, Multiple Levels of Details, Sketching, Pen Interaction

SUEDE (2000)



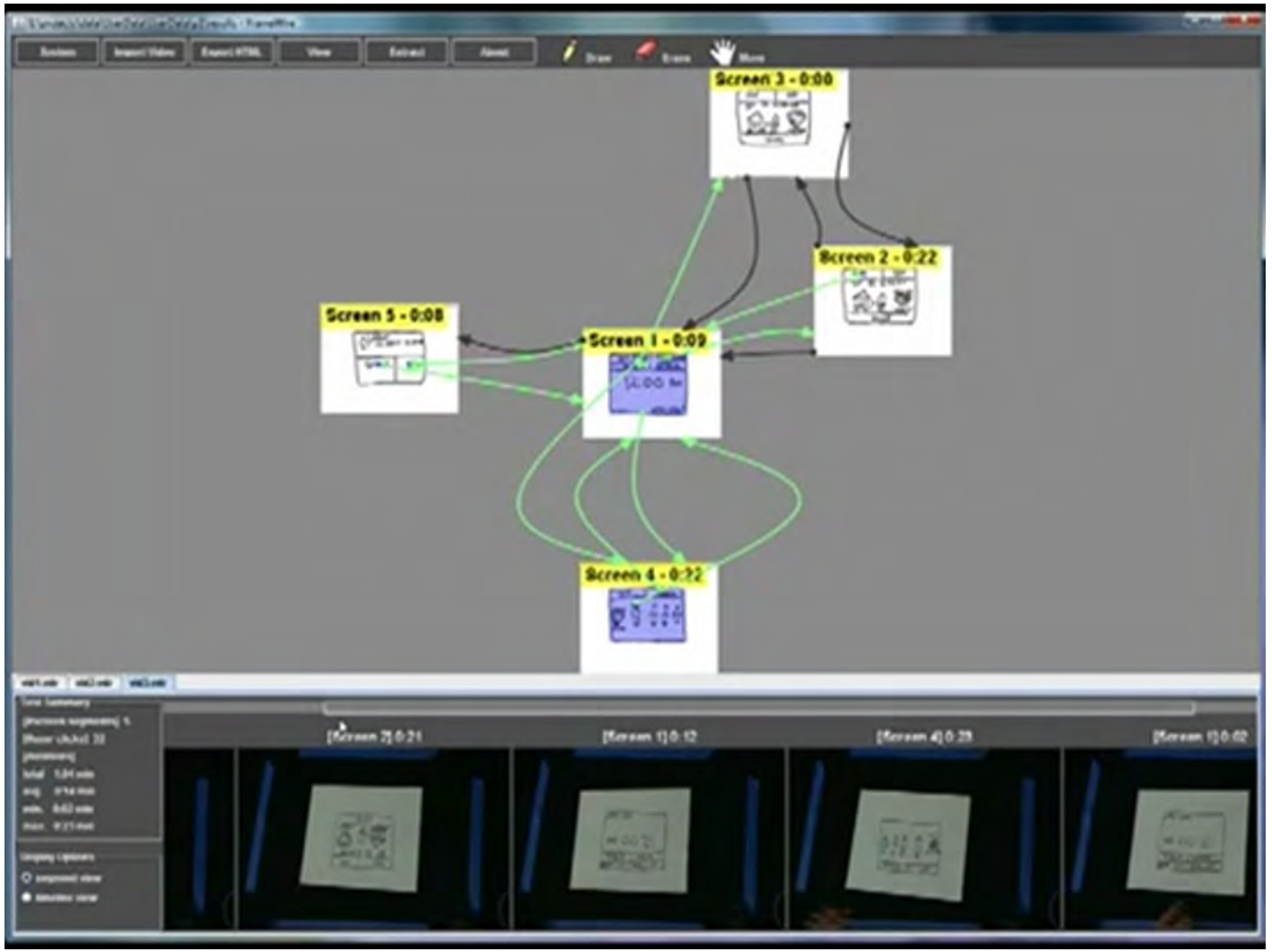
Low-Fidelity Is Not Just About Ink

Topiary (2004)



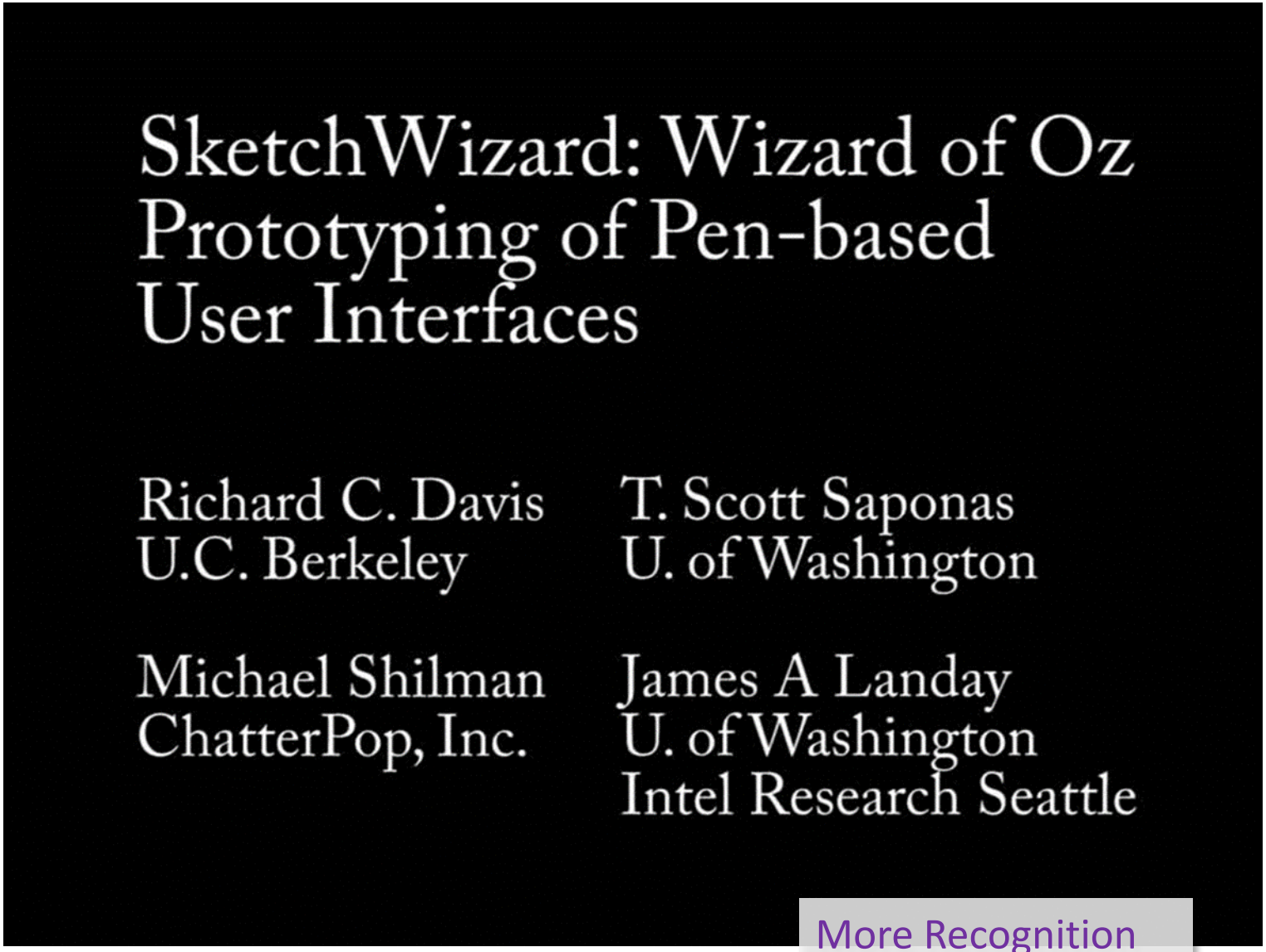
Location Awareness, Wizard of Oz

FrameWire (2010)



Tangible Interaction

Sketch Wizard (2007)



More Recognition

Today

Ethics in Testing

Tasks in Testing

Wizard of Oz Methods in Testing

Remote Usability Testing

Patterns

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

Now available through a variety of services

- Loop11
- TryMyUI
- Userlytics
- Usertesting.com
- UserZoom
- Validately
- WhatUsersDo
- YouEye

Unlikely you need to bake your own

- Some include mobile testing
- Crowds for automated testing in build processes

http://www.nngroup.com/articles/unmoderated-user-testing-tools/

Semi-Automated Remote Usability

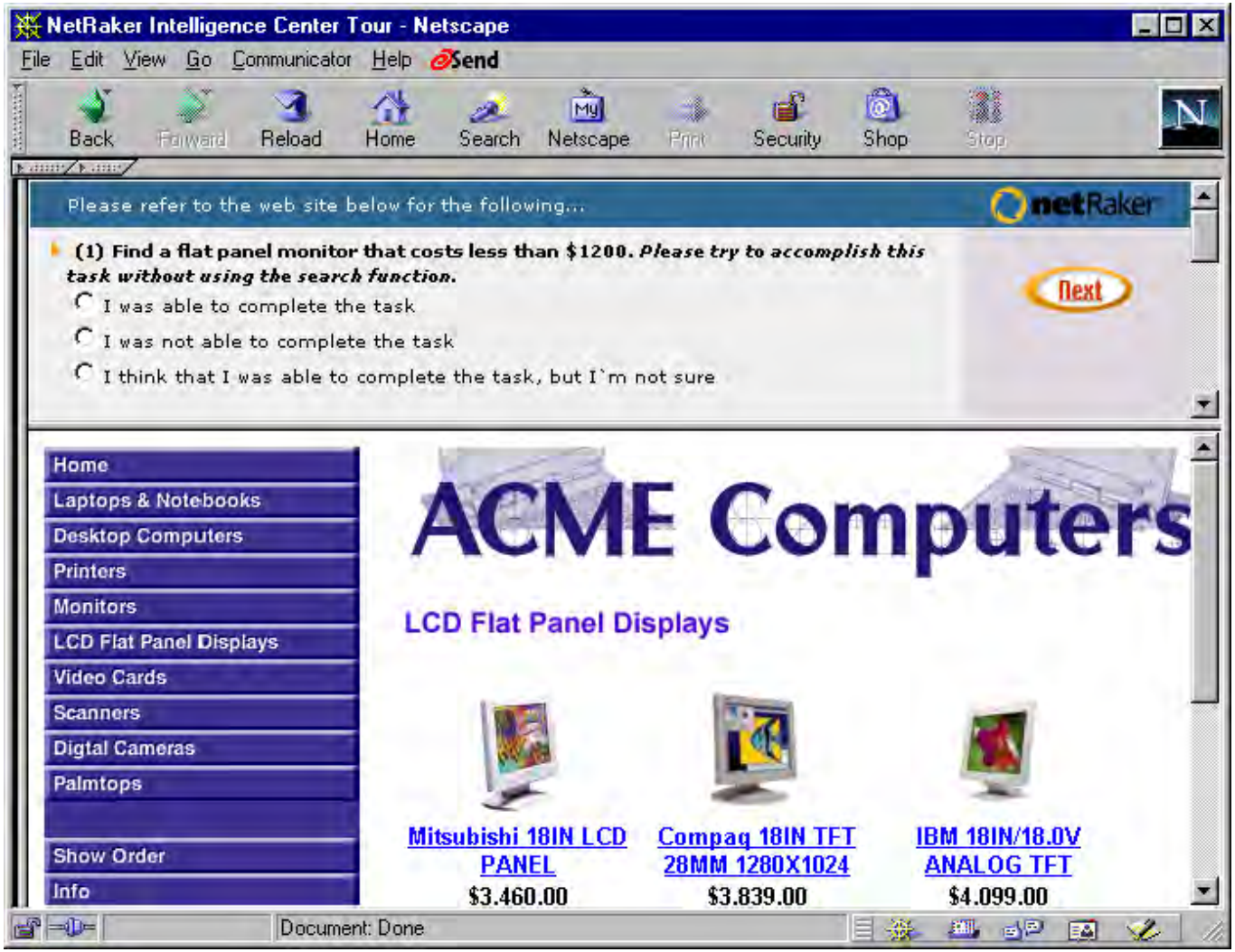
Move usability testing online

- 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

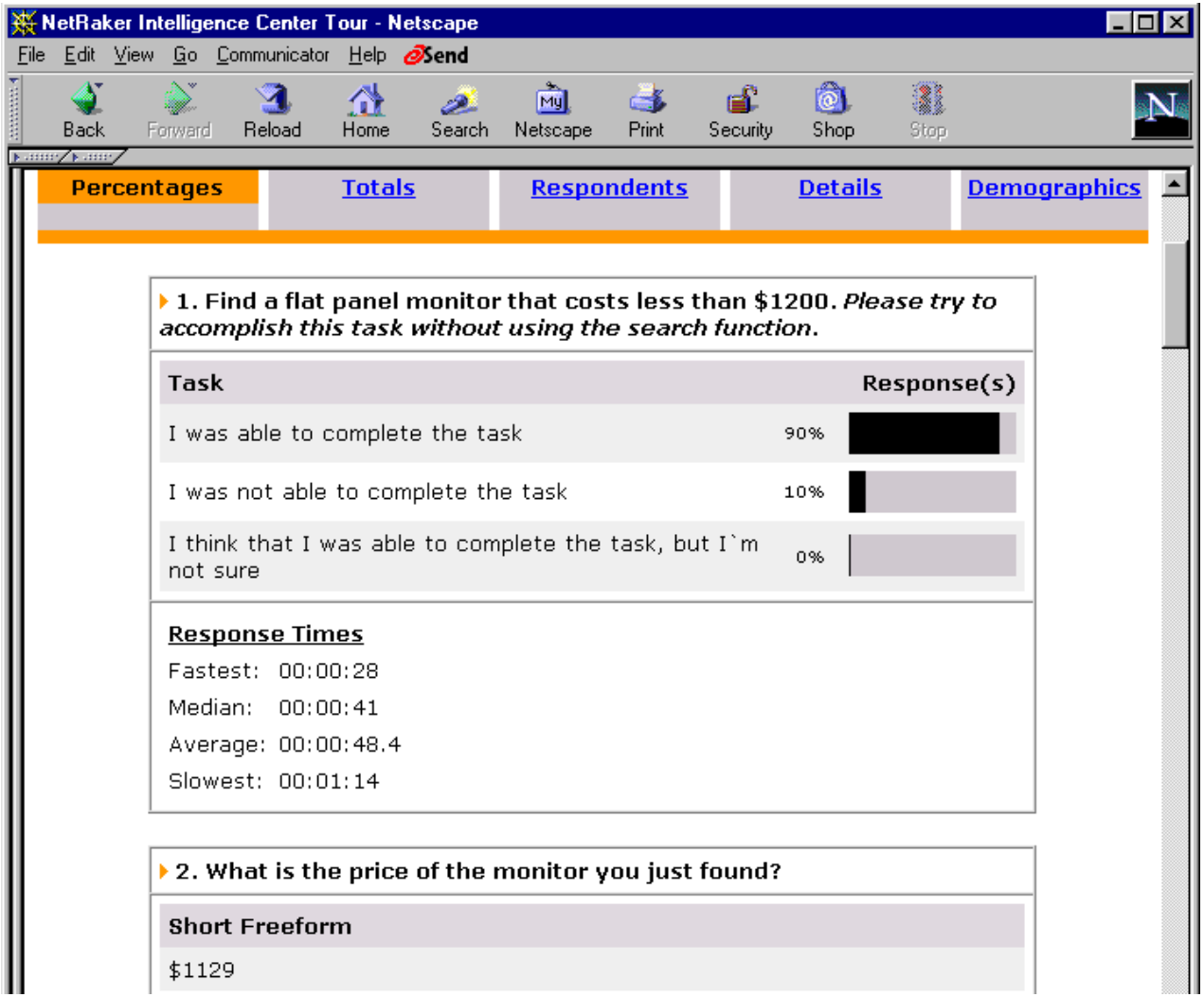
Analyze data individually or in aggregate

- playback individual sessions
- find general problem areas
- if needed, look closely with traditional methods

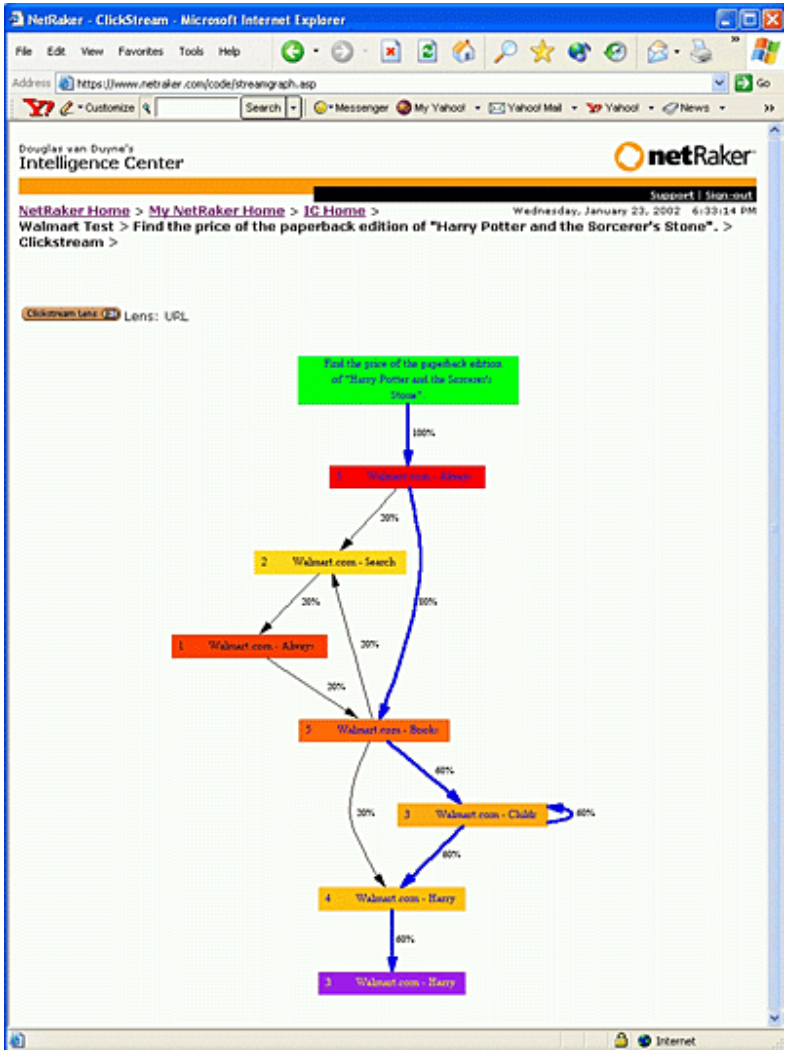
Semi-Automated Remote Usability



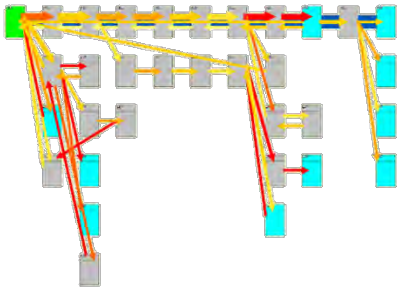
Semi-Automated Remote Usability



Semi-Automated Remote Usability



WebQuilt: Visual Analysis



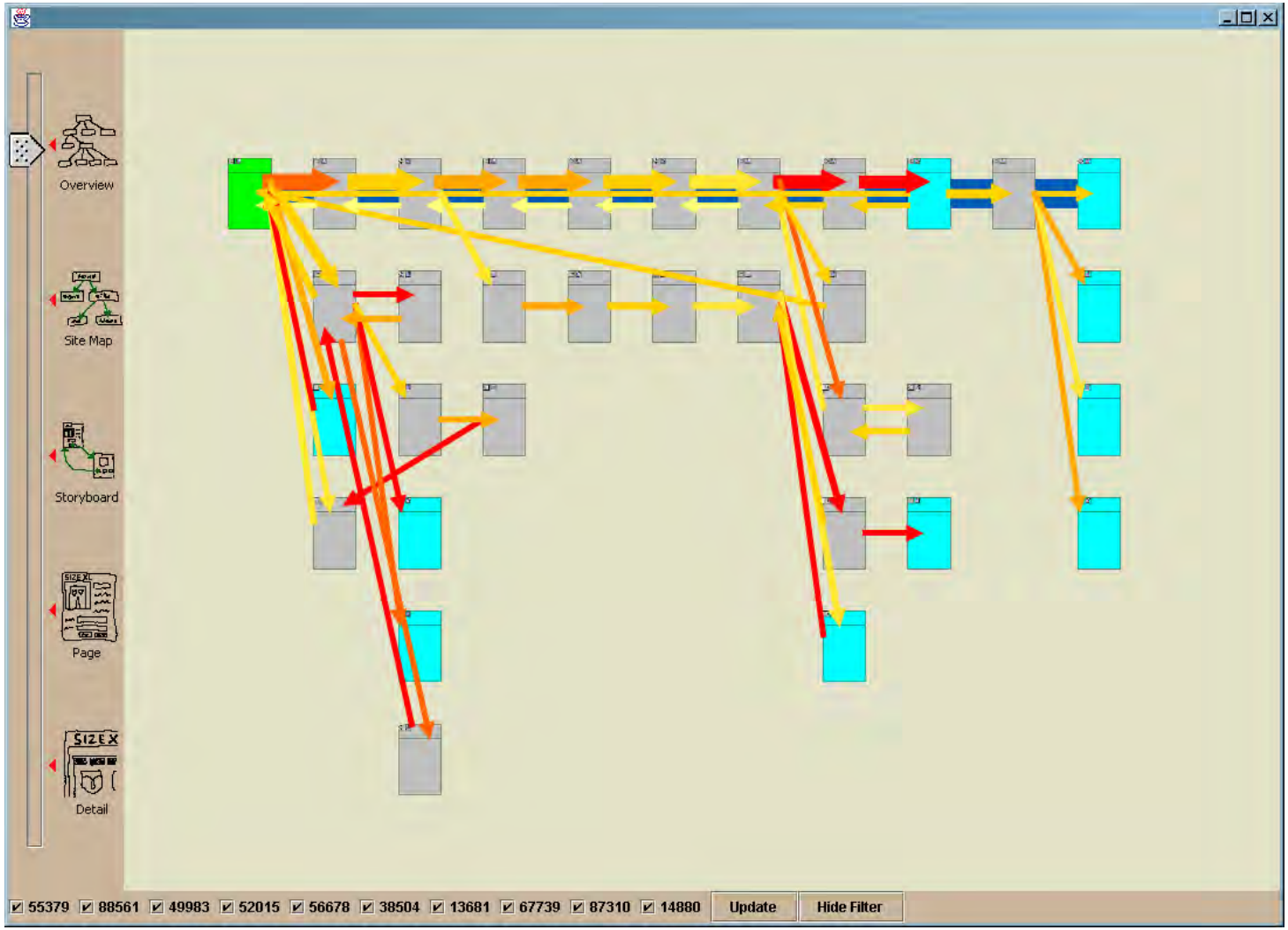
Goals

- link page elements to actions
- identify behavior/navigation patterns
- highlight potential problems areas

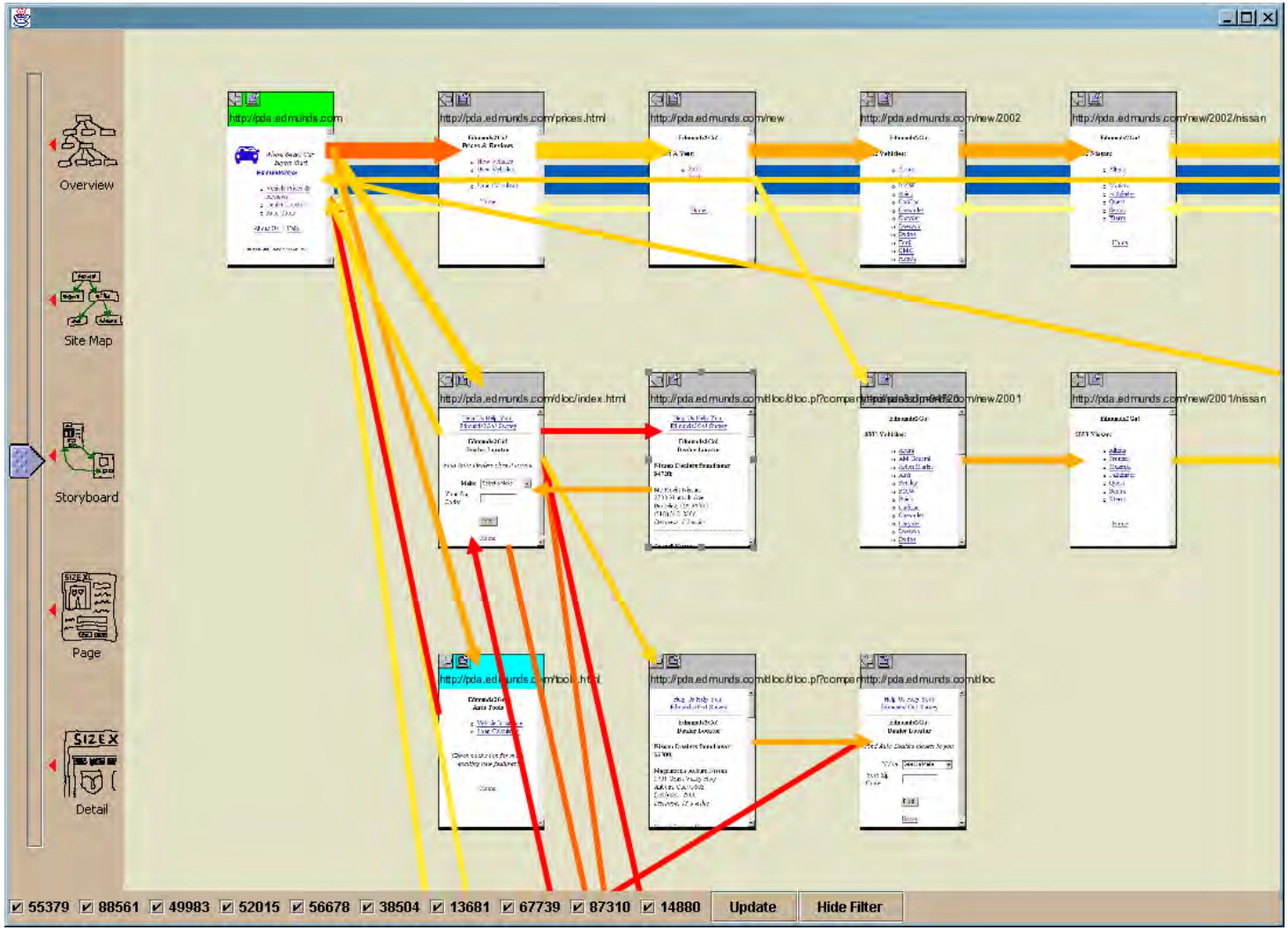
Interactive graph based on web content

- designers can indicate expected paths
- color code common usability interests
- filtering to show only target participants
- use zooming for analyzing at varying granularity

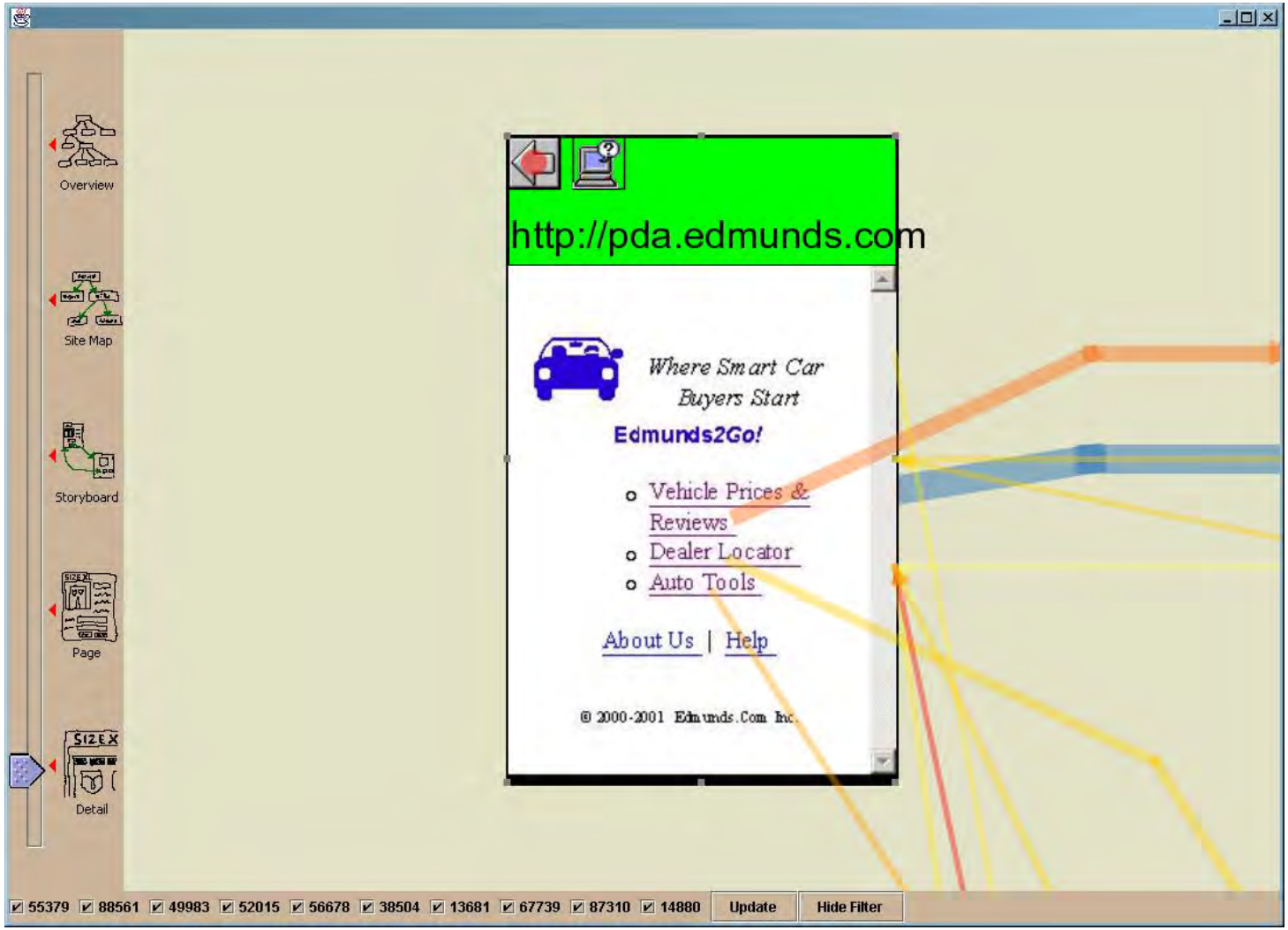
WebQuilt: Visual Analysis



WebQuilt: Visual Analysis



WebQuilt: Visual Analysis



Today

Ethics in Testing

Tasks in Testing

Wizard of Oz Methods in Testing

Remote Usability Testing

Patterns

Controlled A/B Experiments

Many names for it

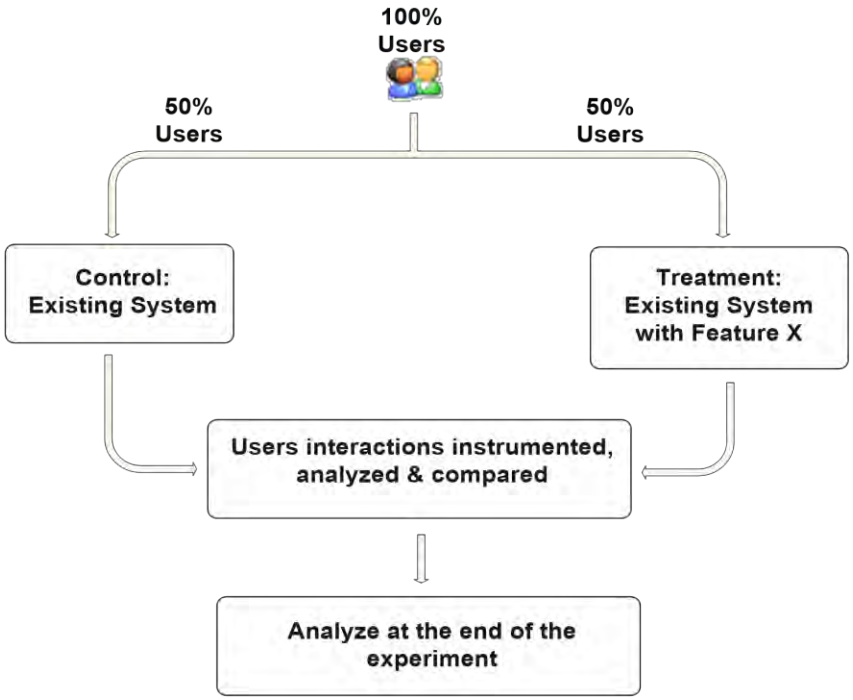
A/B tests or
Control/Treatment

Randomized
Experimental Design

Controlled experiments

Split testing

Parallel flights



(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:

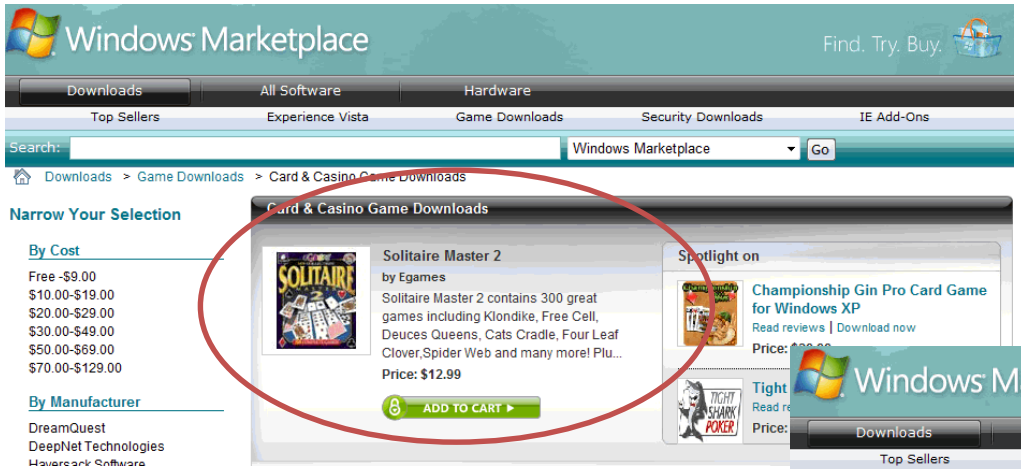
- Wildly successful

From Greg Linden's Blog: http://glinden.blogspot.com/2006/04/early-amazon-shopping-cart.html

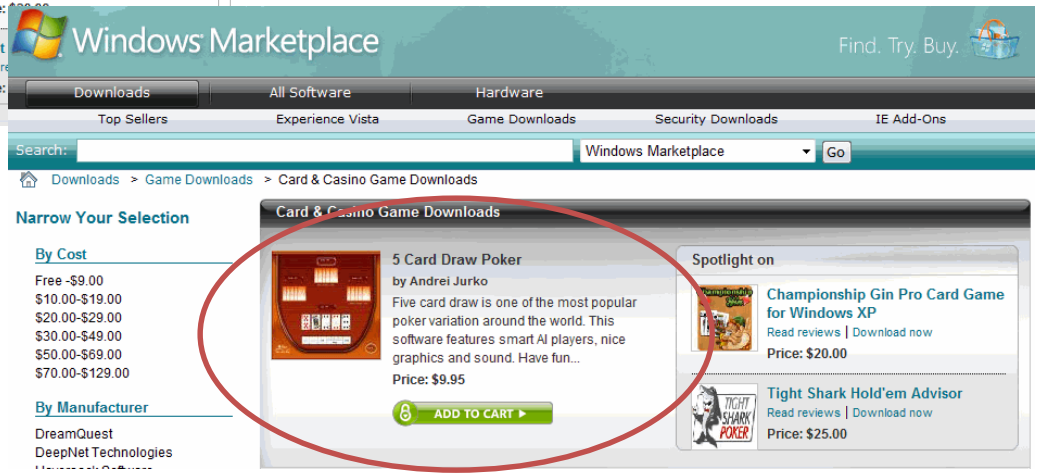
Marketplace: Solitaire vs Poker

Experiment run in Windows Marketplace / Game Downloads

Which image has the higher clickthrough? By how much?



A: Solitaire game

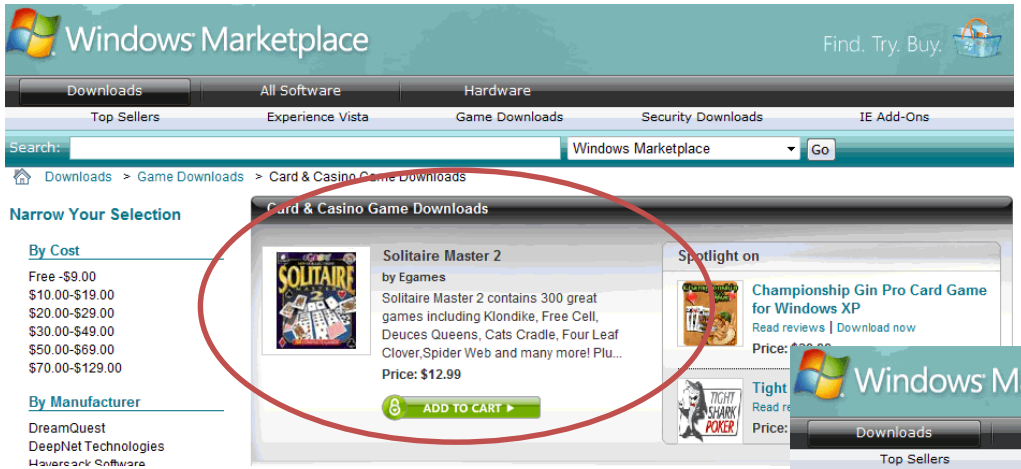


B: Poker game

Marketplace: Solitaire vs Poker

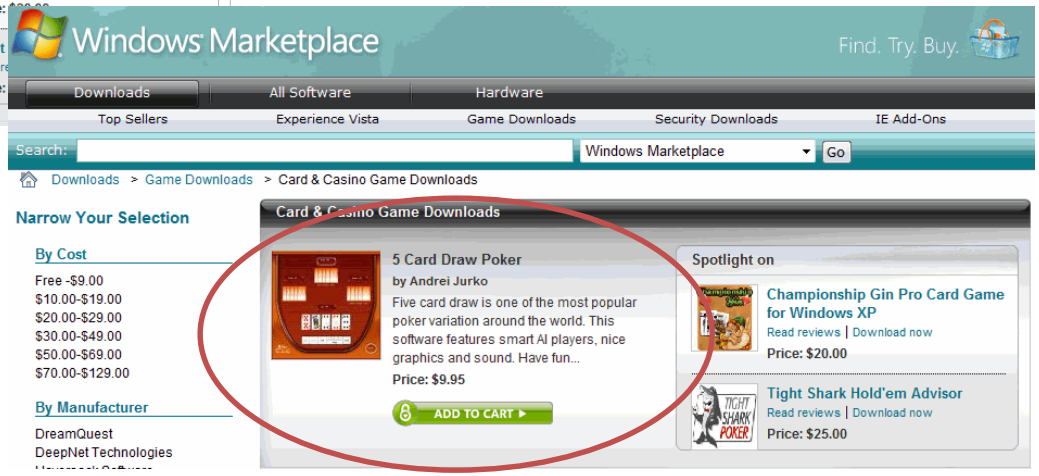
Experiment run in Windows Marketplace / Game Downloads

Which image has the higher clickthrough? By how much?



A: Solitaire game

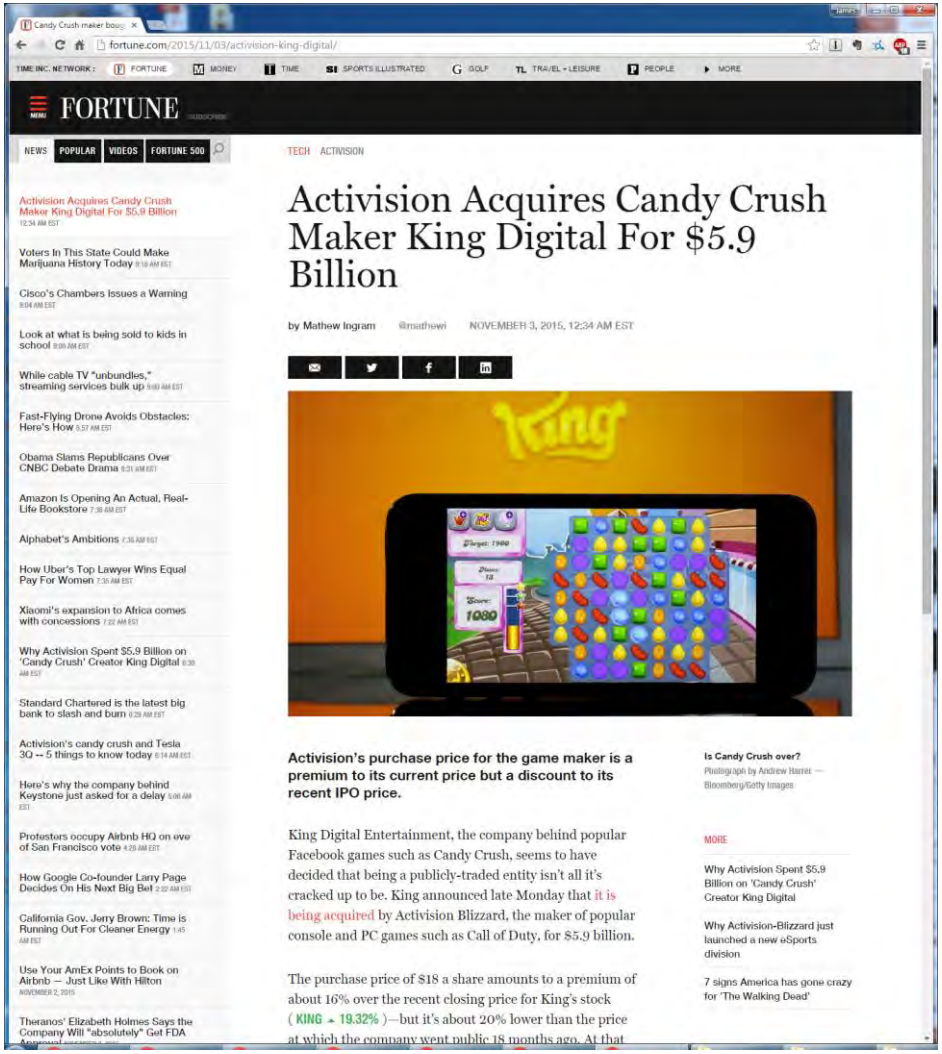
A is 61% better



B: Poker game

Never Underestimate Solitaire

Never Underestimate Solitaire



Candy Crush maker boog

fortune.com/2015/11/03/activision-king-digital/

TIME INC. NETWORK: FORTUNE MONEY TIME SPORTS ILLUSTRATED GOLF TRAVEL + LEISURE PEOPLE MORE

FORTUNE

NEWS POPULAR VIDEOS FORTUNE 500

Activision Acquires Candy Crush Maker King Digital For $5.9 Billion

Voters In This State Could Make Marijuana History Today

Cisco's Chambers Issues a Warning

Look at what is being sold to kids in school

While cable TV "unbundles," streaming services bulk up

Fast-Flying Drone Avoids Obstacles: Here's How

Obama Slams Republicans Over CNBC Debate Drama

Amazon Is Opening An Actual, Real-Life Bookstore

Alphabet's Ambitions

How Uber's Top Lawyer Wins Equal Pay For Women

Xiaomi's expansion to Africa comes with concessions

Why Activision Spent $5.9 Billion on 'Candy Crush' Creator King Digital

Standard Chartered is the latest big bank to slash and burn

Activision's candy crush and Tesla 3Q -- 5 things to know today

Here's why the company behind Keystone just asked for a delay

Protesters occupy Airbnb HQ on eve of San Francisco vote

How Google Co-founder Larry Page Decides On His Next Big Bet

California Gov. Jerry Brown: Time is Running Out For Cleaner Energy

Use Your AmEx Points to Book on Airbnb — Just Like With Hilton

Theranos' Elizabeth Holmes Says the Company Will "absolutely" Get FDA

TECH ACTIVISION

Activision Acquires Candy Crush Maker King Digital For $5.9 Billion

by Mathew Ingram @mathewi NOVEMBER 3, 2015, 12:34 AM EST

Activision's purchase price for the game maker is a premium to its current price but a discount to its recent IPO price.

Is Candy Crush over?
Photograph by Andrew Harrer — Bloomberg/Getty Images

King Digital Entertainment, the company behind popular Facebook games such as Candy Crush, seems to have decided that being a publicly-traded entity isn't all it's cracked up to be. King announced late Monday that it is being acquired by Activision Blizzard, the maker of popular console and PC games such as Call of Duty, for $5.9 billion.

The purchase price of $18 a share amounts to a premium of about 16% over the recent closing price for King's stock (KING ▲ 19.32%)—but it's about 20% lower than the price at which the company went public 18 months ago. At that

MORE

Why Activision Spent $5.9 Billion on 'Candy Crush' Creator King Digital

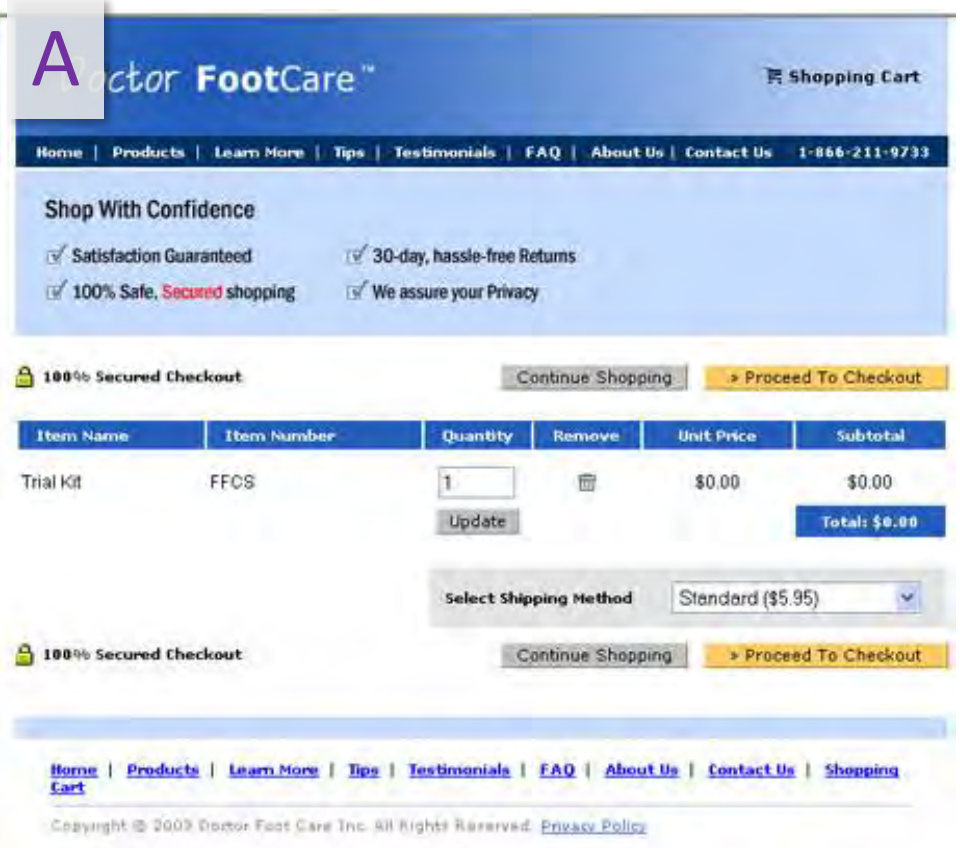
Why Activision-Blizzard just launched a new eSports division

7 signs America has gone crazy for 'The Walking Dead'

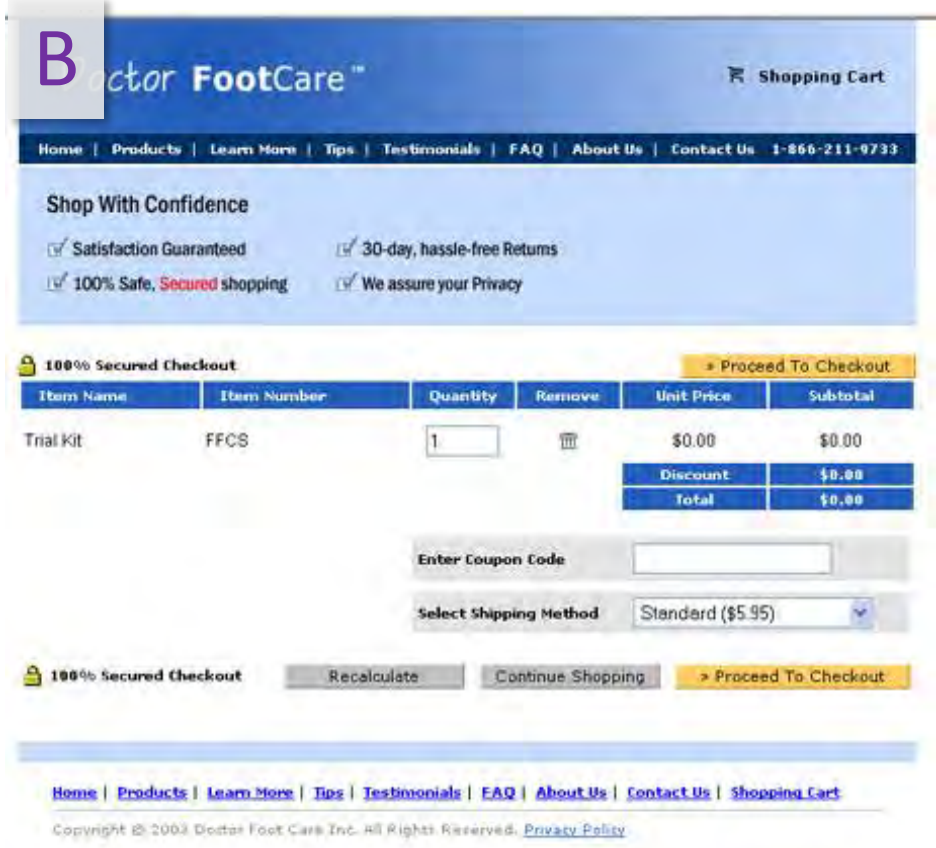
Checkout Page

***Conversion rate* is percentage of visits that include purchase**

A



B

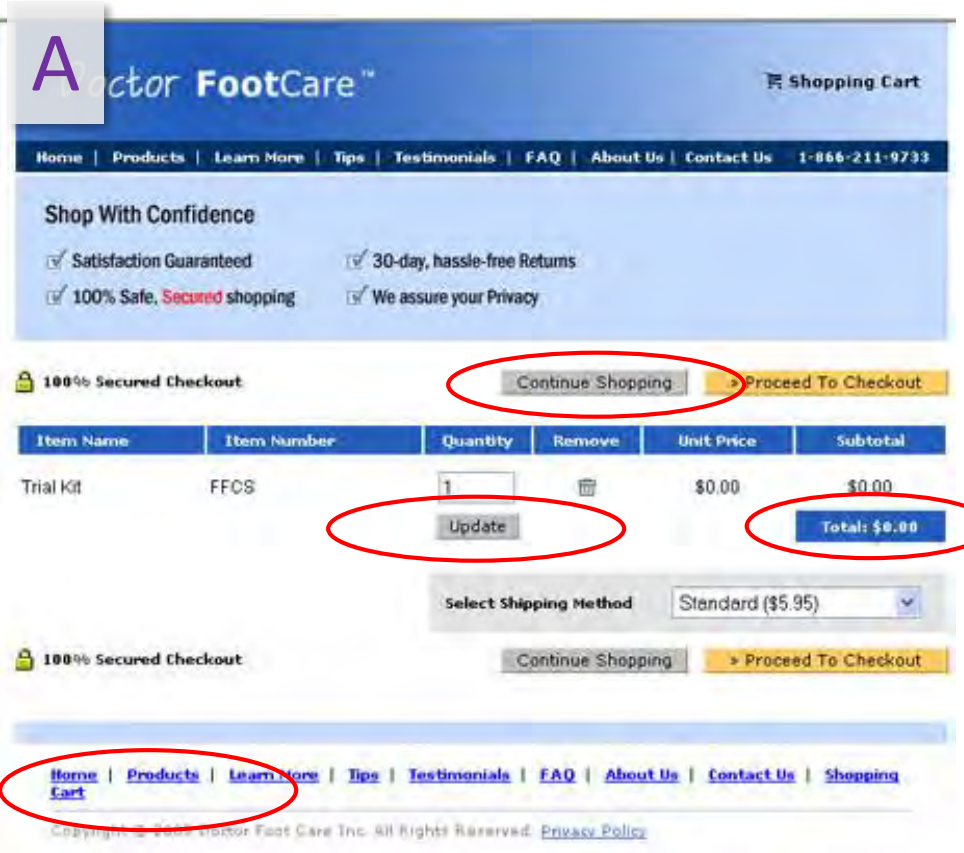


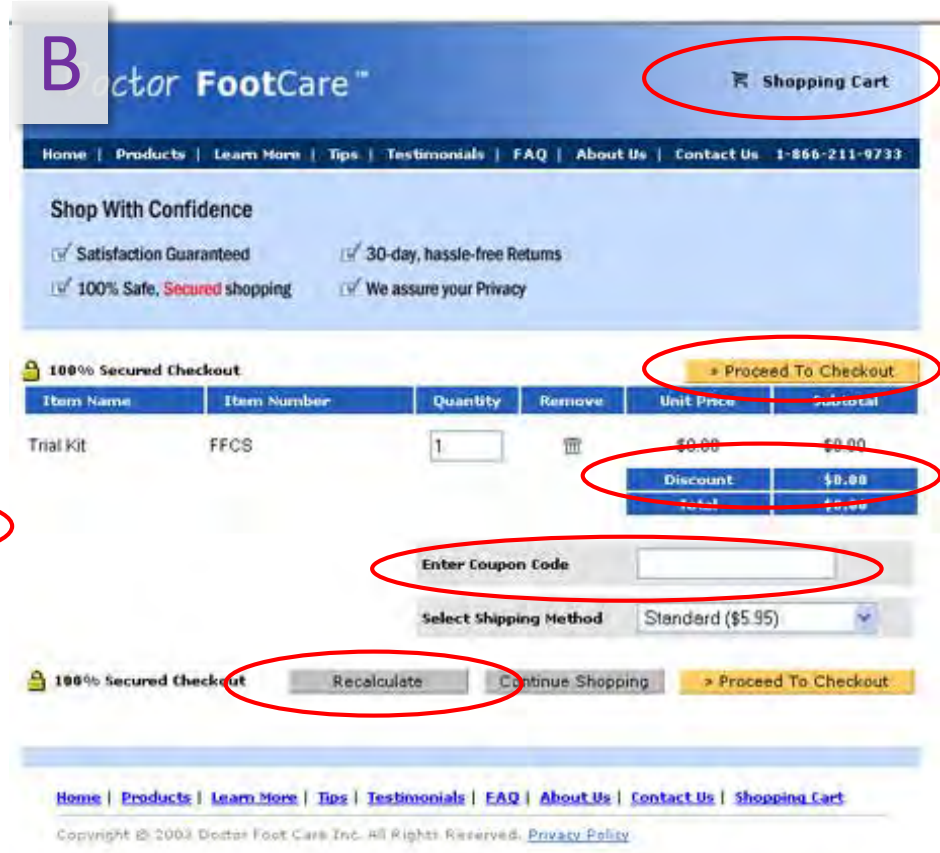
Which version has a higher conversion rate?

Example from Bryan Eisenberg's article on clickz.com

Checkout Page

***Conversion rate* is percentage of visits that include purchase**





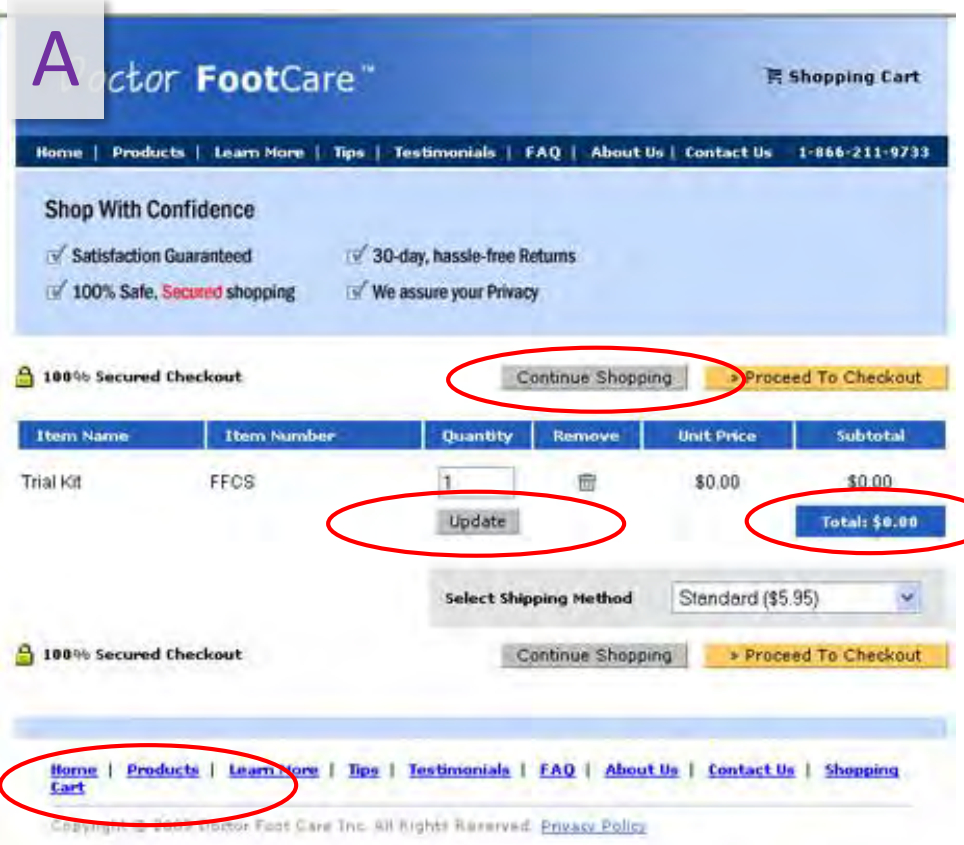
Which version has a higher conversion rate?

Example from Bryan Eisenberg's article on clickz.com

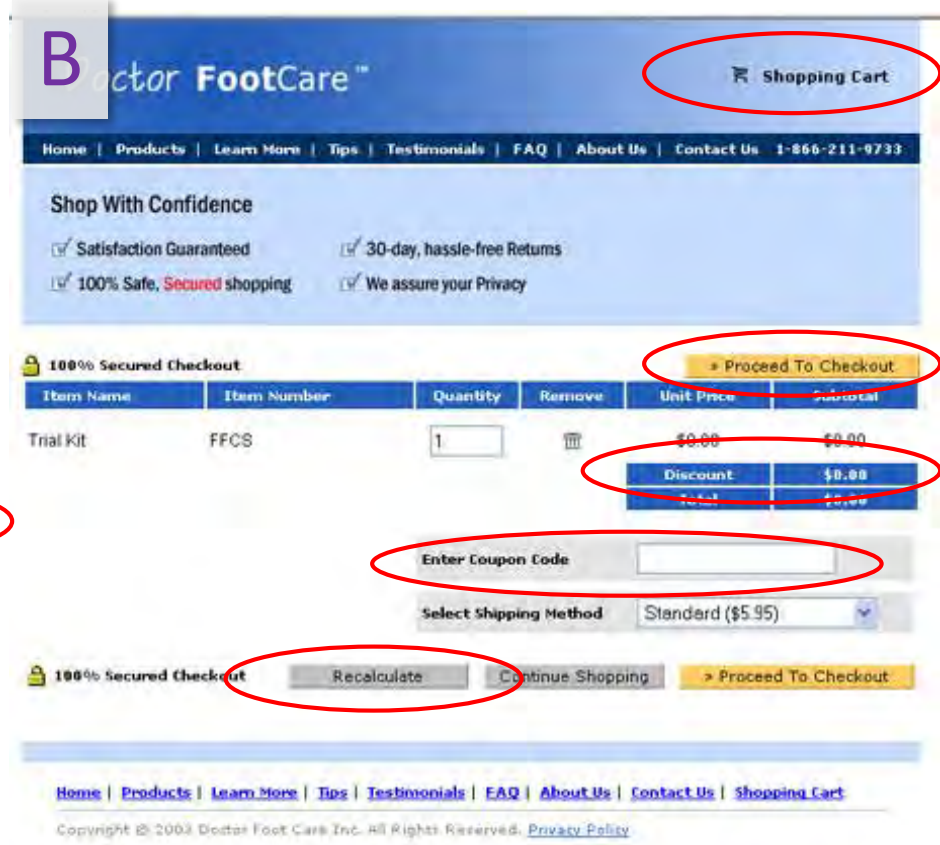
Checkout Page

***Conversion rate* is percentage of visits that include purchase**

A



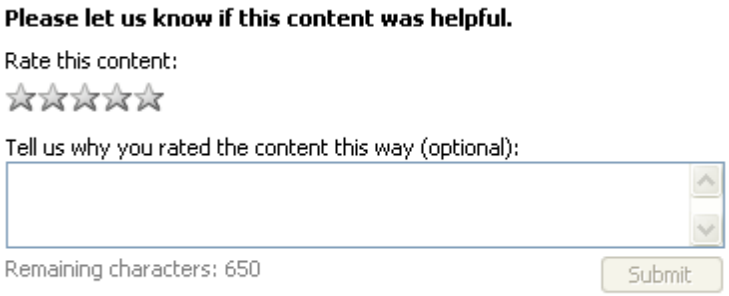
B



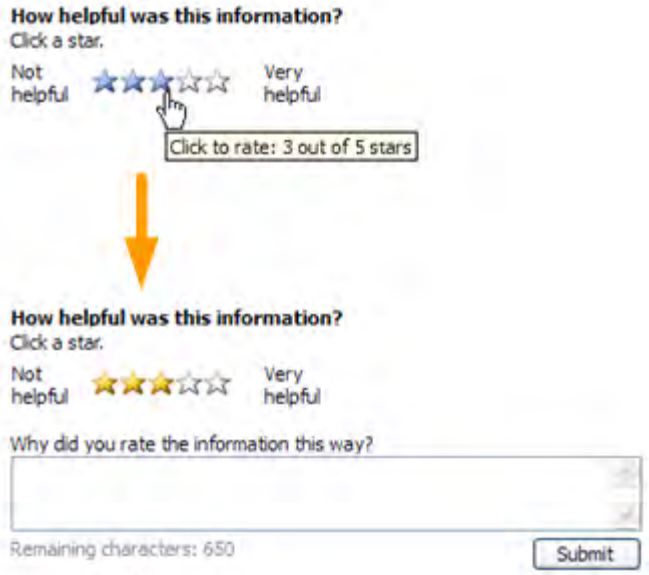
Coupon Code decreases by factor of 10

Office Online Feedback

A



B



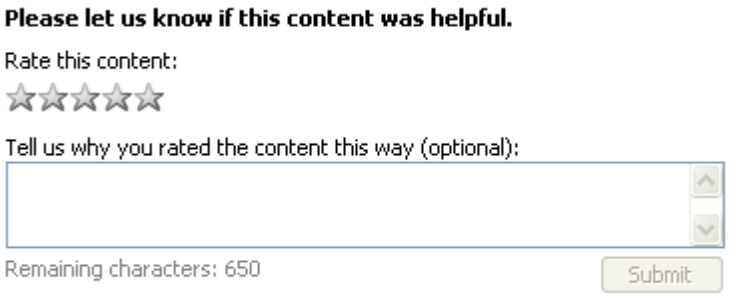
Feedback A puts everything together, whereas feedback B is two-stage: question follows rating.

Feedback A just has 5 stars, whereas B annotates the stars with “Not helpful” to “Very helpful” and makes them brighter.

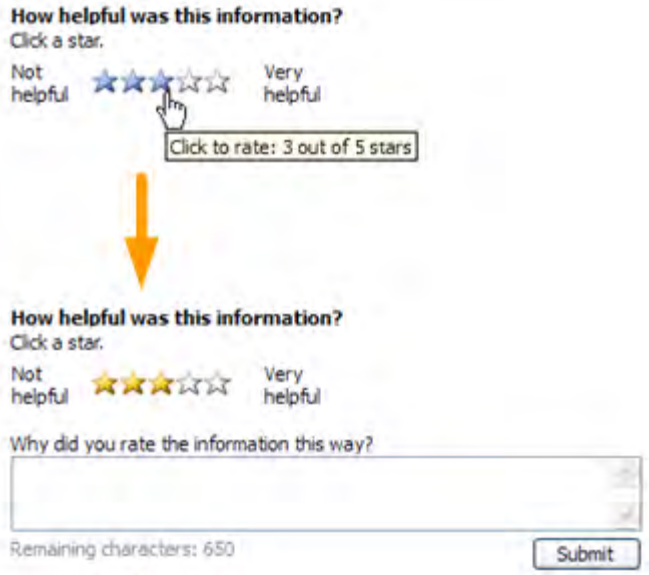
Which one has a higher response rate? By how much?

Office Online Feedback

A



B



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?

