

# 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

# What Is This Course?



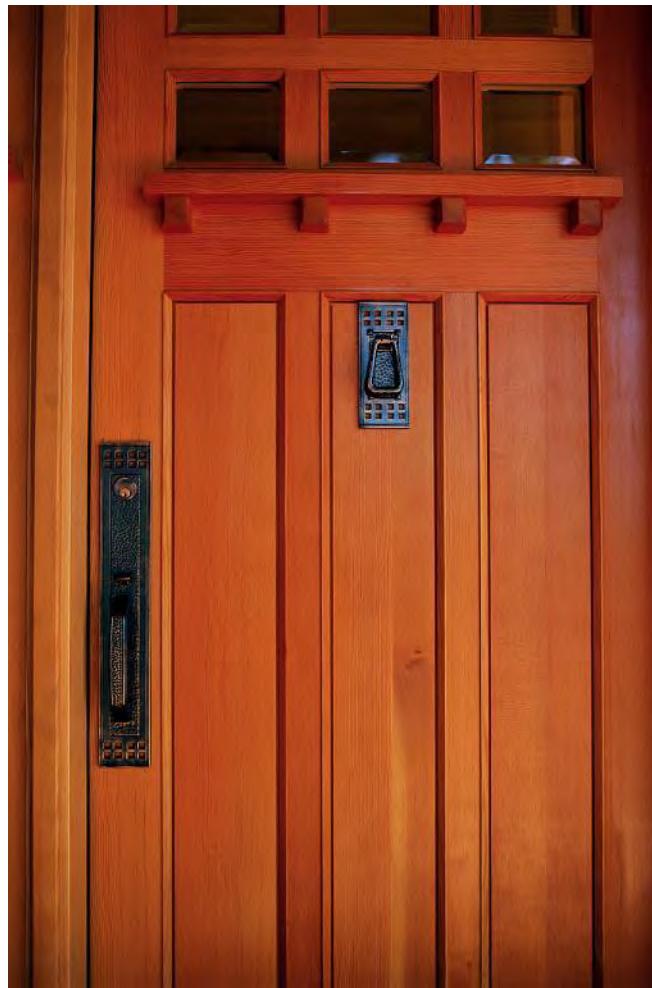
Time for a Door Quiz:

Say out loud what action you use to open the door

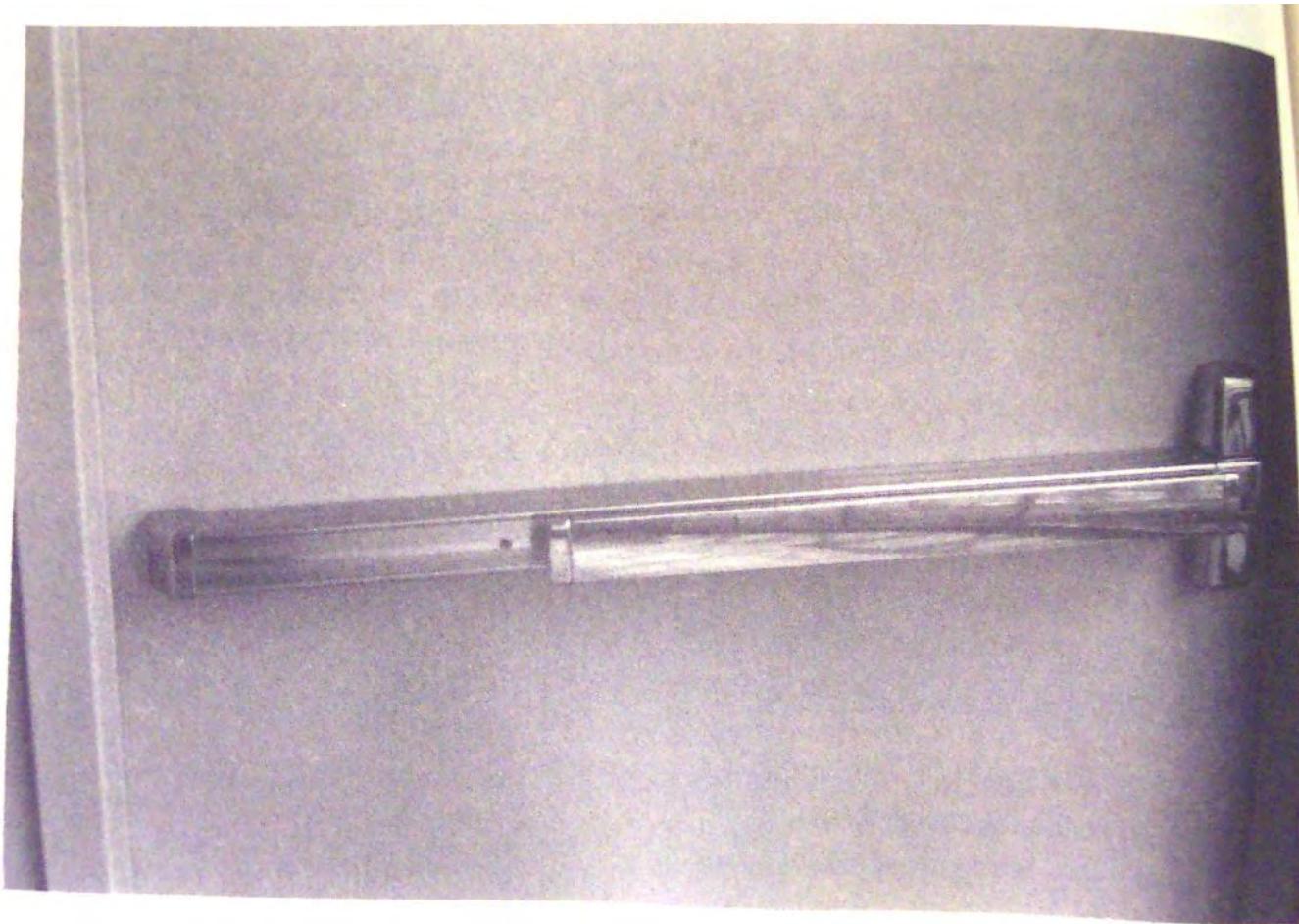
Push

Pull

# Door Quiz



# Door Quiz



# Door Quiz



# Door Quiz



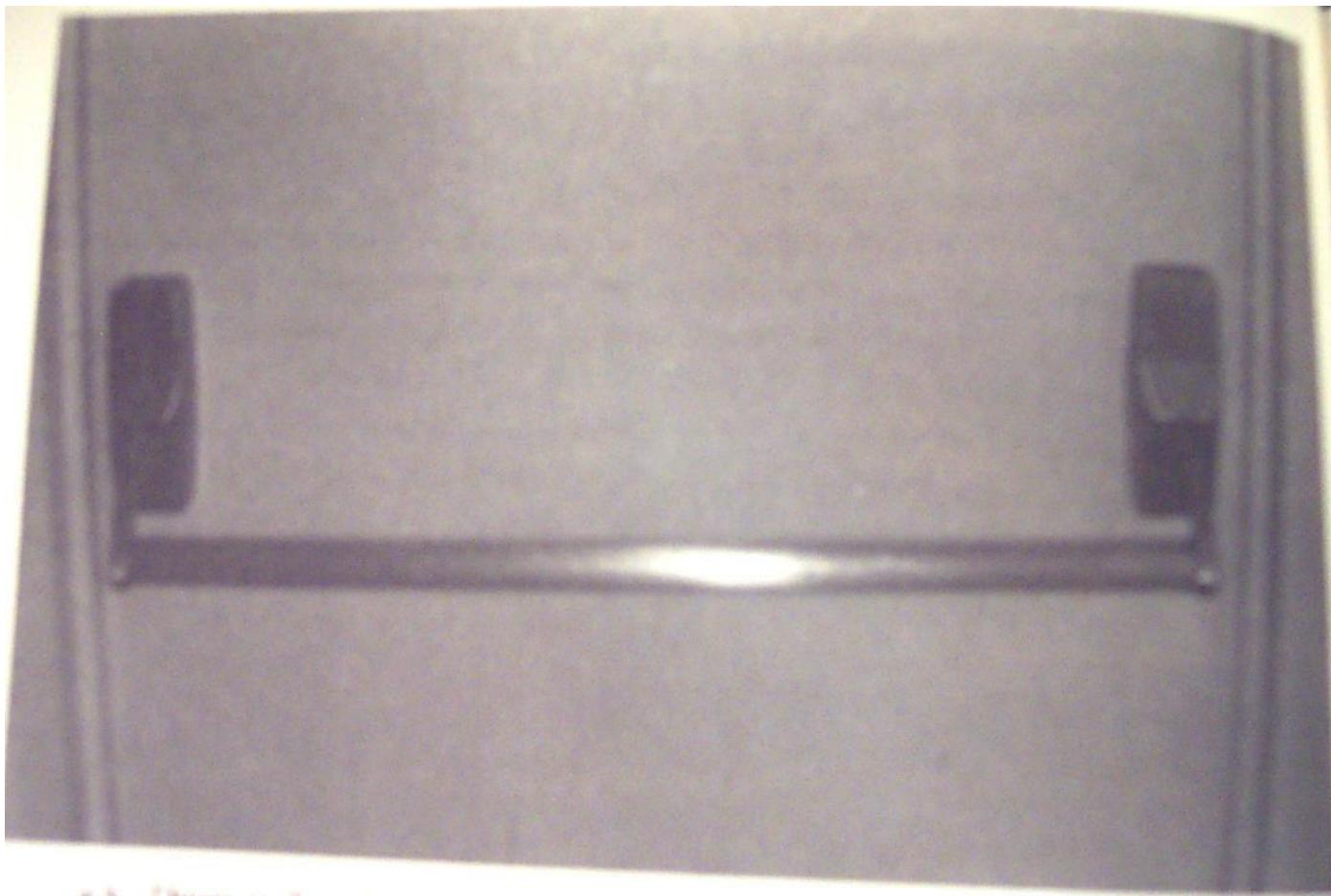
# Door Quiz



# Door Quiz



# Door Quiz



# Door Quiz



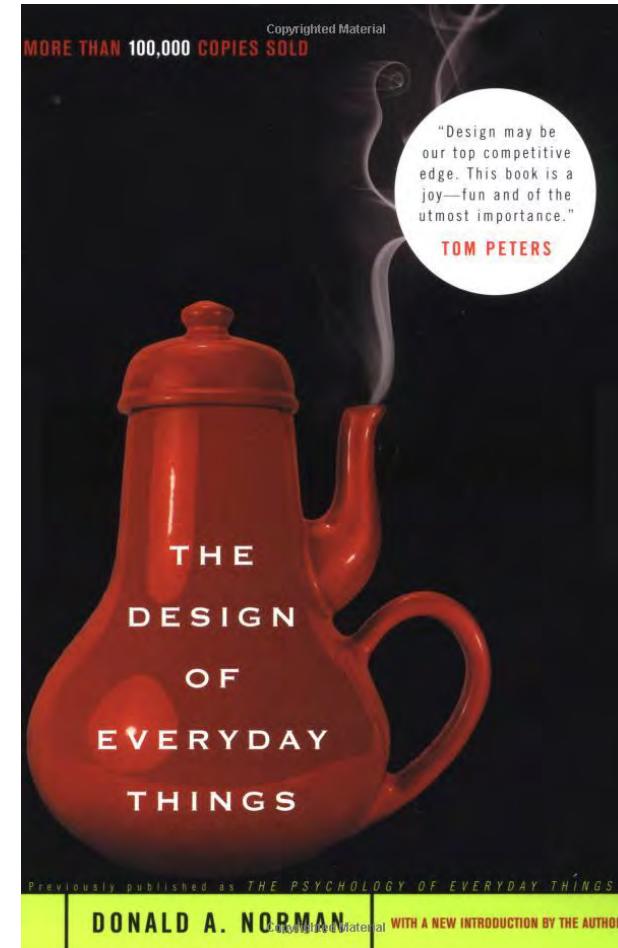
# What is so Special about Computers?

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?

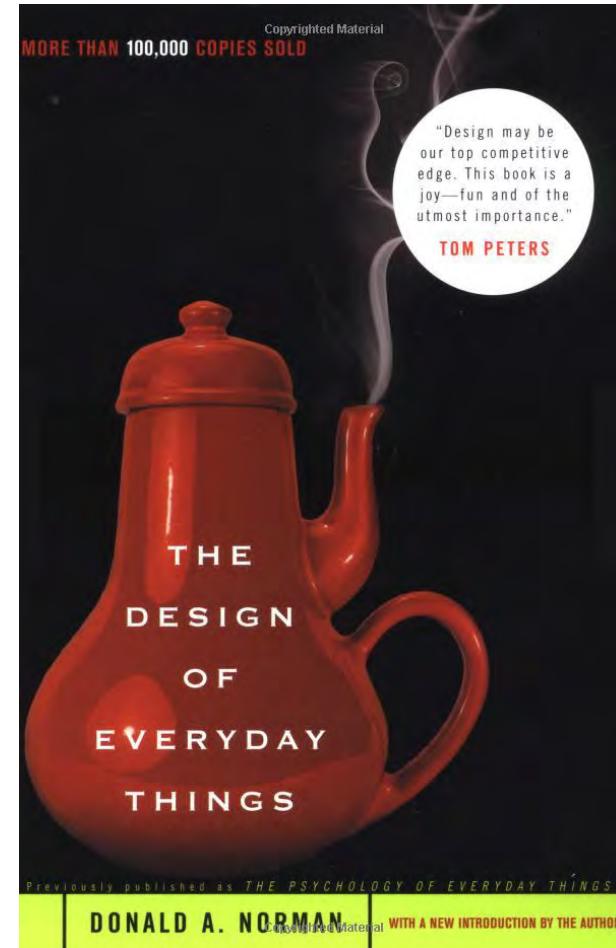
Yet we blame ourselves

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

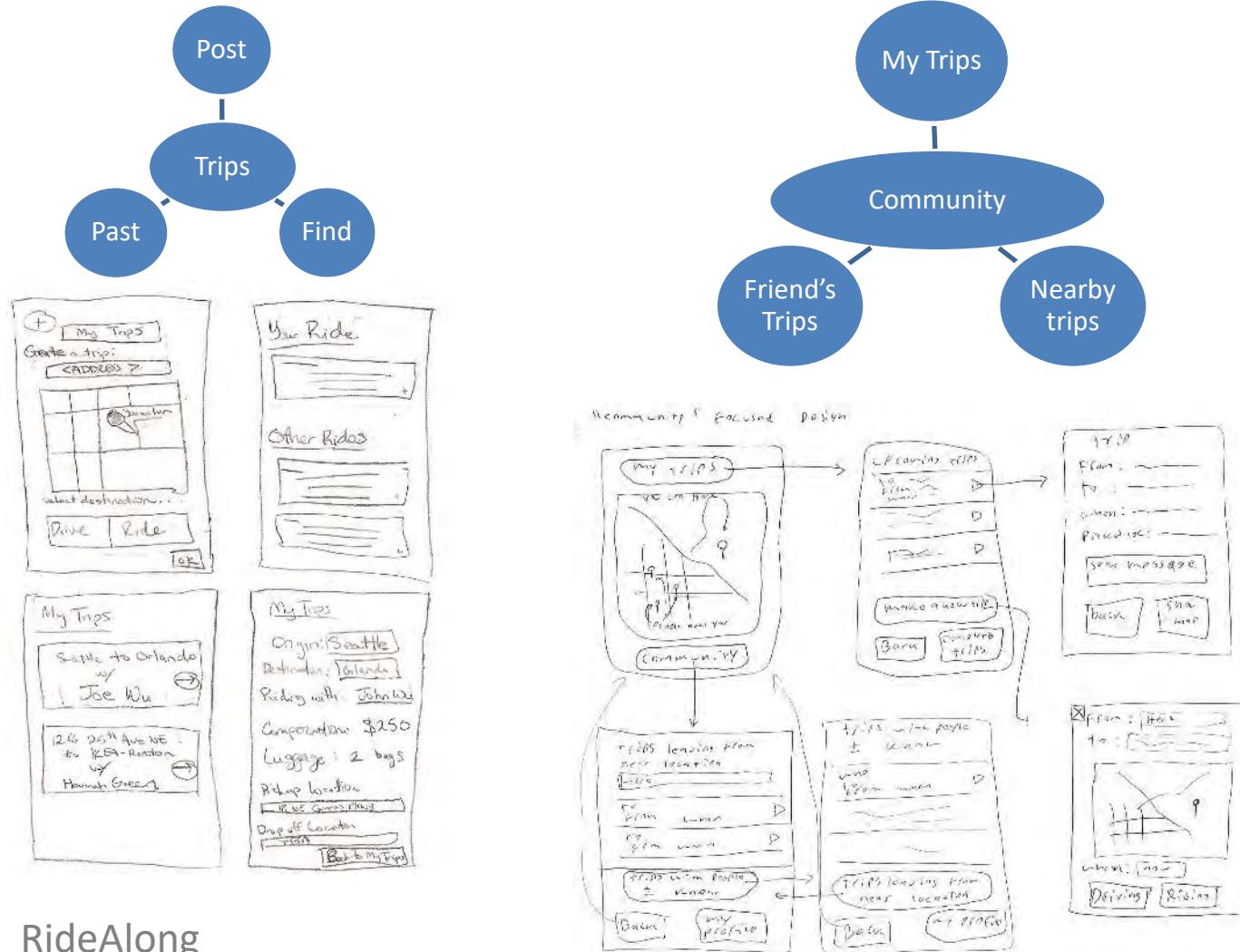


Consumester



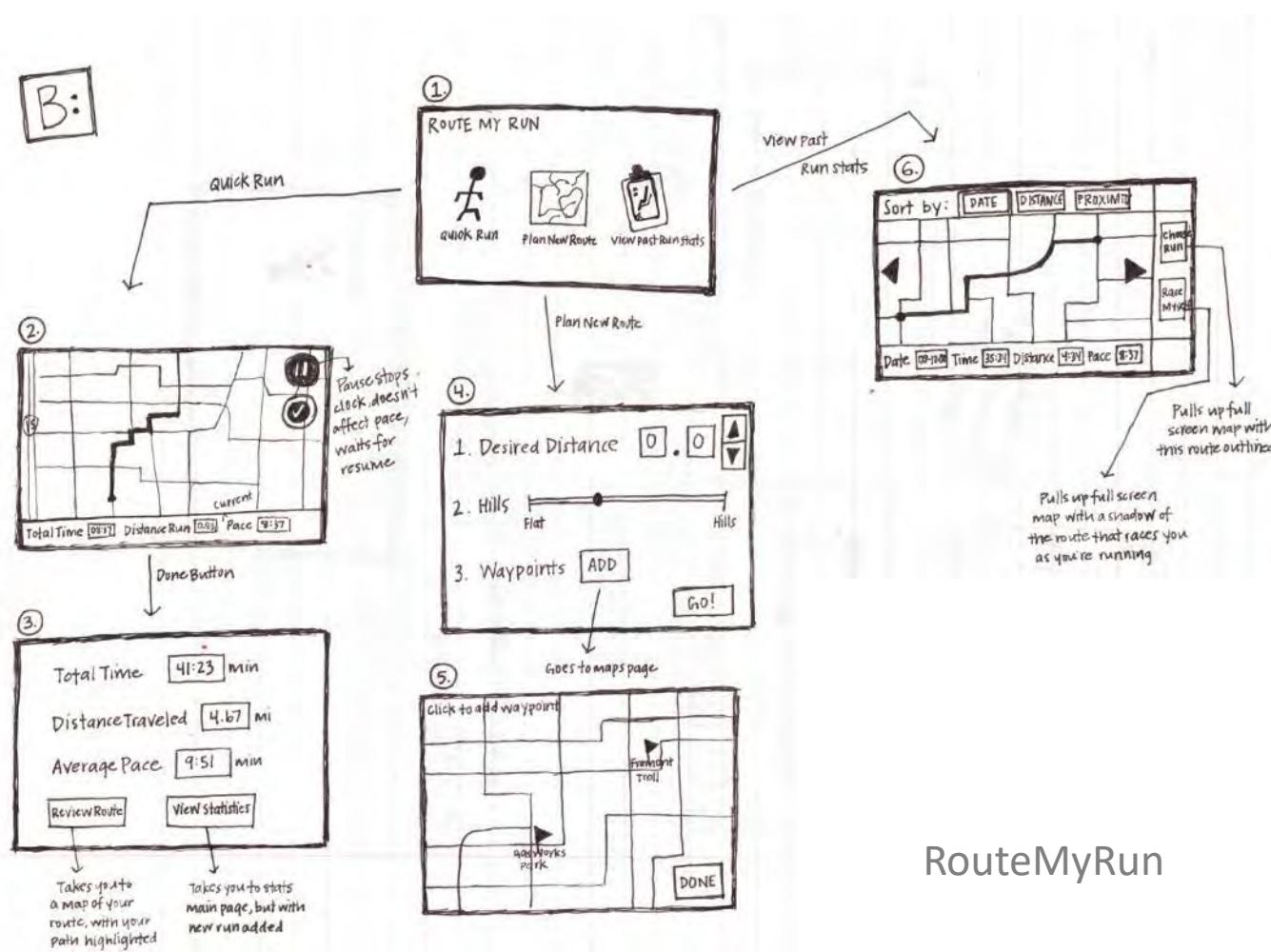
FoodWatch

# Sketching & Storyboarding



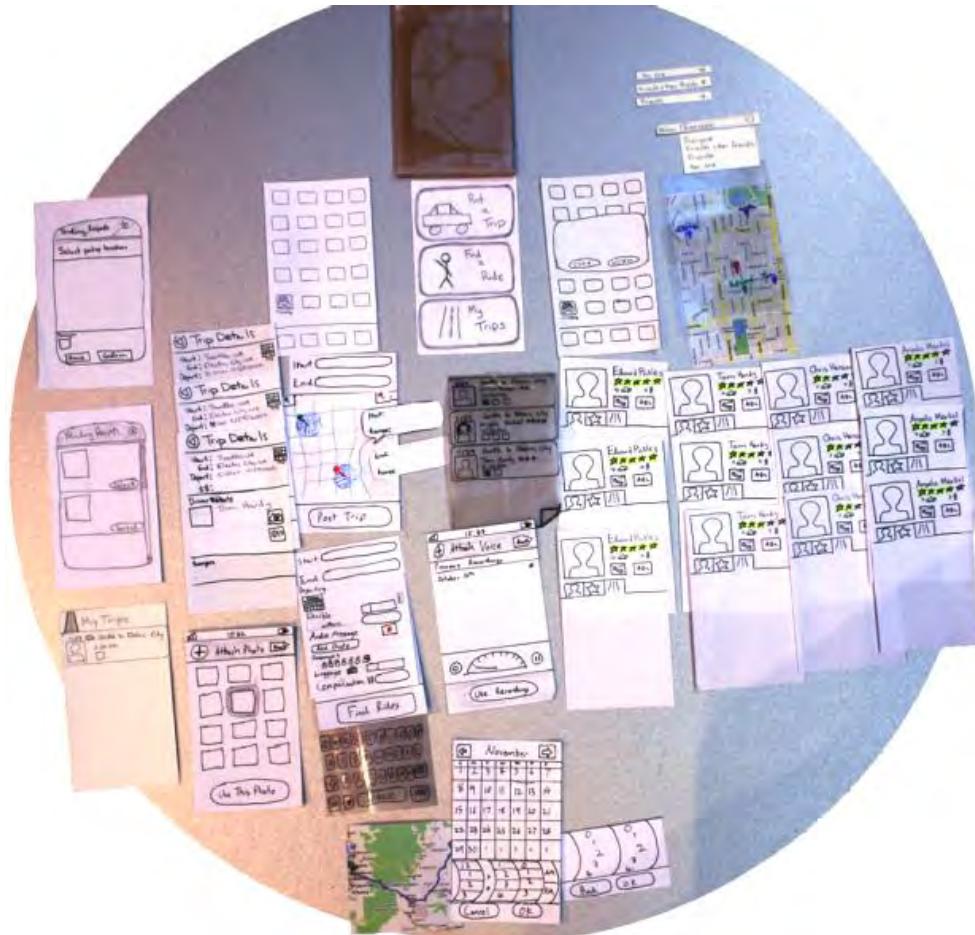
RideAlong

# Sketching & Storyboarding



RouteMyRun

# Low-Fidelity Prototyping & Testing



RideAlong

# Digital Mockup



Balance

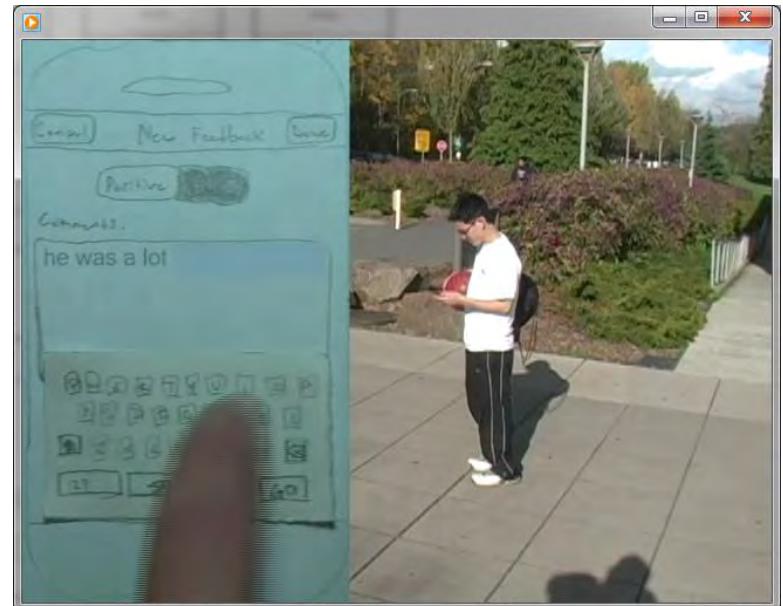


.calm

# Video Prototypes

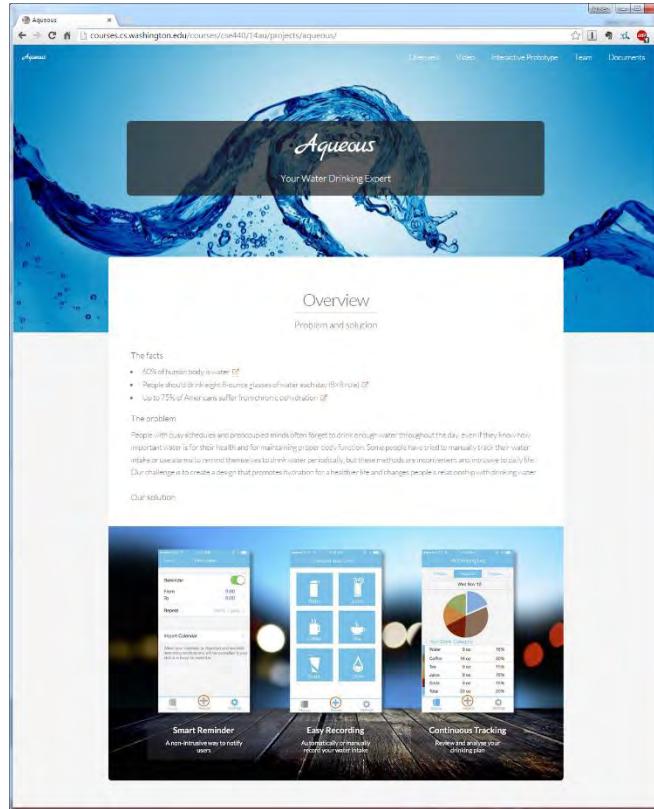


GetOut



PickUp

# Learn by Example from Prior Projects



Autumn 2014 - Aqueous:

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

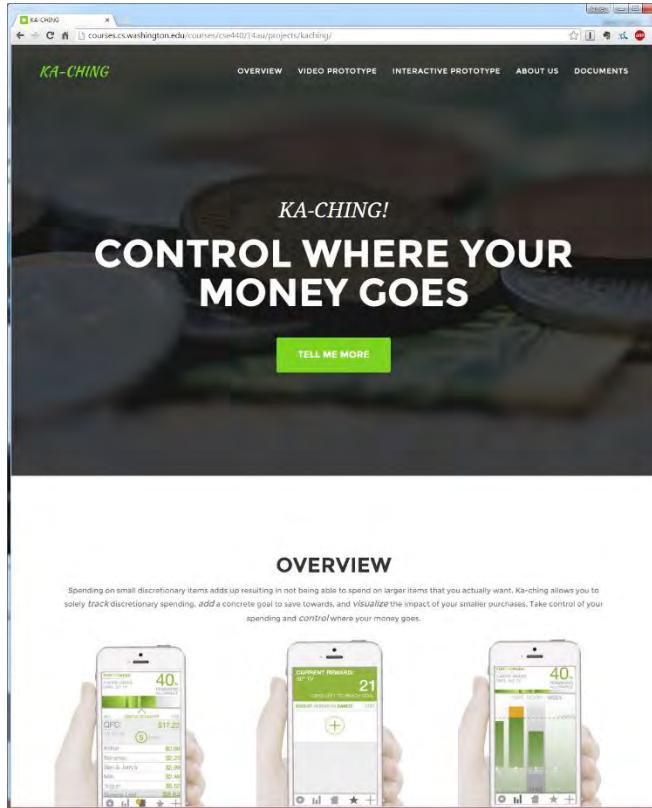
# Learn by Example from Prior Projects



## Autumn 2014 - IEP Connect:

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

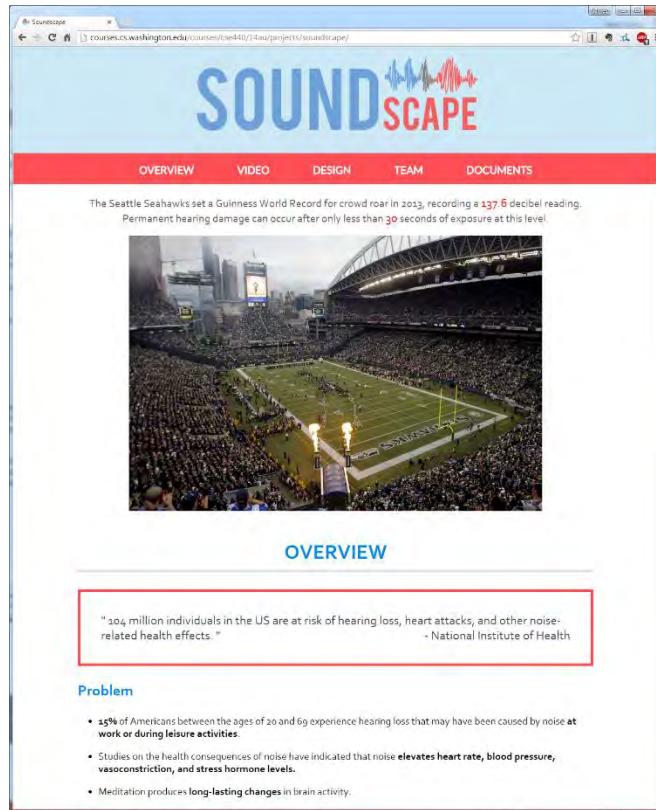
# Learn by Example from Prior Projects



Autumn 2014 - Ka-Ching:

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

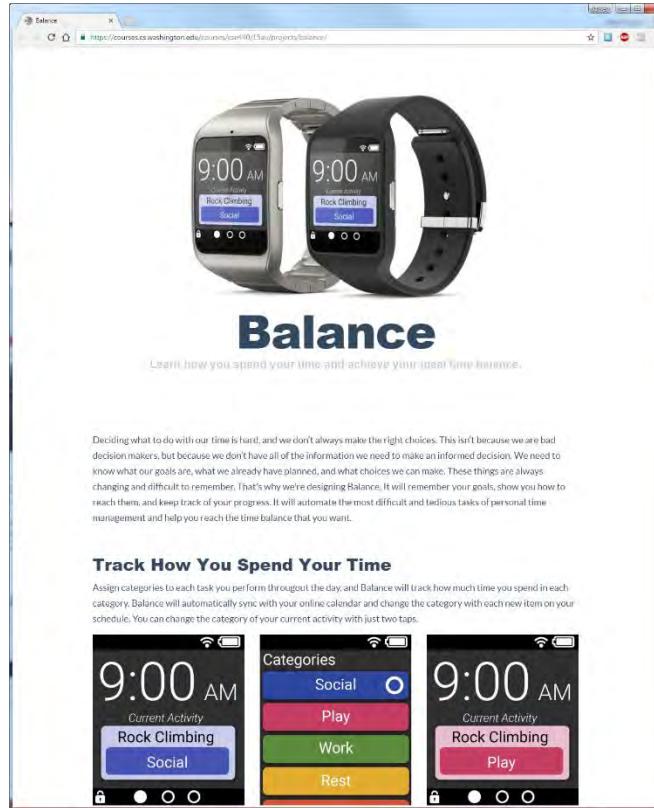
# Learn by Example from Prior Projects



## 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/>

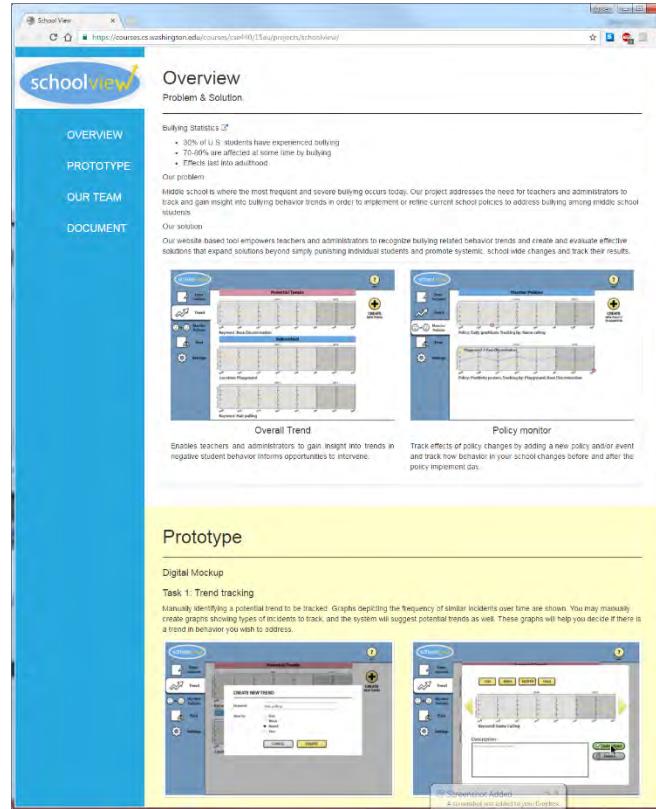
# Learn by Example from Prior Projects



Autumn 2015 - Poliscope:

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

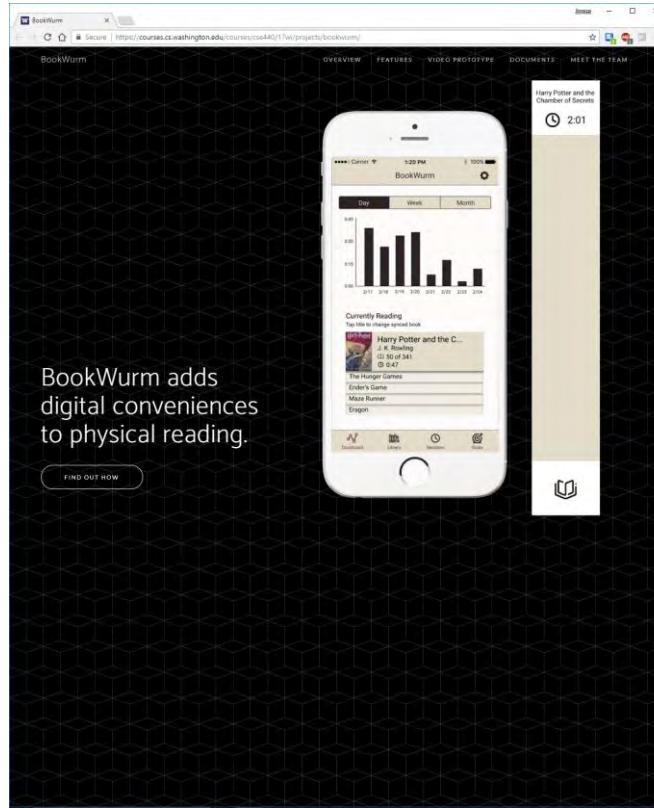
# Learn by Example from Prior Projects



## Autumn 2015 - School View:

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

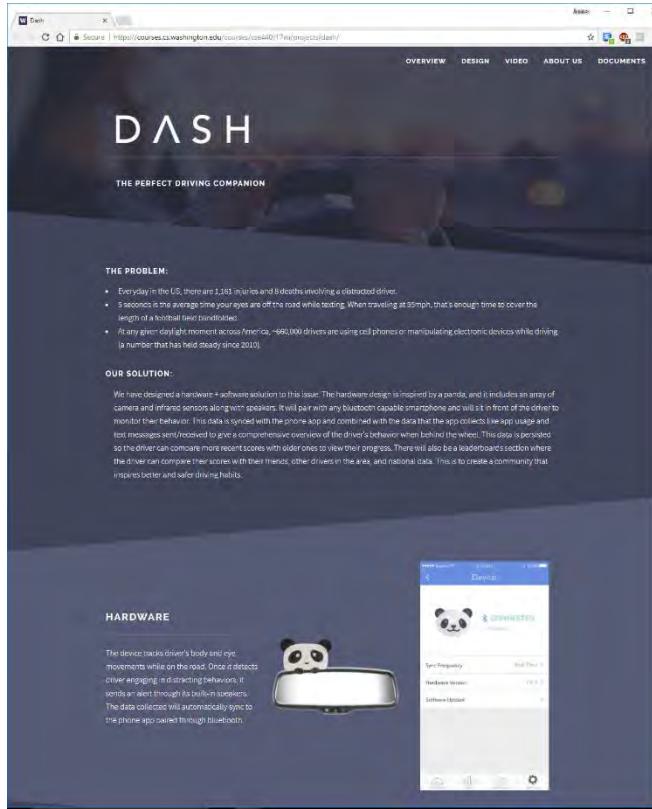
# Learn by Example from Prior Projects



Winter 2017 - BookWurm:

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

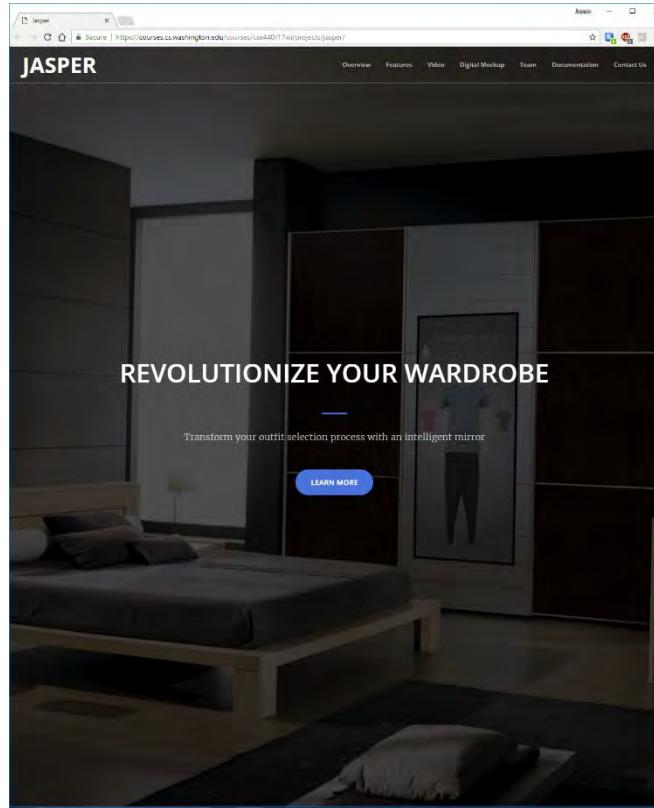
# Learn by Example from Prior Projects



## Winter 2017 - Dash:

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

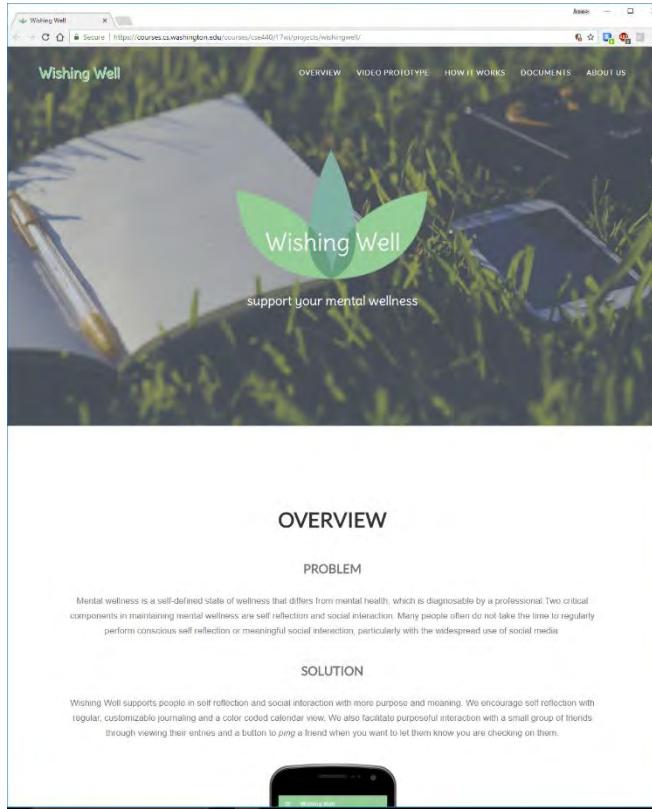
# Learn by Example from Prior Projects



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

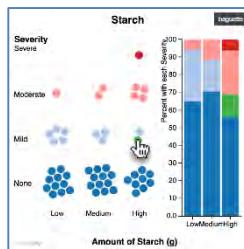
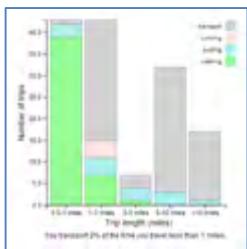
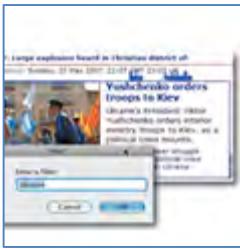
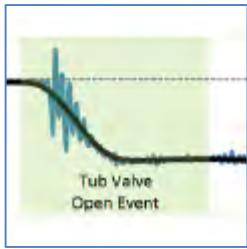
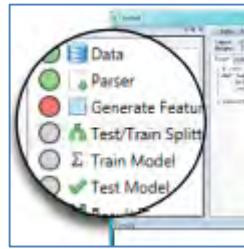
CSE 441: Advanced HCI

CSE 510: Advanced Topics in HCI

CSEP 510: Human-Computer Interaction

CSE 332: Data Structures

# Who We Are



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

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# 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

W CSE 440 - Calendar https://courses.cs.washington.edu/courses/cse440/17au/calendar.html

CSE 440 - Introduction to HCI - Autumn 2017

Home Projects Calendar

## Calendar

This page is still being migrated and developed. All content remains subject to change.