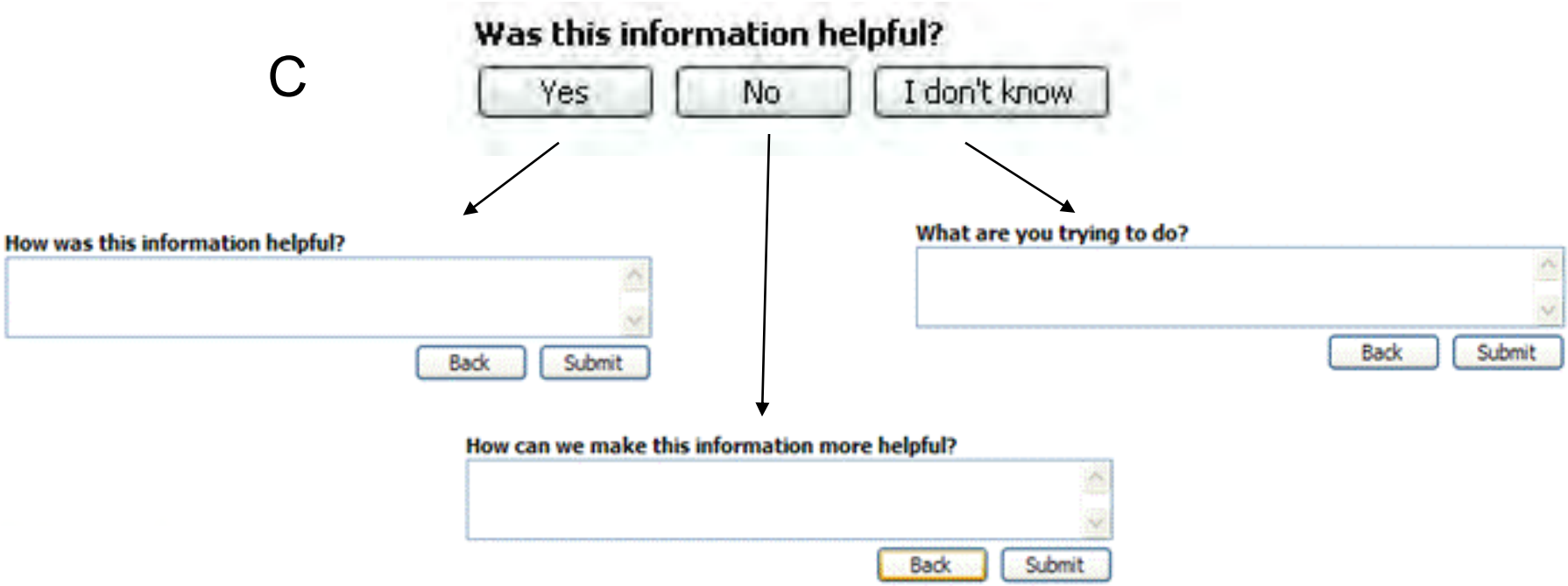
B gets more than double response rate.

Another Feedback Variant

Call this variant C. Like B, also two-stage.

Which one has a higher response rate, B or C?

C

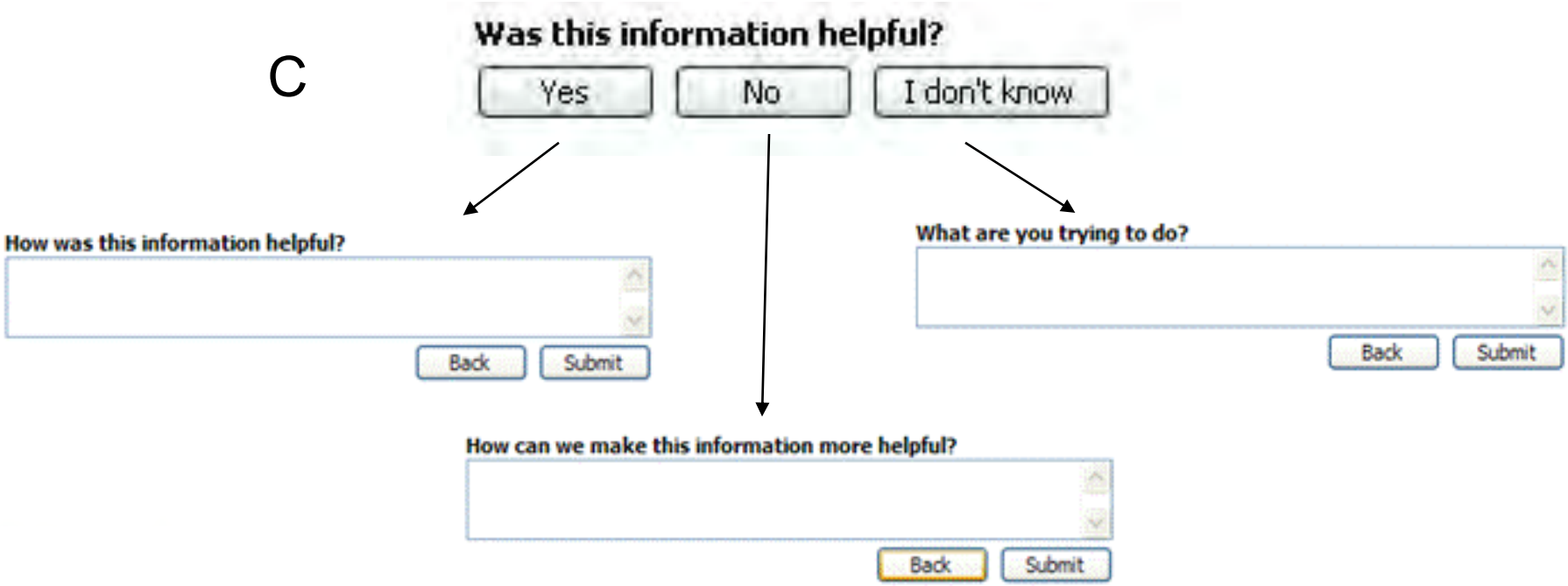


Another Feedback Variant

Call this variant C. Like B, also two-stage.

Which one has a higher response rate, B or C?

C



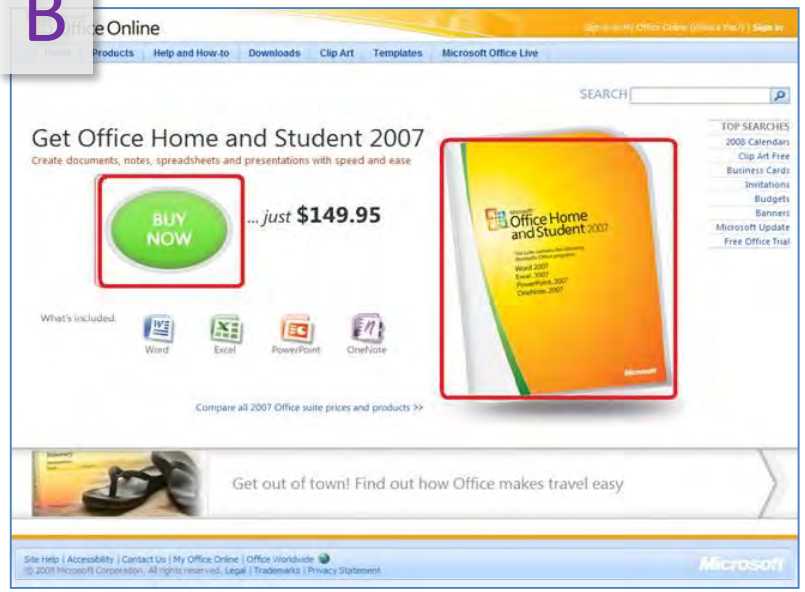
C outperforms B by a factor of 3.5

Office Online

Clicks on revenue generating links (red links)

A

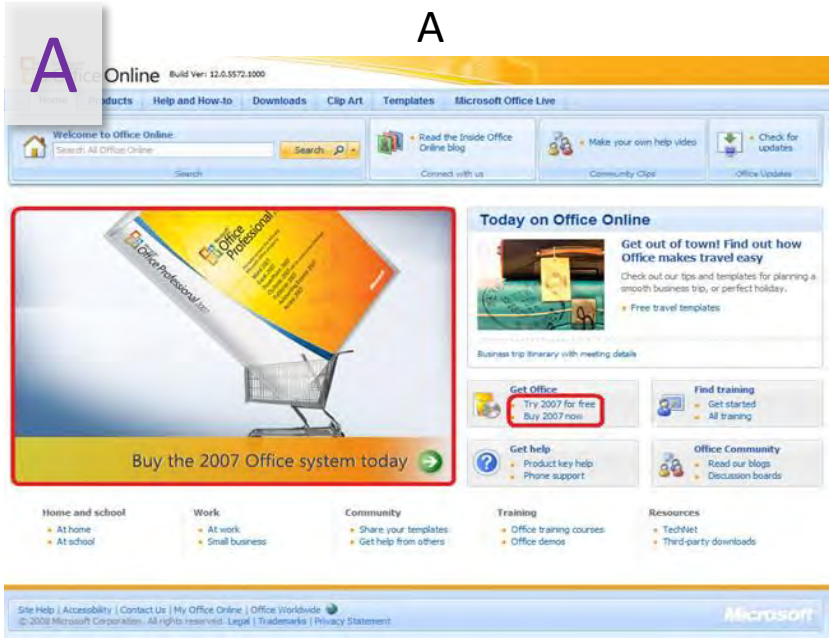
B



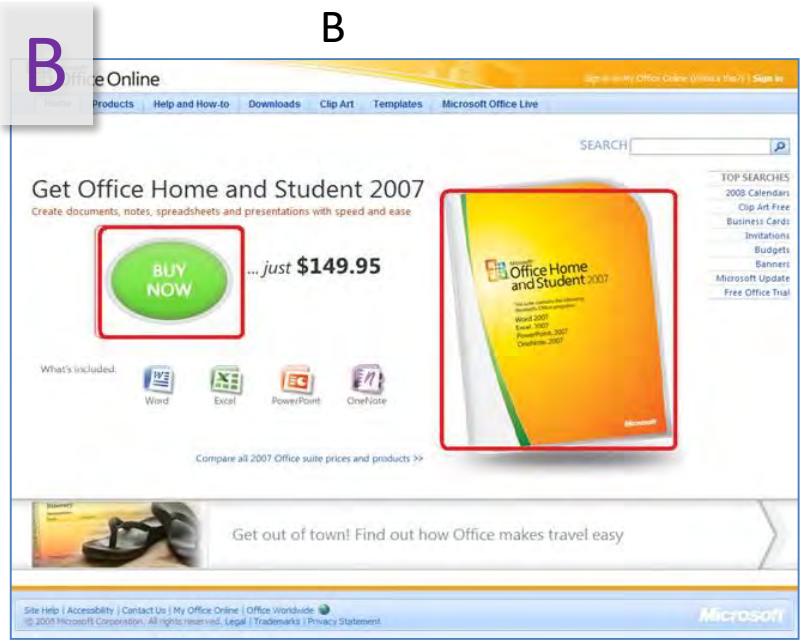
Office Online

Clicks on revenue generating links (red links)

A



B

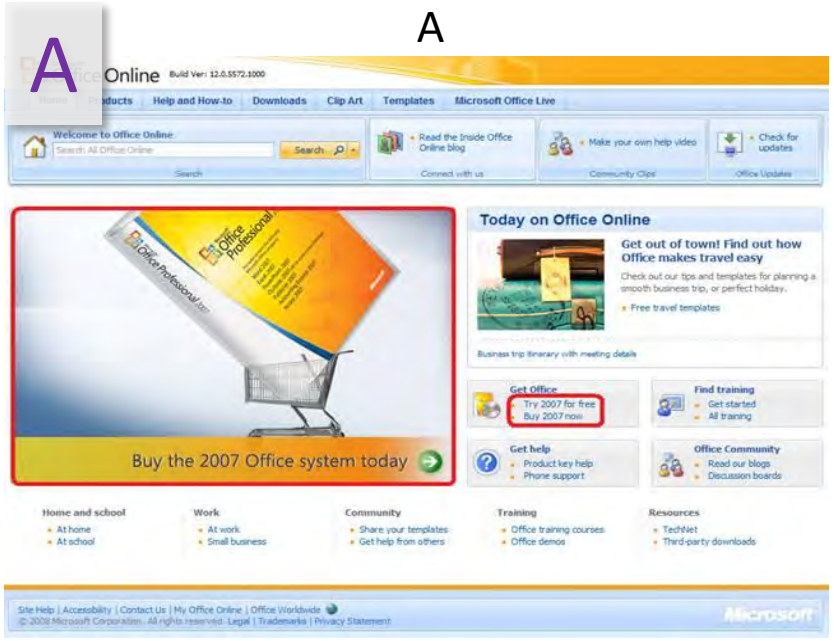


A gets many more clicks

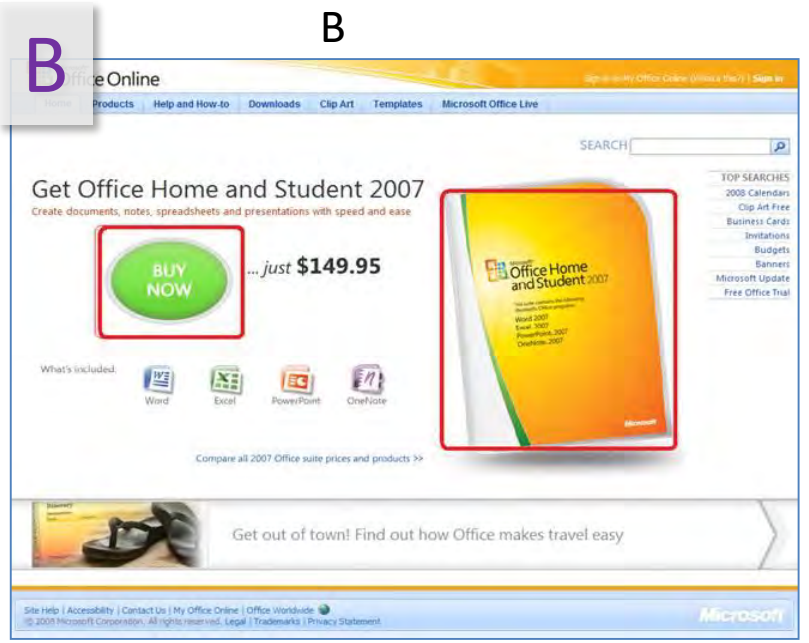
Office Online

Clicks on revenue generating links (red links)

A



B



B gets more revenue

Examples Where Data Is Wrong

If something is “amazing,” find the flaw!

If you have a mandatory birth date field,
and people think it’s unnecessary,
you will find lots of 11/11/11 or 01/01/01

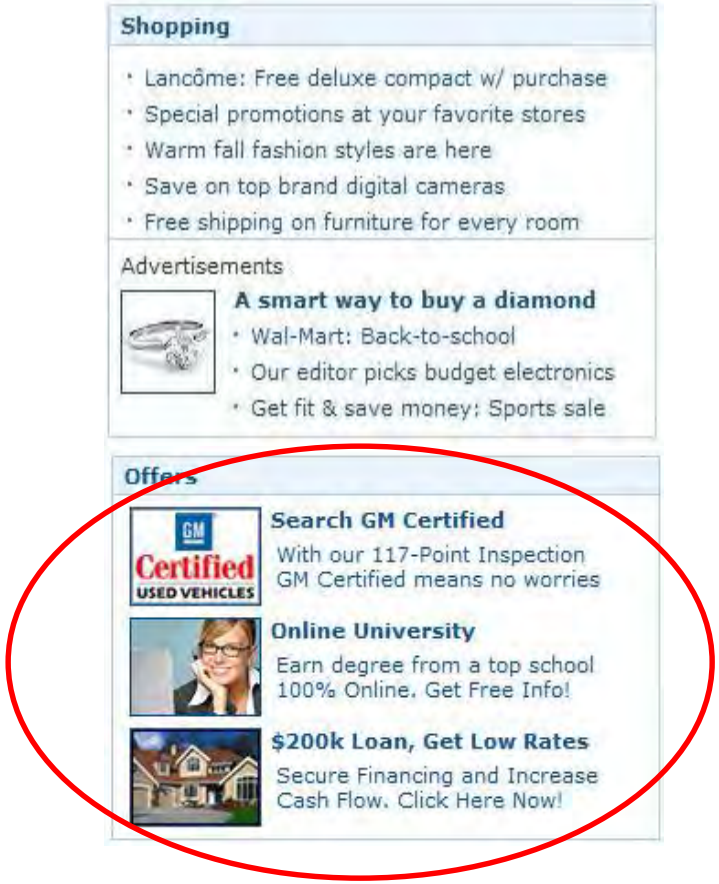
If you have an optional drop down,
do not default to the first alphabetical entry,
or you will have lots of: jobs = Astronaut

Traffic to doubled between 1-2am Nov 6, 2011 for many web sites, relative to same hour week prior

MSN US Home Page

Proposal: New Offers module below Shopping

Control



Treatment

Experiment Results

Ran A/B test for 12 days on 5% of MSN US visitors

Experiment Results

Ran A/B test for 12 days on 5% of MSN US visitors

Clickthrough:

Page views per person-day:

Experiment Results

Ran A/B test for 12 days on 5% of MSN US visitors

Clickthrough: decreased 0.49%

Page views per person-day: decreased 0.35%

Experiment Results

Ran A/B test for 12 days on 5% of MSN US visitors

Clickthrough: decreased 0.49%

Page views per person-day: decreased 0.35%

Value of click from home page: X cents

Net = Expected Revenue –
Value Per Click * Direct lost clicks –
Value Per Click * Lost Due to Decreased Views

Experiment Results

Ran A/B test for 12 days on 5% of MSN US visitors

Clickthrough: decreased 0.49%

Page views per person-day: decreased 0.35%

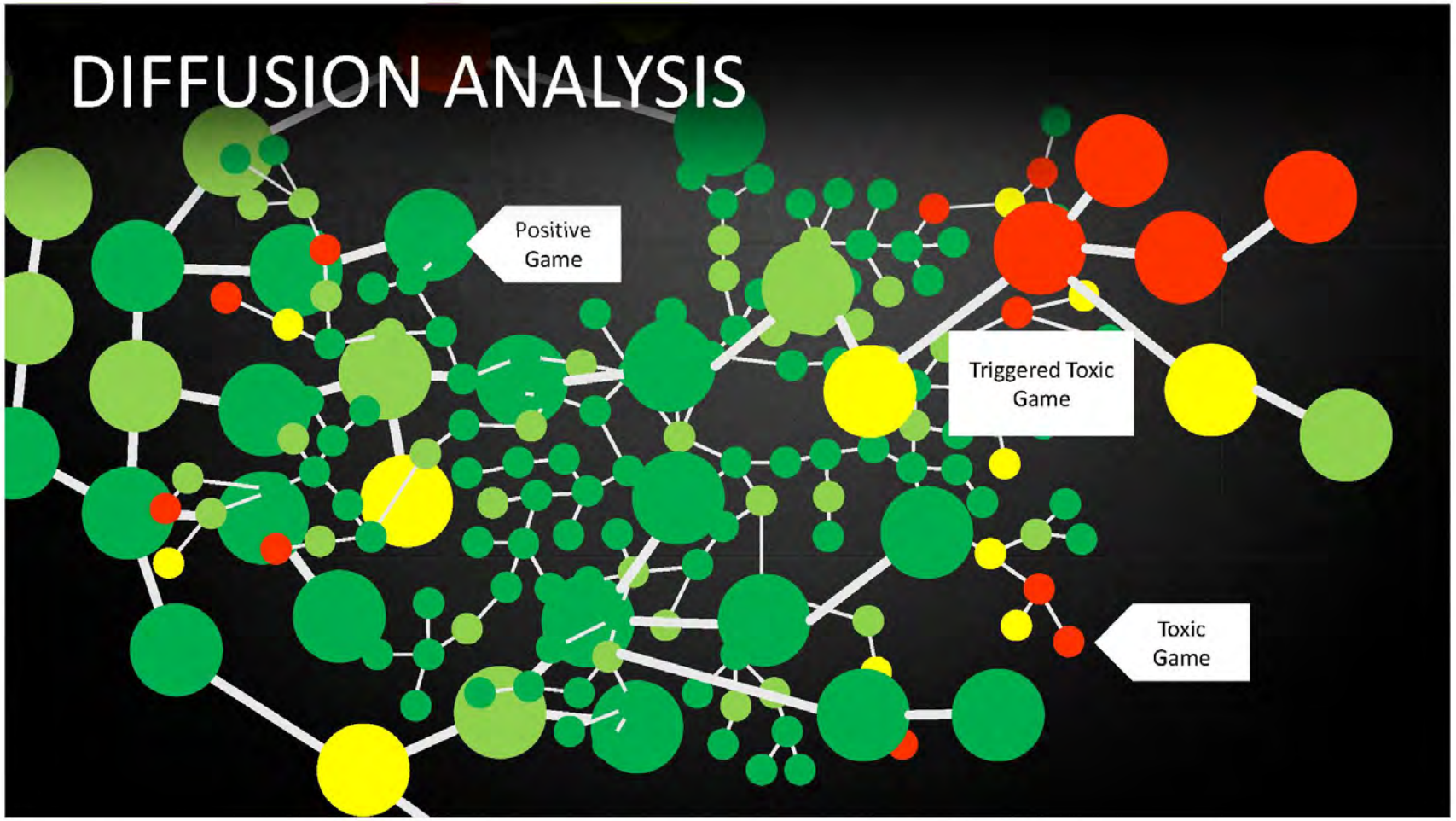
Value of click from home page: X cents

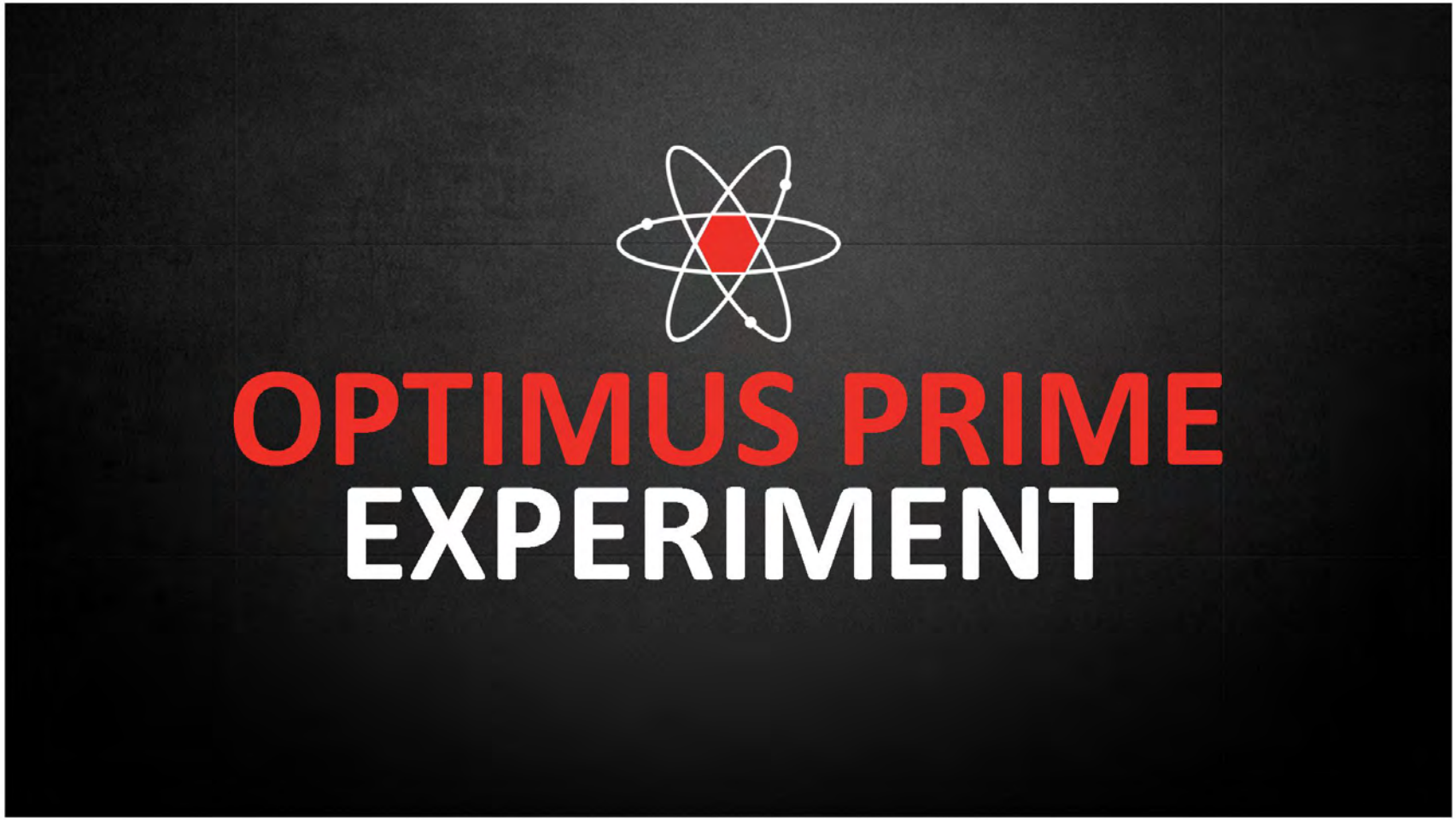
Net = Expected Revenue –
Value Per Click * Direct lost clicks –
Value Per Click * Lost Due to Decreased Views

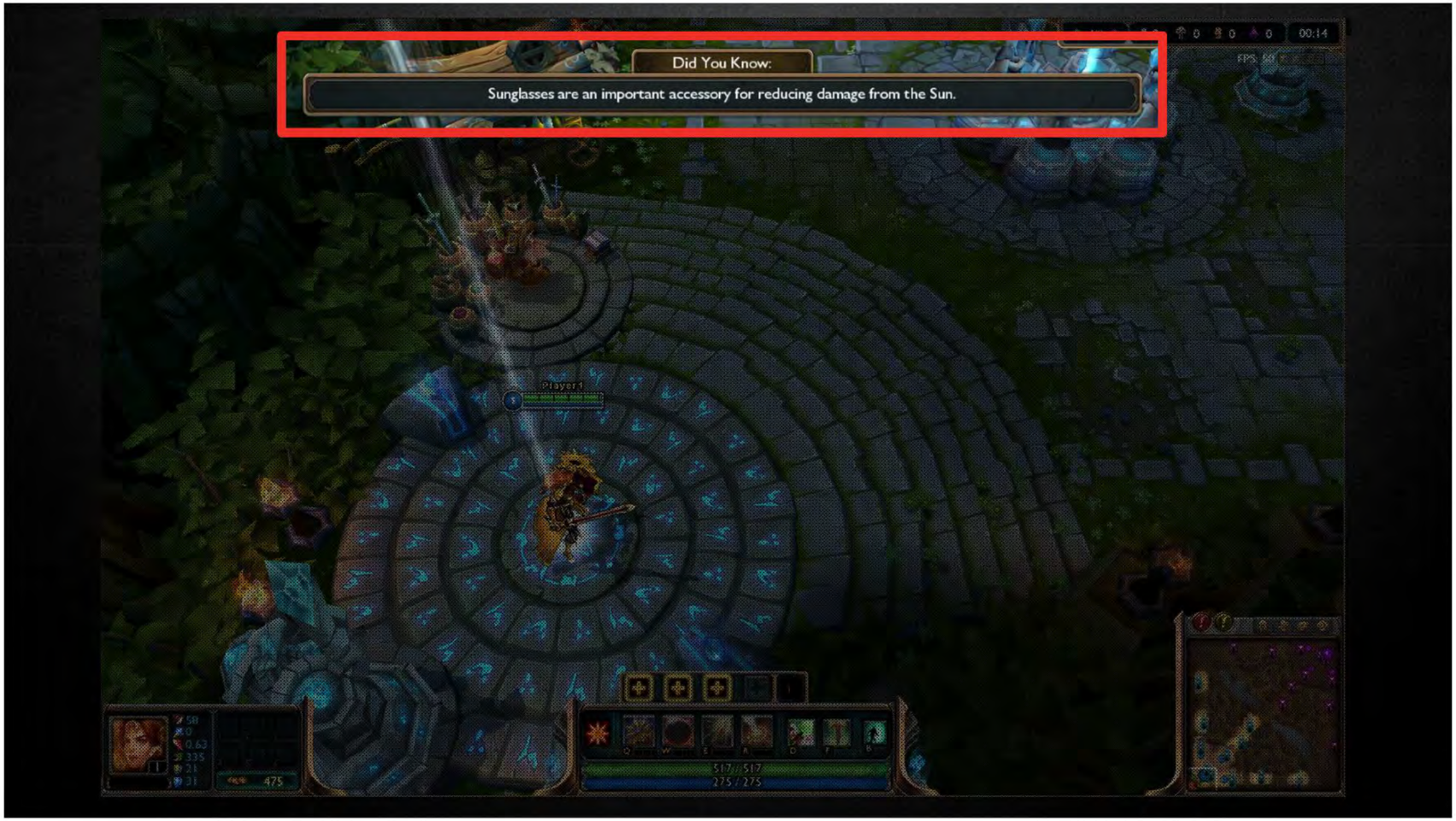
Net was negative (in millions of dollars), offers module did not launch

ONLINE PLATFORMS
AS THE FUTURE OF RESEARCH

JEFFREY “LYTE” LIN
jlin@riotgames.com | @RiotLyte


DIFFUSION ANALYSIS
Positive Game
Triggered Toxic Game
Toxic Game


OPTIMUS PRIME
EXPERIMENT


Did You Know:
Sunglasses are an important accessory for reducing damage from the Sun.
Player1
00:14

OPTIMUS PRIME

EXPERIMENTAL DESIGN

C1

CATEGORY 1:
FUN FACTS

"Nautilus' /joke makes him swim through air. He's weird like that."

OPTIMUS PRIME

EXPERIMENTAL DESIGN

C1 C2

CATEGORY 2:
POSITIVE BEHAVIOR

"Players perform better if you give them constructive feedback after a mistake."

OPTIMUS PRIME

EXPERIMENTAL DESIGN

C1 C2 C3

CATEGORY 3:
NEGATIVE BEHAVIOR

"Players who verbally abuse their teammates lose 16% more games."

OPTIMUS PRIME

EXPERIMENTAL DESIGN

CATEGORY 4:
SELF-REFLECTION

"Who will be the most sportsmanlike player in this game?"

OPTIMUS PRIME

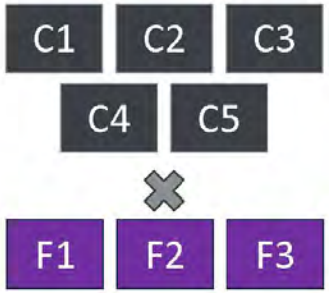
EXPERIMENTAL DESIGN

CATEGORY 5:
GAMEPLAY TIPS

"Hold down the ALT key while casting an ability to cast it on yourself."

OPTIMUS PRIME

EXPERIMENTAL DESIGN

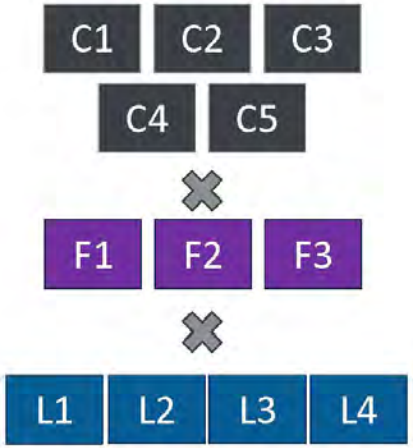


FONT COLORS

Font Color 1 | Red
Font Color 2 | Blue
Font Color 3 | White (Control)

OPTIMUS PRIME

EXPERIMENTAL DESIGN



LOCATIONS

LOCATION 1: Loading Screen

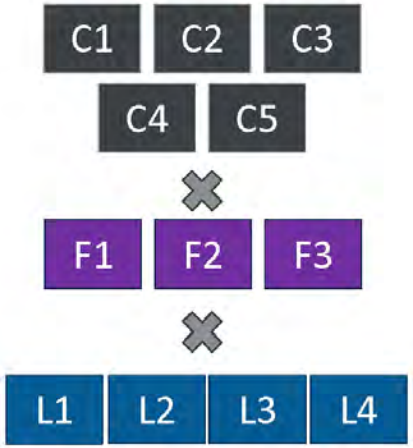
LOCATION 2: In-Game

LOCATION 3: Both

LOCATION 4: None (Control)

OPTIMUS PRIME

EXPERIMENTAL DESIGN



COMPLETE EXPERIMENTAL DESIGN:

24 TIPS ACROSS 5 CATEGORIES

✖

3 FONT COLORS

✖

3 LOCATIONS + 1 OVERALL CONTROL

=

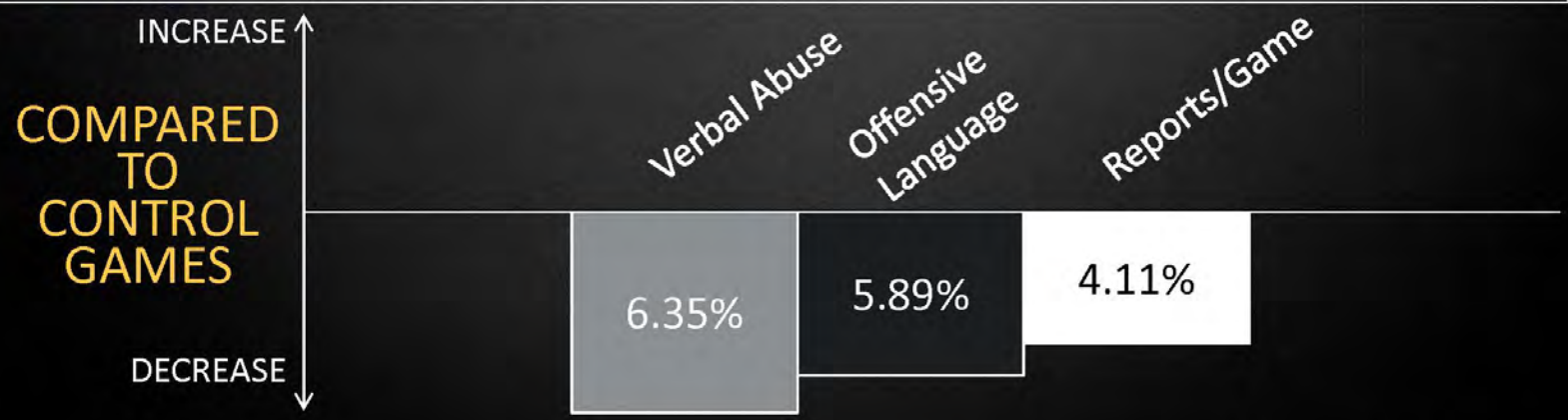
217 UNIQUE CONDITIONS

EVERY GAME OF *LEAGUE OF LEGENDS* GOT A RANDOM TIP, LOCATION & FONT COLOR

(10% OF GAMES GOT NOTHING TO ACT AS CONTROLS)

OPTIMUS PRIME RESULTS

TIP: "X% of players punished by the Tribunal improve their behavior and are never punished again"
FONT: White
LOCATION: Loading Screen

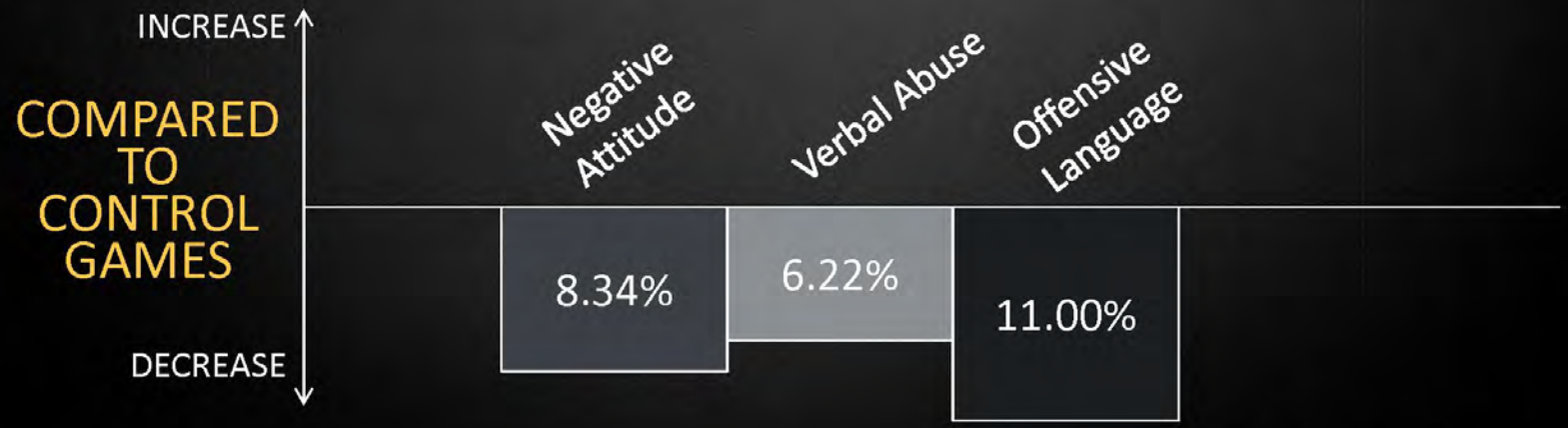


*Optimus data from 11/2012

HOW DO FONT COLORS INTERACT WITH TIP CATEGORIES?

OPTIMUS PRIME RESULTS

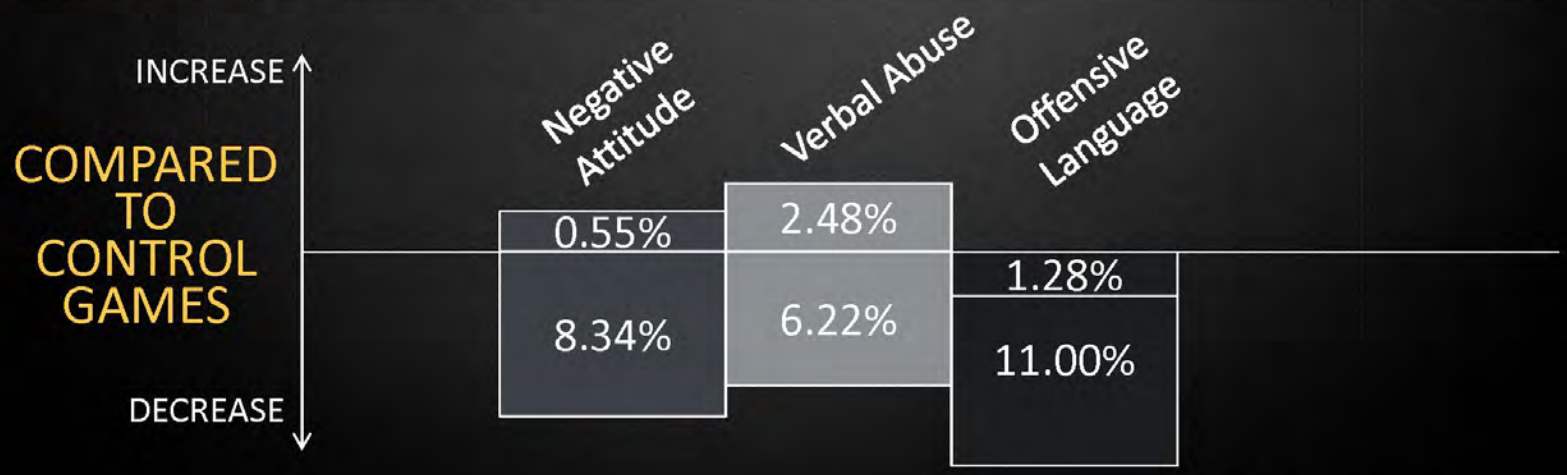
TIP: "Teammates perform worse if you harass them after a mistake."
FONT: Red
LOCATION: Loading Screen



*Optimus data from 11/2012

OPTIMUS PRIME RESULTS

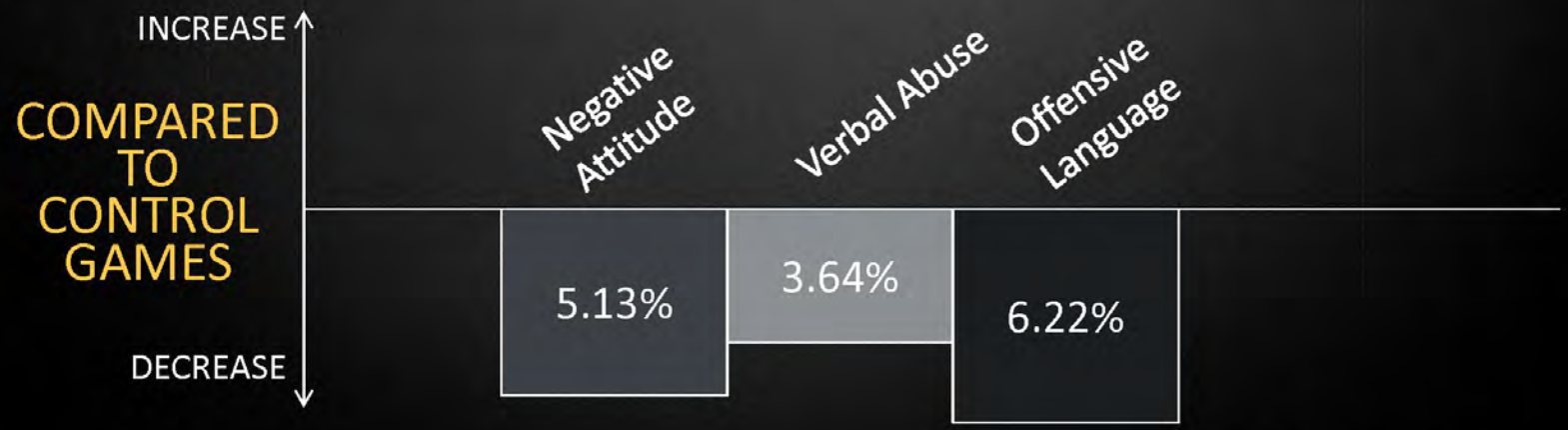
TIP: "Teammates perform worse if you harass them after a mistake."
FONT: White
LOCATION: Loading Screen



*Optimus data from 11/2012

OPTIMUS PRIME RESULTS

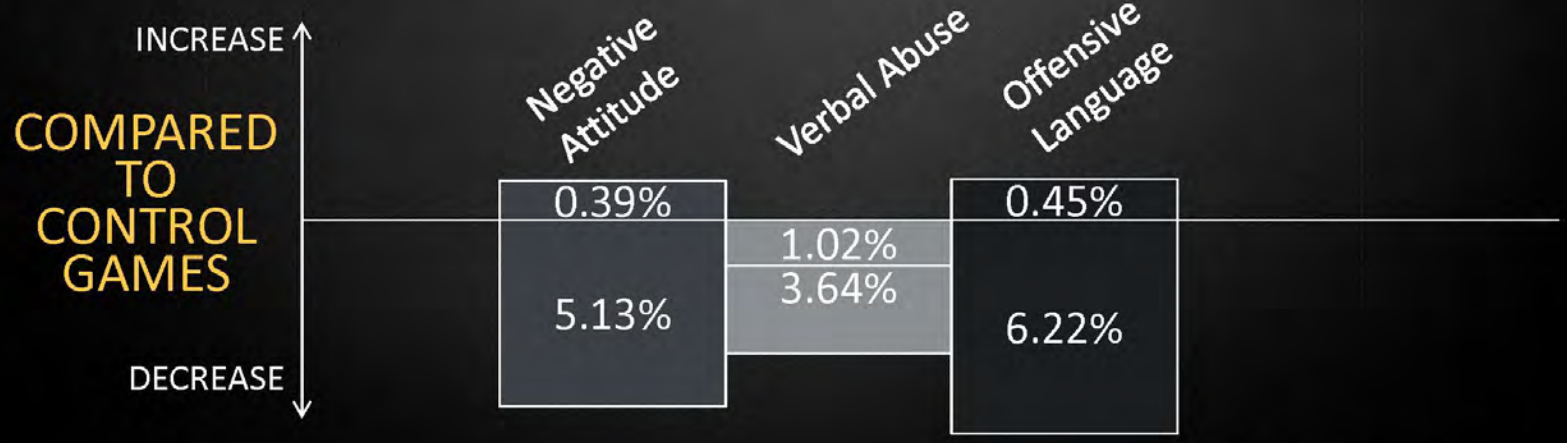
TIP: “Players who cooperate with their teammates win X% more games.”
FONT: Blue
LOCATION: Loading Screen



*Optimus data from 11/2012

OPTIMUS PRIME RESULTS

TIP: "Players who cooperate with their teammates win X% more games."
FONT: Red
LOCATION: Loading Screen



*Optimus data from 11/2012

ONLINE PLATFORMS
AS THE FUTURE OF RESEARCH

JEFFREY “LYTE” LIN
jlin@riotgames.com | @RiotLyte

Data Driven Methods Not Just Online

PREVIOUS NEXT Back to story

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.

PREVIOUS NEXT Back to story

2000

Thick paper replaces cardboard. DVDs are inserted and removed from the top rather than the side.

PREVIOUS NEXT Back to story

2000

Full-color printing is introduced. Top-loading is abandoned in favor of side-loading, which is judged more convenient.

NEXT»

Data Driven Methods Not Just Online

PREVIOUS NEXT Back to story

2000

Customers are asked to peel off a sticker to reveal Netflix's return address. The design is eventually deemed too complex.

PREVIOUS NEXT Back to story

2000

Made from plastic instead of paper, this mailer is cheaper, but it sometimes inflates when transported on airplanes.

PREVIOUS NEXT Back to story

2001

An airhole (the black dot on the left side of the mailer) is added to prevent the package from inflating.

NUCCI STUDIO

PREVIOUS NEXT Back to story

2001

Netflix returns to paper because it's easier to recycle. Foam padding is added to reduce breakage.

NEXT»

Data Driven Methods Not Just Online

PREVIOUS NEXT Back to story

2001

Foam padding is dropped because the benefits don't justify the cost. The company gives top-loading another try.

PREVIOUS NEXT Back to story

2001

Marking a return to side-loading, this mailer is a direct ancestor of the one the company uses today.

PREVIOUS NEXT Back to story

2003

Instead of sealing the entire top and bottom, Netflix introduces a circular sticker, affixed only on the top.

NUCCI STUDIO

PREVIOUS NEXT Back to story

2004

A window shows the disc bar code. Speculation is that this enables storing discs in mailers prior to shipping.

NEXT»

Limitations of Data Driven Testing

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

- Now we step through a larger example

half.com by eBay

1

NEW: Counting Crows: *Hard Candy* $11.88 Save 37%!

my account | cart | help | eBay home | sign in

Home | Books | Music | DVDs/ Movies | Video Games | Computers & Software | Electronics | Everything Else...

Gift Certificates | Wish List | Pre-Orders | Sell Your Stuff | New Users

Search: All Categories go

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!

Categories

Books
Textbooks, Fiction, Biography, Cooking, Business, & more...

Music
Rock, Hip Hop/Rap, Country, Pop, eBay items, & more...

Movies/DVDs
Action, Comedy, Children's, Romance, Animation, & more...

Games
PS2, Xbox, GameCube, Dreamcast, N64, & more...

New CD Releases!

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
[illegible] Goo 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

Just Released: *The Royal Tenenbaums* for $18.45
Wes Anderson (*Rushmore*) directs a motley crew of talented actors in this hysterical comedy about the rise and fall of an eccentric family.

In-Stock Now!	Our Price	List Price
Monster's Ball (DVD)	$11.25	$24.99

Advance Orders

The Simpsons: Complete 2nd Season (DVD) **$34.97** Save 30%!

The Sopranos: Complete 3rd Season (DVD) **$67.99** Save 32%!

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...

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

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...

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)

Redeeming a Gift Certificate or Coupon?

Proceed to Checkout
Speedy Checkout

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 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**".

Redeem

Proceed to Checkout
Speedy Checkout

4

my account | cart | help | ebay home | sign out

Home | Books | Music | DVDs/ Movies | Video Games | Computers & Software | Electronics | Everything Else...

Gift Certificates | Wish List | Pre-Orders | Sell Your Stuff | New Users

Search: All Categories | go

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:

PASSPORT Sign In

5

Checkout

1 Shipping 2 3

Step 1 - Choose Shipping Address

Ship my order to:

Jason Hong
387 Soda Hall Computer Science UC Berkeley
Berkeley, CA 94720

Use This Address

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 list for State.

ZIP code
Country: USA

Save Changes

Checkout

1 Shipping — 2 Review — 3 Place Order

Secure Shopping

Place my order!

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

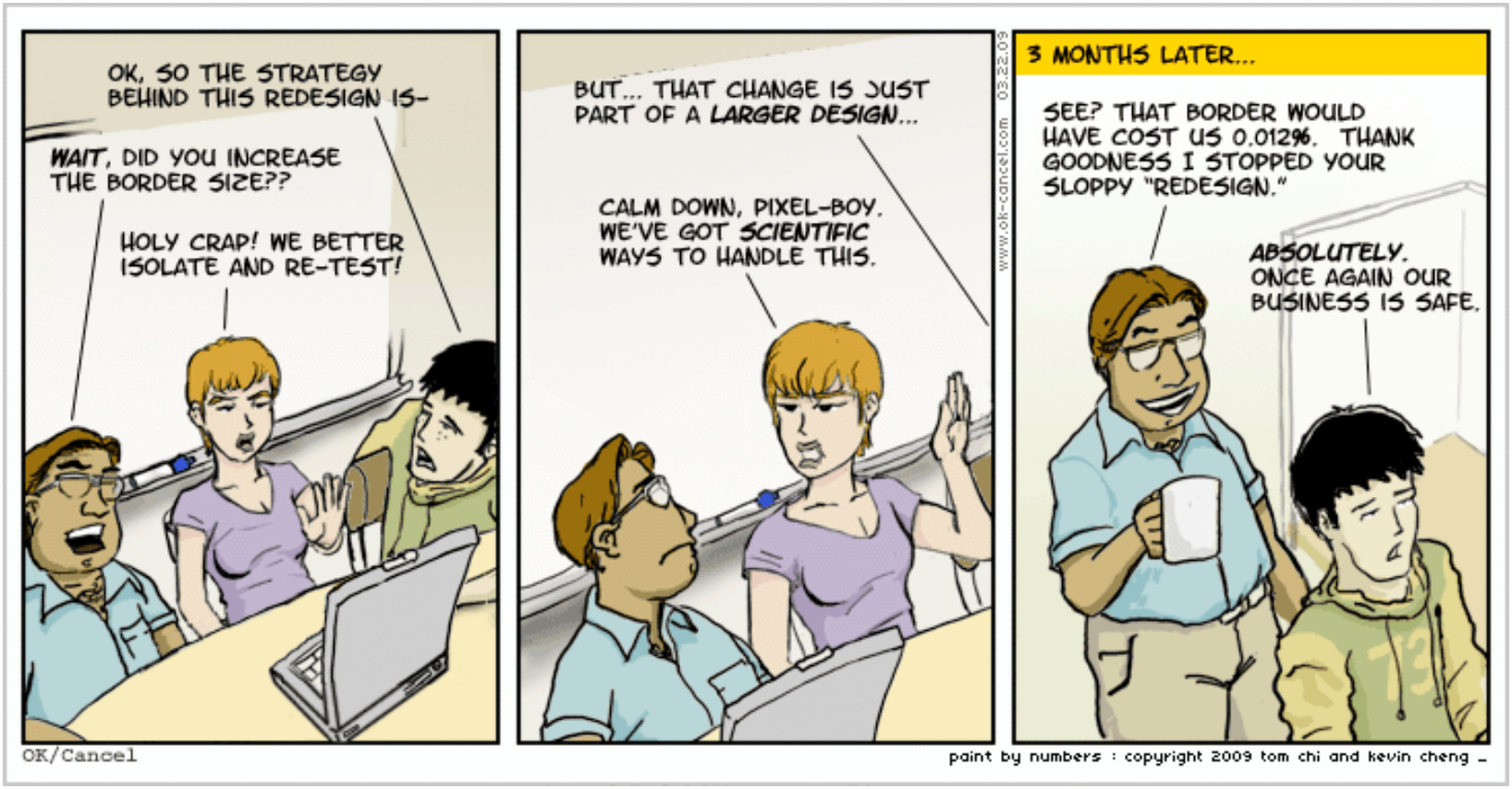
MasterCard ending with 0155
Expires 11/2003
Zipcode: 94709

Edit / Change Billing

☐ Use this shipping and billing information as my Speedy Checkout settings.

Place my order!

Testing in a Larger Design



Goodbye, Google | Stop
James
stopdesign.com/archive/2009/03/20/goodbye-google.html
stopdesign creative outlet of Douglas Bowman
home posts & links
about background info
also relevant bits
Goodbye, Google
20 March 2009 design google
Part 1 of 2 (here's Part 2)
Today is my last day at Google.
I started working in-house at Google almost three years ago. I built a team from scratch. I was fortunate to hire a team of a very talented designers. We introduced Visual Design as a discipline to Google. And we produced amazing work together. I'm very proud of my team, and I wish them well. They have a lot of challenging work ahead. But for me, it's time to move on.
Do I have something else lined up? Yes. That will be covered in Part 2. So I'm not leaving just to leave. But I'm not going to sugarcoat the reasons for my departure either. The scale at which Google operates was an early attractor for me. Potential to impact millions of people? Where do I sign? Unfortunately for me, there was one small problem I didn't see back then.
When I joined Google as its first visual designer, the company was already seven years old. Seven years is a long time to run a company without a classically trained designer. Google had plenty of designers on staff then, but most of them had backgrounds in CS or HCI. And none of them were in high-up, respected leadership positions. Without a person at (or near) the helm who thoroughly understands the principles and elements of Design, a company eventually runs out of reasons for design decisions. With every new design decision, critics cry foul. Without conviction, doubt creeps in. Instincts fail. "Is this the right move?" When a company is filled with engineers, it turns to engineering to solve problems. Reduce each decision to a simple logic problem. Remove all subjectivity and just look at the data. Data in your favor? Ok, launch it. Data shows negative effects? Back to the drawing board. And that data eventually becomes a crutch for every decision, paralyzing the company and preventing it from making any daring design decisions.
Yes, it's true that a team at Google couldn't decide between two blues, so they're testing 41 shades between each blue to see which one performs better. I had a recent debate over whether a border should be 3, 4 or 5 pixels wide, and was asked to prove my case. I can't operate in an environment like that. I've grown tired of debating such minuscule design decisions. There are more exciting design problems in this world to tackle.
I can't fault Google for this reliance on data. And I can't exactly point to financial failure or a shrinking number of users to prove it has done anything

Today

Ethics in Testing

Tasks in Testing

Wizard of Oz Methods in Testing

Remote Usability Testing

Patterns

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

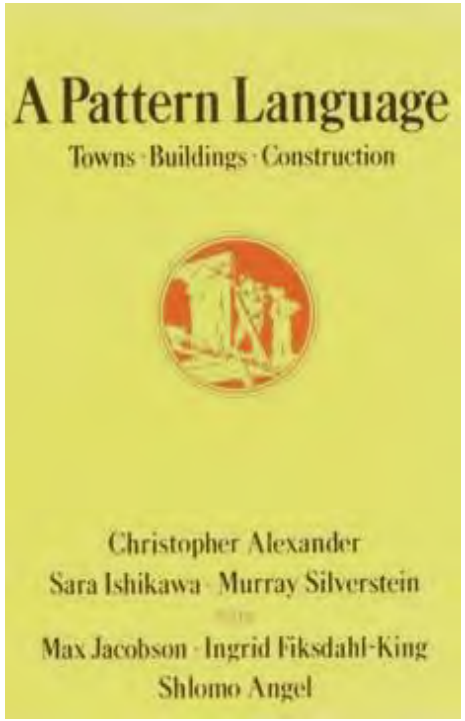
One option is patterns

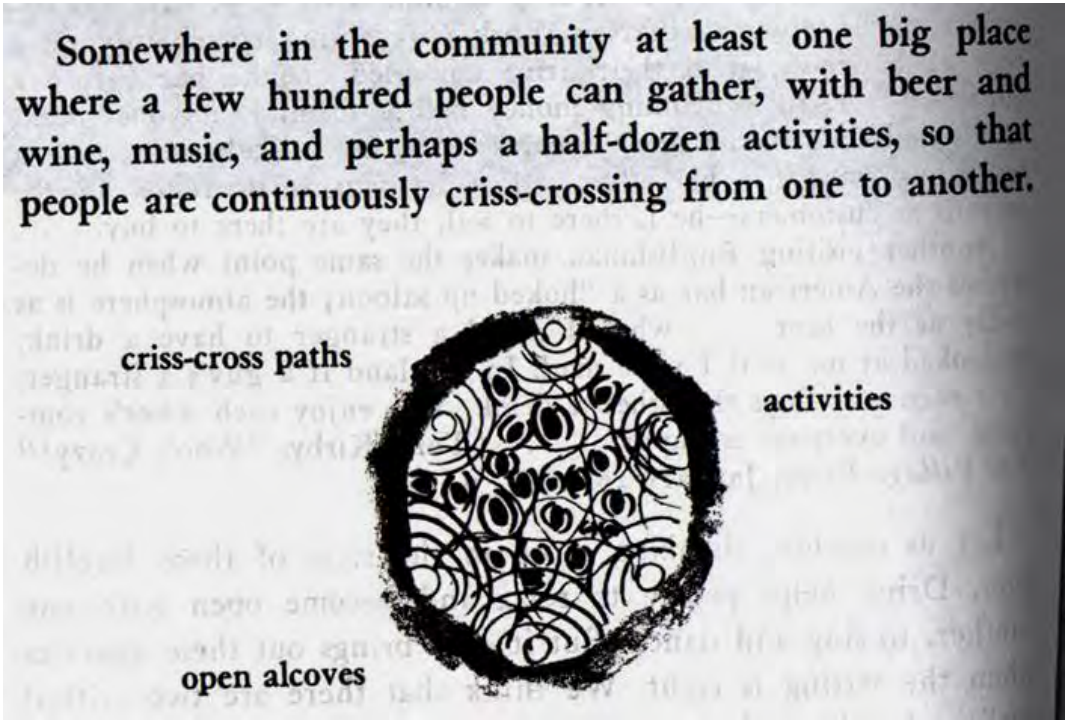
- But this is also why we point you at research

Design Patterns

Design patterns communicate common design problems and solutions

- First used in architecture [Alexander]
- How to create a beer hall where people socialize?





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

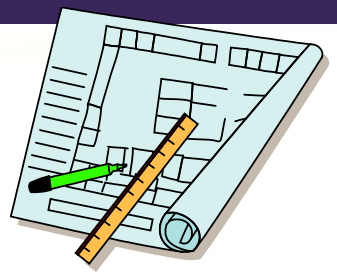
for “building and planning towns, neighborhoods, houses, gardens, and rooms”

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

half.com by ebay

1

NEW: Counting Crows: *Hard Candy* $11.88 Save 37%!

my account | cart | help | ebay home | sign in

Home | Books | Music | DVDs/ Movies | Video Games | Computers & Software | Electronics | Everything Else...

Gift Certificates | Wish List | Pre-Orders | Sell Your Stuff | New Users

Search: All Categories [go]

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!

Categories

Books
Textbooks, Fiction, Biography, Cooking, Business, & more...

Music
Rock, Hip Hop/Rap, Country, Pop, eBay items, & more...

Movies/DVDs
Action, Comedy, Children's, Romance, Animation, & more...

Games
PS2, Xbox, GameCube, Dreamcast, N64, & more...

New CD Releases!

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
Gutterflower, Goo Goo 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

Just Released: *The Royal Tenenbaums* for $18.45
Wes Anderson (*Rushmore*) directs a motley crew of talented actors in this hysterical comedy about the rise and fall of an eccentric family.

In-Stock Now!	Our Price	List Price
Monster's Ball (DVD)	$11.25	$24.99

Advance Orders

The Simpsons: Complete 2nd Season (DVD) **$34.97** Save 30%!

The Sopranos: Complete 3rd Season (DVD) **$67.99** Save 32%!

Tom Clancy: Red Rabbit (Hardcover) **$19.40** Save 33%!

In Computers

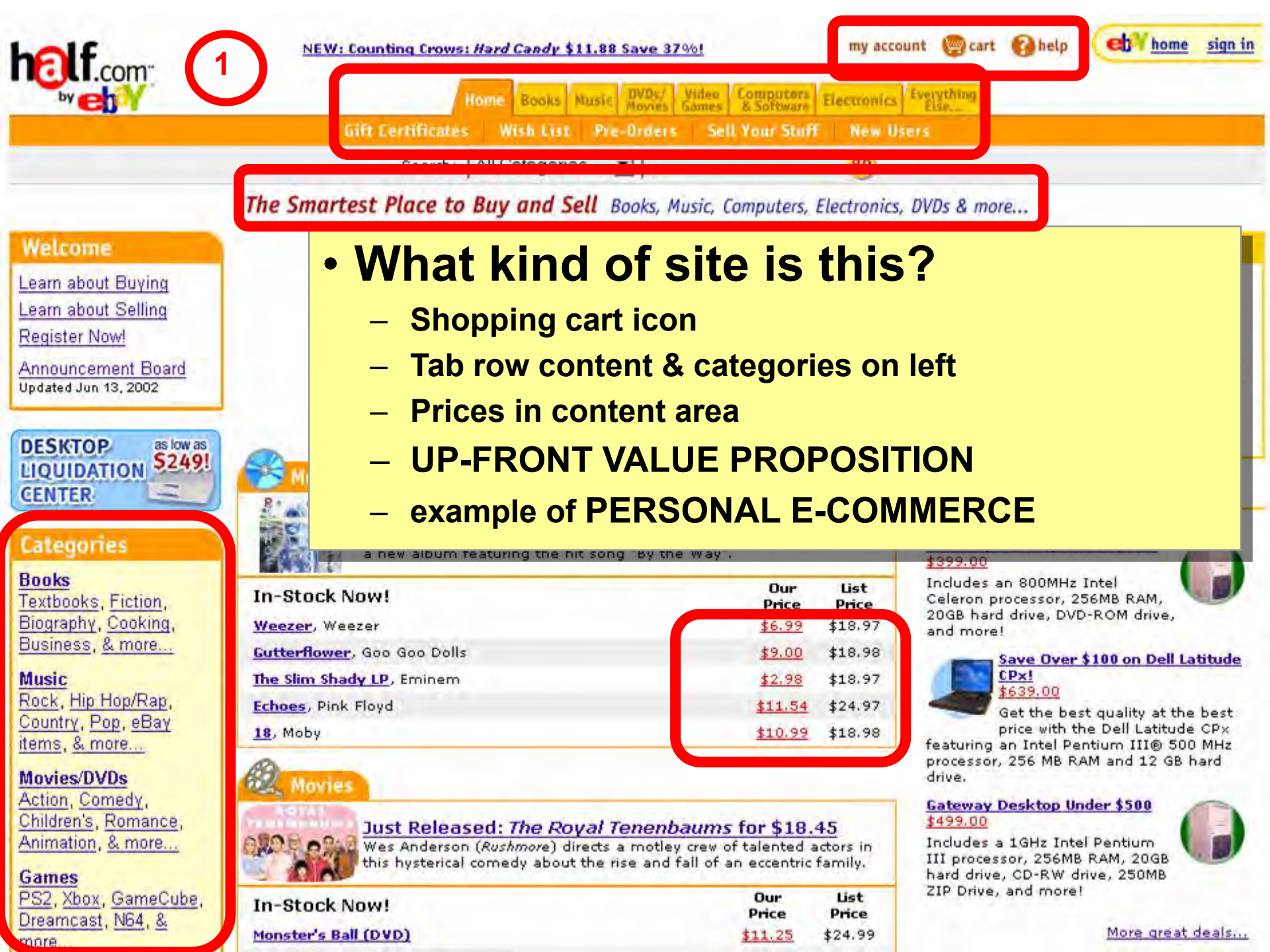
Gateway Desktop Under $400!
$399.00
Includes an 800MHz Intel Celeron processor, 256MB RAM, 20GB hard drive, DVD-ROM drive, and more!

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...

half.com by ebay
1
NEW: Counting Crows: Hard Candy $11.88 Save 37%!
my account
cart
help
ebay home
sign in
Home
Books
Music
DVDs/ Movies
Video Games
Computers & Software
Electronics
Everything Else...
Gift Certificates
Wish List
Pre-Orders
Sell Your Stuff
New Users
• What site is this?
– Logo in top-left corner denotes the site
– Another logo at top-right to reinforce
– examples of SITE BRANDING
Welcome
Learn about Buying
Learn about Selling
Register Now!
Announcement Board
Updated Jun 13, 2002
DESKTOP LIQUIDATION CENTER
as low as $249!
Categories
Books
Textbooks, Fiction, Biography, Cooking, Business, & more...
Music
Rock, Hip Hop/Rap, Country, Pop, eBay items, & more...
Movies/DVDs
Action, Comedy, Children's, Romance, Animation, & more...
Games
PS2, Xbox, GameCube, Dreamcast, N64, & more...
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
Gutterflower, Goo Goo 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
Just Released: The Royal Tenenbaums for $18.45
Wes Anderson (Rushmore) directs a motley crew of talented actors in this hysterical comedy about the rise and fall of an eccentric family.
In-Stock Now!
Our Price
List Price
Monster's Ball (DVD) $11.25 $24.99
Orders
he Simpsons: Complete
nd Season (DVD) $34.97
ave 30%!
nos: Complete 3rd Season
.99 Save 32%!
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...



- **What kind of site is this?**
  - **Shopping cart icon**
  - **Tab row content & categories on left**
  - **Prices in content area**
  - **UP-FRONT VALUE PROPOSITION**
  - **example of PERSONAL E-COMMERCE**

half.com by ebay
1
NEW: Counting Crows: Hard Candy $11.88 Save 37%!
my account
cart
help
ebay home
sign in
Home
Books
Music
DVDs/ Movies
Video Games
Computers & Software
Electronics
Everything Else...
Gift Certificates
Wish List
Pre-Orders
Sell Your Stuff
New Users
Search:
All Categories
go
Welcome
Learn about Buying
Learn about Selling
Register Now!
Announcement Board
Updated Jun 13, 2002
DESKTOP LIQUIDATION CENTER
as low as $249!
Categories
Books
Textbooks, Fiction, Biography, Cooking, Business, & more...
Music
Rock, Hip Hop/Rap, Country, Pop, eBay items, & more...
Movies/DVDs
Action, Comedy, Children's, Romance, Animation, & more...
Games
PS2, Xbox, GameCube, Dreamcast, N64, & more...
• What can I do here?
– Welcome for new visitors
– Tab row / Search on top
– "Categories"
– Prices
– Examples of OBVIOUS LINKS
Evolving after the popularity of Californication, the Chili Peppers release a new album featuring the hit song "By the Way".
In-Stock Now!
Our
List
Weezer, Weezer
$6.99
$18.97
Gutterflower, Goo Goo 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
Just Released: The Royal Tenenbaums for $18.45
Wes Anderson (Rushmore) directs a motley crew of talented actors in this hysterical comedy about the rise and fall of an eccentric family.
In-Stock Now!
Our Price
List Price
Monster's Ball (DVD)
$11.25
$24.99
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...

half.com by ebay
1
NEW: Counting Crows: Hard Candy $11.88 Save 37%!
my account
cart
help
ebay home
sign in
Home
Books
Music
DVDs/ Movies
Video Games
Computers & Software
Electronics
Everything Else...
Gift Certificates
Wish List
Pre-Orders
Sell Your Stuff
New Users
Search:
All Categories
go
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
New CD Releases!
only $11.88
More Hot New Releases!
Advance Orders
The Simpsons: Complete 2nd Season (DVD) $34.97 Save 30%!
The Sopranos: Complete 3rd Season (DVD) $67.99 Save 32%!
Tom Clancy: Red Rabbit (Hardcover) $19.40 Save 33%!
DESKTOP LIQUIDATION CENTER
as low as $249!
Categories
Books
Textbooks, Fiction, Biography, Cooking, Business, & more...
Music
Rock, Hip Hop/Rap, Country, Pop, eBay items, & more...
Movies/DVDs
Action, Comedy, Children's, Romance, Animation, & more...
Games
PS2, Xbox, GameCube, Dreamcast, N64, & more...
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
The Slim Shady LP, Eminem
Echoes, Pink Floyd
18, Moby
In Computers
Gateway Desktop Under $400!
$399.00
Includes an 800MHz Intel Celeron processor, 256MB RAM, 20GB hard drive, DVD-ROM drive, and more!
ZIP Drive, and more!
More great deals...
Movies
Just Released: The Roya
Wes Anderson (Rushmore) direc
this hysterical comedy about th
In-Stock Now!
Our Price
List Price
Monster's Ball (DVD)
$11.25
$24.99
• Most important info visible without scrolling
• ABOVE THE FOLD

Weezer (2001)

Weezer

Actual items for sale may vary from this image.

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...

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	starqaze13 (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...
$8.30 Buy!	$10.75 Media 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...

half.com by ebay

2

NEW: Counting Crows: *Hard Candy* $11.88 Save 37%!

my account | cart | help | ebay home | sign out

Home | Books | Music | DVDs/ Movies | Video Games | Computers & Software | Electronics | Everything Else...

Bestsellers | Greatest Hits | Live CDs | Box Sets | CDs $2.99 or less

Search: Music | go | Advanced Search

Home > Music

- **What site am I at?**
  - Logo in upper-left reinforces brand, can click to go to home
  - Same font, layout, color scheme also reinforces
  - examples of SITE BRANDING (E1)

Sell yours now!

Compare our Prices!

Half.com	$6.99
CDNOW	-- --
AlphaCraze	$ 15.66
CDUniverse	$ 15.69

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

74 items in stock

$7.75	Buy!	$10.20 Media Mail	custodian46 (149)	best buy	More info...
$8.00	Buy!	$10.45 Media Mail	starqaze13 (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...
$8.30	Buy!	$10.75 Media 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...

- **Where am I in the site?**
  - **"Home > Music" are LOCATION BREAD CRUMBS**
  - **TAB ROW says "Music"**
  - **Album cover, "Product Highlights", and CD cover**

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

Sell yours now!

Compare our Prices!

Half.com	$6.99
CDNOW	-- --
AlphaCraze	$ 15.66
CDUniverse	$ 15.69

we also

74 items in stock

$7.75	Buy!	$10.20 Media Mail	custodian46 (149)	best buy	More info...
$8.00	Buy!	$10.45 Media Mail	starqaze13 (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...
$8.30	Buy!	$10.75 Media 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...

- **Can I trust these sellers?**
  - **Who am I buying from?**
  - **Are they reputable?**
  - **What about shipping?**

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

Weez

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...

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...
$8.30 Buy!	$10.75 Media 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...

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

[redacted] [redacted]
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

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...

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...
[redacted]	Buy!	Media Mail	[redacted] (35)	[redacted]	[redacted]

Very Good

Sorted by **Price**

Price		Total Price	Seller (Rating)	Seller Comments	
$8.00	Buy!	**$10.45** Media Mail	lucidsky (14)		
$8.84	Buy!	**$11.29** Media Mail	steveeq1 (82)		
$9.00	Buy!	**$11.45** Media Mail	saint.timothy (18)	Great shape...first class ship	More info...

- **The Fold**
  - **Hmm, what's below here?**

2

may we also suggest...

» People who bought **"Weezer (2001)"** also bought:

Weezer (1994) CD, Release Year: 1994
Weezer
Save $6.97 - Best price: $5.00

Pinkerton CD, Release Year: 1996
Weezer
Save $10.95 - Best price: $6.00

Hybrid Theory CD, Release Year: 2000
Linkin Park
Save $11.68 - Best price: $6.29

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

- **Impulse buy**
  - **PESONALIZED RECOMMENDATIONS**
- **About this album**
- **Lots of unused space**
- **Still more info below…**

2

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...C
observed power pop of their '94 debut, a

Customer Reviews

Rated **4.3** out of 5.0 by 29 raters.

» Read Customer Reviews
» Rate this item

- **Is this product any good?**
  - **Editorial reviews**
  - **Customer reviews**
  - **RECOMMENDATION COMMUNITY**

Portions of this page Copyright 1948-2001 Muze Inc. muze For personal non-commercial use only. All rights reserved. Provider 1

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?

Proceed to Checkout
Speedy Checkout

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 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**".

Redeem

Proceed to Checkout
Speedy Checkout

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?

Proceed to Checkout
Speedy Checkout

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

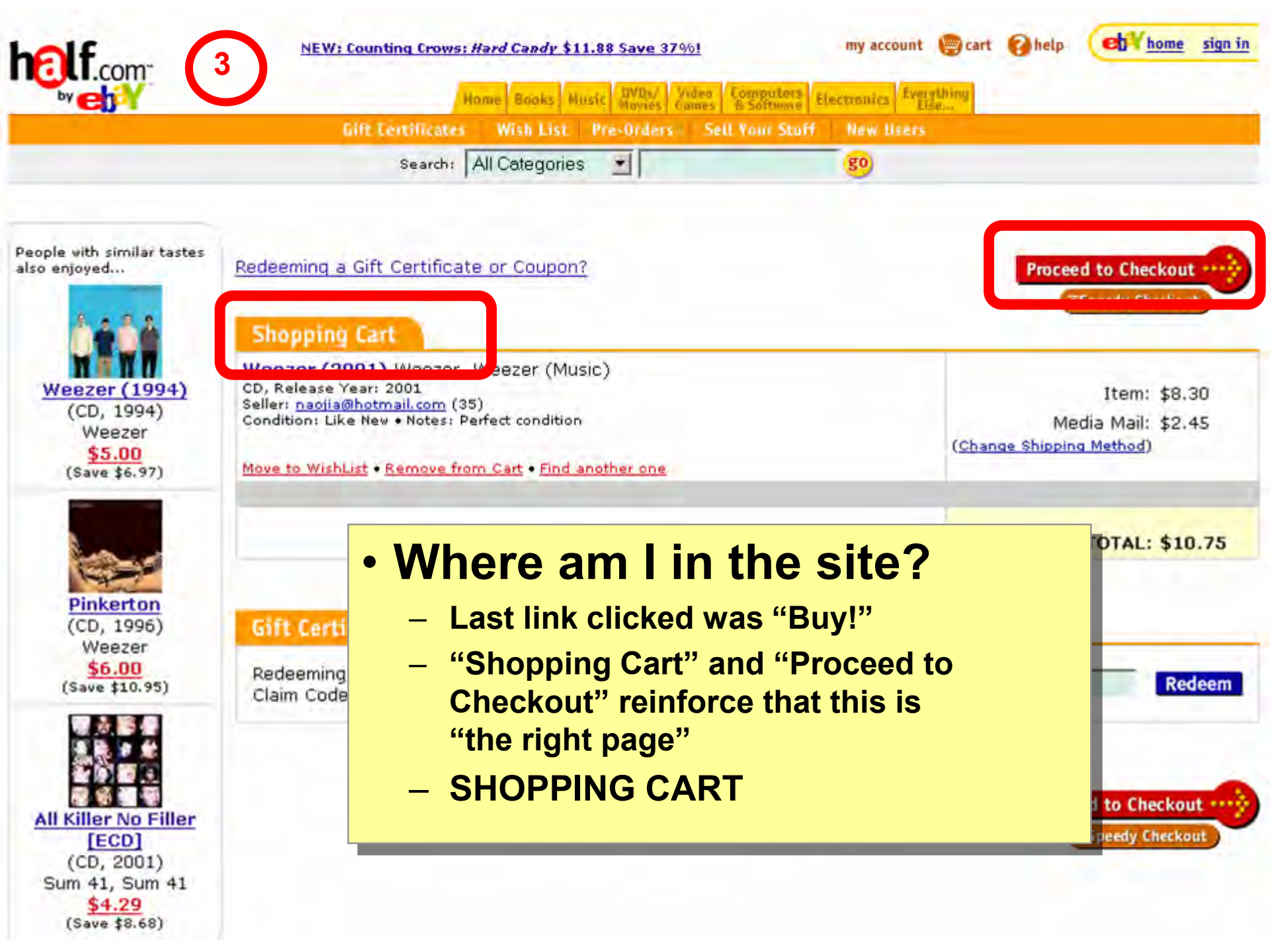
Gift Certi

Redeeming
Claim Code

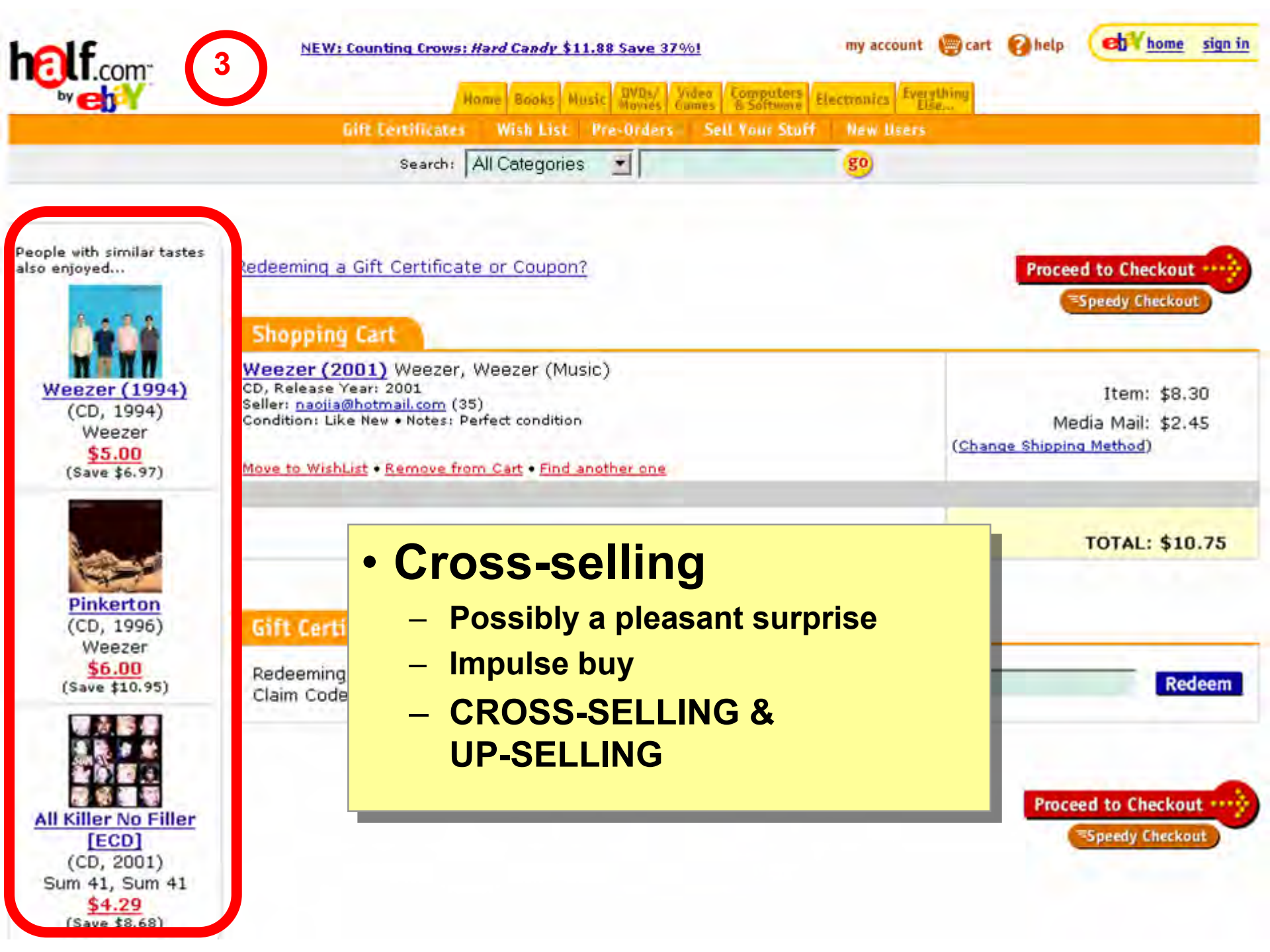
Redeem

- **What site am I at?**
  - **Logo in upper-left**
  - **Colors, layout, font**
  - **examples of SITE BRANDING**

Proceed to Checkout
Speedy Checkout



- **Where am I in the site?**
  - **Last link clicked was "Buy!"**
  - **"Shopping Cart" and "Proceed to Checkout" reinforce that this is "the right page"**
  - **SHOPPING CART**



- **Cross-selling**
  - **Possibly a pleasant surprise**
  - **Impulse buy**
  - **CROSS-SELLING & UP-SELLING**

half.com by ebay

3

NEW: Counting Crows: *Hard Candy* $11.88 Save 37%!

my account | cart | help | ebay home | sign in

Home | Books | Music | DVDs/ Movies | Video Games | Computers & Software | Electronics | Everything Else...

Gift Certificates | Wish List | Pre-Orders | Sell Your Stuff | New Users

Search: All Categories go

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?

Proceed to Checkout
Speedy Checkout

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

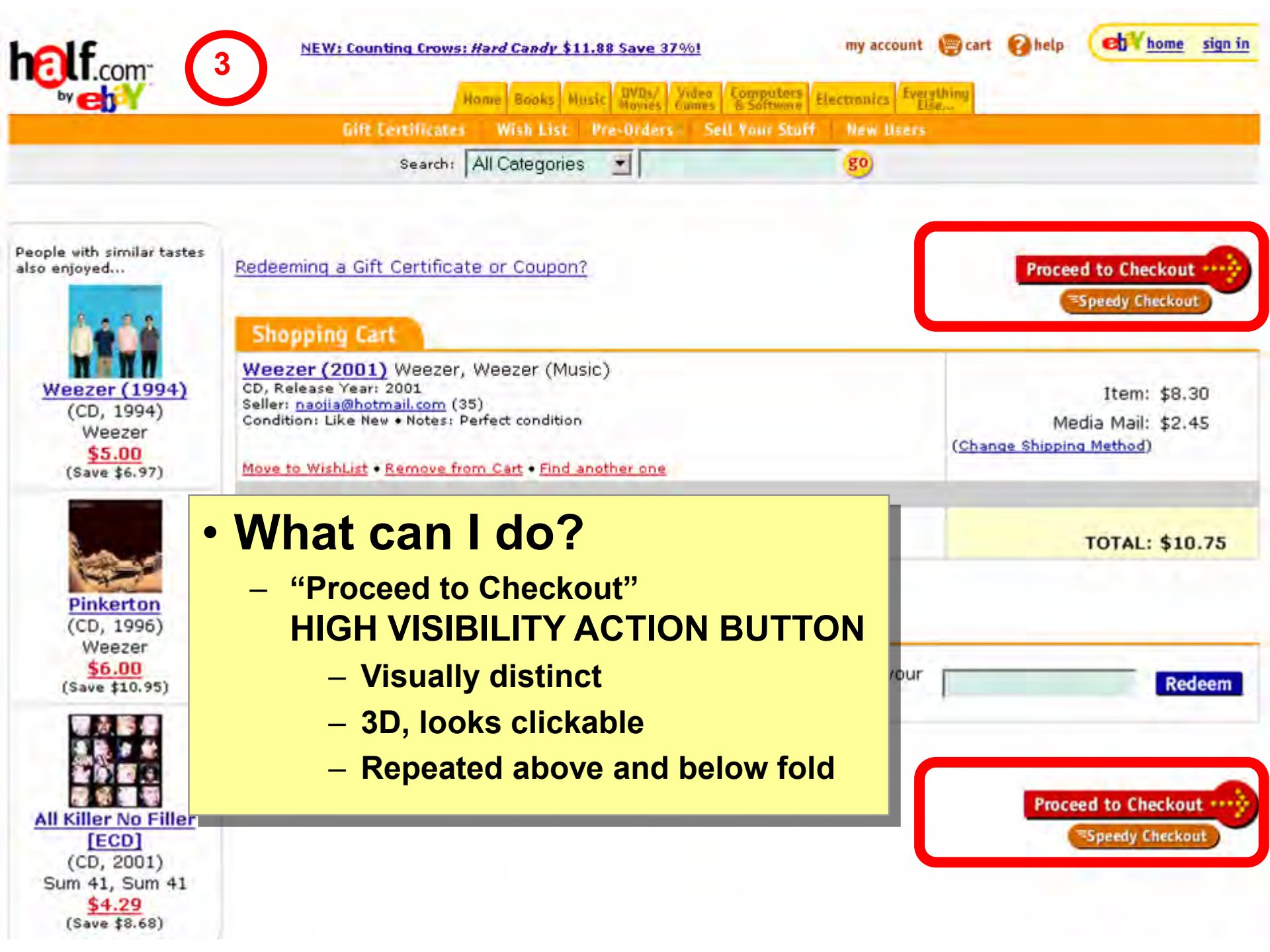
Gift Certi

Redeeming
Claim Code

Redeem

Proceed to Checkout
Speedy Checkout

- **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**



- **What can I do?**
  - **"Proceed to Checkout" HIGH VISIBILITY ACTION BUTTON**
    - **Visually distinct**
    - **3D, looks clickable**
    - **Repeated above and below fold**

4

my account cart help ebay home sign out

Home | Books | Music | DVDs/ Movies | Video Games | Computers & Software | Electronics | Everything Else...

Gift Certificates | Wish List | Pre-Orders | Sell Your Stuff | New Users

Search: All Categories go

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**

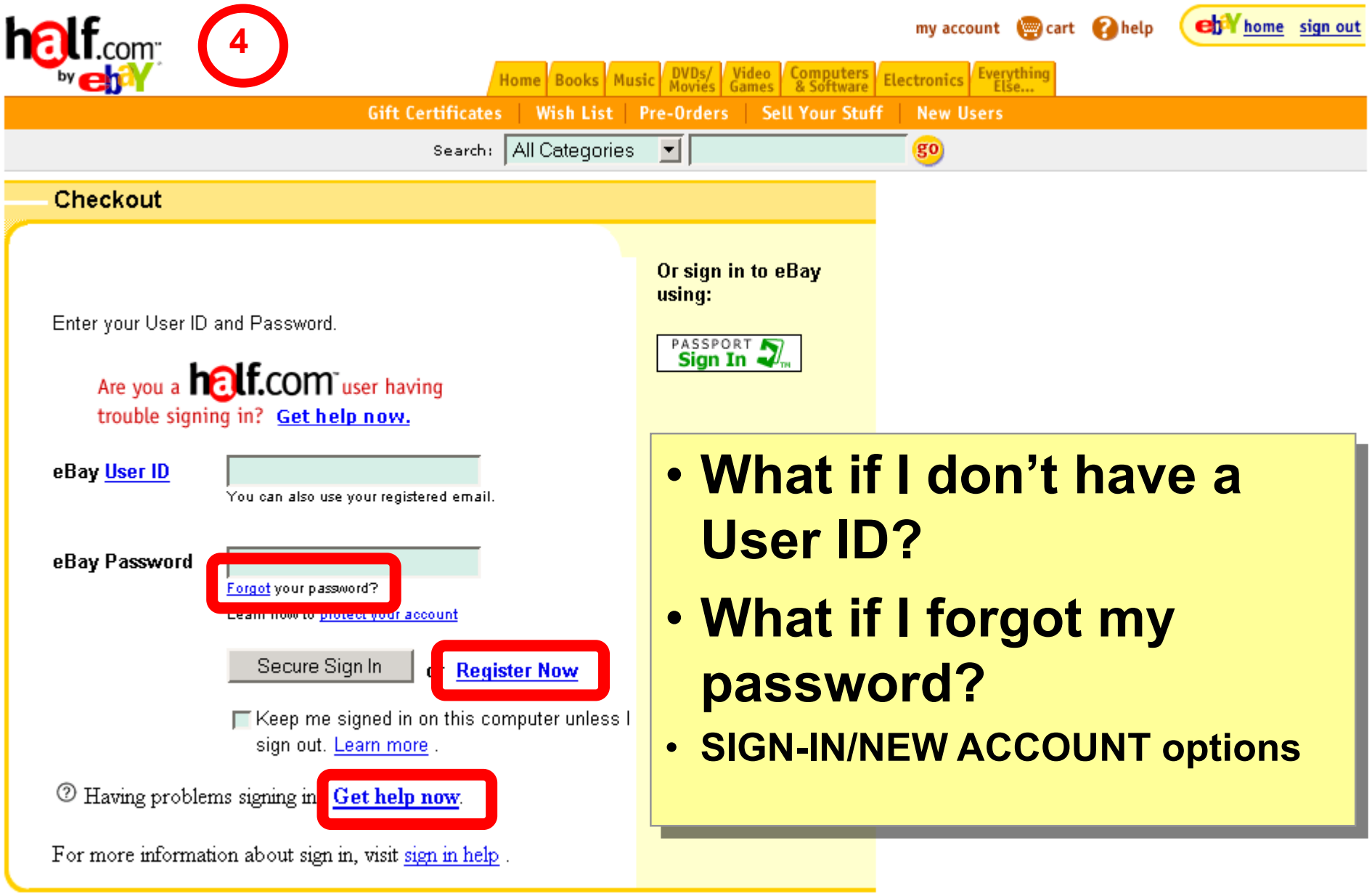
Keep me signed in on this computer unless I sign out. Learn more .

Having problems signing in? **Get help now.**

For more information about sign in, visit sign in help .

Or sign in to eBay using:

PASSPORT Sign In


half.com by ebay
4
my account
cart
help
ebay home
sign out
Home
Books
Music
DVDs/ Movies
Video Games
Computers & Software
Electronics
Everything Else...
Gift Certificates
Wish List
Pre-Orders
Sell Your Stuff
New Users
Search:
All Categories
go
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:
PASSPORT Sign In
• What if I don't have a User ID?
• What if I forgot my password?
• SIGN-IN/NEW ACCOUNT options

5

Checkout

1 Shipping 2 3

Step 1 - Choose Shipping Address

Ship my order to:

Jason Hong
387 Soda Hall Computer Science UC Berkeley
Berkeley, CA 94720

Use This Address

OR

Enter a new shipping address:

Name

Street address

City

If U.S. Military, enter APO/FPO for City.

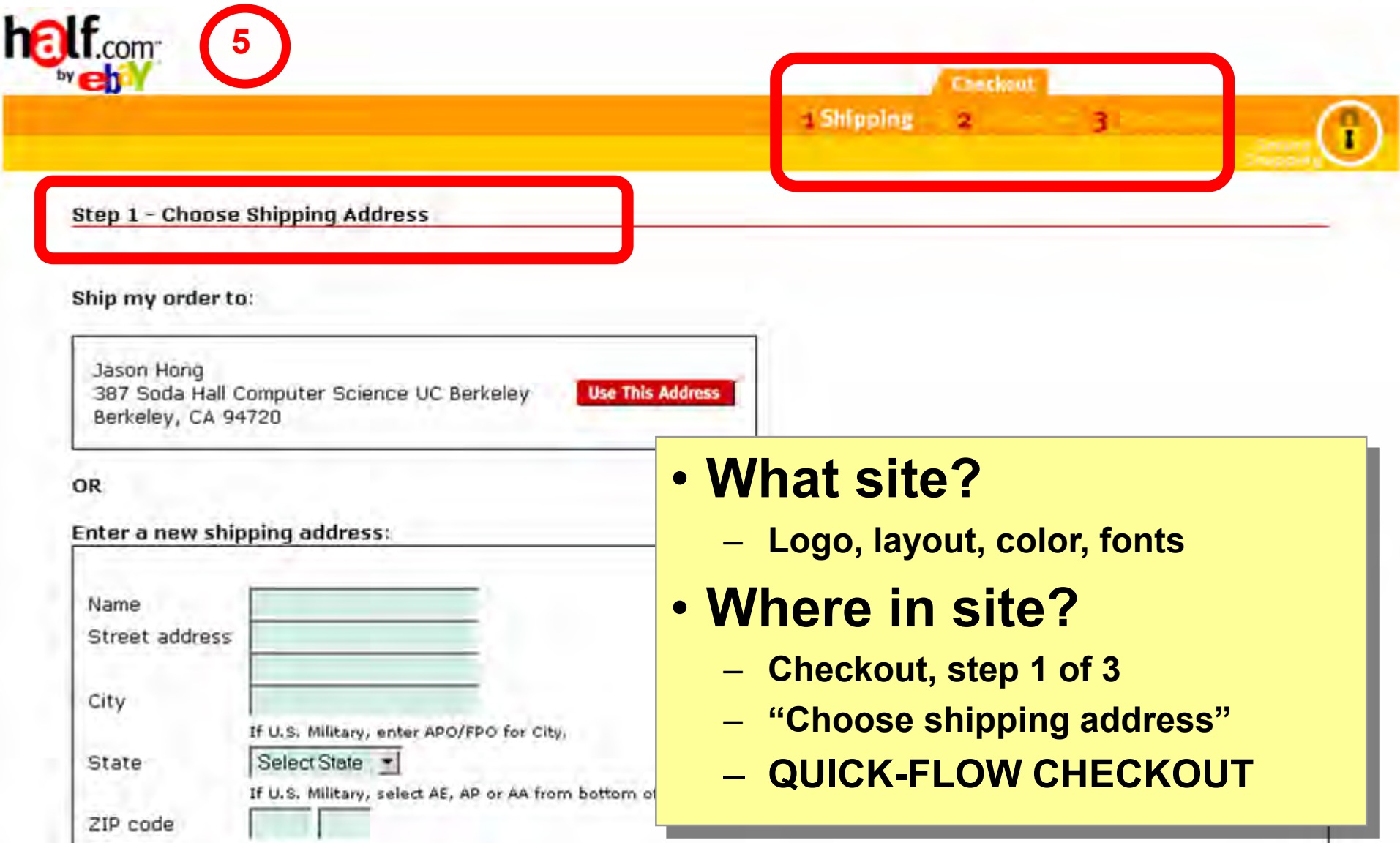
State Select State

If U.S. Military, select AE, AP or AA from bottom of list for State.

ZIP code

Country USA

Save Changes


half.com by ebay
5
Checkout
1 Shipping 2 3
Step 1 - Choose Shipping Address
Ship my order to:
Jason Hong
387 Soda Hall Computer Science UC Berkeley
Berkeley, CA 94720
Use This Address
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
Save Changes
• What site?
– Logo, layout, color, fonts
• Where in site?
– Checkout, step 1 of 3
– "Choose shipping address"
– QUICK-FLOW CHECKOUT

Checkout

1 Shipping 2 3

Step 1 - Choose Shipping Address

Ship my order to:

Jason Hong
387 Soda Hall Computer Science UC Berkeley
Berkeley, CA 94720

Use This Address

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
ZIP code
Country — USA

Save Changes

- **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

Checkout

1 Shipping — 2 Review — 3 Place Order

Secure Shopping

Place my order!

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

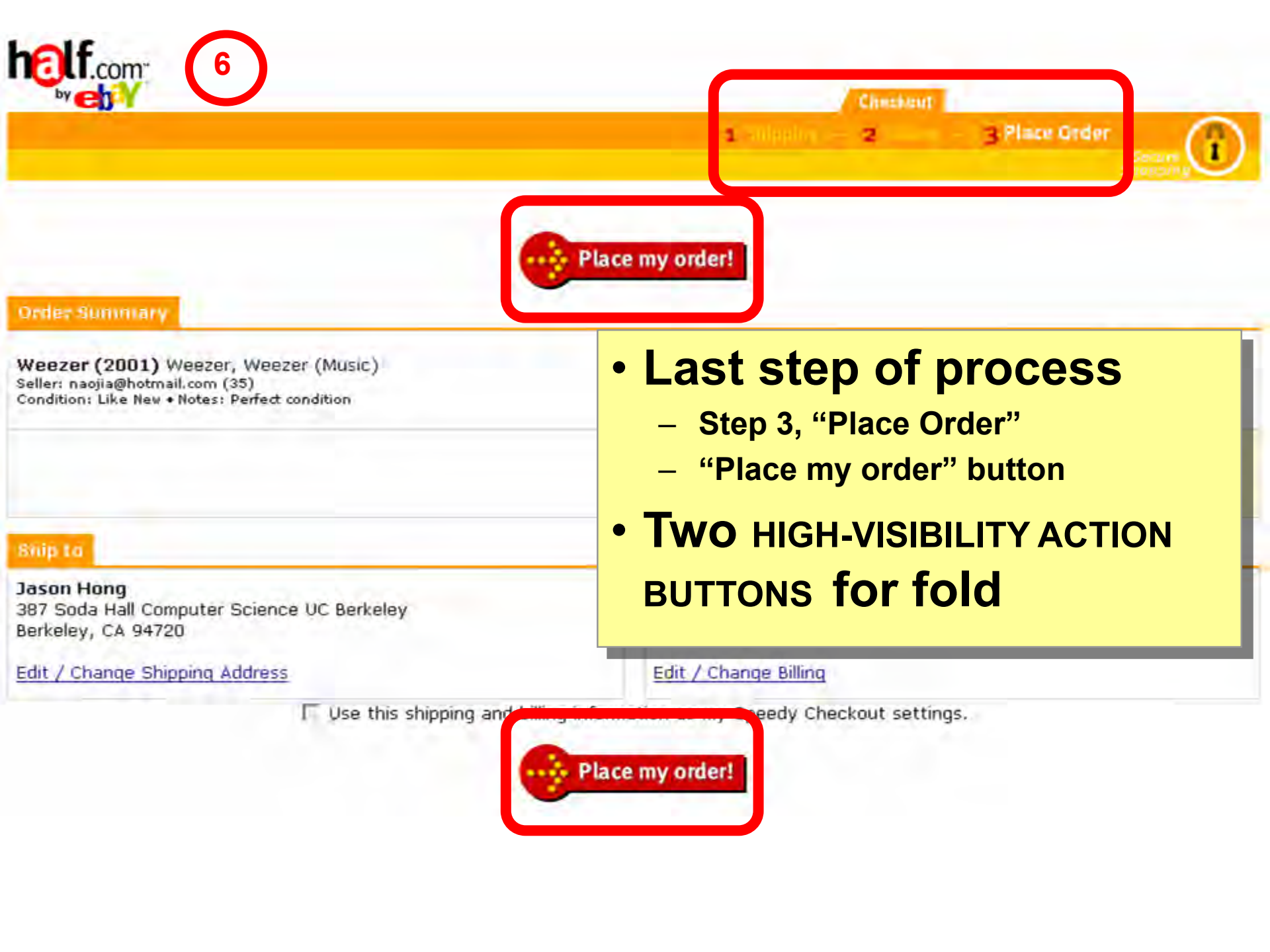
Bill to

MasterCard ending with 0155
Expires 11/2003
Zipcode: 94709

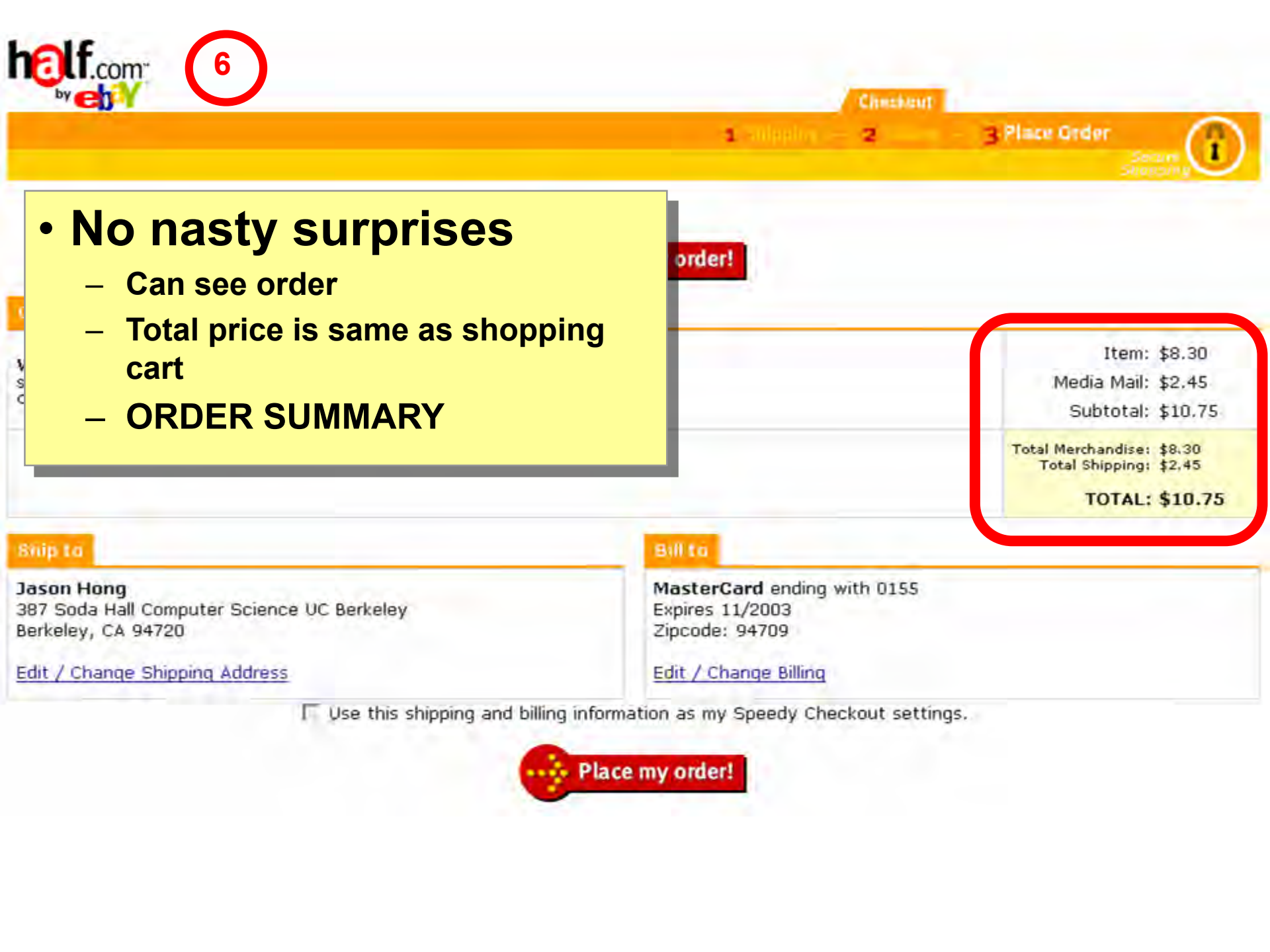
Edit / Change Billing

☐ Use this shipping and billing information as my Speedy Checkout settings.

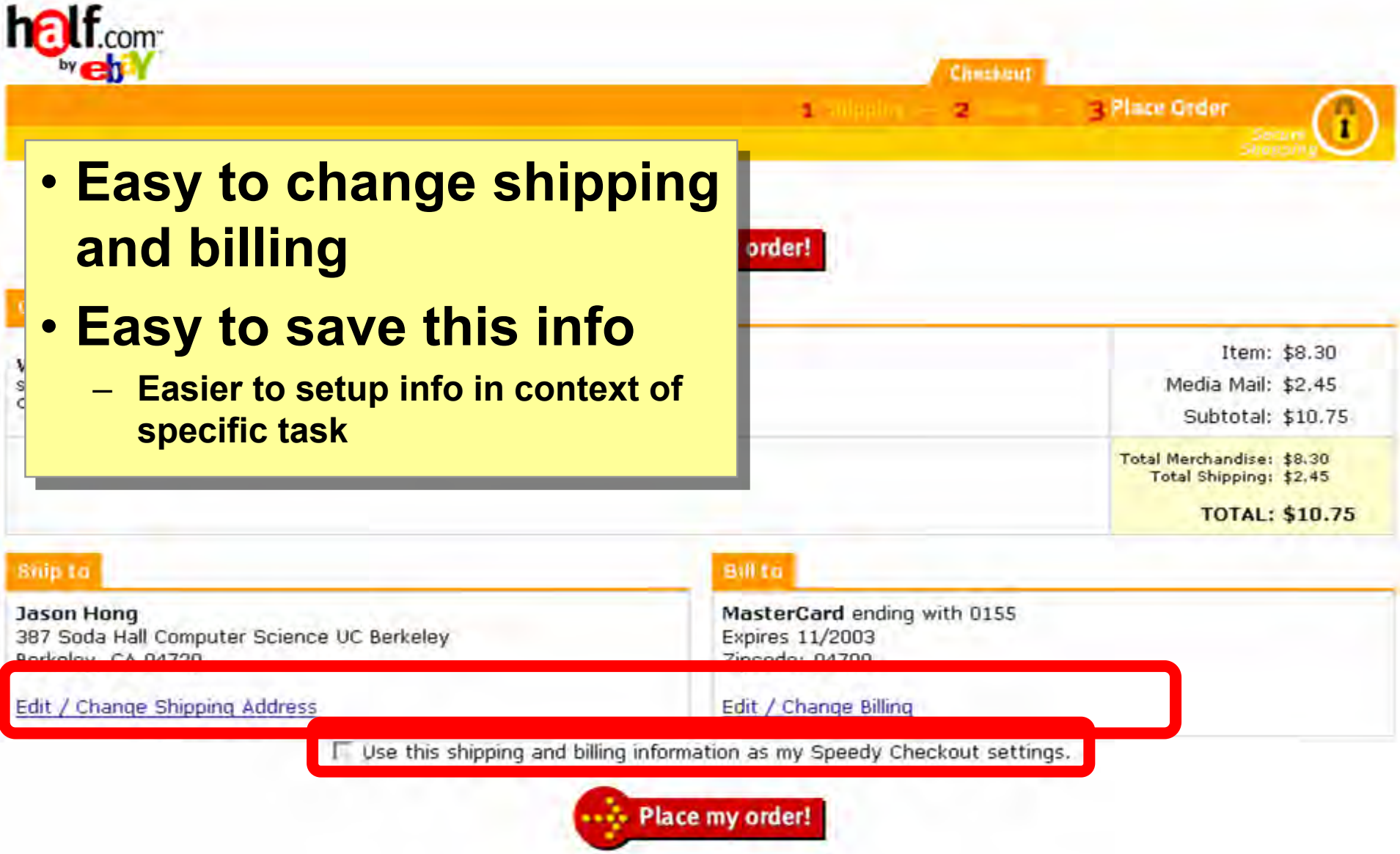
Place my order!



- **Last step of process**
  - **Step 3, "Place Order"**
  - **"Place my order" button**
- **TWO HIGH-VISIBILITY ACTION BUTTONS for fold**



- **No nasty surprises**
  - **Can see order**
  - **Total price is same as shopping cart**
  - **ORDER SUMMARY**



- **Easy to change shipping and billing**
- **Easy to save this info**
  - **Easier to setup info in context of specific task**

Web Design Patterns

Communicate design problems & solutions

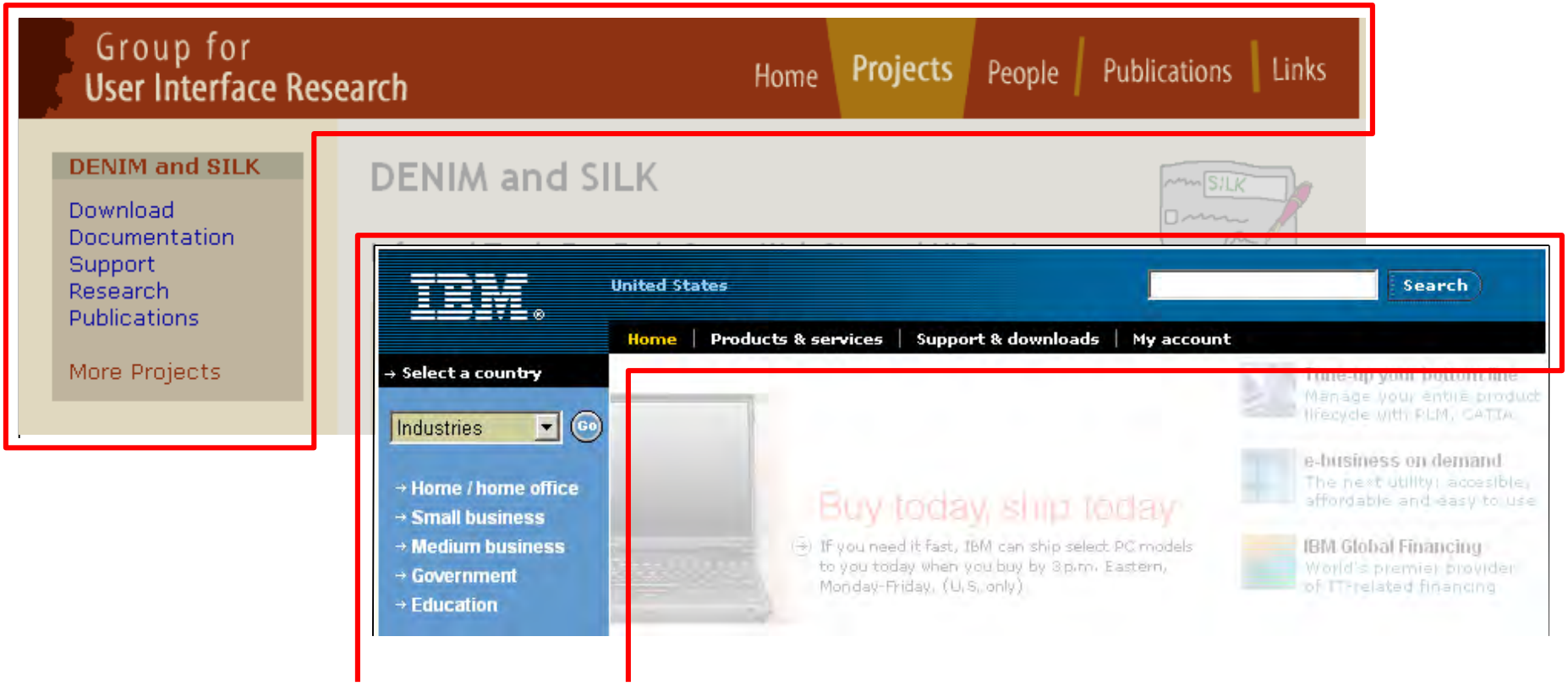
how to create navigation bars for finding relevant content

how to create a shopping cart that suports check out

how to make e-commerce sites where people return & buy

NAVIGATION BAR (K2)

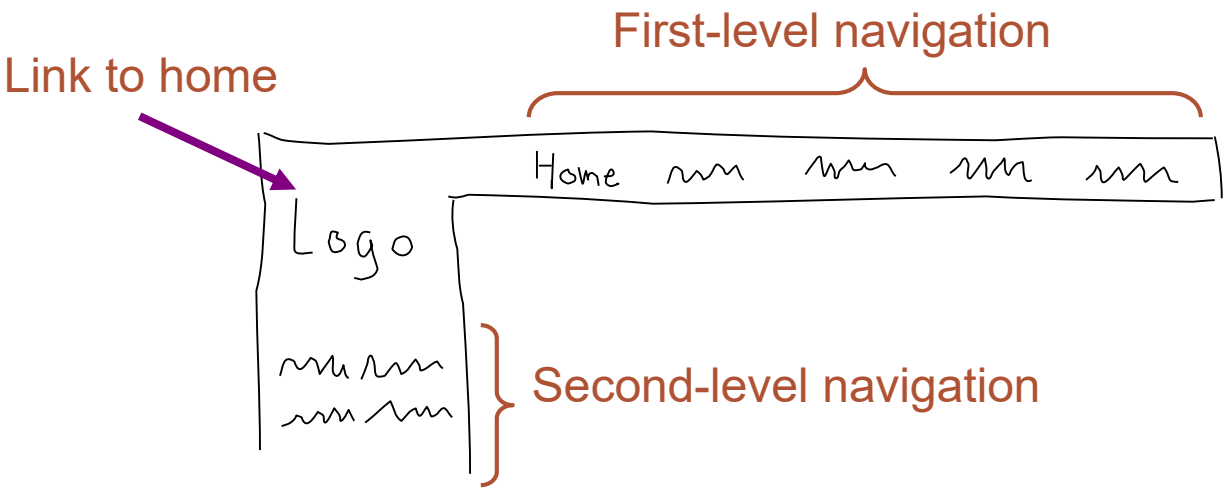
Problem: Customers need a structured, organized way of finding the most important parts of your Web site



NAVIGATION BAR (K2)

Solution diagram

Captures essence on how to solve problem



Pattern Groups

Patterns organized by group

Site genres

Navigational framework

Home page

Content management

Trust and credibility

Basic ecommerce

Advanced ecommerce

Completing tasks

Page layouts

Search

Page-level navigation

Speed

The mobile web

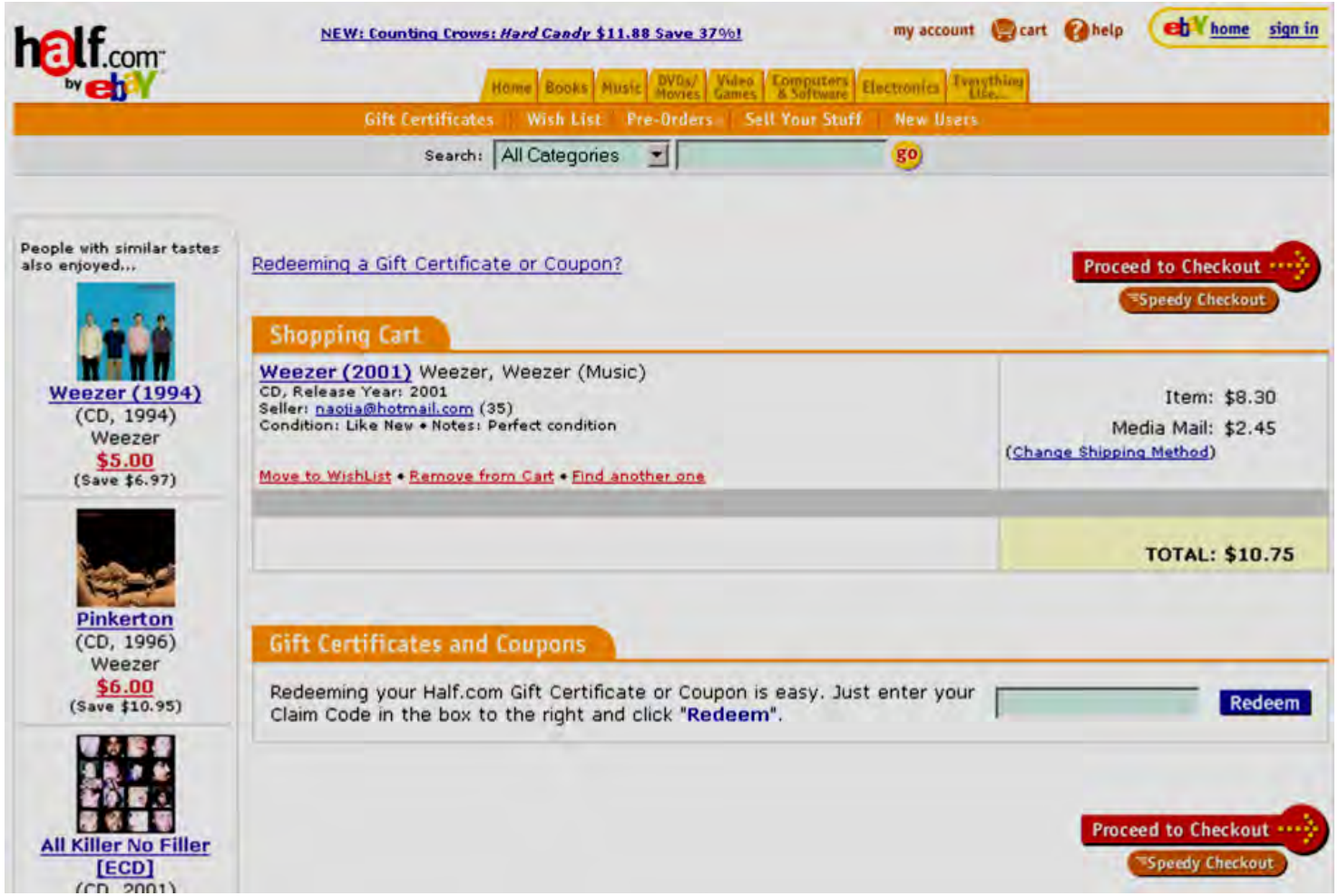
PROCESS FUNNEL (H1)

Problem:

Need a way to help people complete highly specific stepwise tasks

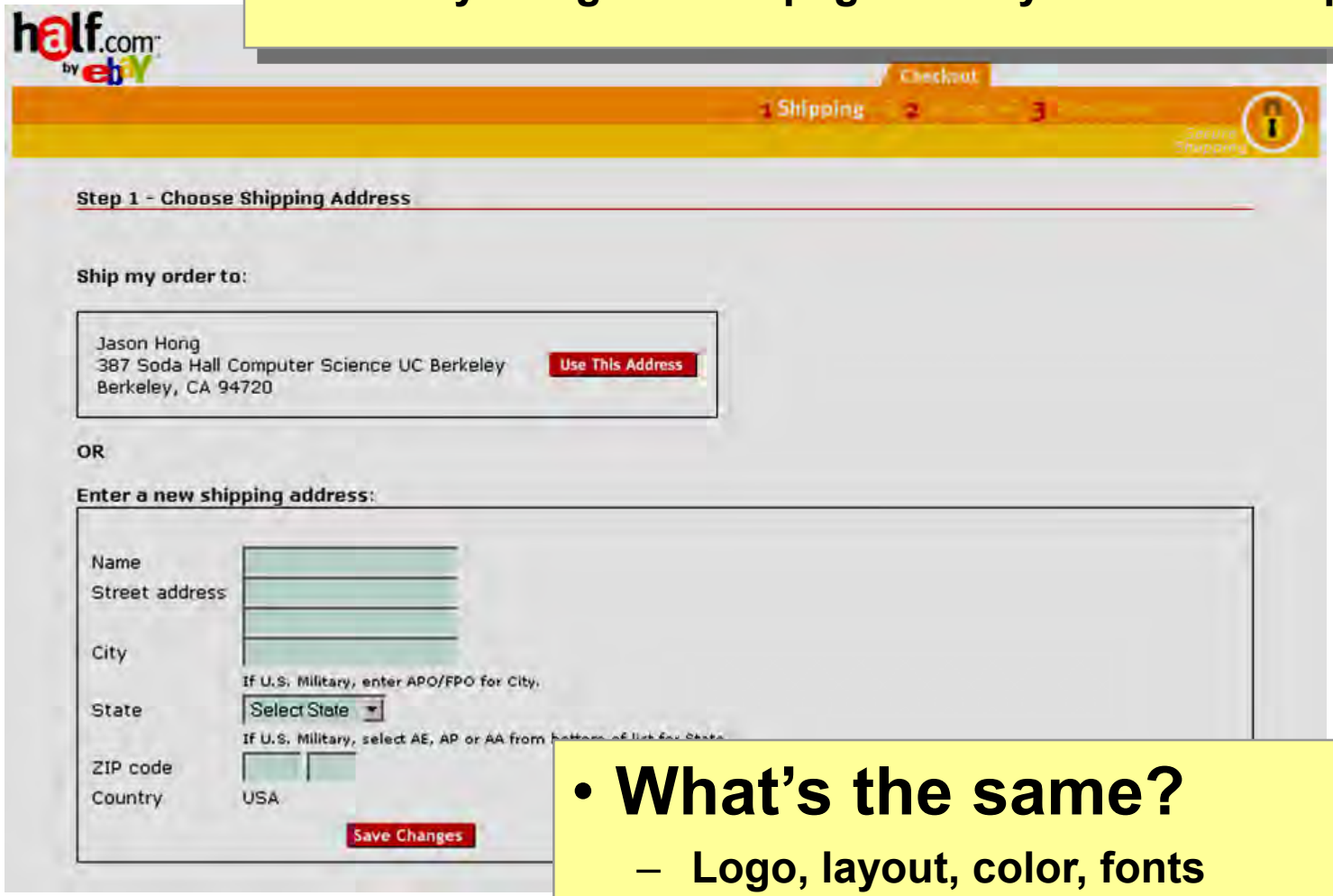
- Ex. Create a new account
- Ex. Fill out survey forms
- Ex. Check out

PROCESS FUNNEL (H1)



PROCES

- **What's different?**
  - **No tab rows**
  - **No impulse buys**
  - **Only navigation on page takes you to next step**



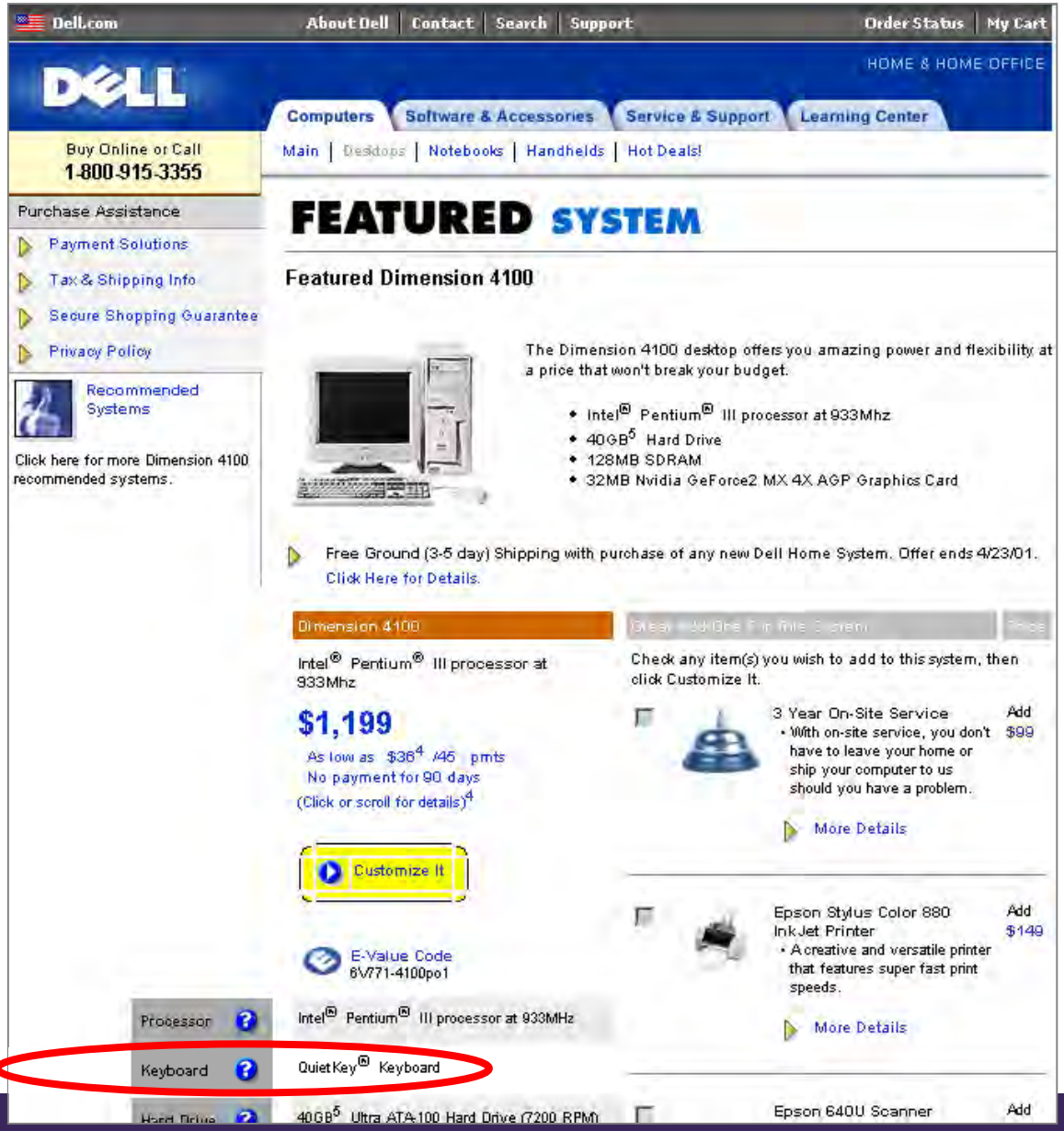
- **What's the same?**
  - **Logo, layout, color, fonts**

PROCESS FUNNEL (H1)

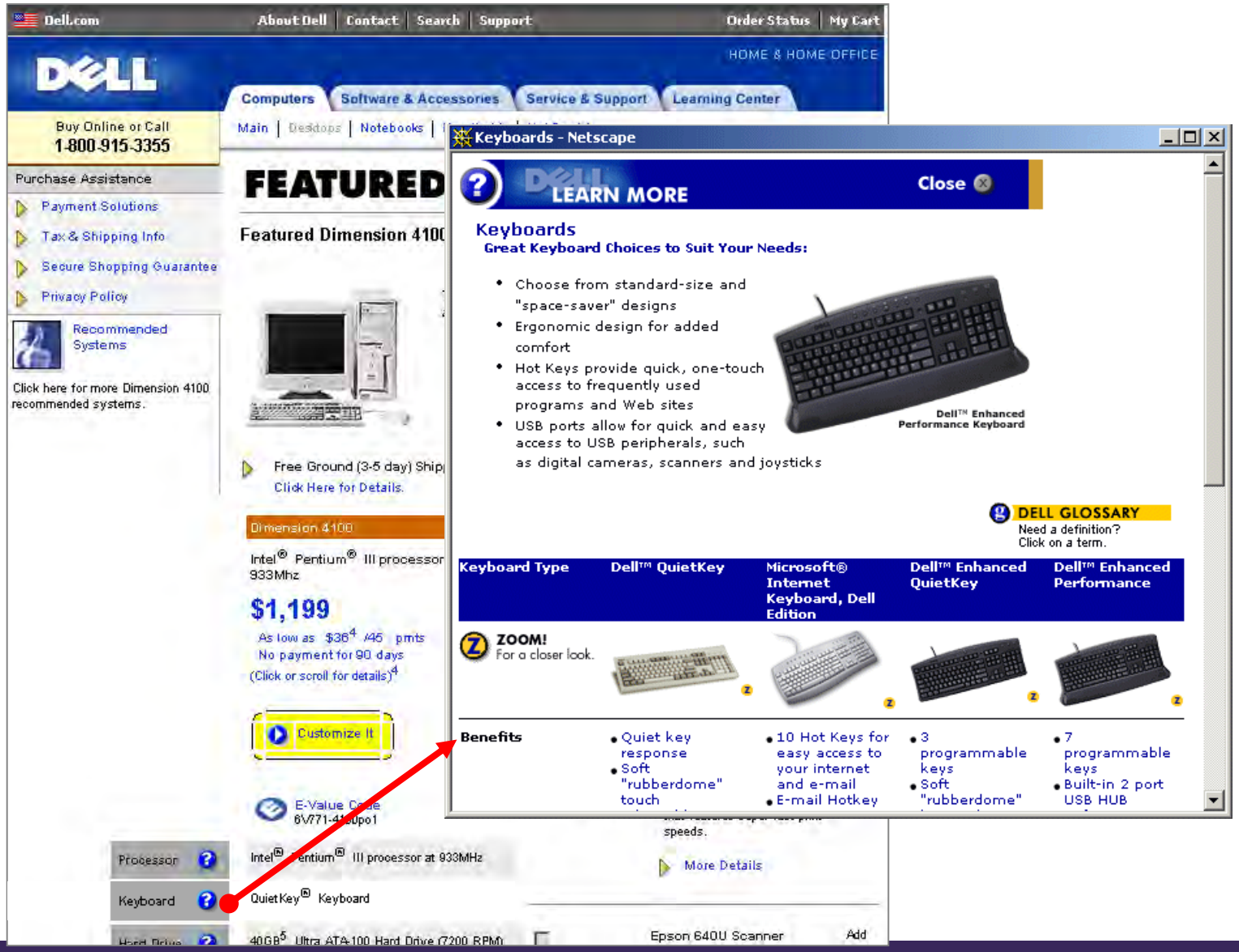
Problem:

What if users need extra help?