Sep 25	Sep 26	Sep 27	Sep 28	Sep 29
Nigini Away	Nigini Away	Nigini Away	Nigini Away Introduction, Project Overview, and Personal Informatics 12:30 - 1:20   PAA A110	Nigini Away, Kelley in All Sections Section 9:30 - 10:20   MGH 058 10:30 - 11:20   MGH 058 12:30 - 1:20   MOH 058 1:30 - 2:20   MGH 058
1a - Project Protocol (due Night Before Class)	Design of Everyday Things 12:00 - 1:20   PAA A110	1c - Project List (due Night Before Class)	1a - Project Brainstorm (due Night Before Section)	
Oct 2	Oct 3	Oct 4	Oct 5	Oct 6
Nigini Away	Nigini Away	Nigini Away	Nigini Away	Nigini Away
1b - Design Research Plan (due Night Before Class)	Design of Everyday Things 12:00 - 1:20   PAA A110	1e - Project List (due Night Before Class)	1c - Contexual Inquiry, Design Research 12:00 - 1:20   PAA A110	Section 9:30 - 10:20   MGH 058 10:30 - 11:20   MOH 058 12:30 - 1:20   MGH 058 1:30 - 2:20   MGH 058
Kaley Office Hour 3:30 - 4:30 CSE 632	Kaley Office Hour 2:00 - 3:00 CSE 220	Kaley Office Hour 2:00 - 3:00 CSE 220	Dhruv Office Hour 1:30 - 2:30 CSE 021	Dhruv Office Hour 1:30 - 2:30 CSE 021
James Office Hour 3:30 - 4:30 CSE 021	James Office Hour 3:30 - 4:30 CSE 632			2a - Project Iteration (done in Session)
Oct 9	Oct 10	Oct 11	Oct 12	Oct 13
Ch - Design Research Plan (due Night Before Class)	Lecture 12:00 - 1:20   PAA A110	Kaley Office Hour 2:00 - 3:00 CSE 220	Lecture 12:00 - 1:20   PAA A110	Section 9:30 - 10:20   MGH 058 10:30 - 11:20   MOH 058 12:30 - 1:20   MGH 058 1:30 - 2:20   MGH 058
Nigini Office Hour 3:30 - 4:30 CSE 021	Nigini Office Hour 3:30 - 4:30 CSE 632			Dhruv Office Hour 1:30 - 2:30 CSE 021
Oct 16	Oct 17	Oct 18	Oct 19	Oct 20
2b - Design Research Review (due Night Before Class)	Lecture 12:00 - 1:20   PAA A110	Kaley Office Hour 2:00 - 3:00 CSE 220	Lecture 12:00 - 1:20   PAA A110	Section 9:30 - 10:20   MGH 058 10:30 - 11:20   MOH 058 12:30 - 1:20   MGH 058 1:30 - 2:20   MGH 058
Nigini Office Hour 3:30 - 4:30 CSE 021	Nigini Office Hour 3:30 - 4:30 CSE 632			Dhruv Office Hour 1:30 - 2:30 CSE 021
Oct 23	Oct 24	Oct 25	Oct 26	Oct 27
James Away @ CCS Symposium	James Away @ CCS Symposium	Kaley Office Hour 2:00 - 3:00 CSE 220	Lecture 12:00 - 1:20   PAA A110	Section 9:30 - 10:20   MGH 058 10:30 - 11:20   MOH 058 12:30 - 1:20   MGH 058 1:30 - 2:20   MGH 058
2c - Design Check-in (due Night Before Class)	Lecture 12:00 - 1:20   PAA A110			Dhruv Office Hour 1:30 - 2:30 CSE 021
Nigini Office Hour 3:30 - 4:30 CSE 021				
Oct 30	Oct 31	Nov 1	Nov 2	Nov 3
On - Getting the Right Design (due Night Before Class)	Lecture 12:00 - 1:20   PAA A110	2d - Feminism (due Night Before Class)	Presentations 12:00 - 1:20   PAA A110	Presentations 9:30 - 10:20   MGH 058 10:30 - 11:20   MOH 058 12:30 - 1:20   MGH 058 1:30 - 2:20   MGH 058
Nigini Office Hour 3:30 - 4:30 CSE 021	Nigini Office Hour 3:30 - 4:30 CSE 632	Kaley Office Hour 2:00 - 3:00 CSE 220	Dhruv Office Hour 1:30 - 2:30 CSE 021	

# 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

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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

CS 440 - Assignment 1

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. Your 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.washington.edu/courses/1173784/assignments/3902306>

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 Poliscopic: [1b\\_poliscopic.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

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
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Be sure your presentation looks good:

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**Samples from Prior Offerings**

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- 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 KaChing: 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

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Some Reflection

Self-Tracking and Relevant Background

# Thousands of Health Monitoring Apps



# Activity and Medical Sensing Devices



Thermometer



Blood glucose meter

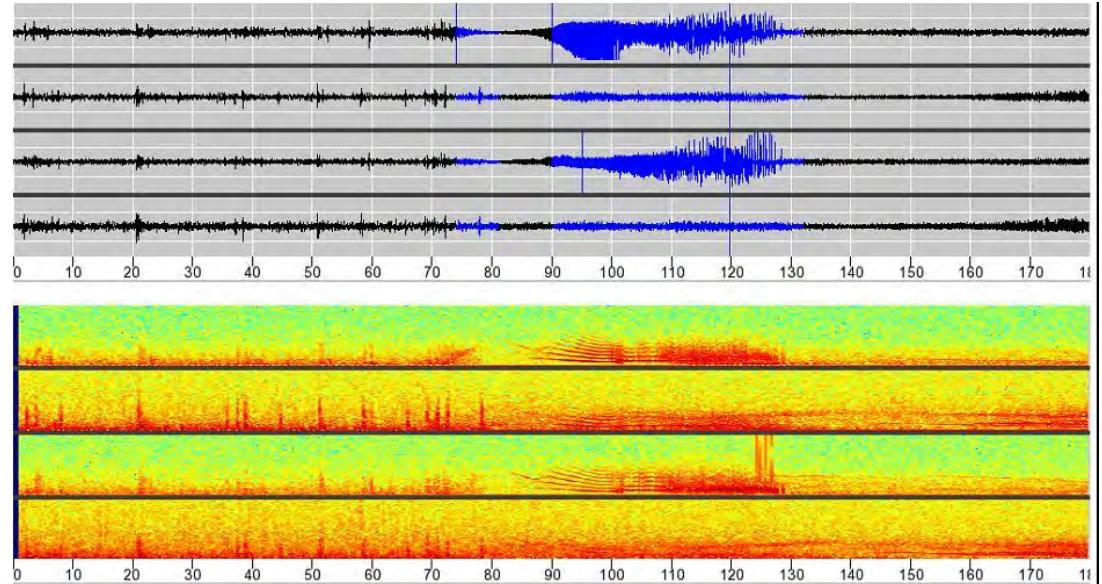


Blood pressure monitor



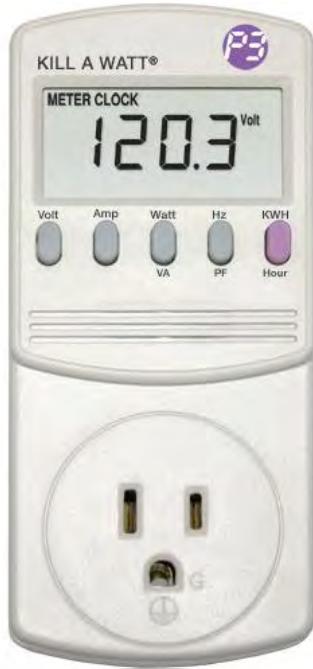
Heart rate monitor

# Medical Implants



NeuroPace

# Sustainability Tracking



Kill A Watt



Belkin  
WeMo Water



Automatic

# Location and Activity



FitBit



Garmin



FitBark



Moves

# Time Tracking



RescueTime

# Finances

**mint.com**

WHAT IS MINT? HOW IT WORKS FEATURES COMMUNITY BLOGS

Log In Sign Up

It's easy to understand what's going on with your money.

Get a handle on your finances the **free** and fast way. Mint does all the work of organizing and categorizing your spending for you... See where every dime goes and make money decisions you feel good about.

Free! Get Started

Sign up

By clicking "Sign up" you agree to the

Budget Reports

All Accounts: \$34,612.45

Budget Accounts: Checking: \$20,224.40 Credit Card: \$1,000.00 Savings: \$13,387.65

Spending Over Time

Spending by Category

Spending by Payee

Income vs Expenses

Net Worth

SUMMARY: All Salaries: \$34,612.45 Categories: 100+ Payees: 100+ Accounts: All Accounts

Net Worth: \$34,612.45 Income: \$34,644.62 Net: \$2,032.18

Bar chart showing Net Worth over time.

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.**

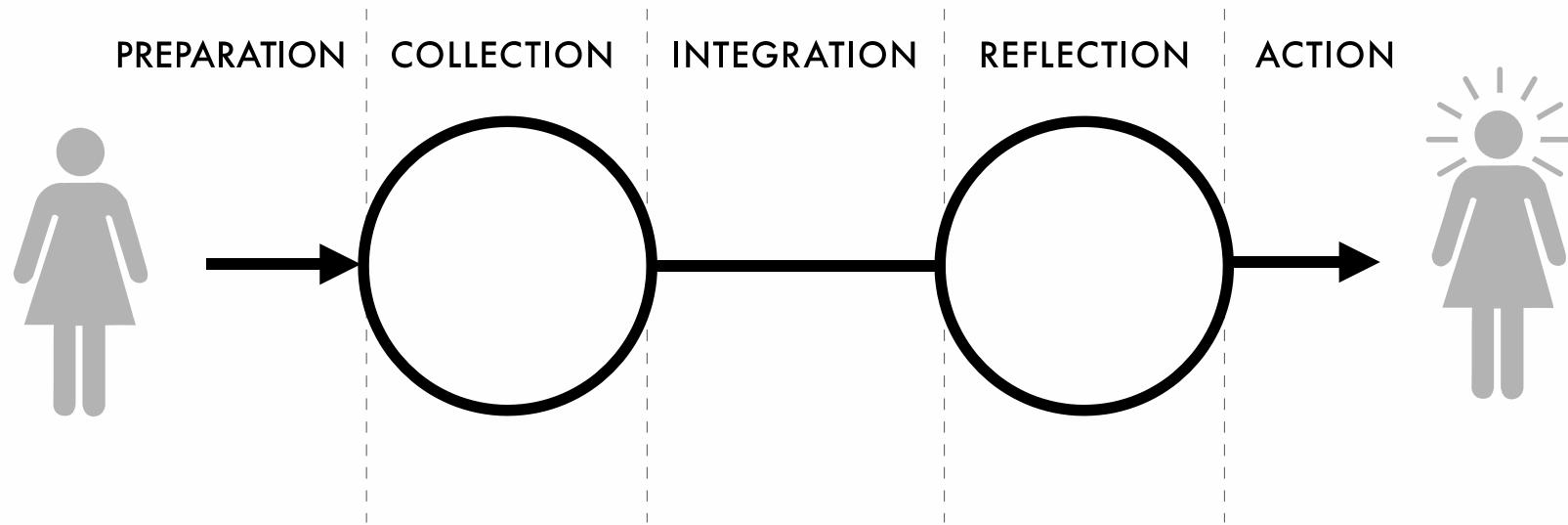
	S.	M.	T.	W.	T.	F.	S.
T.							
S.	*	*		*		*	
O.	**	*	*		*	*	*
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F.		*			*		
I.			*				
S.							
J.							
M.							
C.							
T.							
C.							
H.							

# 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



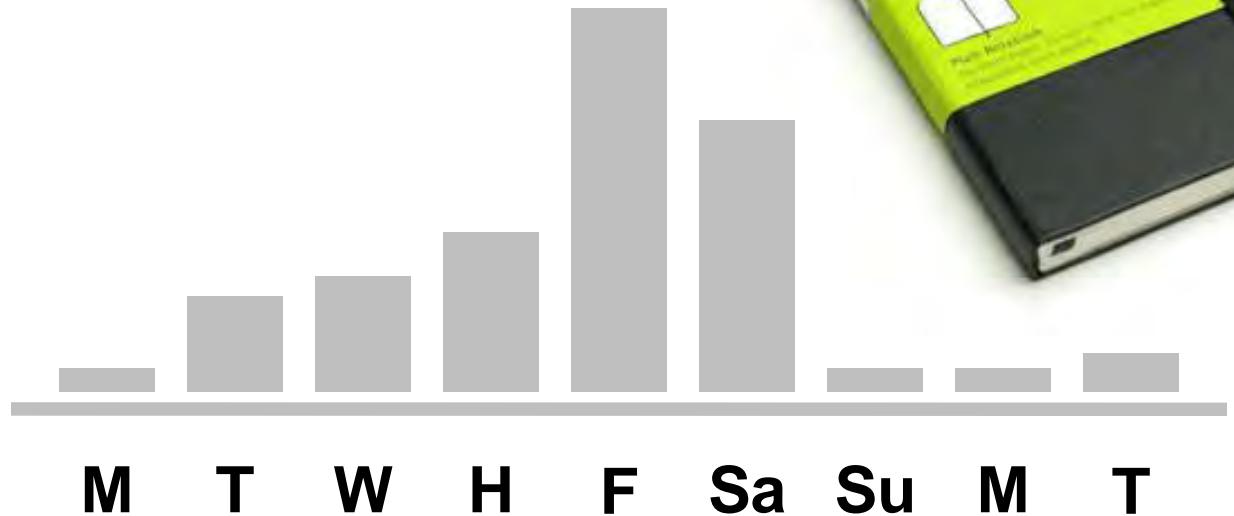
Li I., Dey A., Forlizzi J. *CHI 2010.*  
“A Stage-Based Model of Personal Informatics Systems”

# Collection



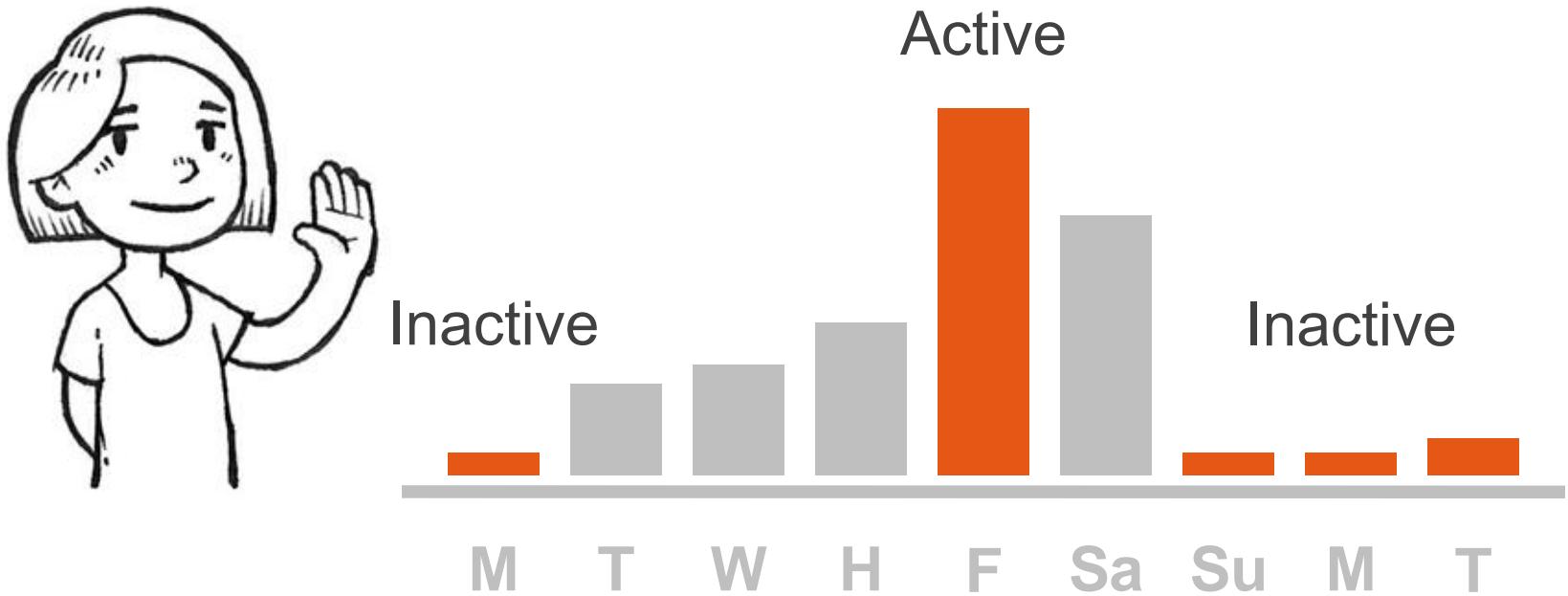
Li I., Dey A., Forlizzi J. *CHI 2010.*  
“A Stage-Based Model of Personal Informatics Systems”

# Integration



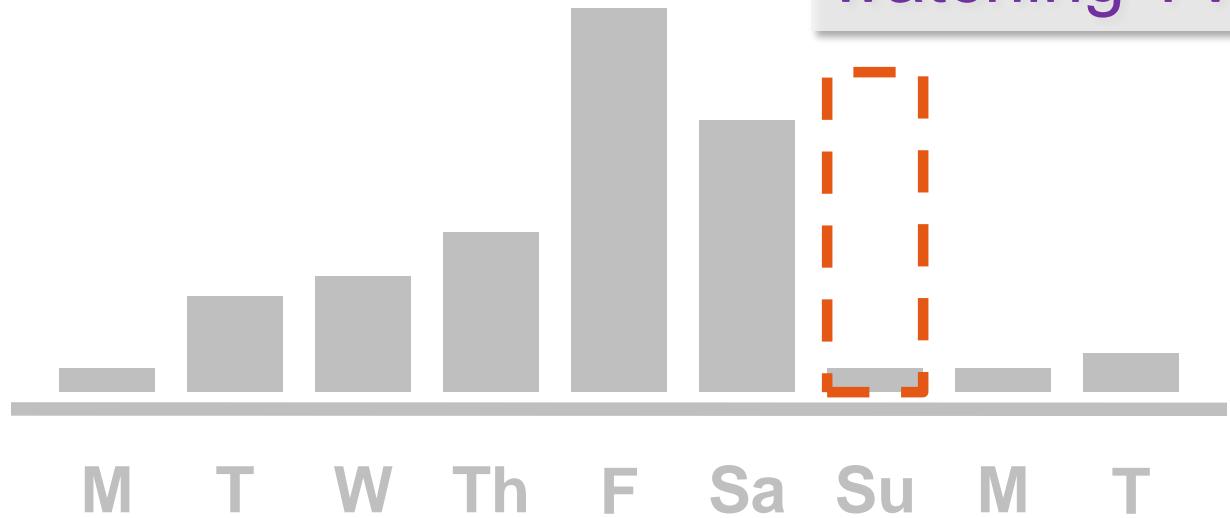
Li I., Dey A., Forlizzi J. *CHI 2010.*  
“A Stage-Based Model of Personal Informatics Systems”

# Reflection



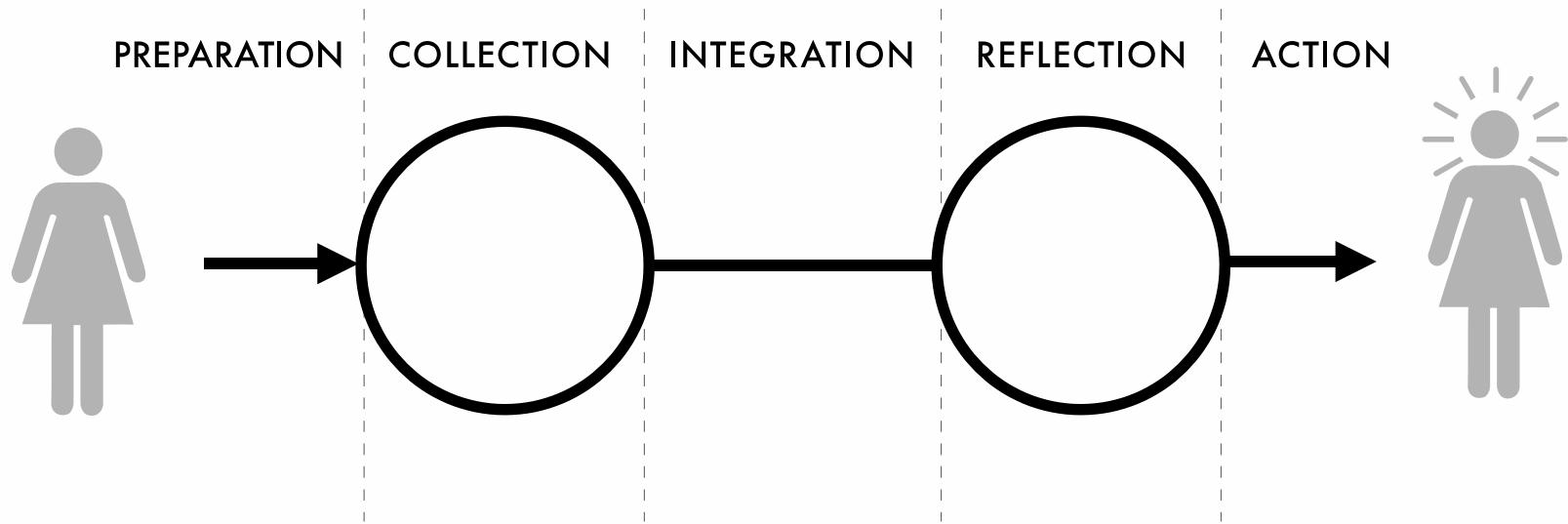
Li I., Dey A., Forlizzi J. *CHI 2010.*  
“A Stage-Based Model of Personal Informatics Systems”

# Action



Walk in park  
instead of  
watching TV

# 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

The screenshot shows the Quantified Self website. At the top, there's a logo with 'QS' and the text 'Quantified Self' with the tagline 'self knowledge through numbers'. Below the logo are links for 'ABOUT', 'VIDEOS', and 'FORUMS'. A search bar is on the right. The main content area features a video thumbnail of Mark Moschel speaking. The video player shows a play button, a timestamp of '11:24', and 'HD' and 'vimeo' buttons. Below the video, there's a 'Share this:' button with links to various social media platforms. To the right of the video, there's a sidebar for the 'Quantified Self Europe Conference' in Amsterdam, dated May 10-11, 2014. It also includes sections for 'Make a Sparktweet' and 'QS Meetup Groups' with a list of locations.

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

What I Learned

- What a good nights sleep looks like and what affects that for me

Your sleep pattern asleep active

zzzz YOUR SLEEP EFFICIENCY 97%

11pm 12am 1am 2am 3am 4am

Time to asleep 5 Times awakened You were in bed 8hrs 27min

Your sleep pattern asleep active

11pm 12am 1am 2am 3am 4am 5am 6am 7am 8am

Actual sleep time 8hrs 5min You were in bed 11pm 12am 1am 2am 3am 4am 5am 6am 7am 8am

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”

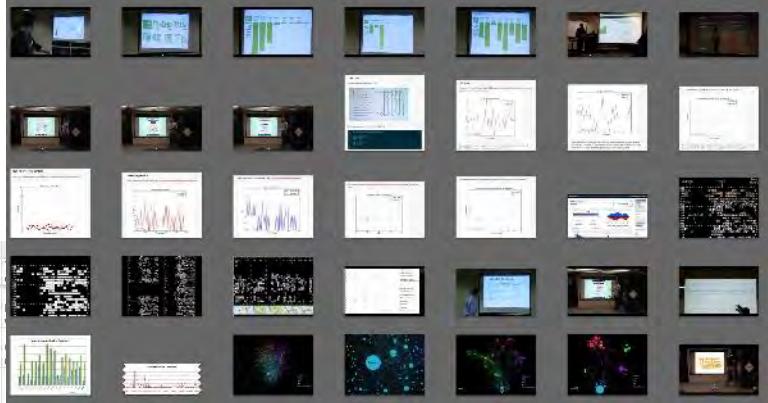
# Analysis



## Themes

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

## Visualizations



## 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

# 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

# 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)

# Building Custom Tools



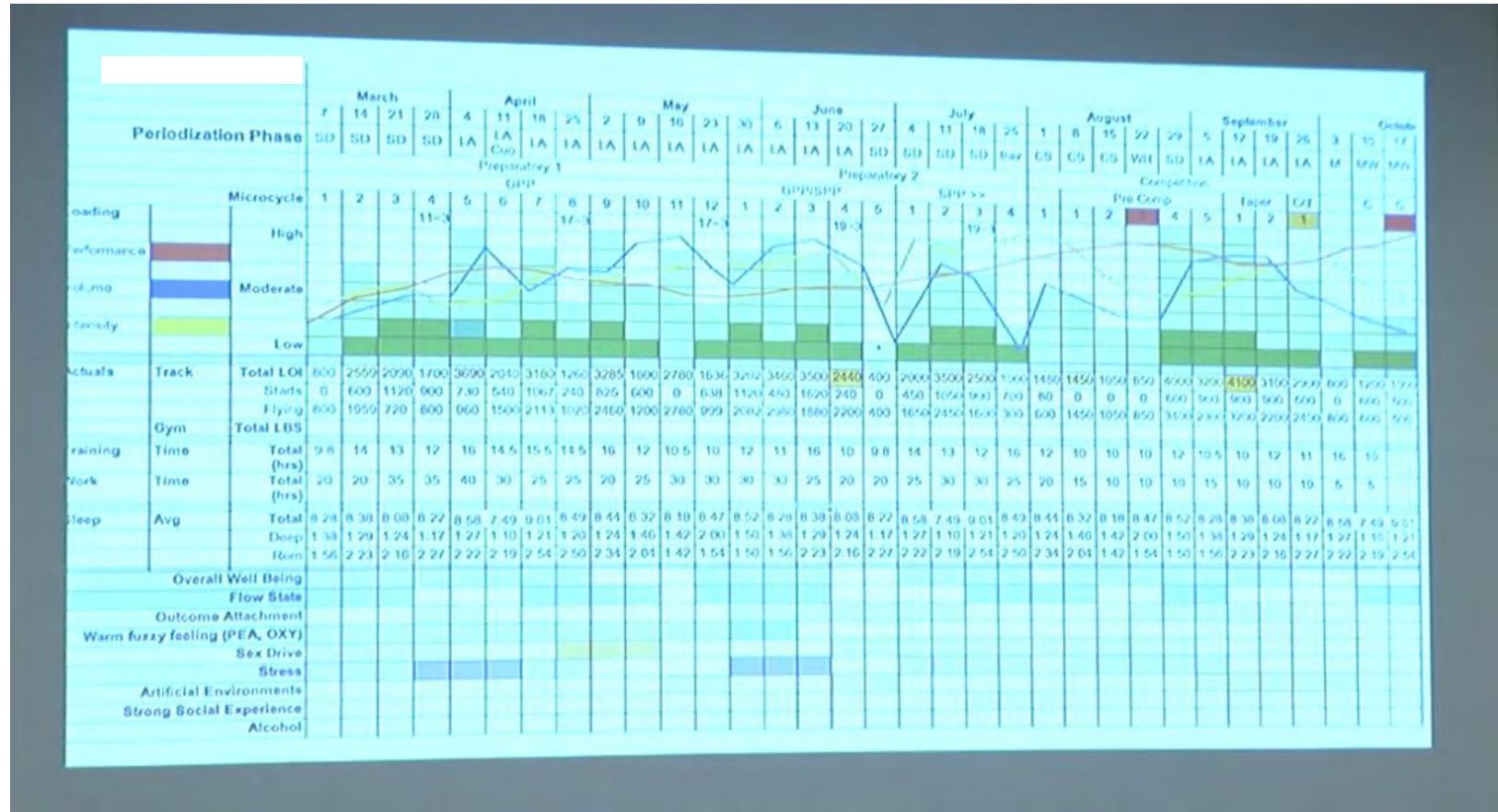
Captures smile via wearable sensing  
Provides real-time feedback



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

# 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...”

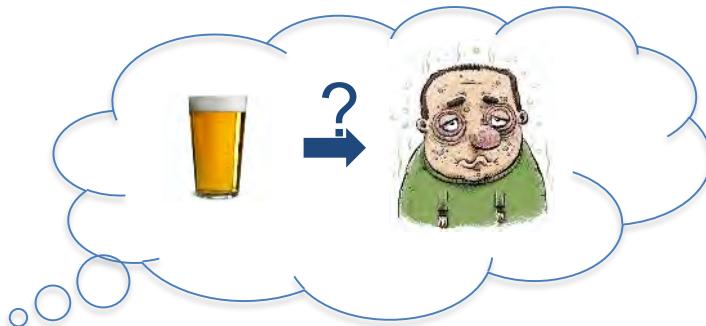
People lack clues on what to track

Missing information on how to improve outcome

They track the wrong information

# Lacking Scientific Rigor

Conduct self-experimentations without control or without addressing confounding factors



And they conduct flawed experiments

# 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

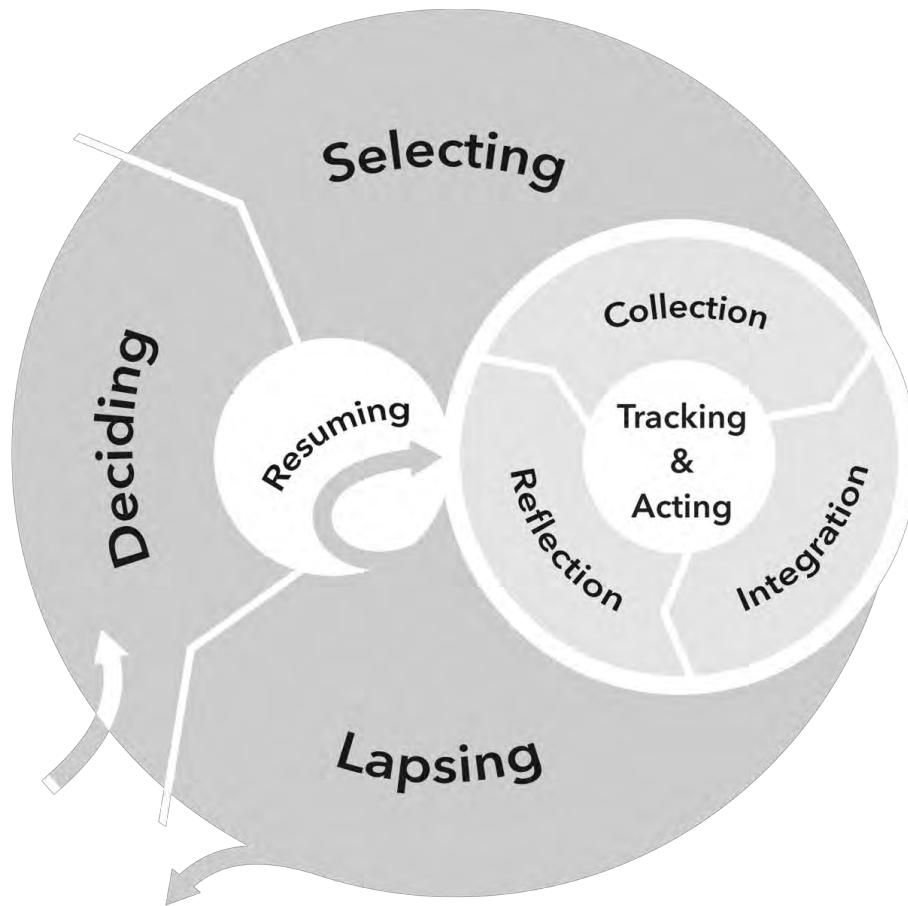
Judgment and choosing not to journal

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)

# 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

# CSE 440: Introduction to HCI

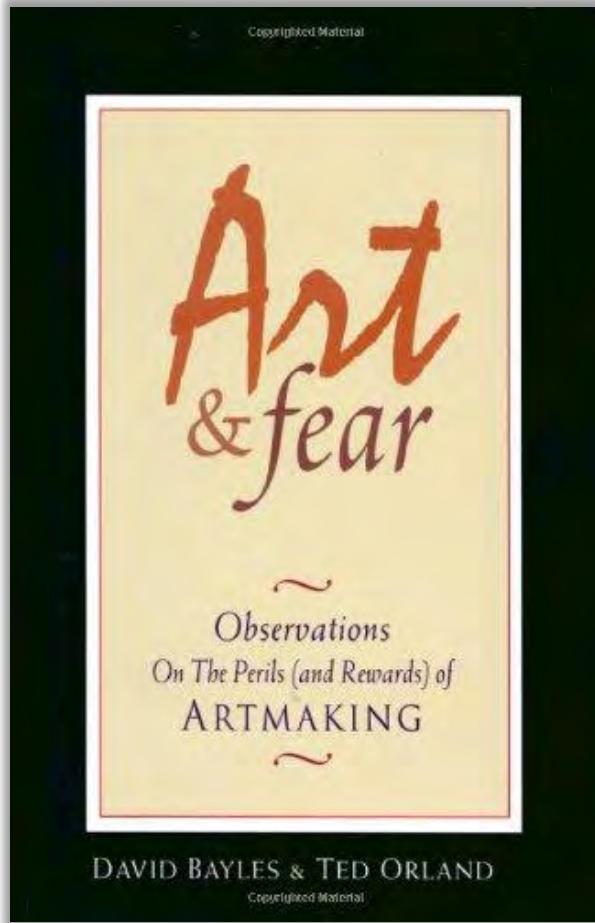
User Interface Design, Prototyping, and Evaluation

Lecture 02:  
Design Diamond

Tuesday / Thursday  
12:00 to 1:20

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

# 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?

# 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”

# 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:

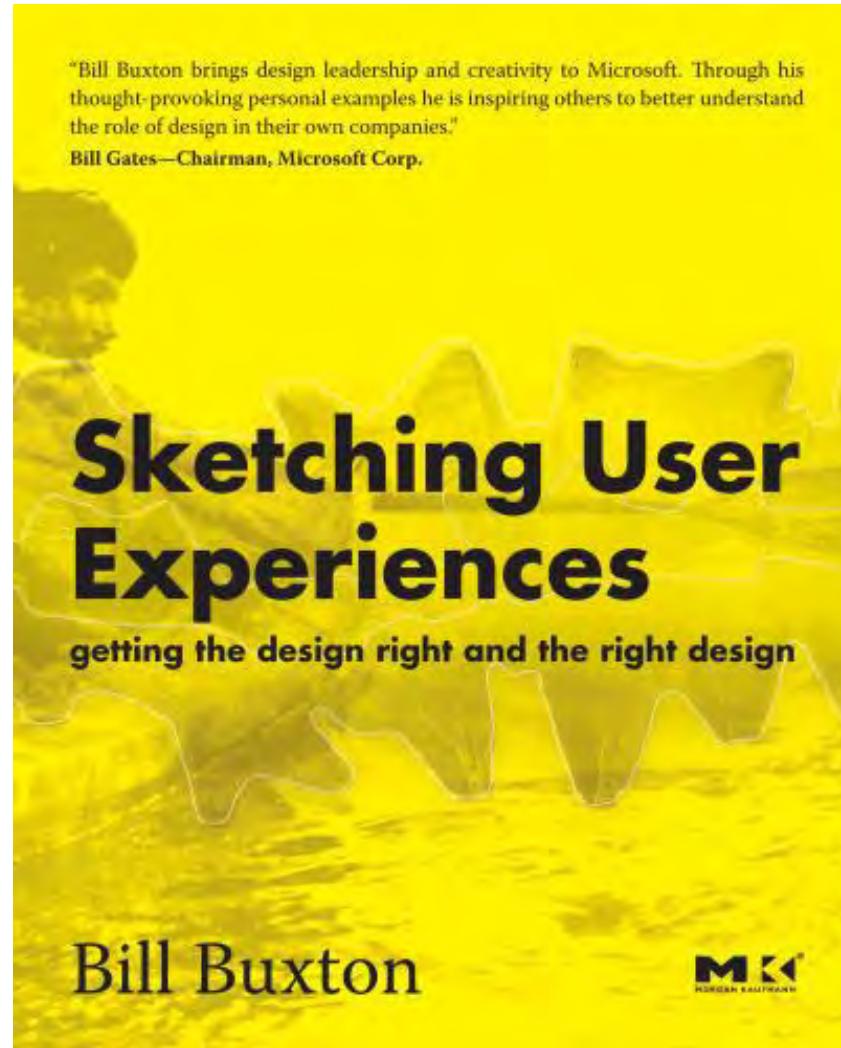
Describe an iterative design process

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

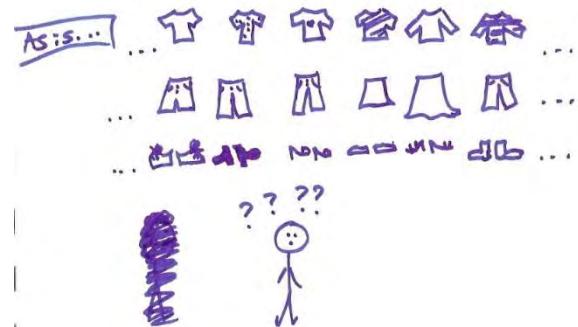
# Sketching User Experiences



# Sketching



## STORE FOR THE STYLE-CHALLENGED

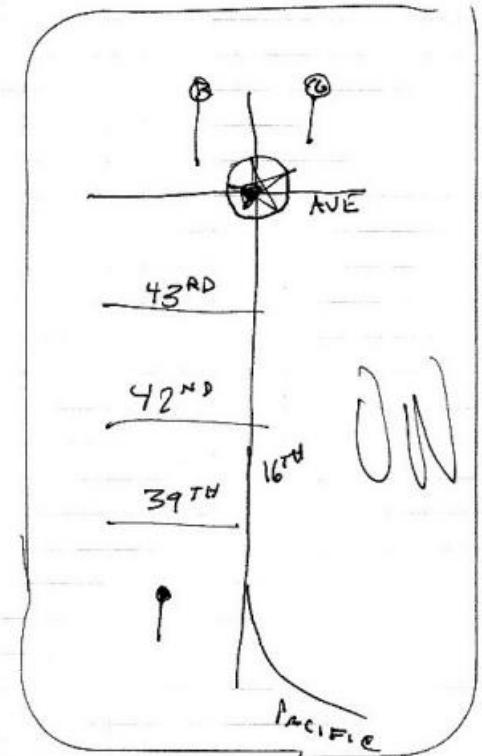


### As it should be...

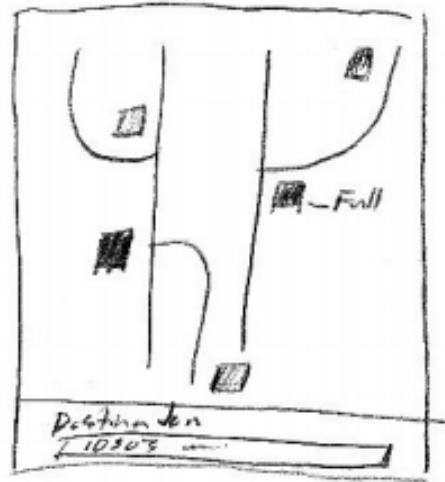


(pre-selected to match so you don't  
have to choose.)

# Sketching

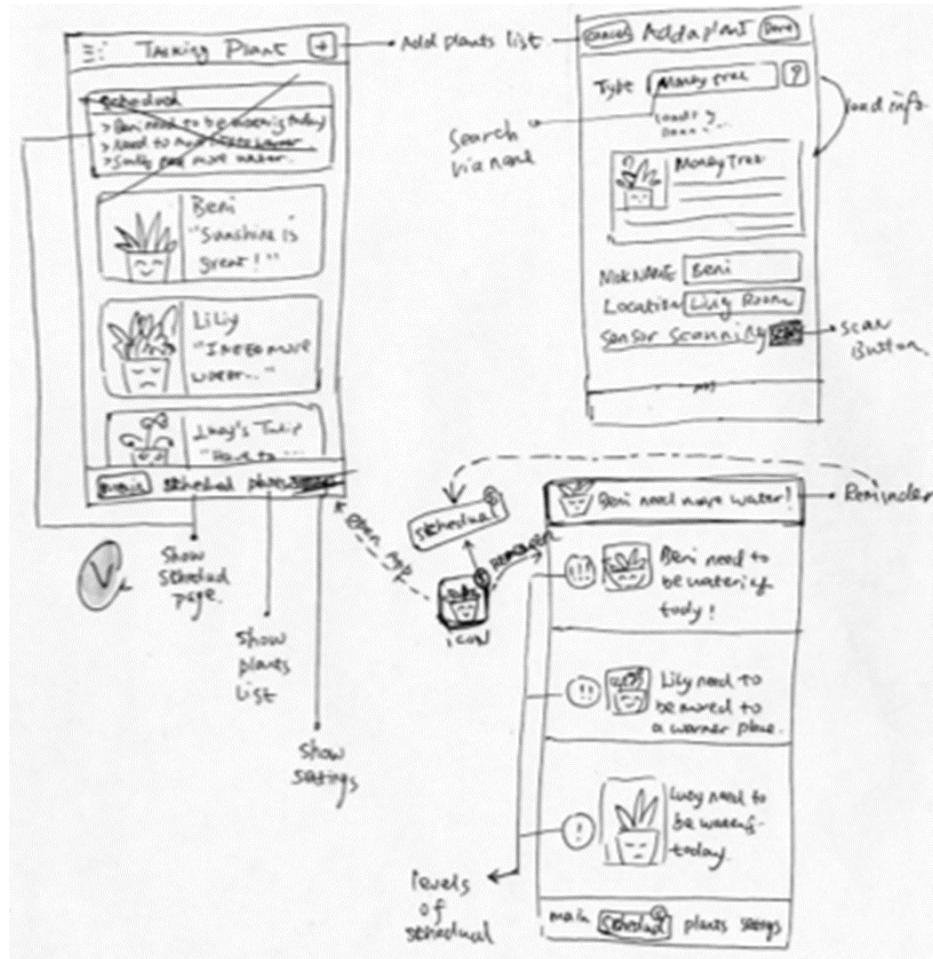


MAP SHOWING PARKING  
AVAILABILITY BASED ON INPUTTED  
DATA, INPUTTED ON MAP



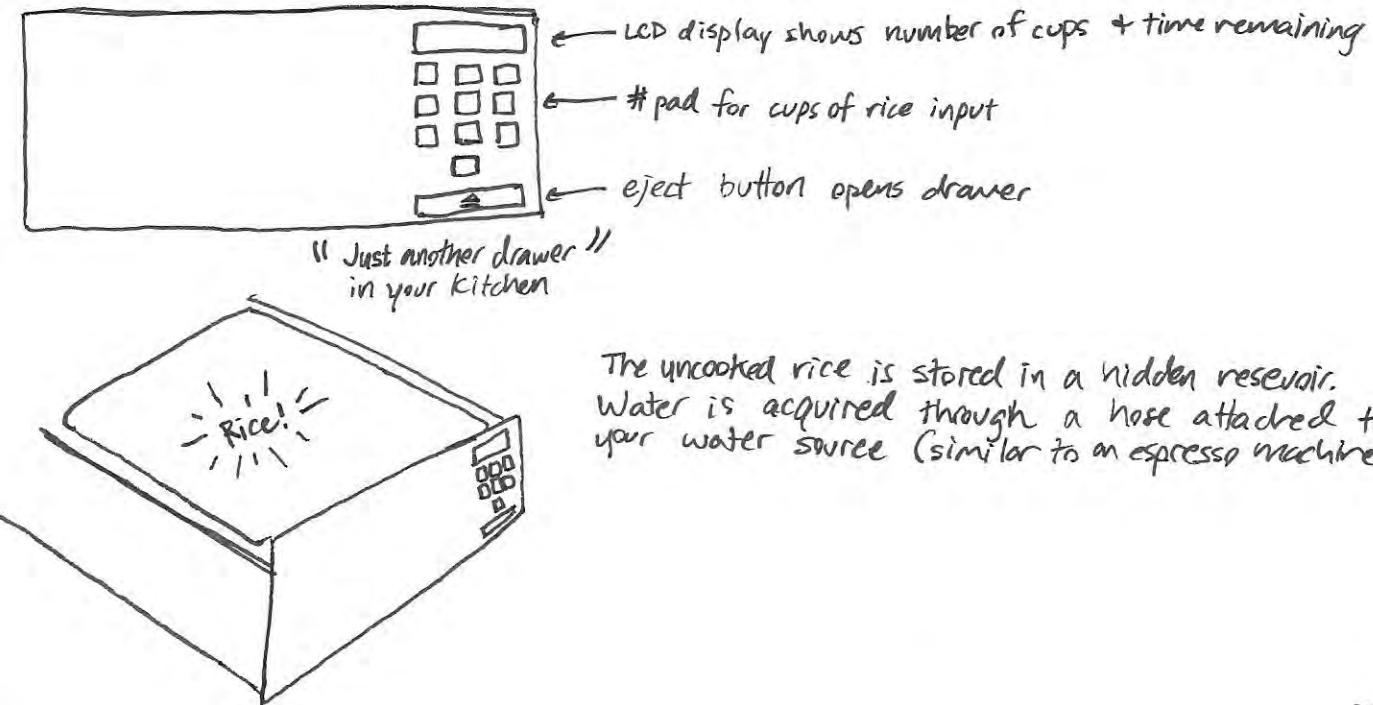
- different colors
- highlights availability
-

# Sketching



# Sketching

## UBIQUITOUS RICE COOKER



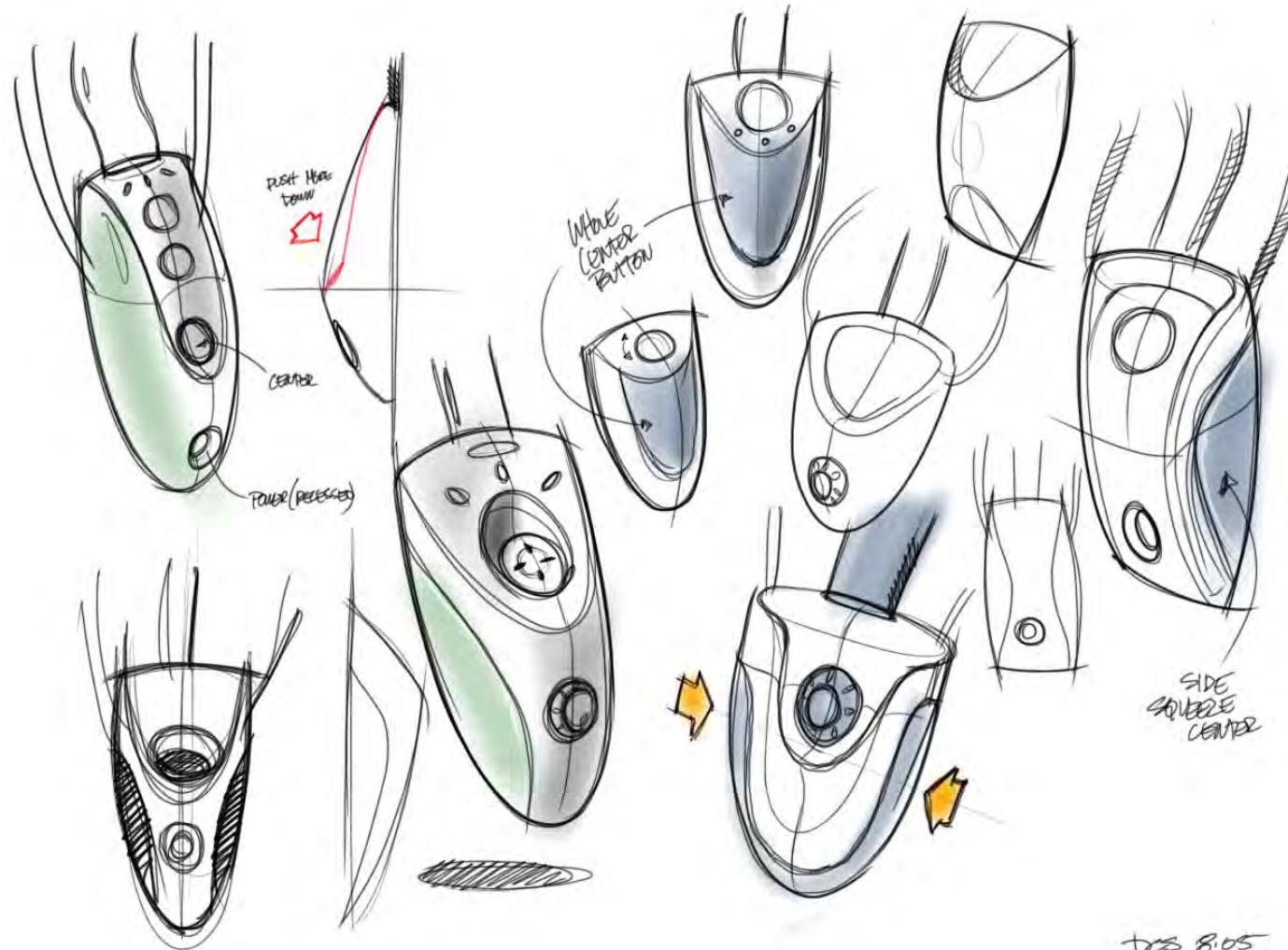
v

f

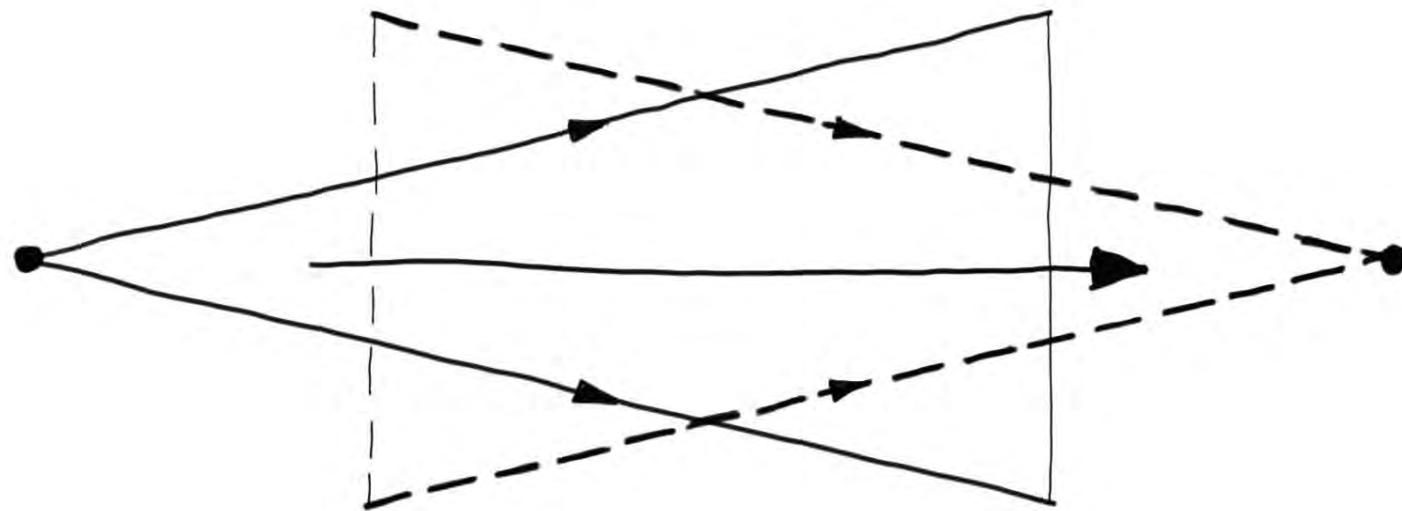
# Sketching

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?