PROCESS FUNNEL (H1)

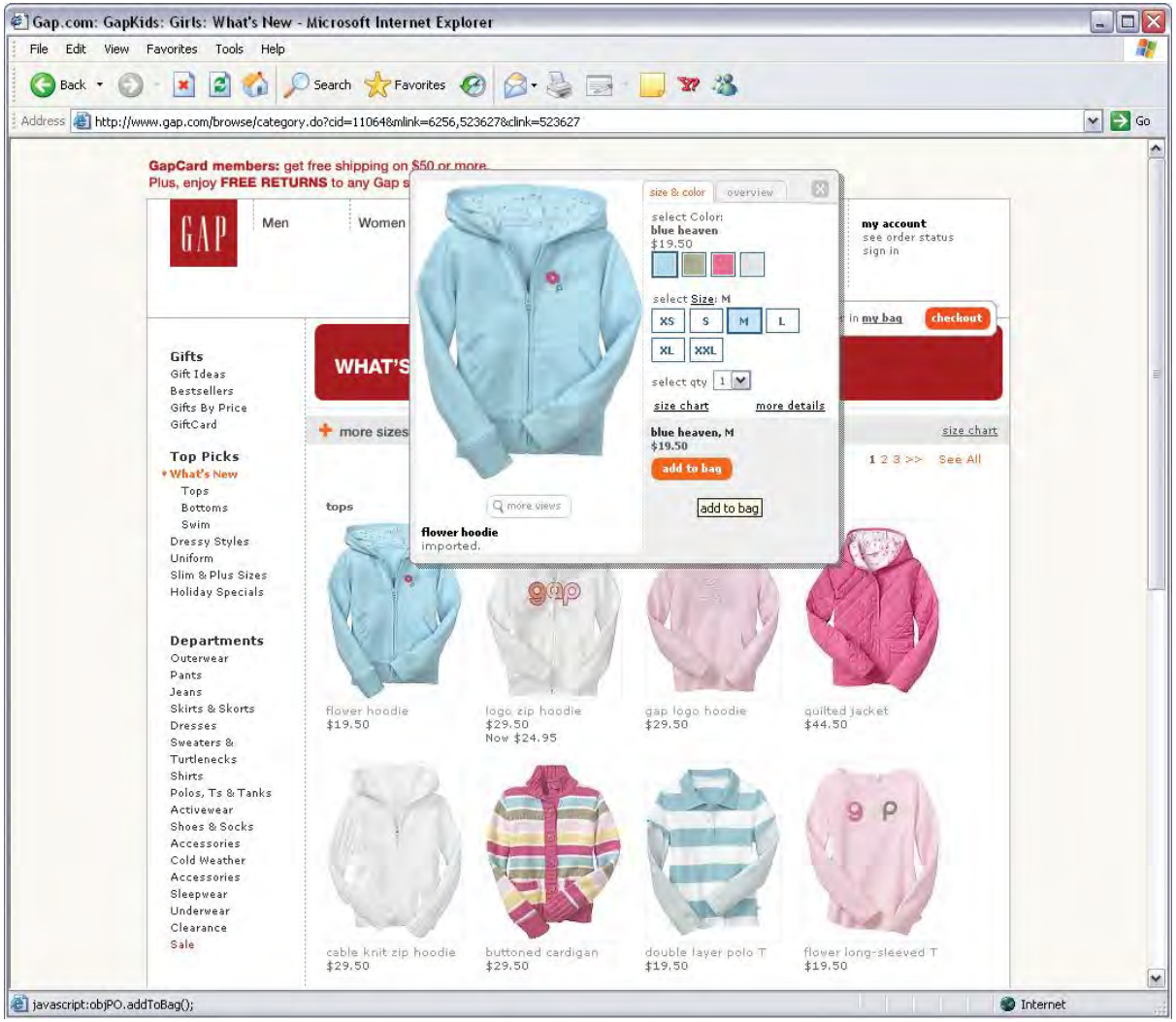


CONTEXT-SENSITIVE HELP (H8)



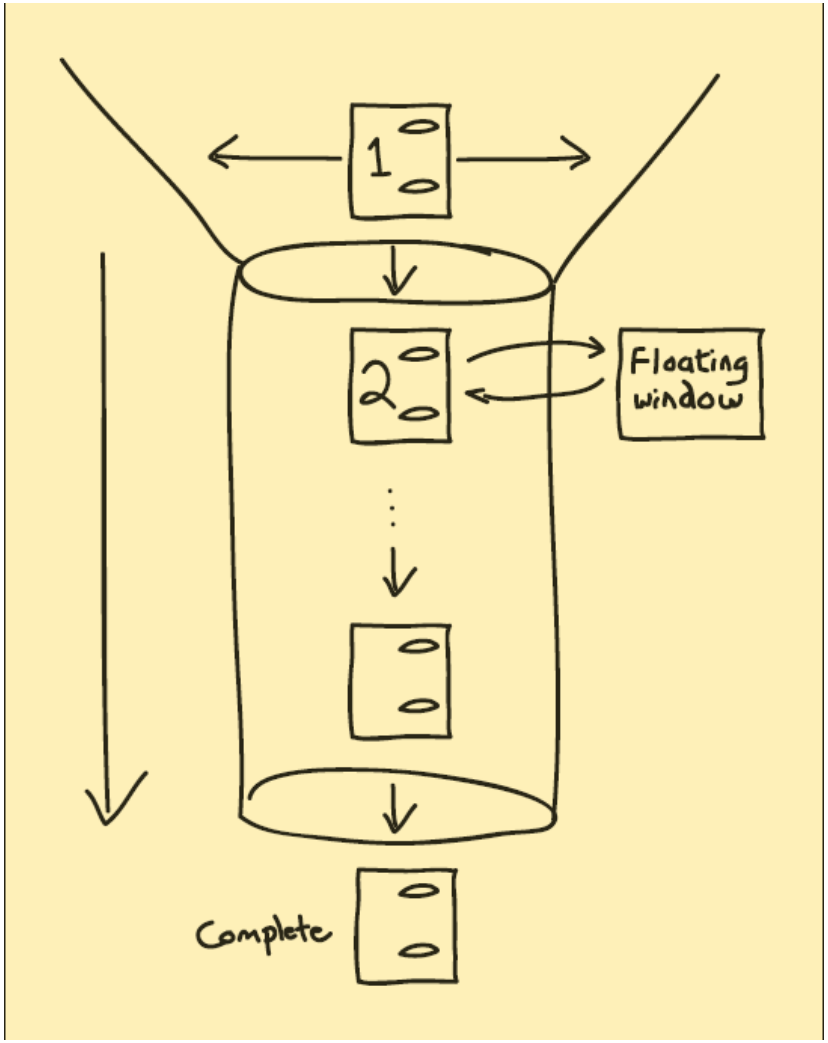
FLOATING WINDOWS (H6)

FLOATING WINDOWS (H6)

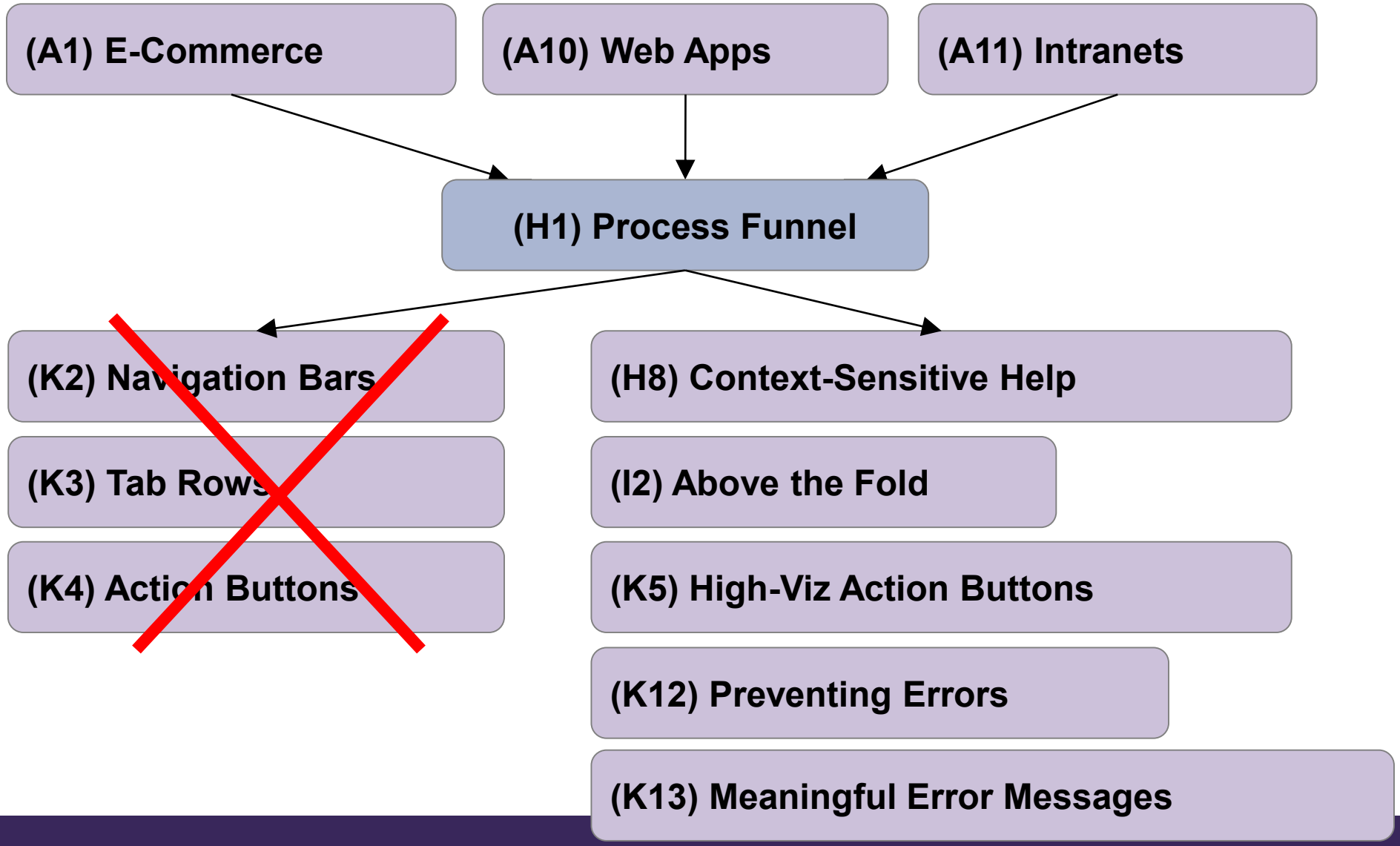


PROCESS FUNNEL (H1)

Solution Diagram



Related Patterns



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

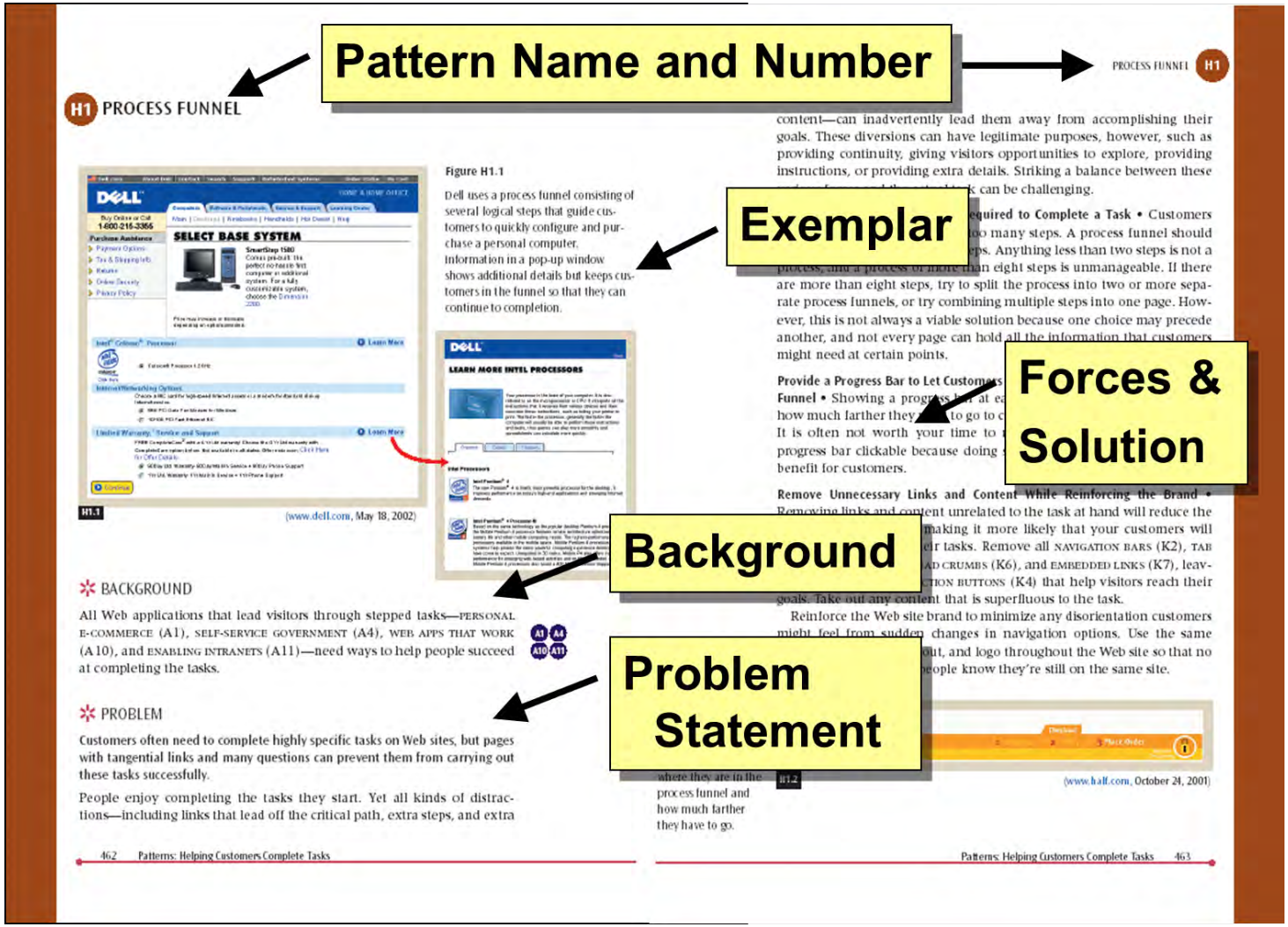
Patterns let you focus on the hard, unique problems of your design situation

Principles, Guidelines, Templates

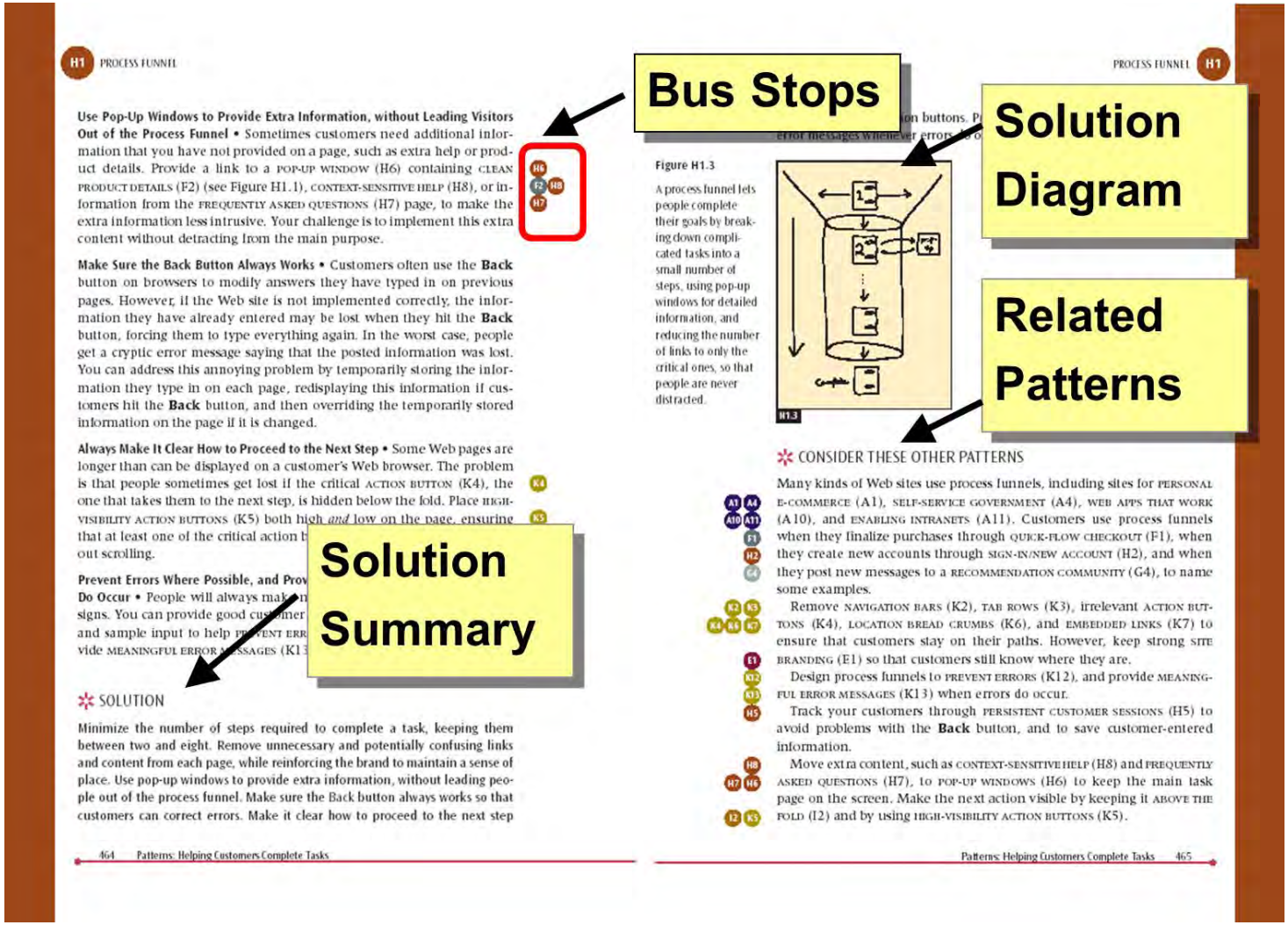
Patterns help design without over-constraining

- 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

Web Design Patterns



Web Design Patterns



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.

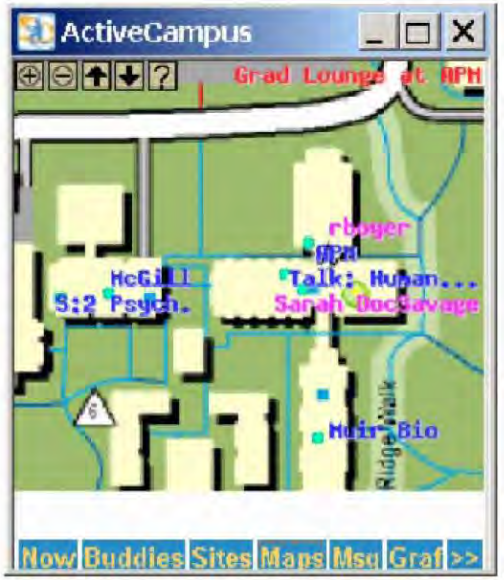


Figure 2. UC San Diego's ActiveCampus project shows your friends' location in real time. While useful, this visualization raises many privacy concerns.

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 / rant
- Pre-pattern based on some meta-analysis
- Established pattern

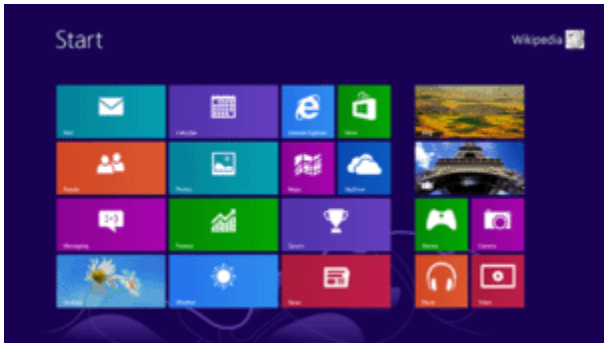
Be aware of misapplying patterns

- And be aware of anti-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

Dark Patterns

A Dark Pattern is an interface that has been carefully crafted to trick people into doing things, such as buying insurance with their purchase or signing up for recurring bills.

Disguised Ads

> Ads that are disguised as other kinds of content or navigation, in order to get users to click on them

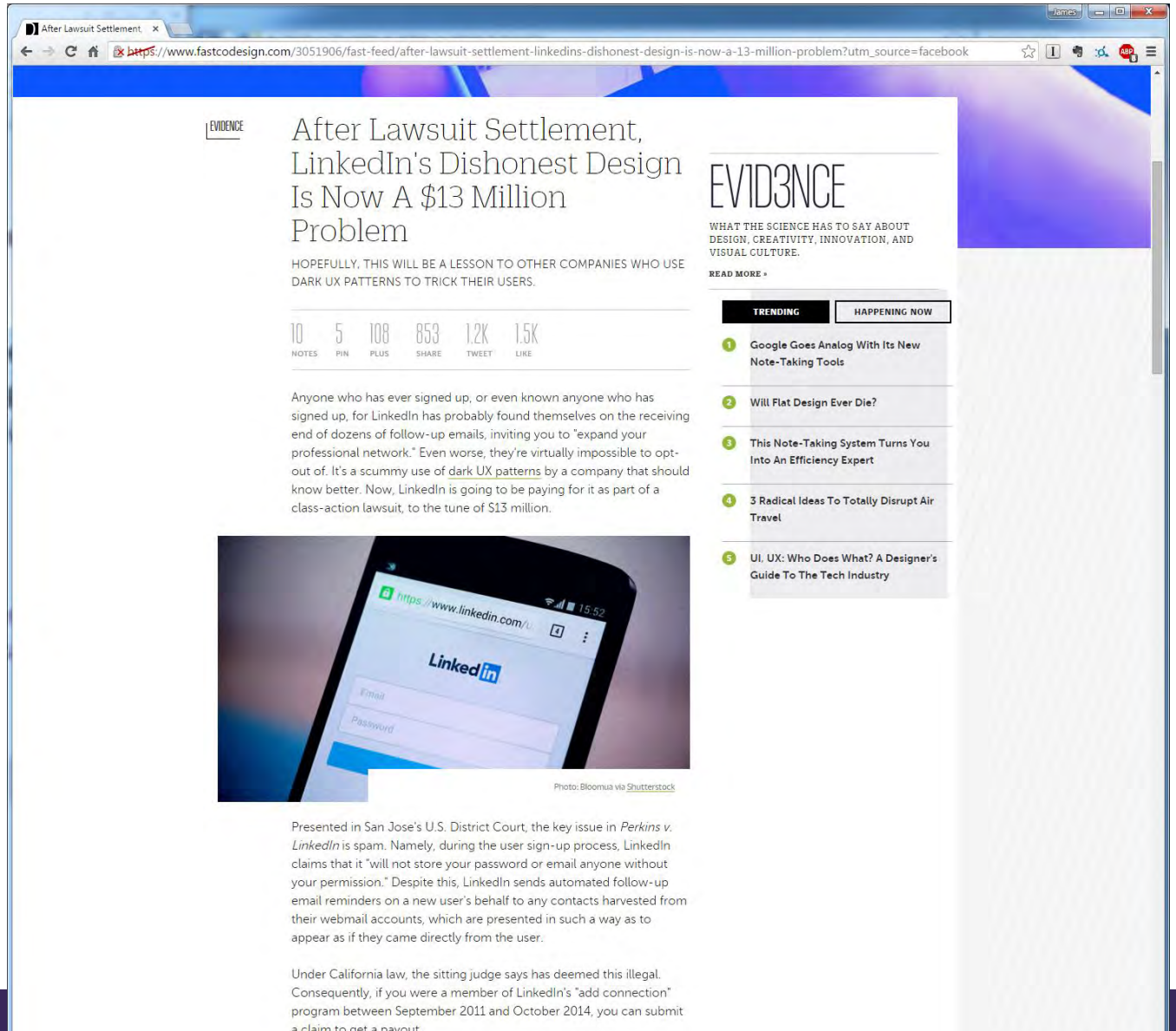
Dark Patterns

A Dark Pattern is an interface that has been carefully crafted to trick people into doing things, such as buying insurance with their purchase or signing up for recurring bills.

Friend Spam

A site or game asks for your credentials, then goes on to publish content or send out bulk messages

Dark Patterns



CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 08:
Presentations,
Paper Prototyping,
Tasks in Testing

Tuesday / Thursday

12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

DESIGN
USE
BUILD

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 11:
Inspection

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

DESIGN
USE
BUILD

Project Status

Looking Forward

- Team Peer Feedback was Due Saturday 11/4
- 3b: Heuristic Evaluation Due Wednesday 11/8
- 3c: Usability Testing Check-In Due Friday 11/10
- 3d: Usability Testing Review Due Monday 11/13
- 3e: Digital Mockup Due Thursday 11/16

Other Assignments

- Reading 4 Due Saturday 11/11, Sooner is Better
- Reading 5 Can Be Done Anytime, Sooner is Better

Objectives

Be able to:

Describe why we use inspection-based methods

Given Nielsen's heuristics, be able to:

explain what each of them means

apply them to identify usability failures in an interface

Describe an effective heuristic evaluation process

Explain why the typical recommendation for heuristic evaluation is 3 to 5 independent evaluators

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

- Can become relatively slow and expensive
- Study participants can be scarce
- Can waste participants on obvious problems

Inspection-Based Methods

Simulate study participants

- Instead of actual 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
- Not a method for “coming up with” 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 heuristics explain problems
- Factor analysis to identify key heuristics

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 people informed about what is going on, through appropriate feedback within reasonable time.

1. Visibility

Visibility of system status

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

Refers to both visibility of system status and providing appropriate feedback

Anytime a person is 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 a person's language, with words, phrases and concepts familiar to the person, 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 a person's language, with words, phrases and concepts familiar to the person, 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. Control and Freedom

User control and freedom

People 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

People 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

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

4. Consistency

Consistency and standards

People 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 people with a confirmation option before they commit to the action.

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 people 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 a person's memory load by making objects, actions, and options visible. A person 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 a person's memory load by making objects, actions, and options visible. A person 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, while unseen by novices,
may often speed up the interaction for experts
such that the system can cater to both
inexperienced and experienced use.
Allow people to tailor frequent actions.

7. Flexibility and Efficiency

Flexibility and efficiency of use

> Accelerators, while unseen by novices, may often speed up the interaction for experts such that the system can cater to both inexperienced and experienced use. Allow people 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.

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.

Not just about “ugliness”.
About clutter, overload of visual field, visual noise, distracting animations.

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.

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.

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 a person's task, list concrete steps to be carried out, and not be too large.

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 a person's task, list concrete steps to be carried out, and not be too large.

This does not mean that a person 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

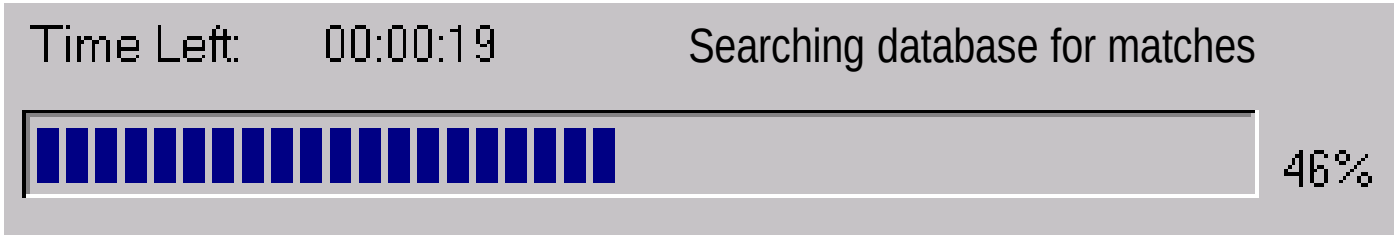
Typography uses different fonts in 3 dialog boxes

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

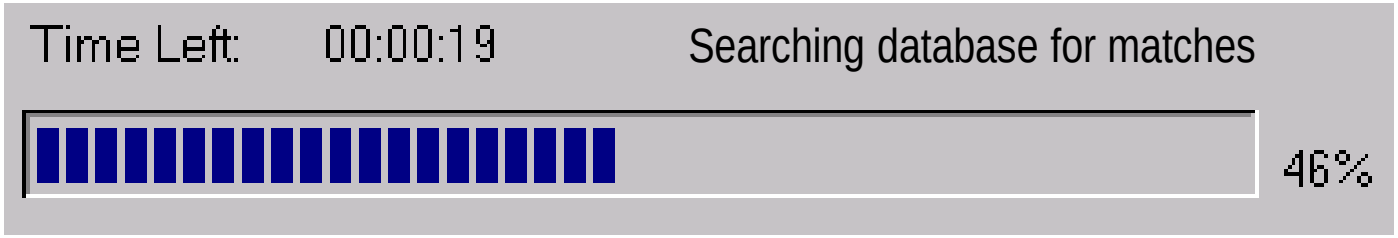
Heuristics

Heuristics

Heuristics



Heuristics



Visibility of system status

- pay attention to response time
  - 0.1 sec: no special indicators needed (why?)
  - 1.0 sec: person tends to lose track of data
  - 10 sec: maximum duration if person to stay focused
  - longer delays require progress bars

Heuristics

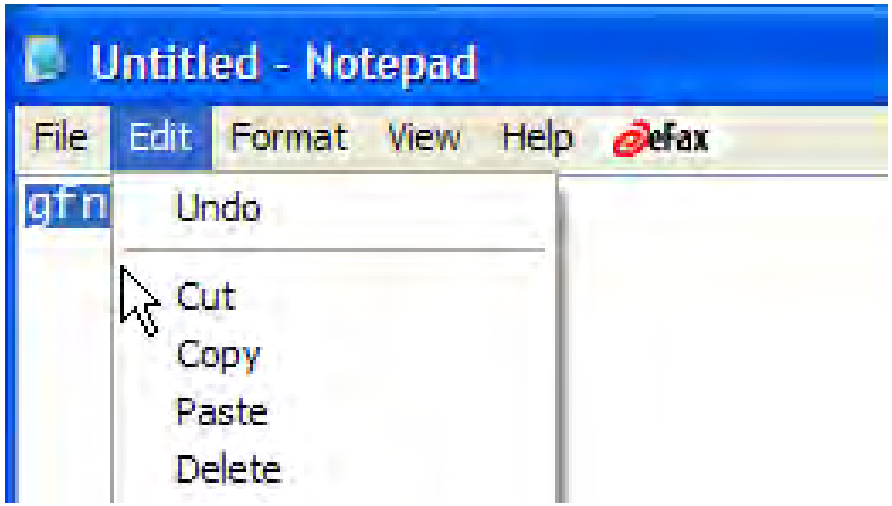
Heuristics

“Mailto”, “protocol”?

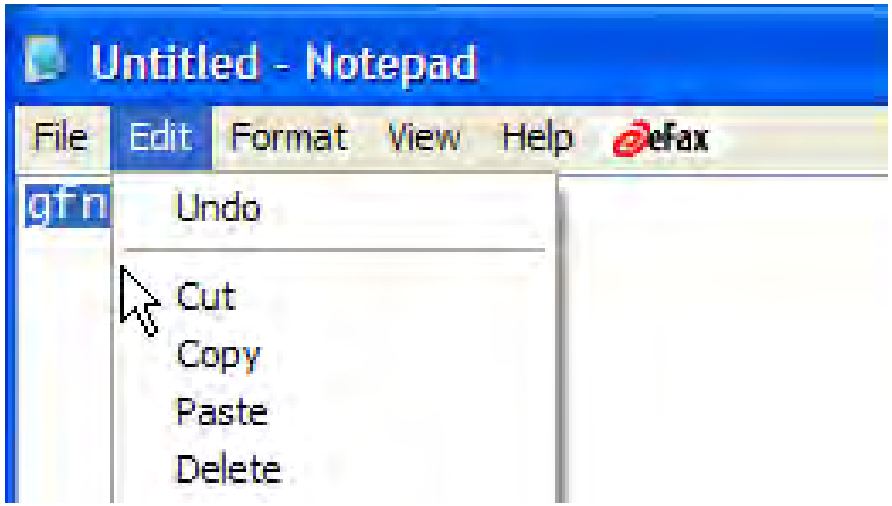
Match system to real world

Speak the person’s language

Heuristics


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

Heuristics

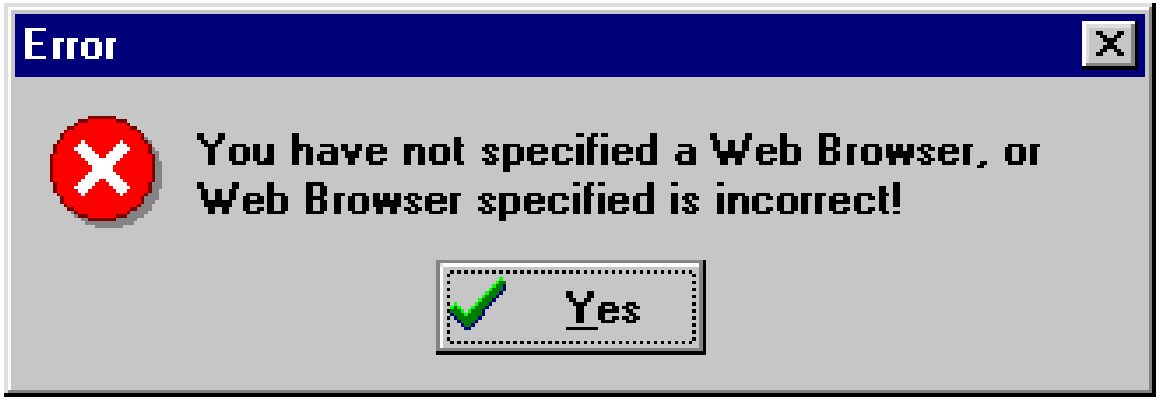


Flexibility and Efficiency of Use

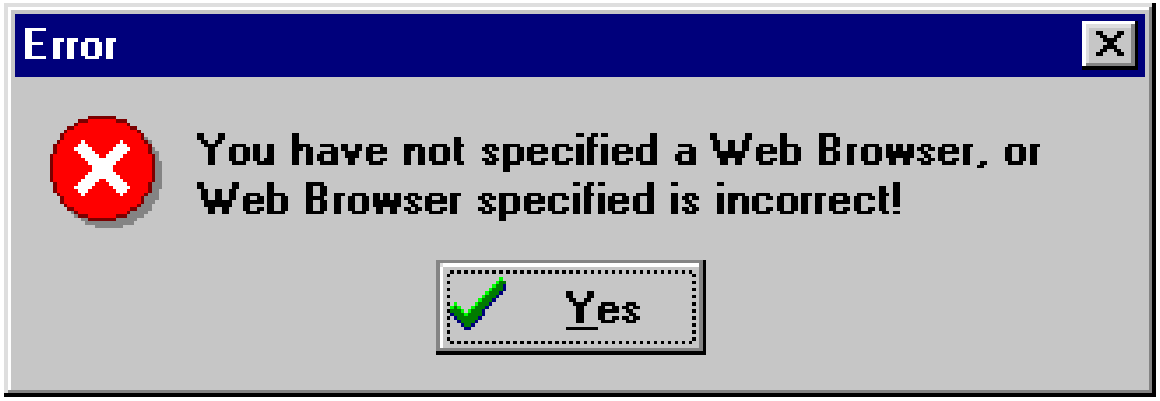
accelerators for experts (e.g., keyboard shortcuts)

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

Heuristics


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

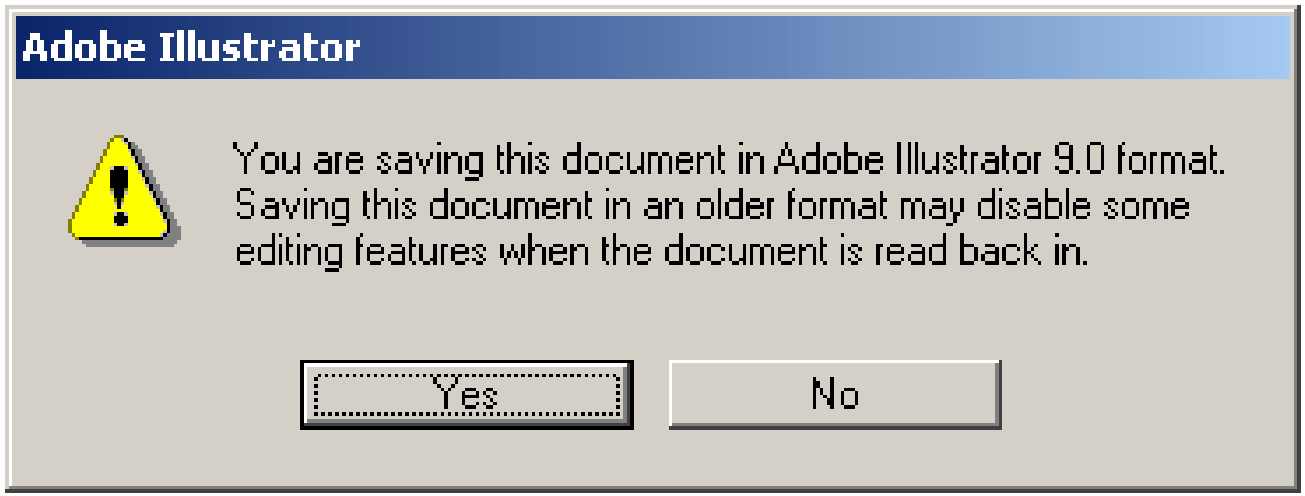
Heuristics



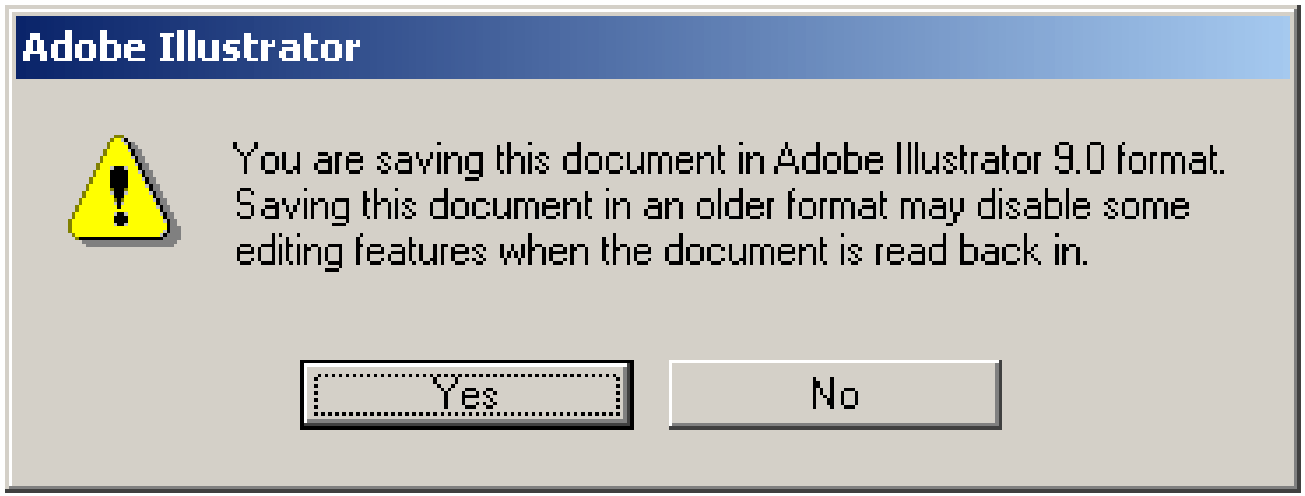
Help recognize, diagnose, & recover from errors

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

Heuristics


Adobe Illustrator
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.
Yes
No

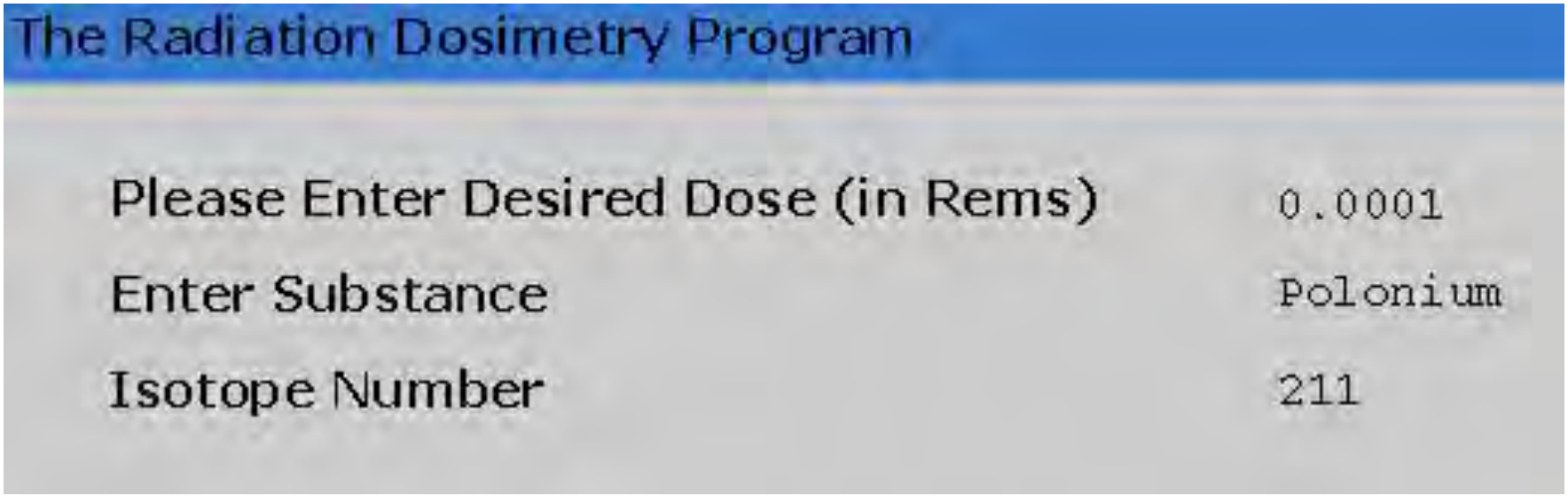
Heuristics



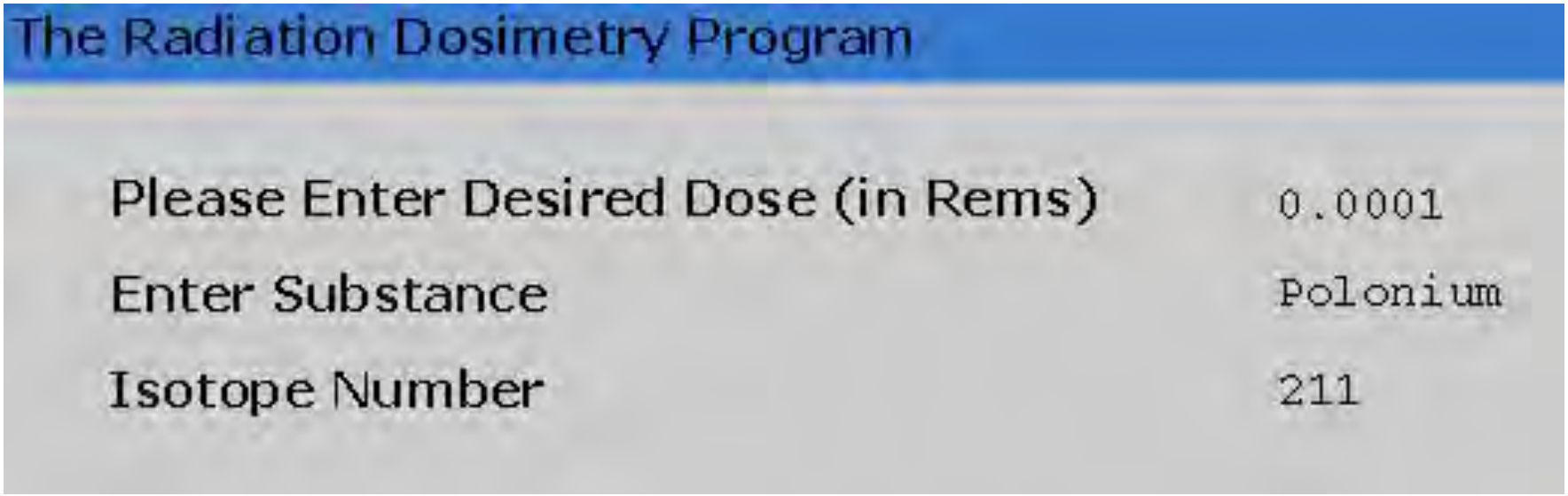
User Control and Freedom

Prevent Errors

Heuristics

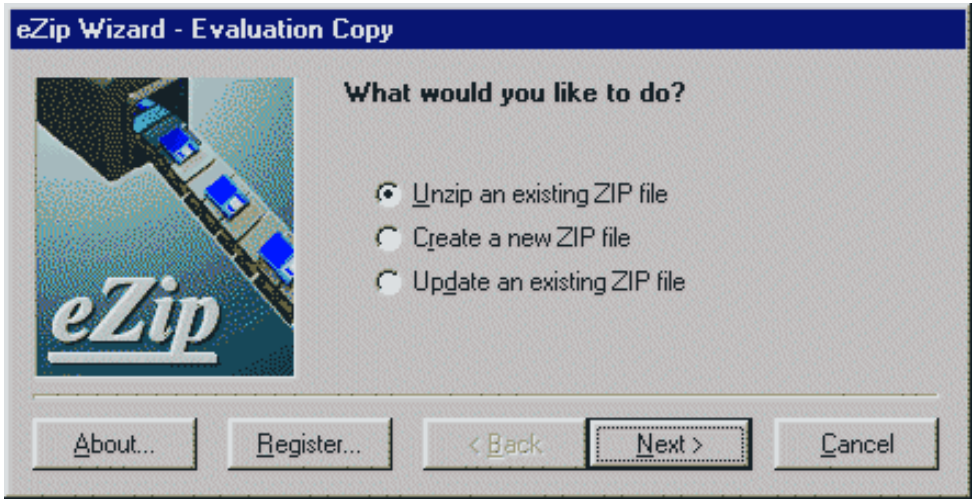

The Radiation Dosimetry Program
Please Enter Desired Dose (in Rems)
0.0001
Enter Substance
Polonium
Isotope Number
211

Heuristics

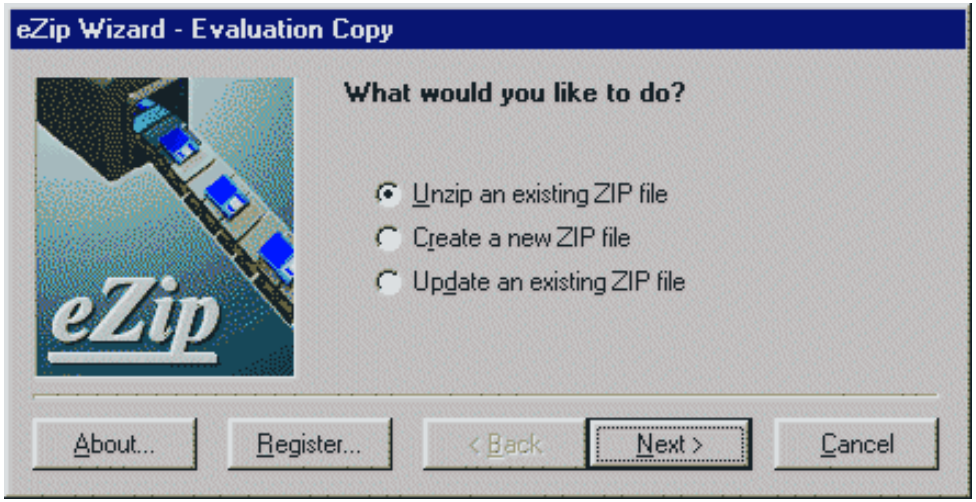


Prevent Errors

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
eZip
About...
Register...
< Back
Next >
Cancel

Heuristics



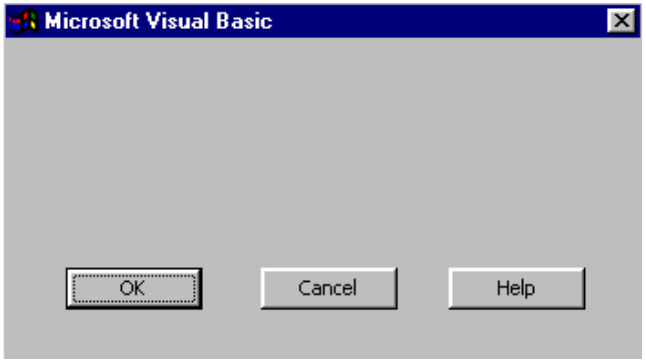
User control & freedom

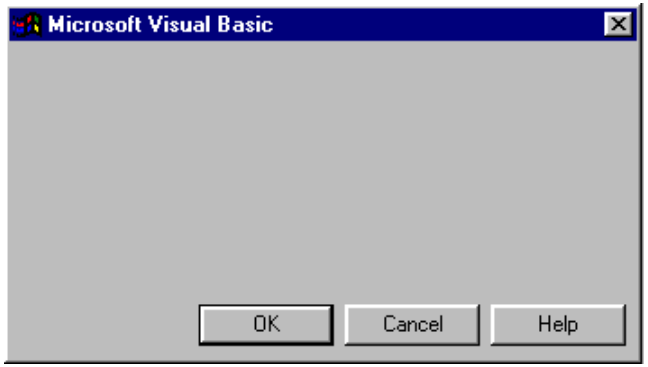
- provide “exits” for mistaken choices, undo, redo
- don’t force down fixed paths

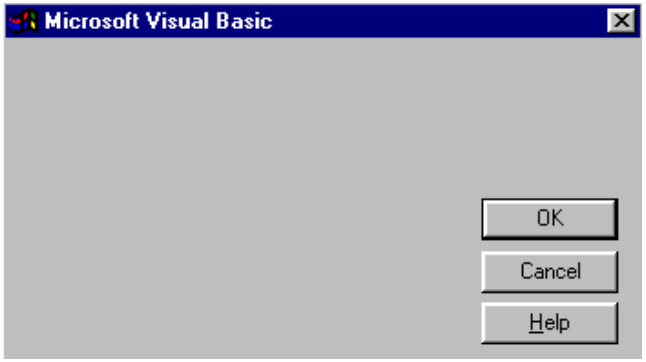
Wizards

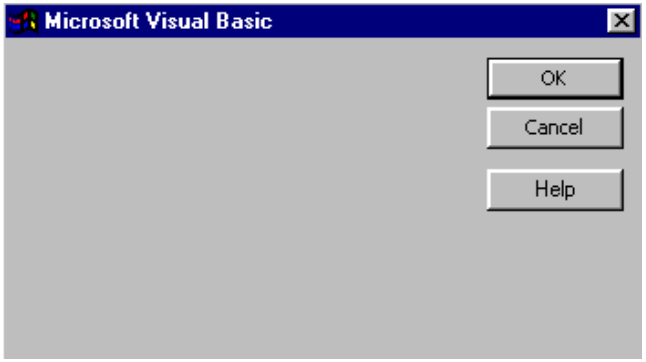
- must respond to question before going to next
- good for beginners, infrequent tasks
- not for common tasks
- consider having 2 versions (WinZip)

Heuristics

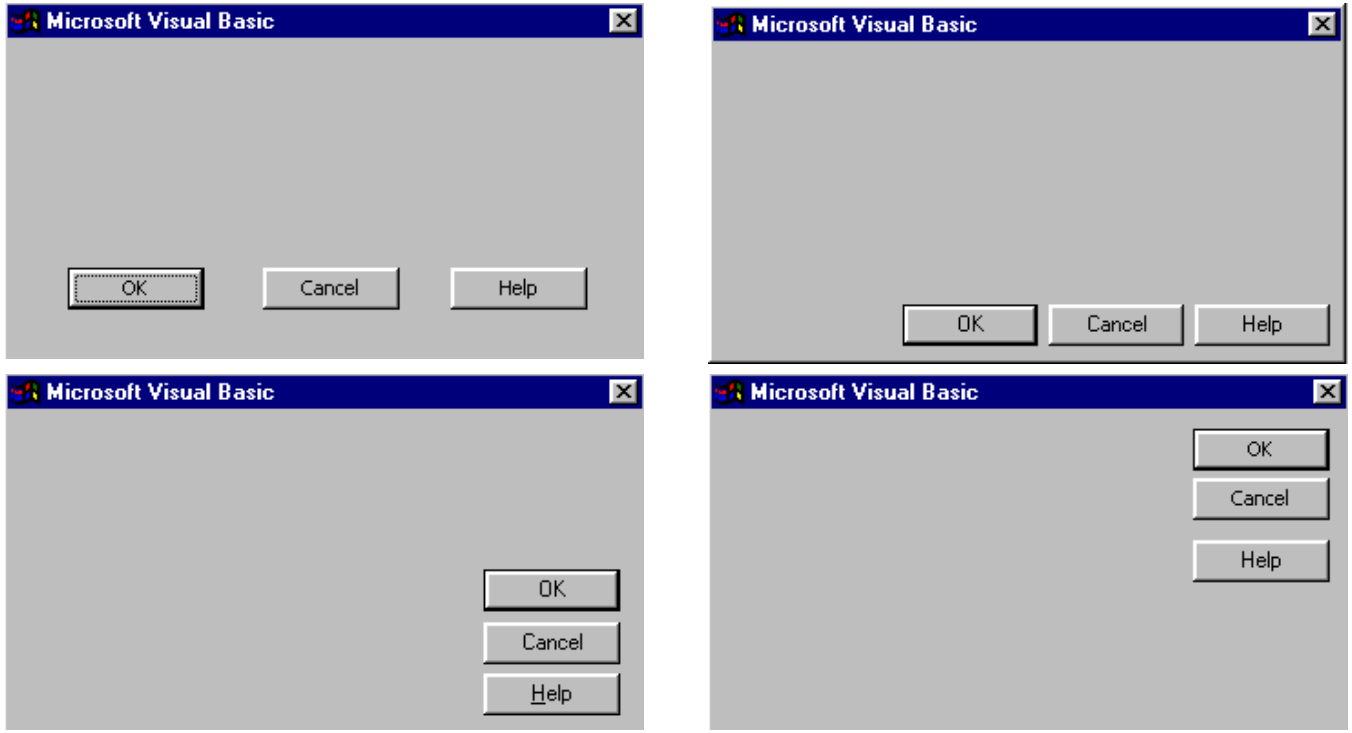

Microsoft Visual Basic
OK
Cancel
Help


Microsoft Visual Basic
OK
Cancel
Help


Microsoft Visual Basic
OK
Cancel
Help


Microsoft Visual Basic
OK
Cancel
Help

Heuristics

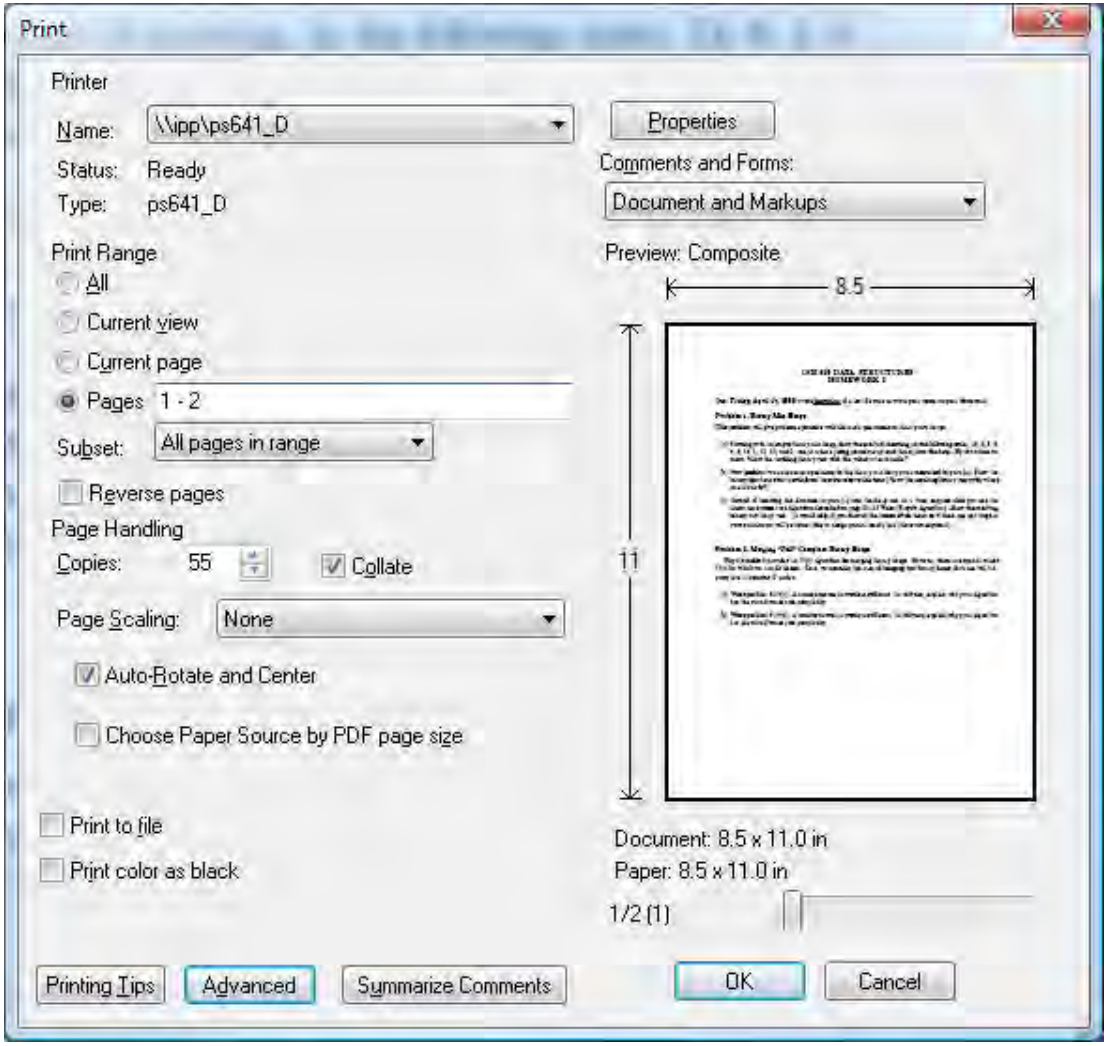


Consistency & Standards

Heuristics

Select an award style...
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
CERTIFICATE OF ACHIEVEMENT
Cancel
OK

Heuristics


Print
Printer
Name:
\\ipp\ps641_D
Properties
Status:
Ready
Type:
ps641_D
Comments and Forms:
Document and Markups
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
Preview: Composite
8.5
11
Document: 8.5 x 11.0 in
Paper: 8.5 x 11.0 in
1/2 (1)
Printing Tips
Advanced
Summarize Comments
OK
Cancel

Heuristics

UR Rewarding Experiences - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ultimaterewardslt.chase.com/edealinv/servlet/ExecMacro?ctl_nbr=10630&nurl=control%2FS
Most Visited Getting Started Latest Headlines
UR Rewarding Experiences
My Chase Accounts Manage Ultimate Rewards Help Log Off
CHASE
ultimate rewards
Rewards Home Travel Experiences Merchandise Gift Cards Cash Back Earn Faster Spotlight
Your rewards balance is 25,601 Points
All Rewards Search GO
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.
Featured Experiences & Auctions
Five-Night Vacation to Rome for Two
Auction
Rome, Italy
Opening Bid: 128,575 points
View Details | View More Like This
Quick Search
City
All Cities
Category
All Categories
From To
Search
Culinary & Wine
Culinary Experiences (29)
Wine Experiences (2)
Restaurants (1)
See All Culinary & Wine
Sports & Leisure
Car Racing (38)
Adventure (27)
Outdoor Activities (24)
See All Sports & Leisure
Art & Entertainment
More Art & Entertainment (4)
Museums (1)
Music (1)
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.
» FAQs
Transferring data from ultimaterewardslt.chase.com...

How to Perform Heuristic 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 person’s file, but used the string "Write file" on the second screen.
People may be confused by this different terminology for the same function.

How to Perform Heuristic Evaluation

Why separate listings for each violation?

- risk of a ‘fix’ repeating some 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, but sometimes features are implied and just not yet “implemented”

Phases of Heuristic Evaluation

1) Pre-evaluation training

   give expert evaluators needed
   domain knowledge & information on the scenario

2) Evaluation

   individuals evaluate interface
   and make lists of problems

3) Severity rating

   determine how severe each problem is

4) Aggregation

   group meets and aggregates problems (w/ ratings)

5) Debriefing

   discuss the outcome with design team

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 people from completing tasks. Highly confusing or unclear. Difficult to avoid. Likely to occur more than once.

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

Example Heuristic Violation

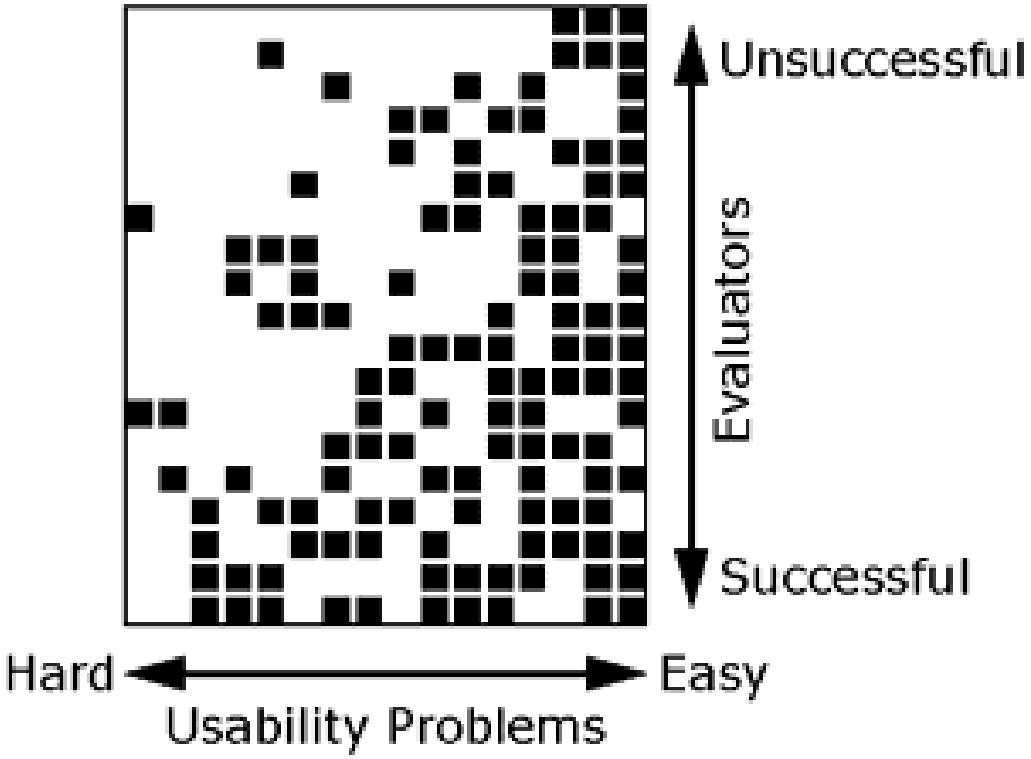
1. [H4 Consistency] [Severity 3]

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

Why Multiple Evaluators?

Every evaluator does not find every problem

Good evaluators find both easy & hard ones



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

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.

Example Heuristic Violation

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

The interface used the string "Save" on the first screen for saving the person's file, but used the string "Write file" on the second screen. People 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

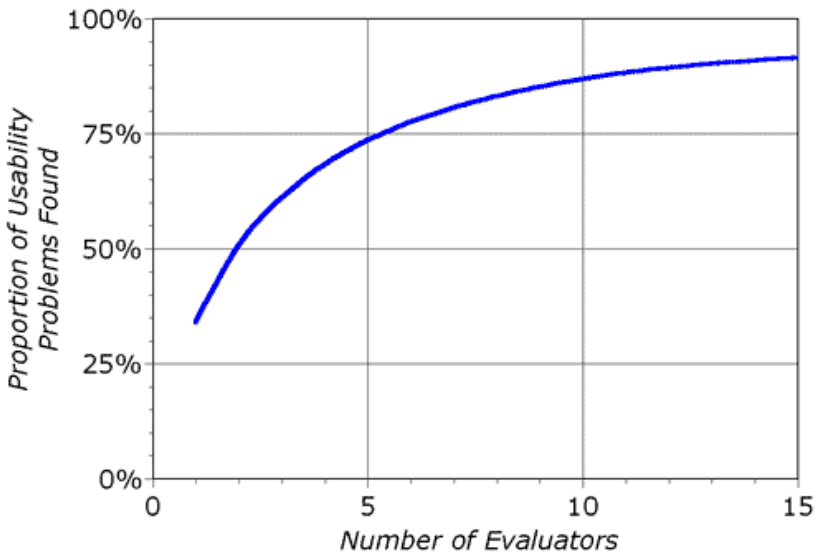
Single evaluator achieves poor results

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

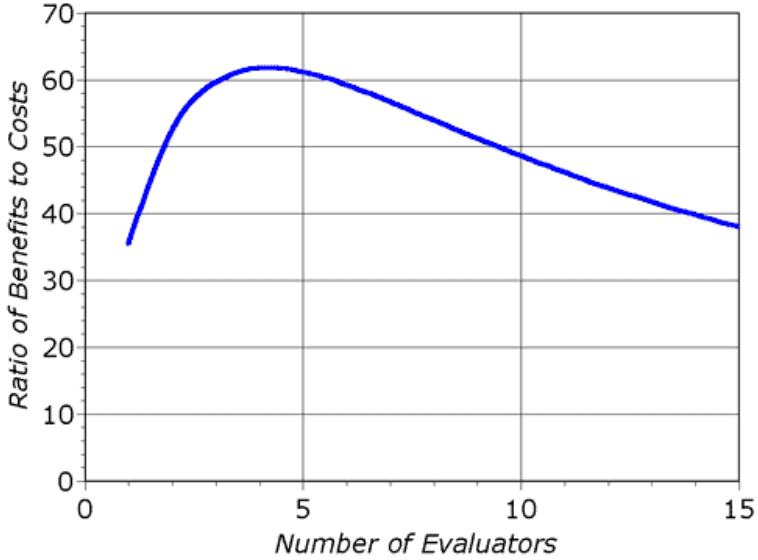
Nielsen, 1994

Decreasing Returns

problems found



benefits / cost



Nielsen, 1994

Alternative Inspection-Based Methods

Cognitive Walkthrough

- Surfaces different types of usability problems
- Consider as a complement to heuristic evaluation

Action Analysis

- Low-level modeling of expert performance
- Be aware of GOMS, but 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) Person description, including level of experience and 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 person's point of view
4) Action sequence describing the system display and the actions needed to complete the task. One system display and one 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,
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 person be trying to produce whatever effect the action has?
2) Will the person be able to notice that the correct action is available?
3) Once the person 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 person 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 much faster
- Does not require interpreting participant actions
- May miss problems or find false positives

Usability testing

- More accurate, by definition
- Account for actual people 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 11:
Inspection

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

DESIGN
USE
BUILD

Phases of Heuristic Evaluation

1) Pre-evaluation training

   give expert evaluators needed
   domain knowledge & information on the scenario

2) Evaluation

   individuals evaluate interface
   and make lists of problems

3) Severity rating

   determine how severe each problem is

4) Aggregation

   group meets and aggregates problems (w/ ratings)

5) Debriefing

   discuss the outcome with design team

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 12:
Human Performance

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

DESIGN
USE
BUILD

Project Status

It just keeps going forward

Looking Forward

- 3c: Usability Testing Check-In Due Friday 11/10
- 3d: Usability Testing Review Due Monday 11/13
- 3e: Digital Mockup Due Thursday 11/16

Other Assignments

- Reading 4 Due Saturday 11/11, Sooner is Better
- Reading 5 Can Be Done Anytime, Sooner is Better

Objectives

Be able to:

Describe an interaction in terms of a model, such as Norman's Execution-Evaluation Cycle or Buxton's 3-State Model

Describe properties of the human perceptual system that impact interaction

Use the Model Human Processor to describe simple human performance phenomena

Describe what Fitts's Law models, how terms in the model impact interaction, how the model can be used in low-level and higher-level interaction design

Describe the Gestalt perspective on human perception

These are Examples of What?

Popsicle-stick bridge

$x = x_0 + v_0t + \frac{1}{2} at^2$

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

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

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

Models of Interaction

Models of interaction allow a closer look

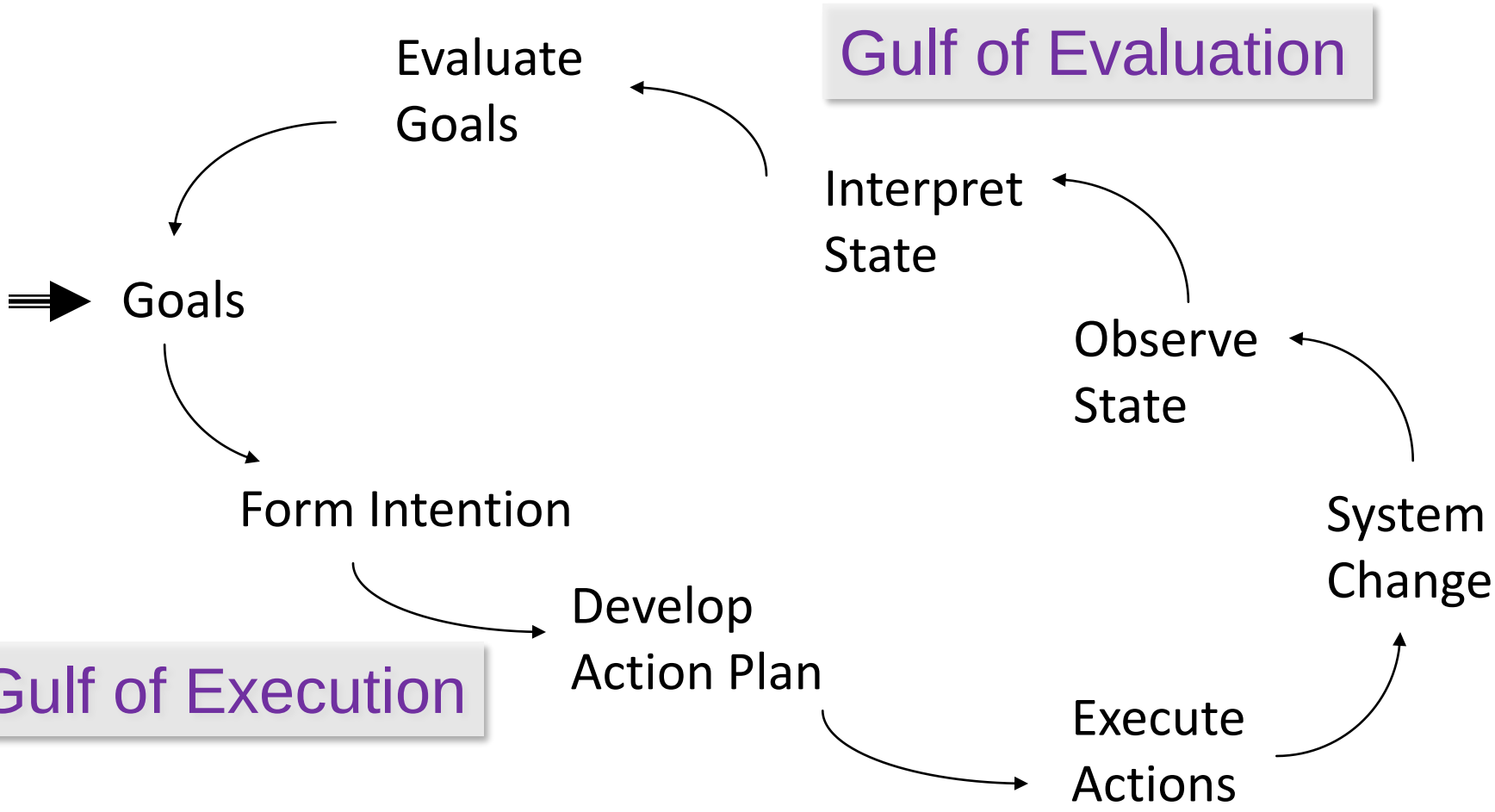
- Define and describe an interaction
- Isolate areas where problems occur
- Design new interaction

Two examples at different scales

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

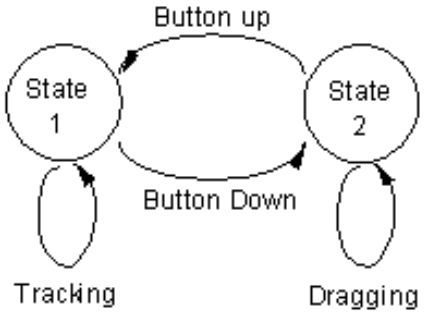
"All models are wrong, but some are useful"
George Box

Norman's Execution-Evaluation Cycle

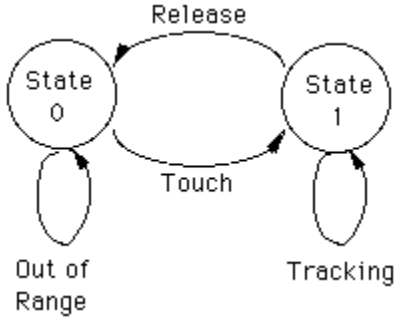


Buxton's 3-State Model

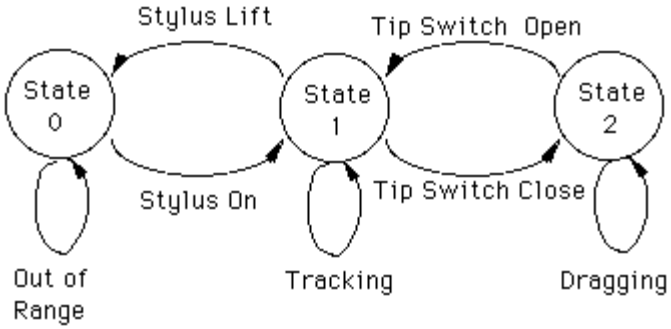
Mouse



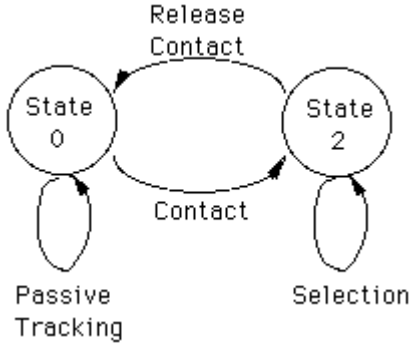
Touchpad



Stylus

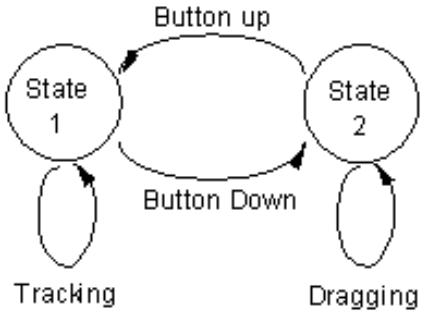


Touch Screen

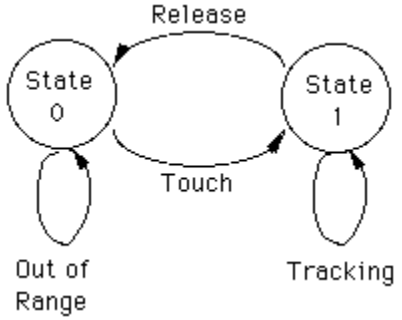


Buxton's 3-State Model

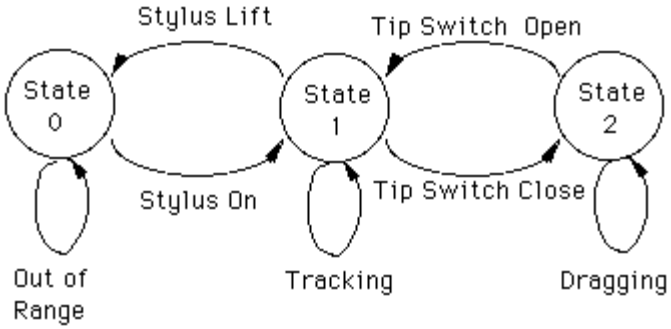
Mouse



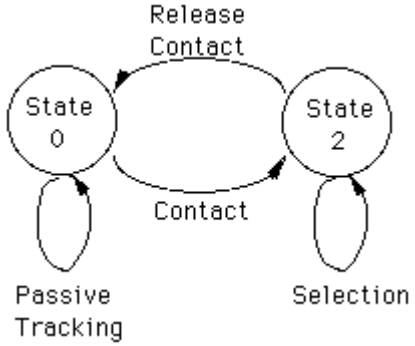
Touchpad



Stylus



Touch Screen



Which can support tooltip previews?

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

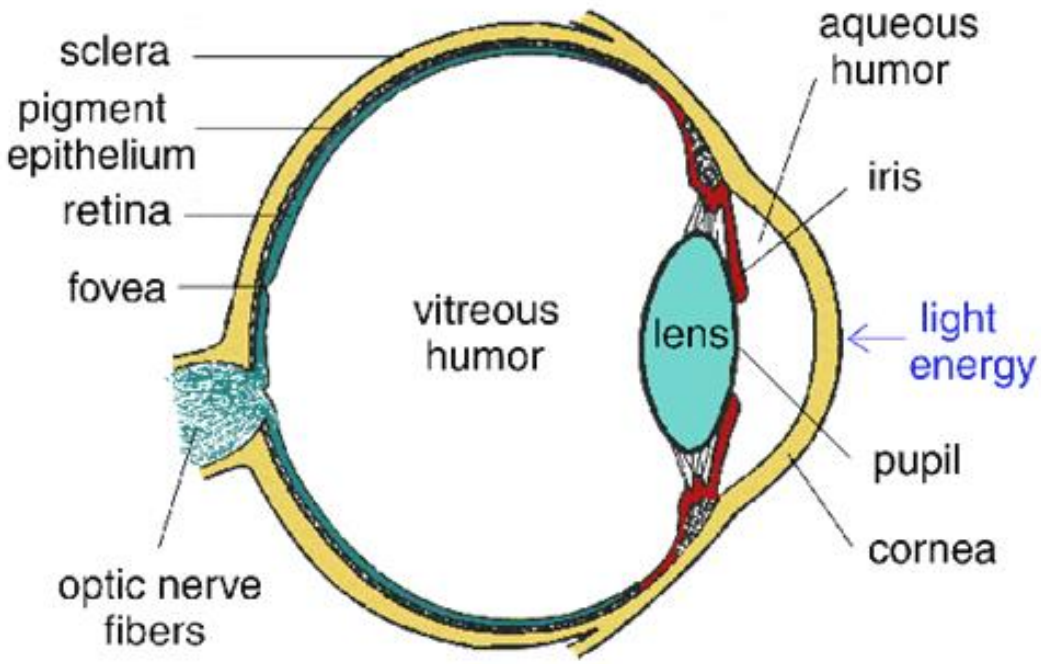
From specific observations
to broader generalization

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

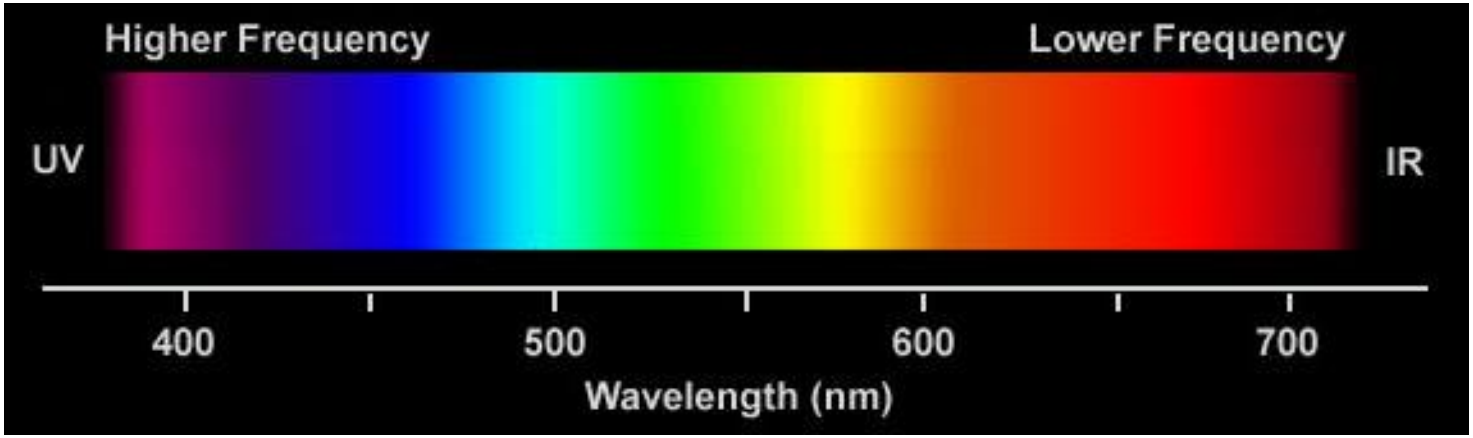
q r s t u v w x

Use right eye, look at letters

Blind Spot

Use left eye, look at cross

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 …

Retina

- Center of retina has most of the cones
  - Allows for high acuity of objects focused at center

Retina

Center of retina has most of the cones

- Allows for high acuity of objects focused at center

Edge of retina is dominated by …

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

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?

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

Retina

Center of retina has most of the cones

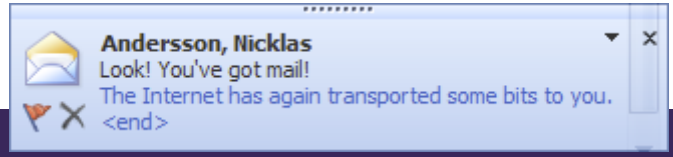
- Allows for high acuity of objects focused at center

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



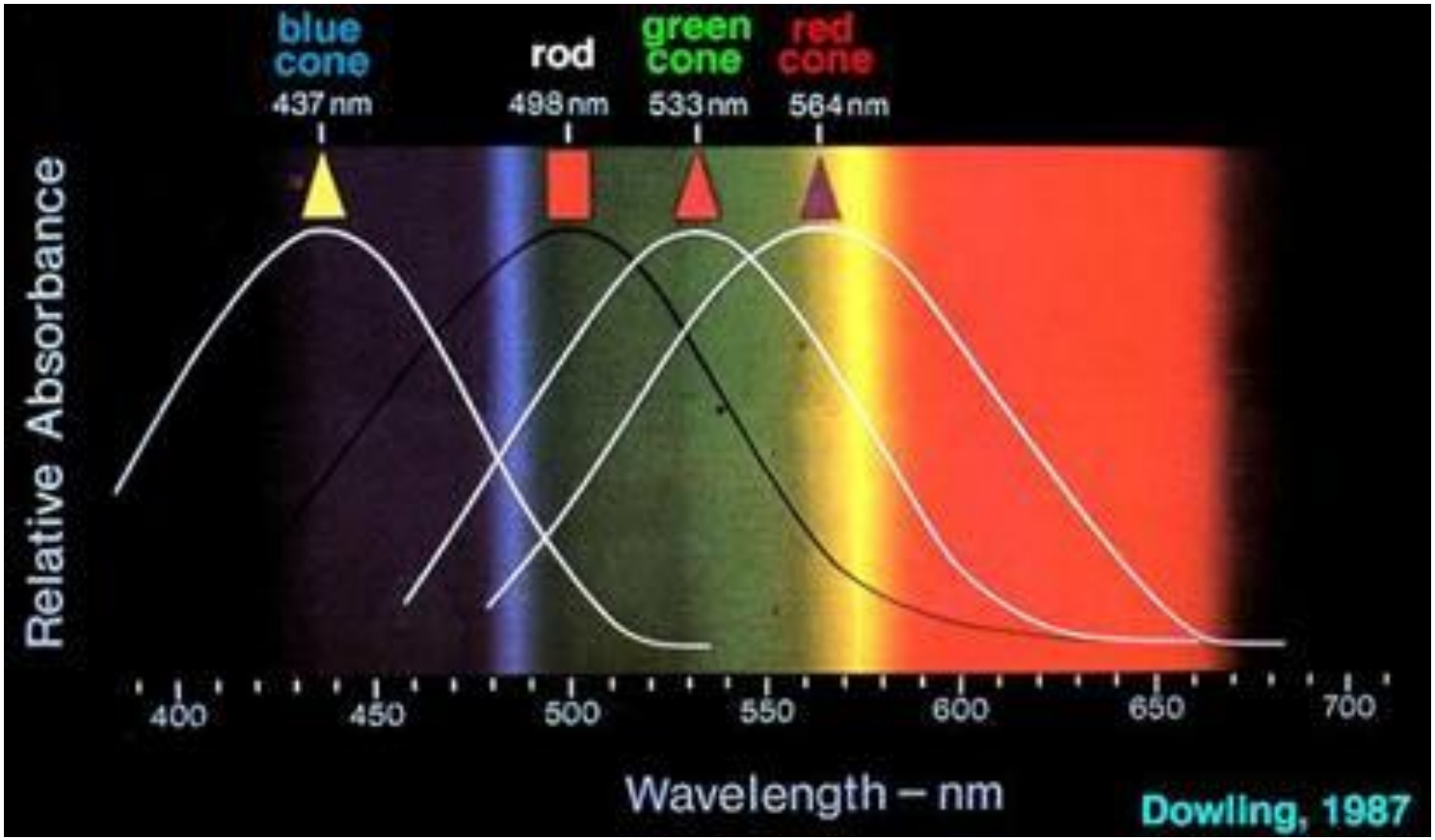
Color Perception via Cones

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



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 Red + 0.59 Green + 0.11 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

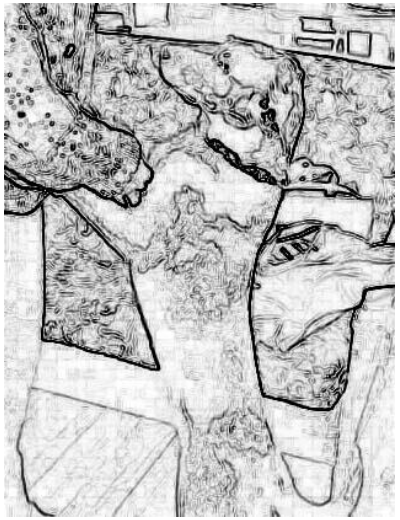
- Y = 0.3 Red + 0.59 Green + 0.11 Blue

Shapes detected by finding edges

- We use brightness and color difference

Implication

- Blue edges and shapes are hard



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)

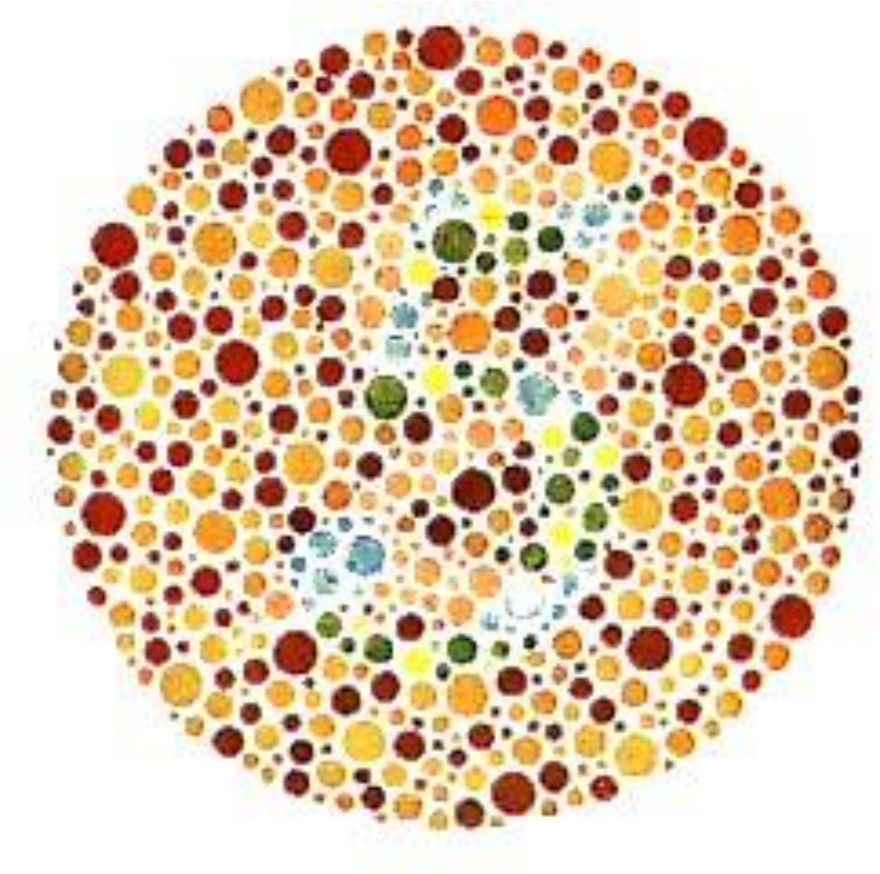
This hurts, why?

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



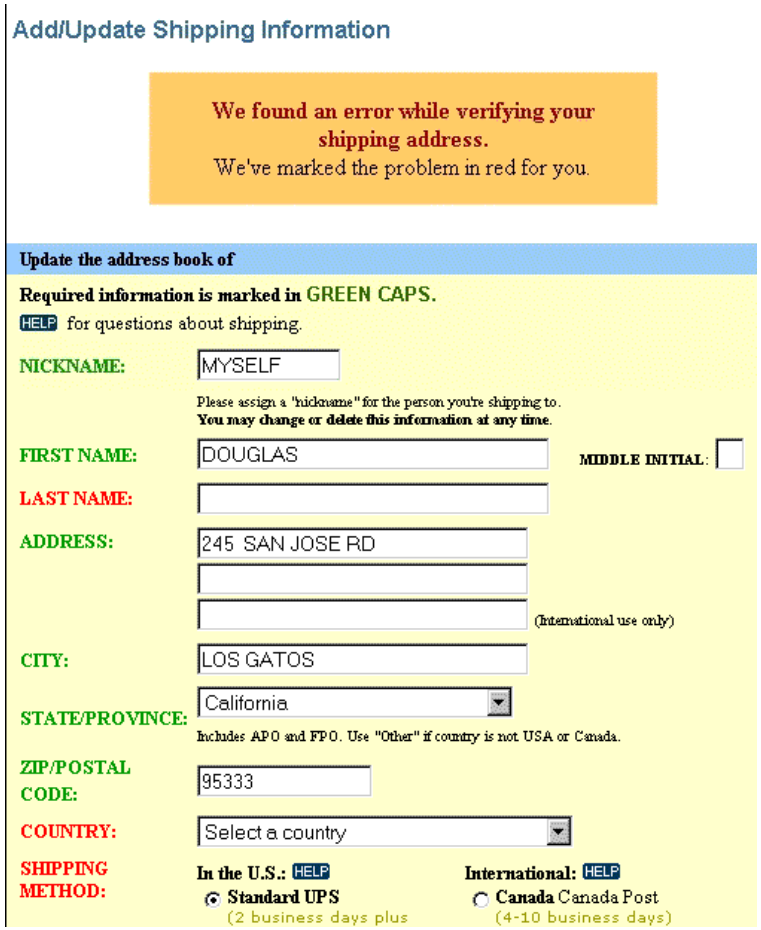
Dual / Redundant Encoding

Apples to Apples

Pandemic

http://danielsolisblog.blogspot.com/2011_03_01_archive.html

Dual / Redundant Encoding

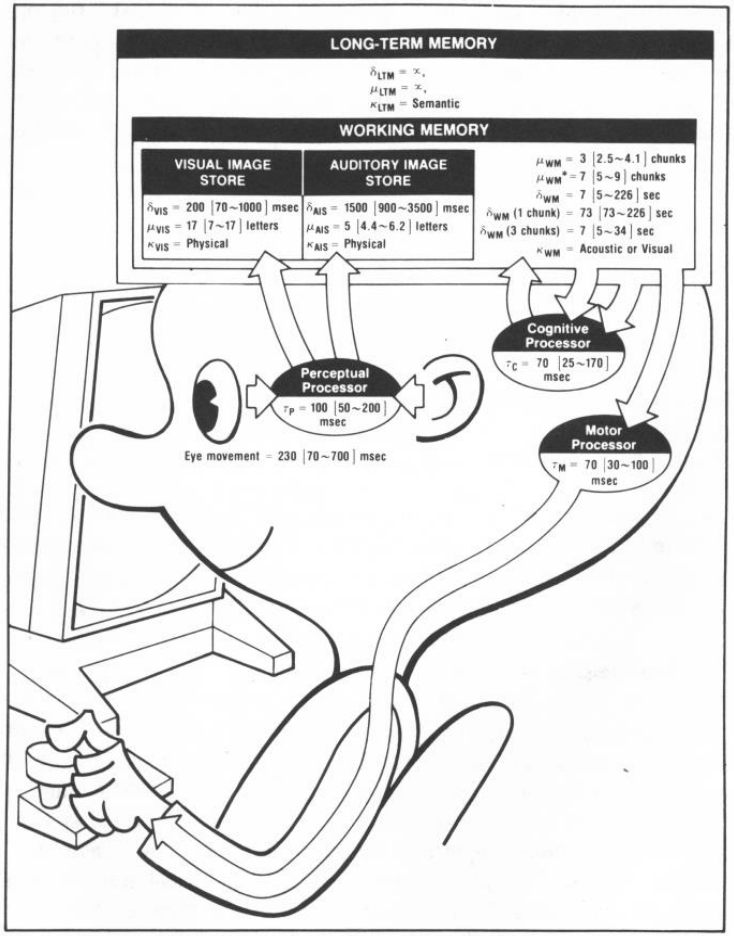


Today

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

The Model Human Processor



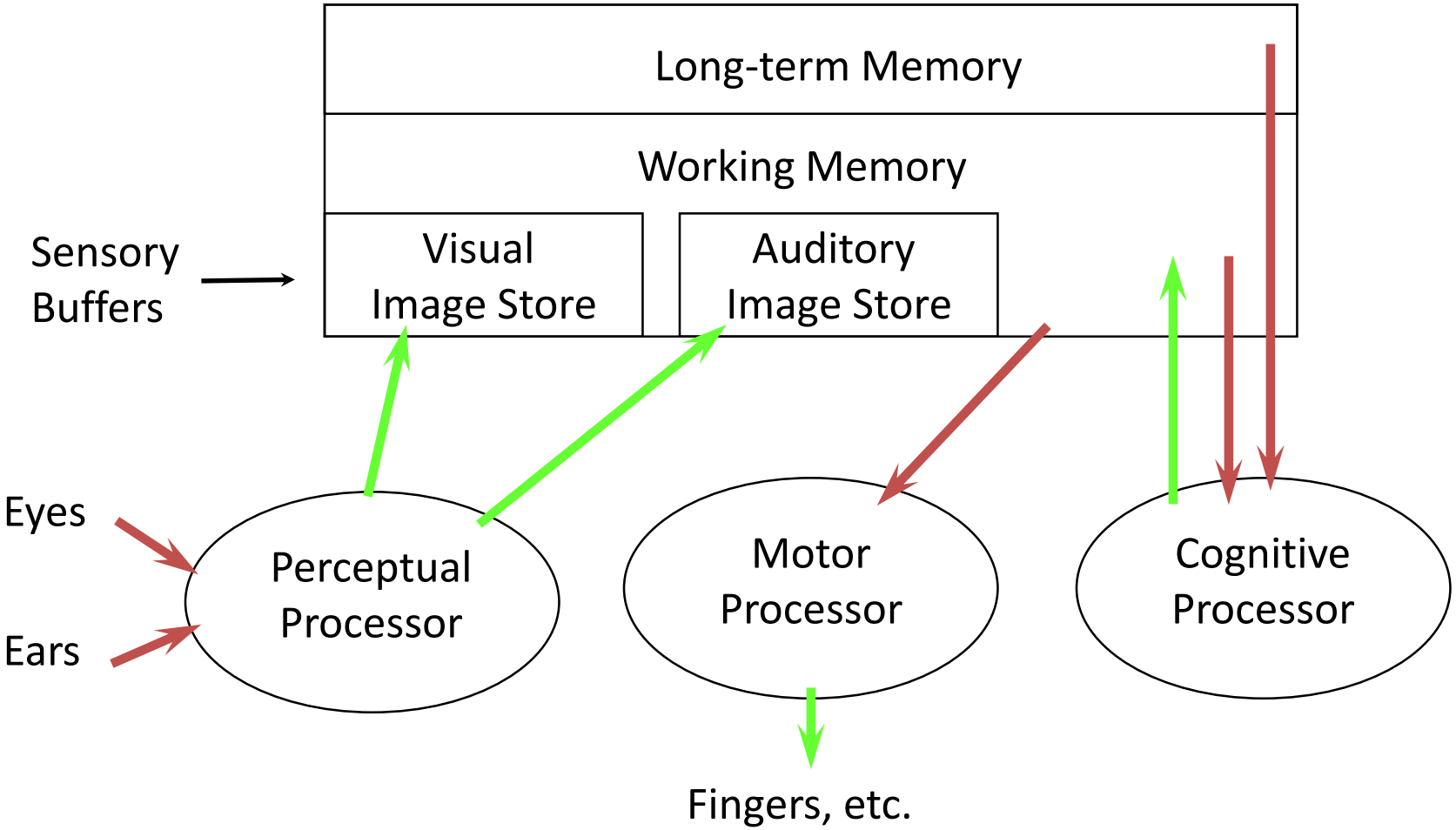
Developed by Card, Moran, & Newell (1983)

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



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, about 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

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

Activation Experiment

word	word	word
word	word	word
word	word	word
word	word	word
word	word	word

Activation Experiment

Volunteer

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	olftcs	fwax
ncudgt	zjdcv	lxngyt
mkbh	xbts	cfto
bhfe	cnhdes	fwa
cnofgt	uhths	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

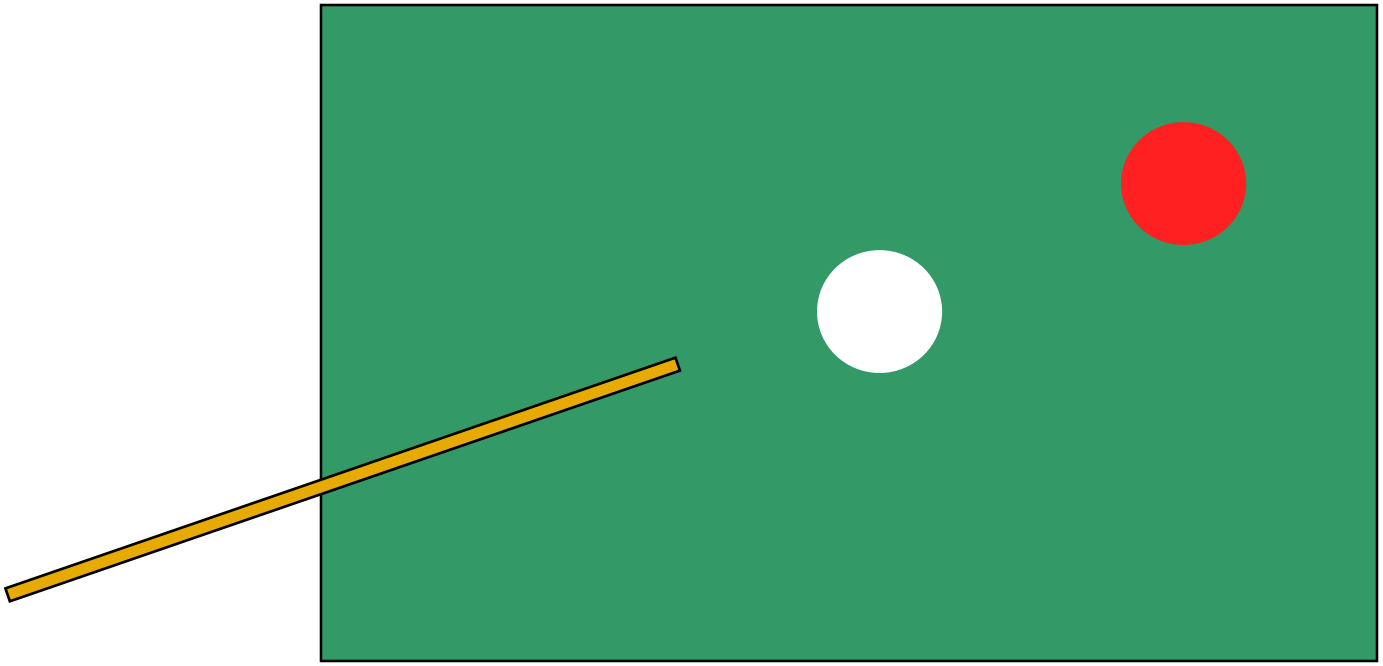
Discrimination Principle

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

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

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)

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

James's use of 's is correct,
but most people say Fitts' Law

Fitts's Law (1954)

Models time to acquire targets in aimed movement

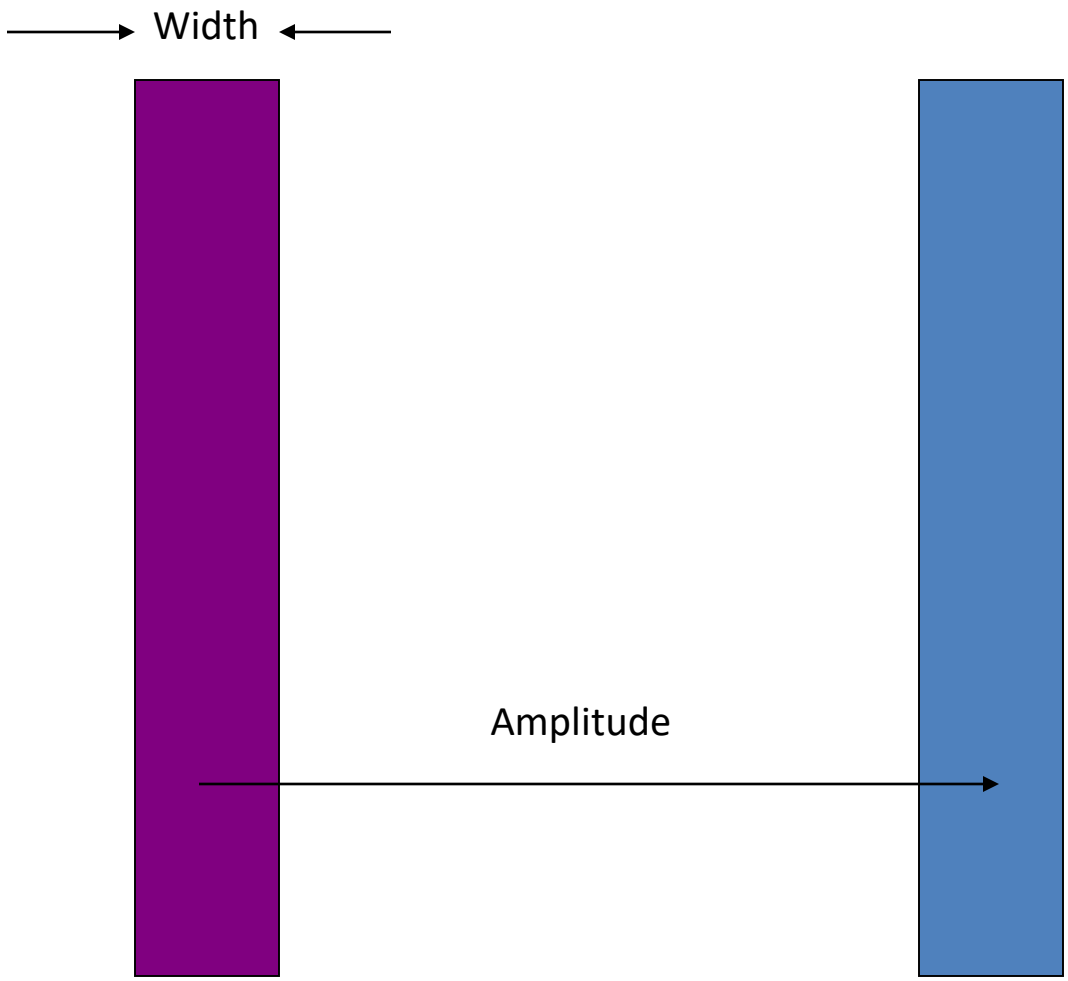
- Reaching for a control in a cockpit
- Moving across a dashboard
- Pulling defective items from a conveyor belt
- Clicking on icons using a mouse

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

https://en.wikipedia.org/wiki/Fitts's_law

Reciprocal Point-Select Task



Closed Loop versus Open Loop

What is closed loop motion?

What is open loop motion?

Closed Loop versus Open Loop

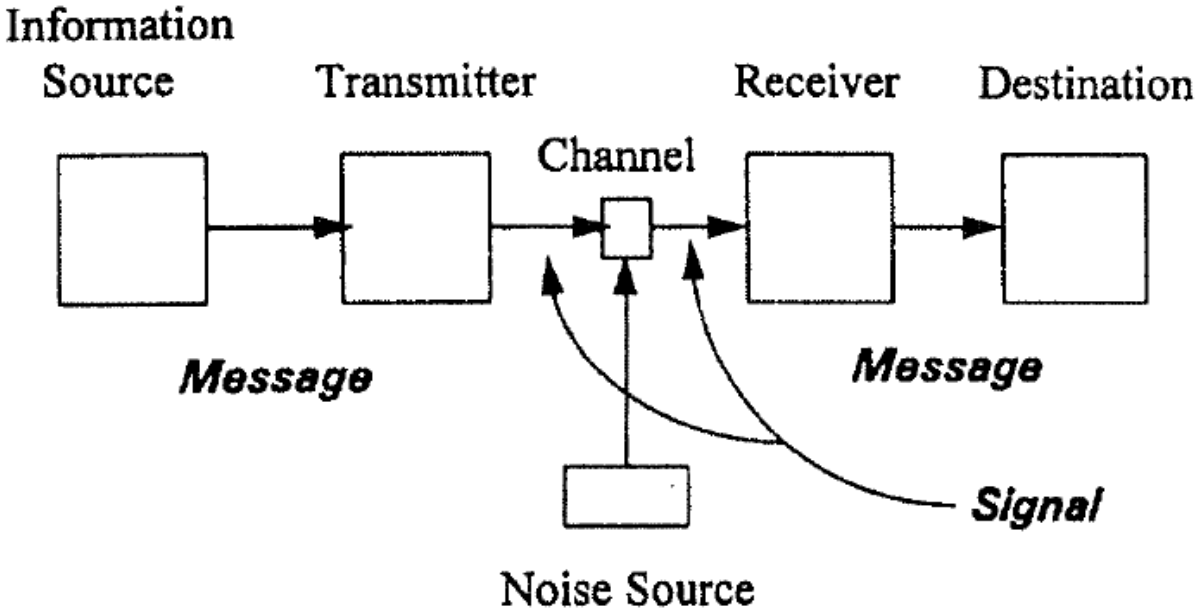
What is closed loop motion?

- 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)

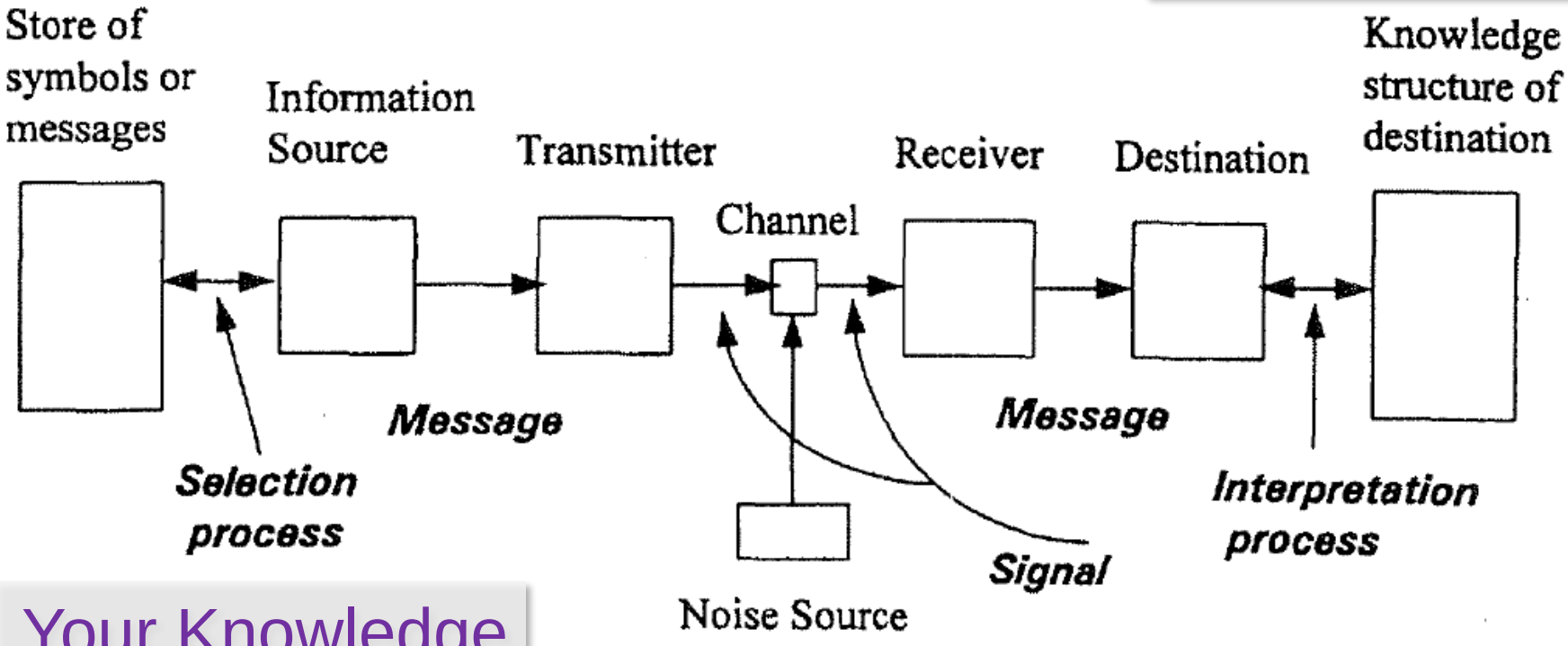
Model by Analogy



Analogy to Information Transmission
Shannon and Weaver, 1959

Model by Analogy

The Interface



Your Knowledge

Analogy to Information Transmission
Shannon and Weaver, 1959

Fitts's Law

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

What kind of equation does this remind you of?

Fitts's Law

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

What kind of equation does this remind you of?

$y = mx + b$

$MT = a + bx$, where $x = \log_2(A / W + 1)$

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

Experimental Design and Analysis

Factorial Design

- Experiment with more than one manipulation

Within vs. Between Participant Design

- Statistical power versus potential confounds

Carryover Effects and Counterbalanced Designs

A	B	C	D
C	D	A	B
D	C	B	A
B	A	D	C

Latin Square Design

https://depts.washington.edu/aimgroup/proj/ps4hci/

“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

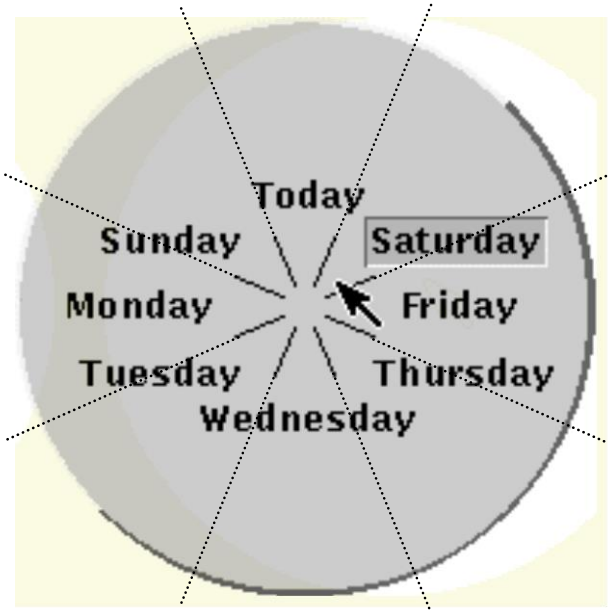
Fitts's Law Examples

Which will be faster on average?

Pop-up Linear Menu

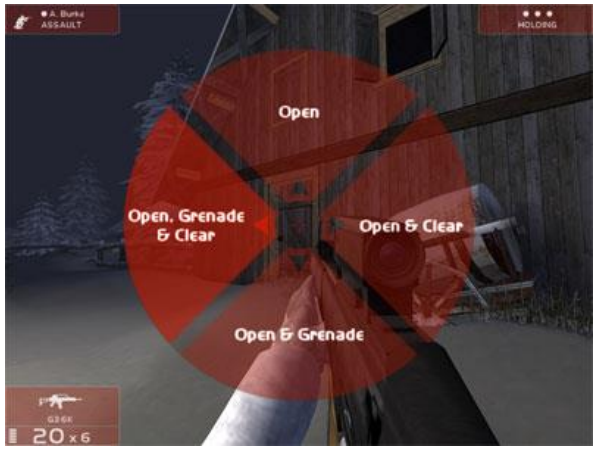
Today
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday

Pop-up Pie Menu

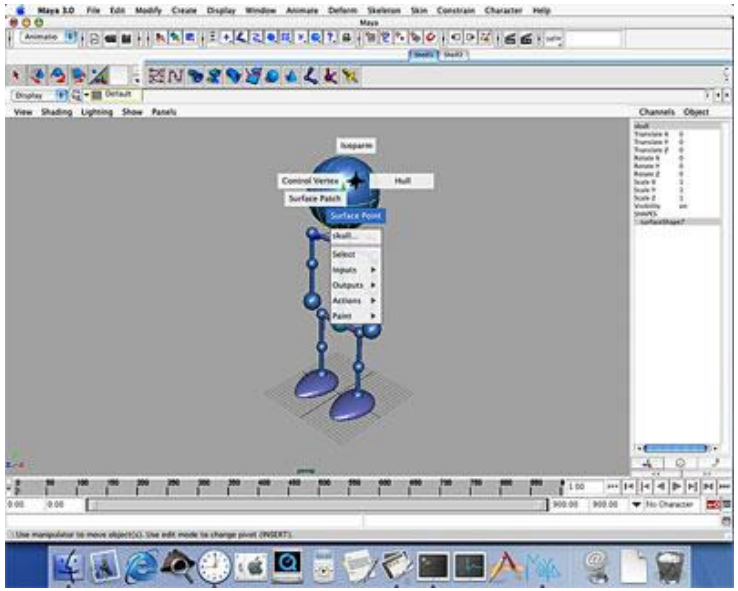


Pie Menus in Use

The Sims



Rainbow 6



Maya

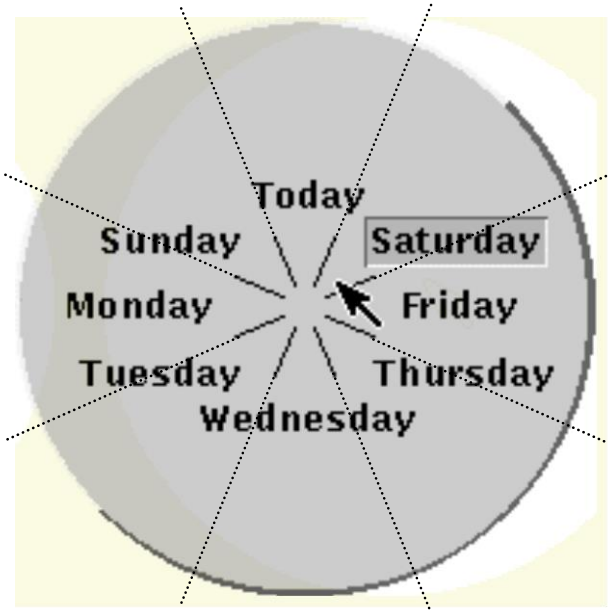
Fitts's Law Examples

Which will be faster on average?

Pop-up Linear Menu

Today
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday

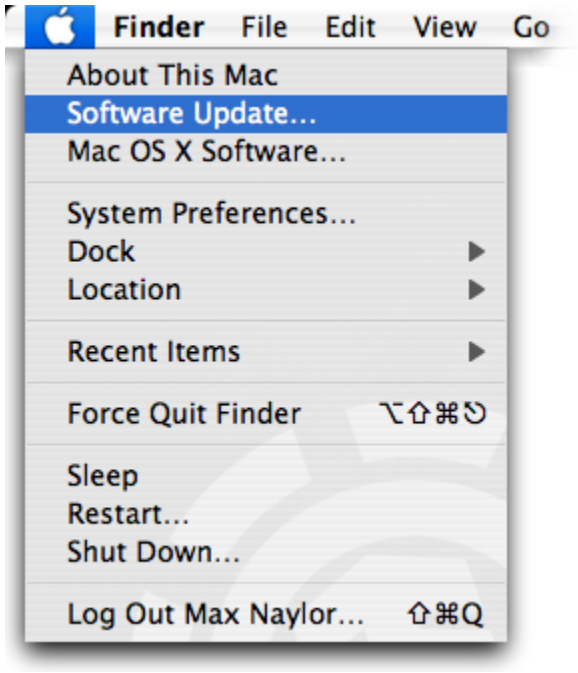
Pop-up Pie Menu



What about adaptive menus?

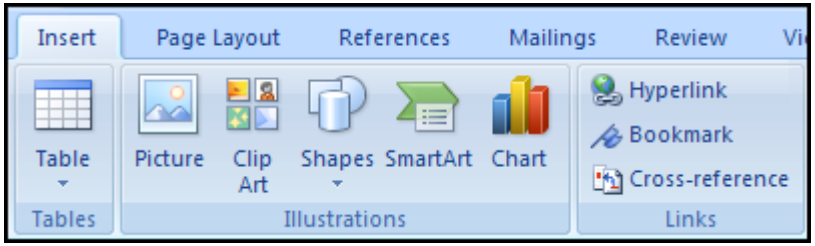
Fitts's Law in Windowing

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

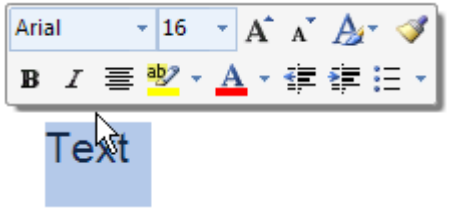


Macintosh Menu

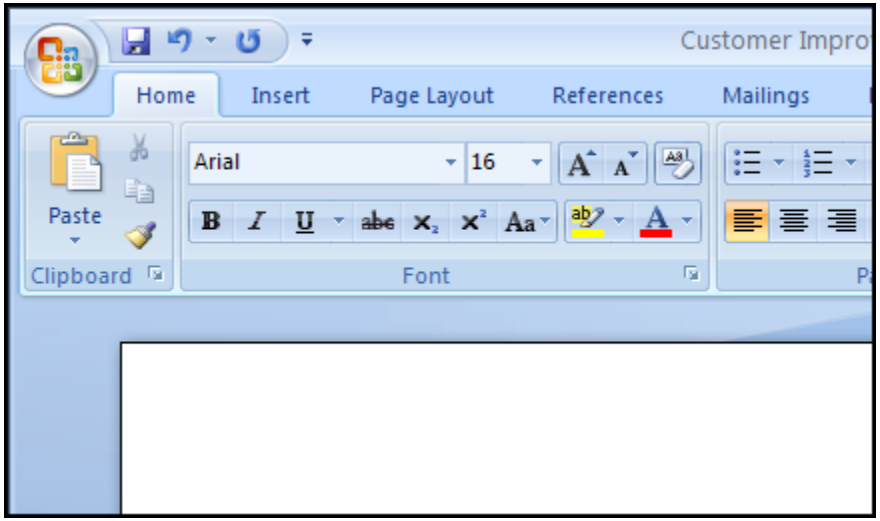
Fitts's Law in MS Office 2007



Larger, labeled controls
can be clicked more quickly



Mini toolbar is close to the cursor

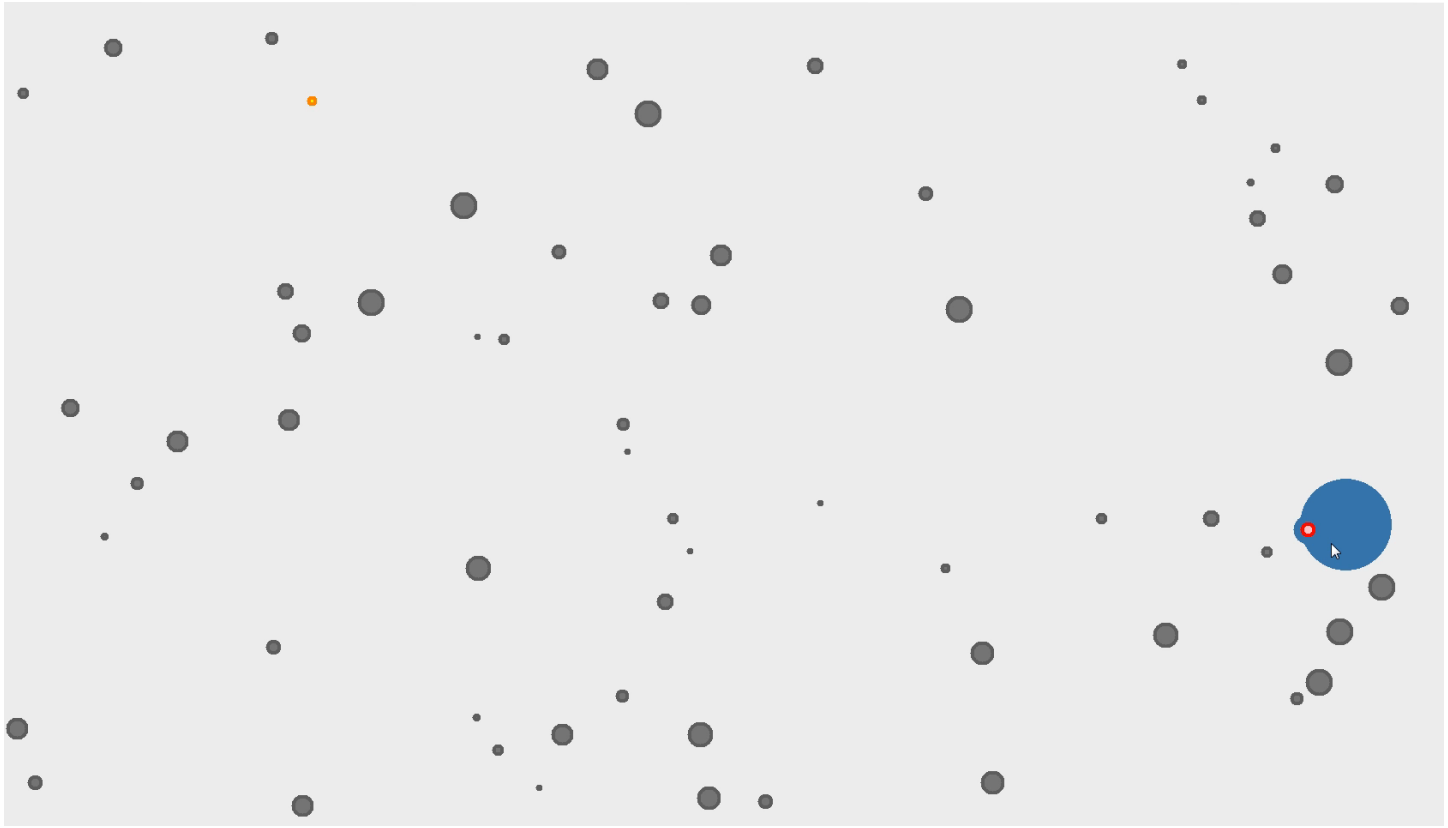


Magic Corner:
Office Button in the upper-left corner

Bubble Cursor

Grossman and Balakrishnan, 2005

Bubble Cursor



Grossman and Balakrishnan, 2005

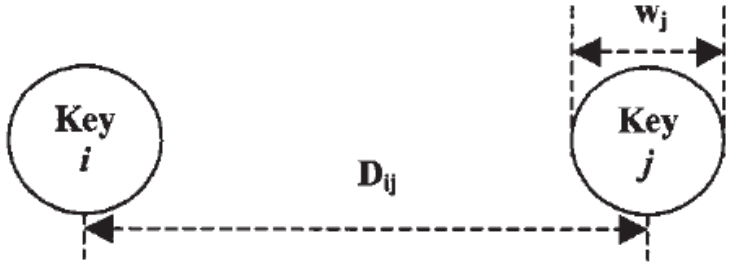
Bubble Cursor with Prefab

Dixon et al, 2012

Bubble Cursor with Prefab

Dixon et al, 2012

Fitts's Law and Keyboard Layout



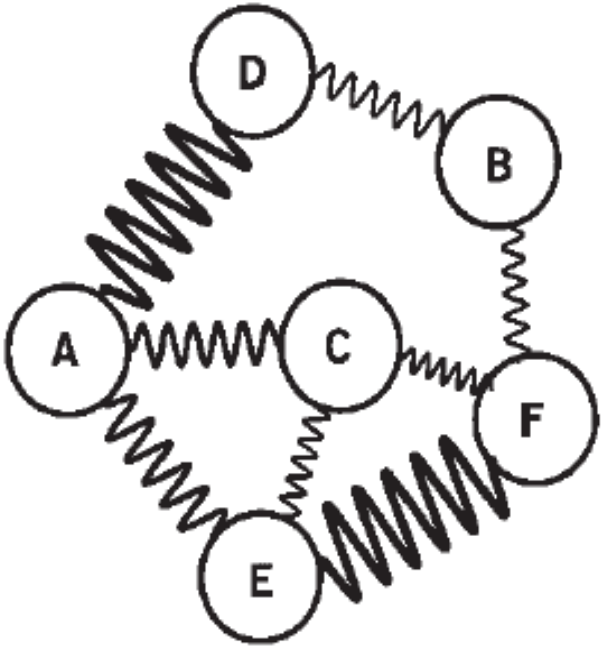
$$MT = a + b\log_2\left(\frac{D_{ij}}{W_j} + 1\right),$$