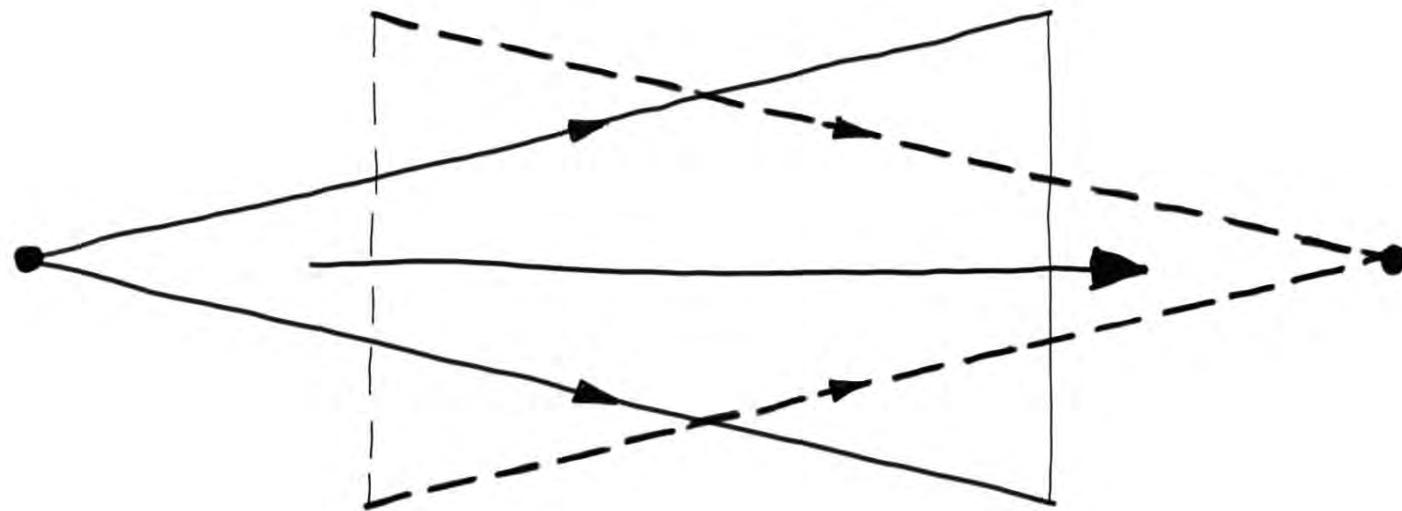
Hook design with reusable bags

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”

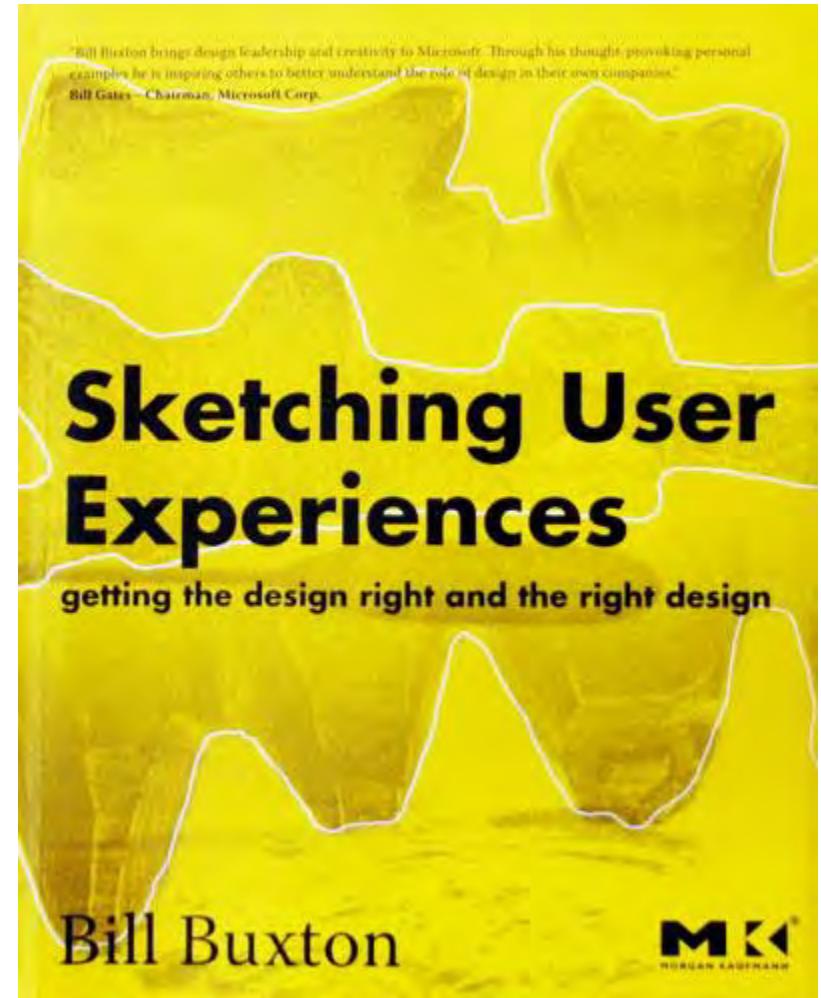
“the creativity that you bring to enumerating meaningfully distinct options from which to choose”



# 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

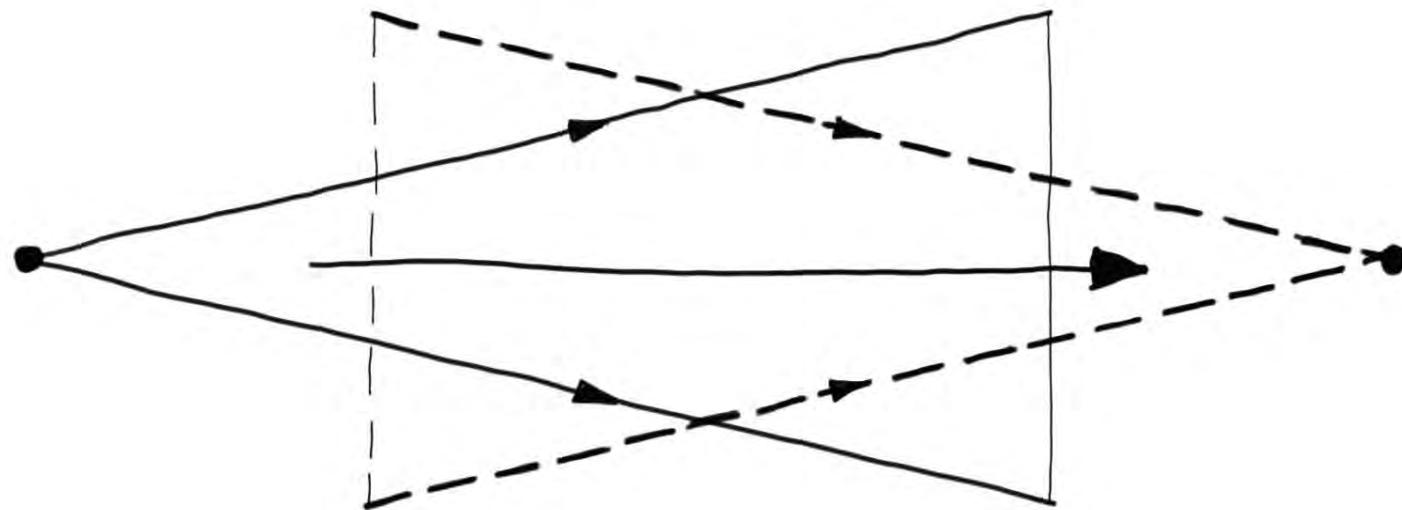
# Design as Choice

**Elaboration**

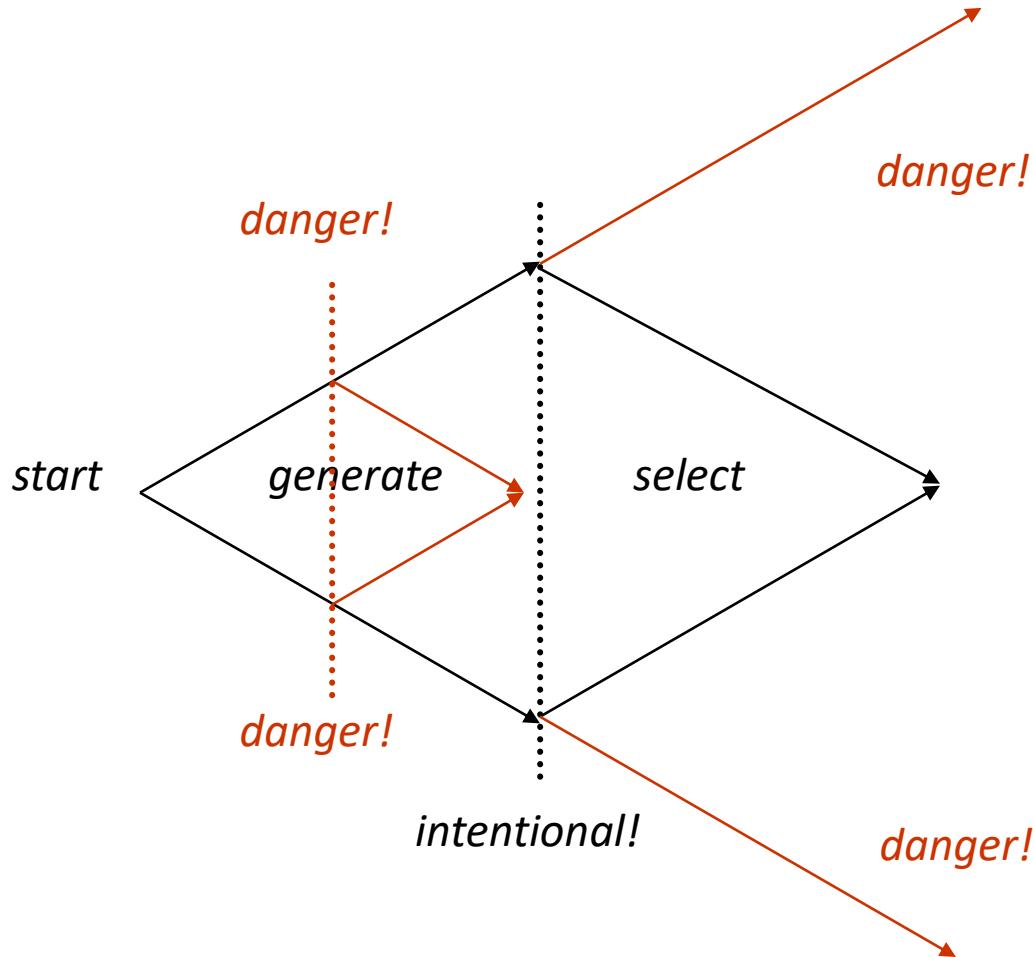
palette of choices

**Reduction**

heuristics to choose



# The Design Diamond

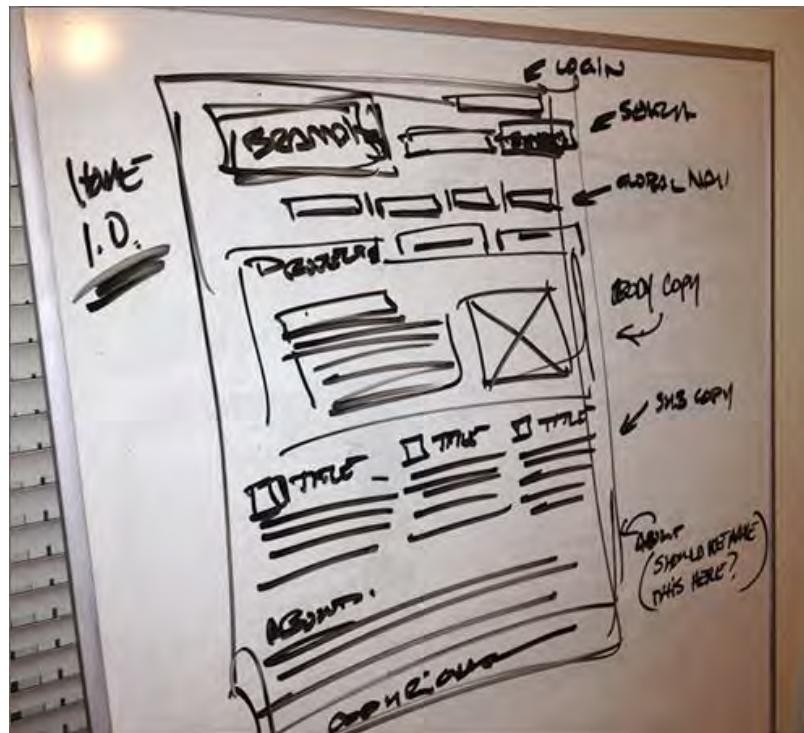


# Properties of Sketches

Quick	Distinct Gesture
Timely	Minimal Detail
Inexpensive	Appropriate Refinement
Disposable	Suggest and Explore
Plentiful	Ambiguous
Clear Vocabulary	

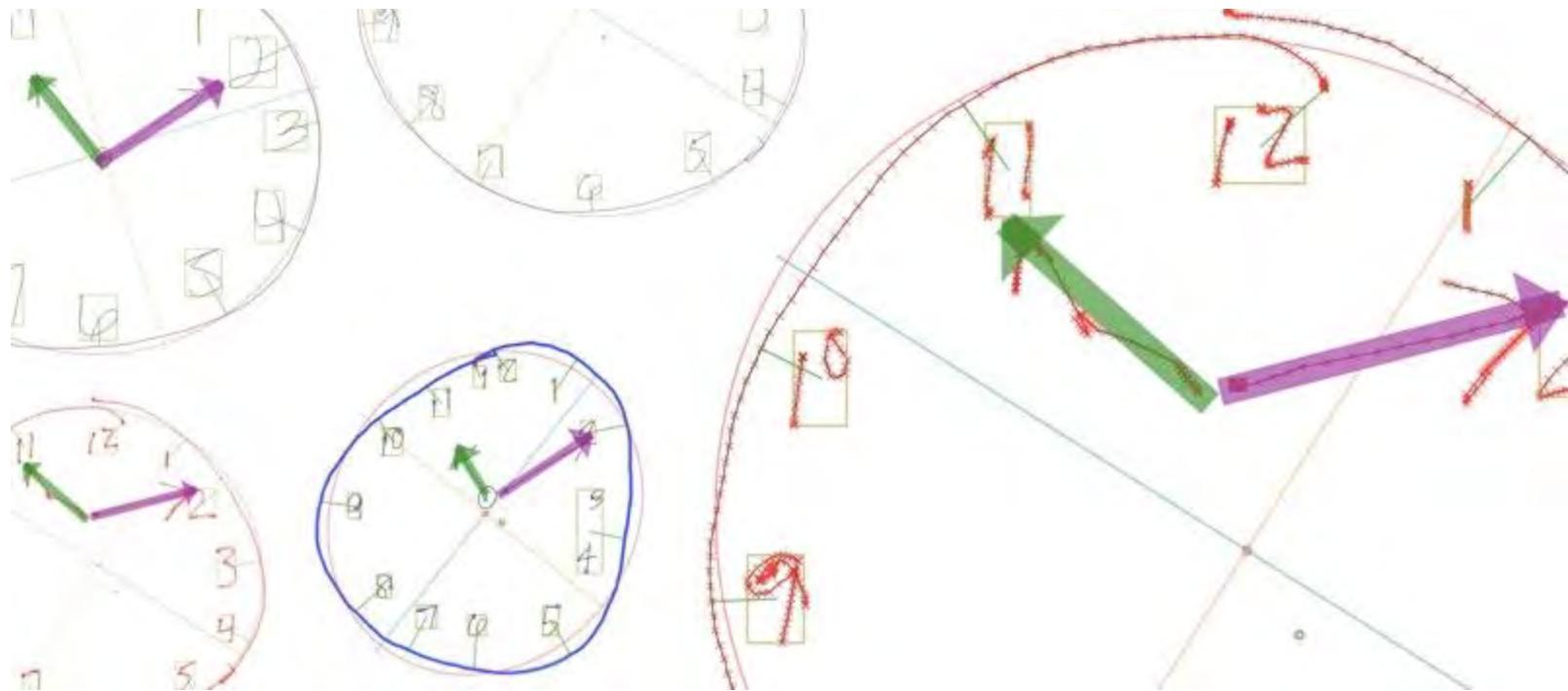
# Quick

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

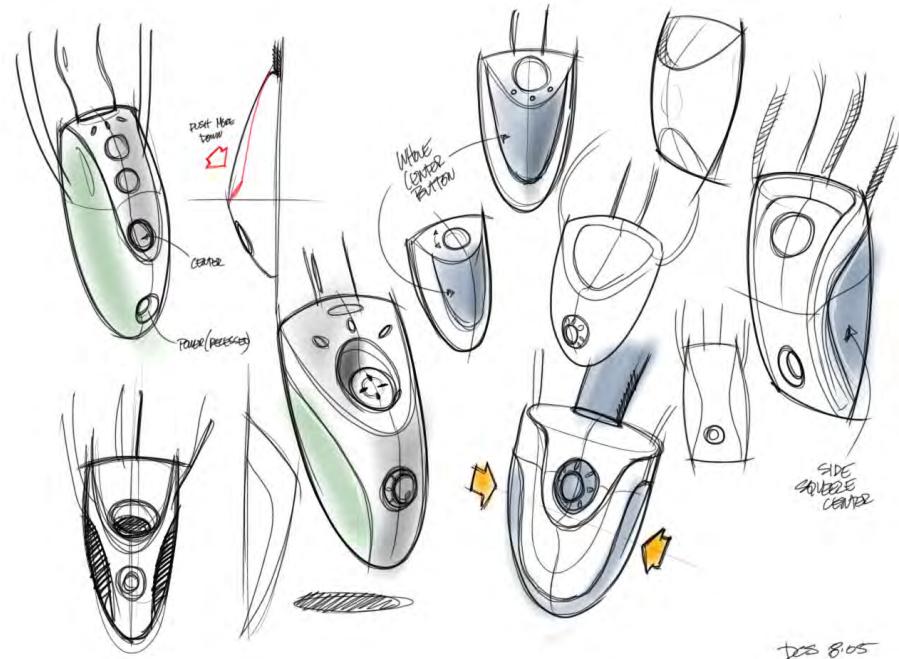
But they are not "worthless"



# Plentiful

Sketches do not exist in isolation

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



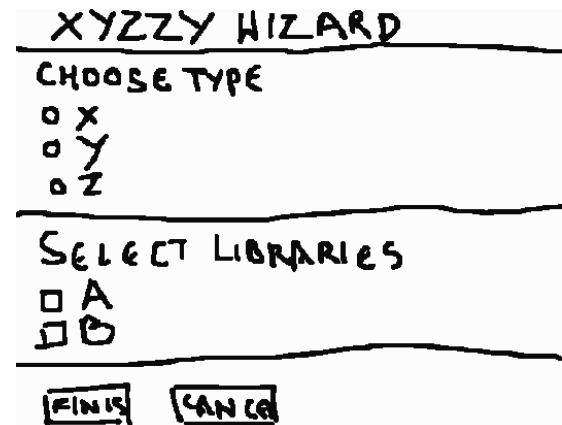
DES 805

# 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

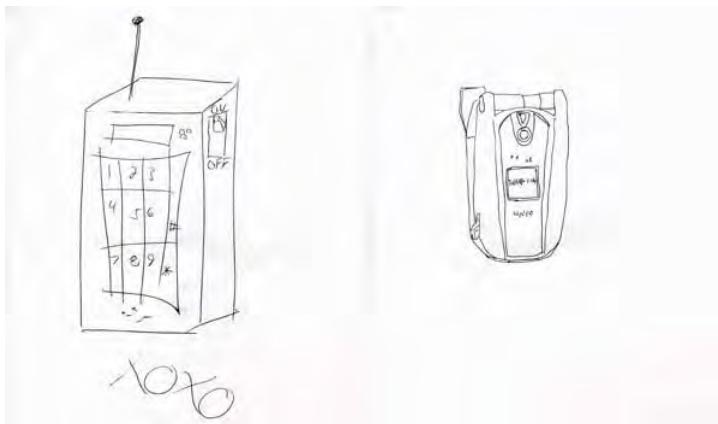
Physical sketches have their own vocabulary



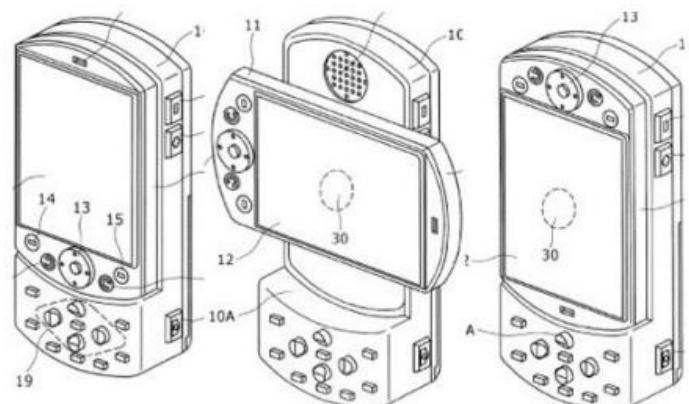
# Distinct Gesture

Fluidity of sketches gives them  
a sense of openness and freedom

Opposite of engineering drawing,  
which is tight and precise

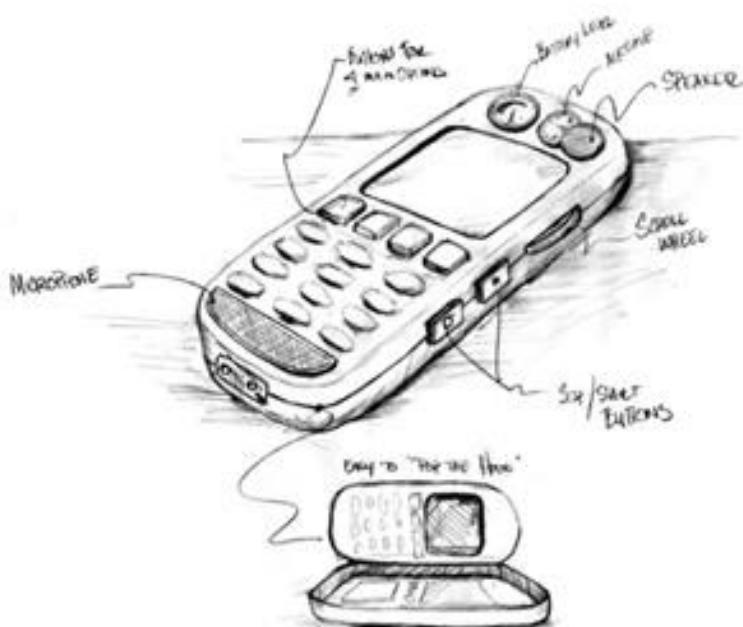


vs.



# Minimal Detail

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



Create JSP for this page

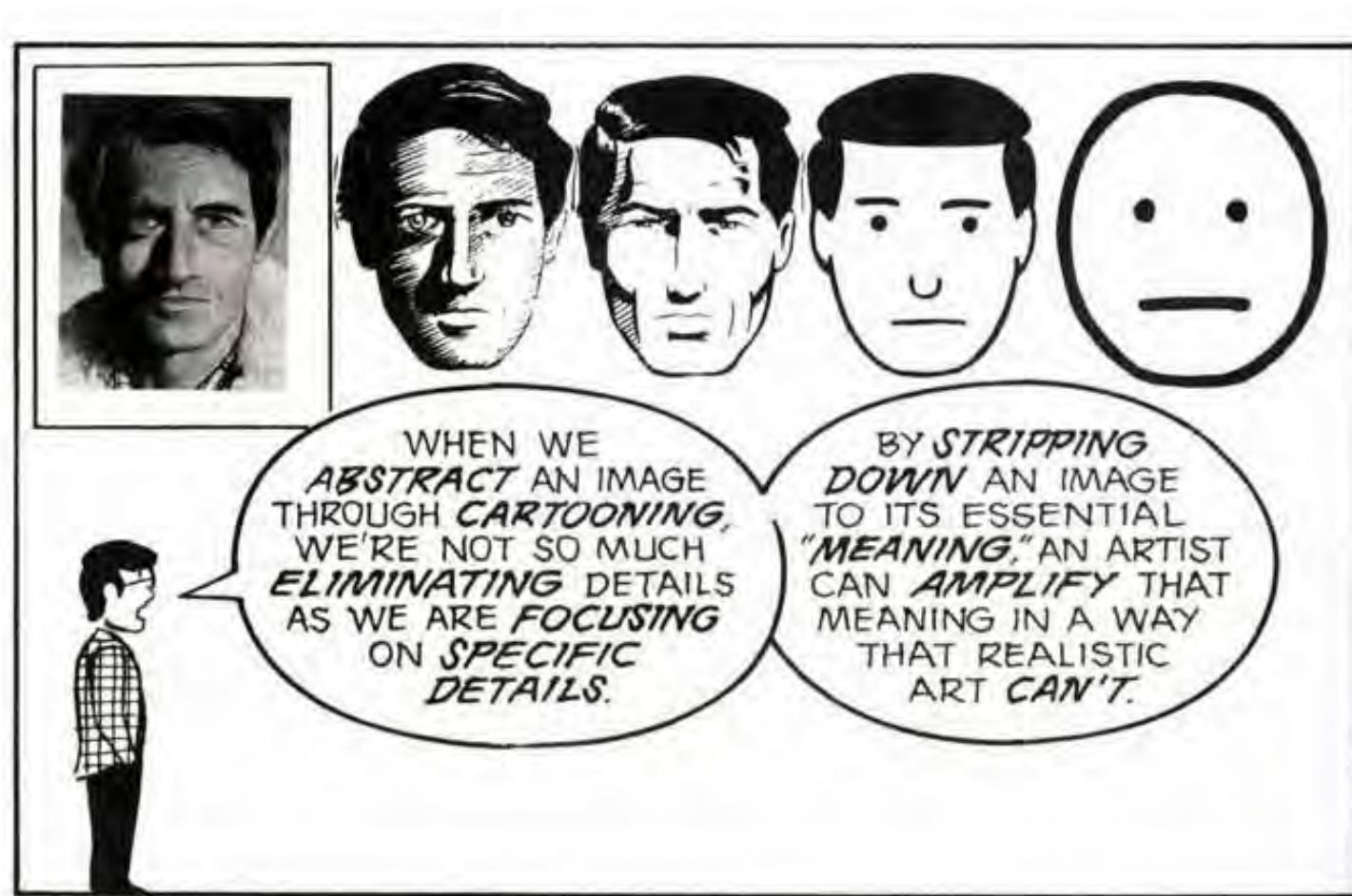
Name:

Number:

Category:  Clothing

Price Range:  0.00 to  9,999.99

# Minimal Detail

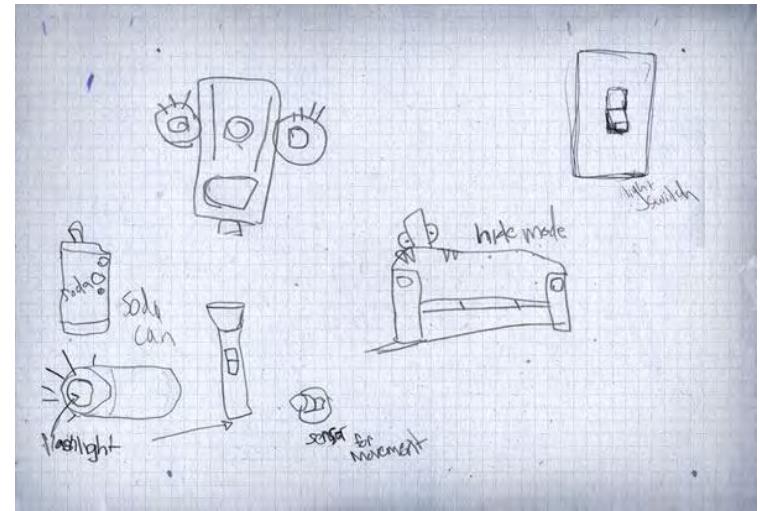


# Appropriate Degree of Refinement

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

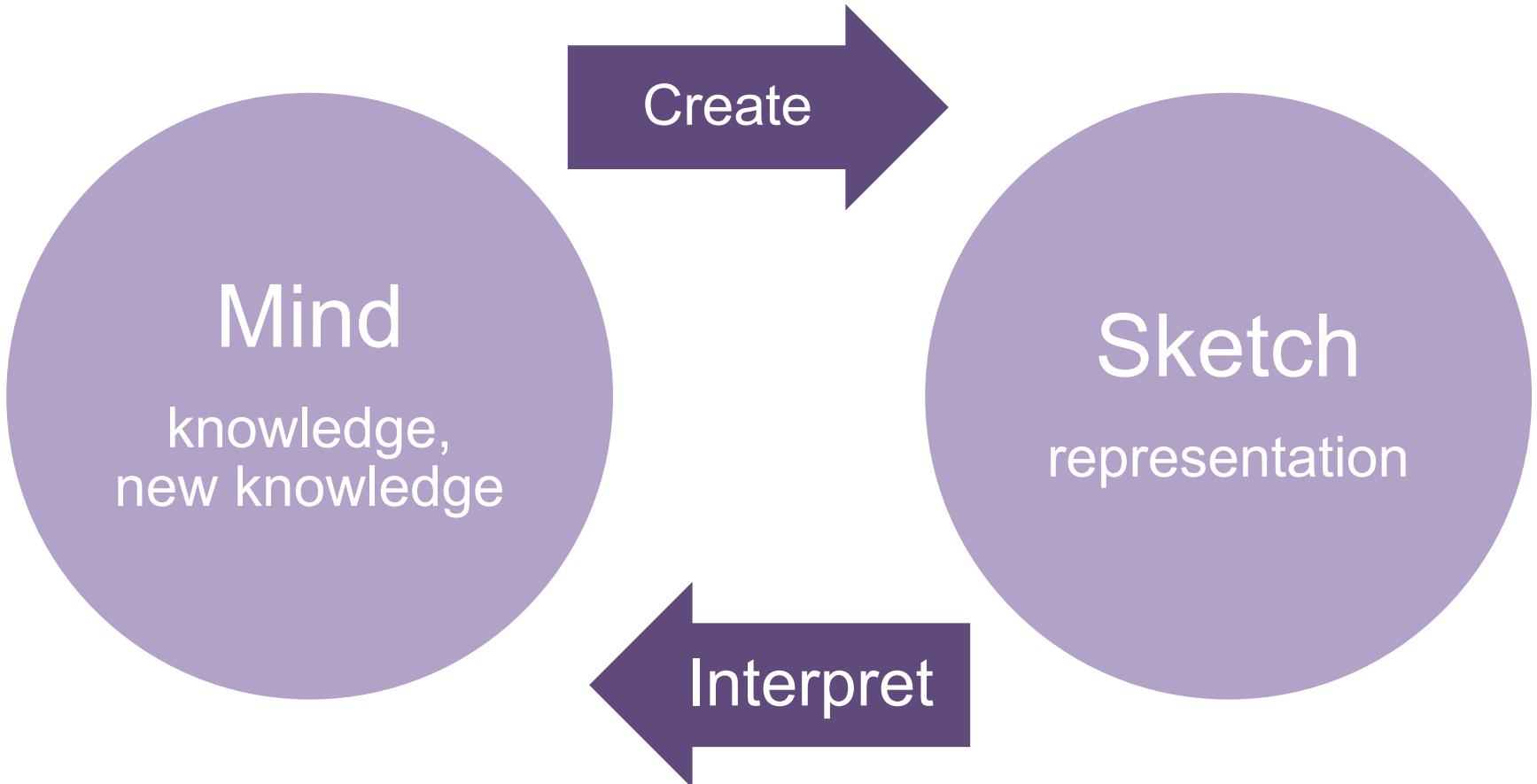
Intentionally ambiguous

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

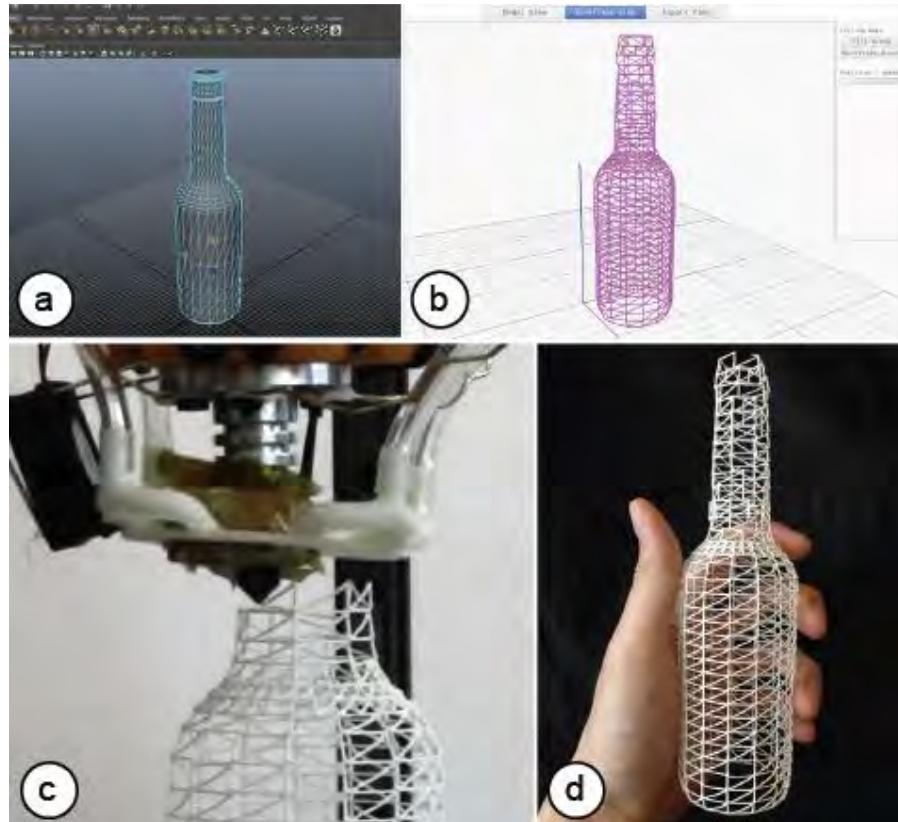


Making the Macintosh:  
<http://www-sul.stanford.edu/mac/index.html>

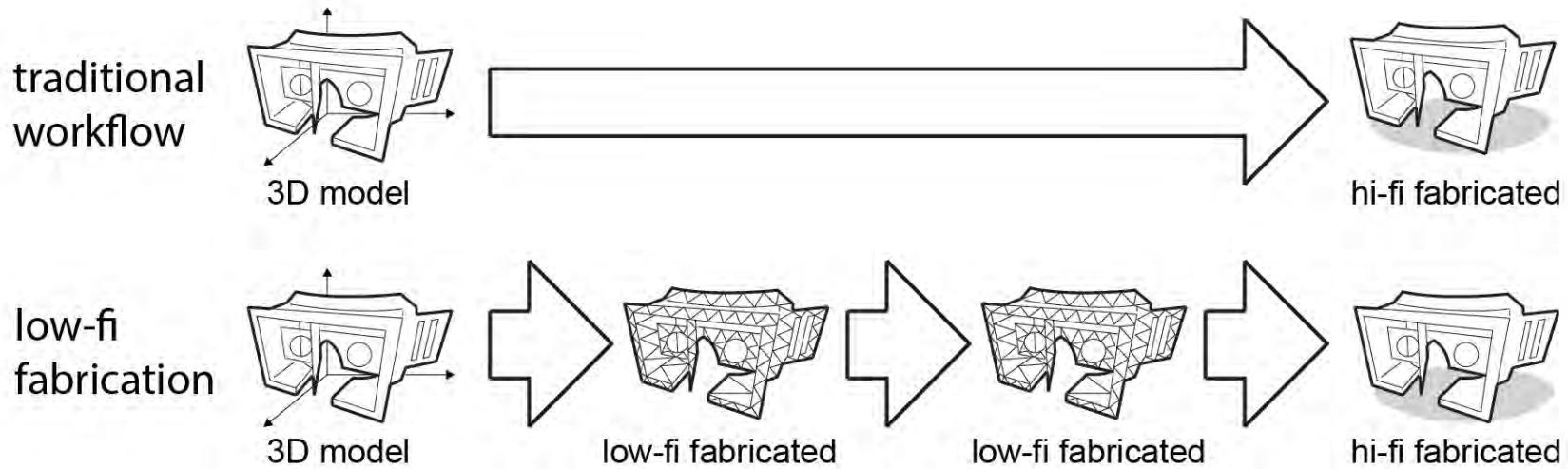
# Physical Sketching



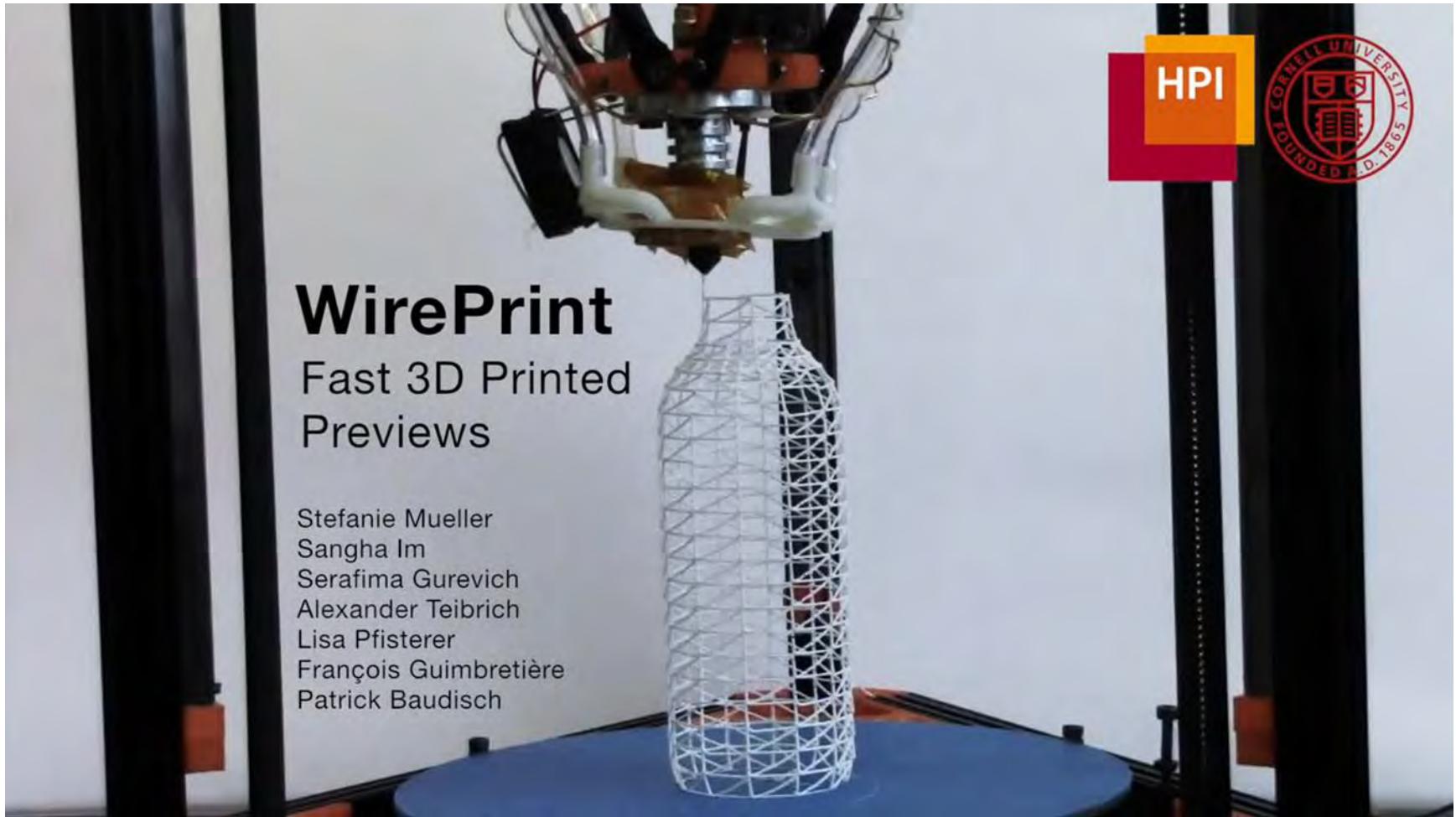
# Physical Sketching



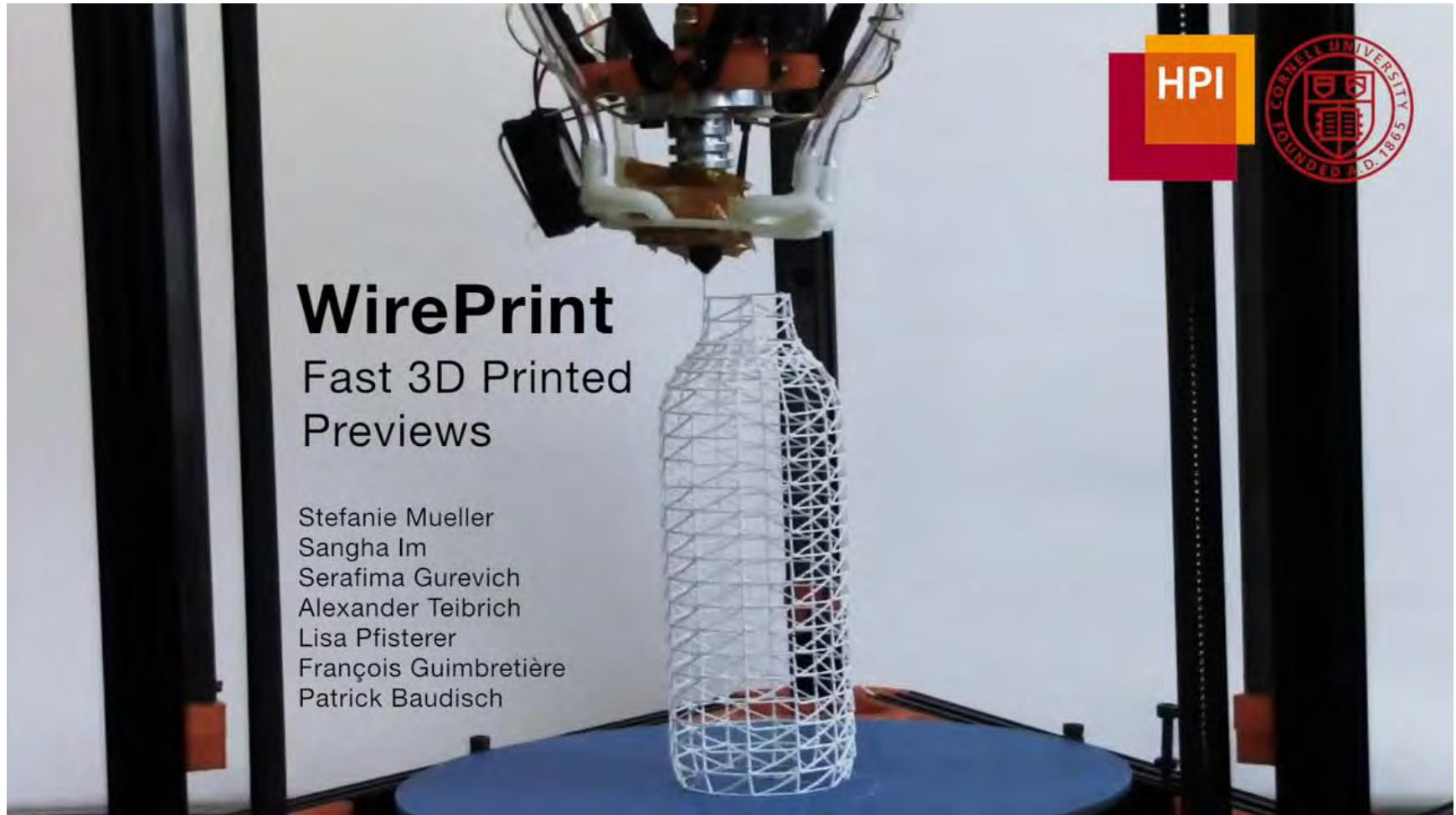
# Physical Sketching



# WirePrint (2014)



# WirePrint (2014)

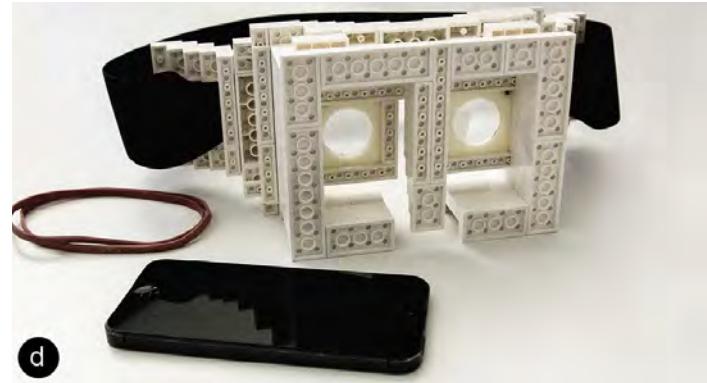
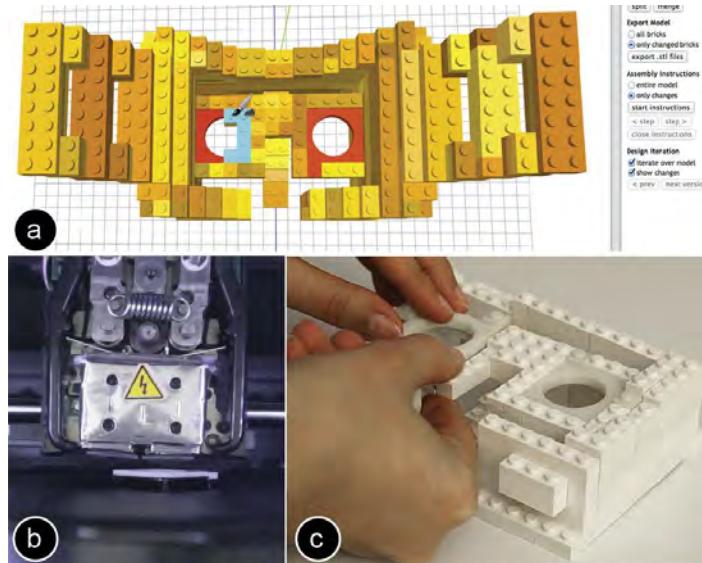


## WirePrint

### Fast 3D Printed Previews

Stefanie Mueller  
Sangha Im  
Serafima Gurevich  
Alexander Teibrich  
Lisa Pfisterer  
François Guimbretière  
Patrick Baudisch

# Physical Sketching



# faBrickation (2014)



## faBrickation

Stefanie Mueller, Tobias Mohr, Kerstin Guenther,  
Johannes Frohnhofer, Patrick Baudisch

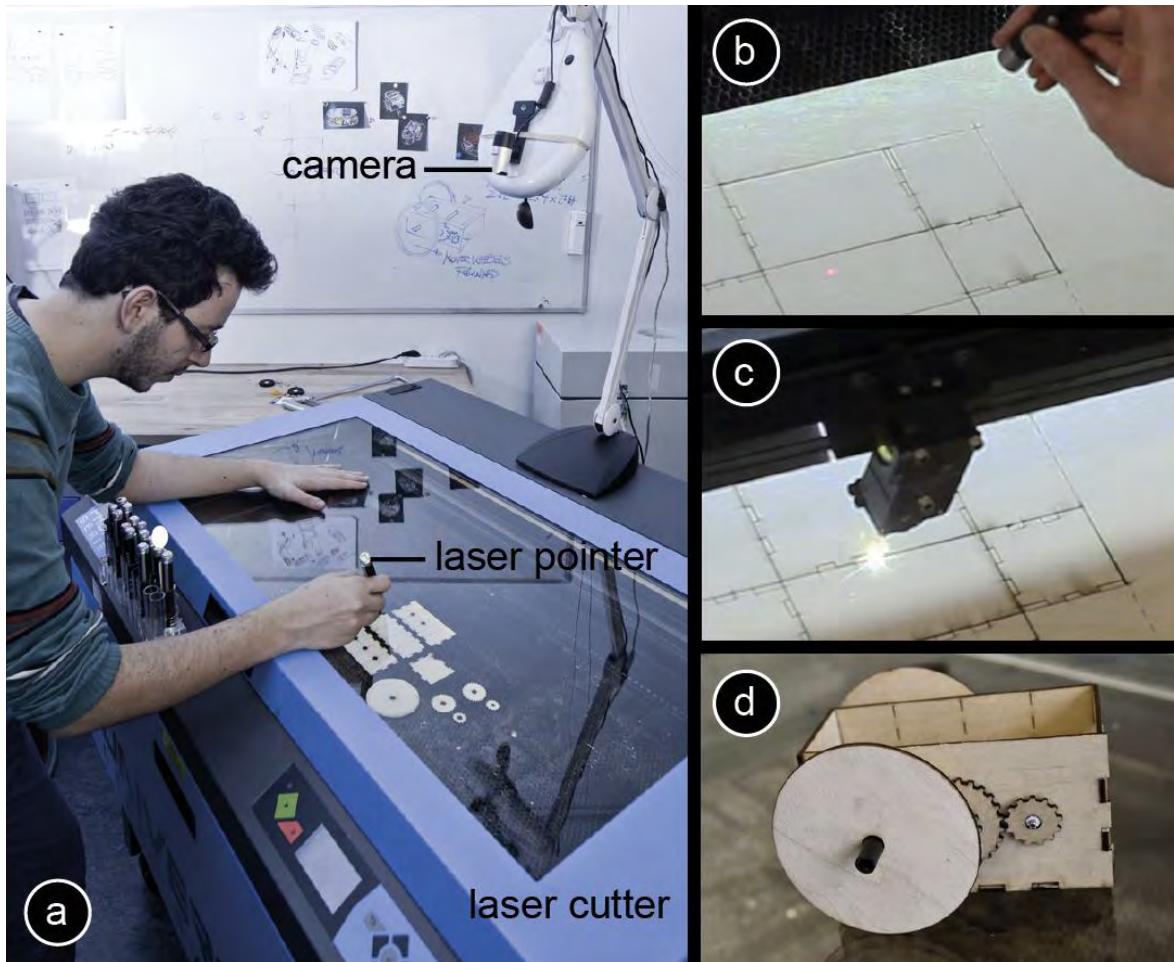
# faBrickation (2014)



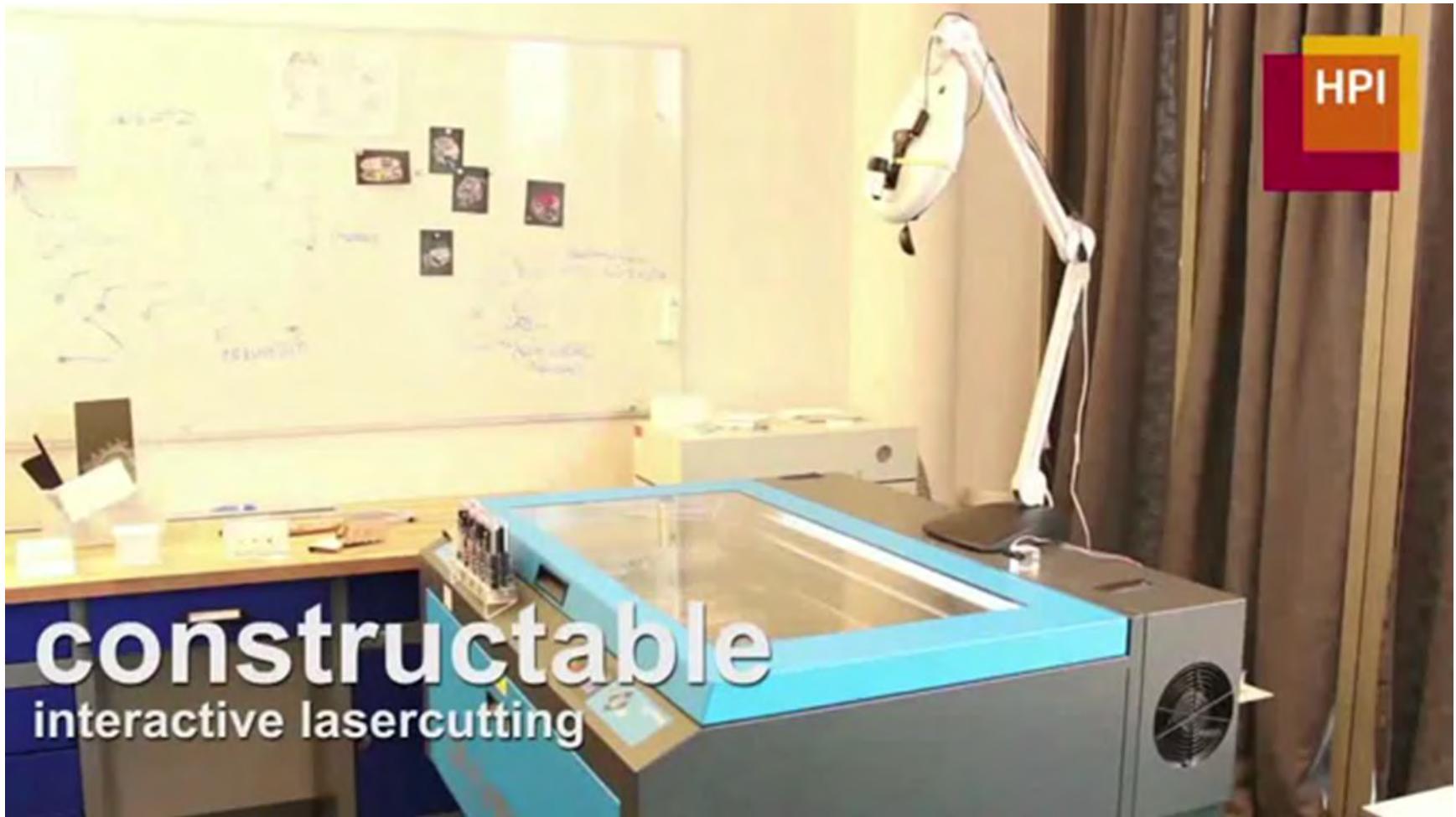
## faBrickation

Stefanie Mueller, Tobias Mohr, Kerstin Guenther,  
Johannes Frohnhofer, Patrick Baudisch

# Physical Sketching



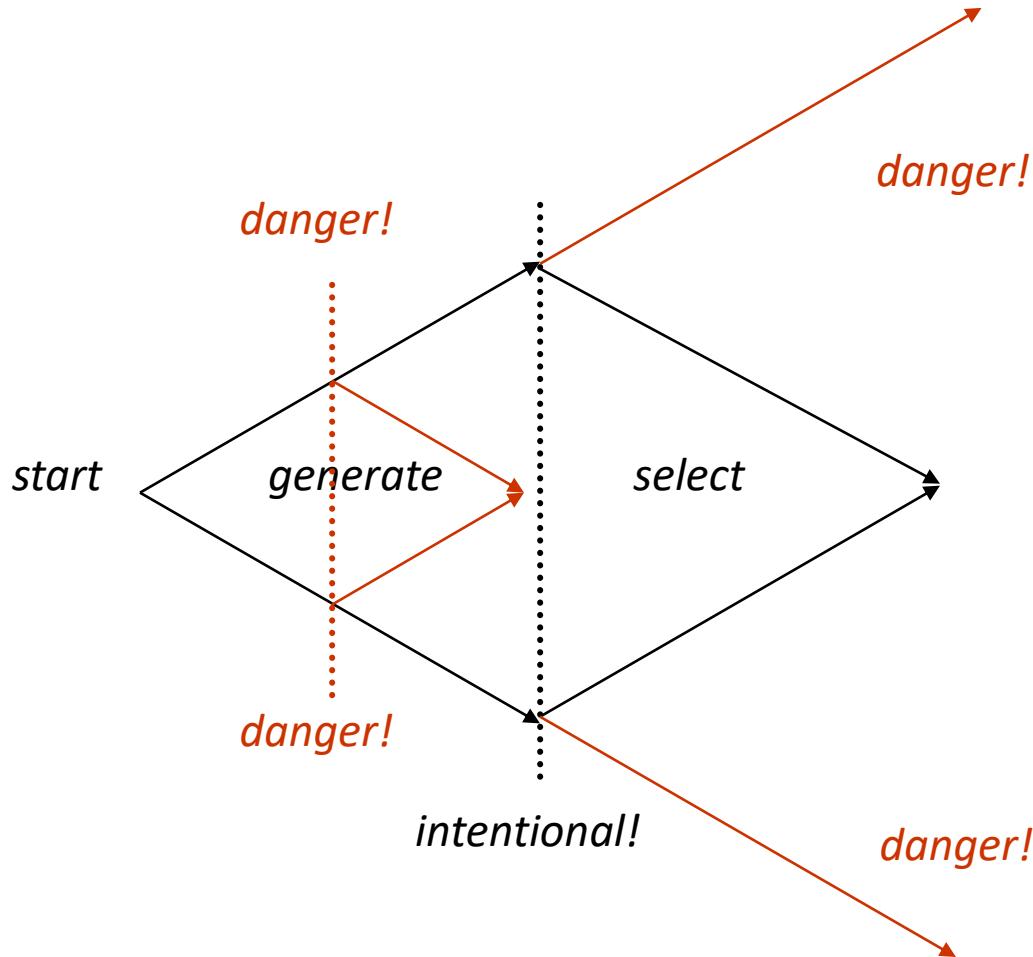
# Constructable (2012)



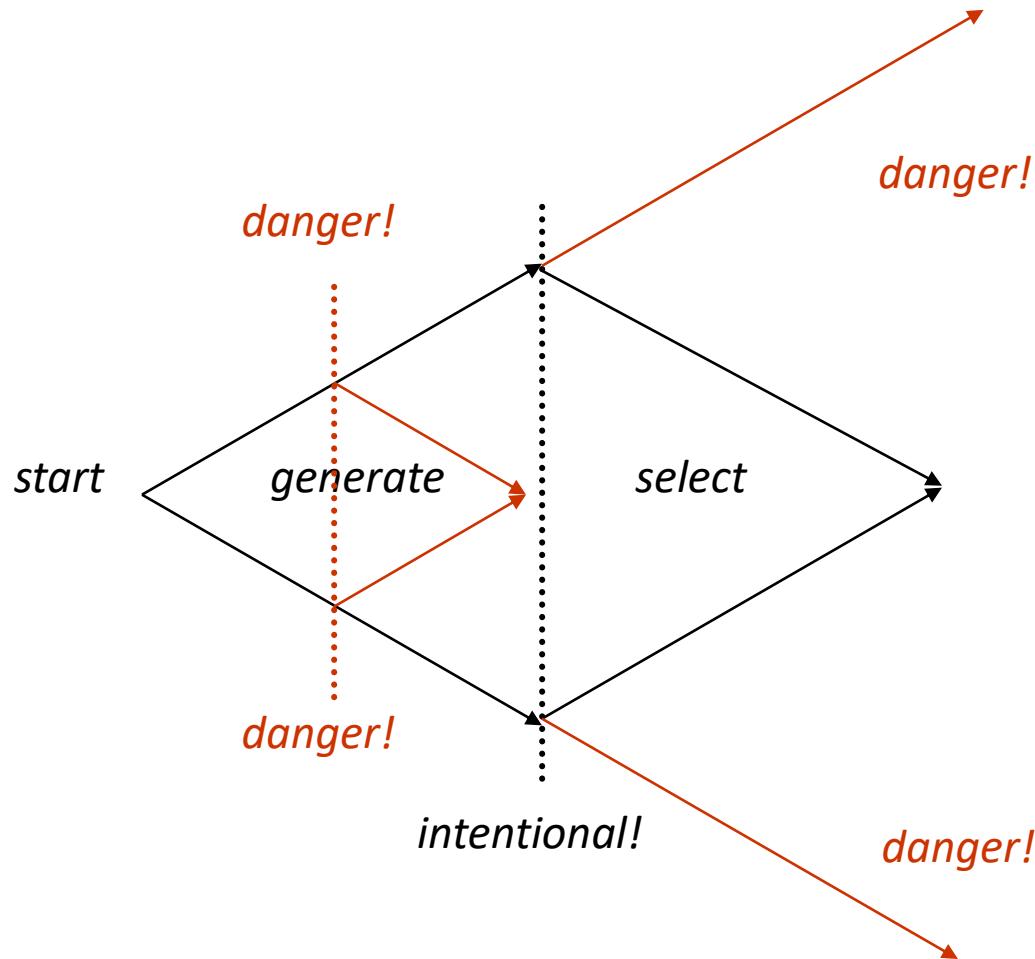
# Constructable (2012)



# The Design Diamond



# Idea Oscillation



# Critiquing Sketches is Important

Ideas are both good and bad

Both are useful in design

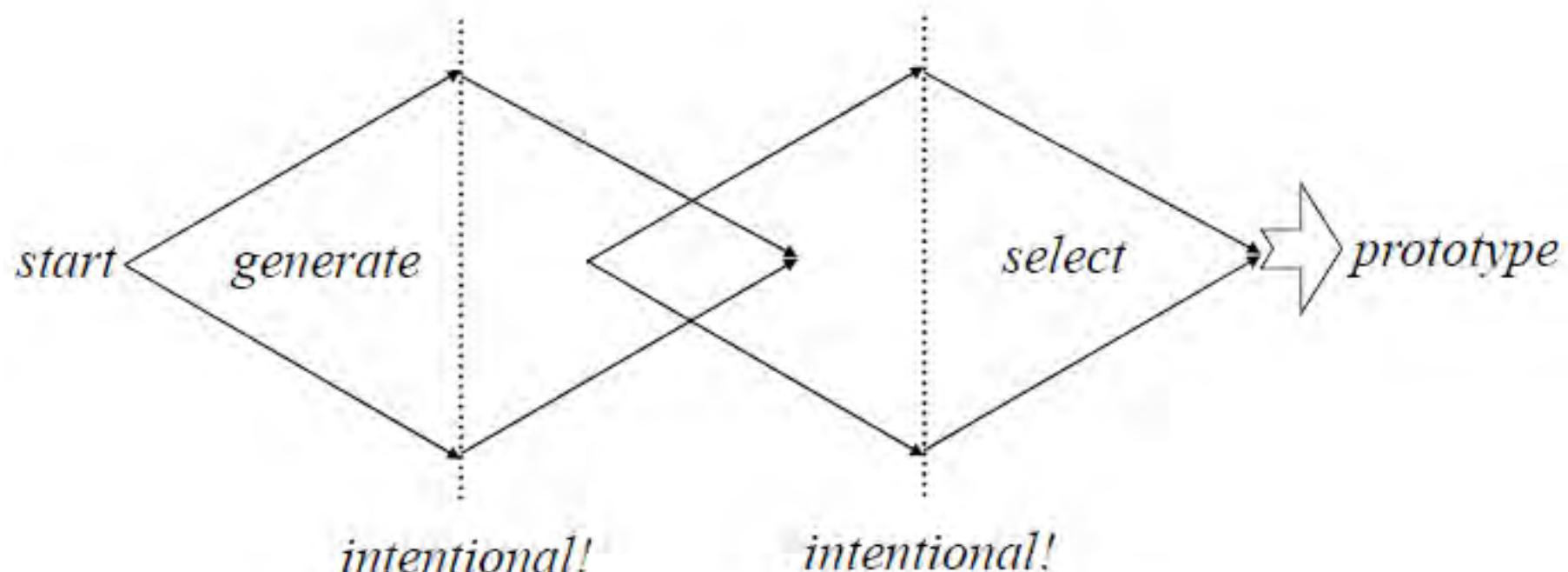
By making clear what is a bad design,  
we can avoid actually implementing it

Bad ideas help you justify your good ideas

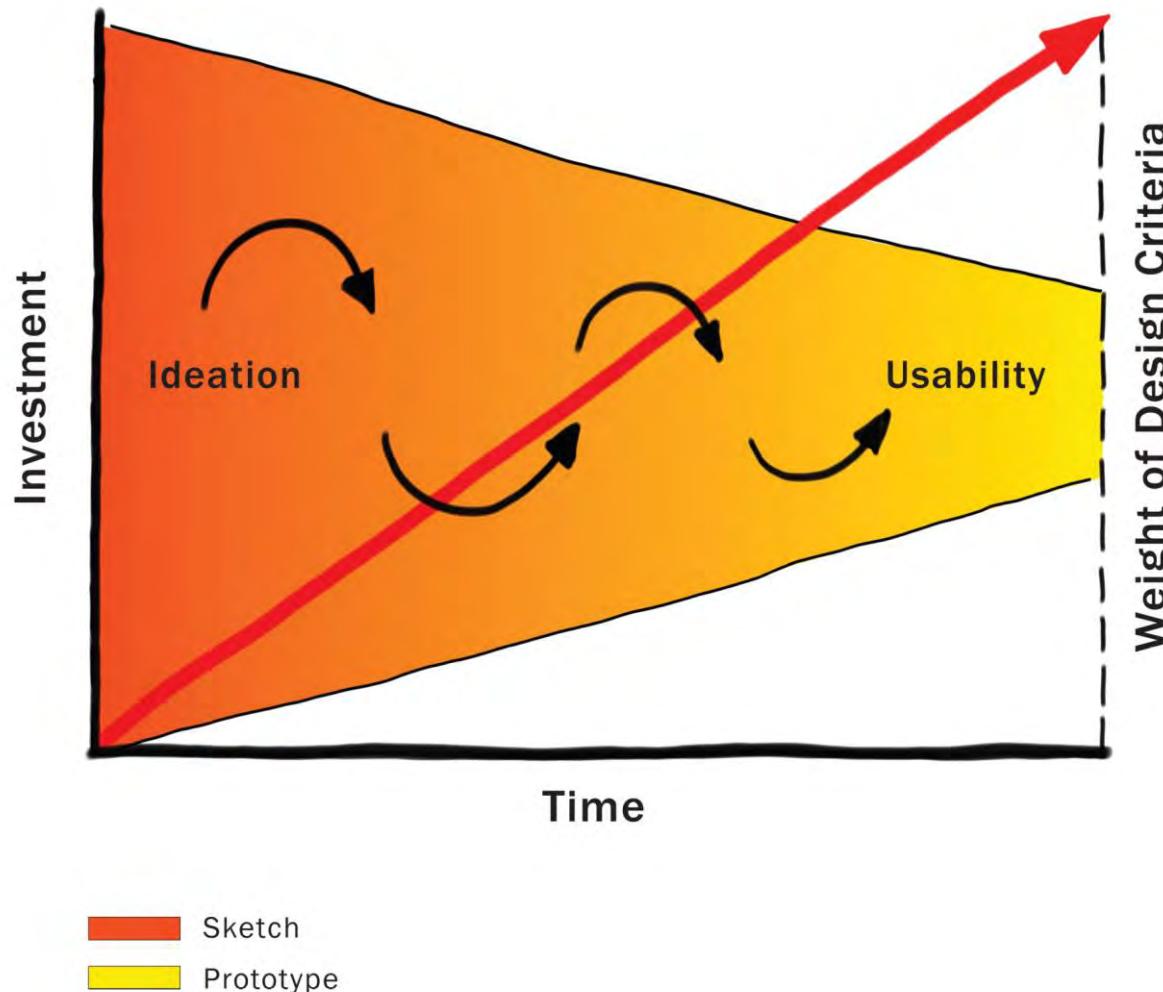
Feedback can turn a good idea into a great idea

Sketching generates too many ideas to implement

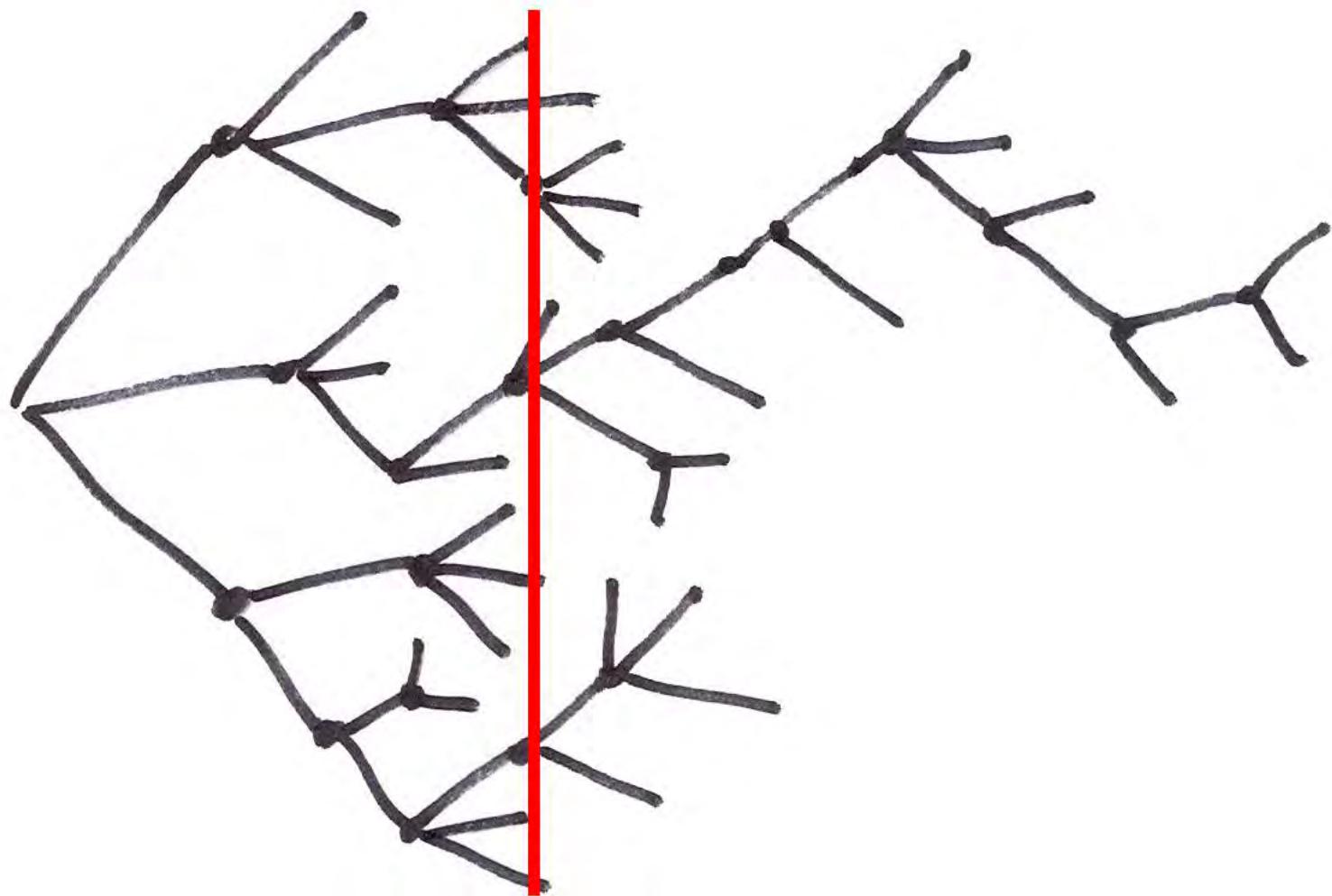
# Idea Oscillation



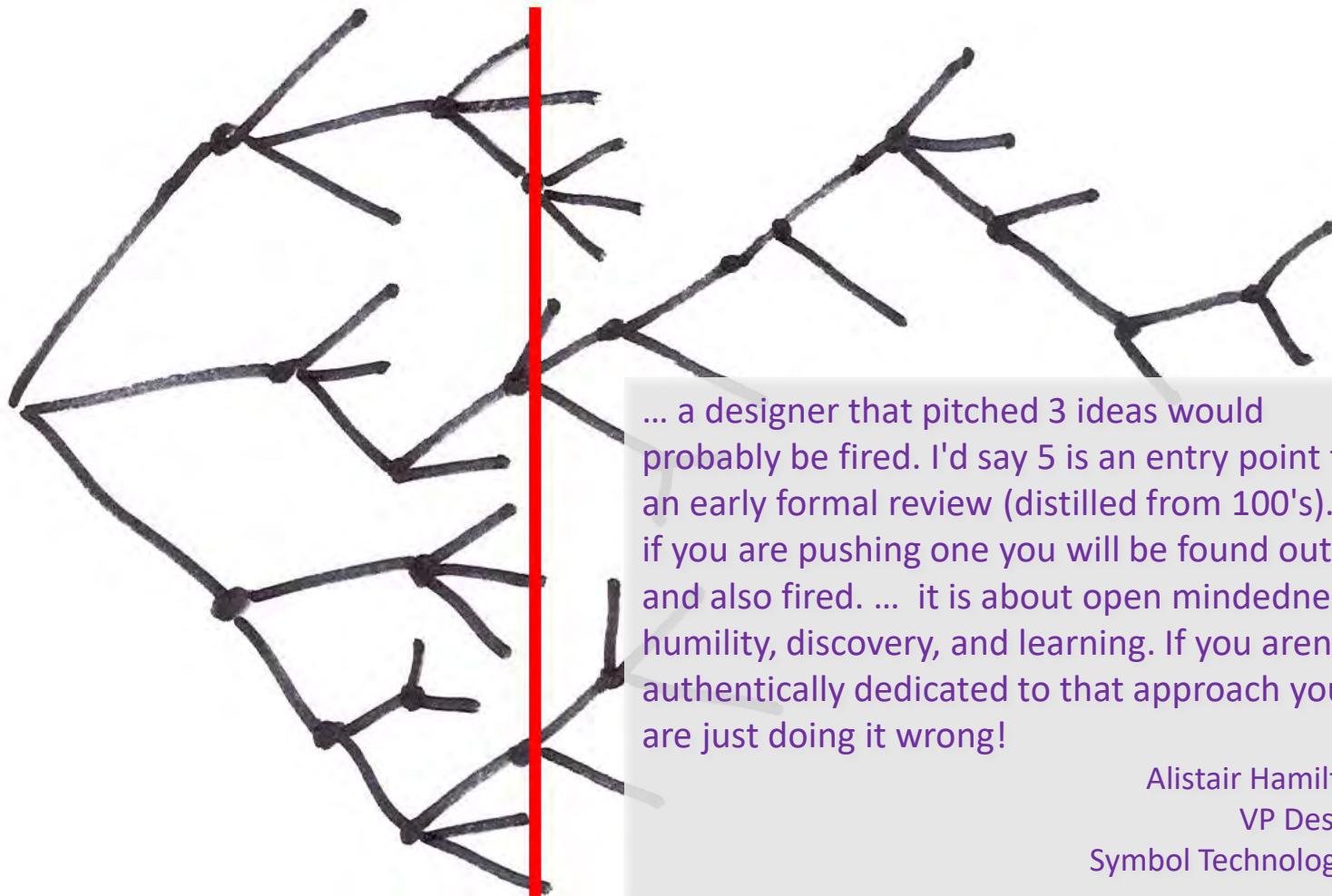
# Iteration Toward a Design



# Exploration of Alternatives



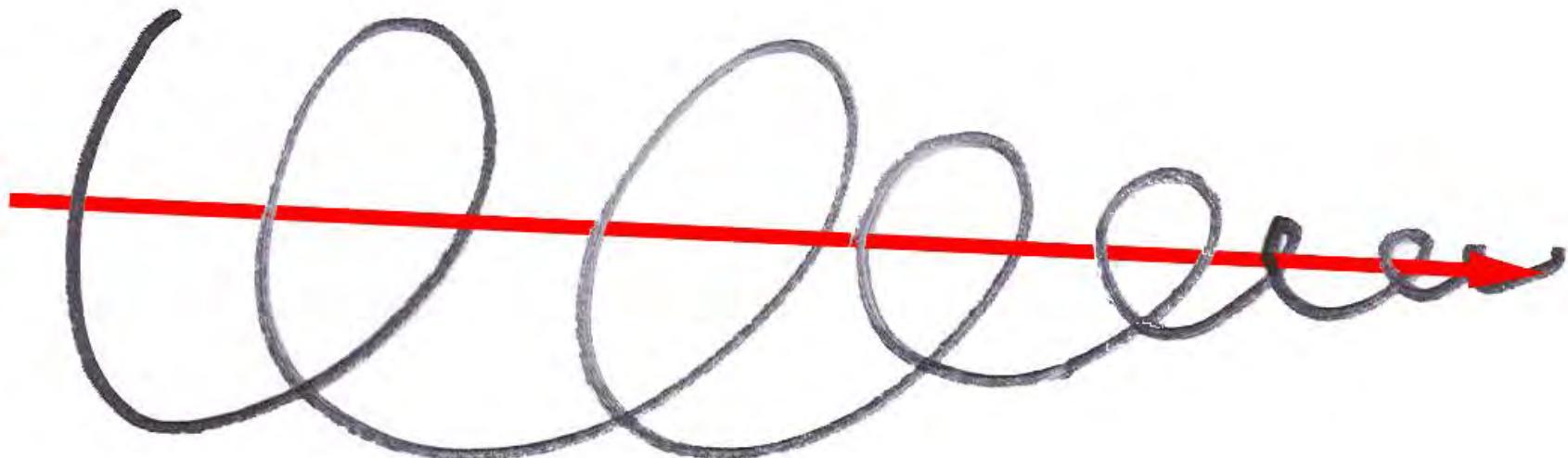
# Exploration of Alternatives



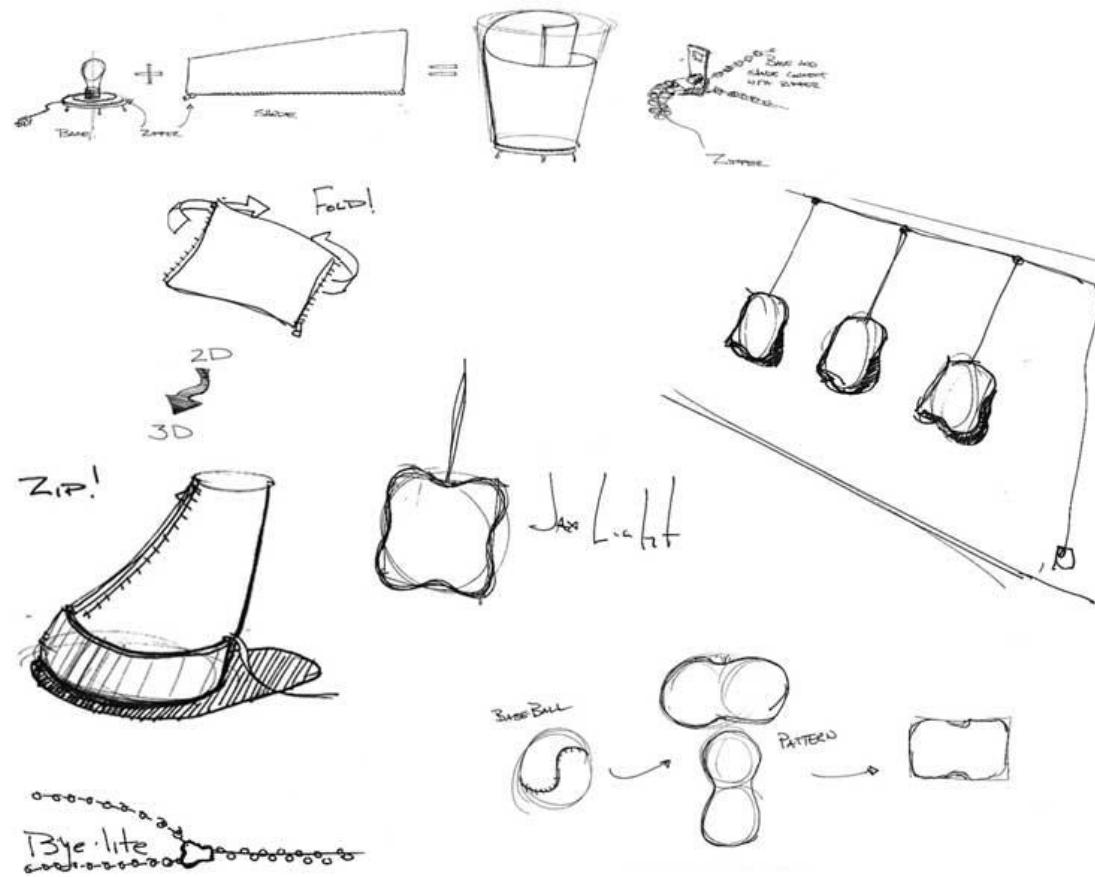
... a designer that pitched 3 ideas would probably be fired. I'd say 5 is an entry point for an early formal review (distilled from 100's). ... if you are pushing one you will be found out, and also fired. ... it is about open mindedness, humility, discovery, and learning. If you aren't authentically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

Alistair Hamilton  
VP Design  
Symbol Technologies

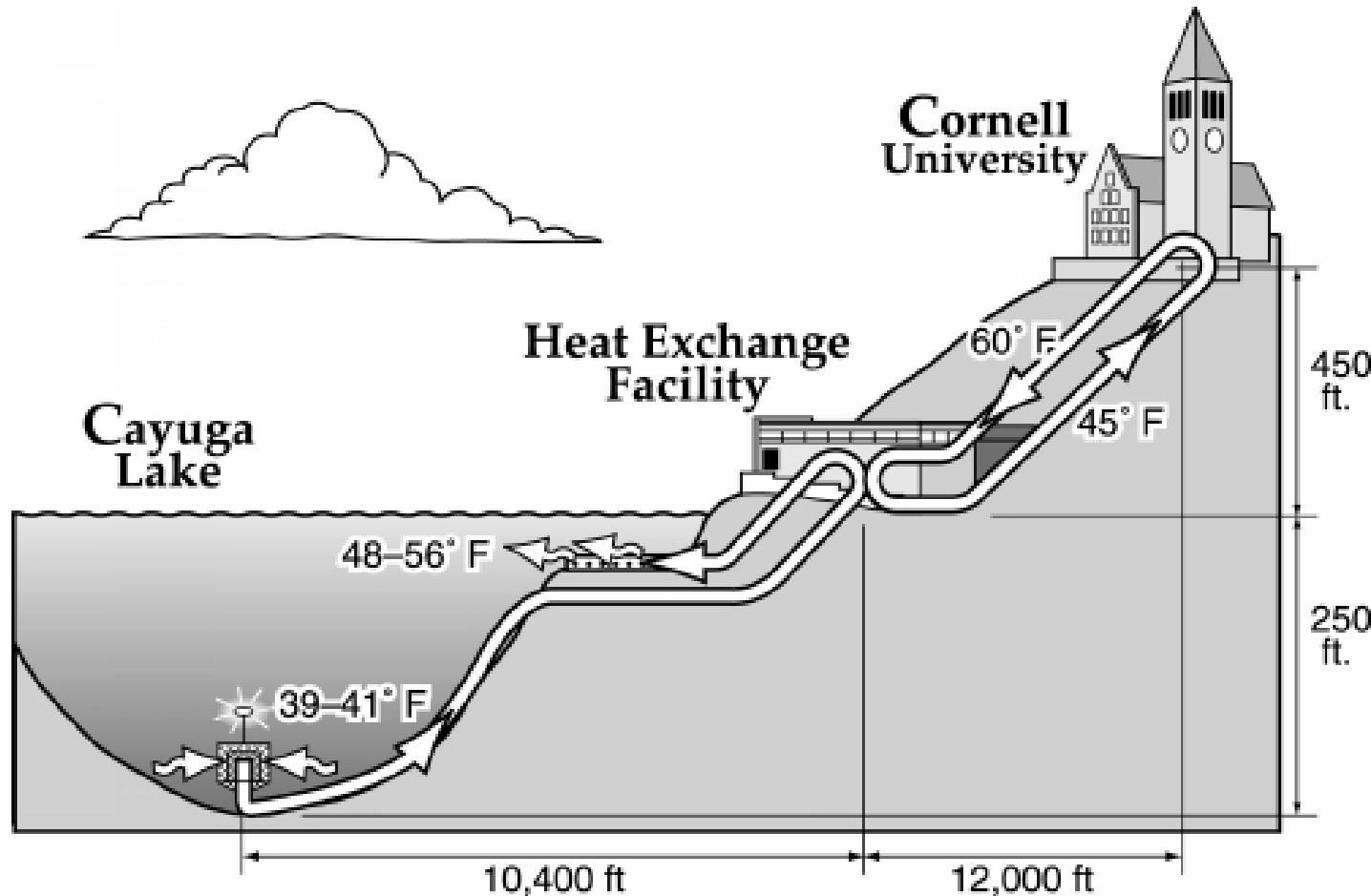
# The Converging Path



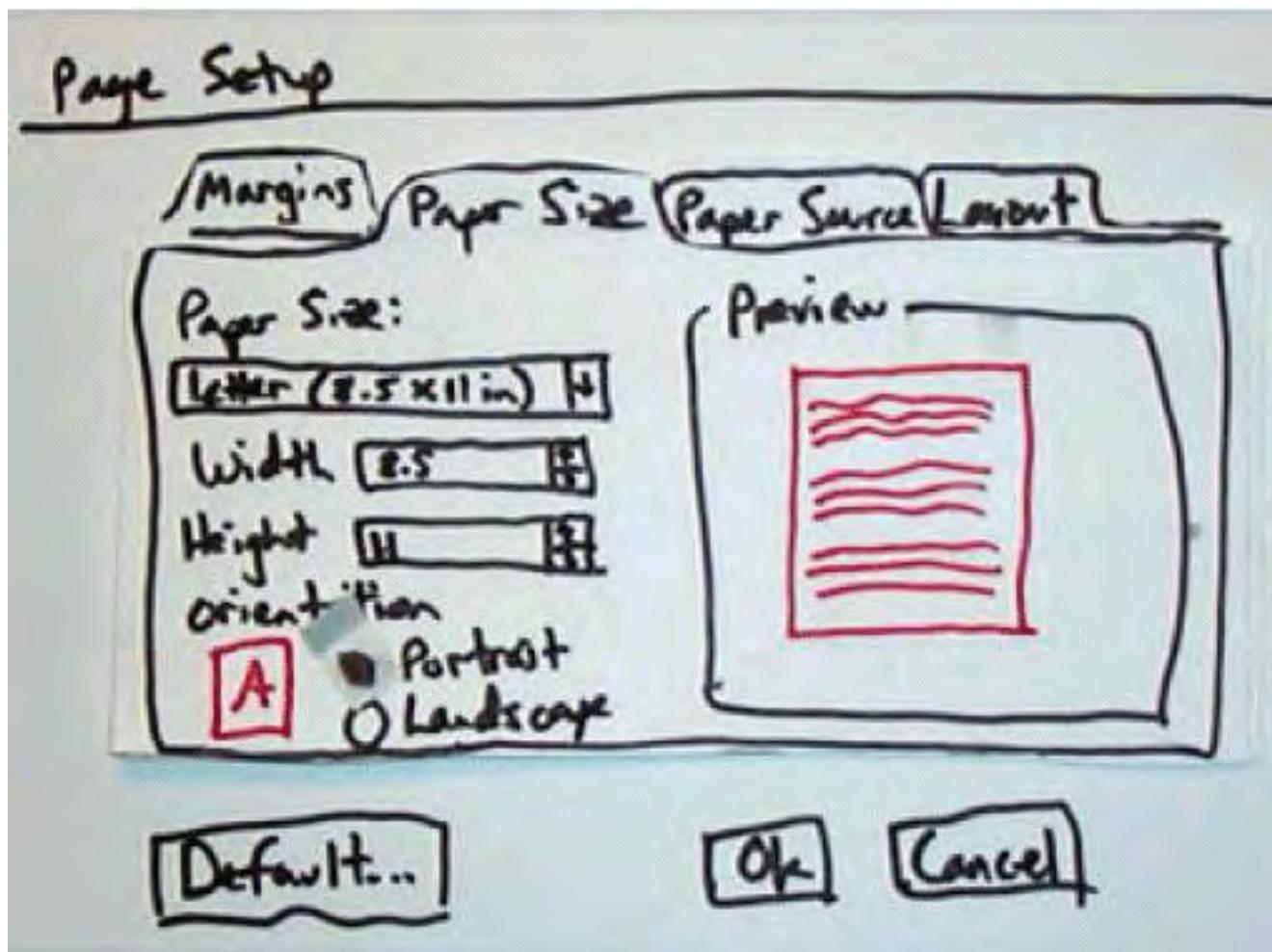
# Is this a sketch? Why or why not?



# Is this a sketch? Why or why not?



# Is this a sketch? Why or why not?



# Is this a sketch? Why or why not?



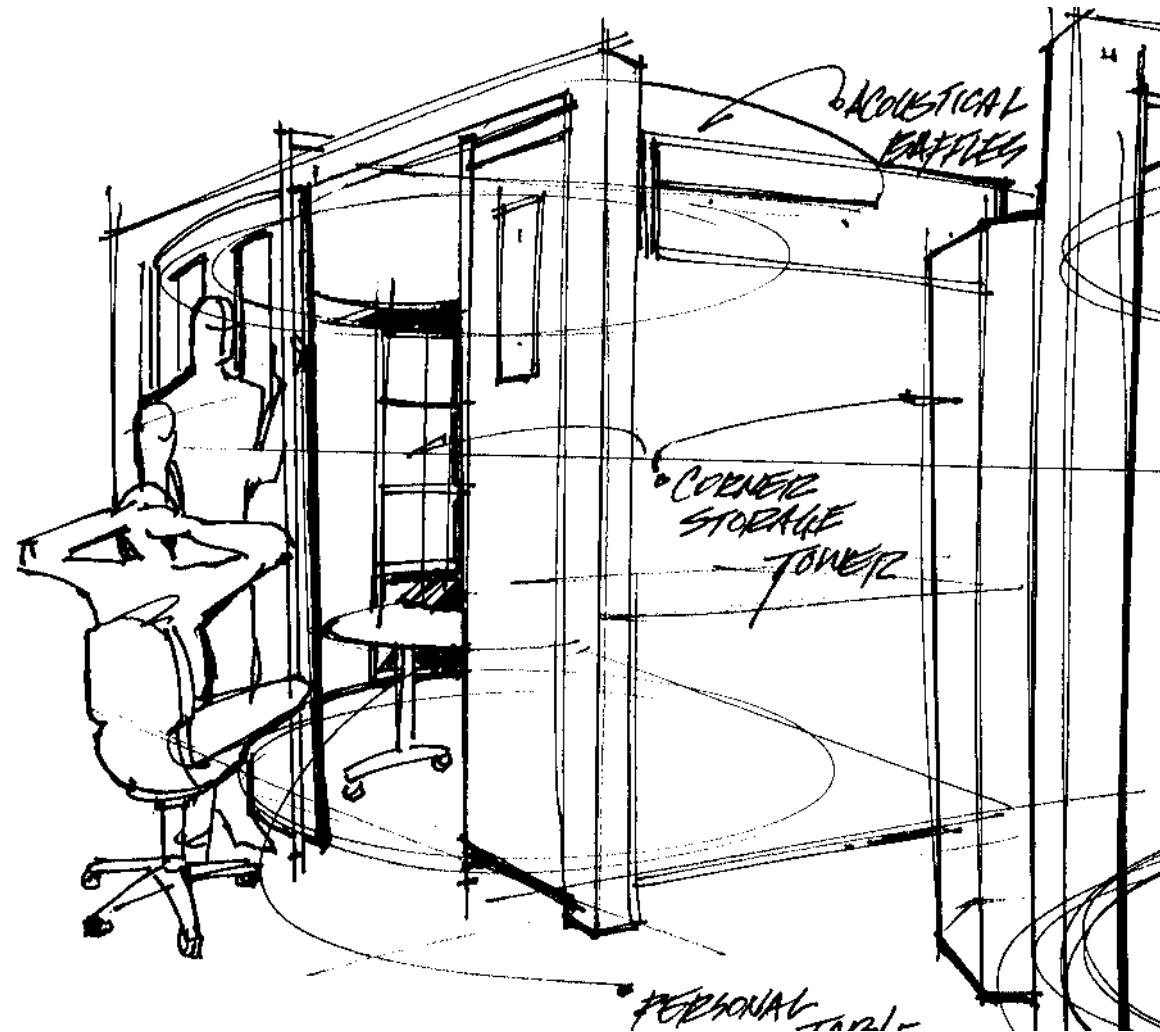
# Is this a sketch? Why or why not?