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

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

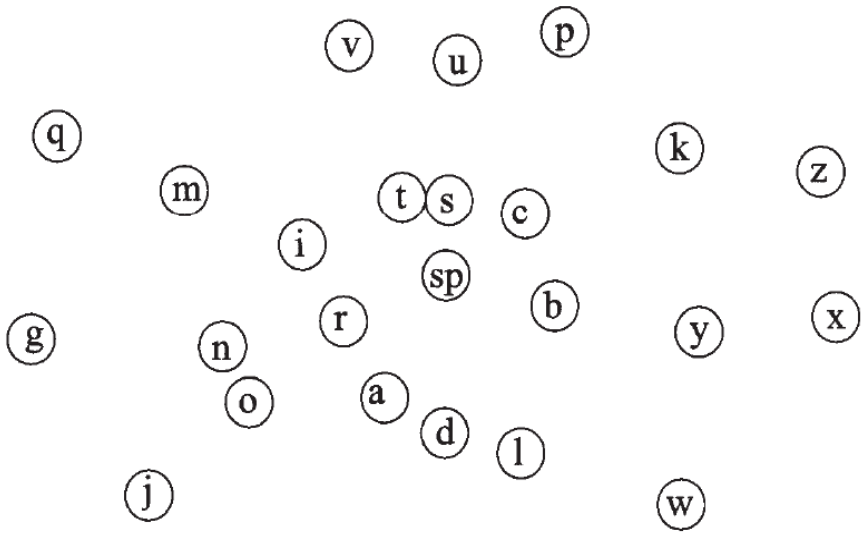
Hooke's Keyboard

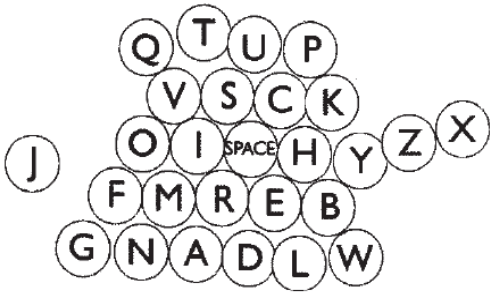
Optimizes a system of springs

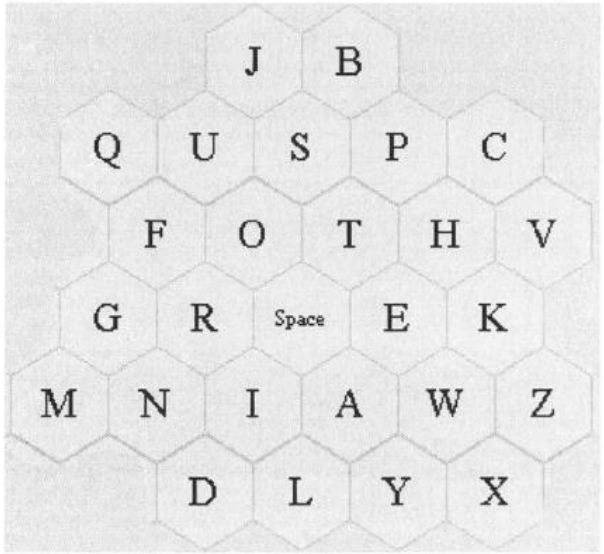


Metropolis Keyboard

Random walk minimizing scoring function







Considering Multiple Space Keys

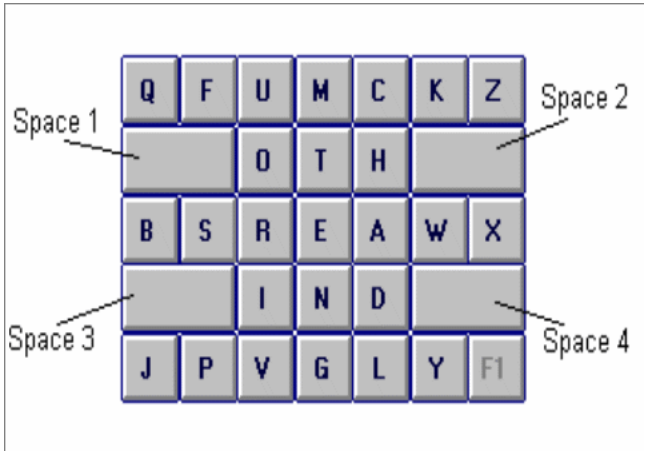
FITALY Keyboard

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



Considering Multiple Space Keys

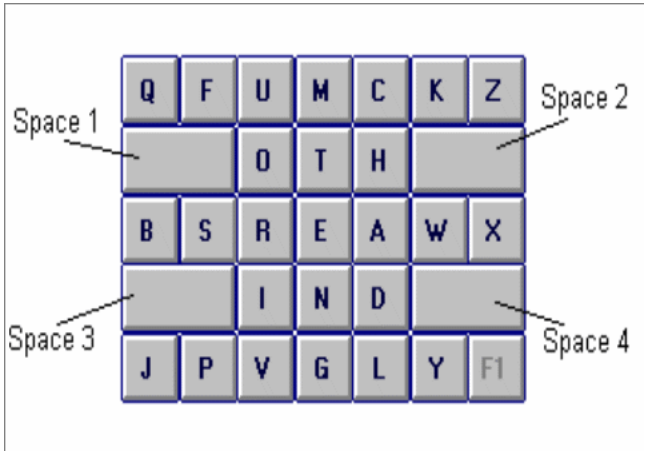
FITALY Keyboard

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

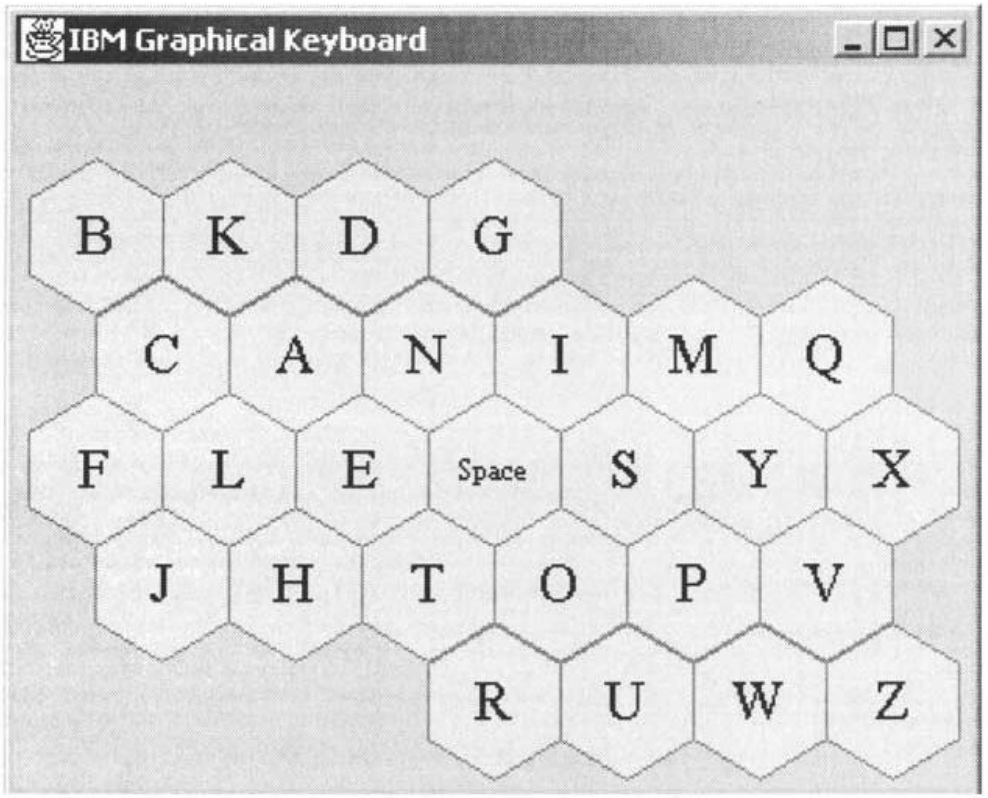


Correct choice of space key becomes important

Requires planning head to be optimal

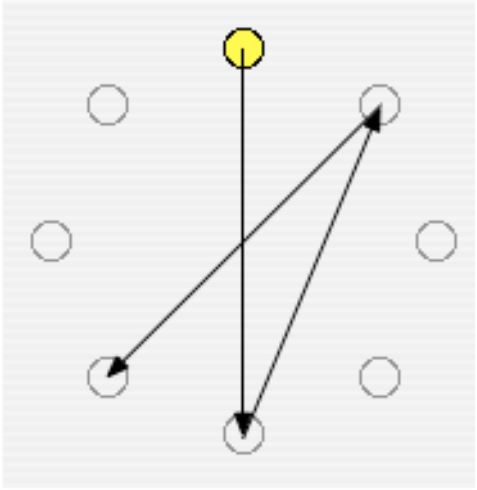
ATOMIK Keyboard

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

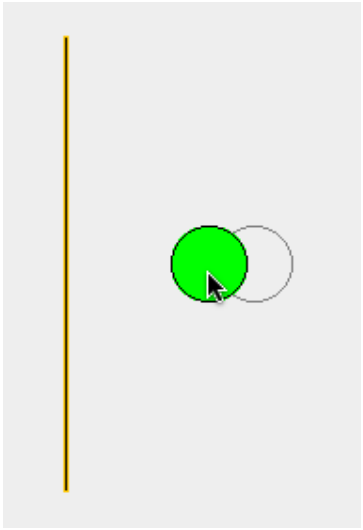


Using Motor Ability in Design

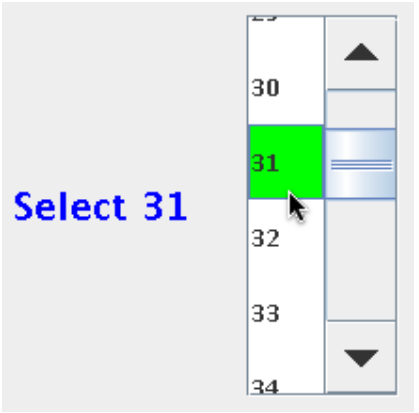
Pointing



Dragging

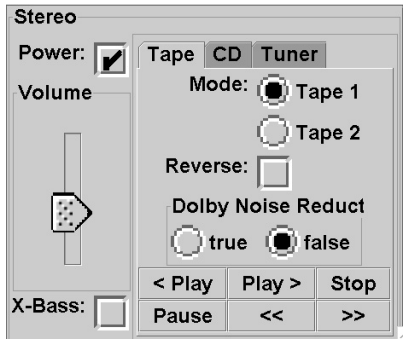


List Selection



Gajos et al 2007

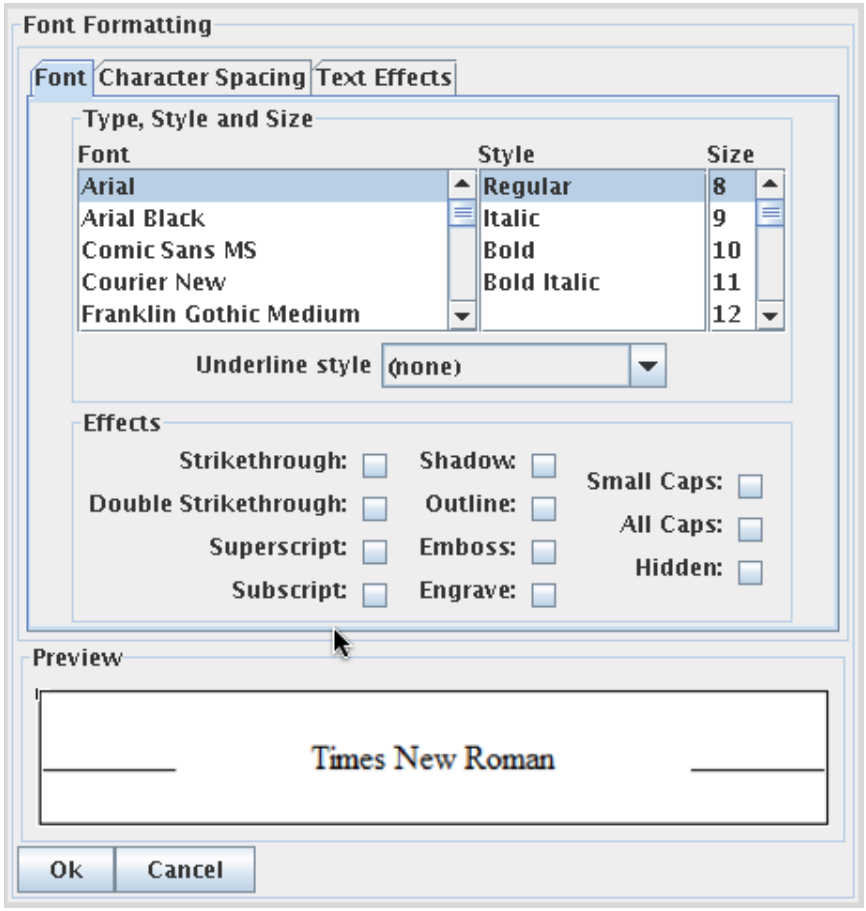
Interface Generation As Optimization

$(

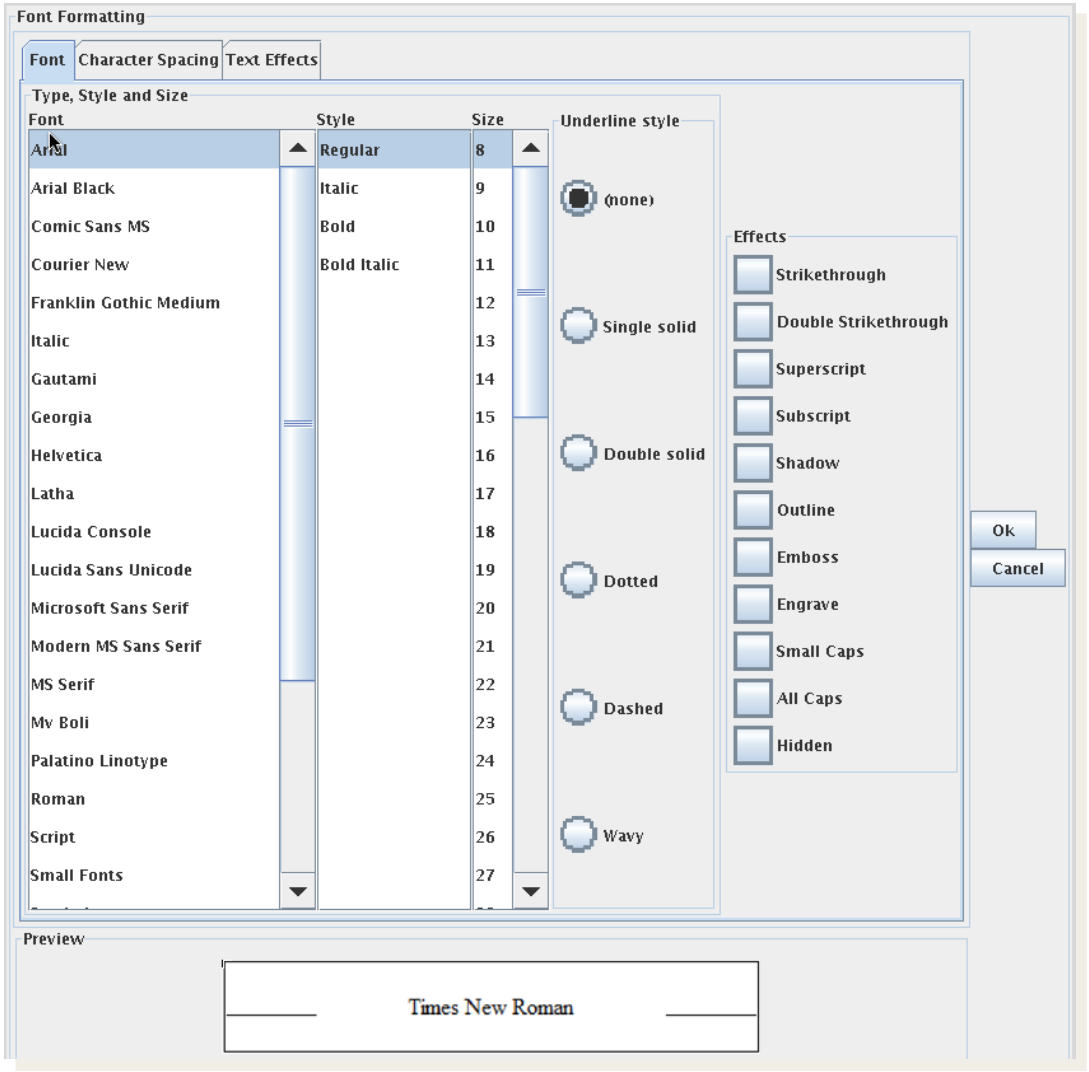
) =

Estimated task completion time

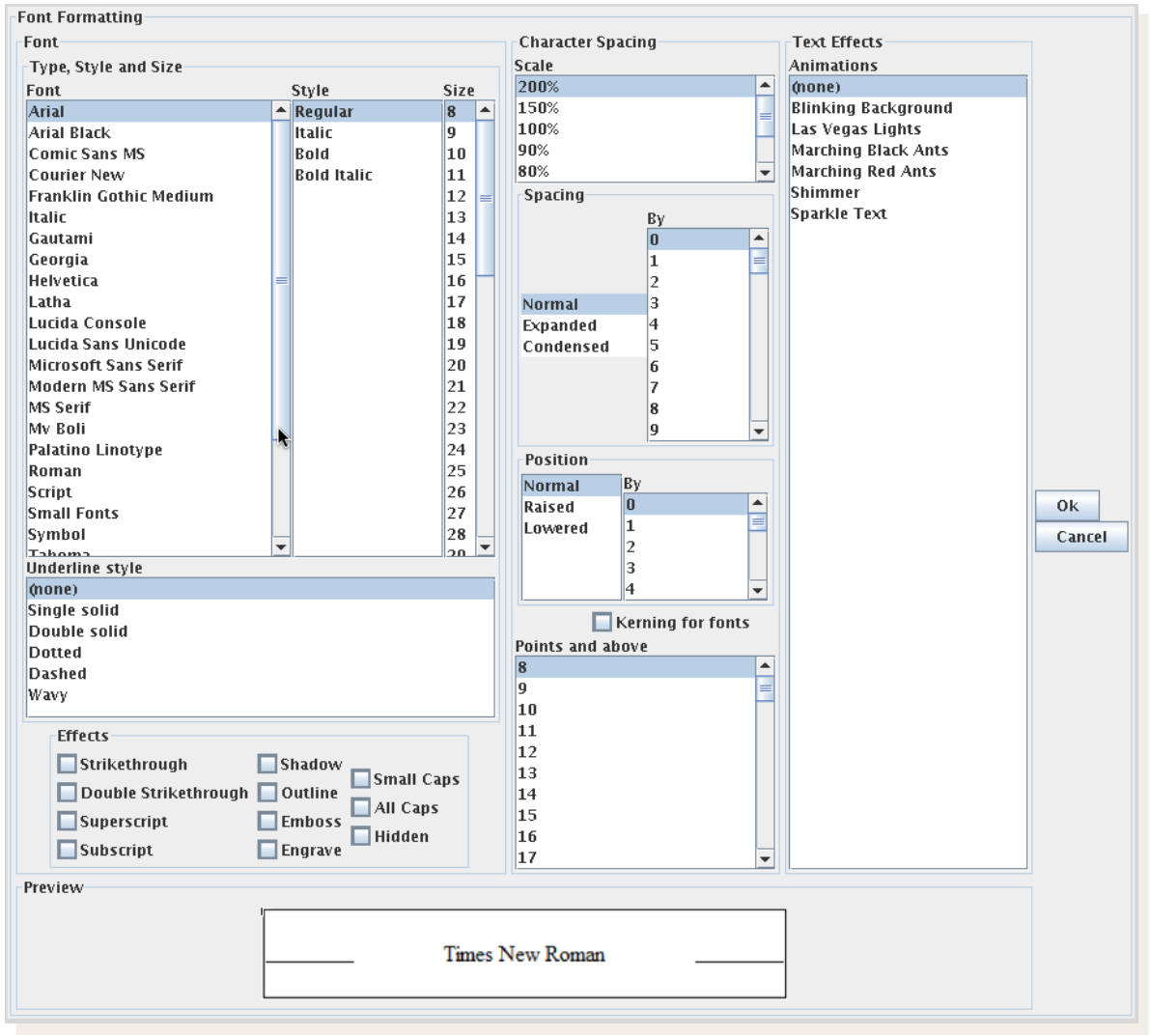
Manufacturer Interface



Person with Cerebral Palsy



Person with Muscular Dystrophy



Interface Generation As Optimization

In a study with 11 participants with diverse motor impairments:

Consistently faster with generated interfaces (26%)

Fewer errors with 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"

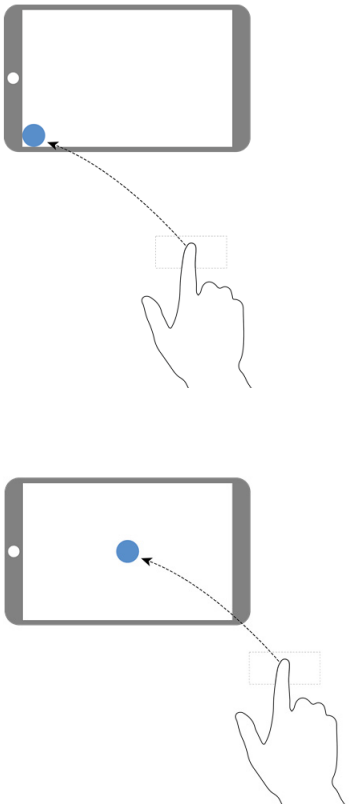
Constrained Motion

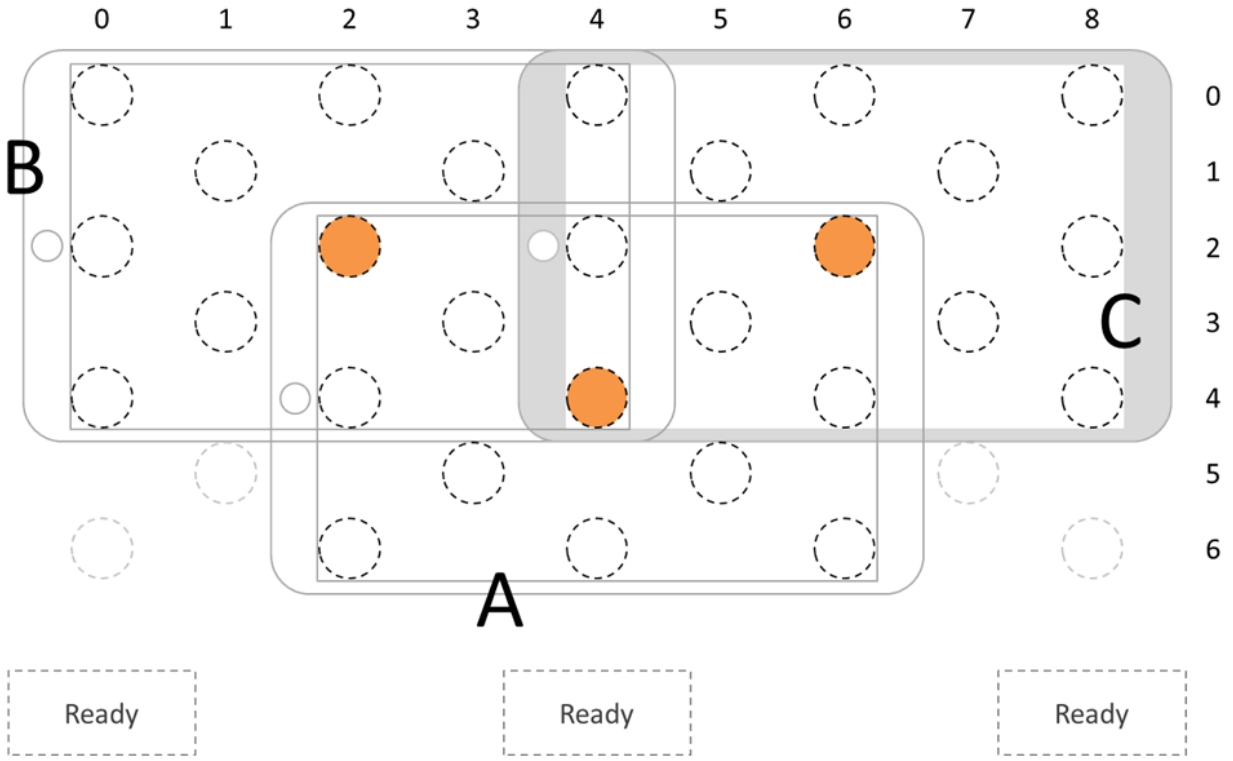
- Snapping,
  holding Shift to limit degrees of movement

Target Prediction

- Determine likely target,
  move it nearer or expand it

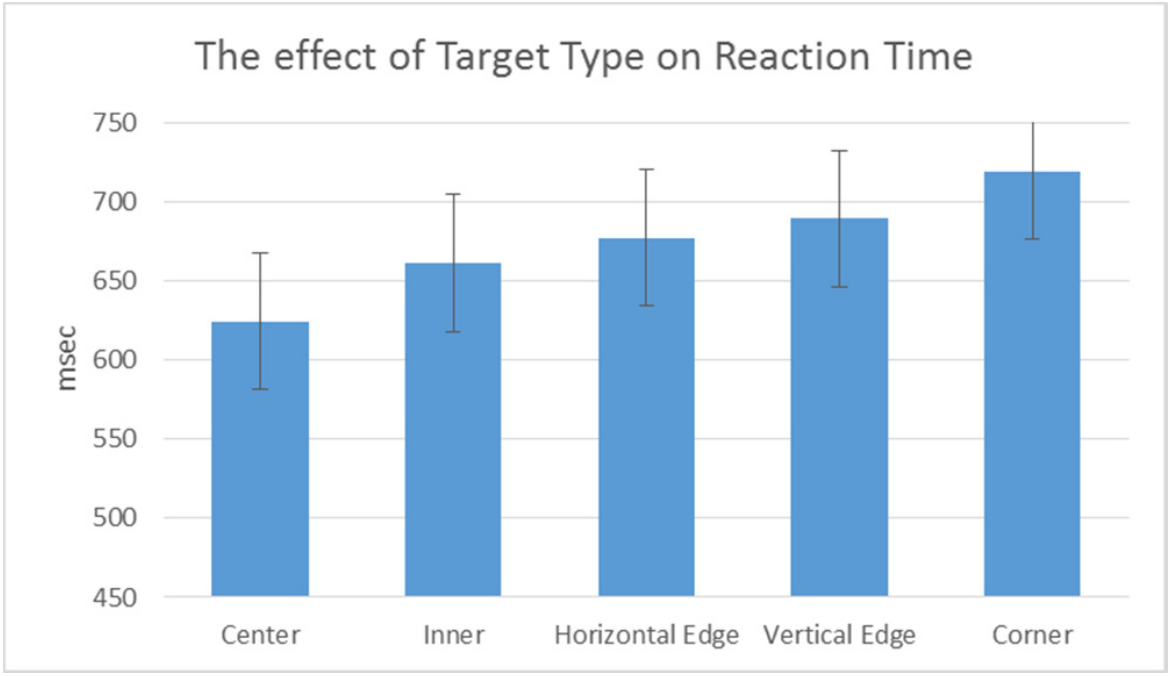
Fitts's Law, Edge Targets, and Touch





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?

Today

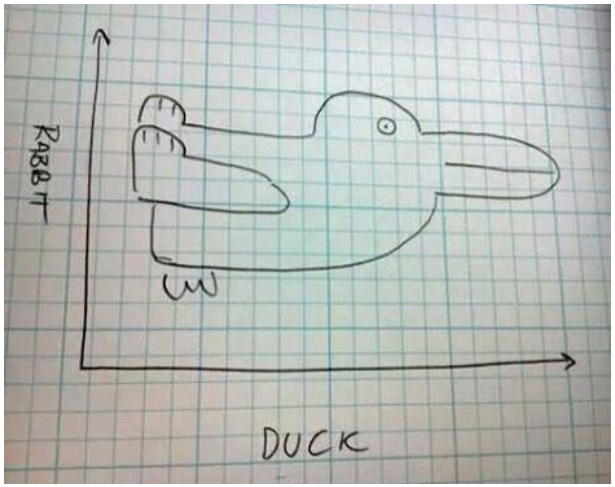
Some example models of human performance

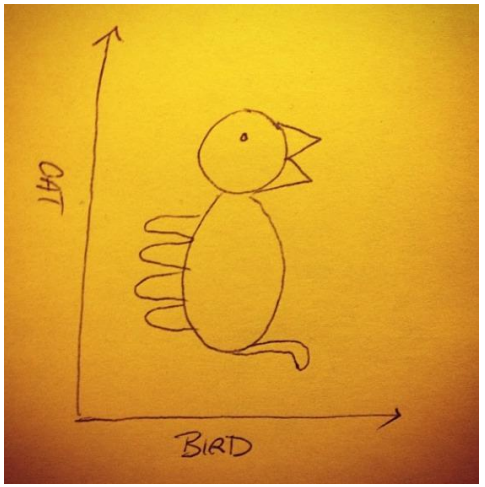
Visual System	Biological Model
Model Human Processor	Higher-Level Model
Fitts's Law	Model by Analogy
Gestalt Principles	Predict Interpretation

Gestalt Psychology

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

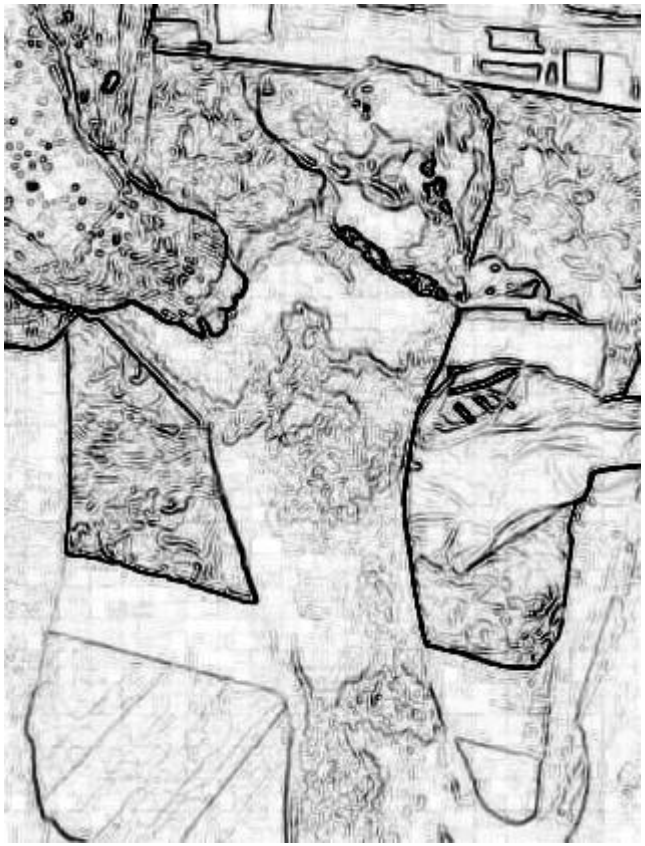
Perception is neither bottom-up nor top-down, rather both inform the other as a whole





Gestalt Psychology

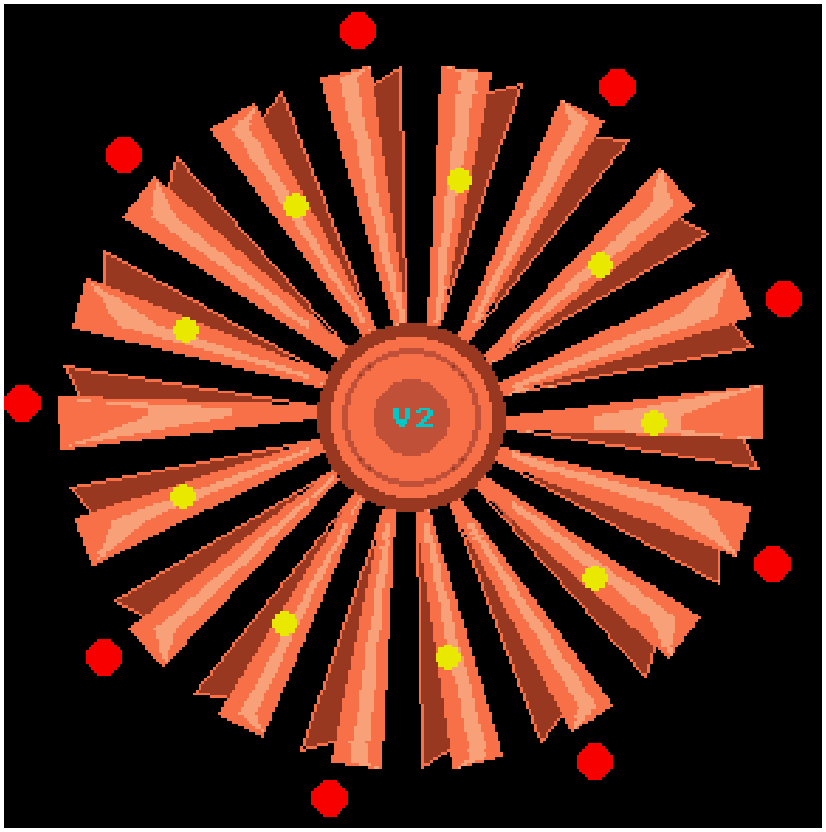
You can still see the dog…



Gestalt Psychology

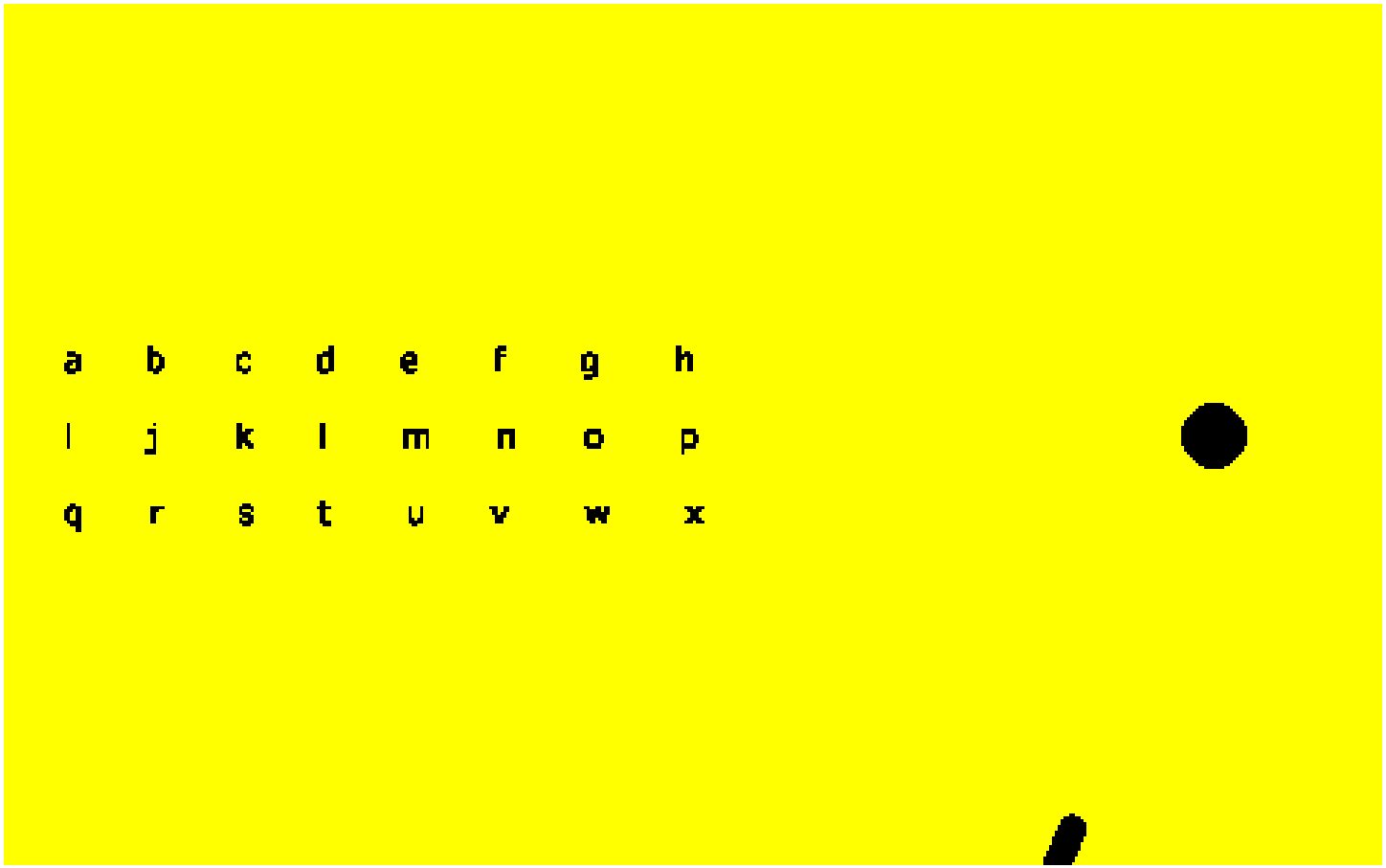
You can still see the dog…

Spinning Wheel



Follow the red dots vs follow the yellow dots

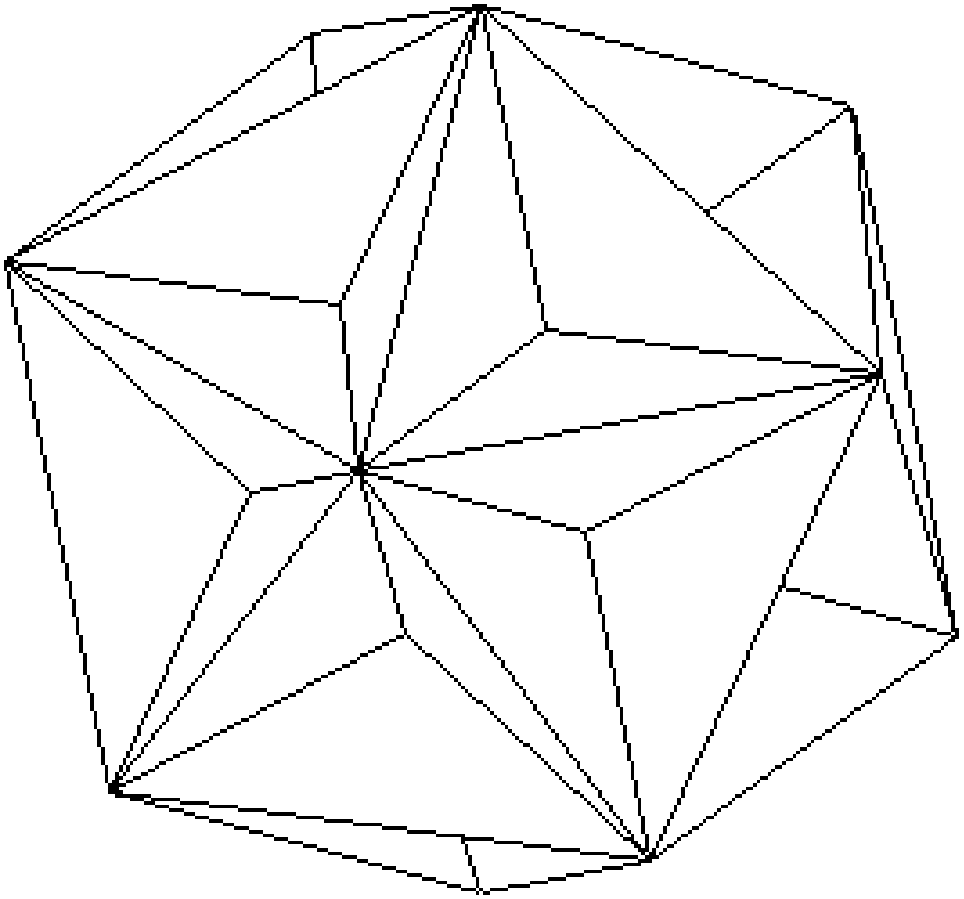
Blind Spot Interpolation



Use right eye, look at letters

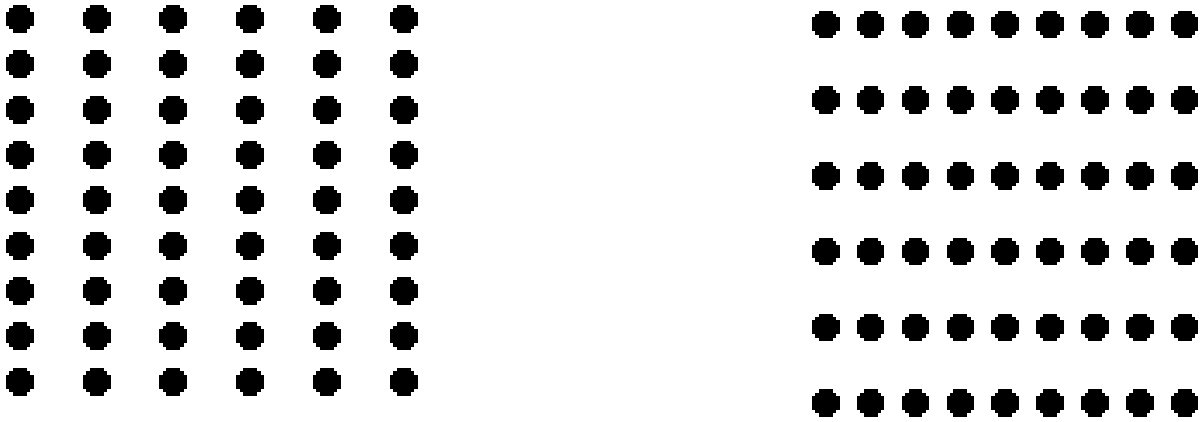
Painful Image Warning

Difficult to Reconcile

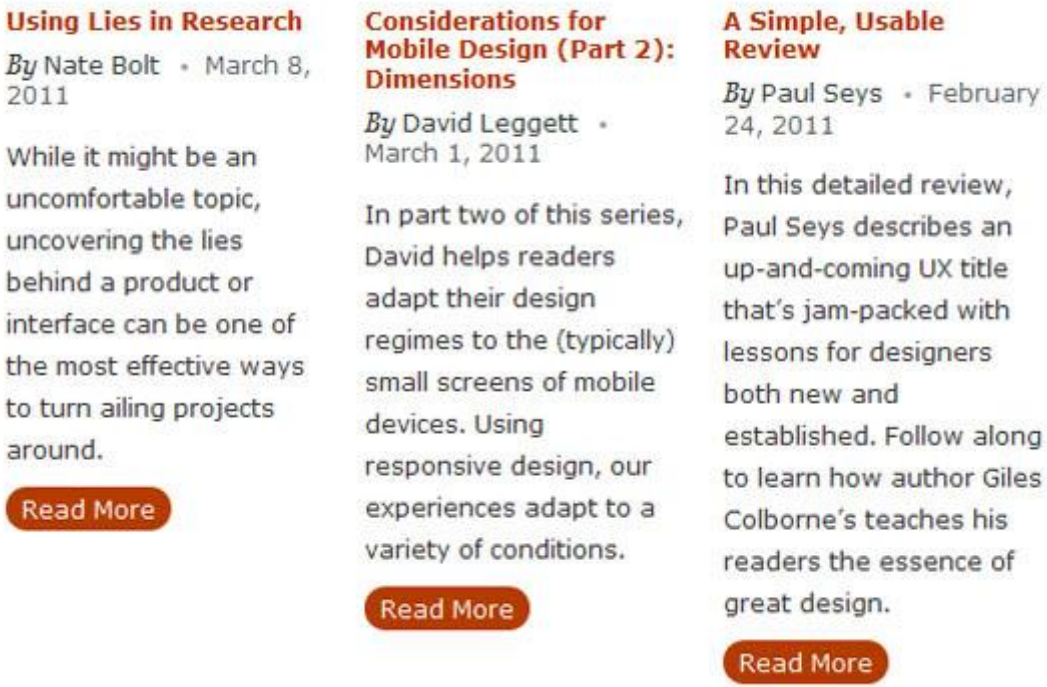


Proximity

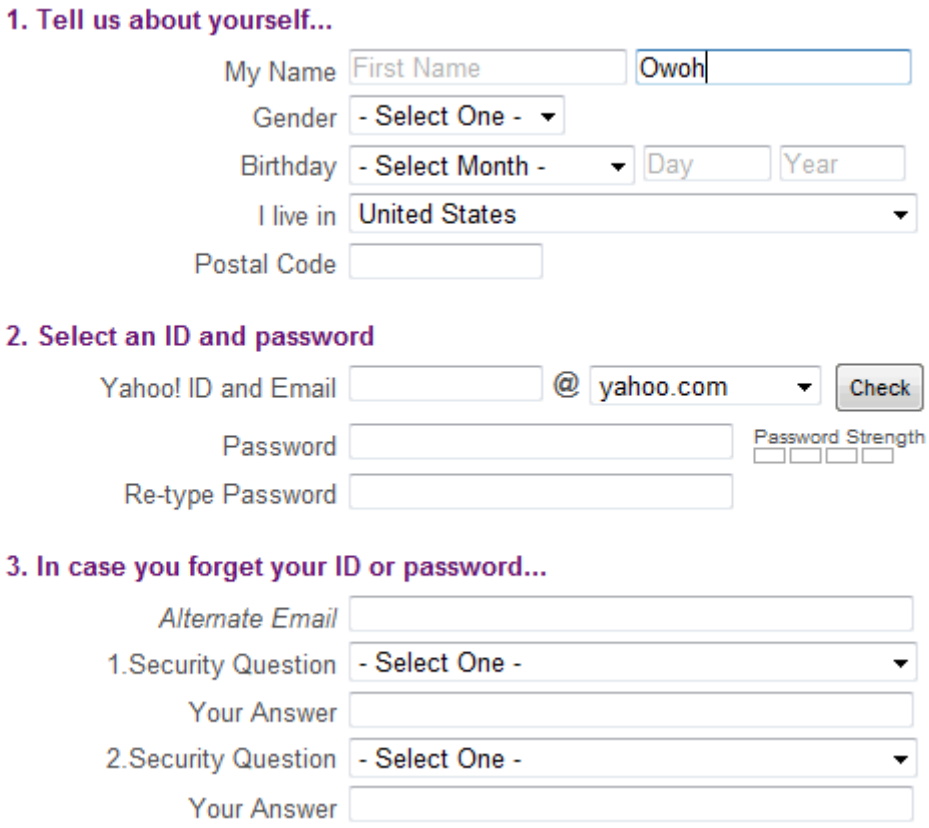
Objects close to each other form a group



Proximity

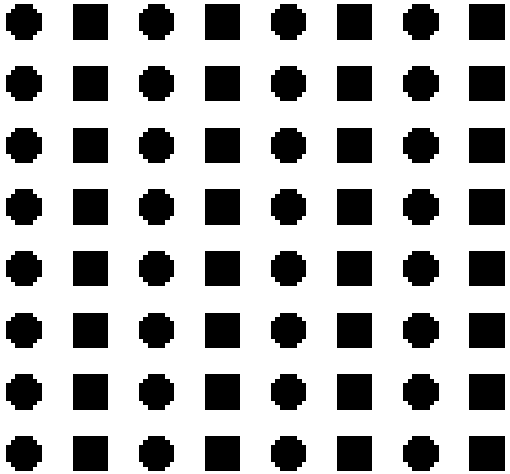

Using Lies in Research
By Nate Bolt • March 8, 2011
While it might be an uncomfortable topic, uncovering the lies behind a product or interface can be one of the most effective ways to turn ailing projects around.
Read More
Considerations for Mobile Design (Part 2): Dimensions
By David Leggett • March 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

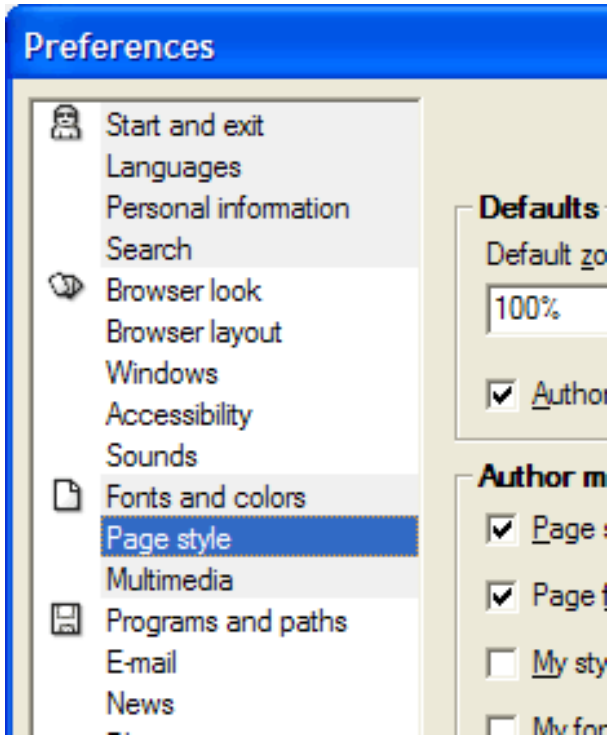

1. Tell us about yourself...
My Name
First Name
Owoh
Gender
- Select One -
Birthday
- Select Month -
Day
Year
I live in
United States
Postal Code
2. Select an ID and password
Yahoo! ID and Email
@
yahoo.com
Check
Password
Password Strength
Re-type Password
3. In case you forget your ID or password...
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%
Author
Author m
Page
Page
My sty

Proximity and Similarity

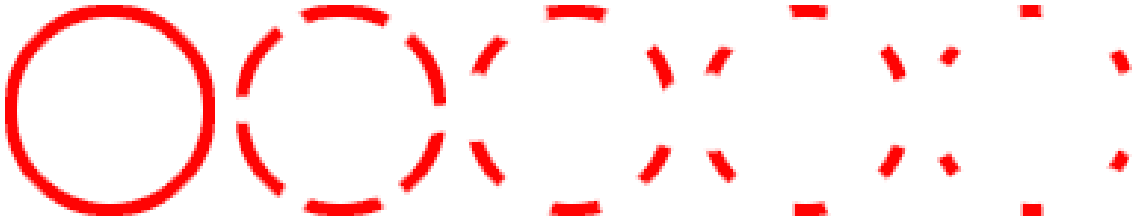
Proximity and Similarity

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

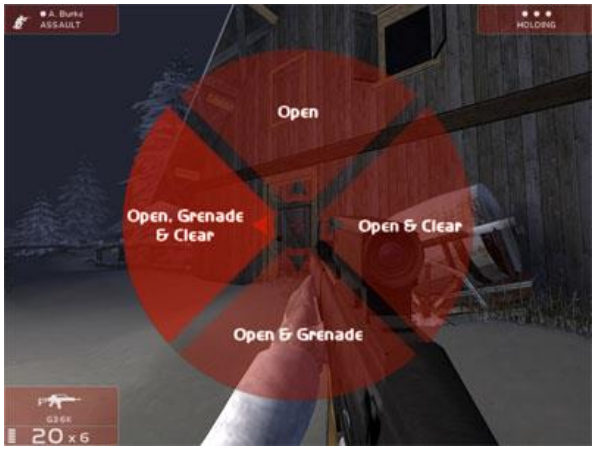
- Increases regularity of stimuli



Closure

The Sims

IBM®



Rainbow 6

Symmetry

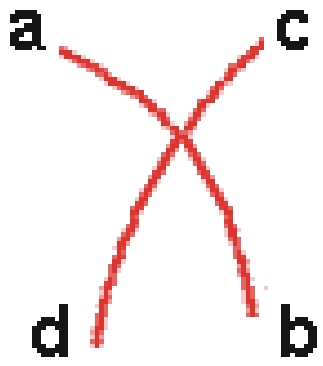
Objects are perceived as symmetrical and forming around a center point

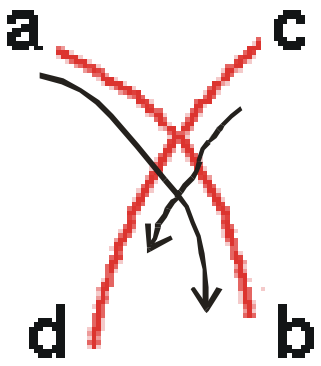
If you fight symmetry, be sure you have a reason

Continuity

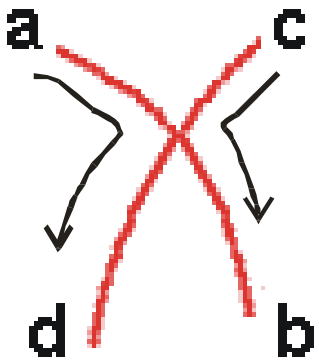
Objects perceived as grouped when they align

- 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 12:
Human Performance

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

DESIGN
USE
BUILD

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 13:
Interface
Implementation

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

DESIGN
USE
BUILD

Project Status

Looking Forward

- 3e: Digital Mockup Due Thursday 11/16
- 3f: Report Due Monday 11/27
- 3g: Presentation Due Wednesday 11/29

- 4a: Initial Website Due Monday 11/27
- 4b: Video Prototype Due Monday 12/4

Other Assignments

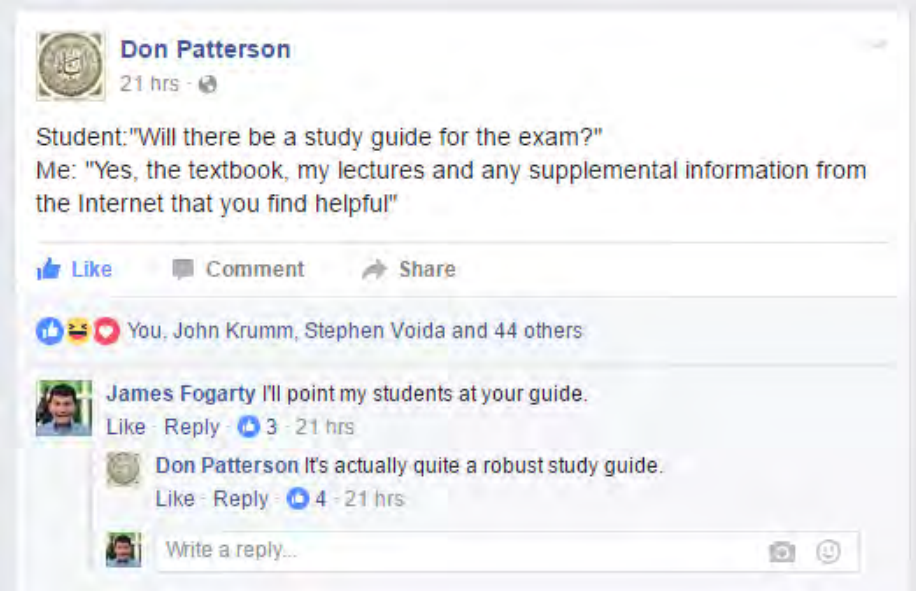
- Reading 5 Due Saturday 12/2, Sooner is Better

Exam

Next Tuesday 11/21, in Denny 303

Mostly short answer, some long answer

Content drawn from lecture and readings



Compilation of the lecture slides is posted

Q&A scheduled Monday at 3:00 in CSE 403

Tools and Interfaces

Why Interface Tools?

Case Study of Model-View-Controller

Case Study of Animation

Sapir-Whorf Hypothesis

Thoughtfulness in Tools

Case Study in Self-Tracking

Objectives

Be able to:

Describe benefits of tools in interface implementation, why we use them

Describe the Model/View/Controller approach to organizing interface implementation

Describe why tools eventually limit design thinking

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

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

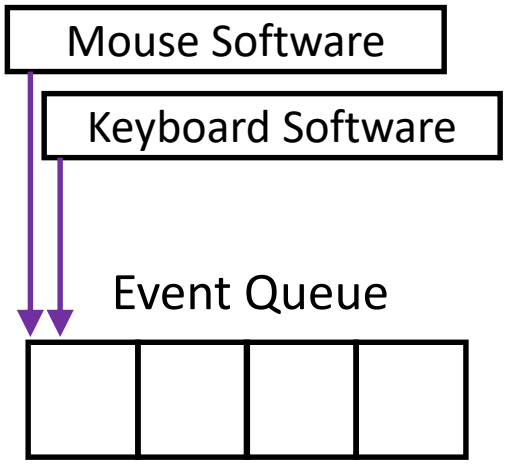
A program waits for a person to provide input

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



How many of these queues? How can you tell?

Basic Interactive Software Loop

```
do {
   e = read_event();
   dispatch_event(e);
   if (damage_exists())
      update_display();
} while (e.type != WM_QUIT);
```

} input
} processing
} output

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

Fundamental Tools Terminology

- 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

Myers et al, 2000
http://dx.doi.org/10.1145/344949.344959

Tools and Interfaces

Why Interface Tools?

Case Study of Model-View-Controller

Case Study of Animation

Sapir-Whorf Hypothesis

Thoughtfulness in Tools

Case Study in Self-Tracking

Model-View-Controller

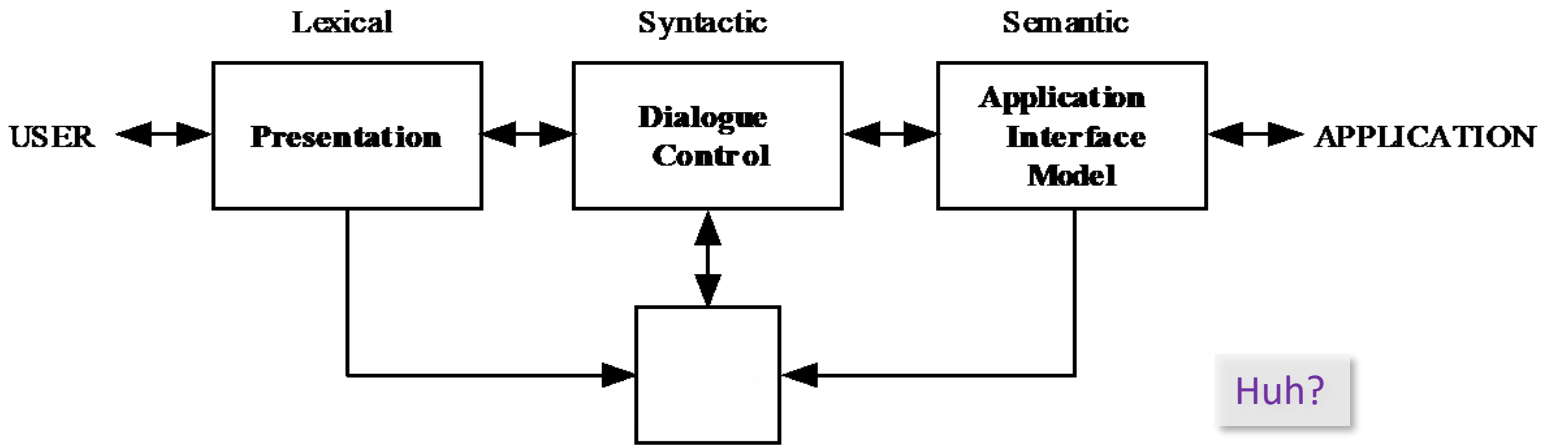
How to organize the code of an interface?

This is a surprisingly complicated question, with 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



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

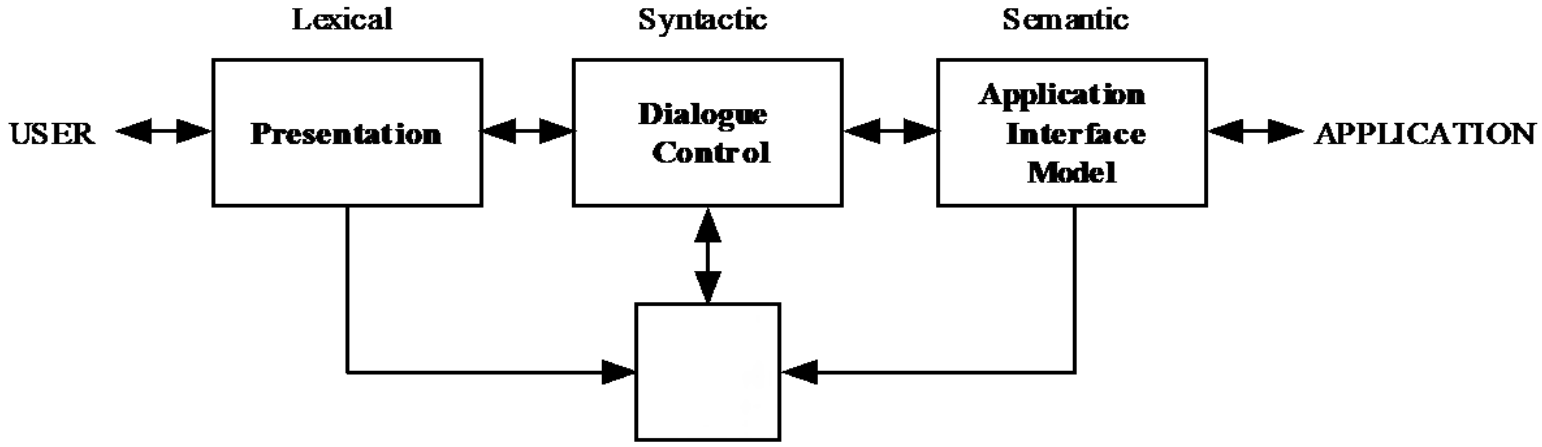
Parsing of tokens into syntax — e.g., three-state model, interface modes

Maintain state

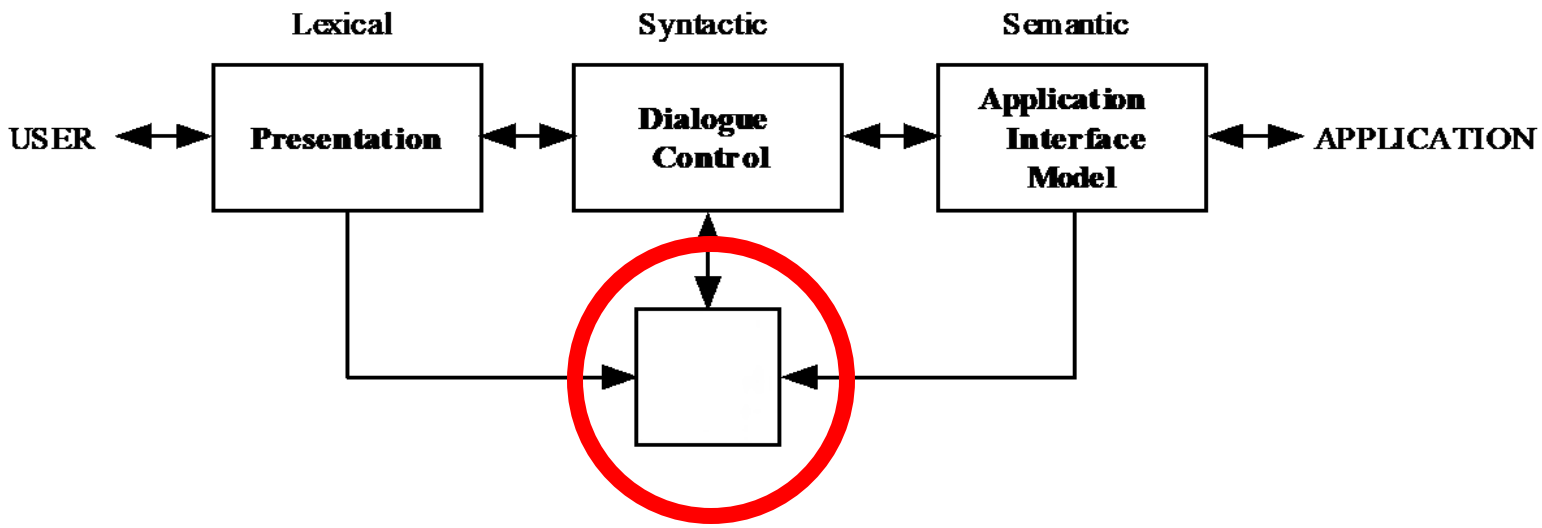
Semantic - Application Interface Model

Defines interaction between interface and rest of software — e.g., drag-and-drop target highlighting

Seeheim Model

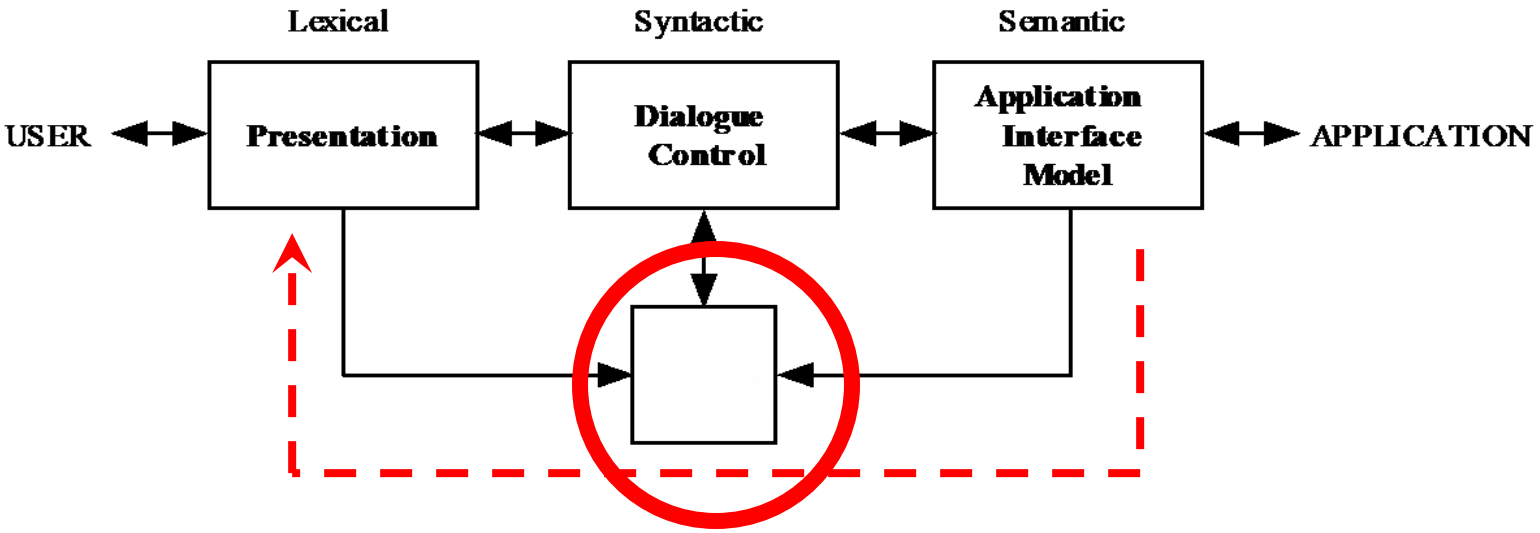


Seeheim Model



Huh?

Seeheim Model



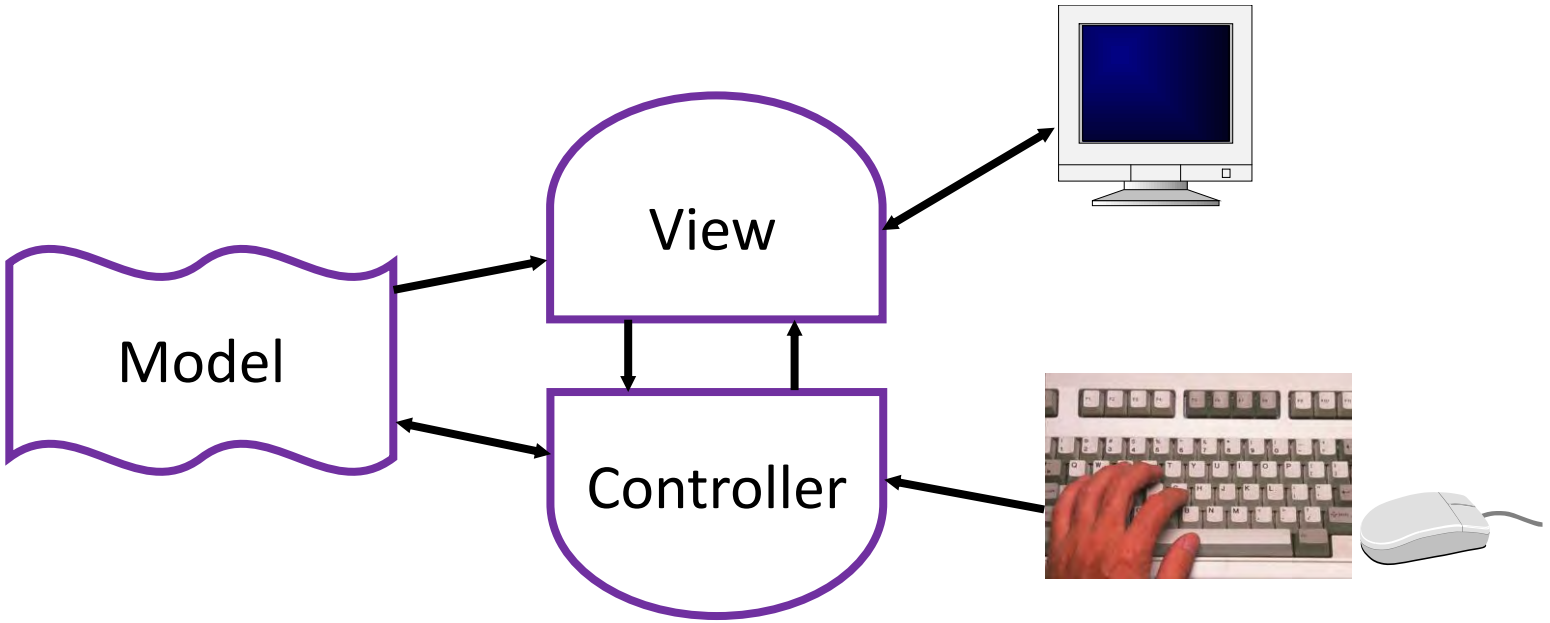
Rapid Semantic Feedback

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 / 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)

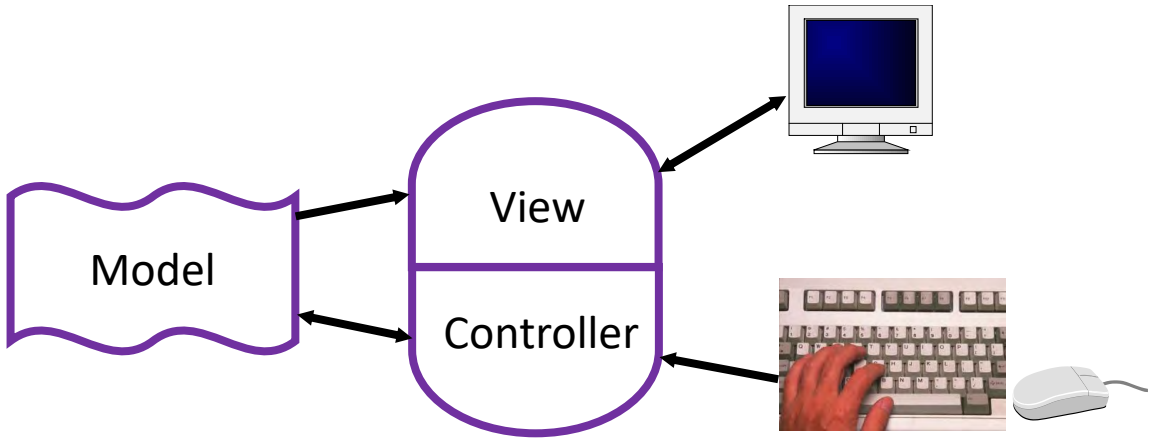
Controller contacts view to interpret what input events mean in context of a view (e.g., selection)

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

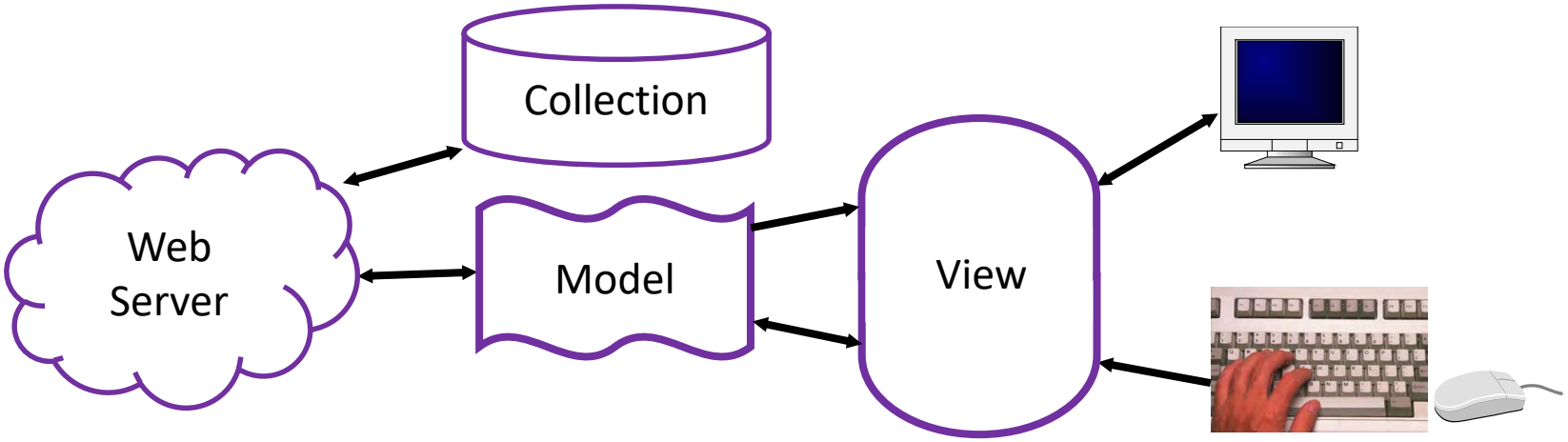
Separation of “business logic” can require care

- May help to think of model as the client model

Model-View-Collection on the Web

Core ideas manifest differently according to needs

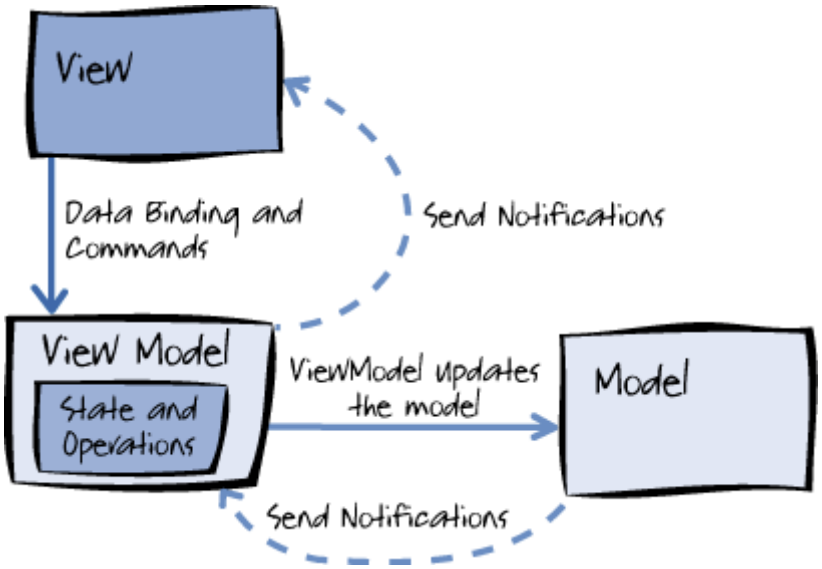
- For example, backbone.js implements client views of models, with REST API calls to web server
- Web tools often implement views as templates



Model View View-Model

Design to support data-binding
by minimizing functionality in view

Also allows greater separation of expertise



Tools and Interfaces

Why Interface Tools?