# Is this a sketch? Why or why not?



# Is this a sketch? Why or why not?



# Is this a sketch? Why or why not?



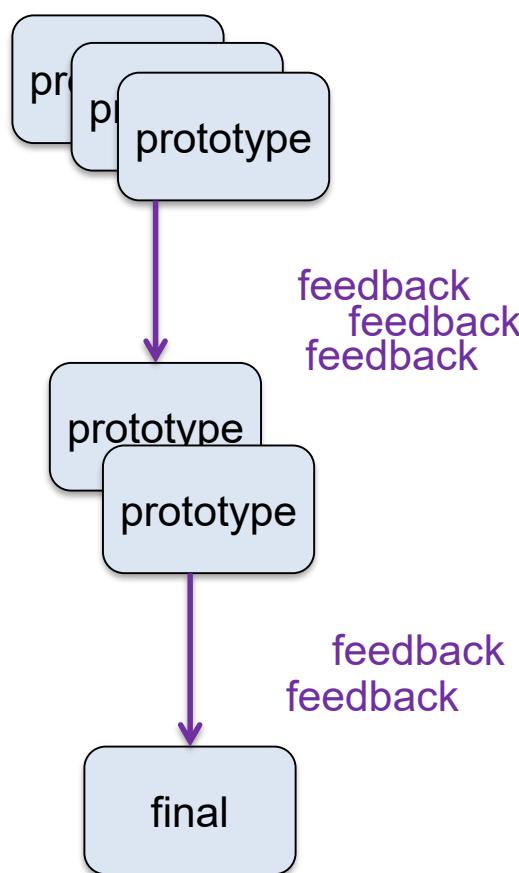
# Some Evidence

Task:

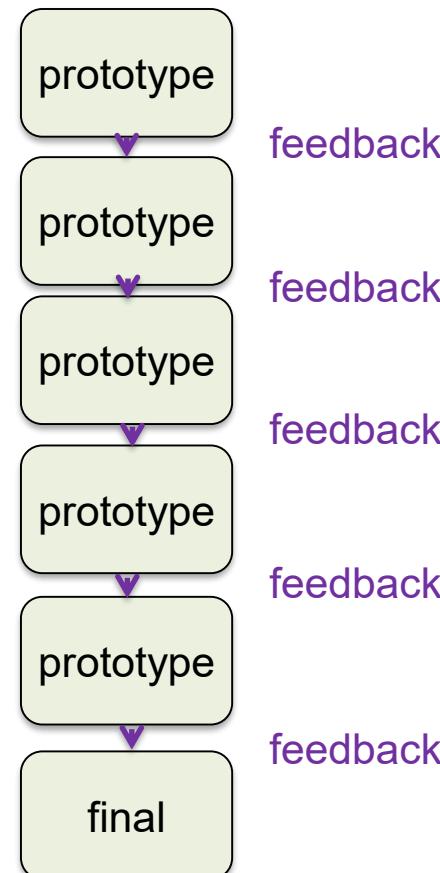
Create a web banner ad for Ambidextrous magazine.



# Feedback in Parallel or Serial



*Parallel condition*



*Serial condition*

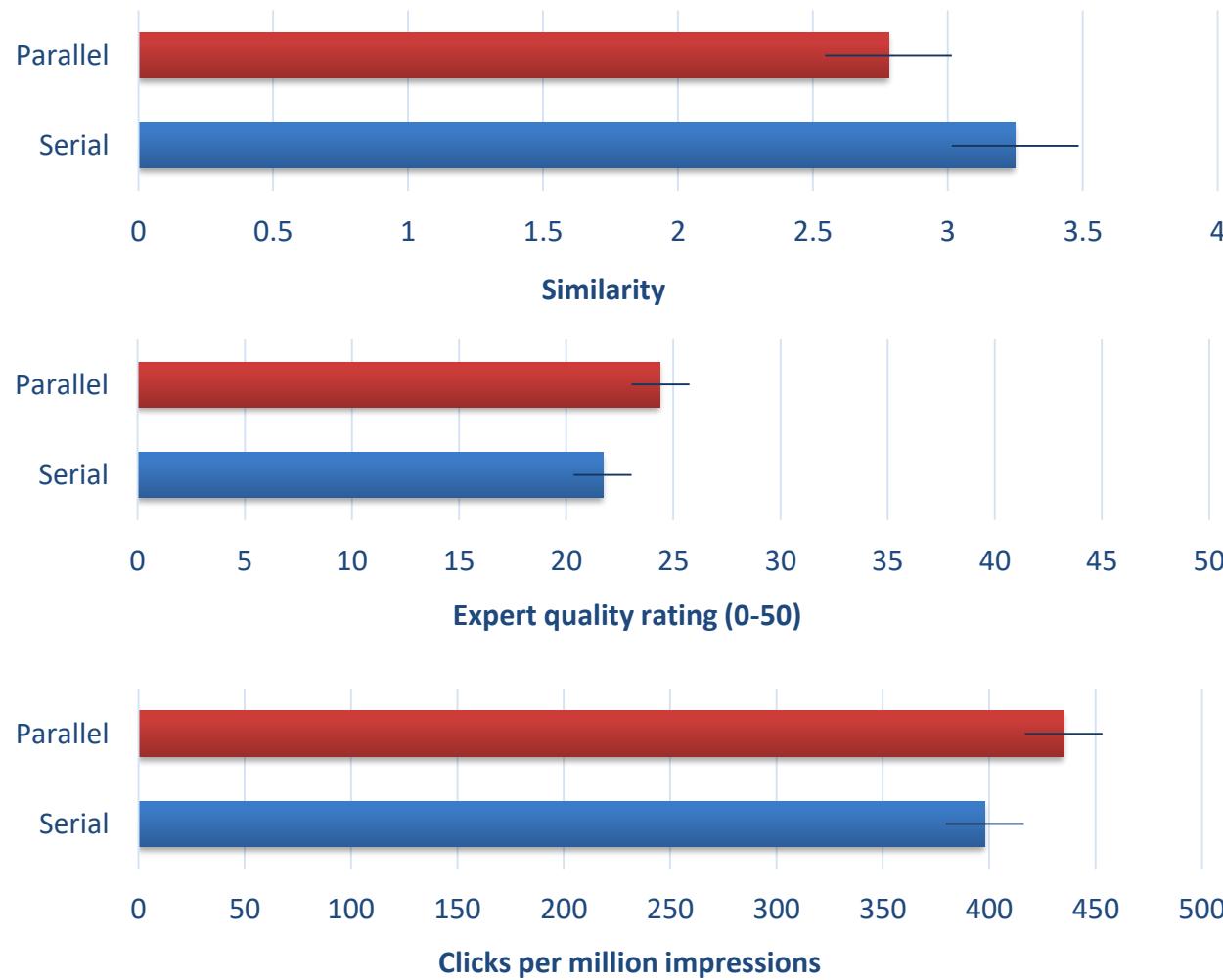
# Procedure

serial  
prototyping  
condition

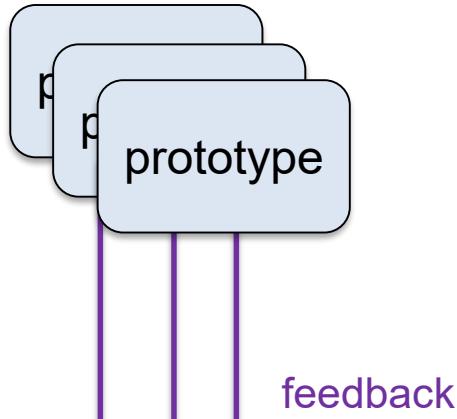
parallel  
prototyping  
condition



# Parallel: more diverse, better, more clicks



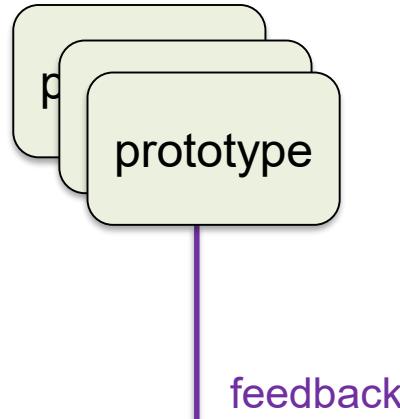
# Share one or share your best?



feedback

final

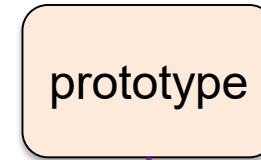
Share multiple  
condition



feedback

final

Share best  
condition

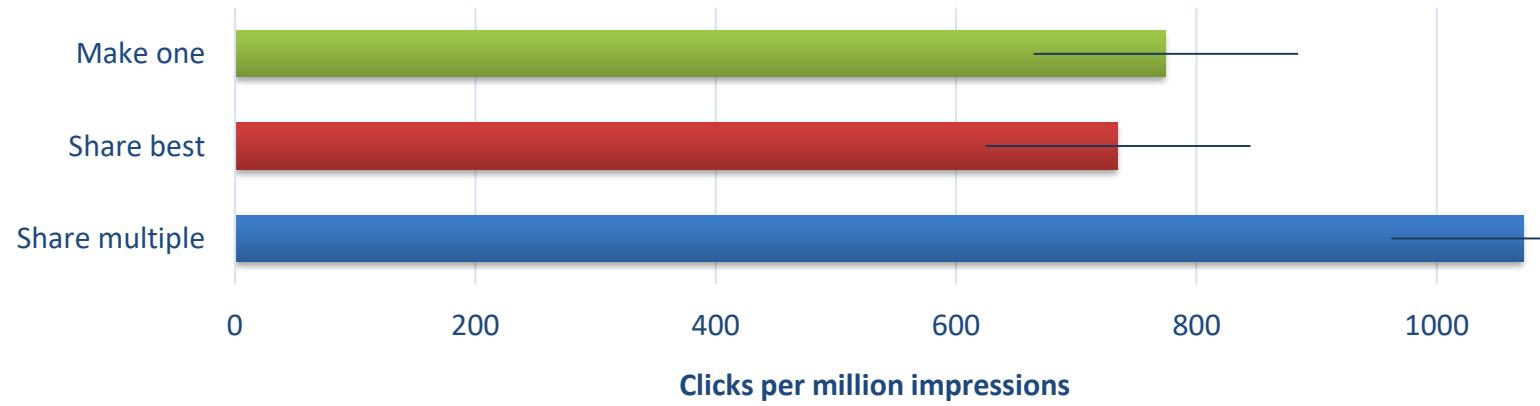
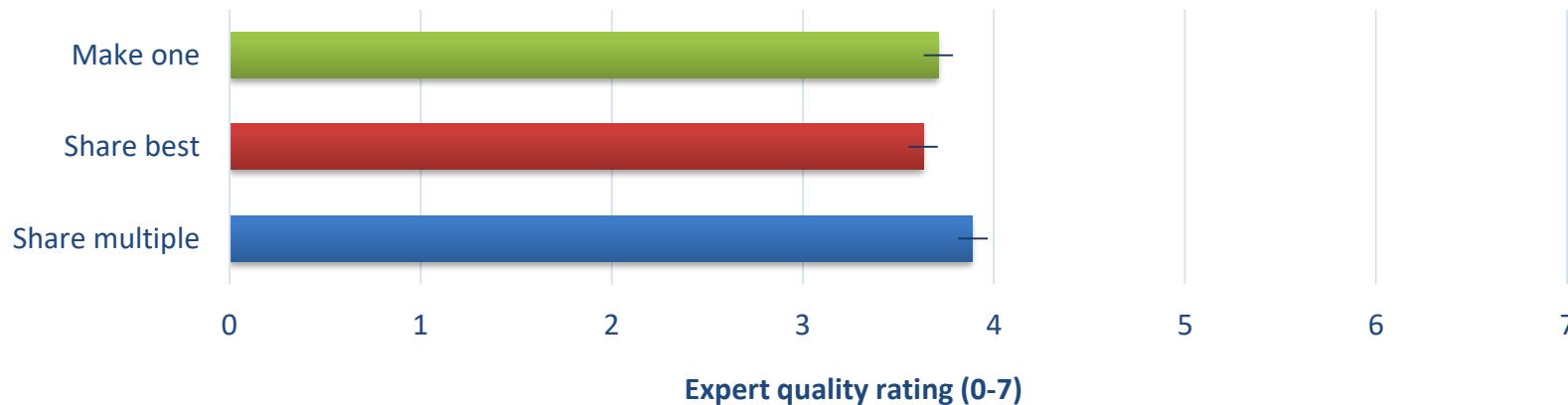


feedback

final

Make one  
condition

# Share Multiple: better, more clicks



# 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

# 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

# Amazing Color Changing Card Trick

The colour  
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

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# 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

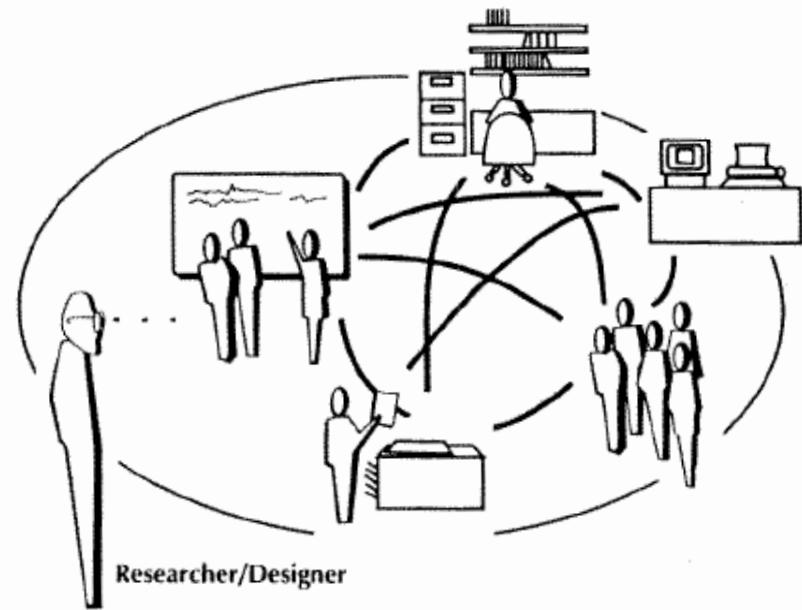
Behavior can only be understood in its larger social context; that is, holistically.

### HOLISTIC

---

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

Focus on relationship between the parts



# Four Ethnographic Principles

## Descriptive

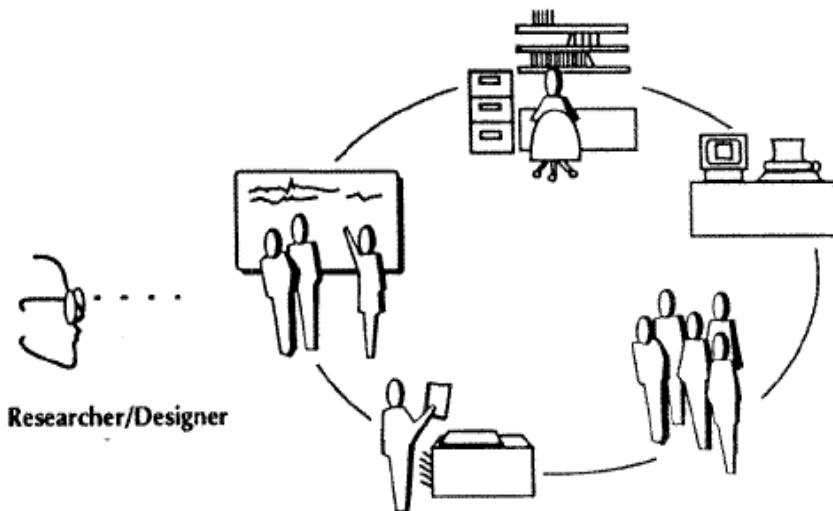
Study how people actually behave, not how they ought to behave.

Defer judgment.

### DESCRIPTIVE

---

Judgements of the efficacy of behaviors observed are withheld



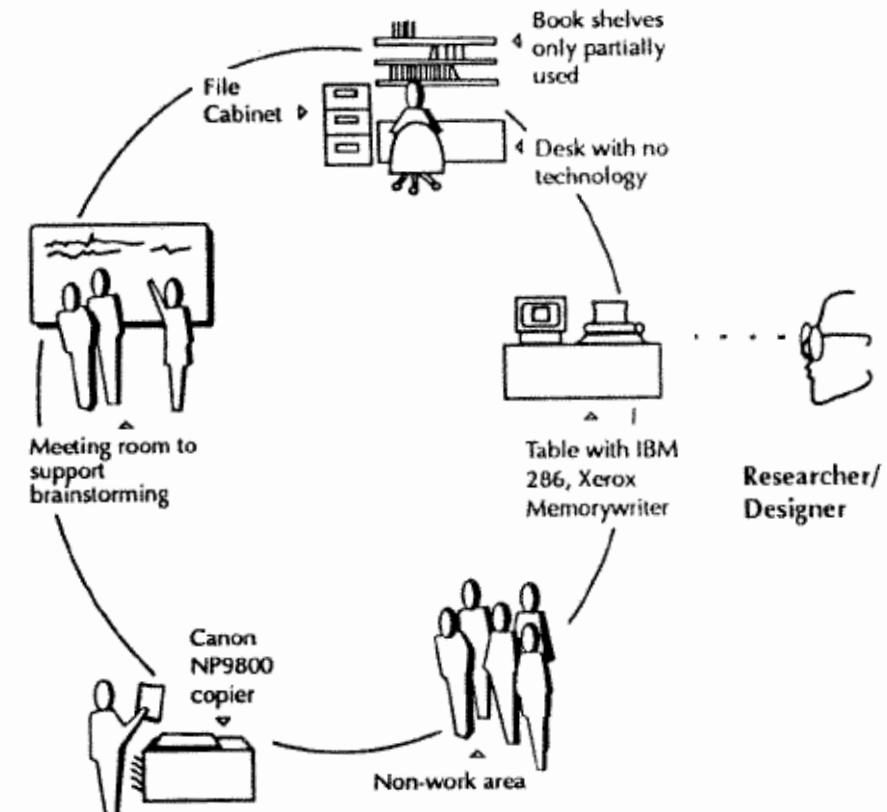
# Four Ethnographic Principles

*Contrasted With* \_\_\_\_\_

## Member Point-of-View

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

Descriptive categories are those of the researcher



# Four Ethnographic Principles

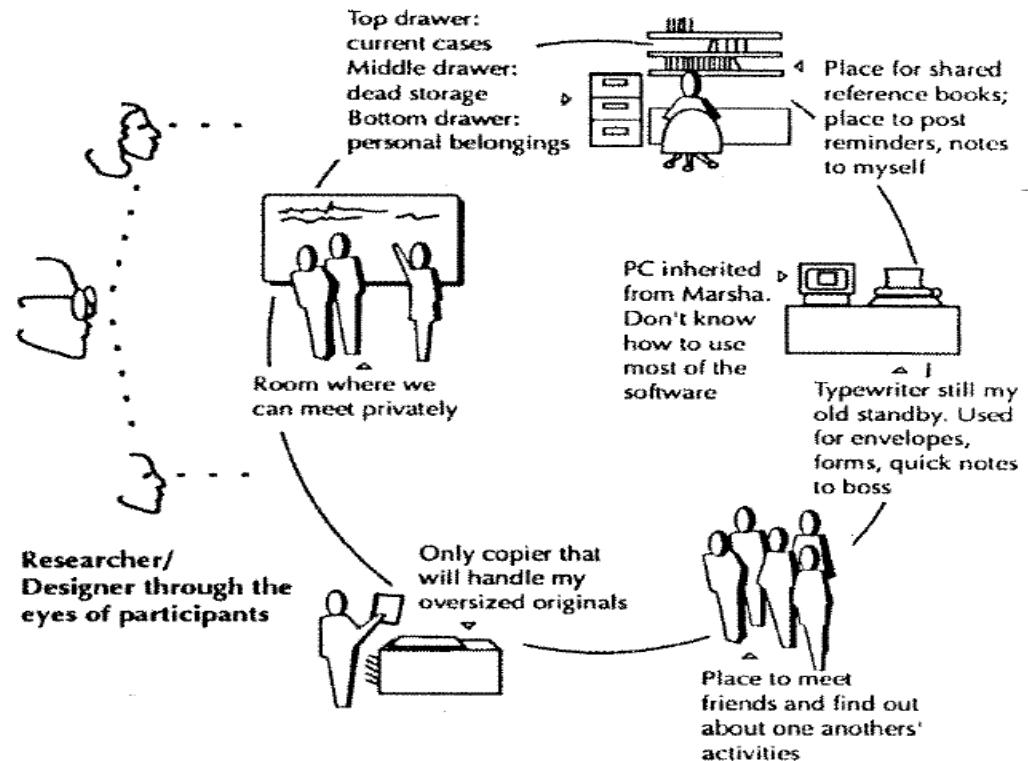
## Member Point-of-View

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

### MEMBERS' POINT OF VIEW

Understand other peoples' behavior from their point of view

Descriptive categories are those of the community of practice



# Design Ethnography

Quicker than traditional ethnography

Days, weeks, or months, not years

Sometimes “concurrent ethnography”

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

Goal is to generate insights informing design

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:

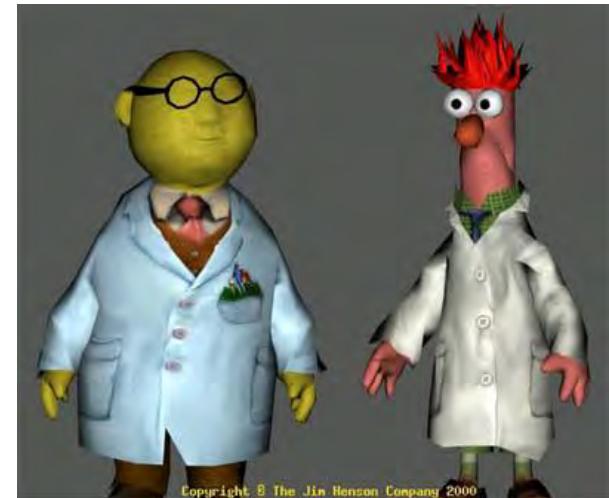
The master is doing stuff

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

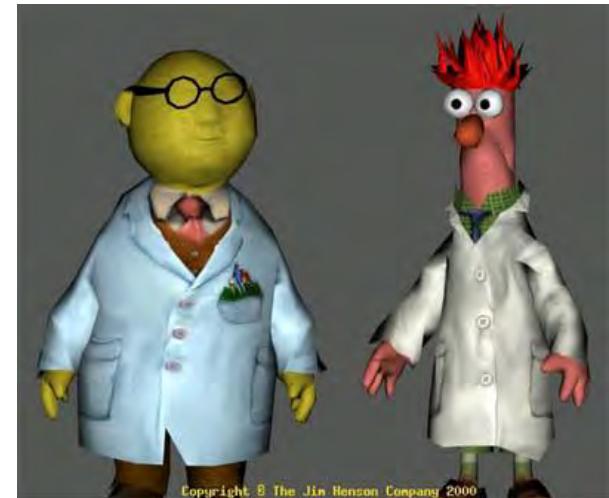
The researcher offers an interpretation

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

John Kellerman  
Attorney at Law

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

**Interviewer:** *Could I see that again?*

**Customer:** *What?*

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

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

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

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

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

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

# Partnership

Do not squash design ideas if they arise

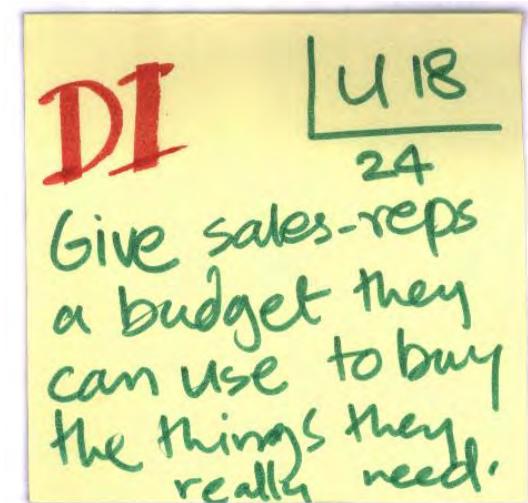
This is design, not dispassionate science

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

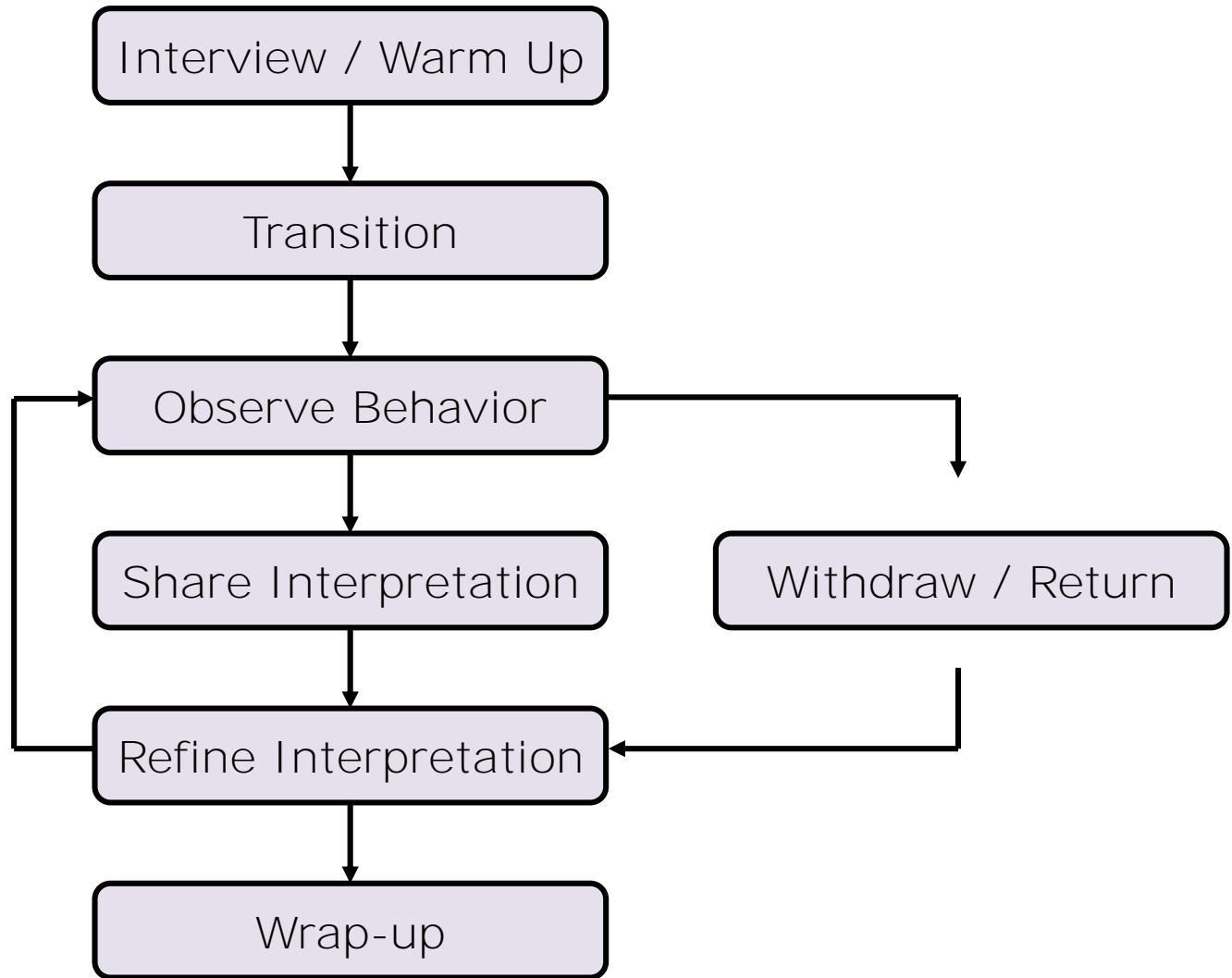
“Do they really do that? Why would they do that?”

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

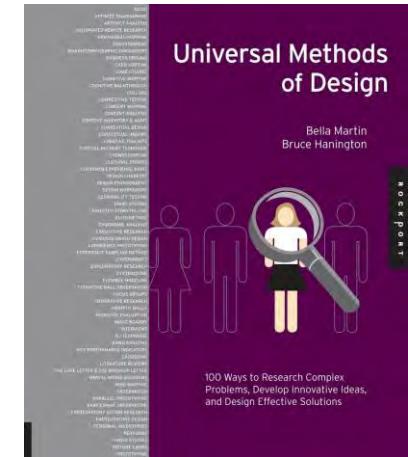
Additional Design Research Methods

Project Team Formation

# Many Design Research Methods

Many other design research methods are available, with different strengths

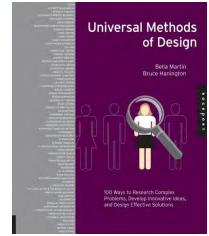
Often apply multiple methods for complementary perspectives



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

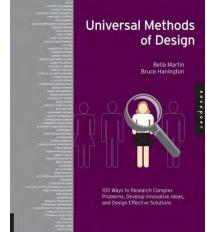
“can you give an example”, “tell me more”,  
“what do you mean”, “why was that important”

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

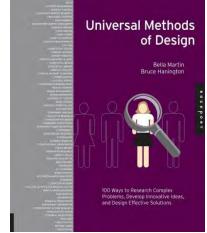
Explanations of problems in status quo

Underlying emotions in a process

Desires / disagreements for new designs

# Diary Study

Method 30



Participants keep a diary

Possibly as primary data

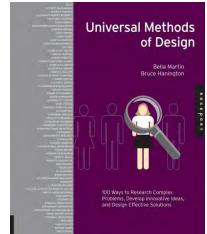
Possibly to create mindfulness before interview



Need						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
10am 3pm	2pm 6am	6am 8am	8am - 12pm	12pm 3pm	3pm 6pm*	6pm 12am
You needed: <input checked="" type="checkbox"/> Info. <input checked="" type="checkbox"/> Assist. <input type="checkbox"/> Other						
What did you need? <i>To know if smaller could be used on Don Valley Trail</i>						
Why did you need it? <i>brought to take baby to school in trail but it must be ice-free</i>						
Where were you? <i>at home</i>						
What were you doing? <i>planning art</i>						
When did you need it? <i>5-15 mins</i>						
What I needed was very important.						
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		

# Diary Study

Method 30



Participants keep a diary

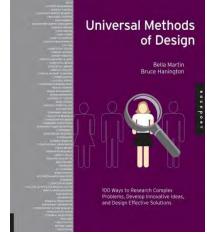
Possibly as primary data

Possibly to create mindfulness before interview



# Diary Study

Method 30



Participants keep a diary

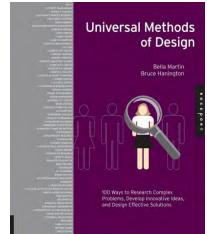
Possibly as primary data

Possibly to create mindfulness before interview



# Experience Sampling

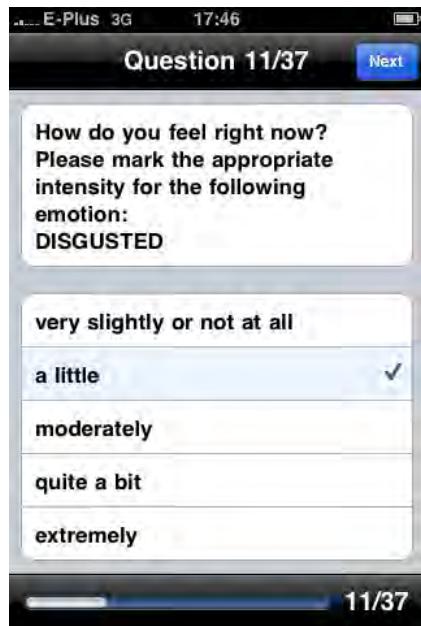
Method 37



Emerges from “beeper study” method

Can be random, can be context-aware

Can gather self-report, photos, sensor data

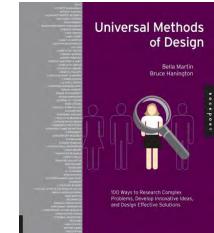


# Many Design Research Methods

## Personal Inventories

Method 62

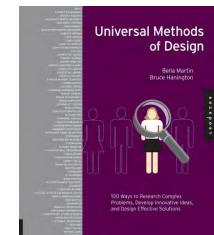
“collections of artifacts selected by the participant”



## 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...”

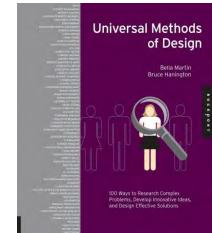
# Many Design Research Methods

## Behavior Mapping

Method 06

“place-centered mapping”

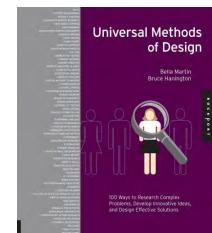
“individual-centered mapping / traces”



## Graffiti Wall

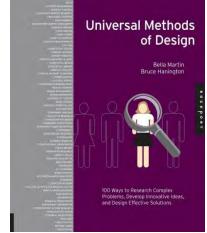
Method 45

“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

# CSE 440: Introduction to HCI

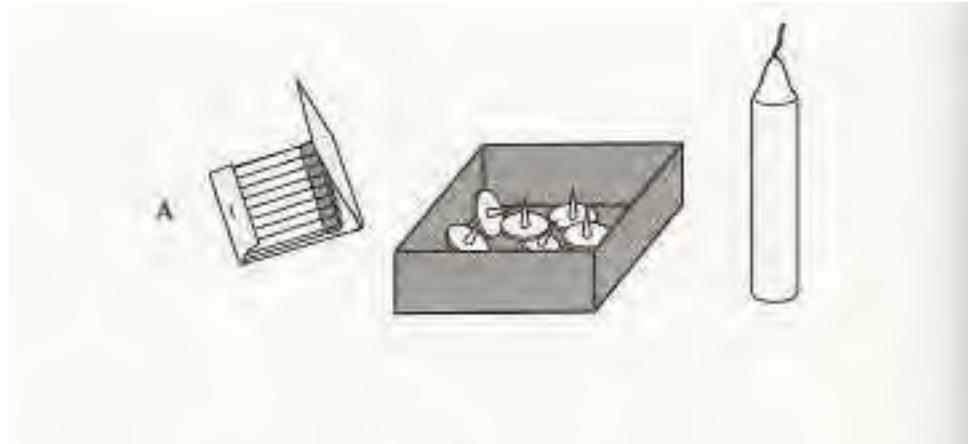
User Interface Design, Prototyping, and Evaluation

Lecture 04:  
Critique

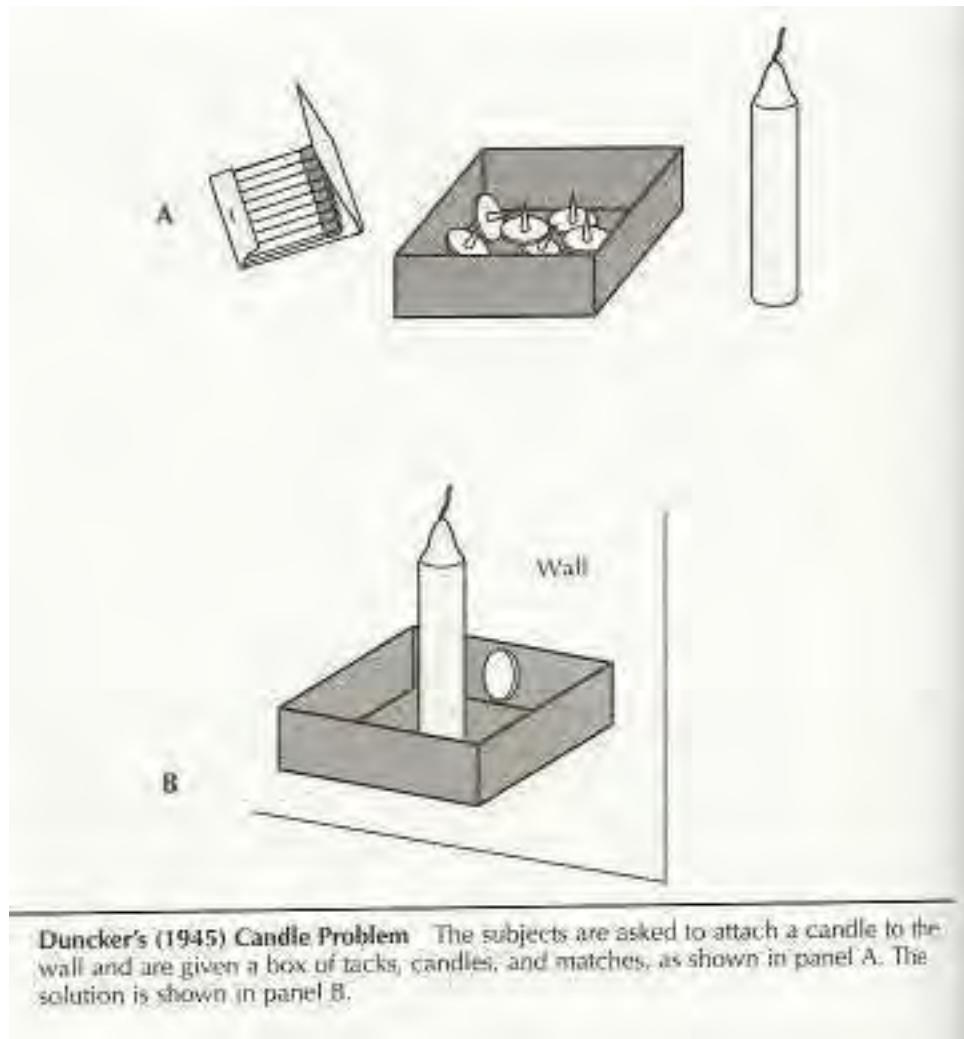
Tuesday / Thursday  
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# Functional Fixedness



# 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

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Lottery tickets, car washes

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Make as much money as possible

Lottery tickets, car washes

Line waiting service, bicycle tire pressure check

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

# \$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...

# 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?

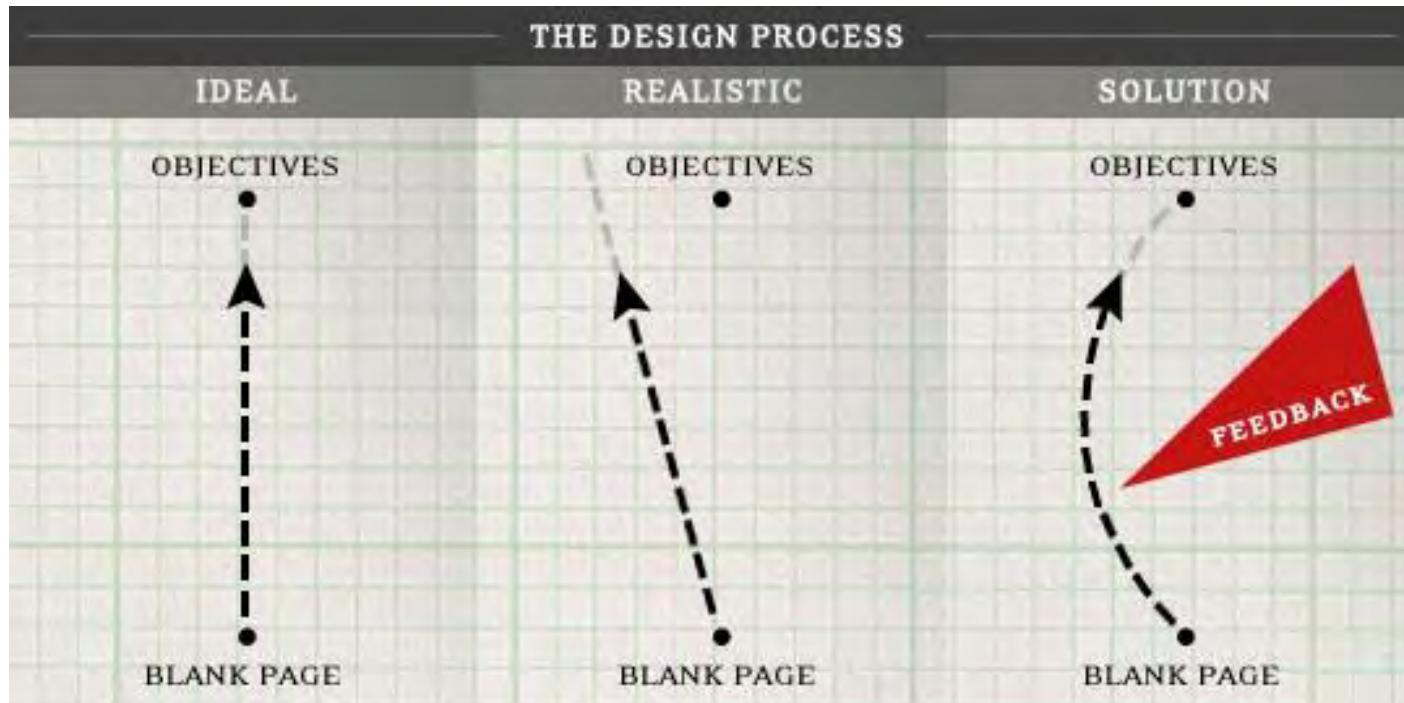
visual art, writing, design, code (i.e., code review)

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



# 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

# 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

# Tips for Presenters

Design your critique:

3) focus on feedback, not criticism

Criticism

passes judgement

finds fault

is personal

is vague

tears down

is ego-centric

is adversarial

belittles the designer

Critique

poses questions

uncovers opportunity

is objective

is concrete

builds up

is altruistic

is cooperative

improves the design

# 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

# 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?

# 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-e13db2990e3>

### 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](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	A list 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: How did you like the login screen? Good: What did you think about the login screen?
Q2	Where possible, ask open-ended questions instead of binary or limited choices	Bad: Does this make sense? Good: What are your impressions of this?
Q3	Ask opinion questions using balanced emphasis on different options	Bad: Is the feature helpful to you? Good: 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: Would this be a good idea? Good: How valuable would this be to you in your job?
Q5	Don't assign blame in probing questions	Bad: Why did you do that? Good: I noticed you did X. Talk me through your thought process.
Q6	Ask for specific examples and encourage storytelling	Bad: Do you have trouble with the search function? Good: 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: When this site was designed, there was discussion whether... Good: How could this site best meet your needs?
Q8	Don't ask participant to design solutions, ask for opinions on experience	Bad: What would be the best way to design this? Good: In your experience what other applications have done this well?
Q9	Ask curious questions to explore, but avoid argumentative probes	Bad: Do you have anything else to say about...? Good: Can you tell me more about...?
Q10	Ask "Why" to understand reasons for certain actions.	Bad: How would you rate your experience with the site? Good: 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	Read 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

# 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

# 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 you 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

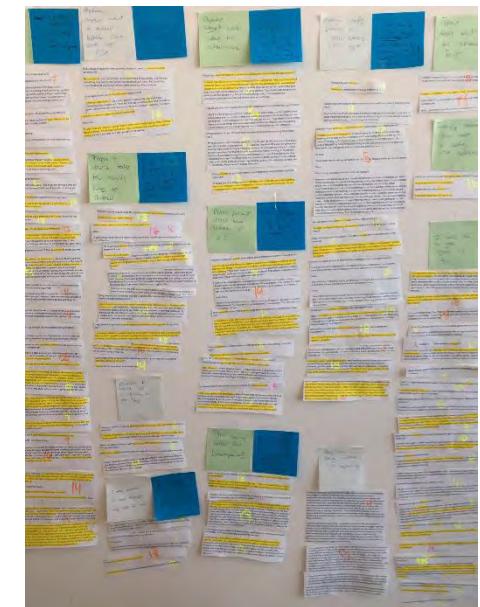
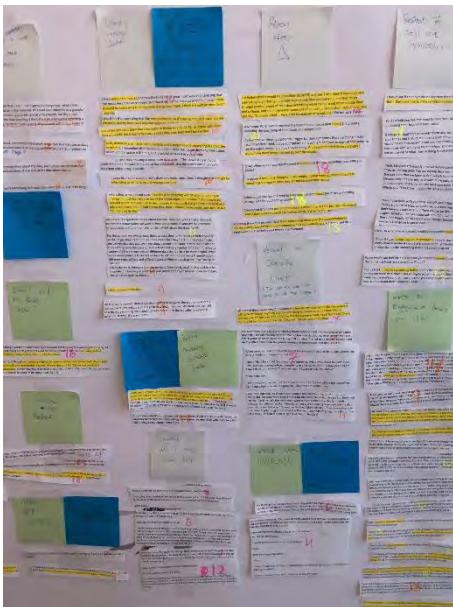
Generated during group session

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

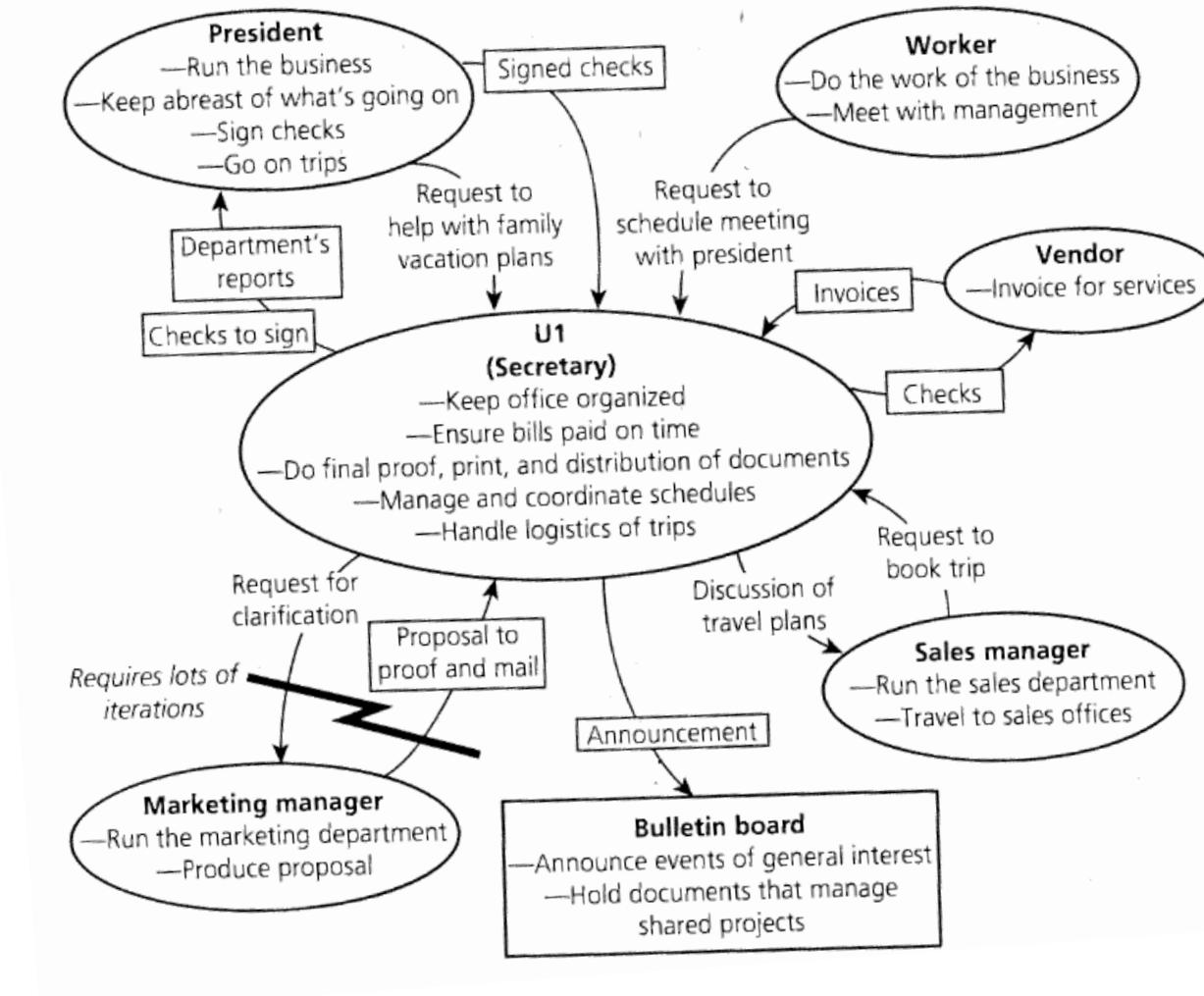
Many types of models

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

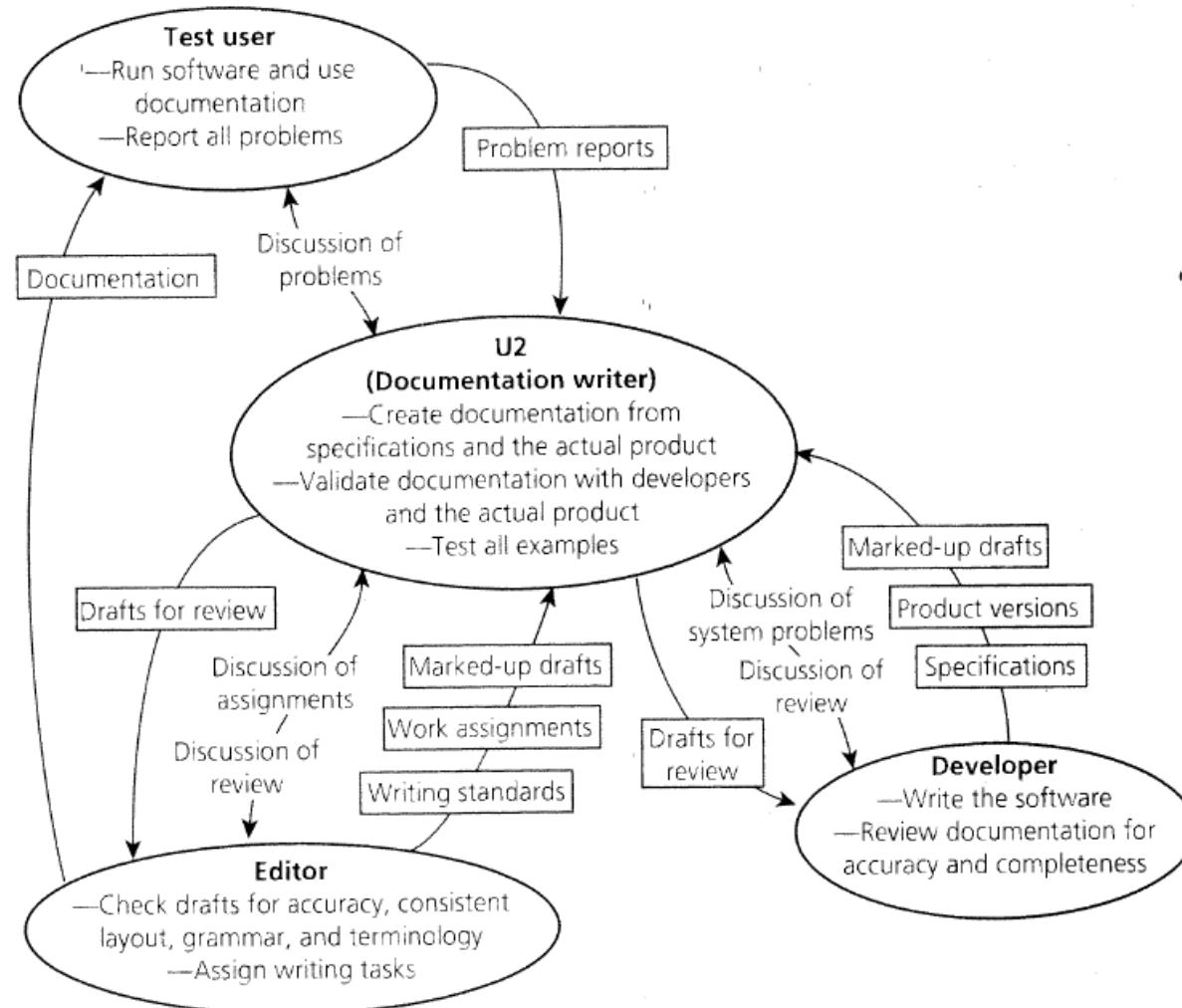
- None is perfect, they highlight different things

No model is perfect or guarantees insight

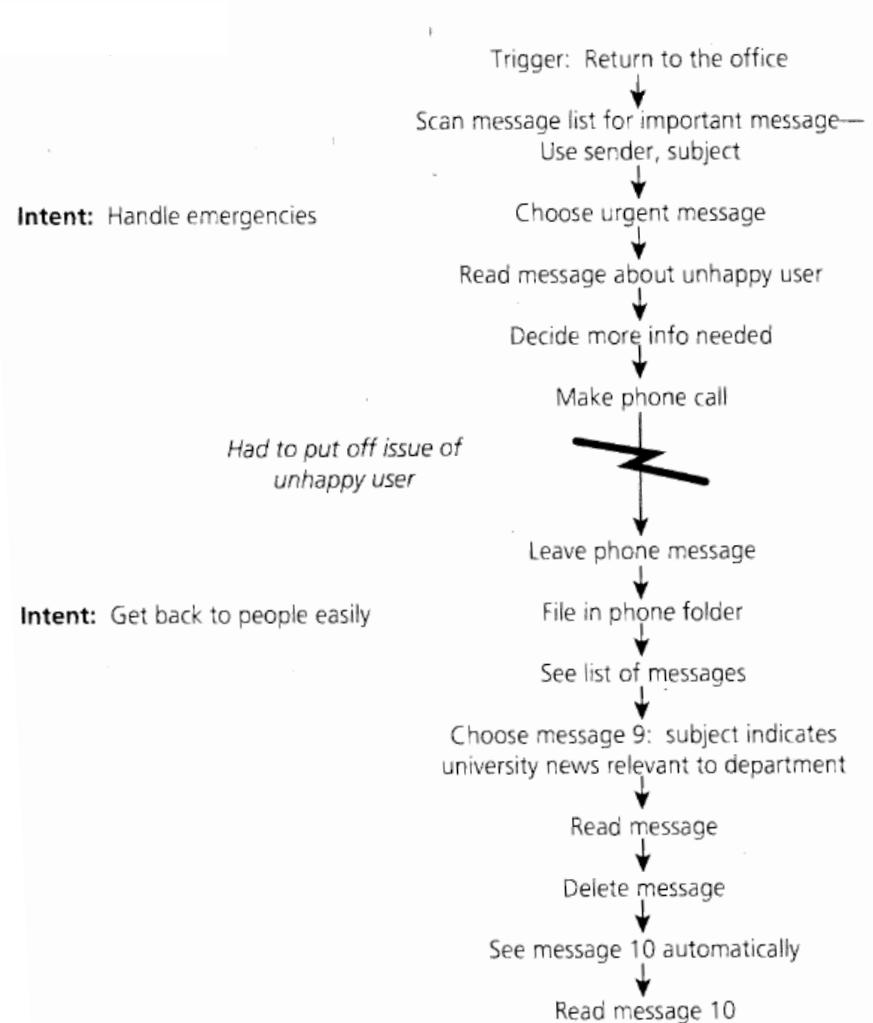
# Flow Model: Secretarial Hub



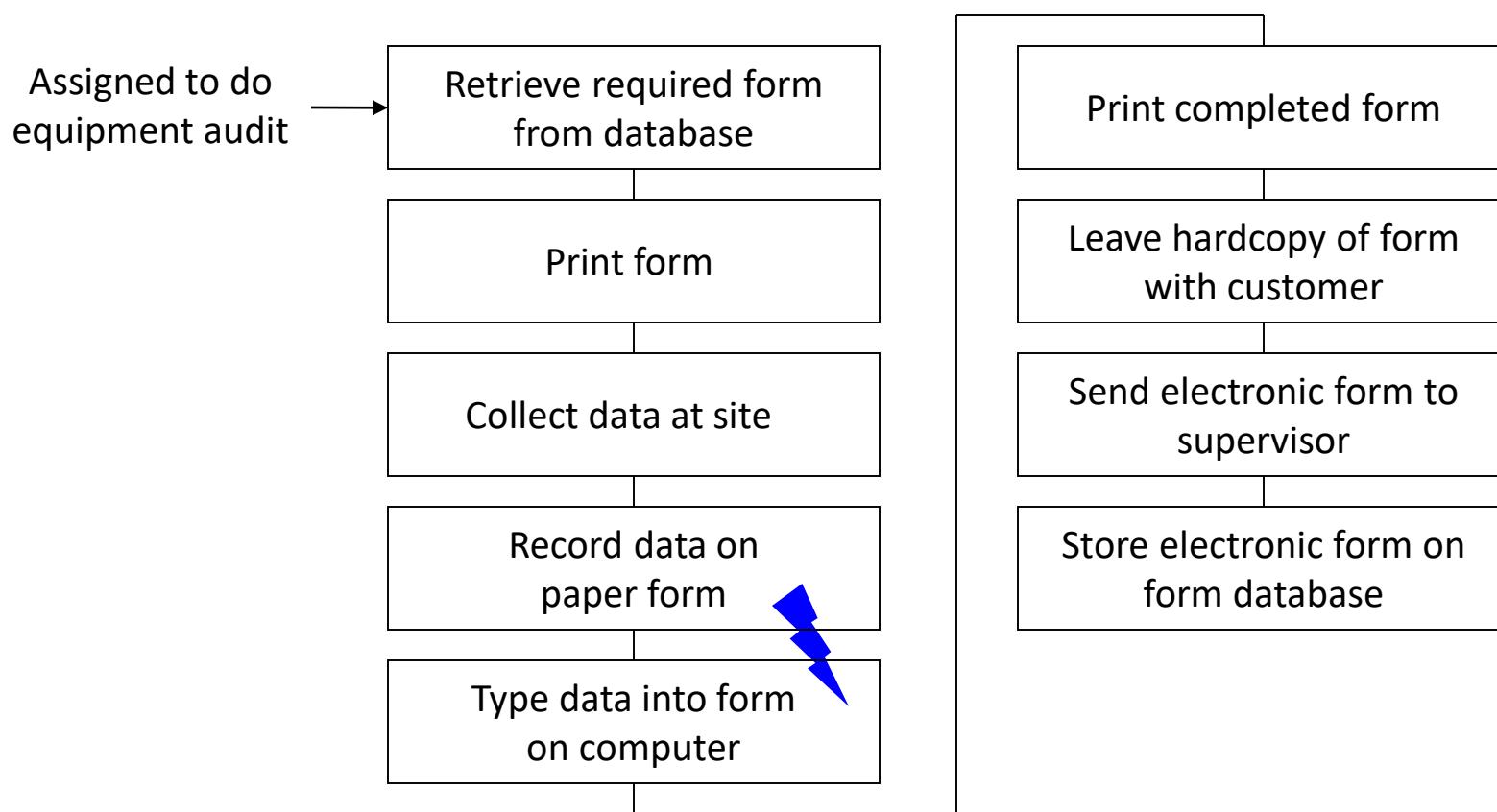
# Flow Model: Creative Work



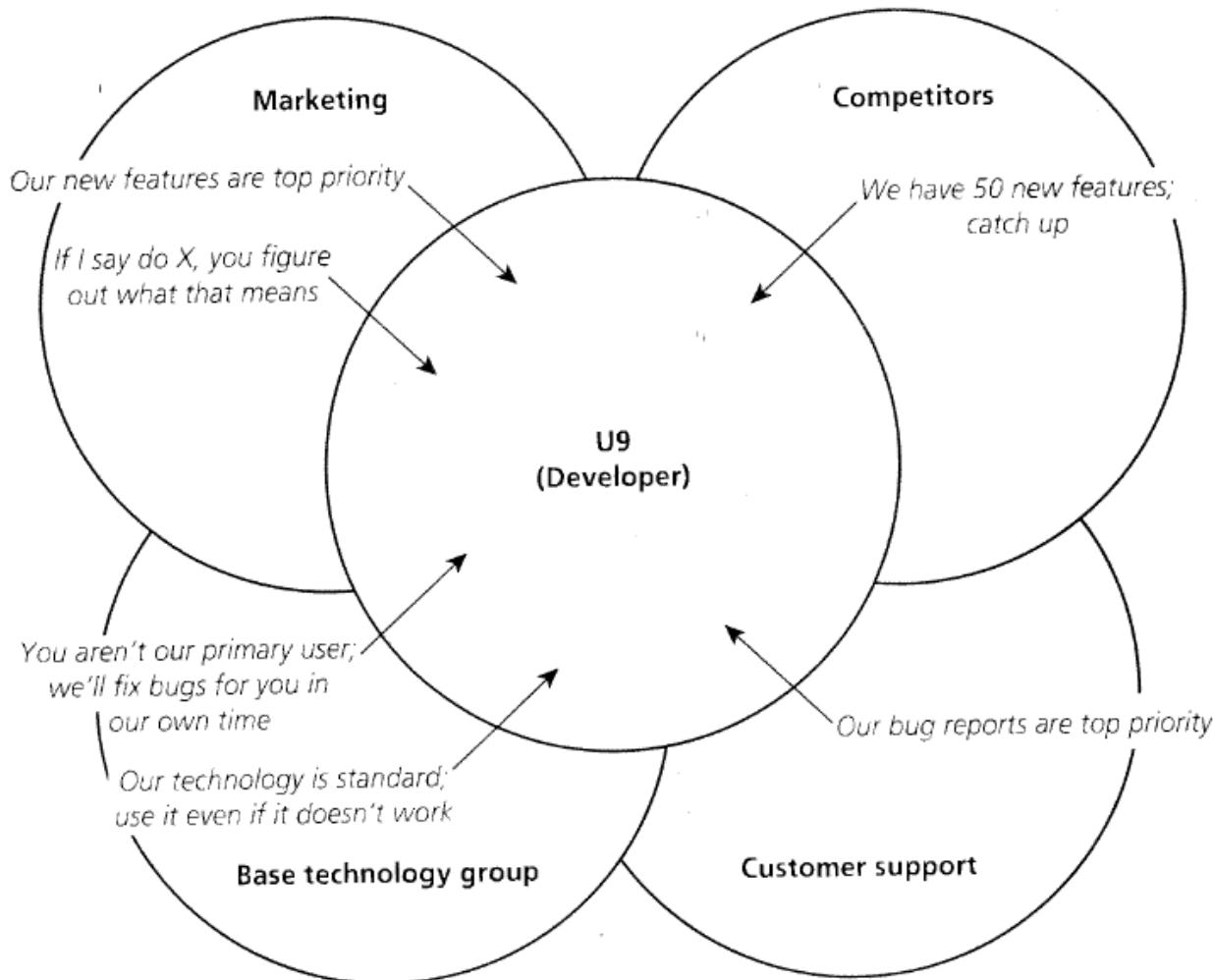
# Sequence Model: Doing Email



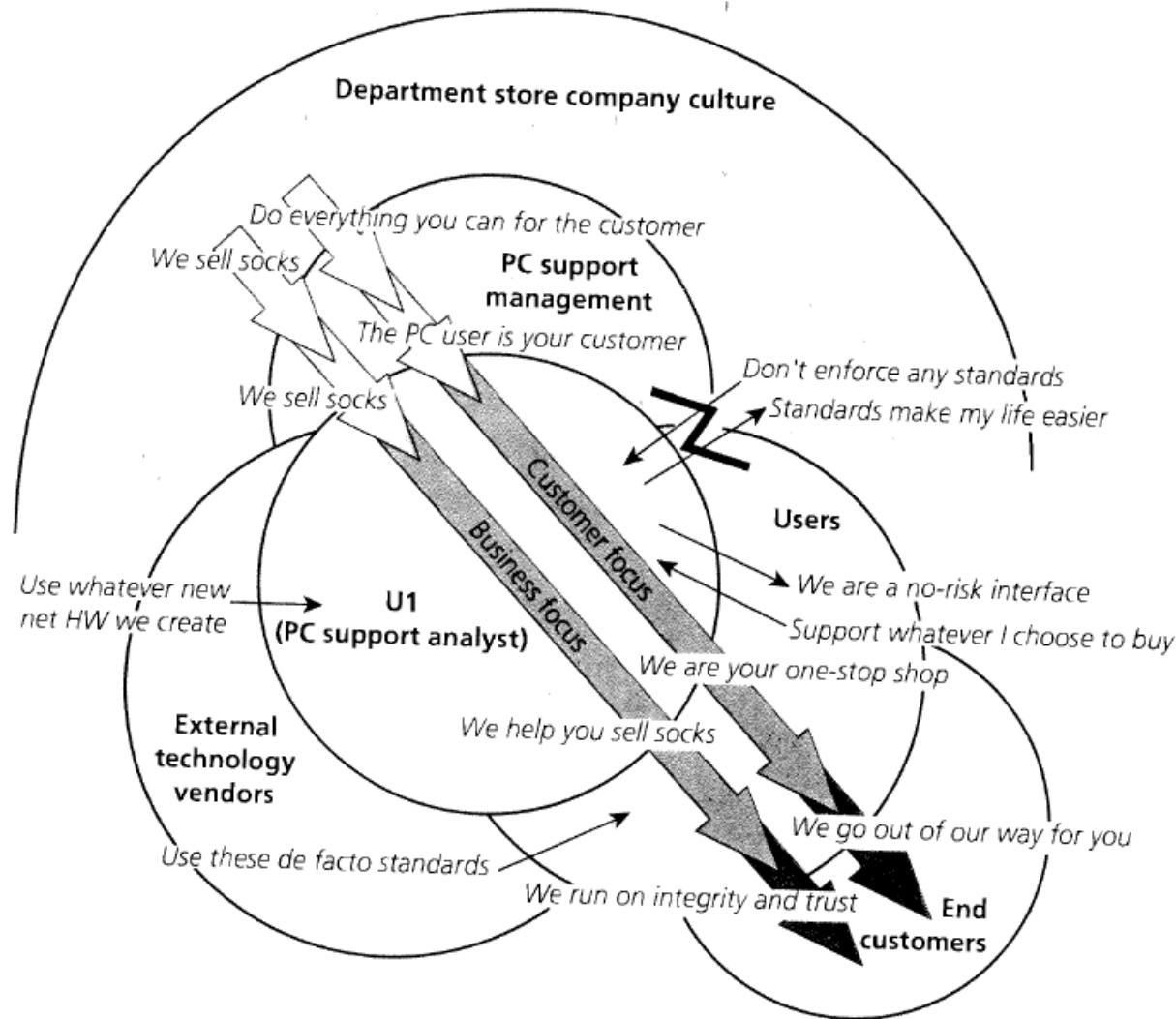
# Sequence Model: Equipment Audit



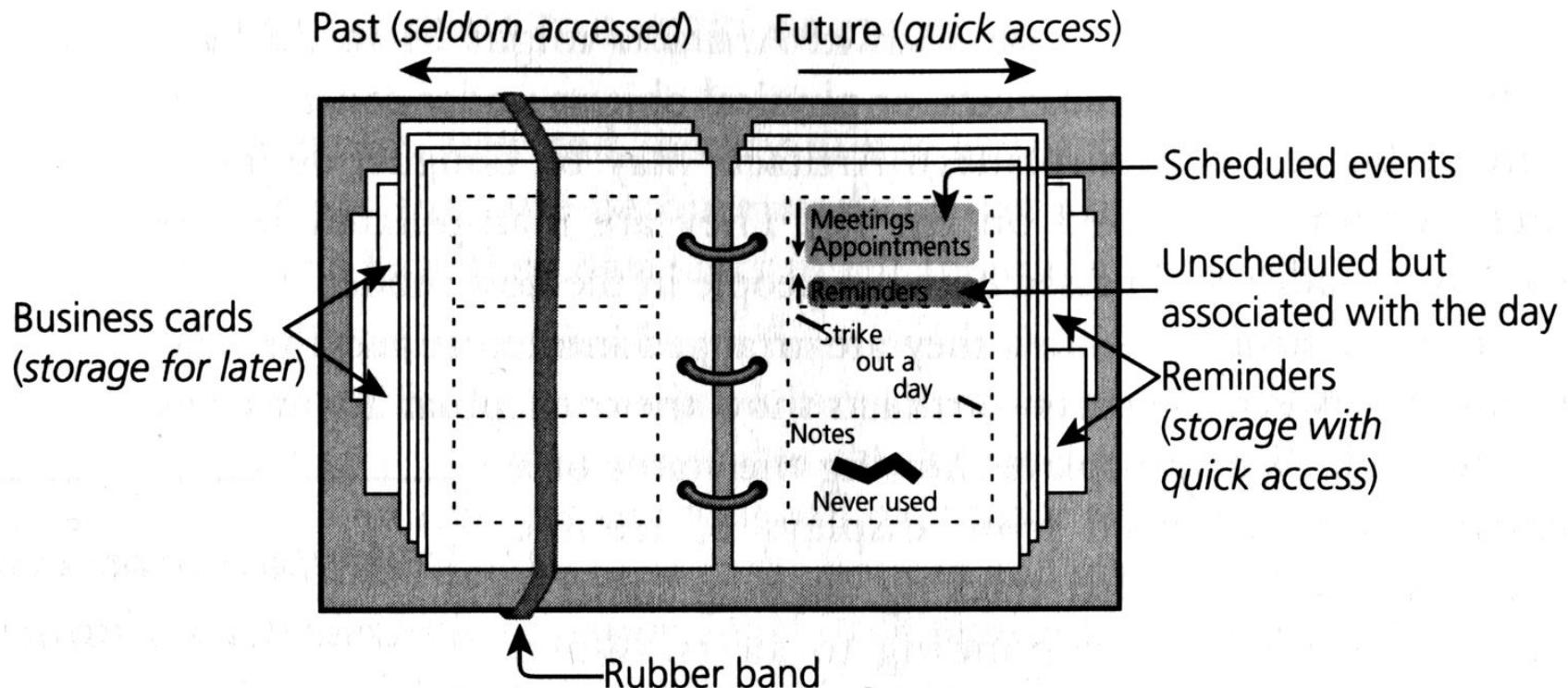
# Cultural Model: Developer



# Cultural Model: Department Store

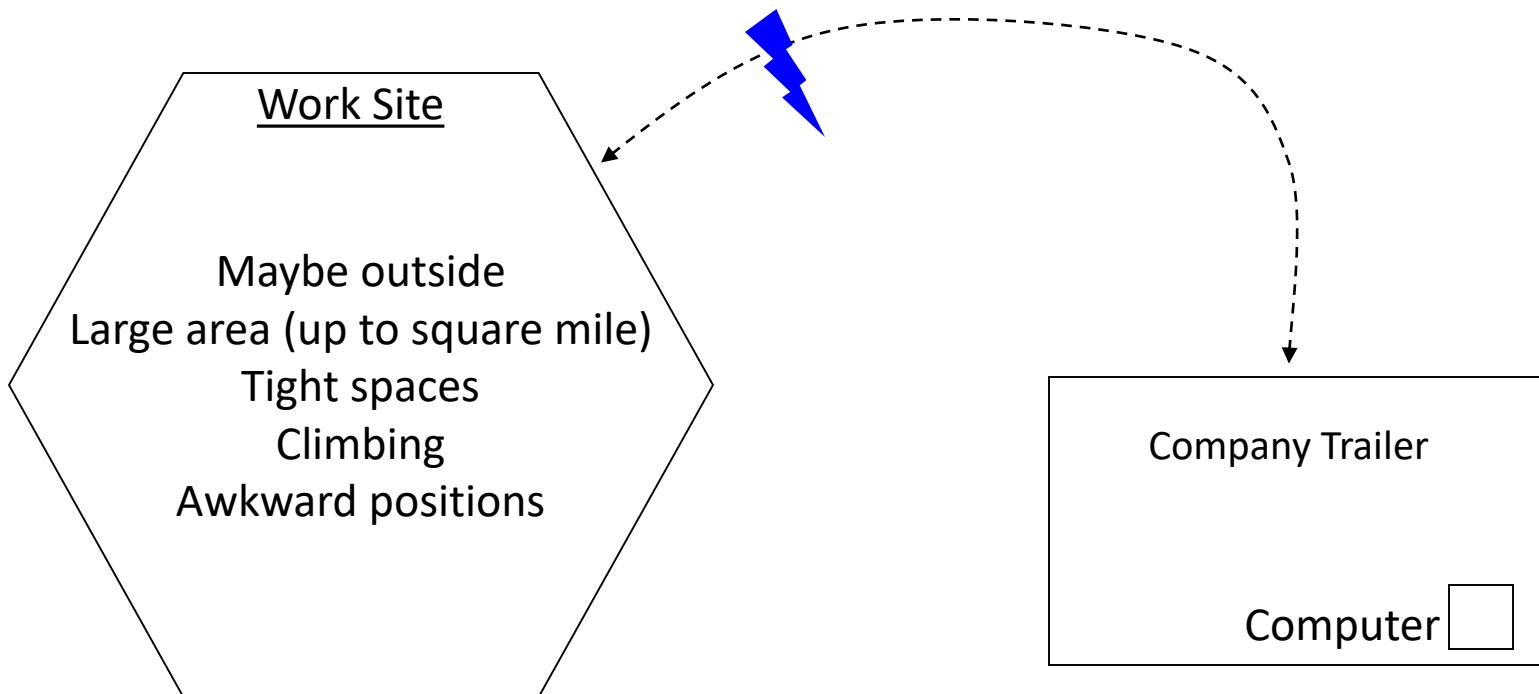


# Artifact Model: Calendar



# 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

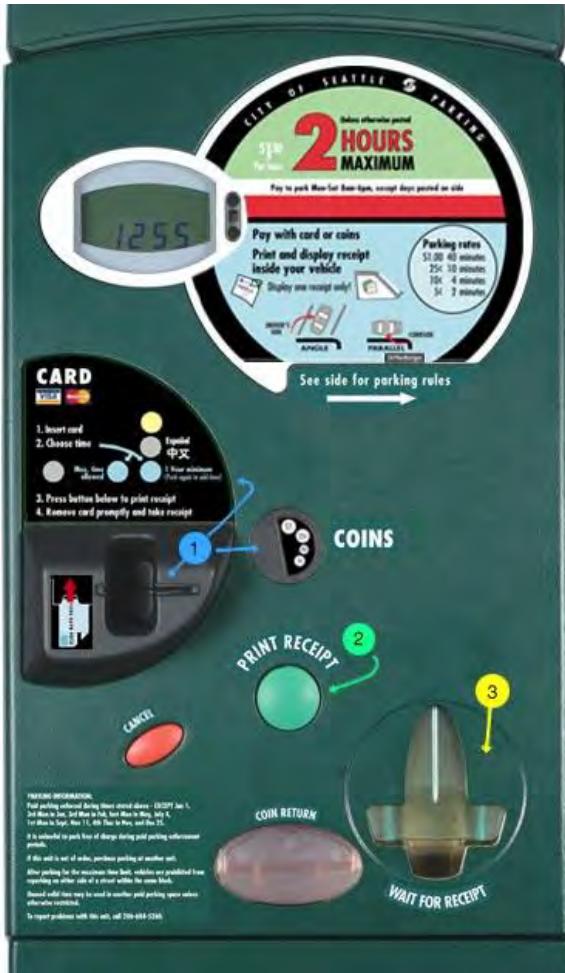
## Background

Existing systems, training

## Skills

Work habits and preferences

Physical characteristics and abilities



# 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



driver's  
side

PARALLEL  
curbside

ANGLE



For **MOTORCYCLES**,  
tape to headlight cover

Questions? Call 684-ROAD (7623)  
[paystations@seattle.gov](mailto:paystations@seattle.gov)



Seattle Department of Transportation

## 泊車、付款並顯示

### 泊車付費站使用說明



插入卡並按**藍色**  
按鈕購買時間，  
或投入硬幣購買時間



按**綠色**按鈕  
打印收據



迅速將卡取出  
等候收據並適當顯示  
僅限顯示一張收據，  
以便在任何咪表或付費  
站的車位泊車，直到您  
的時間到期

請使用可剝離的背面，  
將收據貼在  
前座側車窗內側



如果有問題嗎？請致電 684-ROAD (7623)  
[paystations@seattle.gov](mailto:paystations@seattle.gov)



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## ĐẬU XE, TRÀ TIỀN & DÁN BIÊN NHẬN

### Hướng Dẫn về Trạm Trà Tiền Đậu Xe



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



Bấm nút **XANH**  
để in biên nhận



Rút nhanh thẻ ra  
chờ biên nhận và  
dán đúng cách



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

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



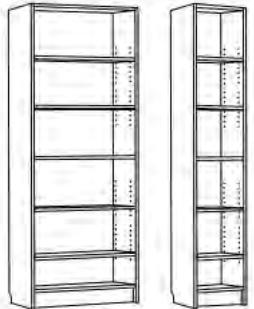
Đối với XE GẦM MÁY,  
dán vào chụp đèn trước

Thắc Mắc? Hãy gọi số 684-ROAD (7623)  
[paystations@seattle.gov](mailto:paystations@seattle.gov)

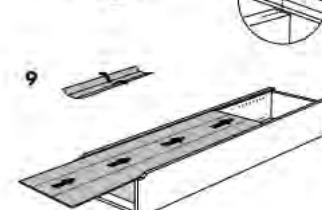
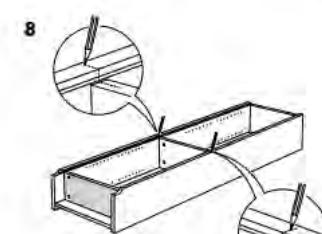
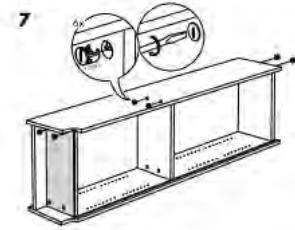
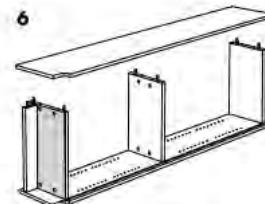
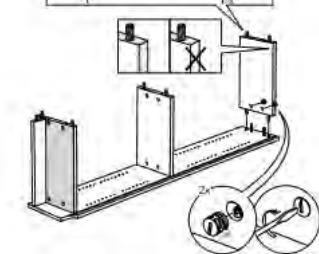
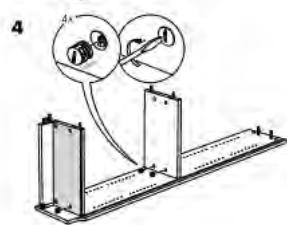
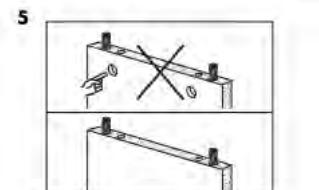
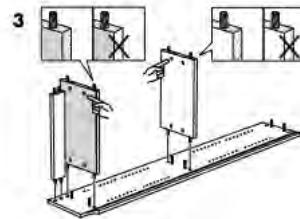
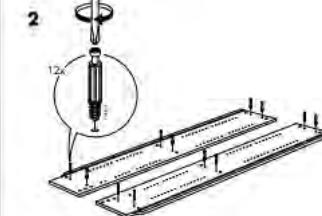
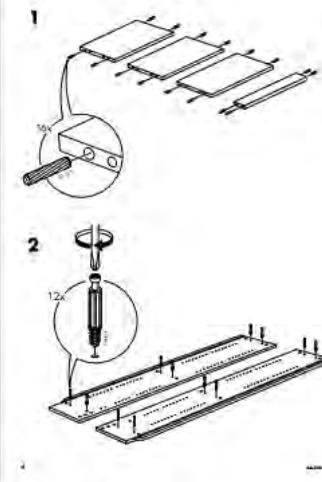


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# BILLY



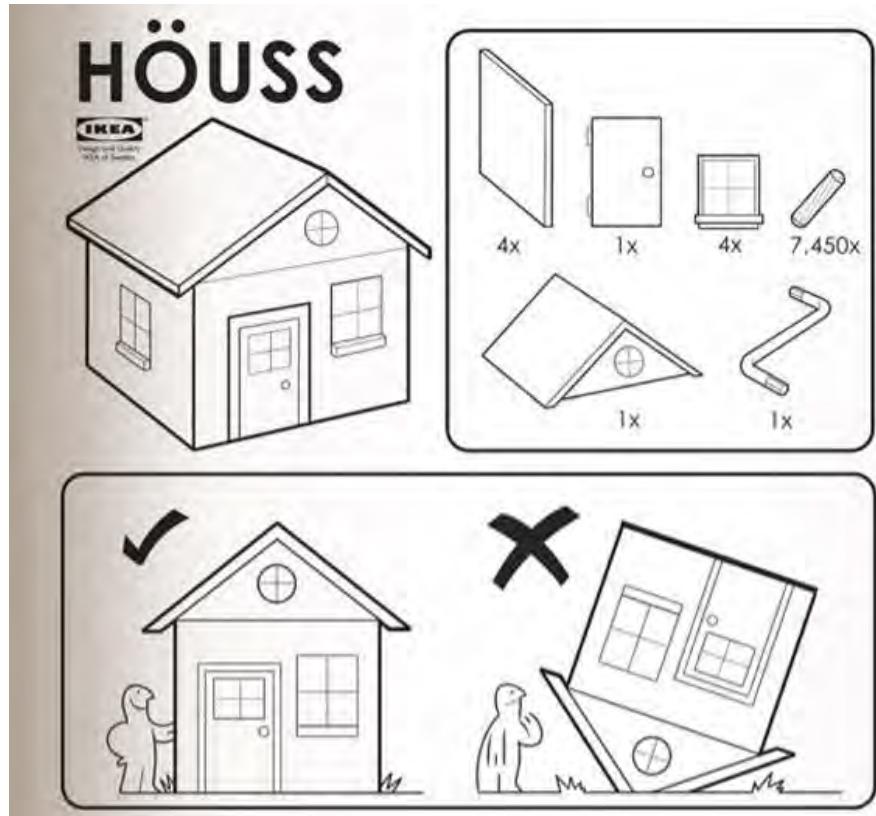
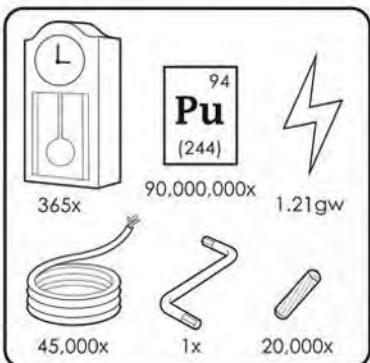
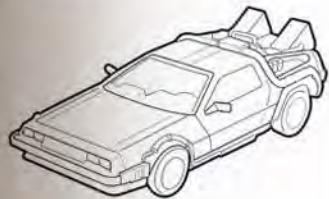
IKEA  
BY VINTER  
BILLY Bookcase

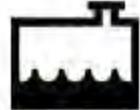


There are limits, a tradeoff in this design

# DJILORIANN

IKEA  
Design and Quality  
Made of Sweden





Coolant  
Low



Cruise  
Control



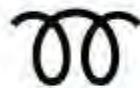
Dashboard  
Illumination



Defroster  
Front



Defroster  
Rear



Diesel  
Preheat



Door  
Power Lock



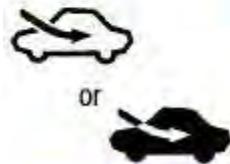
Door Open



Emissions  
Malfunction



Fan  
Operation



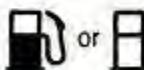
Fresh  
Air



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

*Individual*  
Yorkshire Pudding

spoonful salt  
beaten  
1 milk

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

1/2 cup. flour, add 4  
baking powder to  
it and bake same as

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

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

## POPOVERS

*Beat well*  
*Beat dry*  
2 cupfuls flour              2 eggs              *3 egg recipe makes 1/2*  
1/2 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,  $\frac{2}{3}$  full of popover batter. Place immediately in a hot oven of  $450^{\circ}$  F. and bake for 30 min. Then lower temperature to  $350^{\circ}$  F. and bake for 15 min. longer. Makes 9 popovers.

## CORNBREAD

2 cupfuls cornmeal	2 cupfuls sour milk
1 teaspoonful soda	2 eggs, beaten
1 1/2 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  $400^{\circ}$  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?

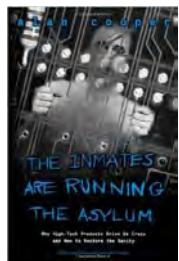
When plants became "sick", people take action, seek help, or ignore the problem until the plant dies. When people forget to water plants, they usually notice that the plant needs water and give it water. Sometimes people may not realize that a plant needs water until it is too late.

# Combine with Other Methods

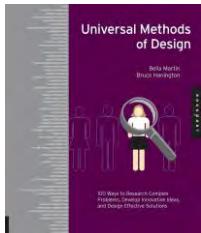
Personas

Concept Mapping

Competitive Analysis



Method 63



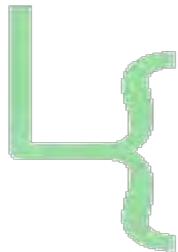
“If you want to create a product that satisfies a broad audience ..., logic will tell you to make it as broad in its functionality as possible to accommodate the most people. Logic is Wrong.”

# 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

**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:**

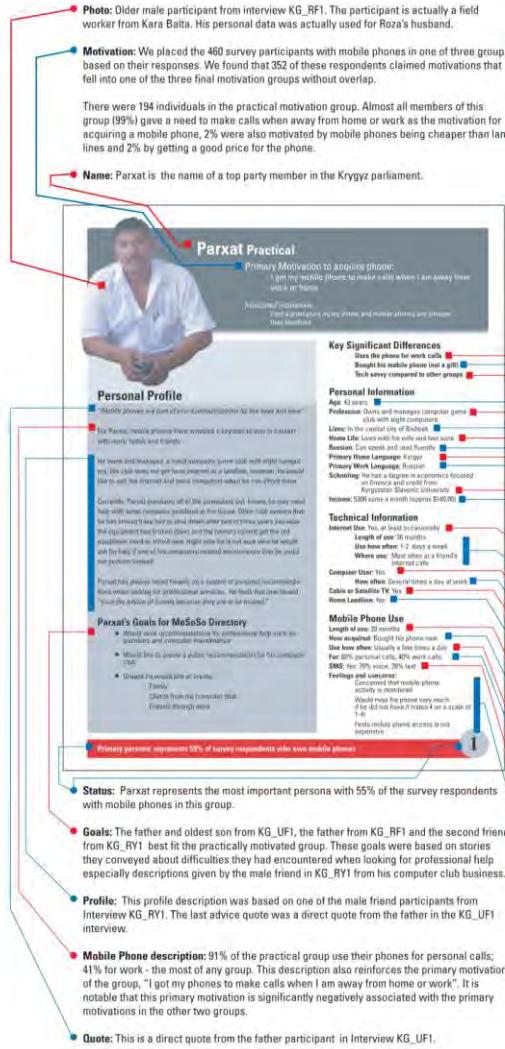
- Concerned that mobile phone activity is monitored
- Would miss his phone very much if he did not have it (rated 4 on a scale of 1-4)
- Feels mobile phone access is too expensive

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

1

# Personas

## Parxat Persona Data Detail



- 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 Kyrgyz. 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://news.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

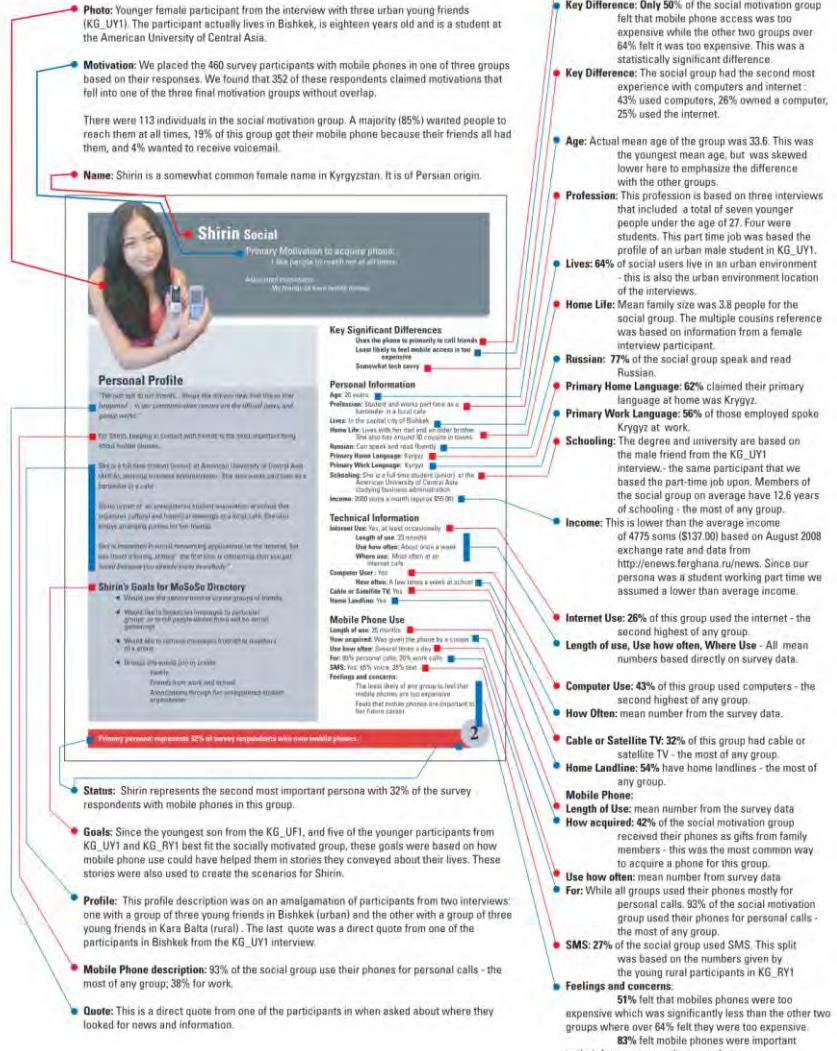
### Mobile Phone Use

**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

# Personas

## Shirin Persona Data Detail



# 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 specialists 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

# 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.

**Personal Profile**

Roza is a middle-aged female participant from interview KG\_RF1. She is a secondary persona, representing 13% of survey respondents who own mobile phones.

**Key Significant Differences**

- Lives in a rural area
- Not tech savvy

**Personal Information**

- Age: 35 years
- Profession: Farmer. Her husband is a farmer (23 years)
- Lives in: Kara Balta, a rural village
- Family: Husband, two sons, and two daughters
- Language Spoken: Russian
- Primary Home Language: Kyrgyz
- Secondary Home Language: English
- Income: \$11,000

**Technical Information**

- Internet Use: No
- Computer Use: No
- 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
- How used: Personal calls, work, and to connect with family
- For: Personal calls, work, and to connect with family
- Feeling: Neutral

**Mobile Phone Description**

- What he uses their to talk to a connection in the interview: Personal calls
- Would like to receive a mobile service using 3G
- Would like to find recommendations for the (professional) services from their network if it's free
- Desired life would look like: Personal calls, work, and to connect with family
- May look in the public area for professional services

**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. The 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 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.