Case Study of Model-View-Controller

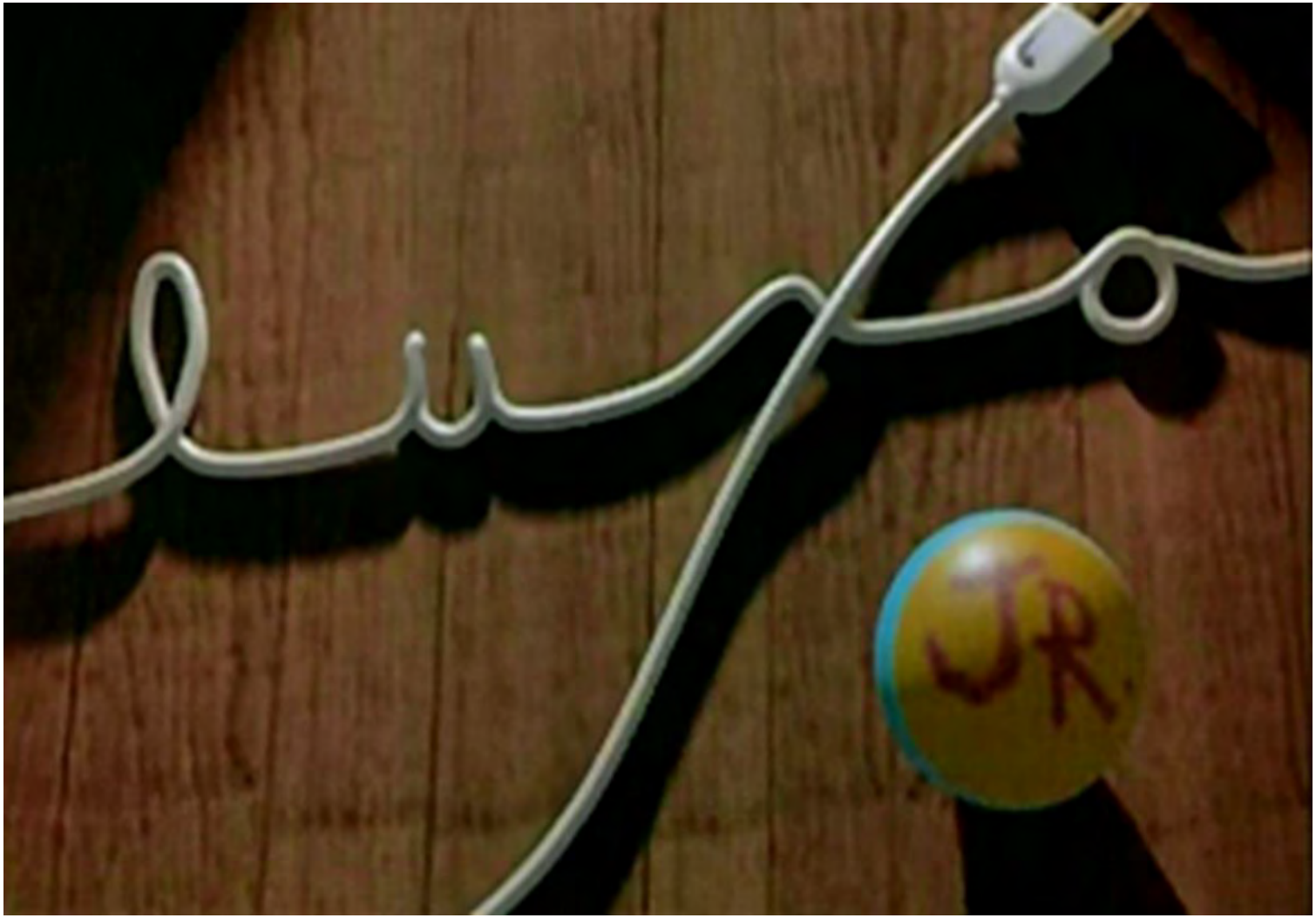
Case Study of Animation

Sapir-Whorf Hypothesis

Thoughtfulness in Tools

Case Study in Self-Tracking

Luxor Jr.



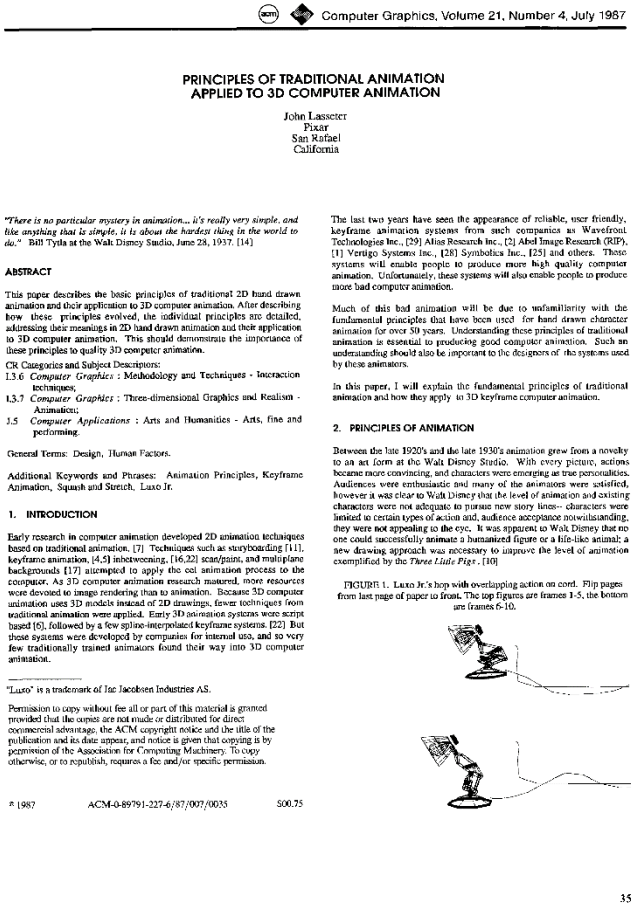
Luxor Jr.

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] scanlining, 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.

"Luxo" is a trademark of Jac Jacobsen Industries AS.

Permission to copy without fee all or part of this material is granted provided that the copies are not made or distributed for direct commercial advantage, the ACM copyright notice and the title of the publication and its date appear, and notice is given that copying is by permission of the Association for Computing Machinery. To copy otherwise, or to republish, requires a fee and/or specific permission.

© 1987 ACM-0-89791-227-6/87/007/0035 $00.75

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.

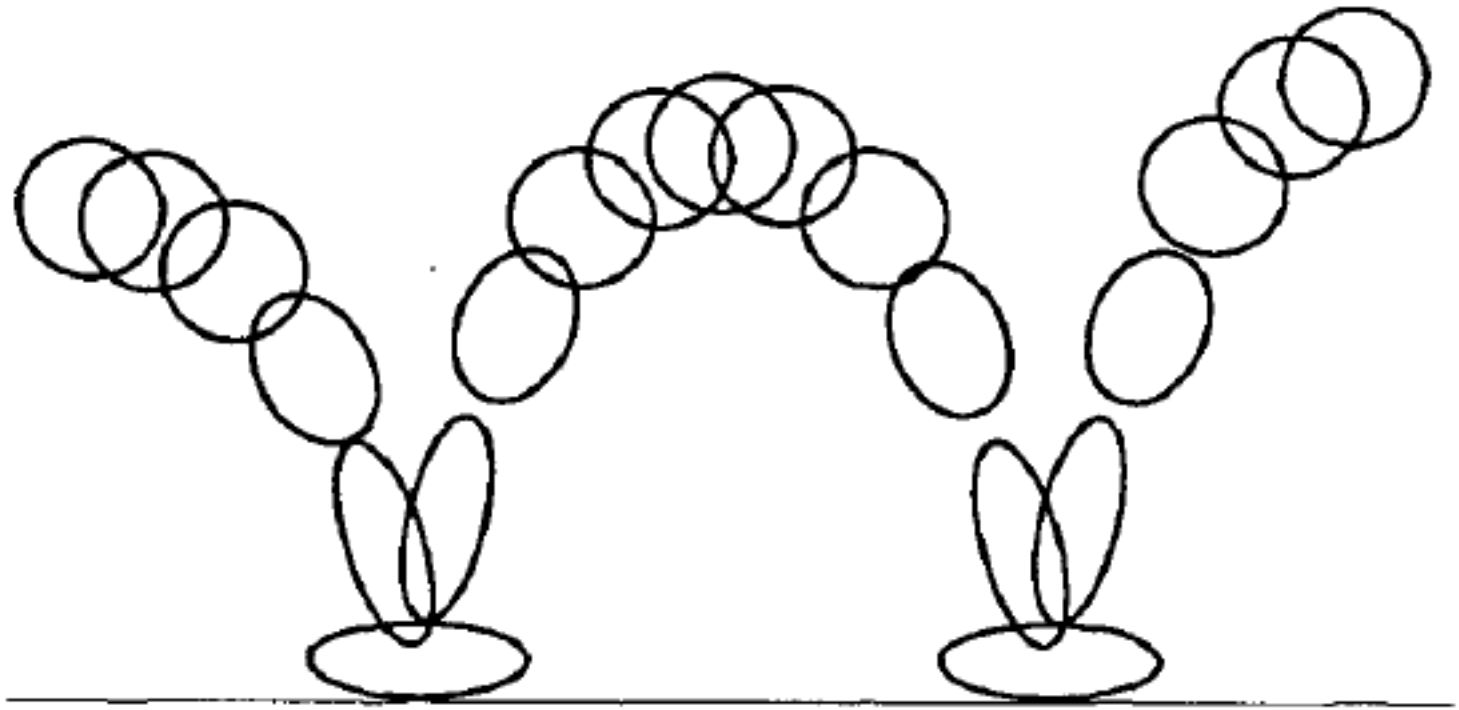
In this paper, I will explain the fundamental principles of traditional animation and how they apply to 3D keyframe computer animation.

2. PRINCIPLES OF ANIMATION

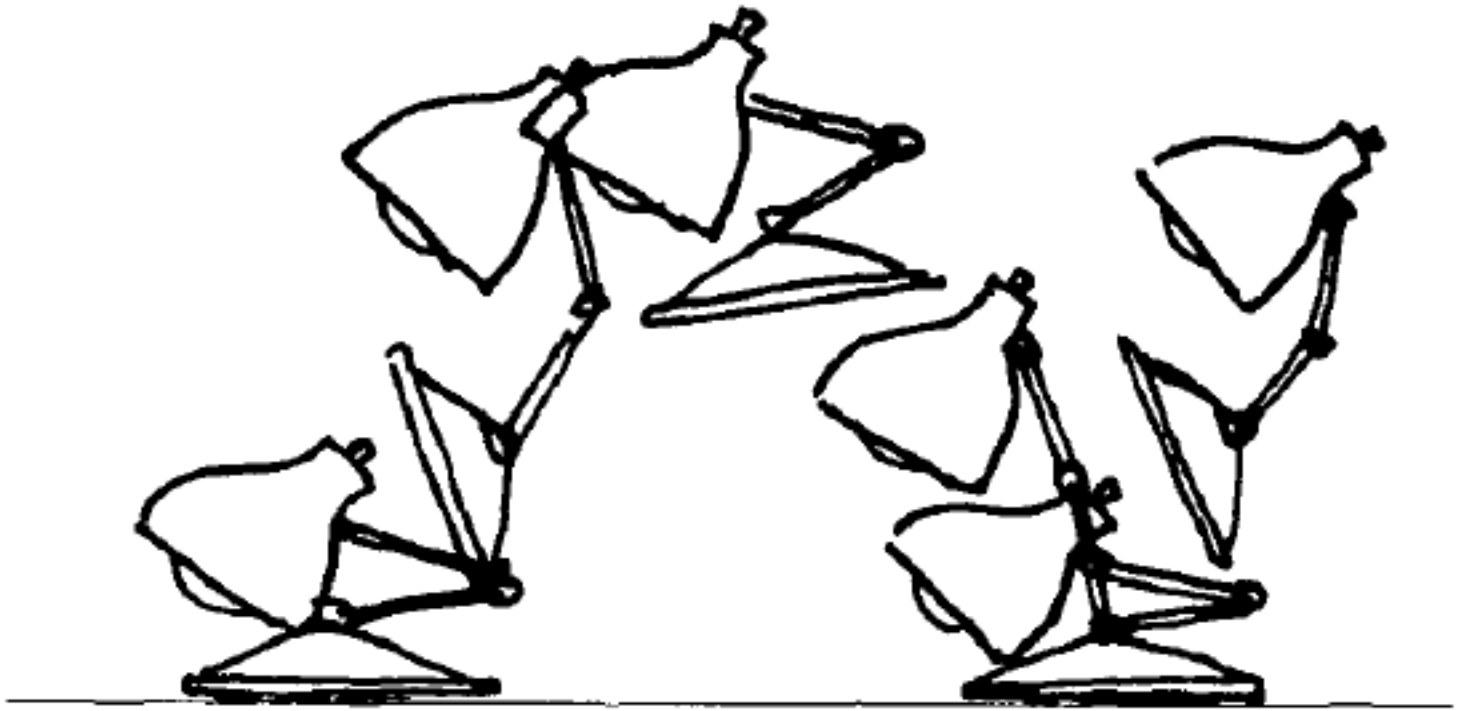
Between the late 1920's and the late 1930's animation grew from a novelty to an art form at the Walt Disney Studio. With every picture, actions became more convincing, and characters were emerging as true personalities. Audiences were enthusiastic and many of the animators were satisfied, however it 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.

Squash and Stretch



Squash and Stretch



Squash and Stretch

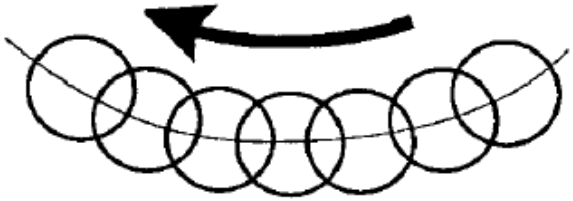


FIGURE 4a. In slow action, an object's position overlaps from frame to frame which gives the action a smooth appearance to the eye.

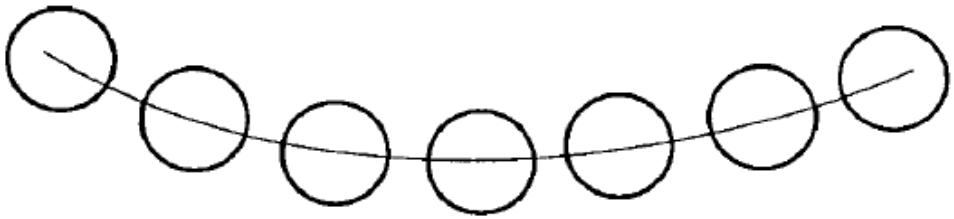


FIGURE 4b. Strobing occurs in a faster action when the object's positions do not overlap and the eye perceives seperate images.

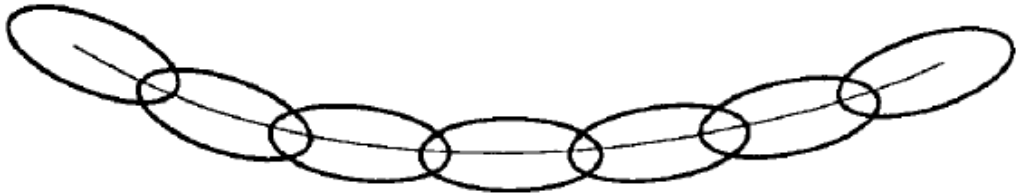


FIGURE 4c. Stretching the object so that it's positions overlap again will relieve the strobing effect.

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 multitude 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.

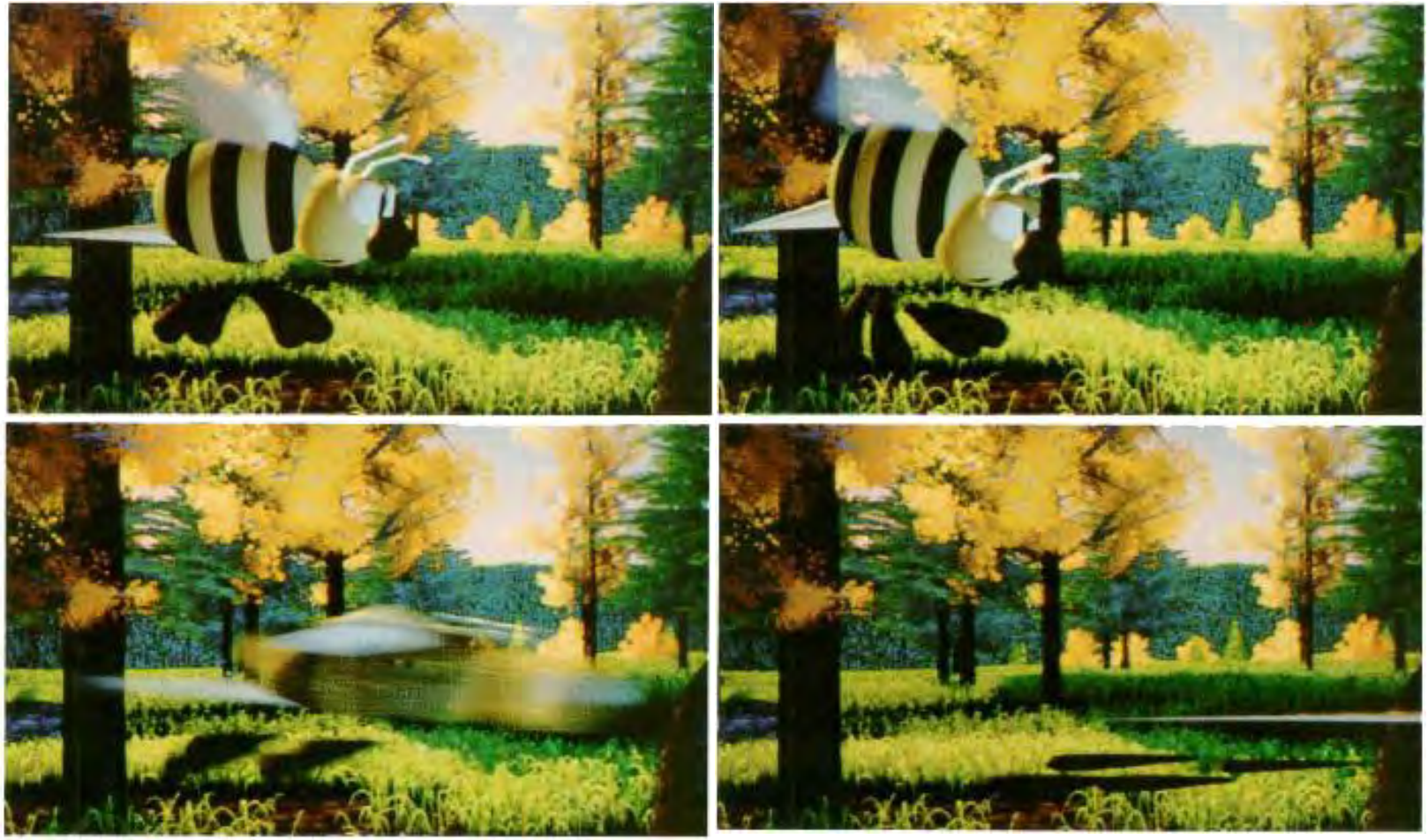
Timing

EIGHT inbetweens..... The Character searches for the peanut butter on the kitchen shelf.

NINE inbetweens.....The Character appraises, considering thoughtfully.

TEN inbetweens..... The Character streiches a sore muscle.

Anticipation



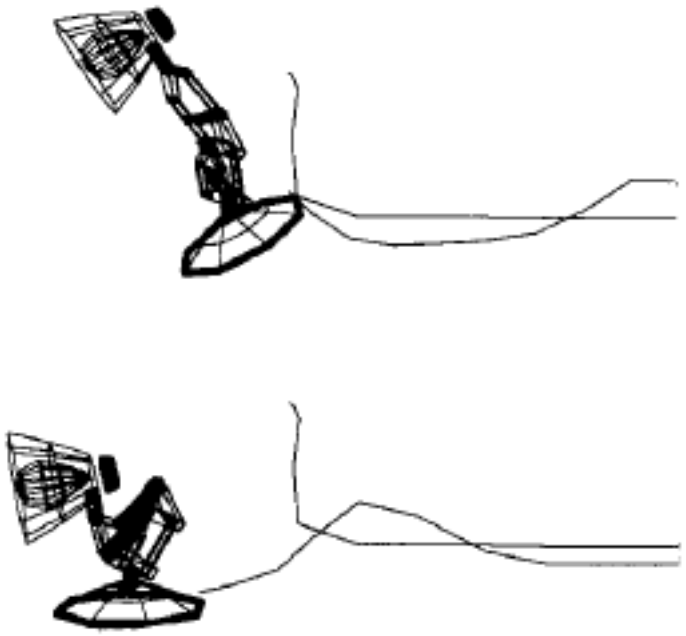
Staging

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

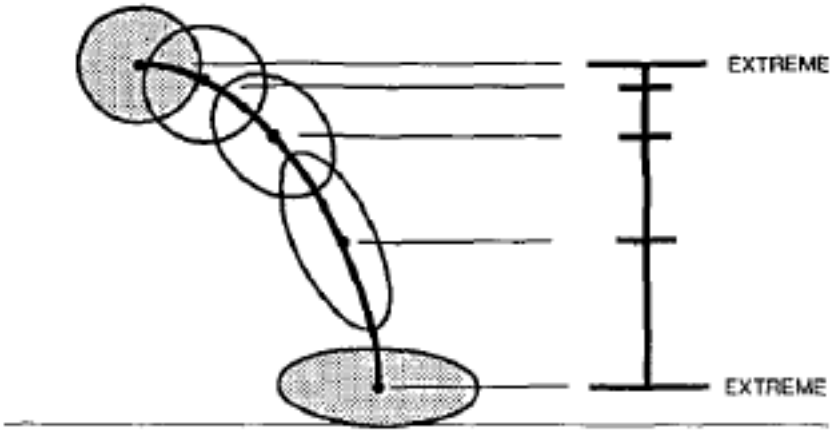
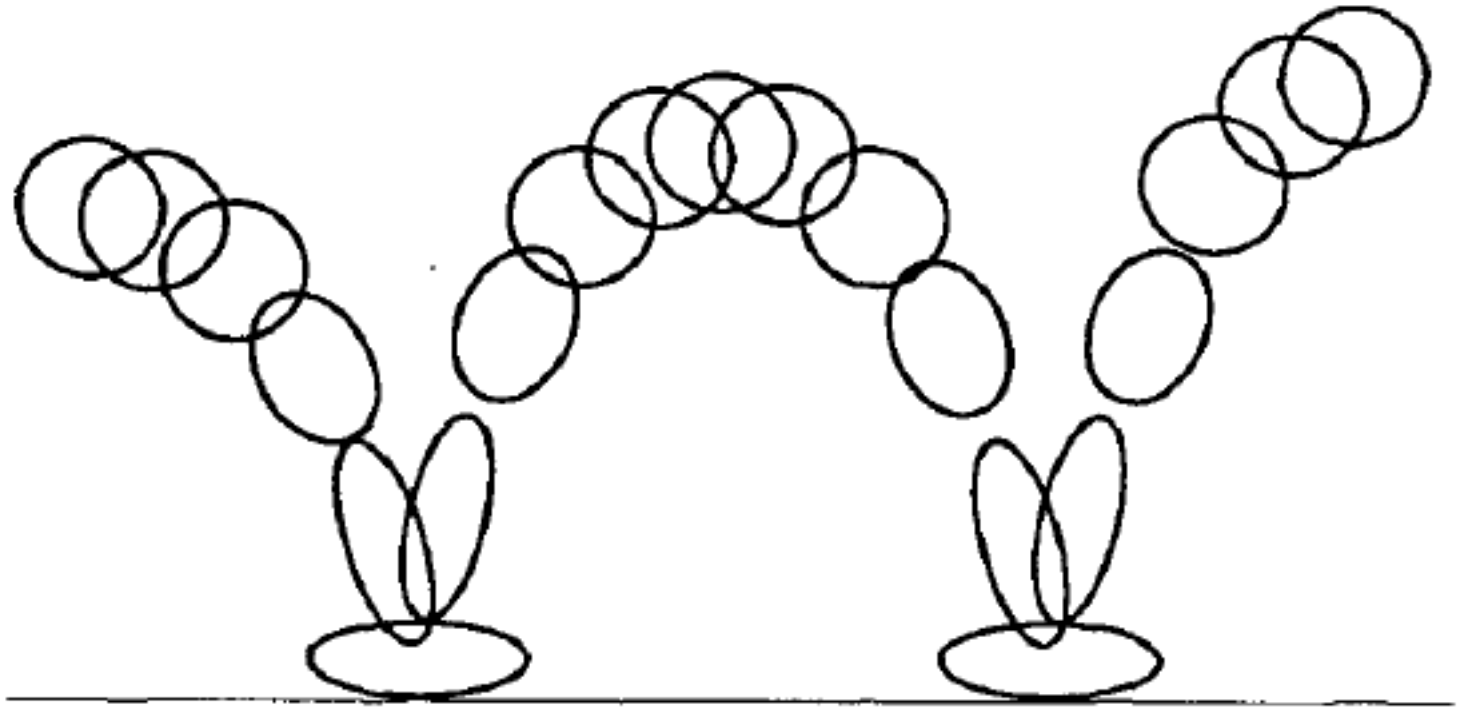


FIGURE 9. Timing chart for ball bounce.

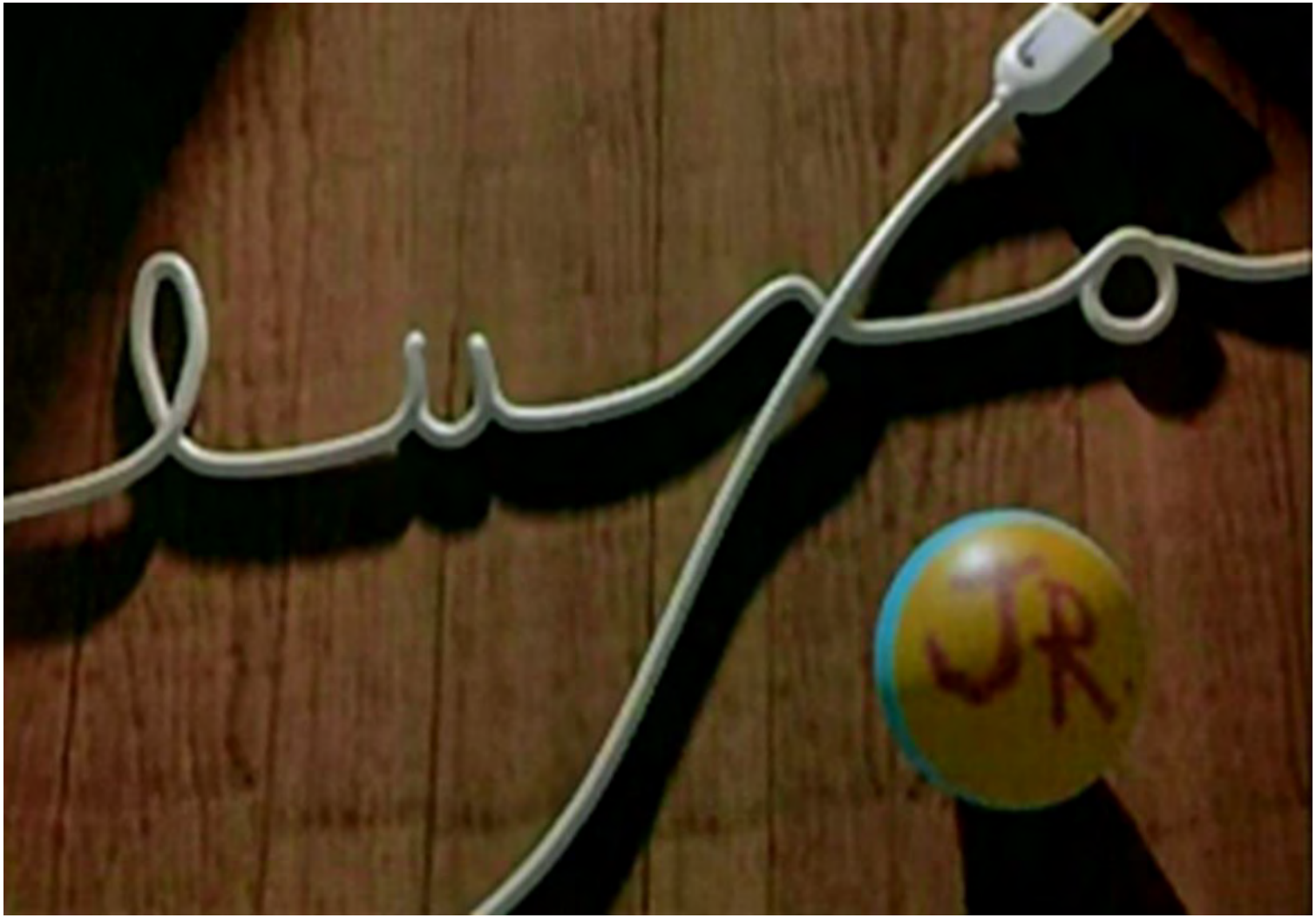
Objects with mass must accelerate and decelerate

Interesting frames are typically at ends,
tweaks perception to emphasize these poses

Arcs



Luxor Jr.



Luxor Jr.

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

Bay-Wei Chang

Computer Systems Laboratory
Stanford University
Stanford, CA 94305

bay@self.stanford.edu

David Ungar

Sun Microsystems Laboratories, Inc.
2550 Garcia Avenue
Mountain View, CA 94043

david.ungar@sun.com

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 dimling 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

Permission to copy without fee all or part of this material is granted provided that the copies are not made or distributed for direct commercial advantage, the ACM copyright notice and the title of the publication and its date appear, and notice is given that copying is by permission of the Association for Computing Machinery. To copy otherwise, or to republish, requires a fee and/or specific permission.

© 1993 ACM 0-89791-628-X/93/0011...$1.50

Frames Three Principles

Solidity

- Desktop objects should appear to be solid objects

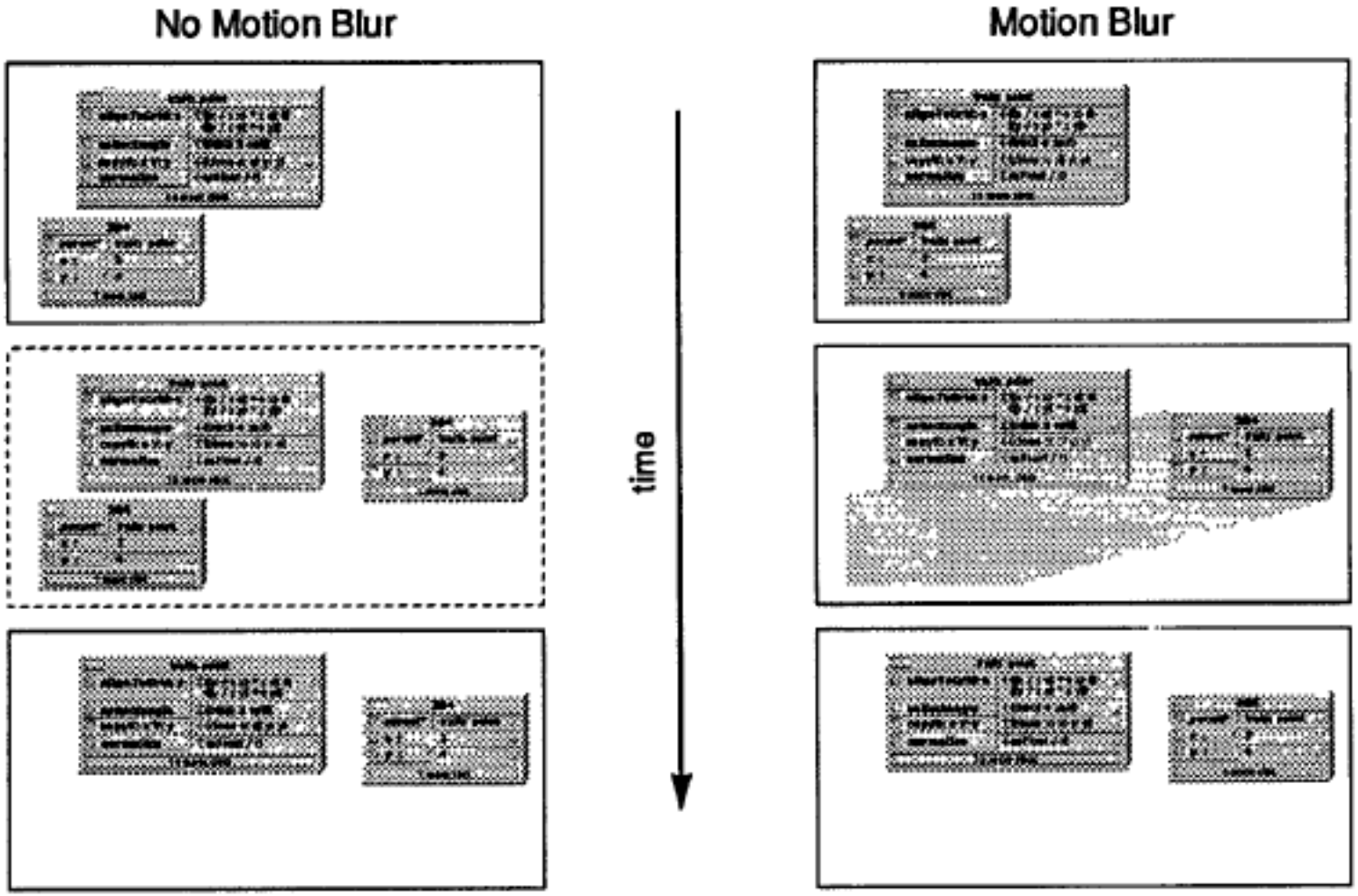
Exaggeration

- Exaggerate physical actions to enhance perception

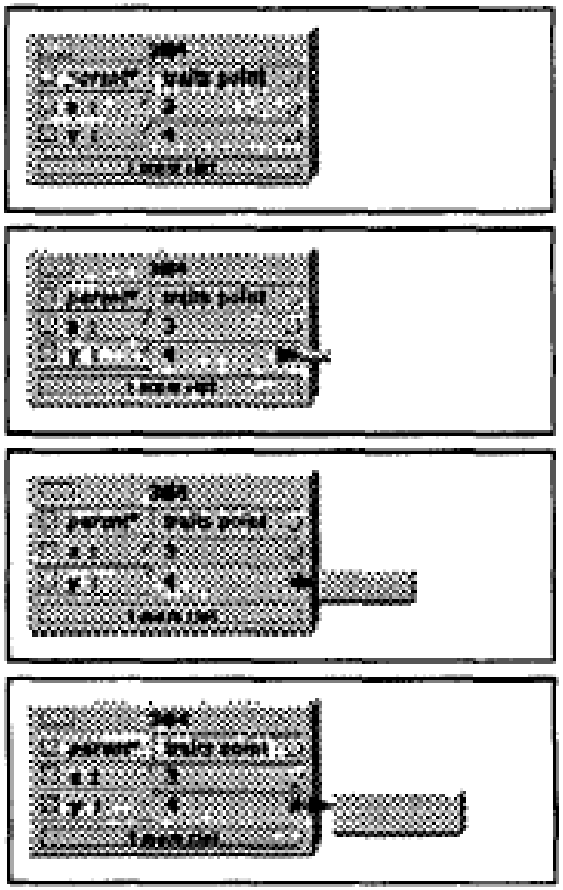
Reinforcement

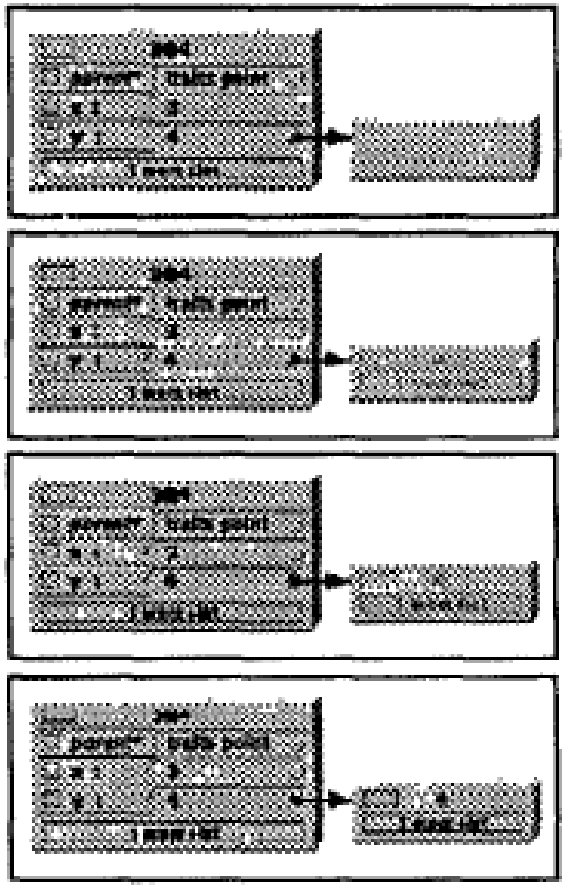
- Use effects to drive home feeling of reality

Solidity: Motion Blur

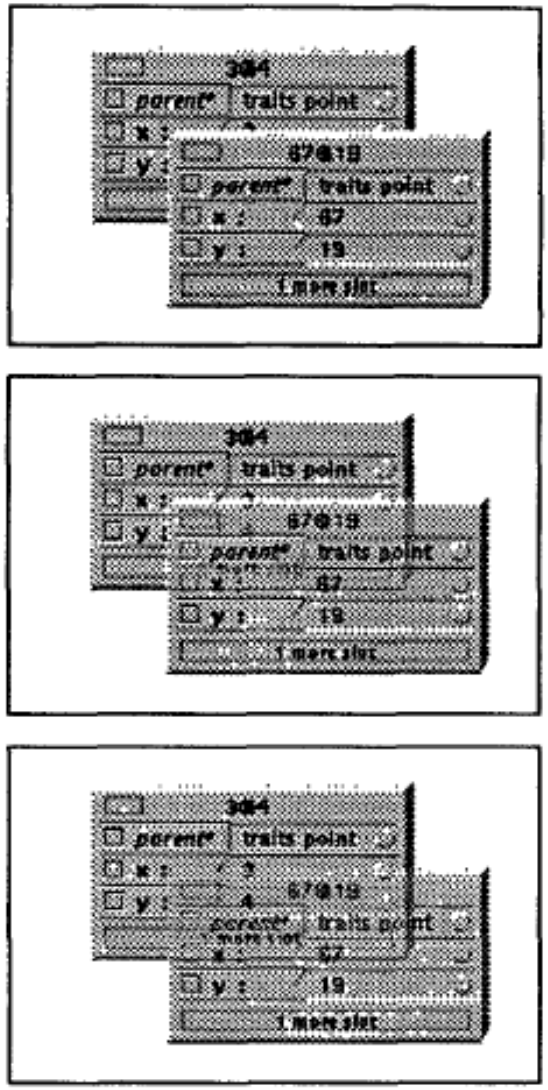


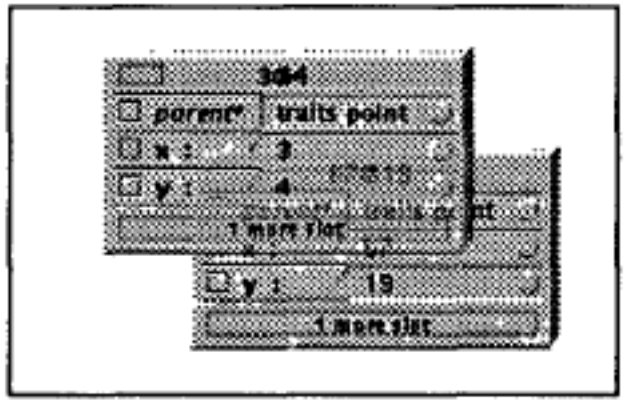
Solidity: Arrival and Departure

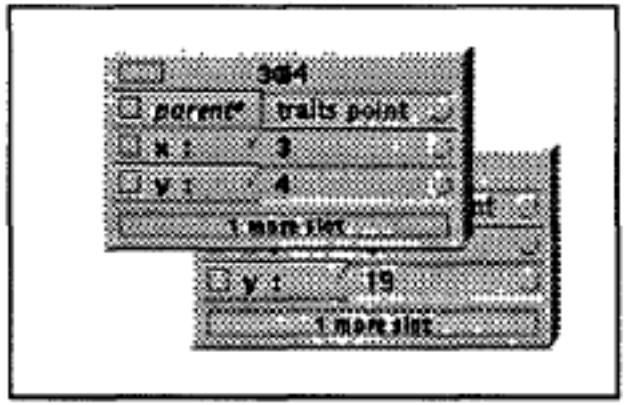




Solidity: Arrival and Departure







Exaggeration: Anticipation

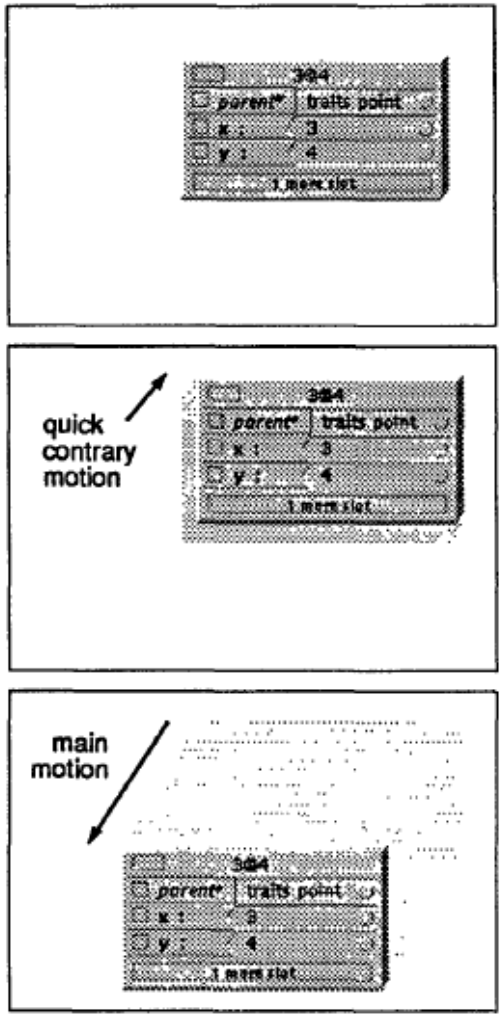


Figure 7. Objects anticipate major actions with a quick contrary motion that draws the user eye to the object in preparation for the main motion to come.

Reinforcement: Slow In Slow Out

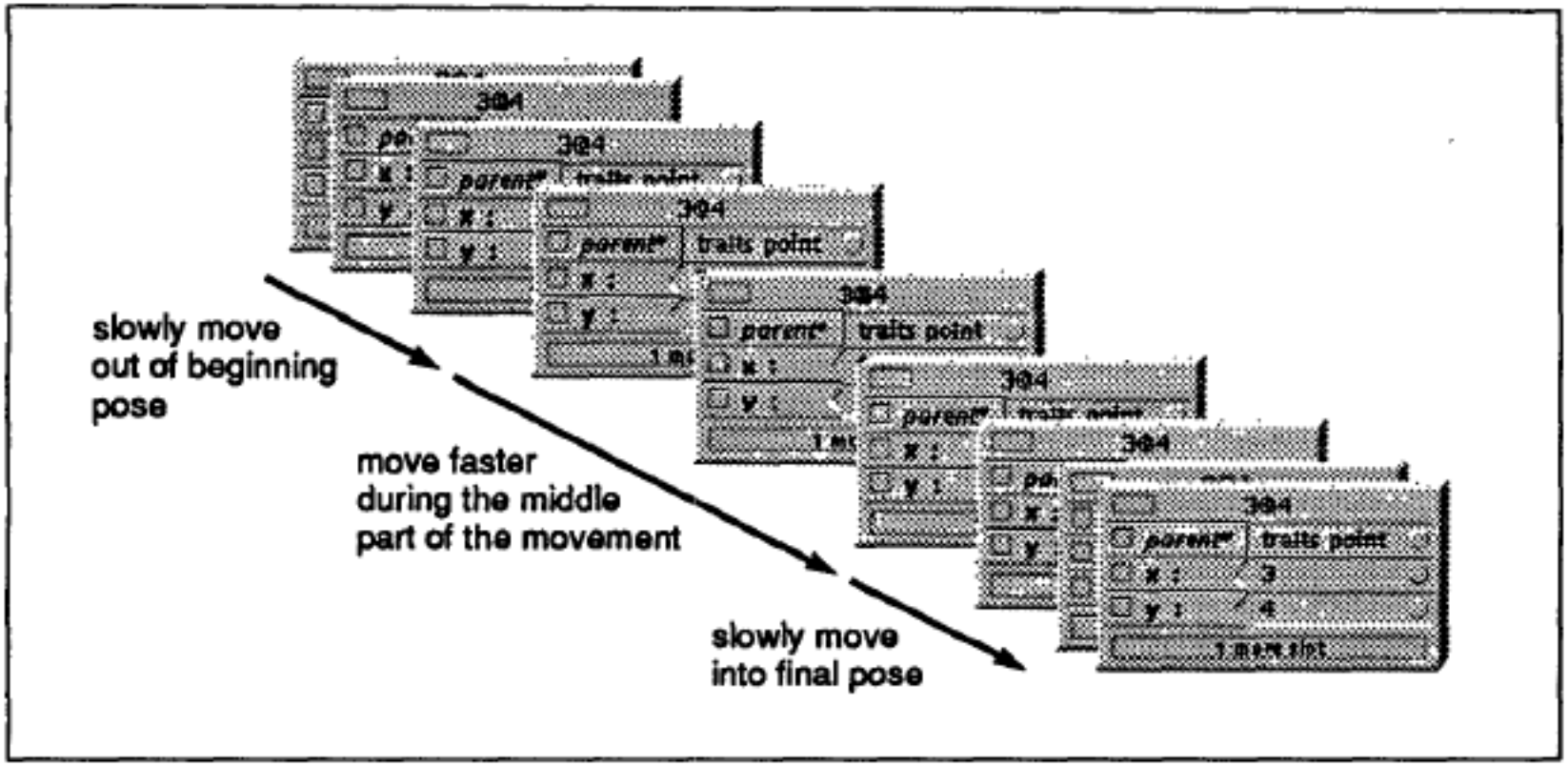


Figure 8. Objects ease out of their beginning poses and ease into their final poses. Although these motions are slower than that during the main portion of the movement, they are still quite fast.

Reinforcement: Arcs

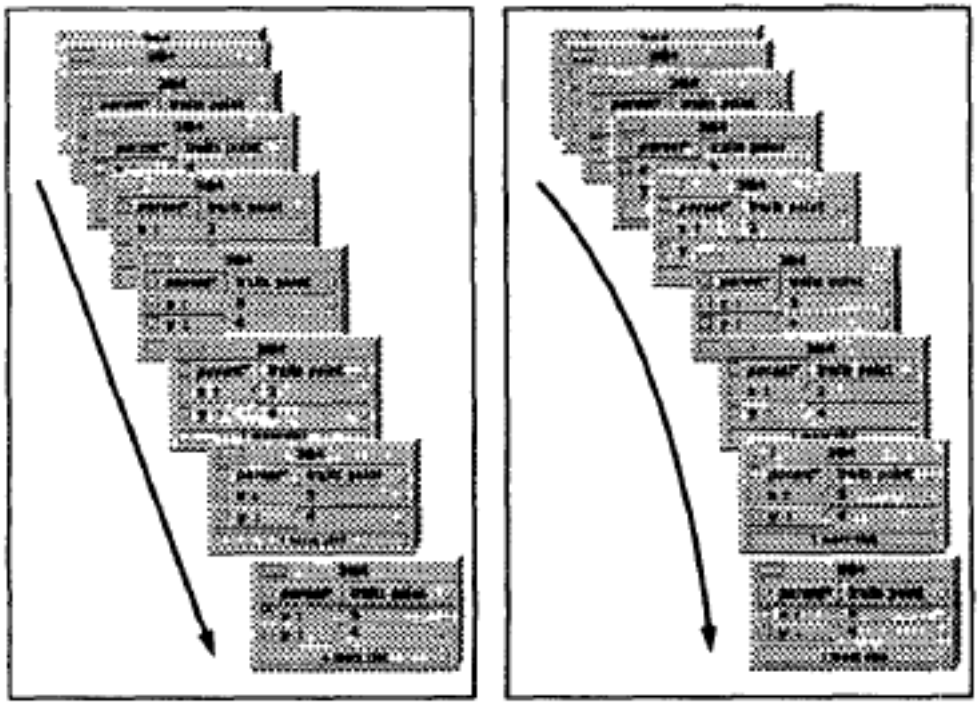


Figure 9. When objects travel under their own power (non-interactively), they move in arcs rather than straight lines.

Reinforcement: Follow Through

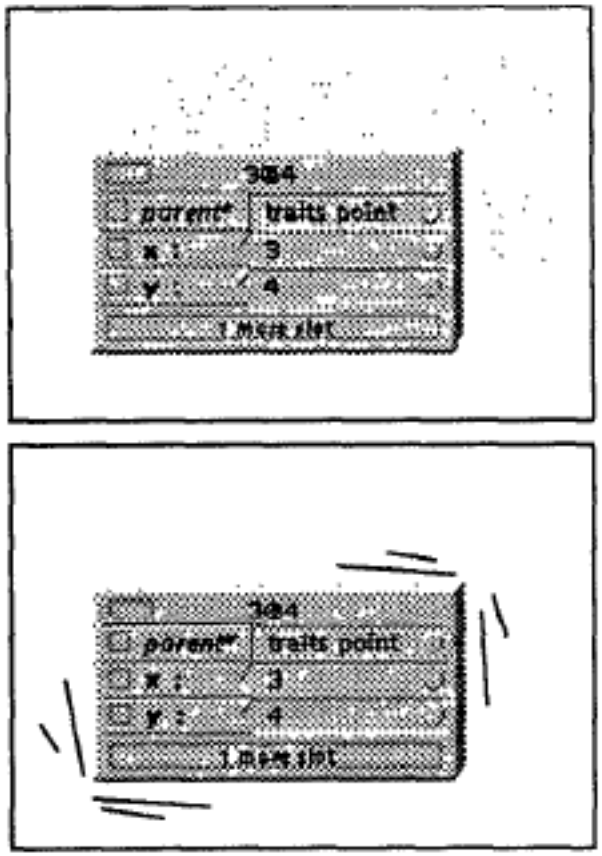


Figure 10. When objects come to a stop after moving on their own, they exhibit follow through in the form of wiggling back and forth quickly. This is just suggested by the "wiggle lines" in the figure—in actuality, the object moves back and forth, with motion blur.

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

Scott E. Hudson
John T. Stasko

Graphics Visualization and Usability Center
College of Computing
Georgia Institute of Technology
Atlanta, GA 30332-0280
E-mail: hudson@cc.gatech.edu, stasko@cc.gatech.edu

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.

This work was supported in part by the National Science Foundation under grants IRI-9015407, DCA-9214947, CCR-9121607 and CCR-9109399.

Permission to copy without fee all or part of this material is granted provided that the copies are not made or distributed for direct commercial advantage, the ACM copyright notice and the title of the publication and its date appear, and notice is given that copying is by permission of the Association for Computing Machinery. To copy otherwise, or to republish, requires a fee and/or specific permission.

© 1993 ACM 0-89791-628-X/93/0011...$1.50

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

Events and Animation

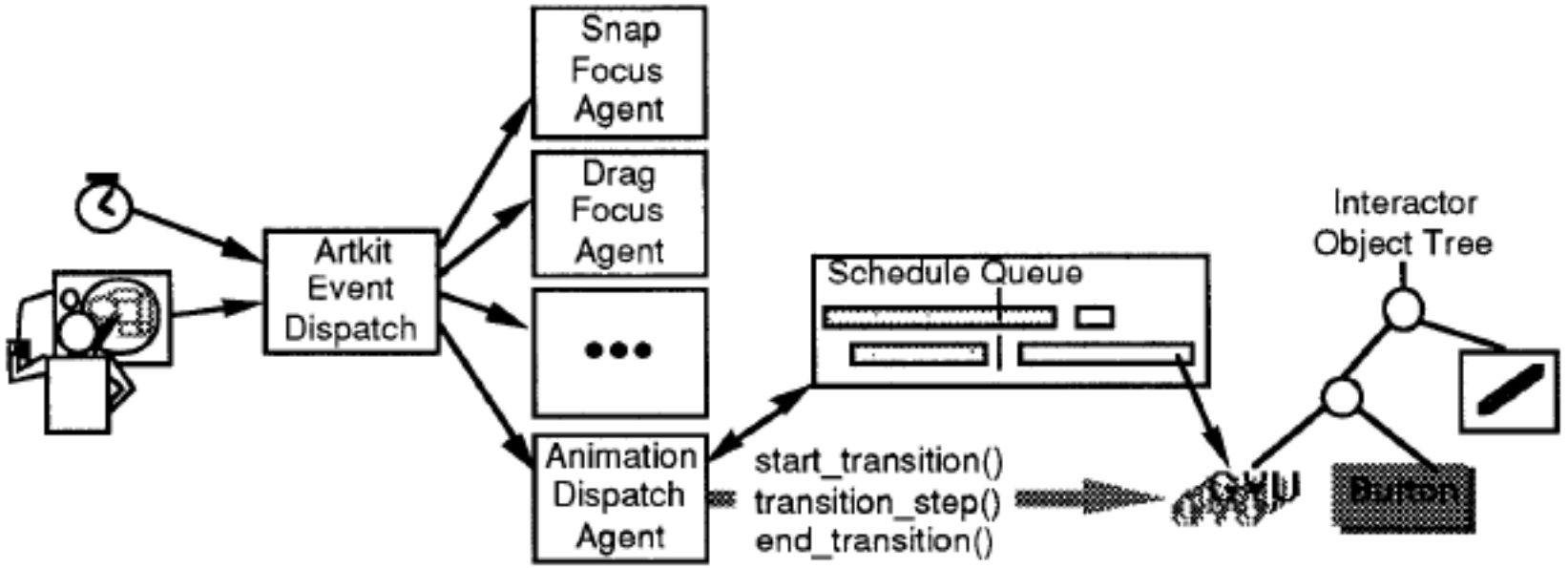


Figure 5. Animation Event Translation and Dispatch

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

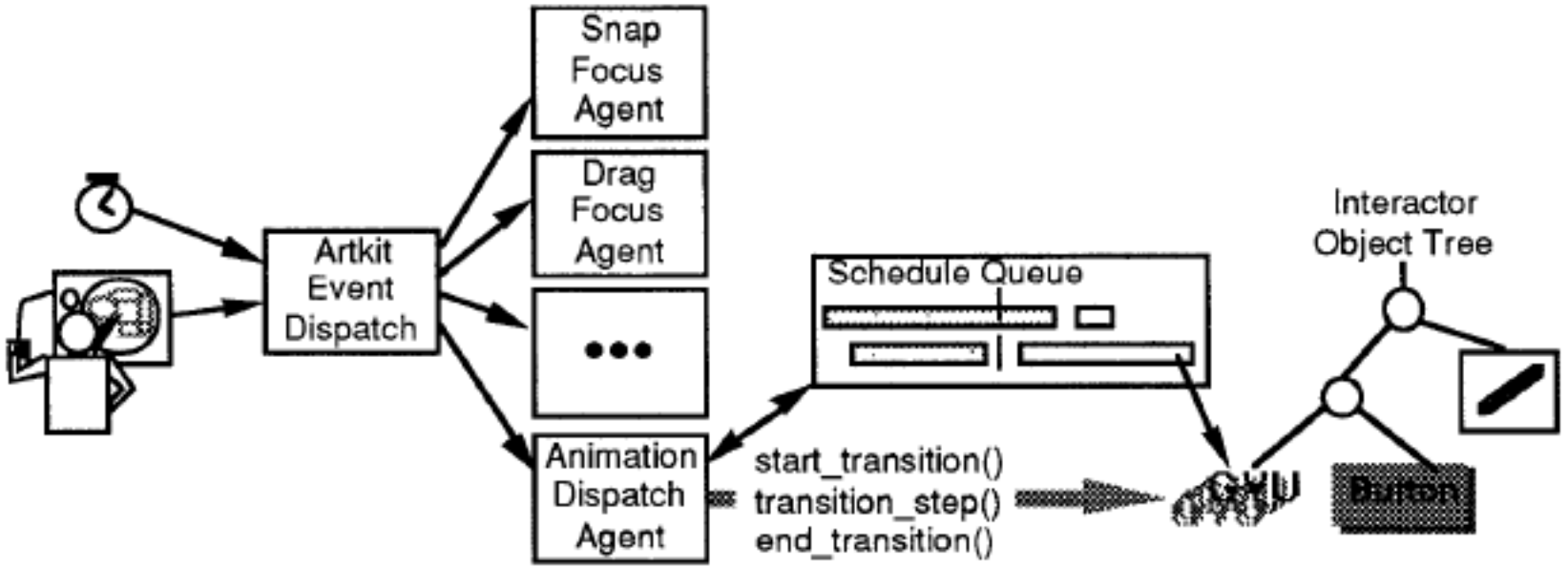


Figure 5. Animation Event Translation and Dispatch

Transition Object

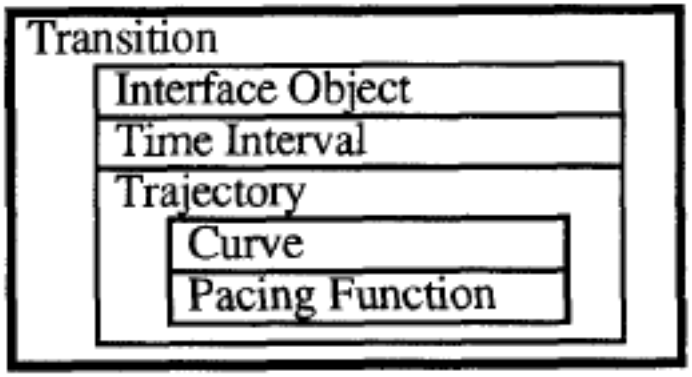


Figure 3. Parts of a Transition Object

Pacing Function

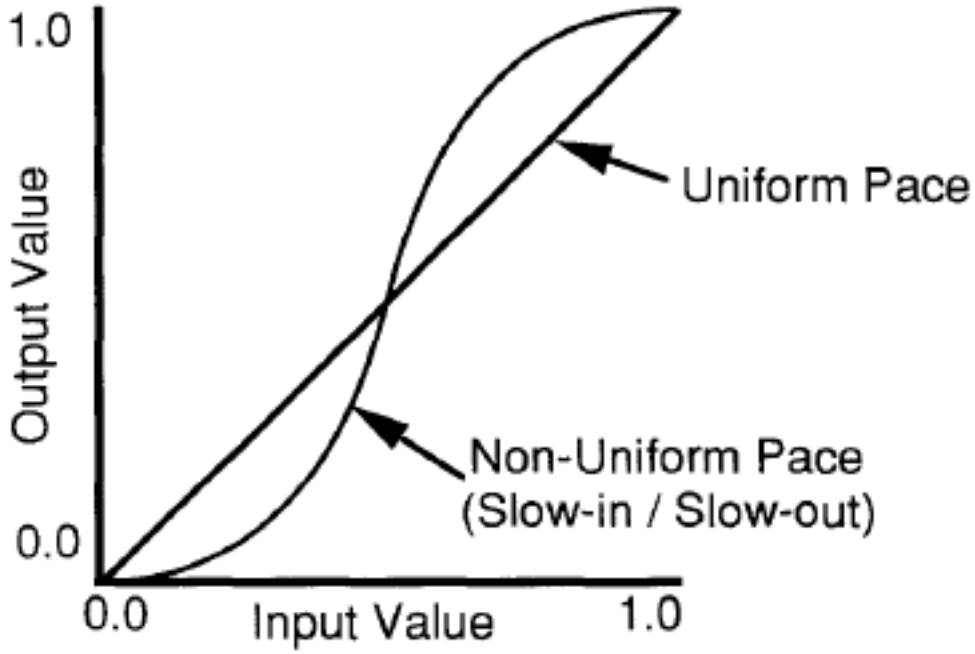


Figure 4. Two Example Pacing Functions

Computing a Frame

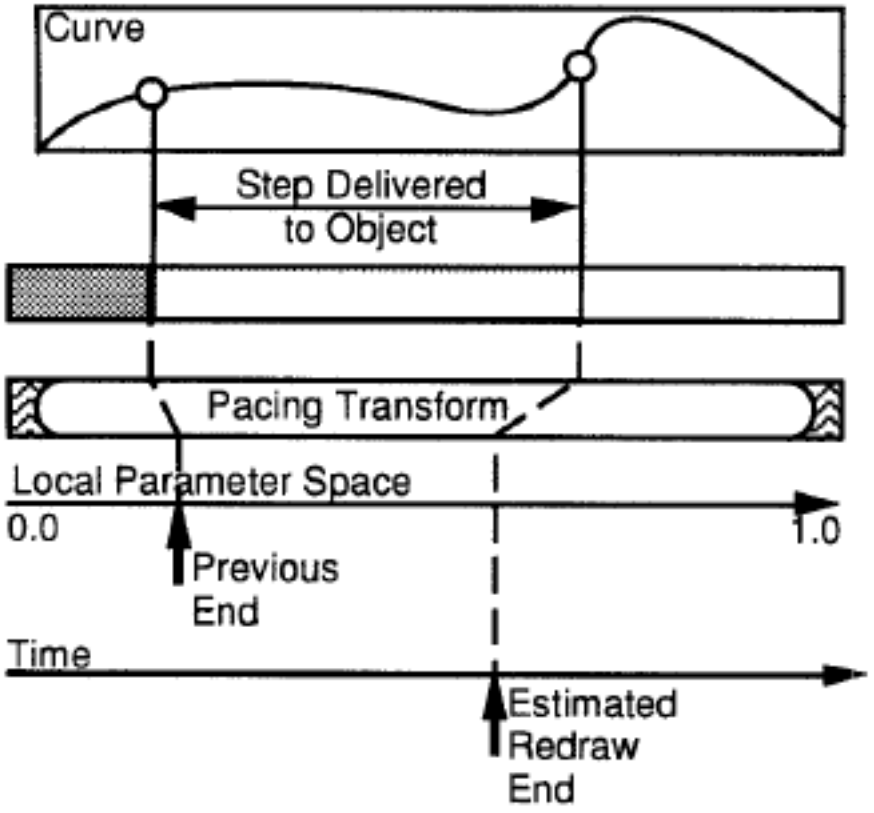


Figure 8. Translation from Time to Space

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

Johnny C. Lee*, Jodi Forlizzi*†, Scott E. Hudson*
*Human Computer Interaction Institute and †School of Design
Carnegie Mellon University,
Pittsburgh, PA 15213 USA
{ johnny, forlizzi, scott.hudson }@cs.cmu.edu

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.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.
UIST'02, October 27-30, 2002, Paris, FRANCE.
Copyright 2002 ACM 1-58113-488-6/02/0010…$5.00.