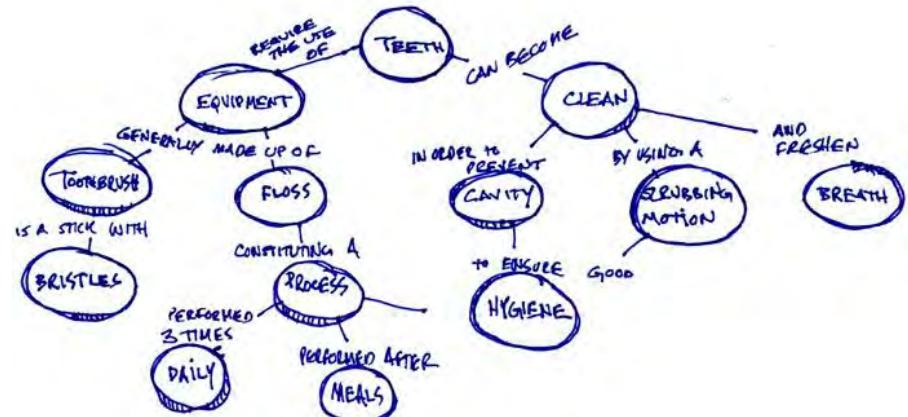
- Key Difference:** Only 18% of the replacement motivation group used their phones for work - this is the lowest of any group
- Key Difference:** 82% of the replacement motivation group lives in a rural area. This is statistically significantly more than any other group.
- Key Difference:** The replacement 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 12% of respondents in this group were employed full time (self-employment was not counted). The husband's 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 Kyrgyz.
- Primary Work Language:** 62% of those employed spoke Kyrgyz 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 has 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
  - 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

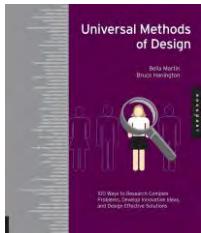
Personas

Concept Mapping

Competitive Analysis



Method 16

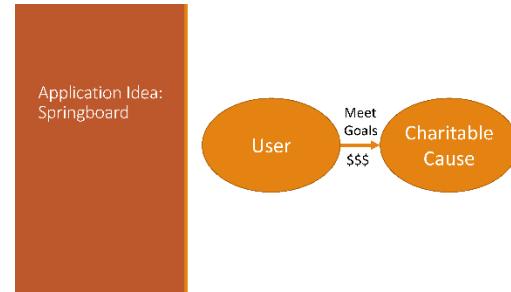
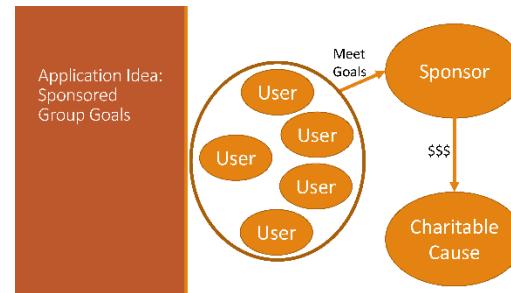
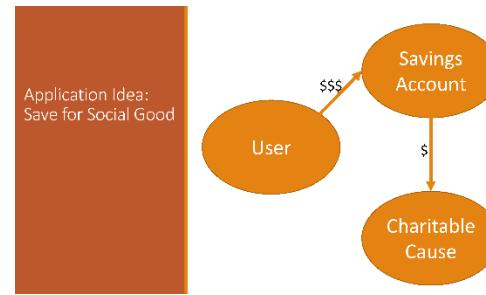


# Combine with Other Methods

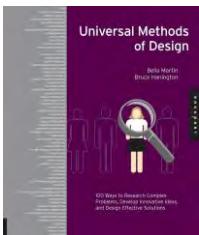
Personas

Concept Mapping

Competitive Analysis



Method 16

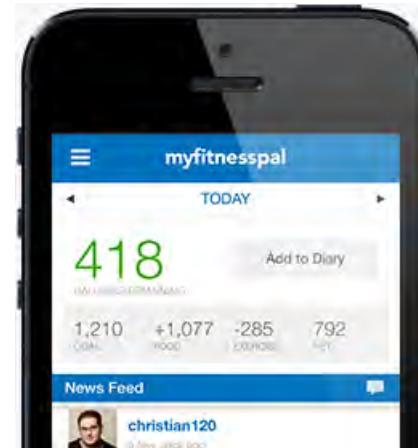


# Combine with Other Methods

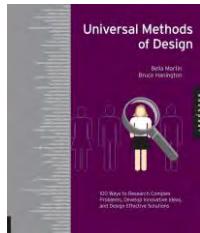
Personas

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

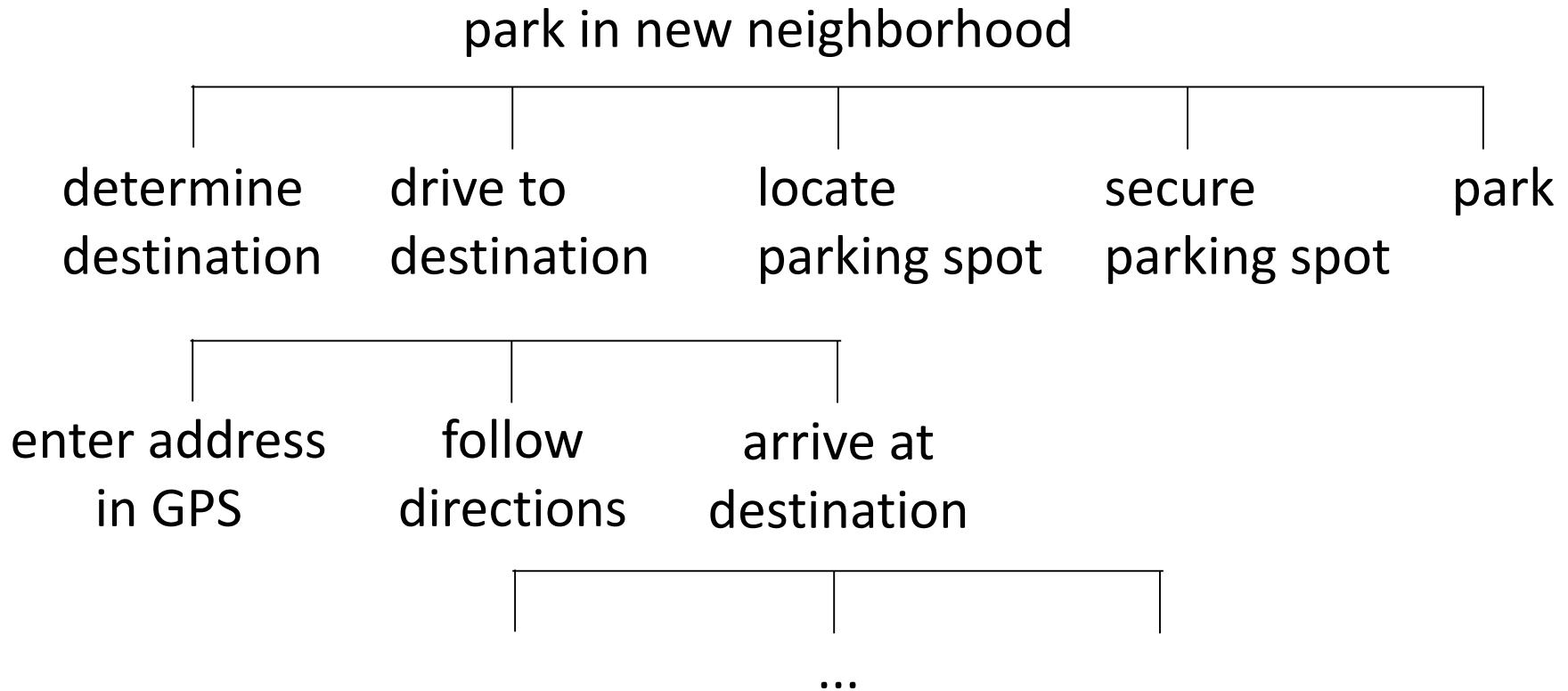
filename task example

# 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.

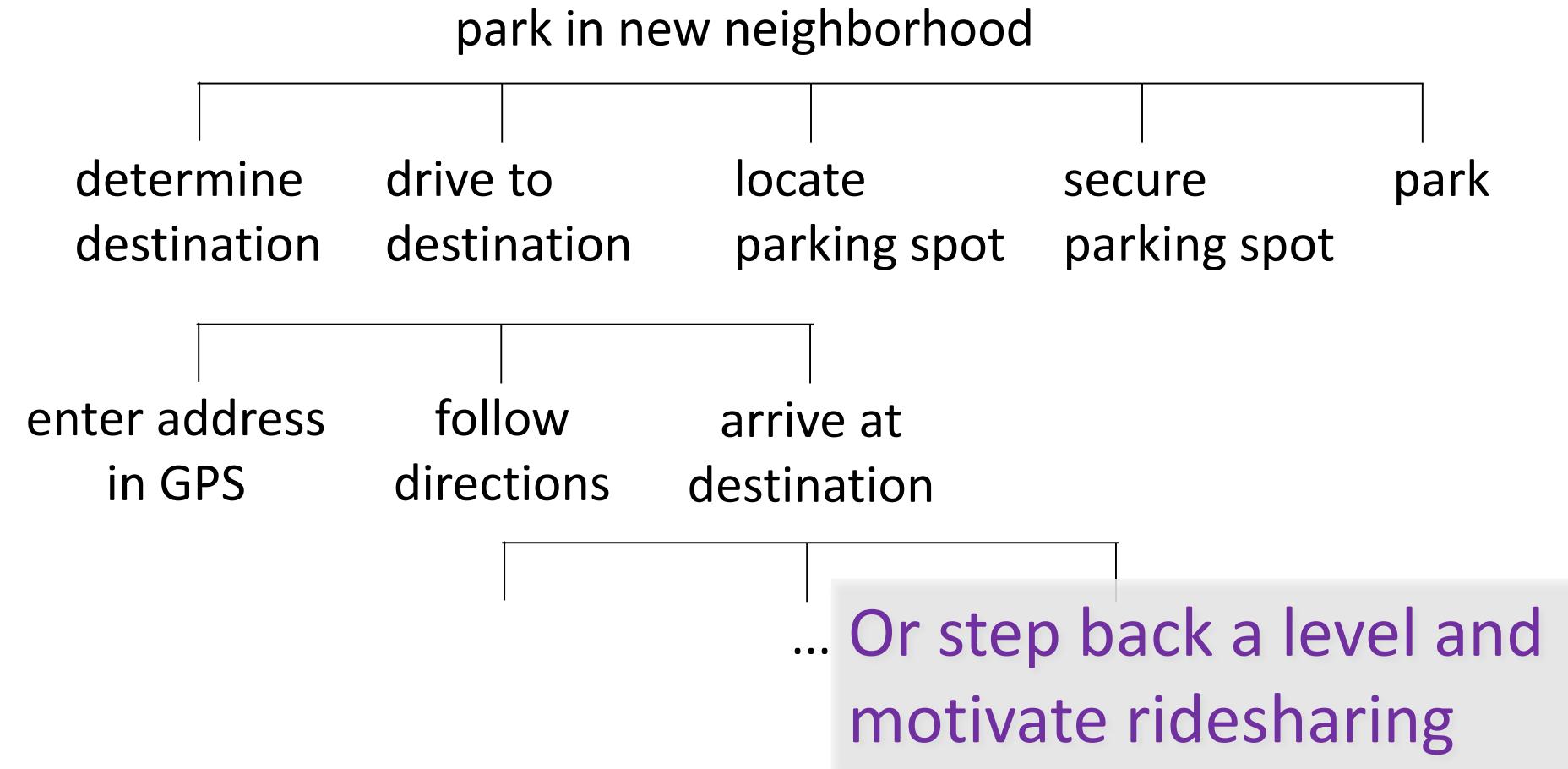
# Hierarchical Task Analysis

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

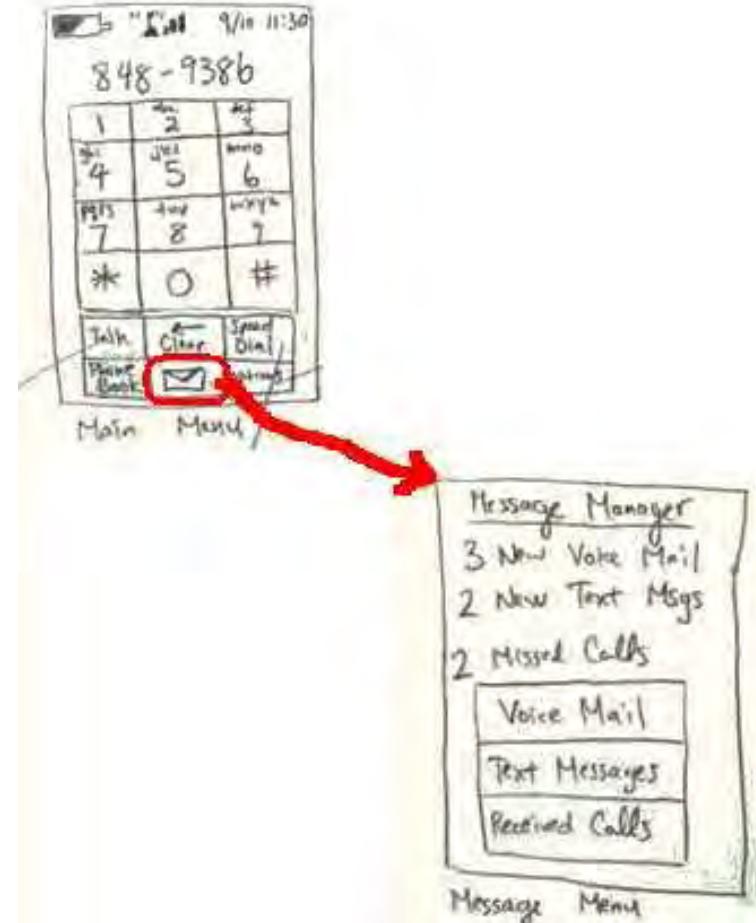
illustrate using storyboards

# 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

# 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



# 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

The screenshot shows a web browser displaying the event page for the Computing Research: Addressing National Priorities and Societal Needs 2017 symposium. The page features a red header with the CCC logo and the text "Catalyzing the computing research community and enabling the pursuit of innovative, high-impact research". Below the header is a navigation menu with links to About, Visioning, Leadership Development, Task Forces, Resources, Events, and Blog. A search bar is also present.

## Computing Research: Addressing National Priorities and Societal Needs 2017

**October 23-24, 2017**  
The InterContinental Washington  
D.C. at the Wharf  
801 Wharf Street, SW, Washington,  
D.C. 20024

**Event Contact:** Ann Drobis, [adrobis@cra.org](mailto:adrobis@cra.org)

**Event Type:** 2017 Events, Special Event

**Event Category:** CCC

**Tags:** grand challenges, research, symposium

**Overview** | **Agenda**

Over the past several decades, computing and information technologies have shaped our lives, our society, and our physical world in ways we never would have imagined. An increasing number of jobs depend on IT, IT shrinks time and distance in our social lives, agriculture and transportation are rapidly becoming IT-based, and IT holds the promise of revolutionizing education and healthcare. Although many of the IT-powered innovations that are reshaping our society can be traced to fundamental computing-related research, their impact has been magnified through powerful applications in areas of broad societal need and opportunity.

Over the past 11 years, the Computing Community Consortium has hosted dozens of research visioning workshops to imagine, discuss, and debate the future of computing and its role in addressing societal needs. The second CCC Computing Research symposium draws these topics into a program designed to illuminate current and future trends in computing and the potential for computing to address national challenges.

The two days are organized around four main themes:

- Intelligent Infrastructure for our Cities and Communities
  - Intelligent infrastructure is already transforming our nation's cities and communities, but the technological revolution is just now beginning. The potential for major improvements in public health and safety, efficient use of our resources, and a higher quality of life for all citizens are enormous. At the same time, new risks arise as we attempt to integrate large scale data collection, advanced cyberphysical systems, and autonomous vehicles into our daily lives. This session will highlight some of the major advances now taking place, while at the same time emphasizing the substantial body of research, much of it crossing disciplinary boundaries, that still needs to be done.
- Security and Privacy for Democracy
  - Computing research enables new technology to help society cope with information security and privacy risks. Learn about how differential privacy will enable new understanding of the population while protecting privacy and about technologies used to help journalists and human rights workers to communicate safely in oppressive regimes.
- AI and Amplifying Human Abilities
  - This panel will examine the emerging role of AI in augmenting human abilities in new and powerful ways. In particular, this session will examine the spectrum of human and machine capabilities and how we develop systems that provide a seamless interface between the two. Speakers will also ground their remarks in application areas ranging from health, transportation, universal access, data analysis, and education.
- Data, Algorithms, and Fairness
  - Data-driven and algorithmic decision making increasingly determine how businesses target advertisements to consumers, how police departments monitor individuals or groups, how banks decide who gets a loan and who does not, how employers hire, how colleges and universities make admissions and financial aid decisions, and much more. As data-driven decisions increasingly affect every corner of our lives, there is an urgent need to ensure they do not become instruments of discrimination, barriers to equality, and threats to social justice.

**Livestream**

# 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

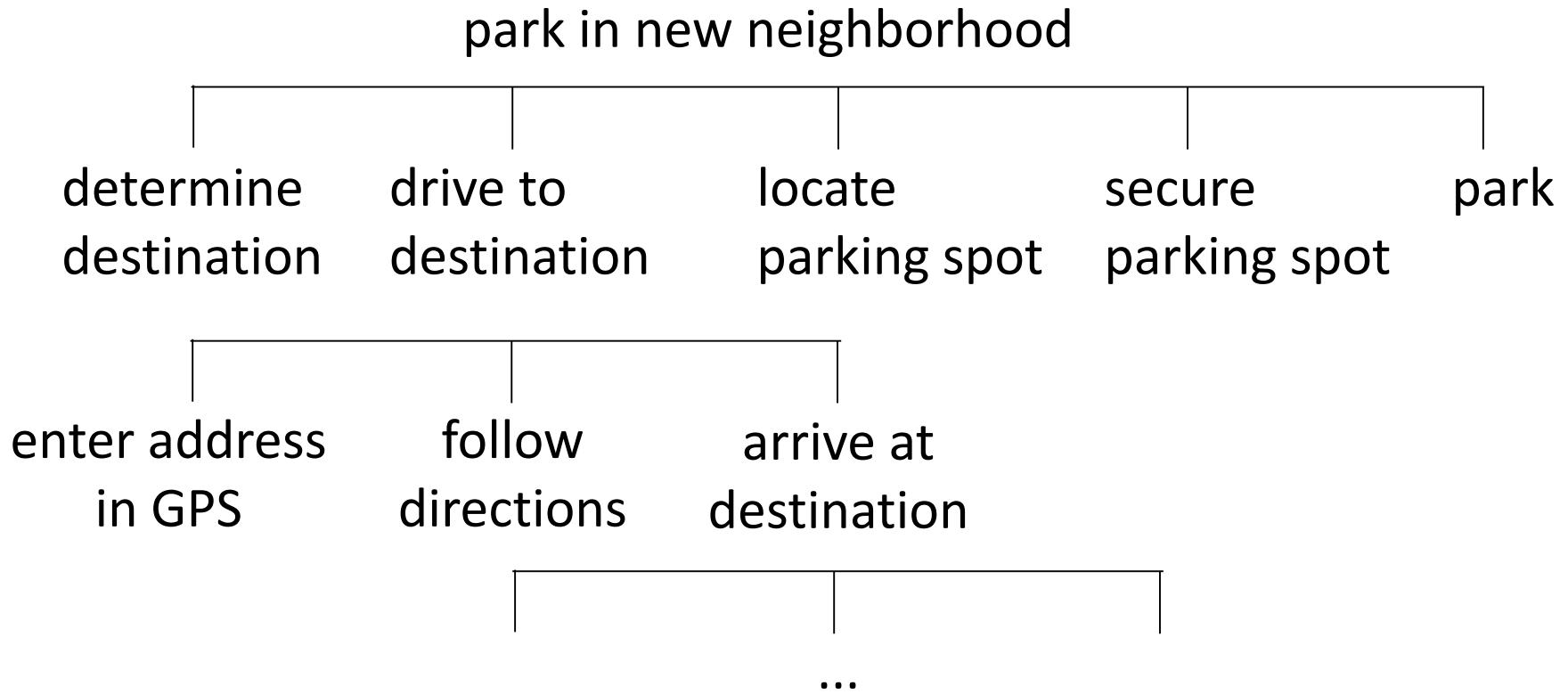
filename task example

# 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.

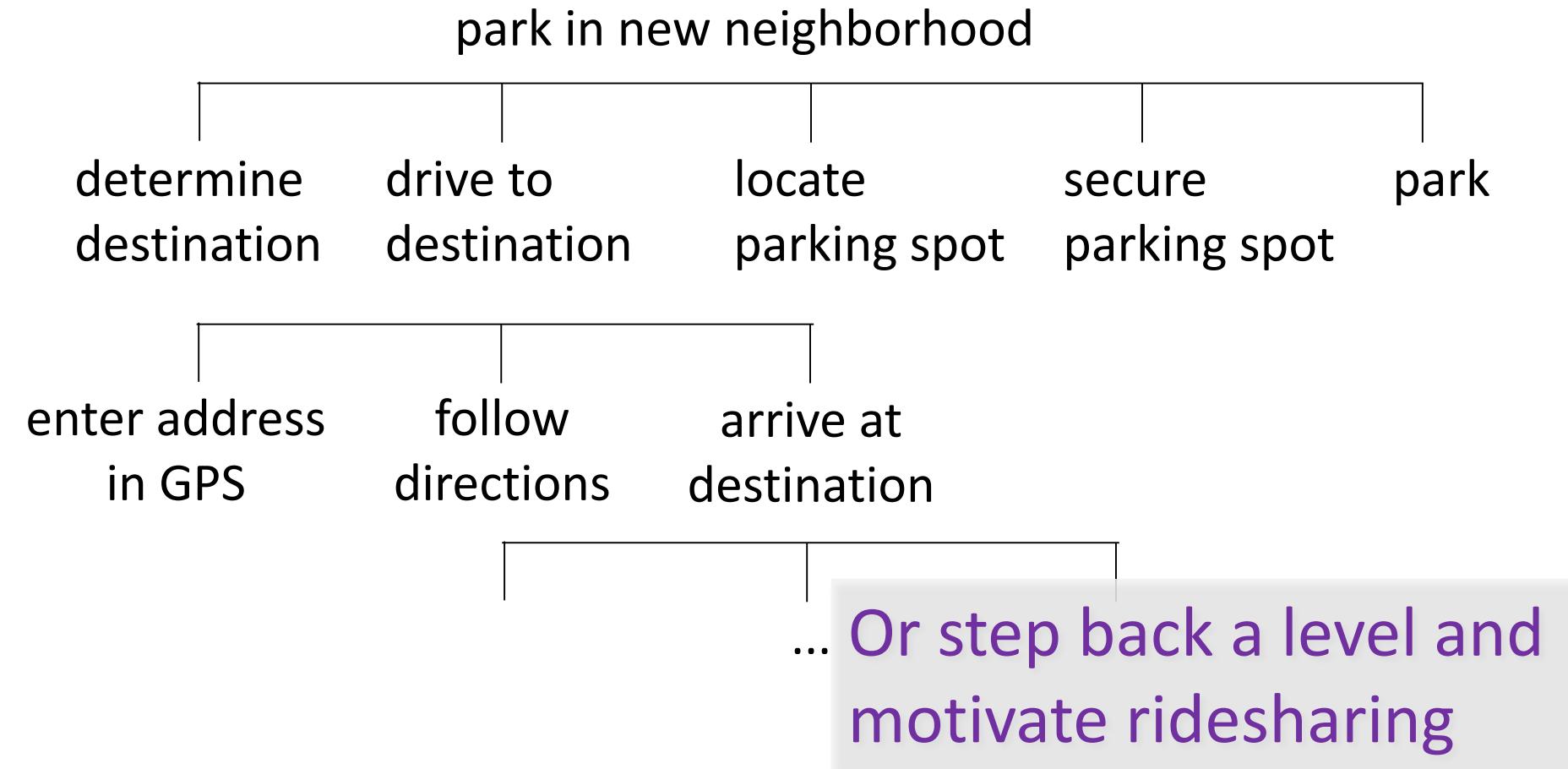
# Hierarchical Task Analysis

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

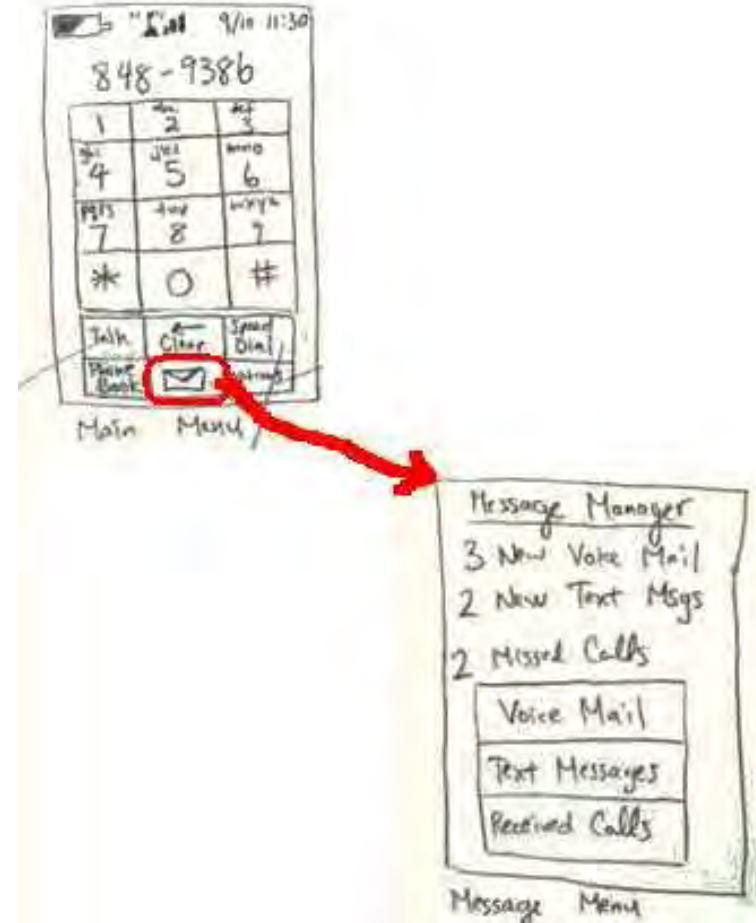
illustrate using storyboards

# 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

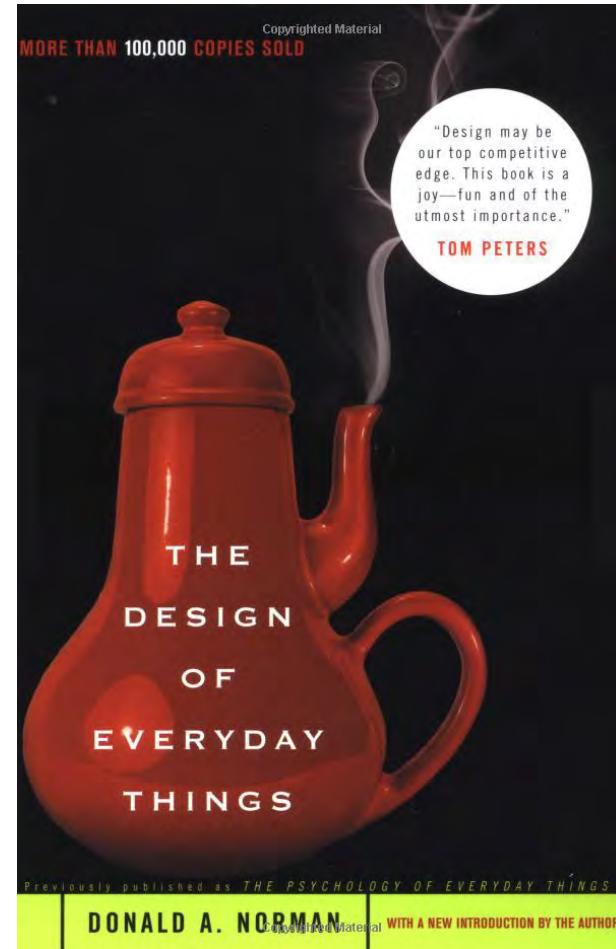
Review core design terminology

# 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.



# 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]

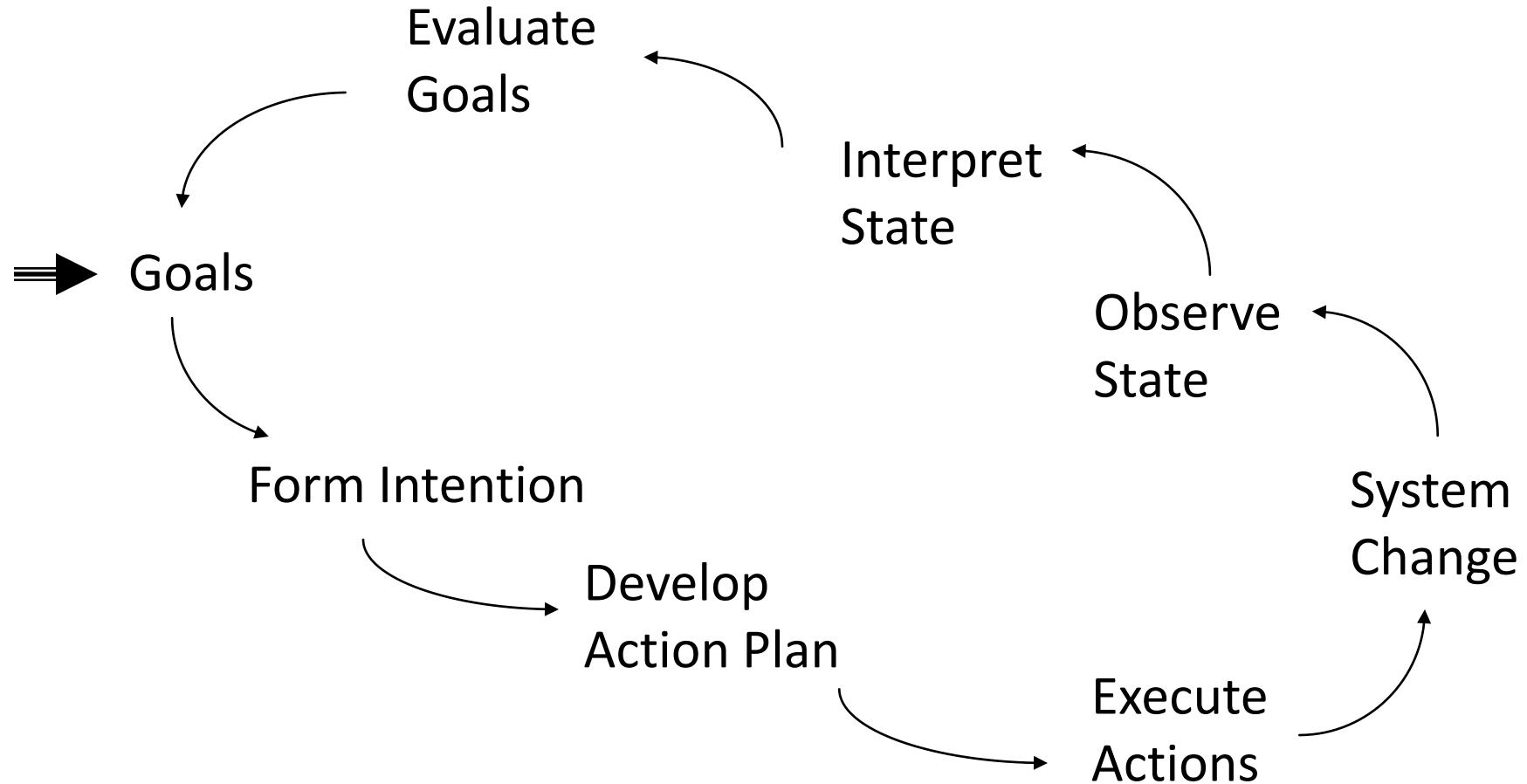
6. Interpret the system state

The knob rotated. The lamp is emitting light. The lamp seems to work

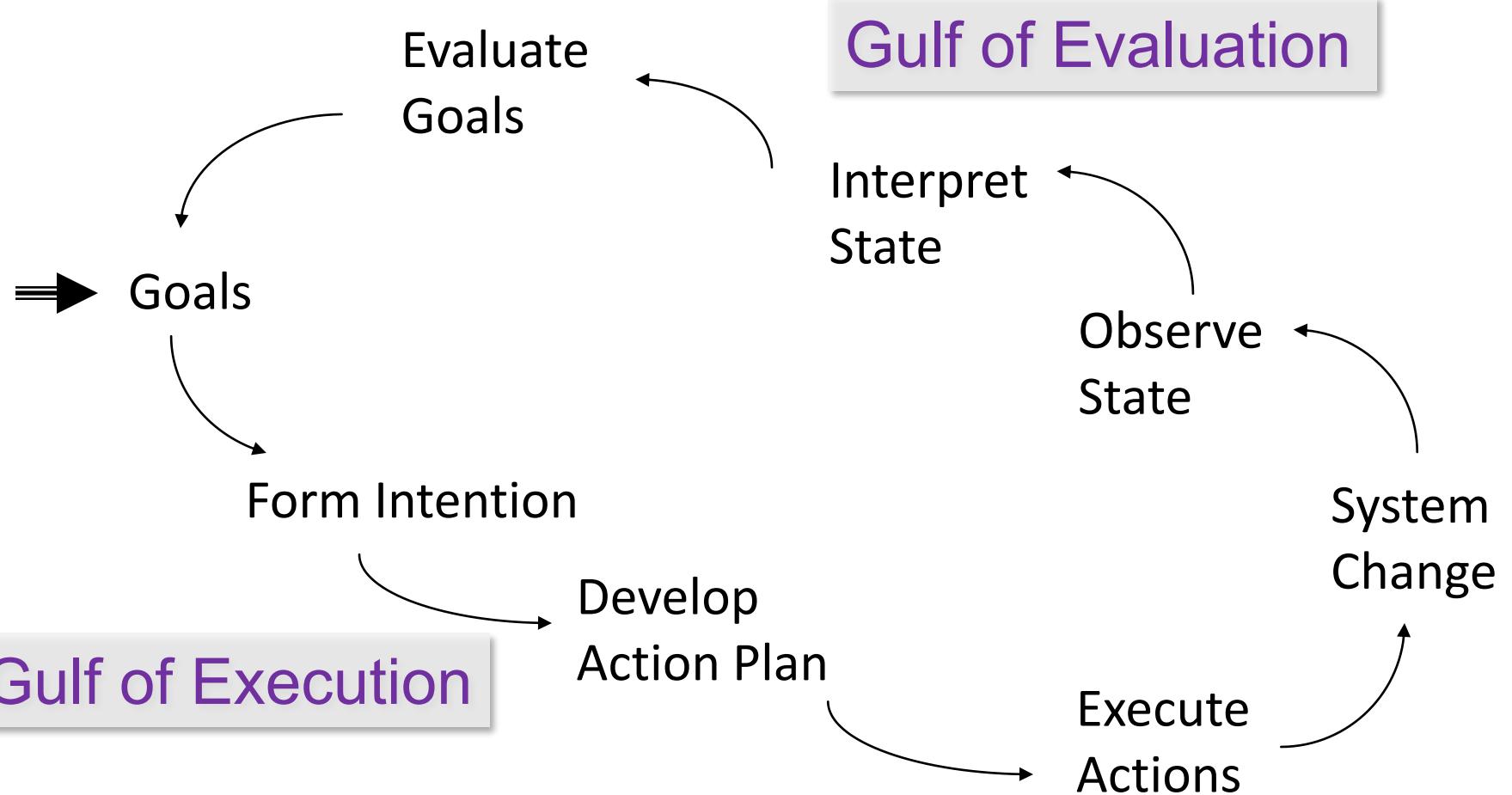
7. Evaluate the system state with respect to the goals and intentions

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)



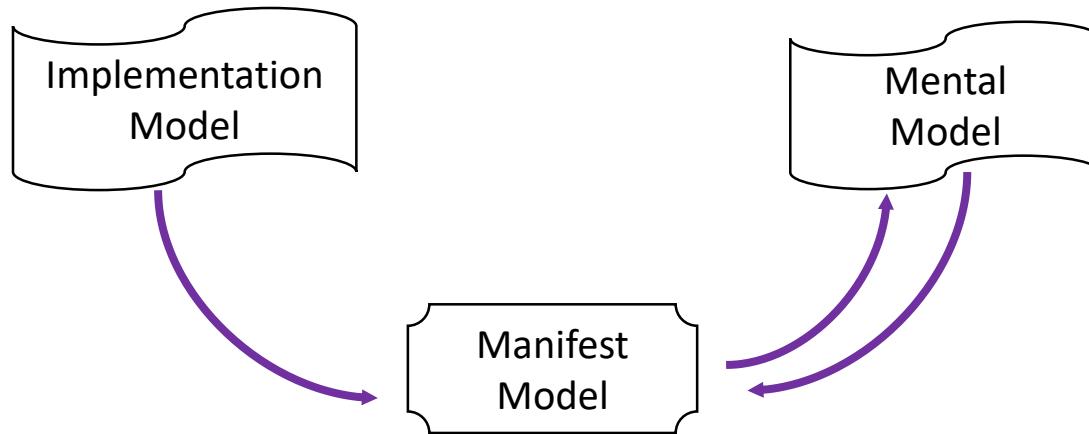
## Mental Model

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

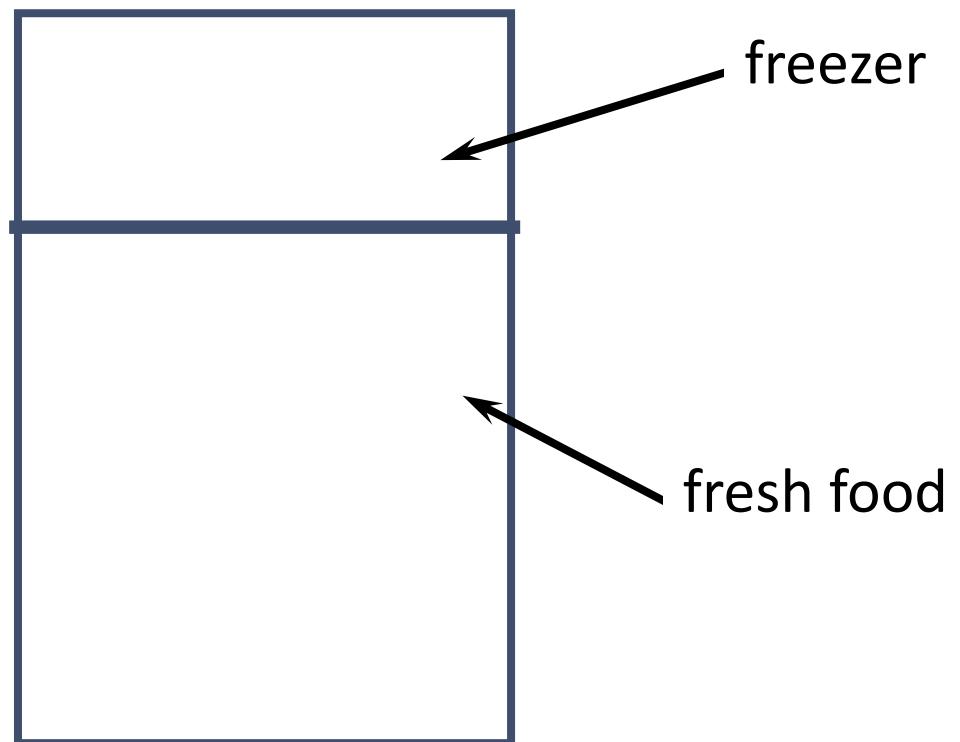
People struggle until model matches manifest model

Update mental model in response to breakdowns

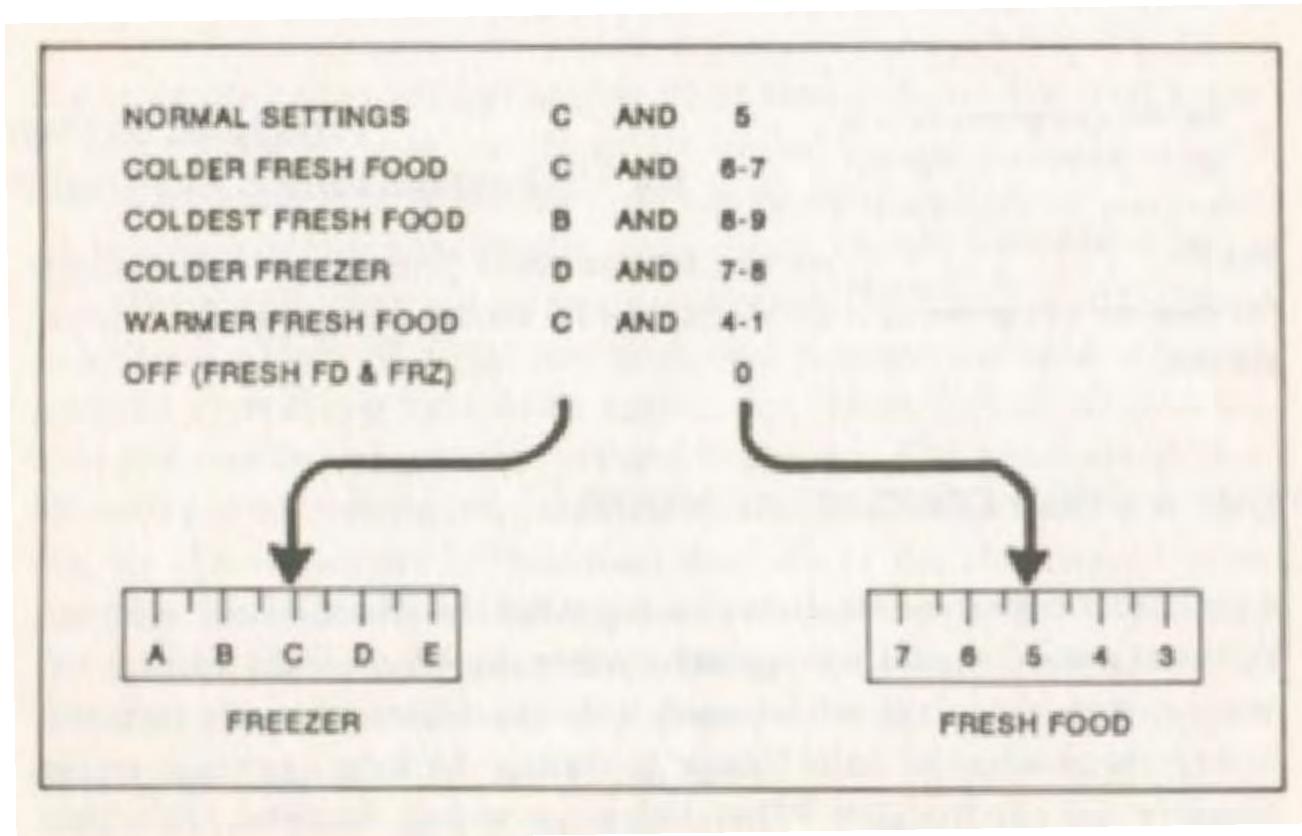
Matching the implementation model is not necessary

# Mental Models

Problem: freezer too cold, fresh food just right

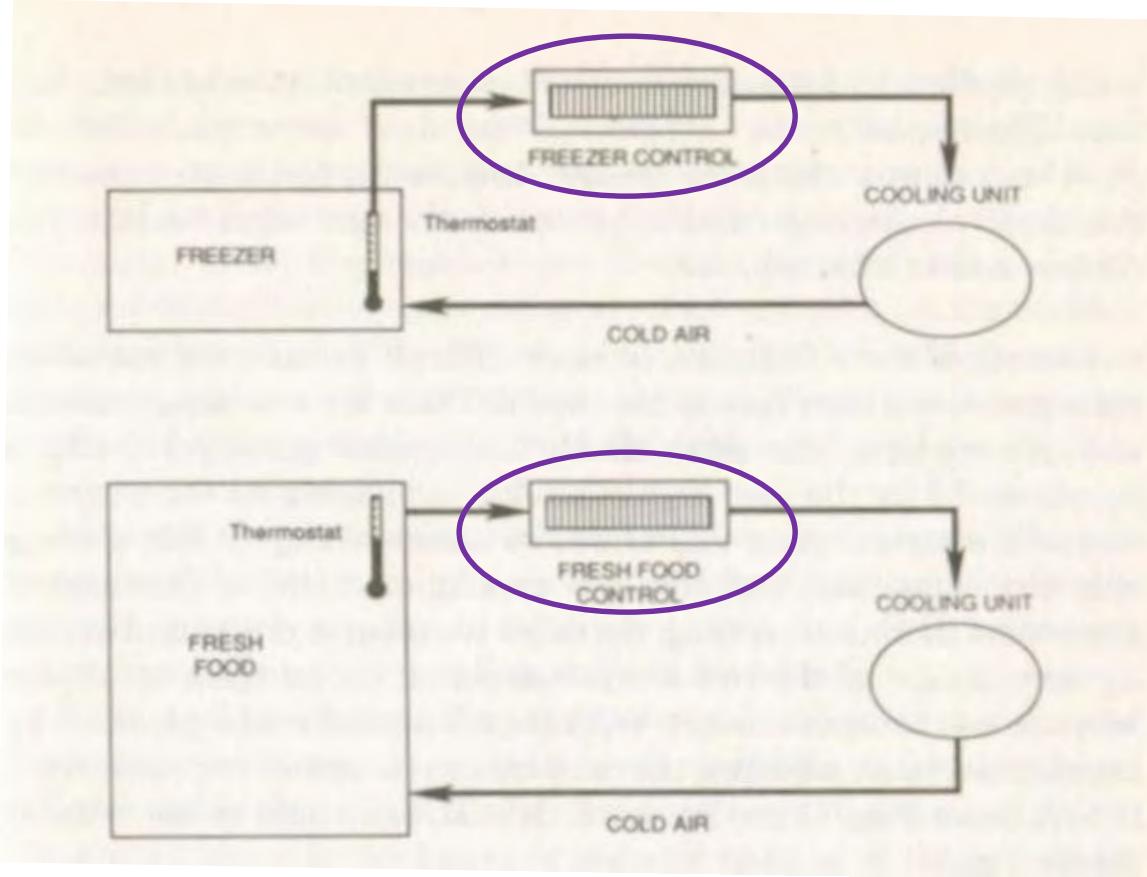


# Manifest Model



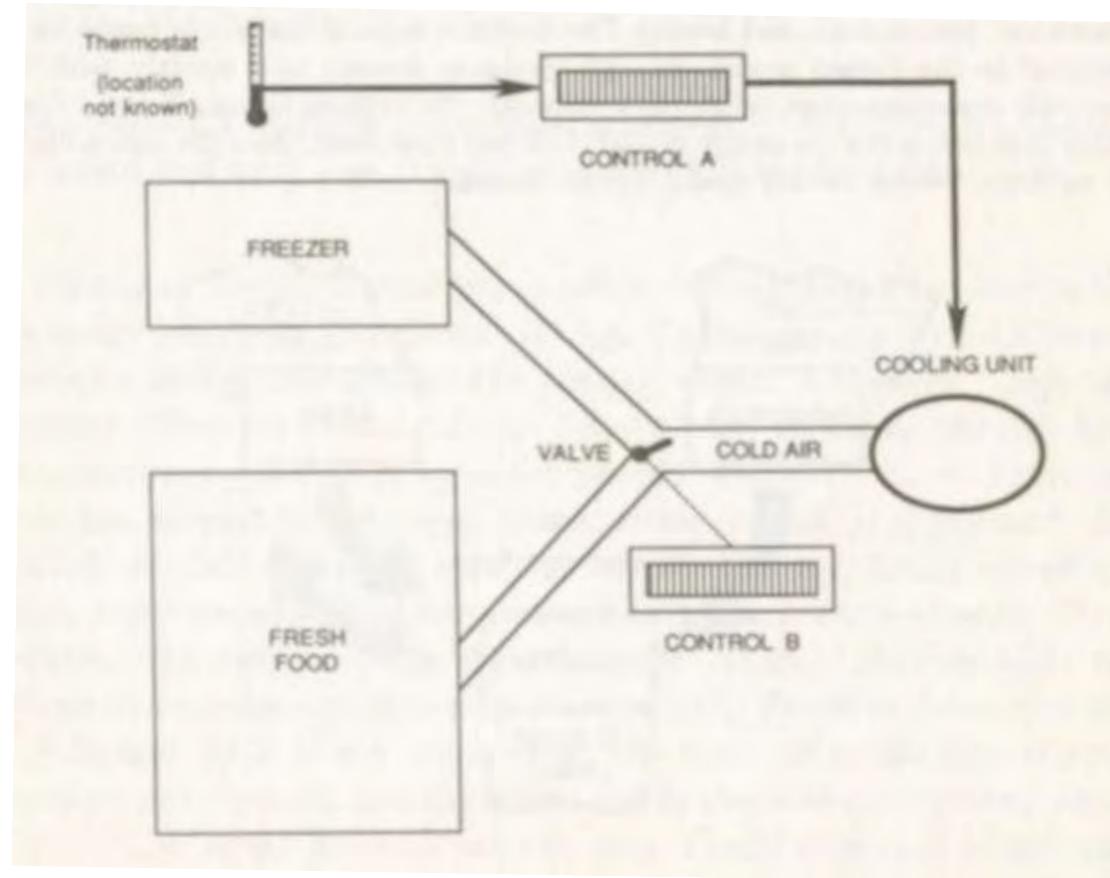
What if I want to make just the freezer warmer?