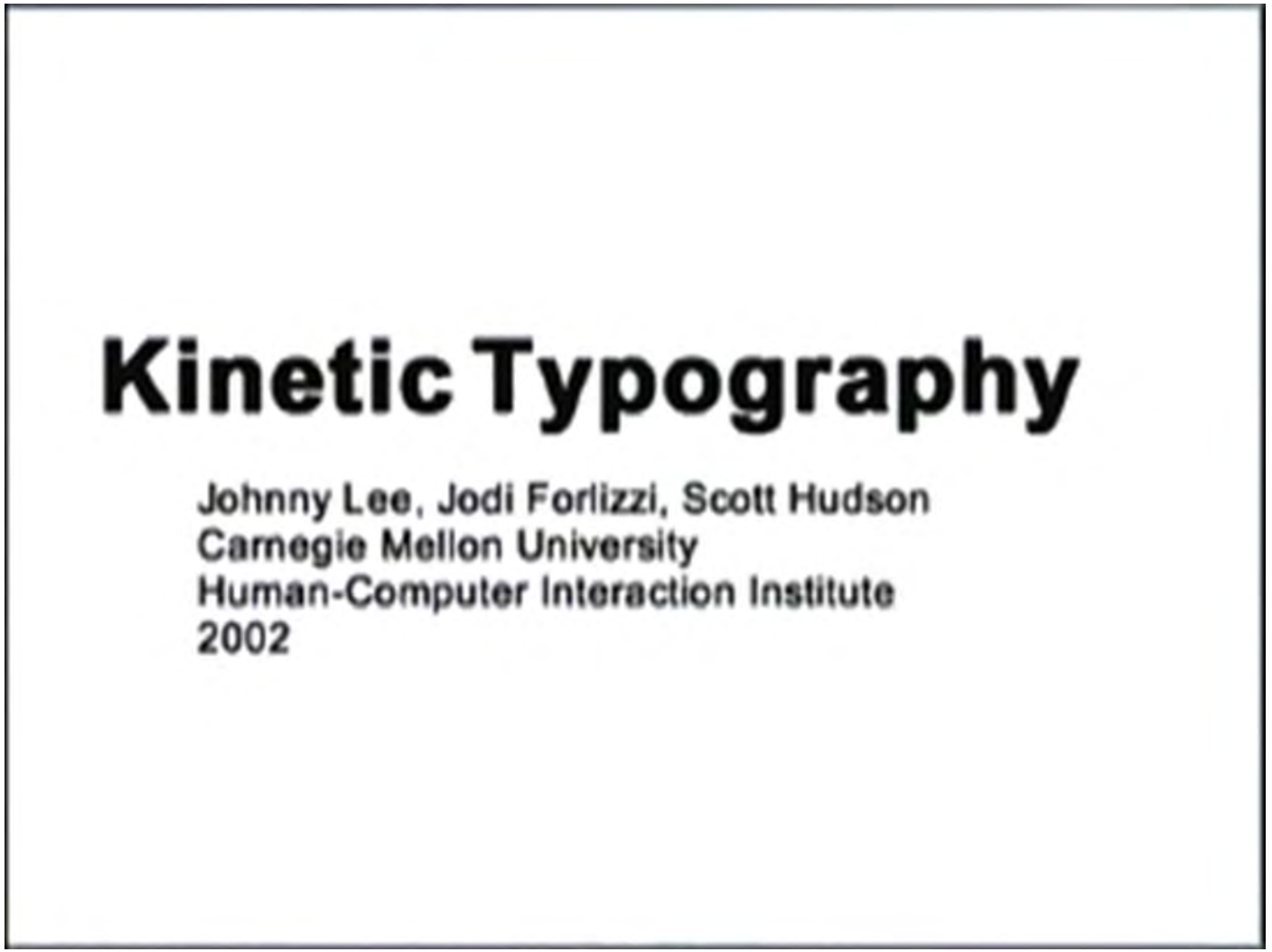
Kinetic typography can be seen as a vehicle for adding some of the properties of film to that of text. For example, kinetic typography can be effective in conveying a speaker's tone of voice, qualities of character, and affective (emotional) qualities of text [Ford97]. It may also allow for a different 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.

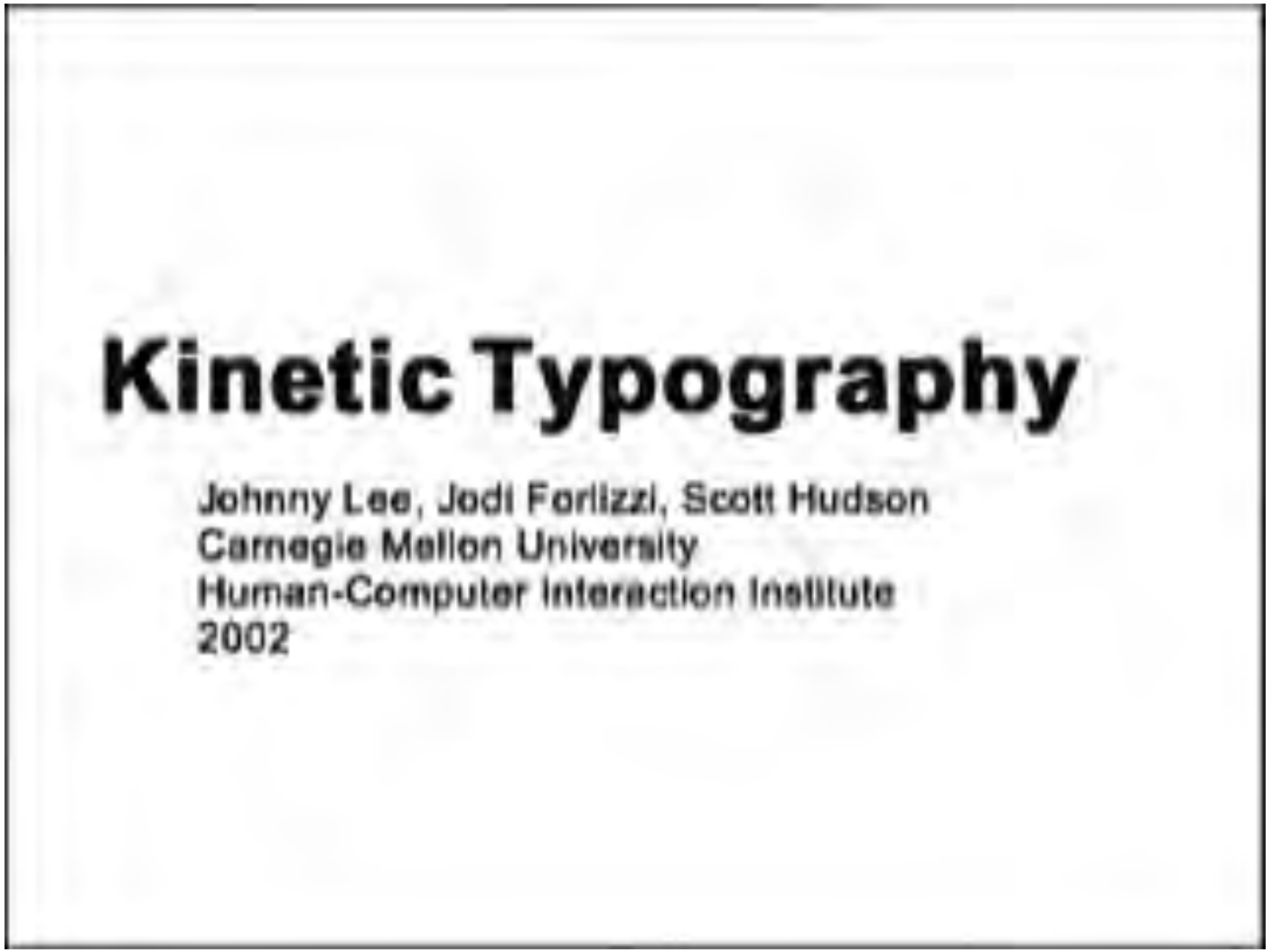
A second origin for time-based presentation of text comes independently from psychological studies of perception and reading. For example, [Mill87] studies perceptual effects of a number of text presentations, such as scrolling text. One of the most fruitful of these is a method known as *Rapid Serial 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]:

Kinetic Typography Engine



Kinetic Typography Engine



Kinetic Typography Engine

Goals of Kinetic Type

- Emotional content
- Creation of characters
- Direction of attention

Animation Composition

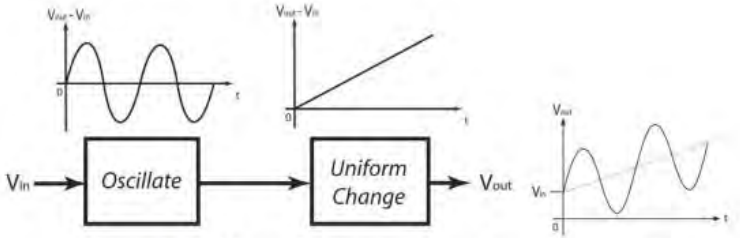


Figure 6. Waveform addition by chaining"

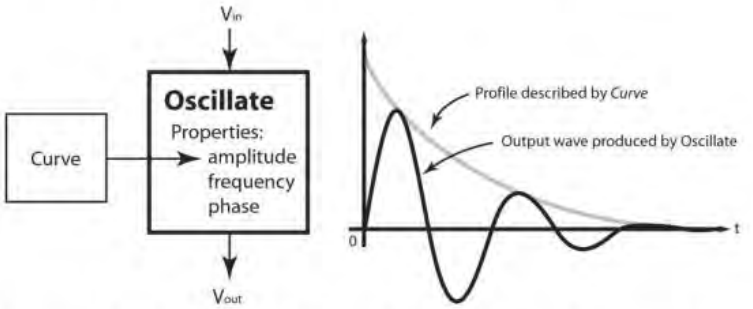


Figure 7. Waveform scaling by functional composition with amplitude

Tools and Interfaces

Why Interface Tools?

Case Study of Model-View-Controller

Case Study of Animation

Sapir-Whorf Hypothesis

Thoughtfulness in Tools

Case Study in Self-Tracking

Sapir-Whorf Hypothesis

Roughly, some thoughts in one language cannot be stated or understood in another language

Our tools define the language of interaction

- Beyond the simple matter of code
- Frame how we think about possibilities

Myers, Hudson, Pausch. Past, Present, and Future of User Interface Software Tools. *TOCHI 2000.*

Sapir-Whorf Hypothesis

Roughly, some thoughts in one language cannot be stated or understood in another language

- Language is not simply a way of voicing ideas, but is the very thing which shapes those ideas

Our tools define the language of interaction

- Beyond the simple matter of code
- Frame how we think about possibilities

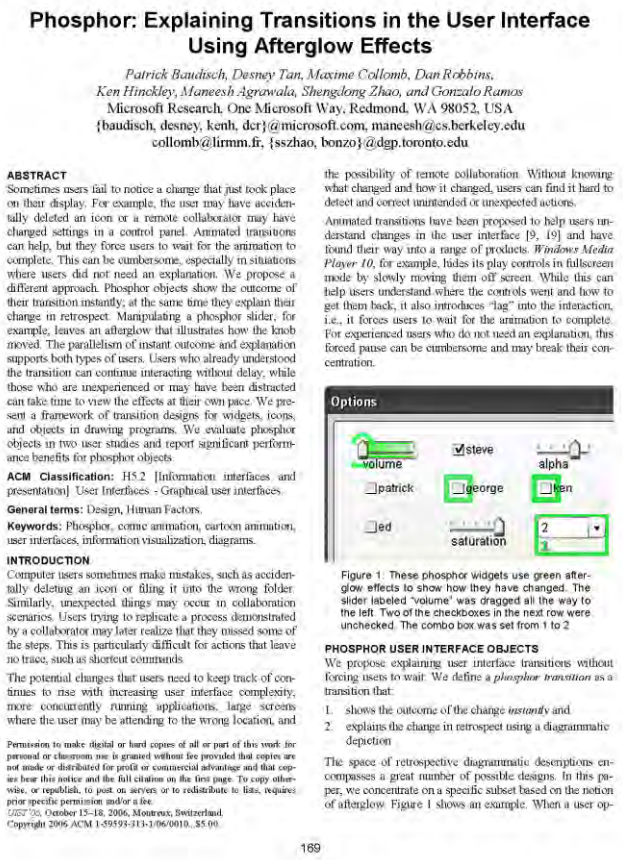
You must be aware of this when choosing tools, designing applications, and creating new tools

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

Patrick Baudisch, Desney Tan, Maxime Collomb, Dan Robbins, Ken Hinckley, Maneesh Agrawala, Shengdong Zhao, and Gonzalo Ramos
Microsoft Research, One Microsoft Way, Redmond, WA 98052, USA
{baudisch, desney, kenh, dcr}@microsoft.com, maneesh@cs.berkeley.edu
collomb@lirmm.fr, {sszhao, bonzo}@dgp.toronto.edu

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.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.
UIST'06, October 15–18, 2006, Montreux, Switzerland.
Copyright 2006 ACM 1-59593-313-1/06/0010...$5.00.

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-

Phosphor

Animation can help people follow interface transitions

But the right speed is crucial

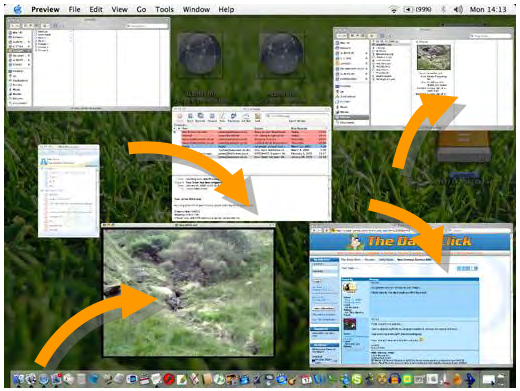
- Too fast increases error rate
- Too slow increases task time

The right speed depends on familiarity, distraction, etc.

- It cannot be determined

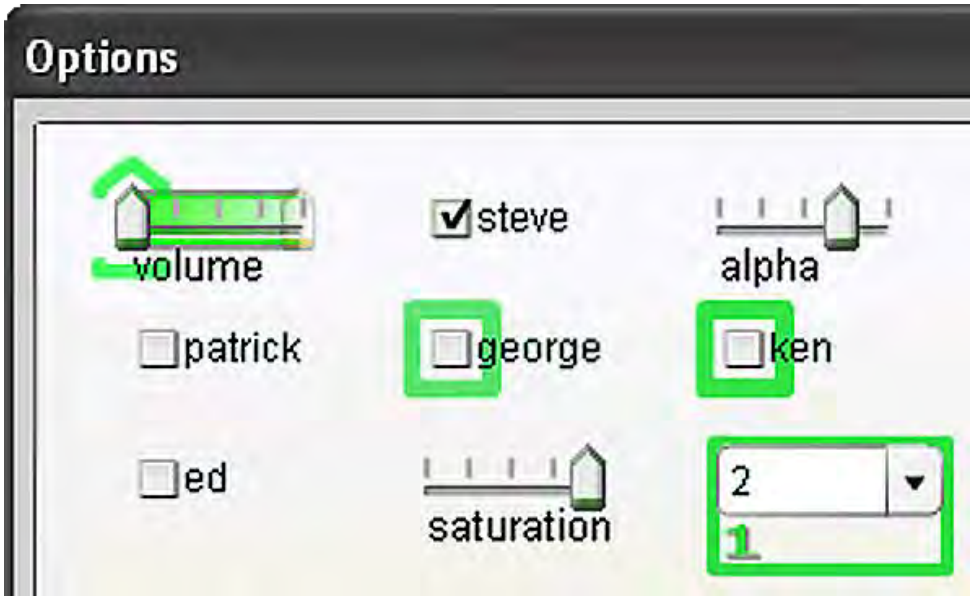
Windows Media Player

Apple Expose

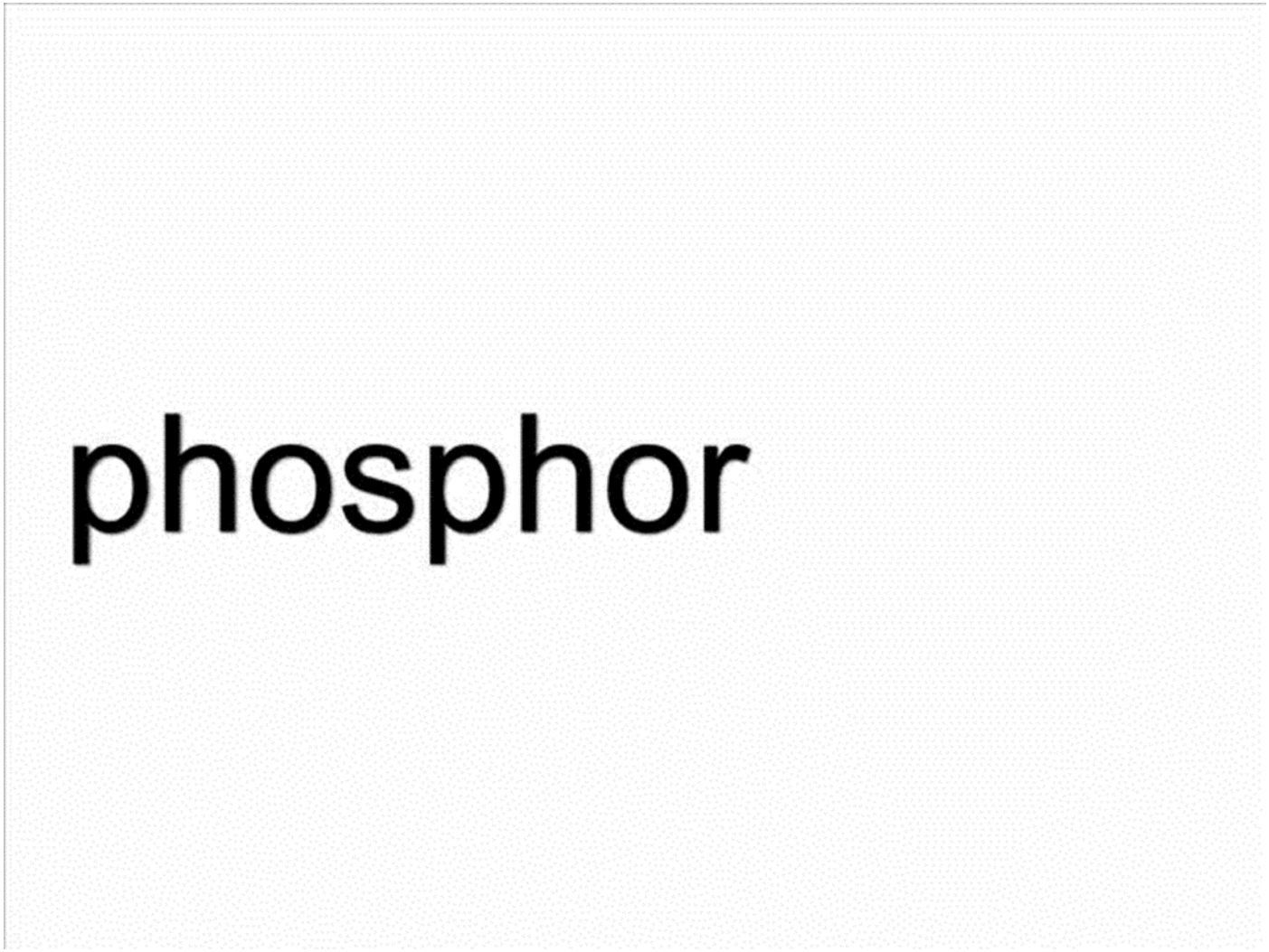


Phosphor

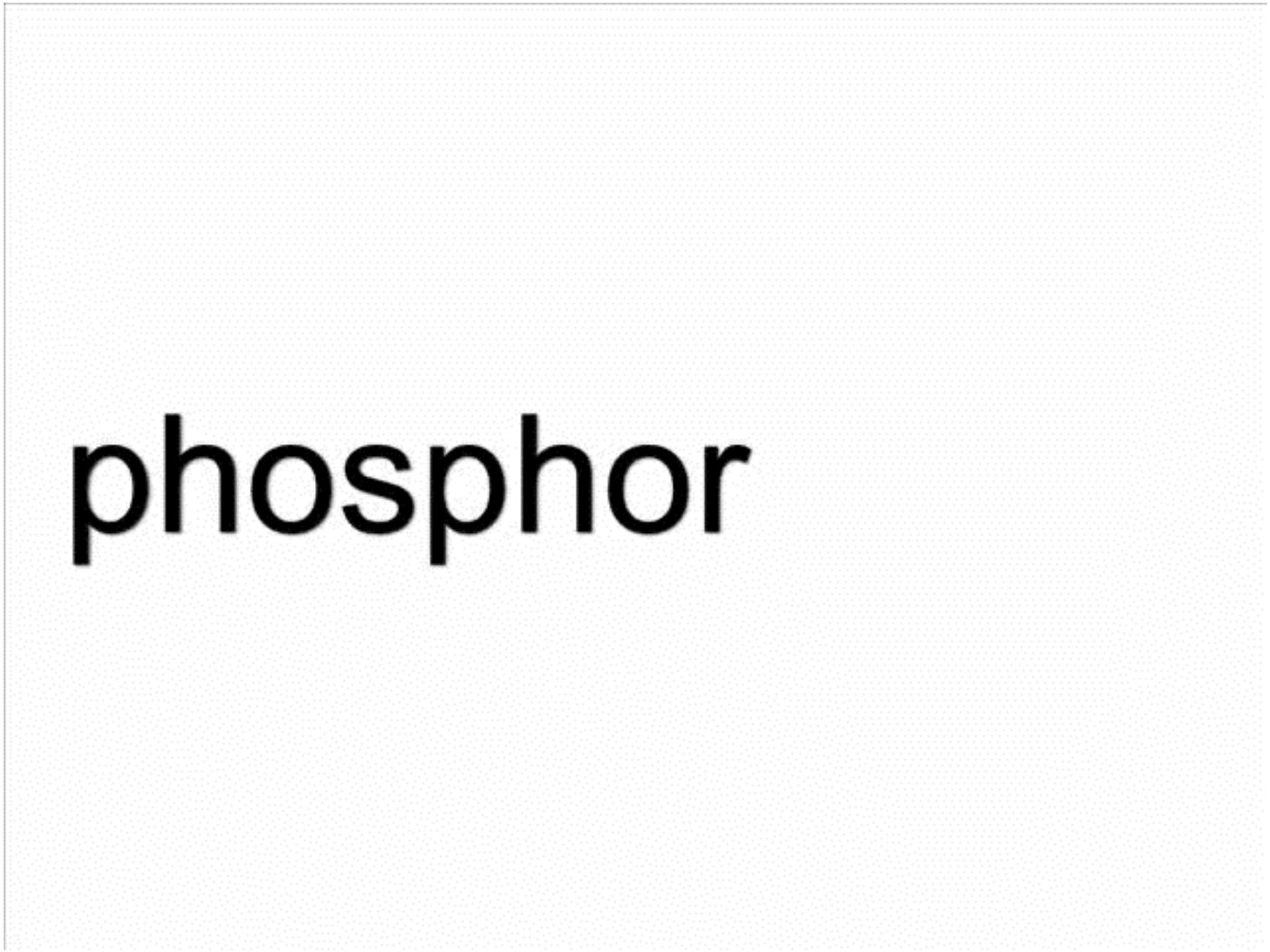
Phosphor shows the outcome immediately, then explains change in retrospect using a diagrammatic depiction



Phosphor

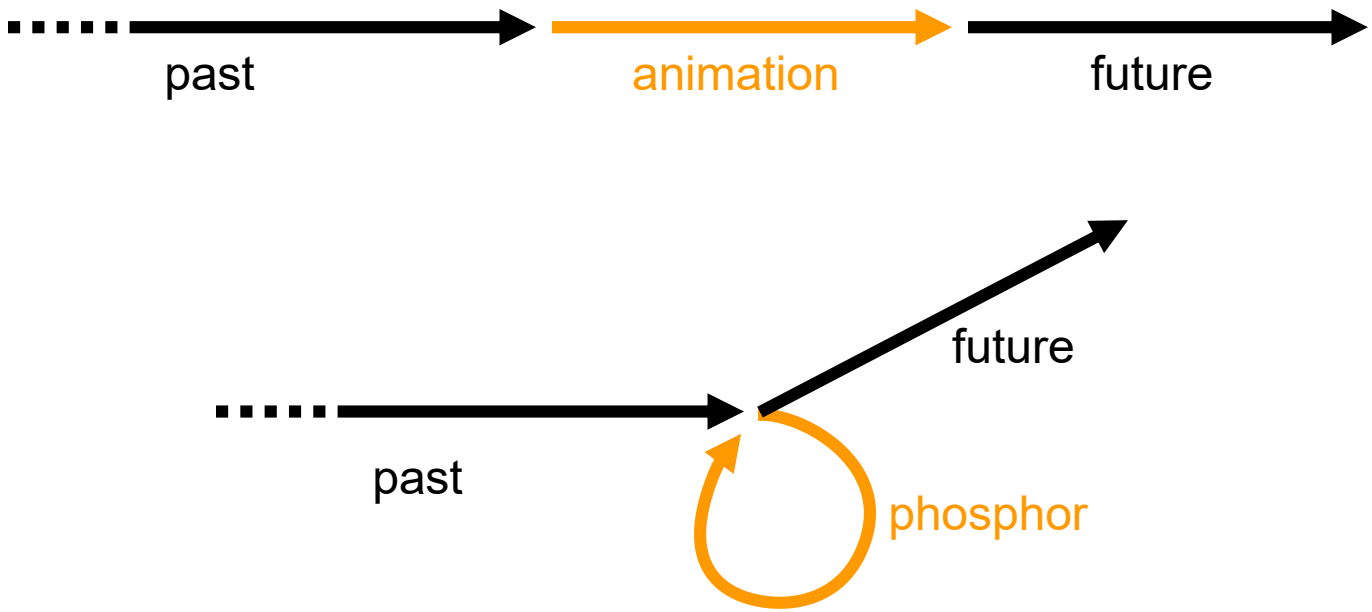


Phosphor



Challenging Assumptions of Tools

Phosphor breaks from the assumptions that have evolved into current transition tools



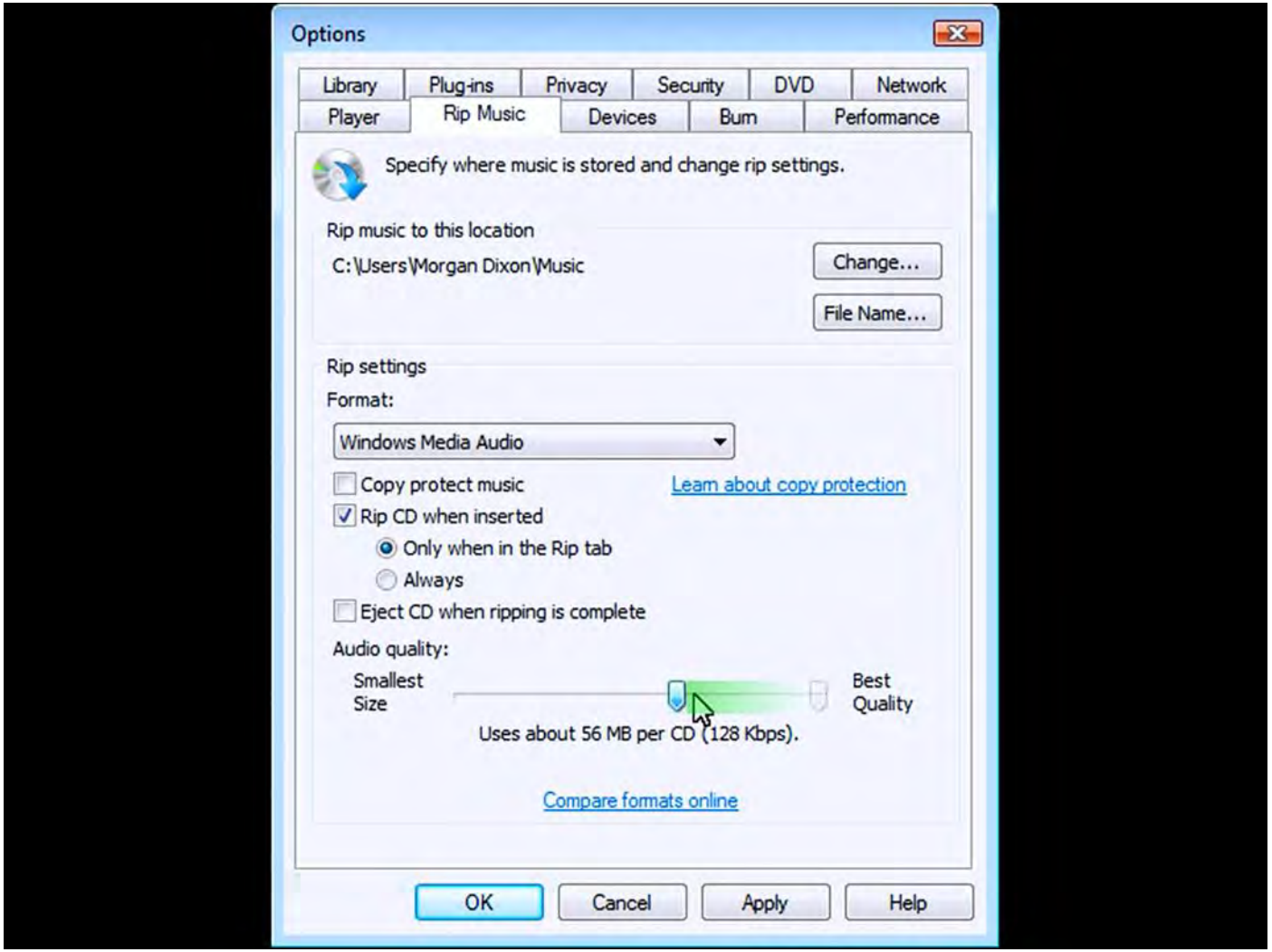
Prefab

Prefab uses pixel analysis to modify existing applications from the outside, using only pixels

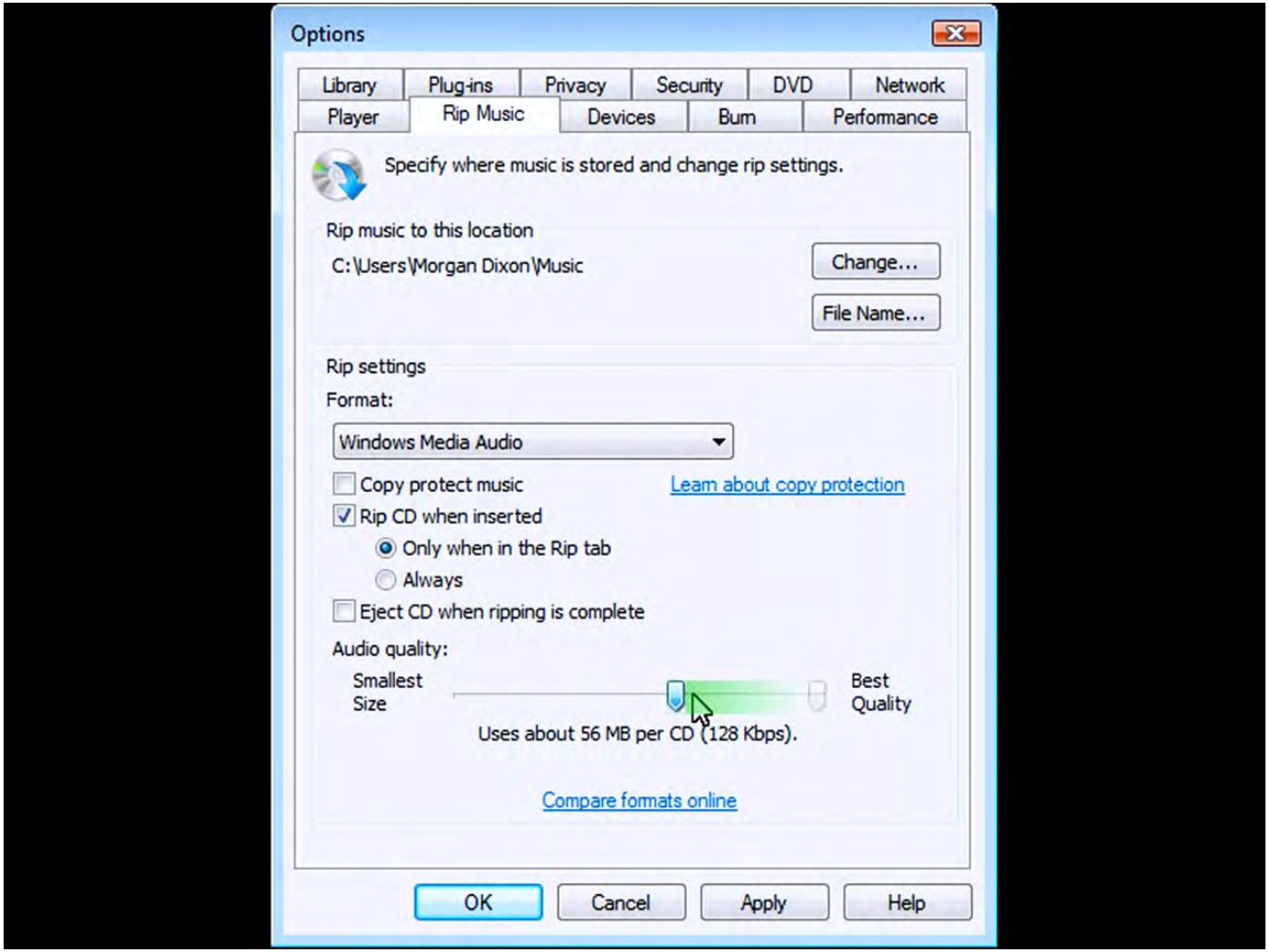
Prefab is informed by how toolkits work, but not linked to any particular toolkit implementation

Allows trying and fielding new ideas that are not supported by existing applications or toolkits

Prefab


Options
Library
Plug-ins
Privacy
Security
DVD
Network
Player
Rip Music
Devices
Burn
Performance
Specify where music is stored and change rip settings.
Rip music to this location
C:\Users\Morgan Dixon\Music
Change...
File Name...
Rip settings
Format:
Windows Media Audio
Copy protect music
Learn about copy protection
Rip CD when inserted
Only when in the Rip tab
Always
Eject CD when ripping is complete
Audio quality:
Smallest Size
Best Quality
Uses about 56 MB per CD (128 Kbps).
Compare formats online
OK
Cancel
Apply
Help

Prefab


Options
Library
Plug-ins
Privacy
Security
DVD
Network
Player
Rip Music
Devices
Burn
Performance
Specify where music is stored and change rip settings.
Rip music to this location
C:\Users\Morgan Dixon\Music
Change...
File Name...
Rip settings
Format:
Windows Media Audio
Copy protect music
Learn about copy protection
Rip CD when inserted
Only when in the Rip tab
Always
Eject CD when ripping is complete
Audio quality:
Smallest Size
Best Quality
Uses about 56 MB per CD (128 Kbps).
Compare formats online
OK
Cancel
Apply
Help

Understanding Tools

Tools promote and encapsulate proven practices

- Reduce expertise barriers
- Enable more rapid and iterative implementation

Codification eventually constrains design

- Inevitable consequence of codification versus evolving understanding of emerging technologies

Codification goes deeper than the code

- Frames how we think about our applications

Myers, Hudson, Pausch. Past, Present, and Future of User Interface Software Tools. *TOCHI 2000.*

Rebuilding the Language

We regularly rebuild the entire system

- Command Line, Text Screens
- Multiple Generations of Desktop
- Multiple Generations of Web
- Mobile Apps

We will do it again

- Several near-term challenges require it
- e.g., Touch, Cloud, Distributed Interfaces

Backward compatibility helps, but is not required

Olsen. Evaluating User Interface Systems Research. *UIST 2007.*

Informing the Next Language

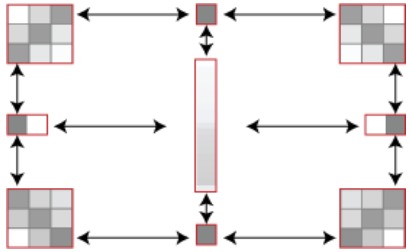
Research explores the next generation of language, while being limited by the current

We therefore conflate:

- Ideas
- Proof of Concept
- Engineering
- Implementation
- Broken Metaphors
- Unspeakably Dirty Hacks

Informing the Next Language

Research explores the next generation of language, while being limited by the current



We therefore conflate:

- Ideas
- Proof of Concept
- Engineering
- Implementation
- Broken Metaphors
- Unspeakably Dirty Hacks

Prefab is not just about ‘do everything with pixels’, but about exploring new possibilities in the current ecosystem of interface tools

Mobile Phones as Pagers

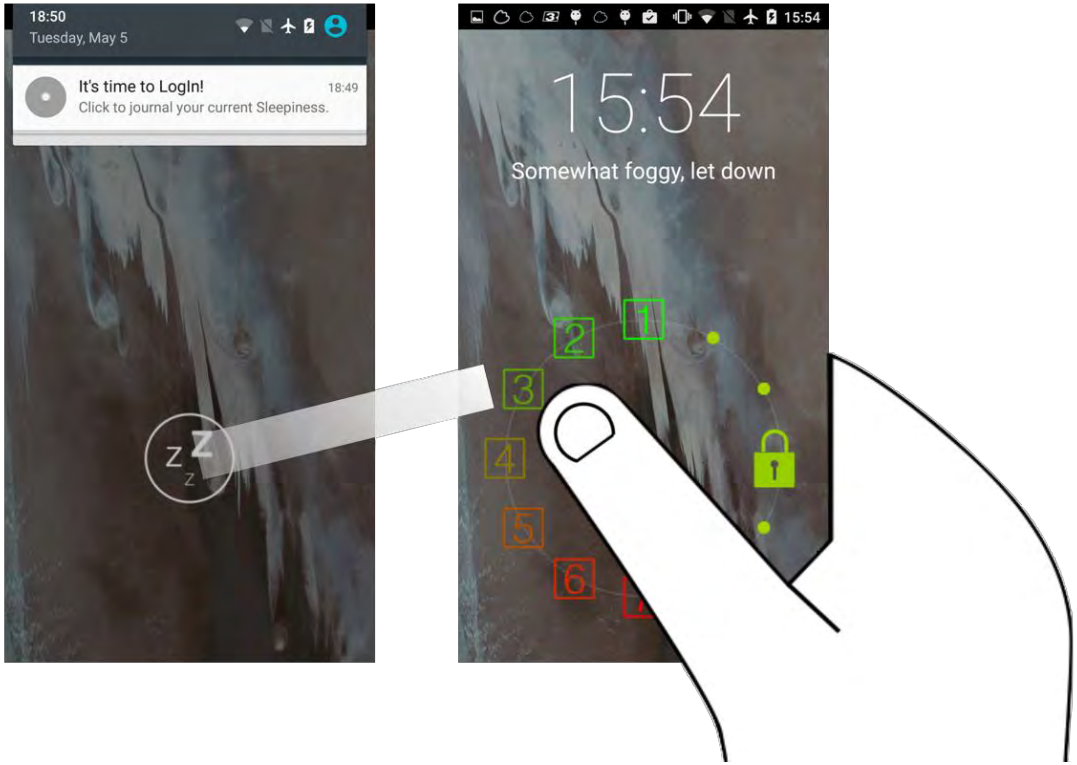
Our notion of technology design for journals / ESM / EMA has been anchored by papers journals and pager-based reminders

Csikszentmihalyi, Larson. Validity and Reliability of the Experience-Sampling Method. *J Nerv Ment Dis 1987*.

Feldman Barrett, Barrett. An Introduction to Computerized Experience Sampling in Psychology. *Soc Sci Comput Rev 2001*.

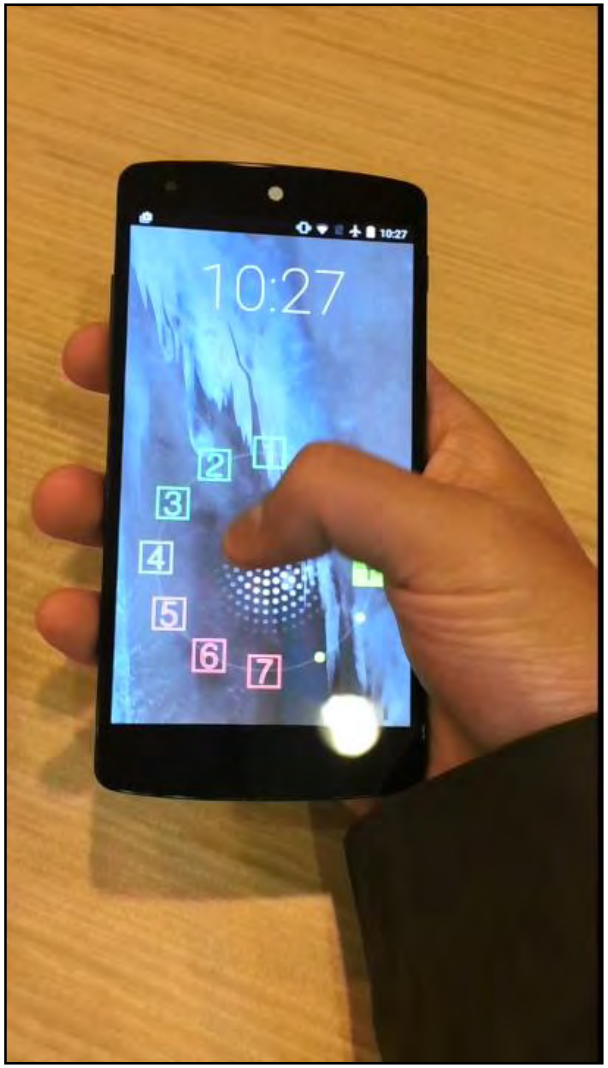
Froehlich, Chen, Consolvo, Harrison, Landay. MyExperience … *MobiSys 2007*.

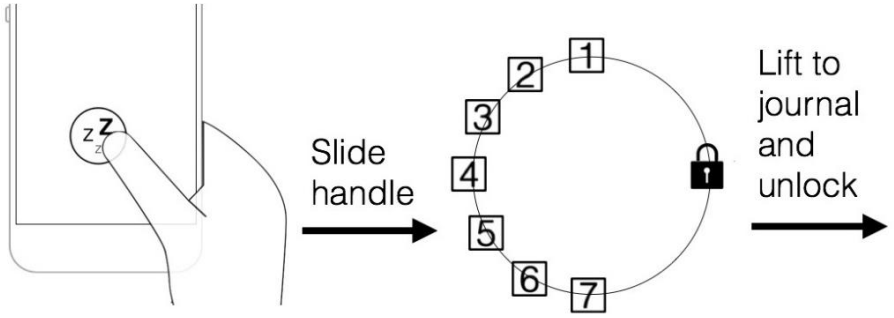
Unlock Journaling for Self-Report



Truong, Shihipar, Wigdor. Slide to X: Unlocking the Potential of Smartphone Unlocking. *CHI 2014*.
Zhang, Pina, Fogarty. Examining Unlock Journaling with Diaries and Reminders ... *CHI 2016.*

Unlock Journaling for Self-Report

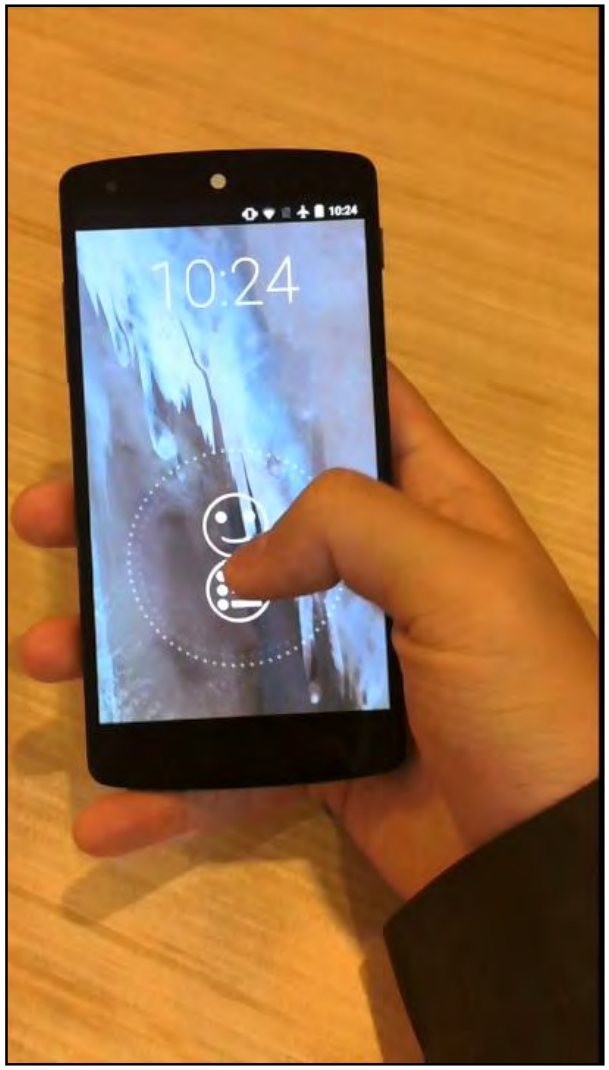


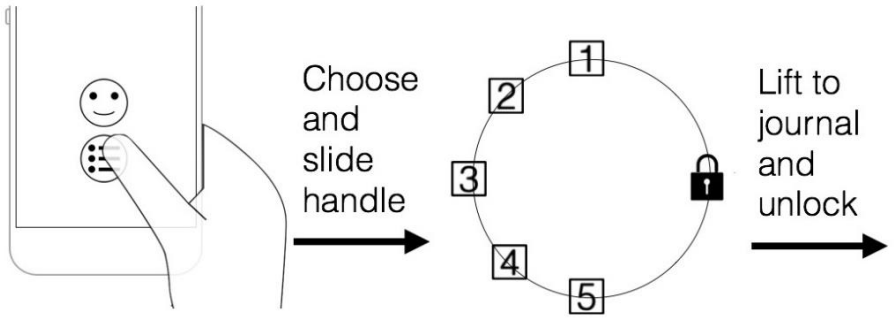


Stanford Sleepiness Scale

Hoddes, Zarcone, Dement. Development and Use of Stanford Sleepiness Scale. *Pyschophysiology 1972*.

Unlock Journaling for Self-Report

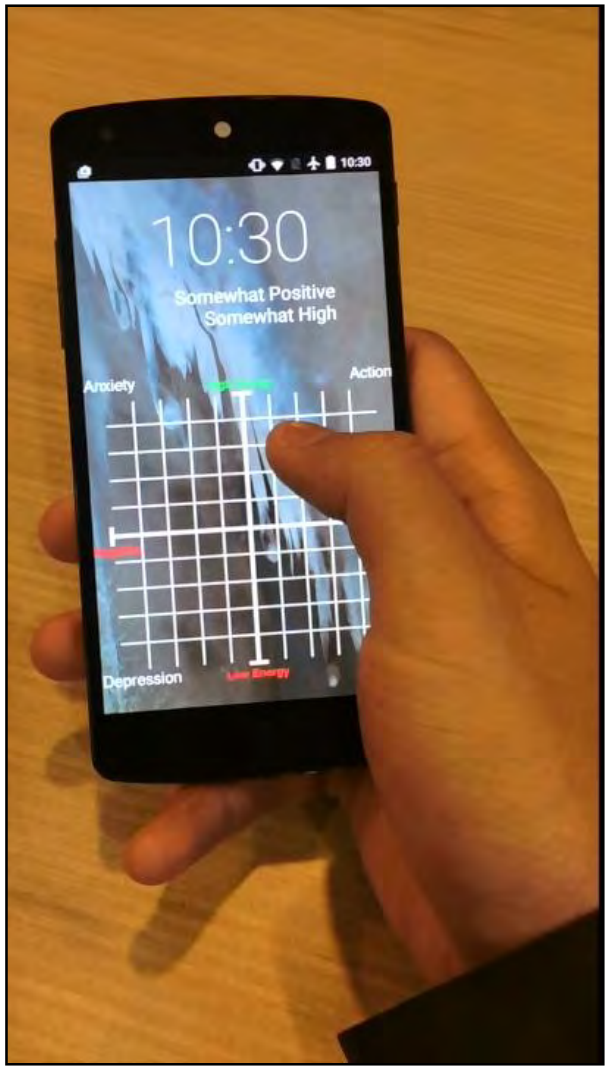


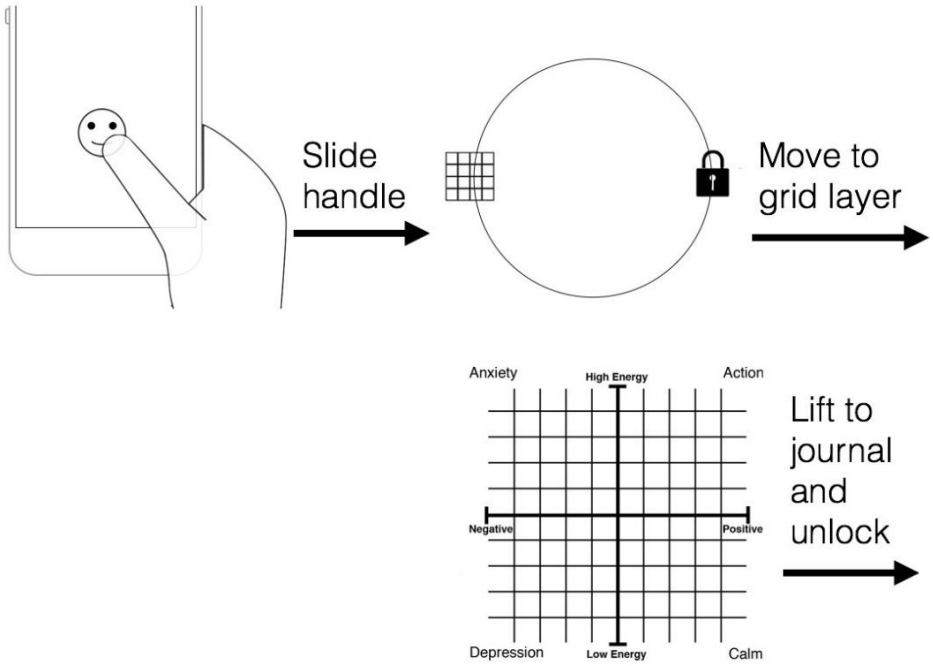


Pleasure and Accomplishment
(e.g., self-monitoring depressive symptoms)

Lejuez, Hopko, Acierno, Daughters, Pagoto. ... Behavioral Activation Treatment for Depression … *Behav Modif 2011*.

Unlock Journaling for Self-Report





Russell's Affect Grid

Russell, Weiss, Mendelsohn. Affect Grid: A Single-Item Scale of Pleasure and Arousal. *J Pers Soc Psychol 1989*.

Unlock Journaling vs. Notifications

Unlock journaling is:

rated less intrusive

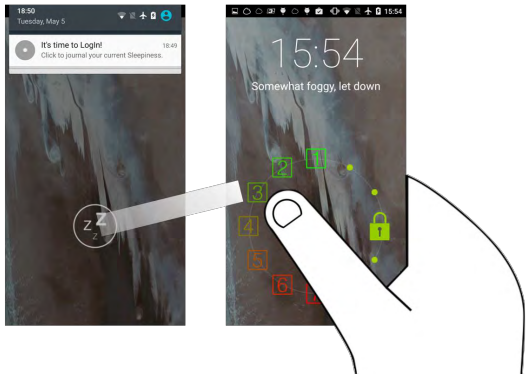
(1.77 vs. 2.22 on a 5-point scale)

yields greater frequency

(15.0 vs. 9.8 per 12-hour day)

comparable timeliness

(8.6 vs. 9.3 minutes)



Instead of reminders to journal, unlock journaling makes the opportunity visible, easy, and optional

It should not have taken 10 years to get here

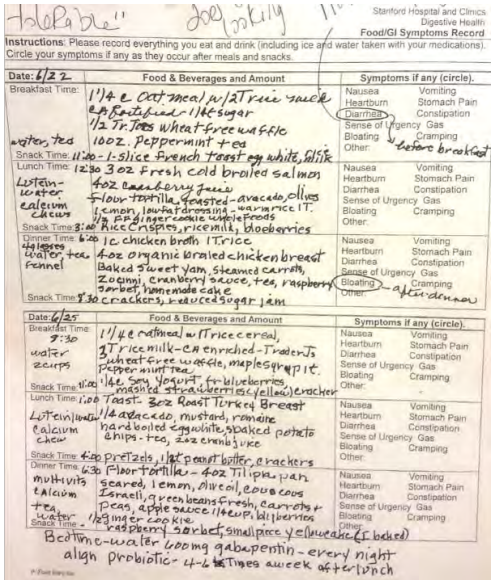
Mobile Food Journals

Origins in daily recall

Self-monitoring of food can support many goals

- Weight Loss
- Diabetes Management
- Trigger Identification

High burdens detract from potential benefit, data is often wrong


Stanford Hospital and Clinics
Digestive Health
Food/GI Symptoms Record

Instructions: Please record everything you eat and drink (including ice and water taken with your medications). Circle your symptoms if any as they occur after meals and snacks.

Date: 6/22	Food & Beverages and Amount	Symptoms if any (circle).
Breakfast Time: water, tea	1 1/4 c oat meal w/ 2 Trice snack c.a. fortified - 1/4 t sugar 1/2 Tr. Joes wheat free waffle 100z. Peppermint tea	Nausea, Vomiting, Heartburn, Stomach Pain, Diarrhea, Constipation, Sense of Urgency, Gas, Bloating, Cramping, Other: before breakfast
Snack Time: 11:00	1-slice French toast egg white, fillik	
Lunch Time: 12:30 Lutein-water calcium chew	3 oz fresh cold broiled salmon 4oz cranberry juice flour tortilla, toasted - avacado, olives 1 lemon, low fat dressing - warm rice 1T. 1/2 FF ginger cookie whole foods	Nausea, Vomiting, Heartburn, Stomach Pain, Diarrhea, Constipation, Sense of Urgency, Gas, Bloating, Cramping, Other:
Snack Time: 3:00	Rice Crispies, rice milk, blueberries	
Dinner Time: 6:00 4 glasses water, tea fennel	1c chicken broth 1T. rice 4oz organic broiled chicken breast Baked sweet yam, steamed carrots, zoeinni, cranberry sauce, tea, raspberry sorbet, homemade cake	Nausea, Vomiting, Heartburn, Stomach Pain, Diarrhea, Constipation, Sense of Urgency, Gas, Bloating, Cramping, Other: after dinner
Snack Time: 8:30	crackers, reduced sugar jam	

Date: 6/25	Food & Beverages and Amount	Symptoms if any (circle).
Breakfast Time: 9:30 water zcups	1 1/4 c oatmeal w/ Trice cereal, 3 Trice milk - c.a. enriched - Trader Js wheat free waffle, maple syrup 1t. Peppermint tea	Nausea, Vomiting, Heartburn, Stomach Pain, Diarrhea, Constipation, Sense of Urgency, Gas, Bloating, Cramping, Other:
Snack Time: 11:00	1/4c Soy Yogurt, fr. blueberries, mashed strawberries (yellow) cracker	
Lunch Time: 1:00 Lutein/water calcium chew	Toast - 3oz Roast Turkey Breast 1/4 avacado, mustard, romaine hard boiled egg white, baked potato chips - tea, 2oz cranb juice	Nausea, Vomiting, Heartburn, Stomach Pain, Diarrhea, Constipation, Sense of Urgency, Gas, Bloating, Cramping, Other:
Snack Time: 4:00	pretzels, 1/2t peanut butter, crackers	
Dinner Time: 6:30 multivits calcium tea water	Floor tortilla - 4oz Tilipia pan seared, lemon, olive oil, cous cous Israeli, green beans fresh, carrots + peas, apple sauce 1/4 cup, blueberries	Nausea, Vomiting, Heartburn, Stomach Pain, Diarrhea, Constipation, Sense of Urgency, Gas, Bloating, Cramping, Other:
Snack Time: 1/2	ginger cookie raspberry sorbet, small piece yellow cake (I baked)	

Bedtime - water 600mg gabapentin - every night
align probiotic - 4-6 times a week after lunch

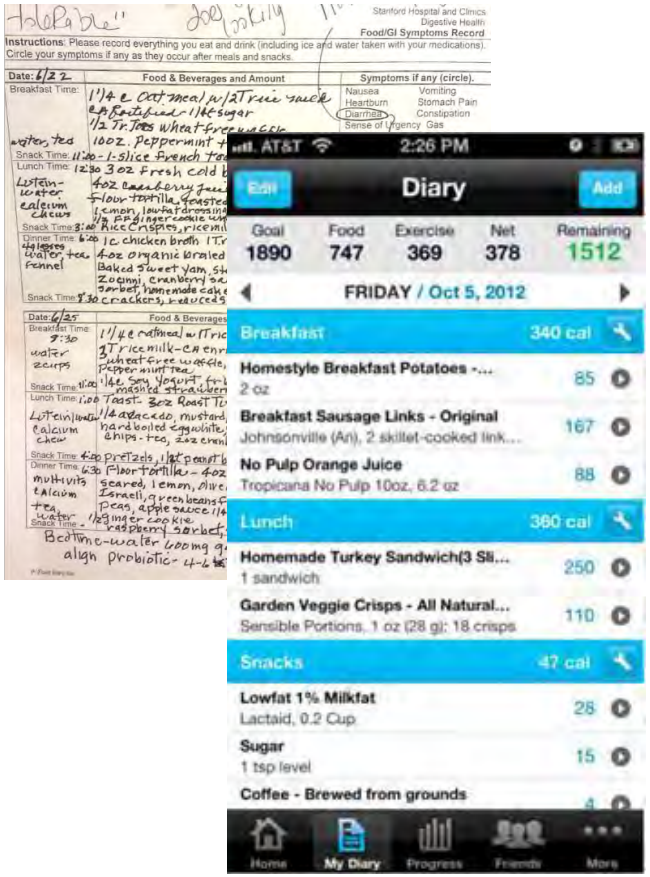
Burke. The Dietary History as a Tool in Research. *J Am Diet Assoc 1947*.
Craig, Kristal, Cheney, Shattuck. The Prevalence and Impact of 'Atypical' Days in 4-Day Food Records. *J Am Diet Assoc 2000*.

Mobile Food Journals

Mobile devices provide real-time feedback

- Search for each food in a large database, often breaking into components
- Typically provide calorie-based feedback

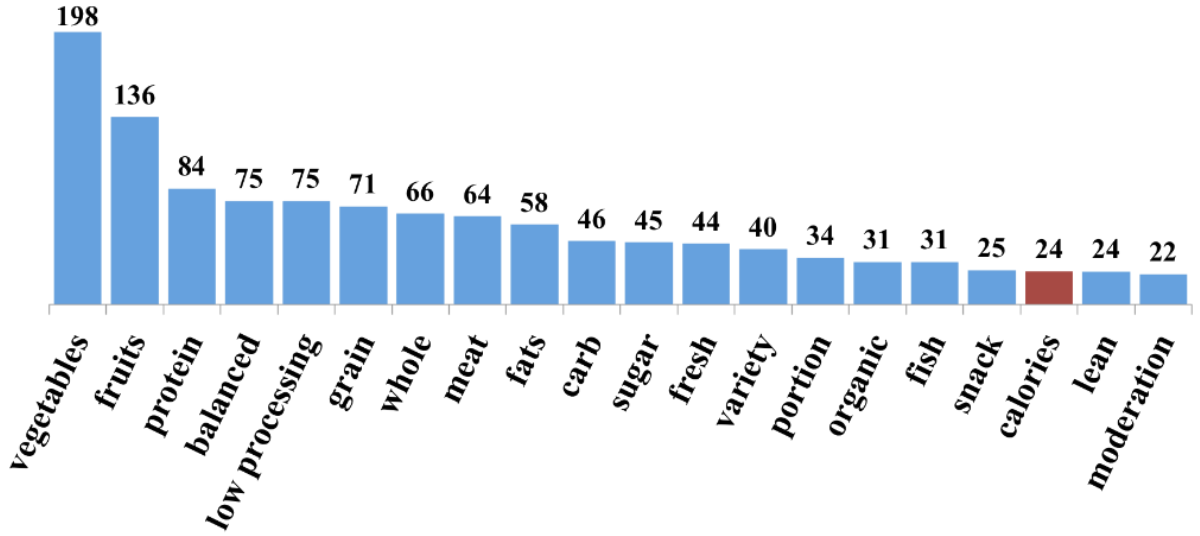
High burdens detract from potential benefit, data is often wrong



Tsai, Lee, Raab, Norman, Sohn, Griswold, Patrick, K. Usability and Feasibility of PmEB … *Mobile Netw Appl 2007*.

Perceptions of Healthy Eating

"What does healthy eating look like to you?"



Food types:

"vegetables"
"fruits"
"protein"

Food qualities:

"low processed"
"organic"
"fresh"

Diet qualities:

"balanced"
"variety"
"portion"

Cordeiro, Bales, Cherry, Fogarty. Rethinking the Mobile Food Journal … *CHI 2015*.

Difficulty as a Negative Nudge

"I just avoided eating things that were hard to log" – SP132

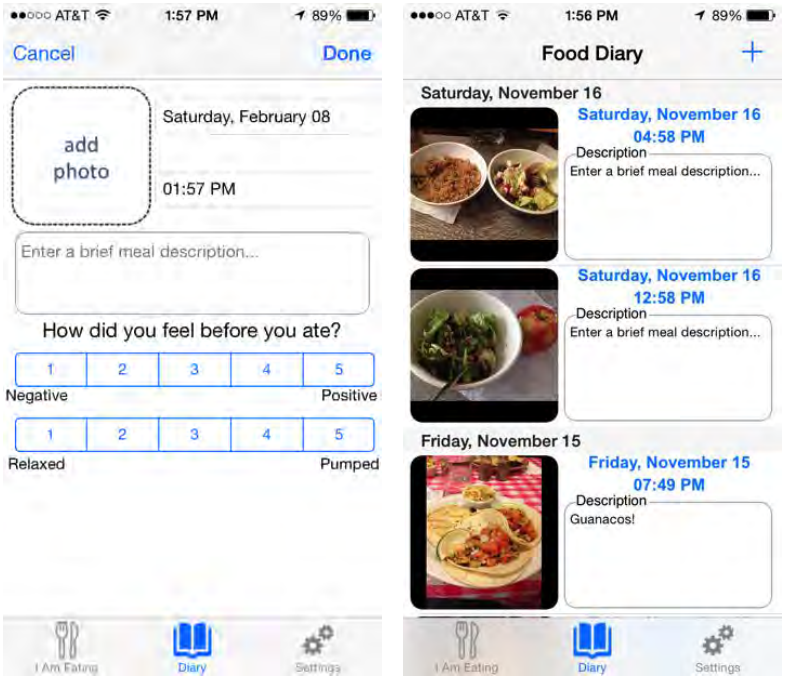
"Prepackaged meals were the easiest because of bar codes but those aren't healthy" – SP123

"I could make life easier by eating the same things regularly" – SP97

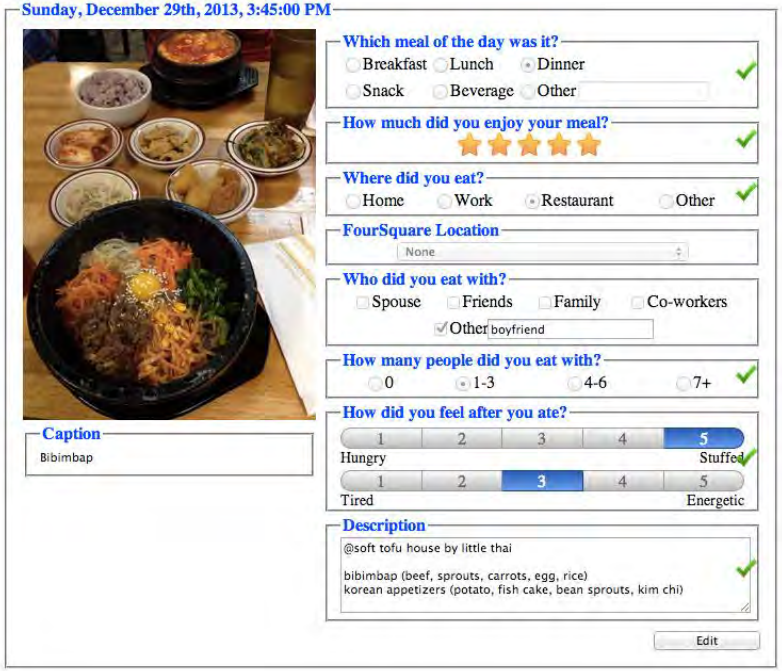
"It discourages you from eating out or at a friend's, even if it is healthy" – SP42

Cordeiro, Epstein, Thomaz, Bales, Jagannathan, Abowd, Fogarty. Barriers and Negative Nudges ... *CHI 2015*.
Cordeiro, Bales, Cherry, Fogarty. Rethinking the Mobile Food Journal … *CHI 2015*.

Deploying a Photo-Based Journal



Mobile capture and review



Web review and annotation

Cordeiro, Bales, Cherry, Fogarty. Rethinking the Mobile Food Journal … *CHI 2015*.

Leveling the Difficulty of Journaling

With prior techniques:

- 60% report not journaling because it was too difficult
- 65% report not journaling because they did not know

With photo-based capture:

- 22% report not journaling because it was too difficult
- None report not journaling due to food knowledge

“For some meals, it’s just really easy to take a picture … than sit there and type in every ingredient” – FP20

Journaling without Judgment

With prior journals, participants report choosing not to journal because they would exceed a calorie budget or because a food was unhealthy

- 13% of survey participants
- 45% of field participants

Photos enable mindfulness while avoiding judgment

- “[it was] easier because there were no calorie counts, no judgments, but still makes you aware” – FP14
- “Do I really want to eat this? I’m capturing this” – FP17

Triggers and Trends

"I eat too much pizza" – FP10

"I'm surprised at how many times I'm seeing things that I consider an exception to my diet!" – FP4

"I don't branch out as much as I thought I did, even when I go somewhere new, I kind of get what I always get somewhere else" – FP10

Food Journals as Daily Recall

"it should be noted that much of the use of food journaling is in a more clinical setting with the purpose being sharing and evaluating the journal with nutritionists and care providers …

it's not relevant if photos are more or less easily understood by the user if a nutritionist is the eventual consumer of the data"

– Actual Anonymous Grumpy R3

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 13:
Interface
Implementation

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

DESIGN
USE
BUILD