# A Sensible Mental Model

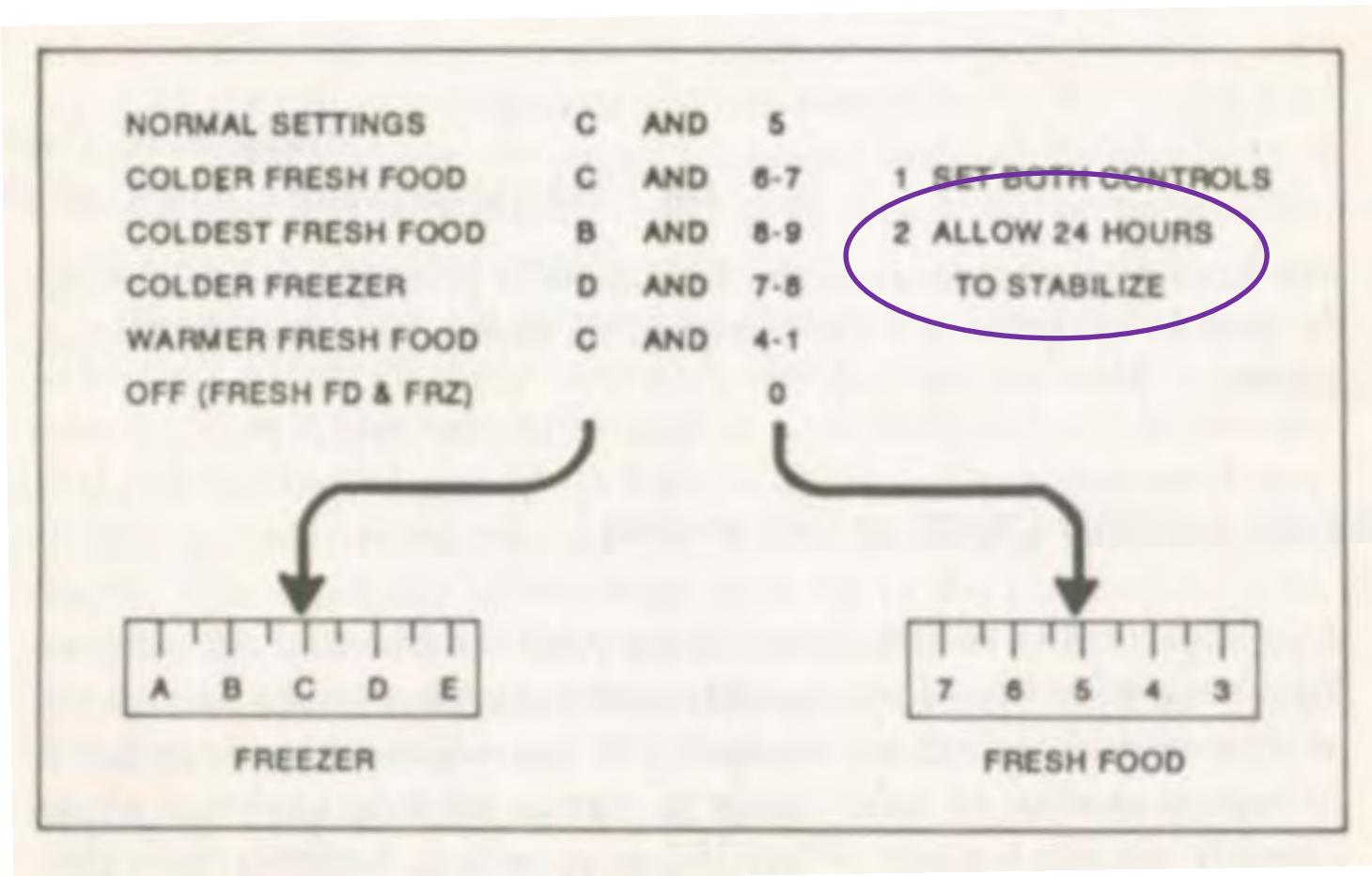


“The Freezer Control controls the freezer temperature and the Fresh Food Control controls the fresh food temperature”

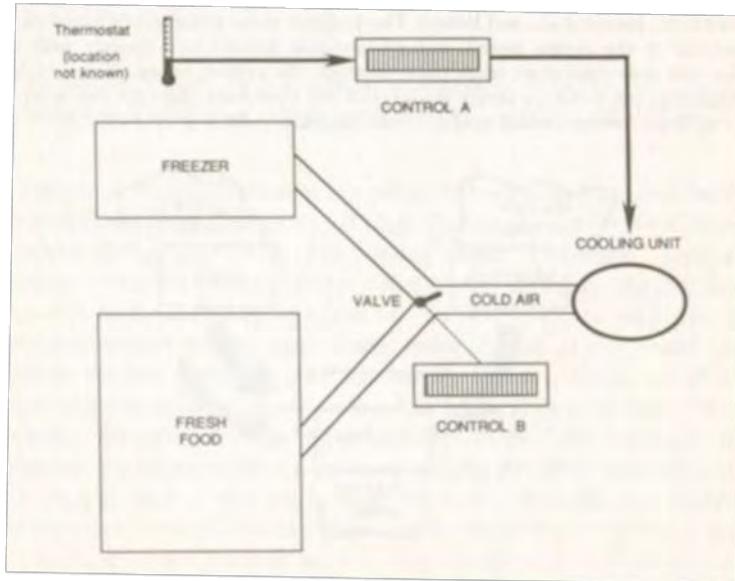
# The Implementation Model



# A Problem with Feedback



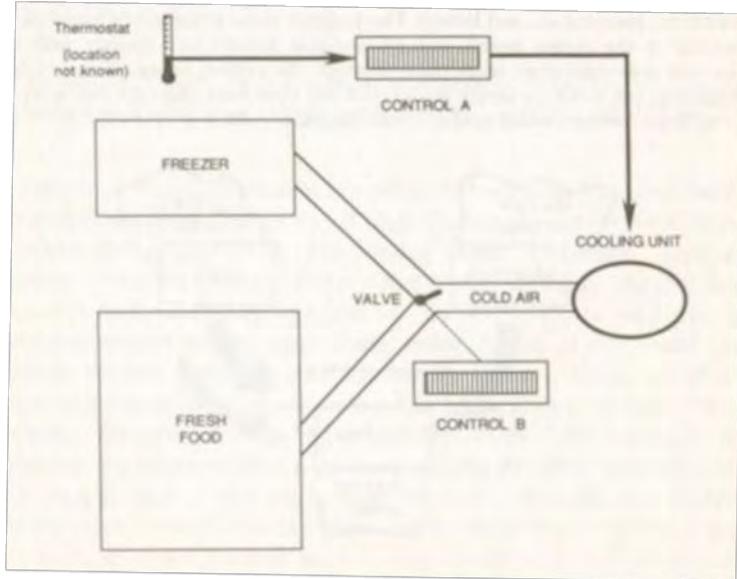
# The Implementation Model



Why is there a problem?

Can you fix the problem?

# The Implementation Model



Why is there a problem?

Cost constraints

Can you fix the problem?

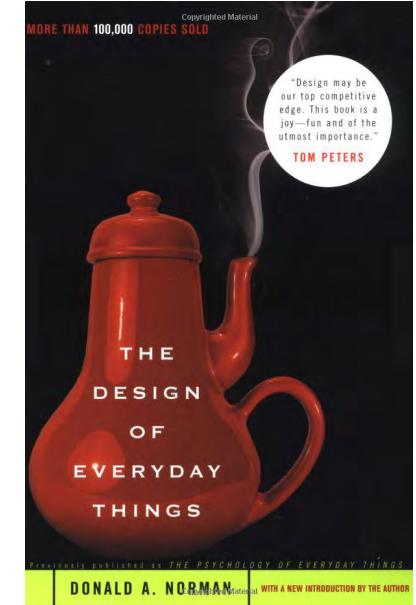
Make controls correspond to  
a person's mental model

“Design depends  
largely on constraints.”  
Charles Eames

Make controls correspond to  
the implementation model

# Building the Right Model

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



How can we help people build the right models:

Affordances

Metaphors

Visibility

Knowledge in the World

Constraints

Mapping

Consistency

Modes

# Affordances

Visual clue to interaction

knobs afford turning

levers afford moving

buttons afford pushing



# Affordances

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

Gibson, 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?

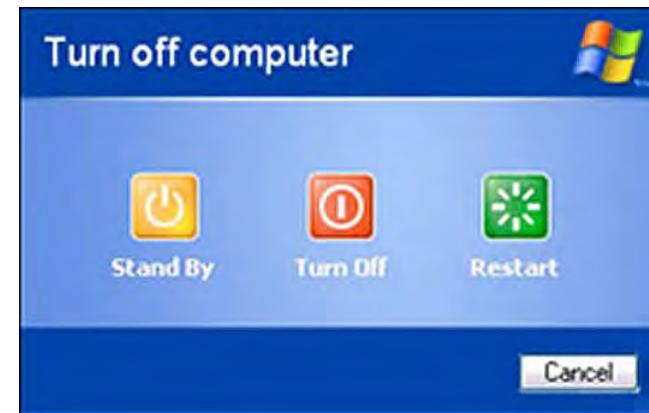


# Affordances



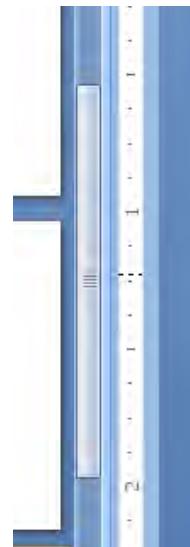
# Affordances

Technology affordances are often based in affordances from the physical world



# Affordances

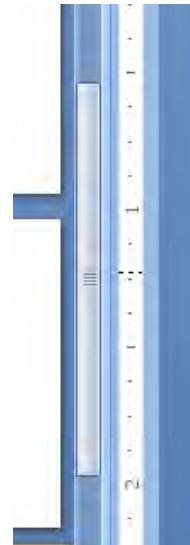
What is the affordance here?



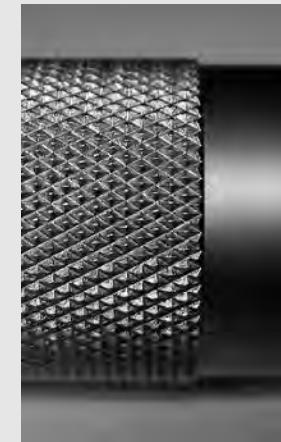
Where does it come from?

# Affordances

What is the affordance here?



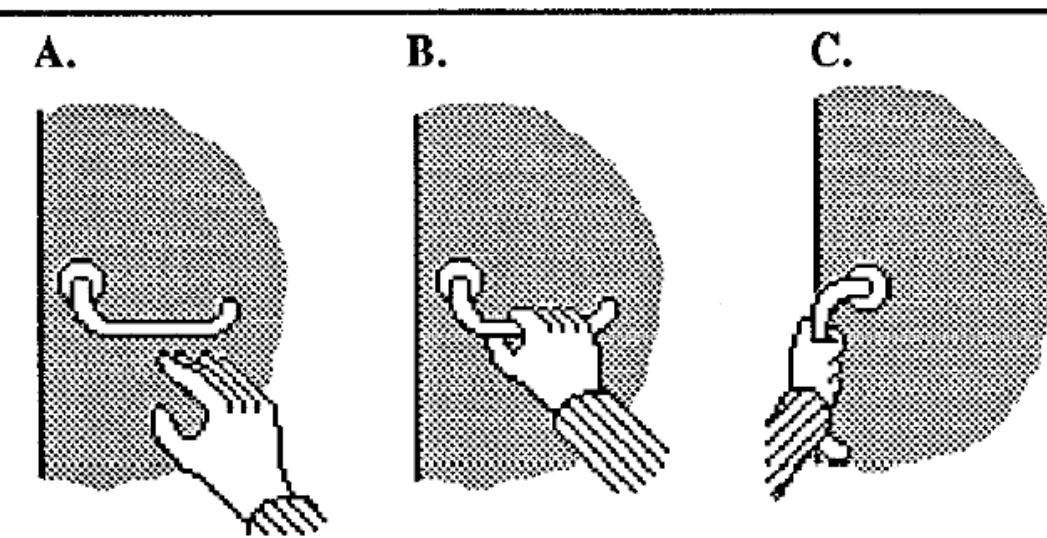
Knurling



Where does it come from?

# Sequential Affordance

Acting on a perceptible affordance leads to information indicating new affordances

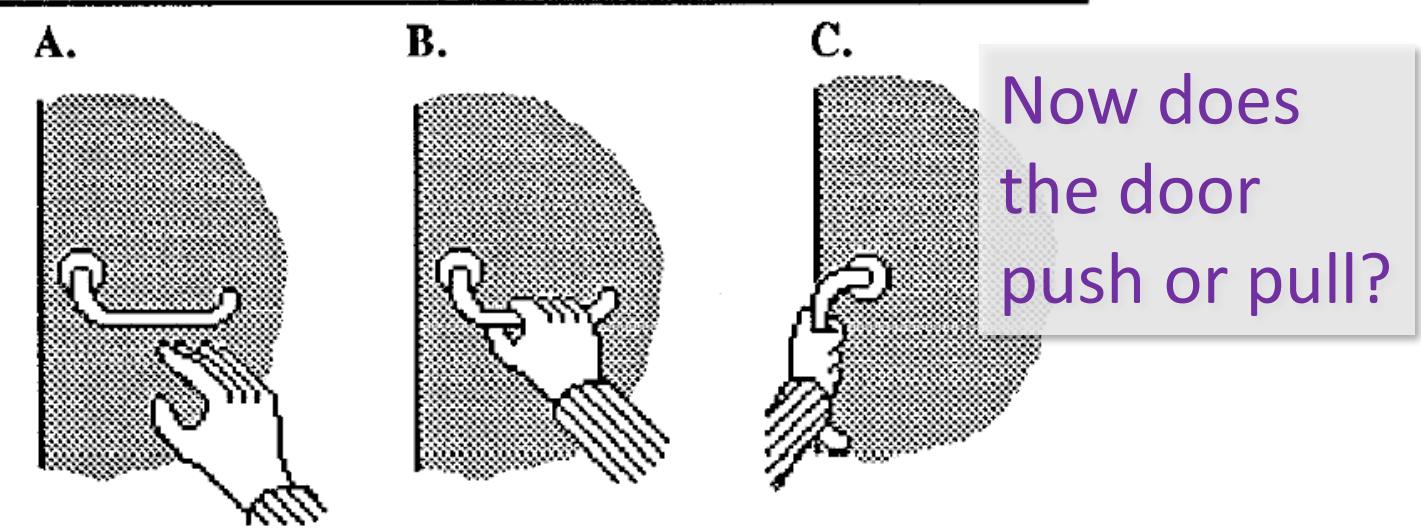


*Figure 4. Sequential affordances: one affordance leads to another. Visual information indicates grasping (A & B); tactile information indicates turning (B & C).*

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# Sequential Affordance

Acting on a perceptible affordance leads to information indicating new affordances



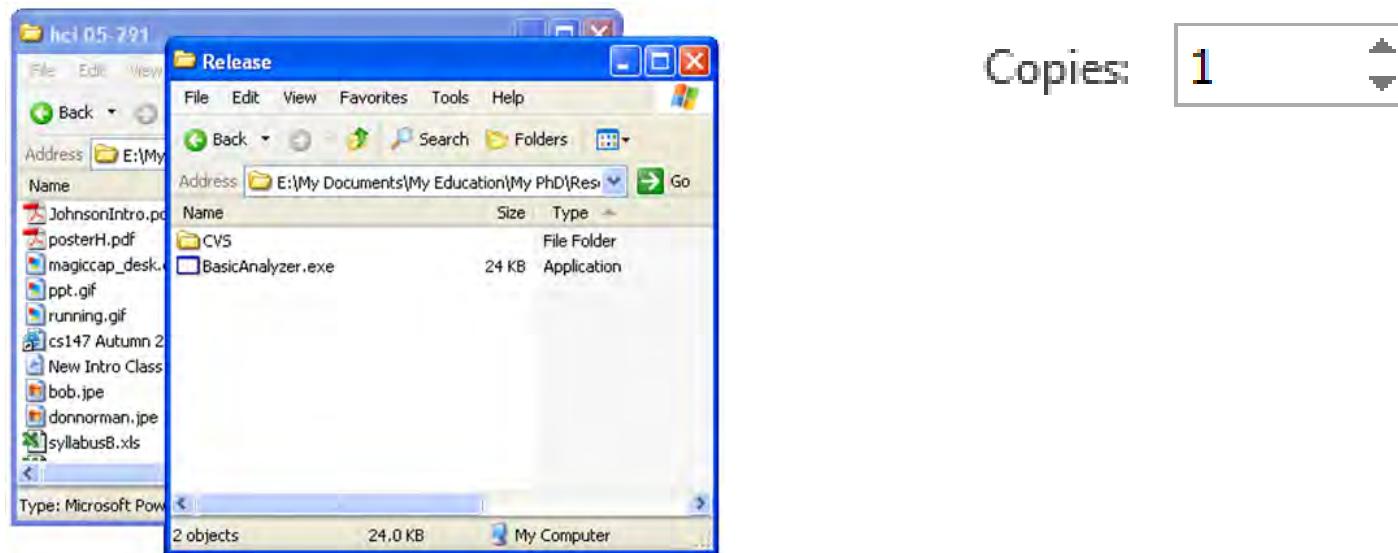
*Figure 4. Sequential affordances: one affordance leads to another. Visual information indicates grasping (A & B); tactile information indicates turning (B & C).*

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# 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



OK

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

# False Affordances



# False Affordances



# False Affordances

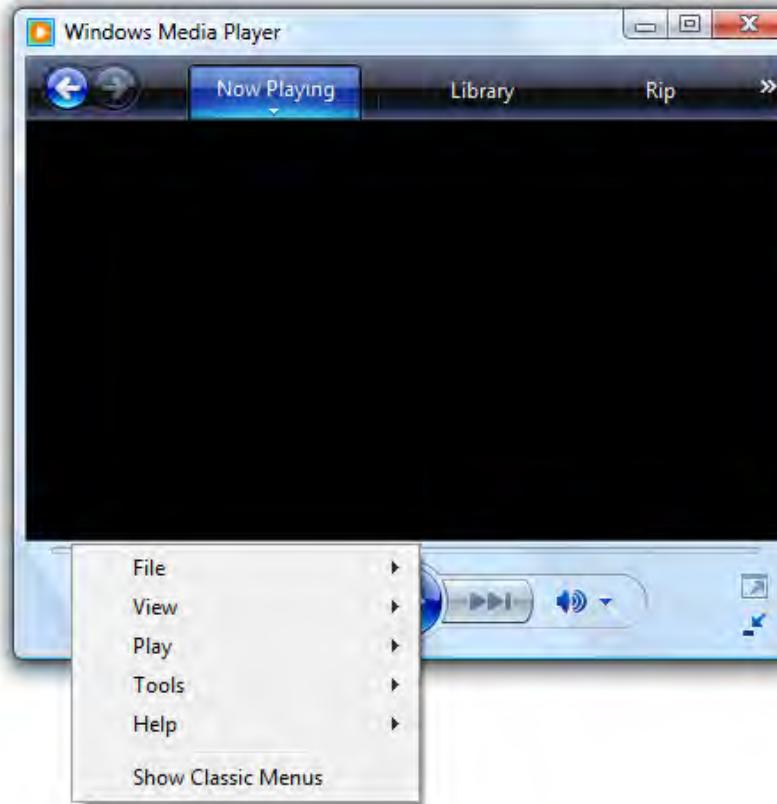


# False Affordances



# 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

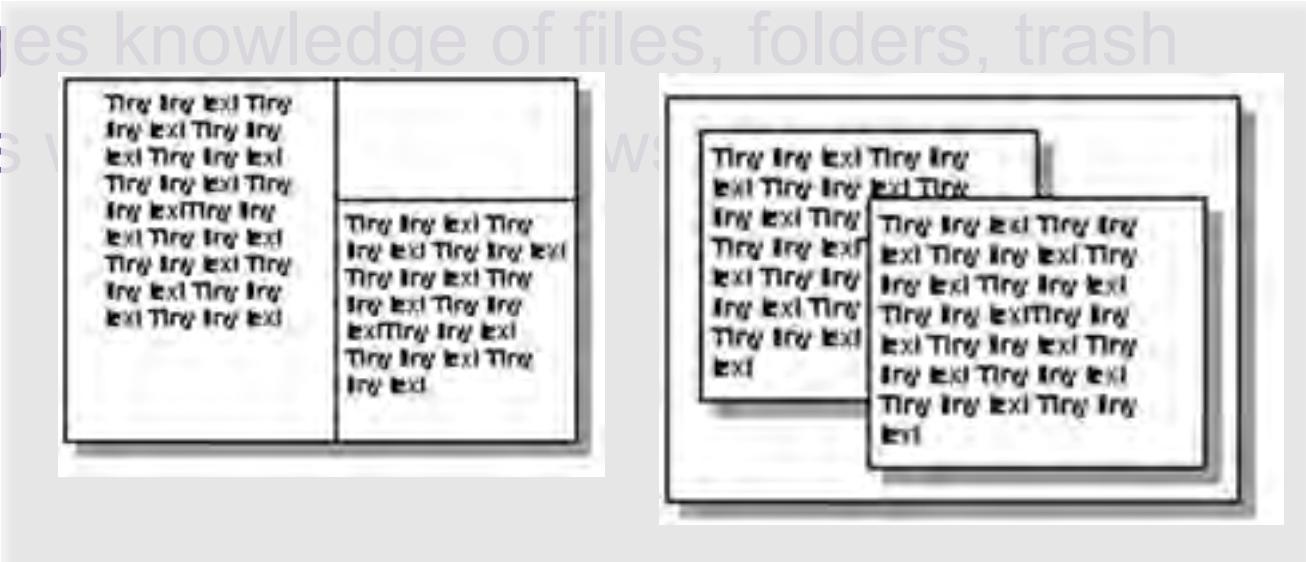
“horseless carriages”, “iron horses”, “wireless”

# Desktop metaphor

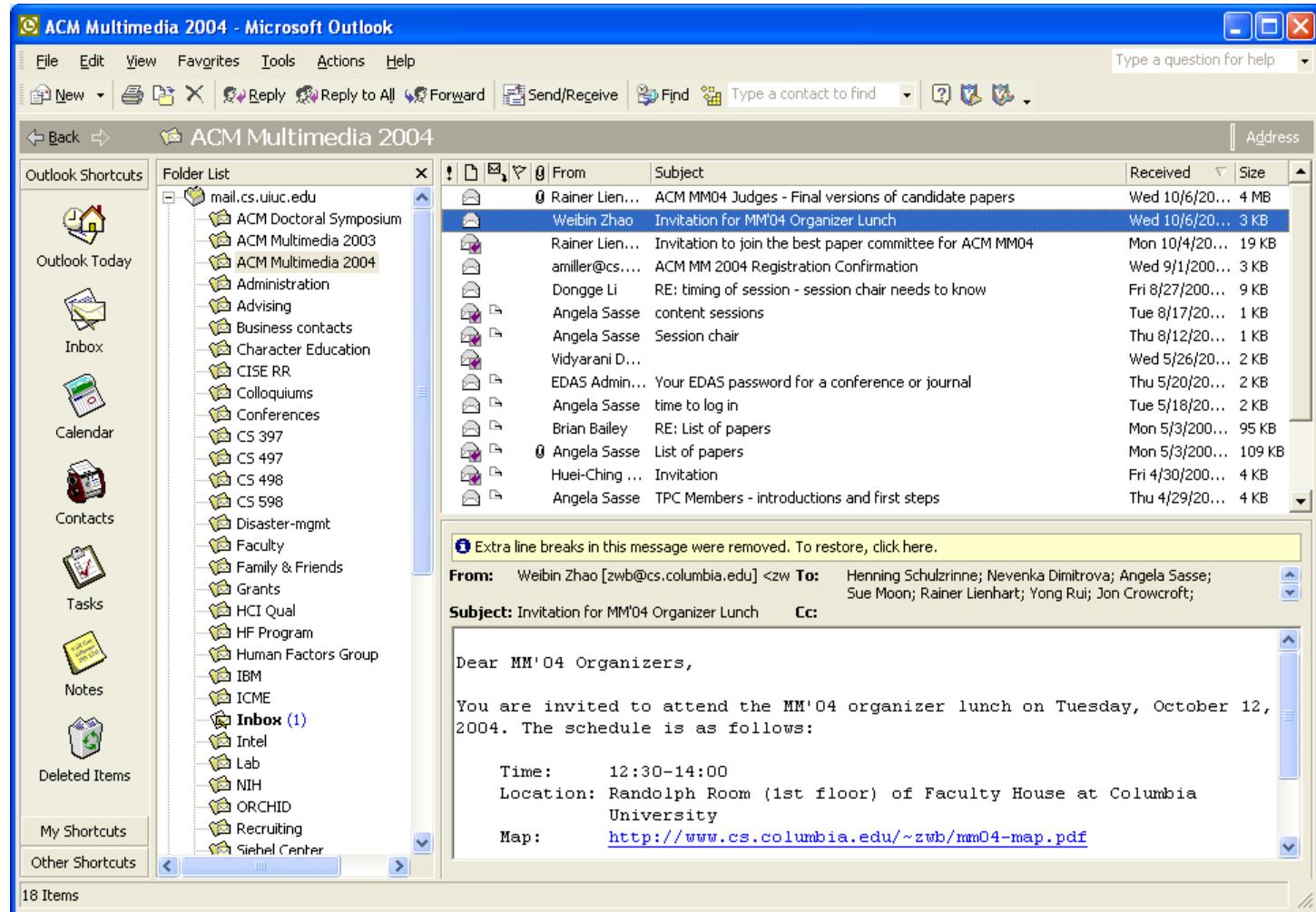
Not an attempt to simulate a real desktop

Leverages knowledge of files, folders, trash

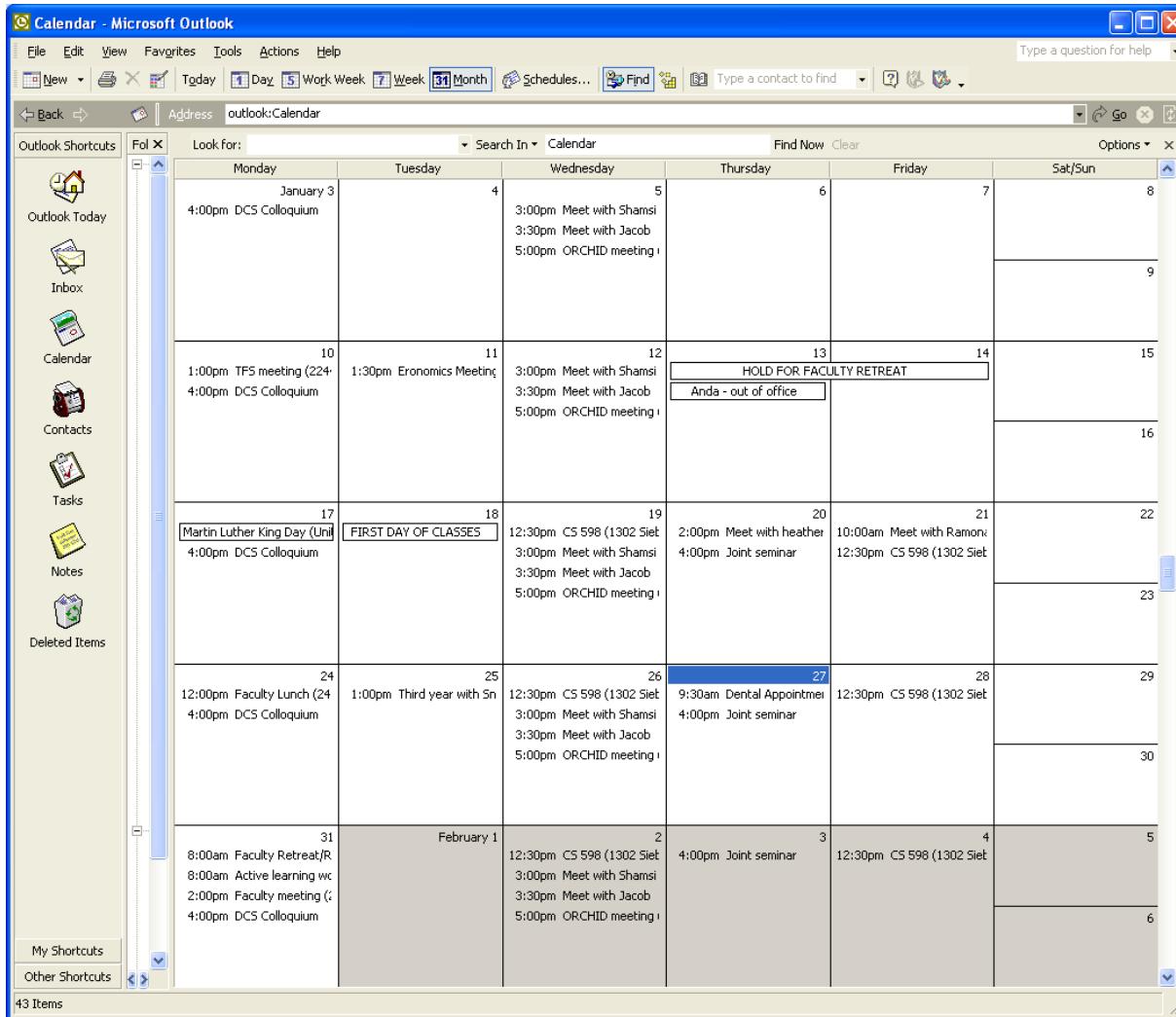
# Explains ✓



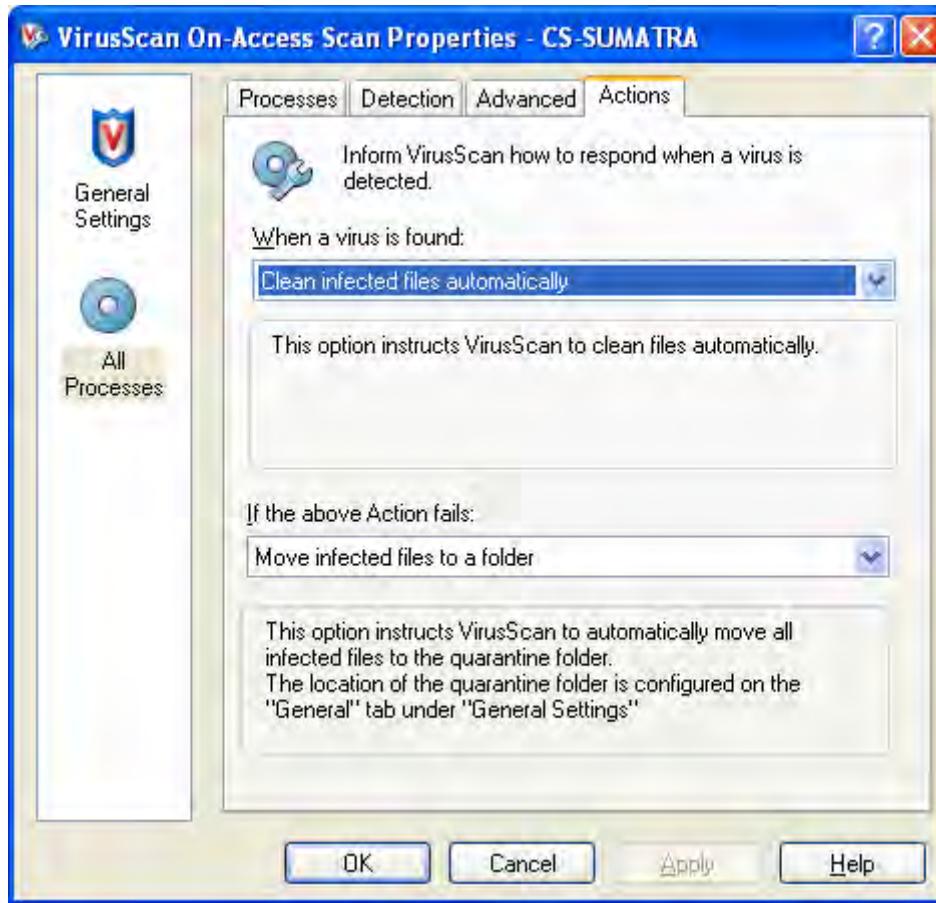
# Mail Metaphor



# Calendar Metaphor

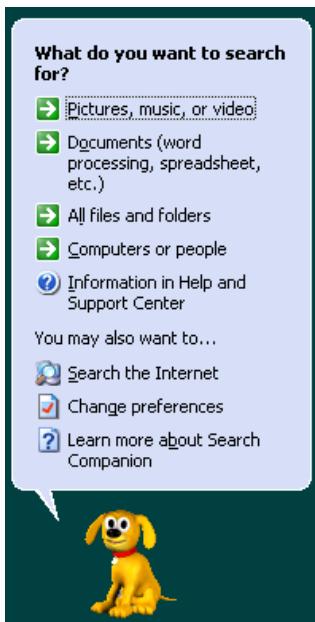


# Health Metaphor



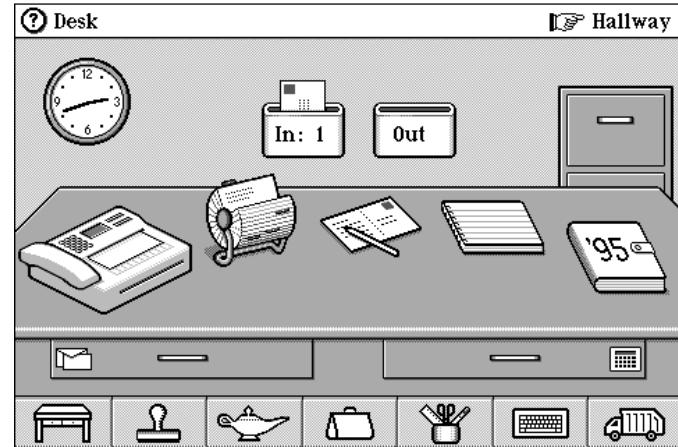
# Shallow or Inappropriate Metaphors

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



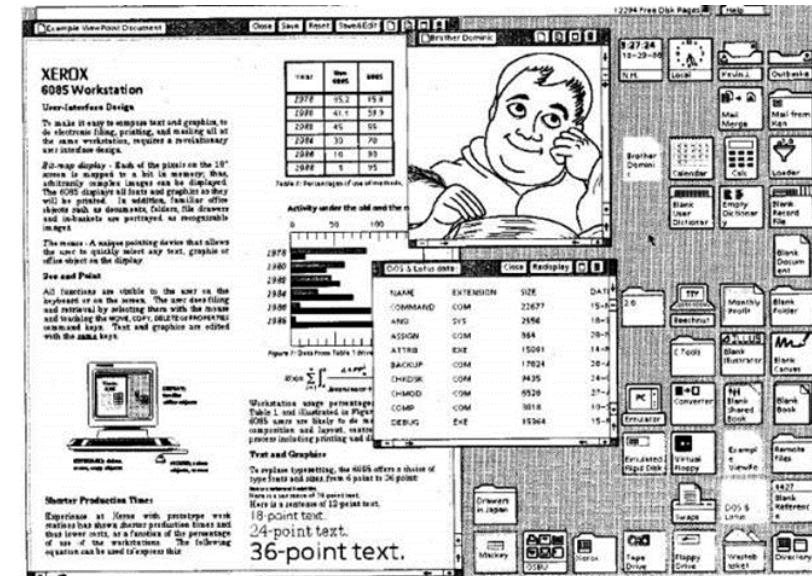
Microsoft Bob

# Mixed Metaphors

Two or more different metaphors coexist with some supposed relation

The desktop metaphor  
Windows into content

Good?  
Bad?  
Neither?  
Both?

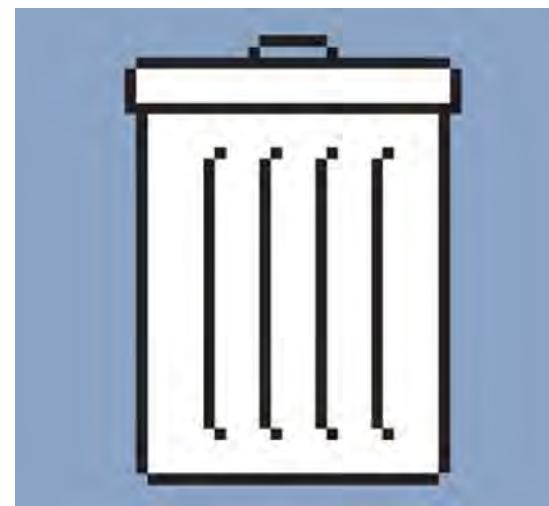
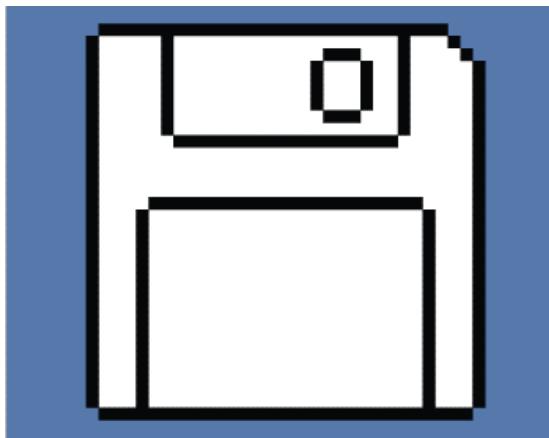


Windows are views into larger content regions

No desktop has windows

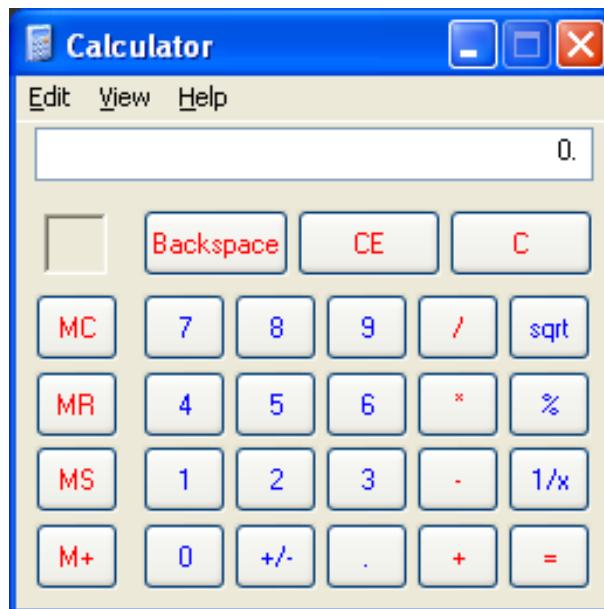
# Broken Metaphors

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

 Milk

 Butter

 Cheese

---

 Water

 Beer

 Wine

# Metaphors versus Idioms

## Idioms

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

Idiomatic widgets  
(e.g., screen splitter,  
draggable 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 perceptible 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 perceptible 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.
- ↖ 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.

# 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

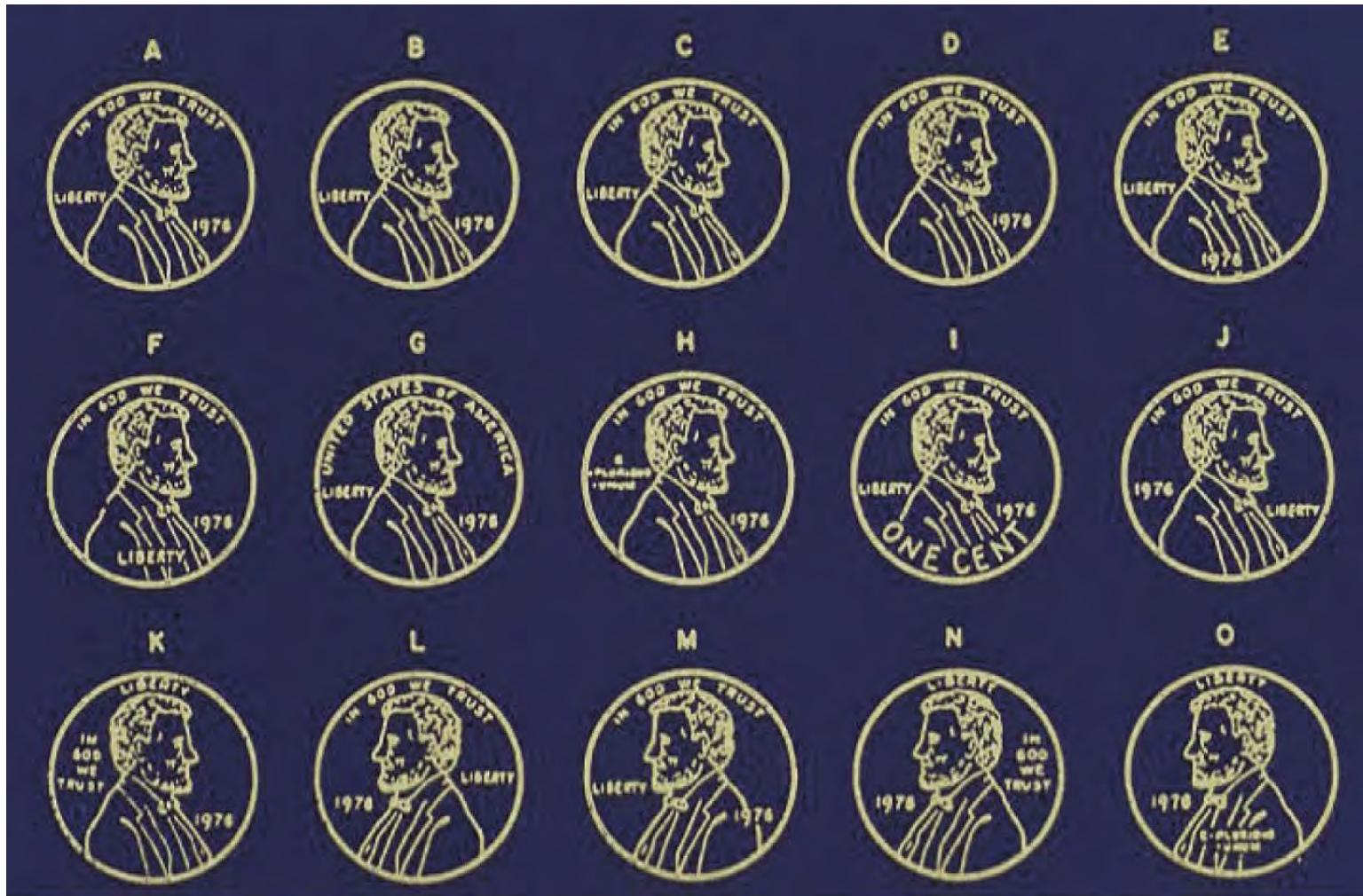
Compare to controls on simple car radio

Number of controls  $\approx$  Number of functions

Controls are labeled and grouped together

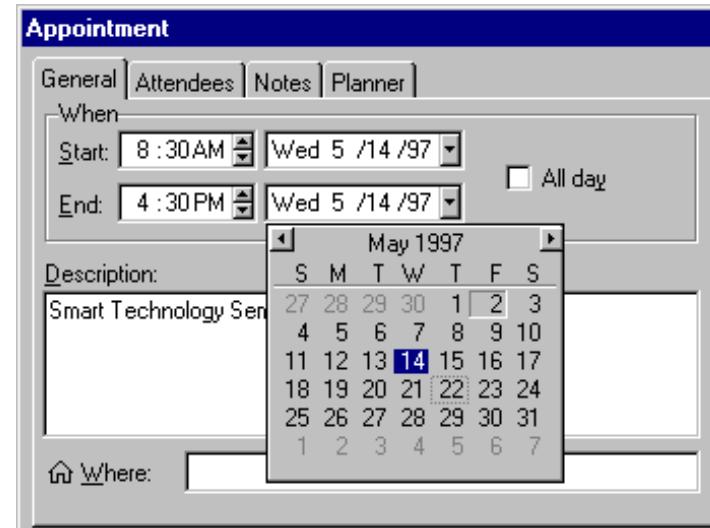
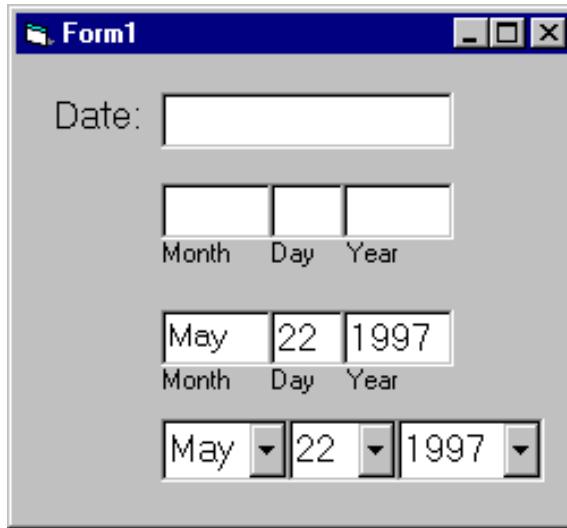


# Knowledge in the World



# Constraints

Prevent some actions while allowing others



Prevent errors before they can happen

Disruptive error messages are a last resort

# Constraints



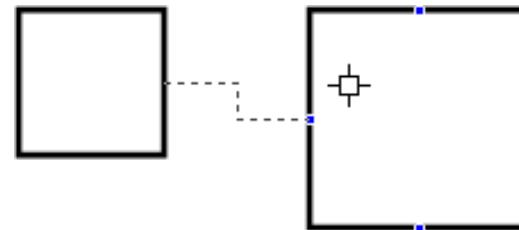
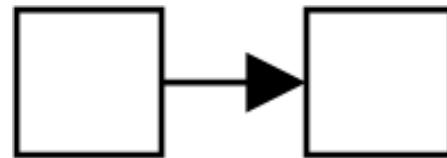
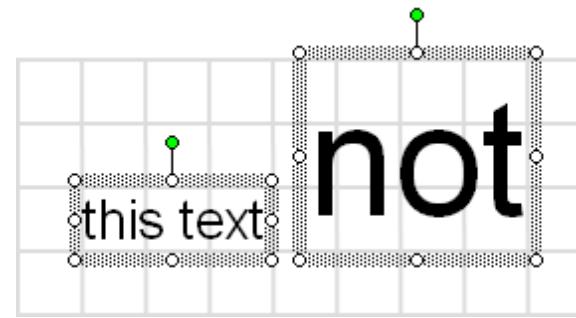
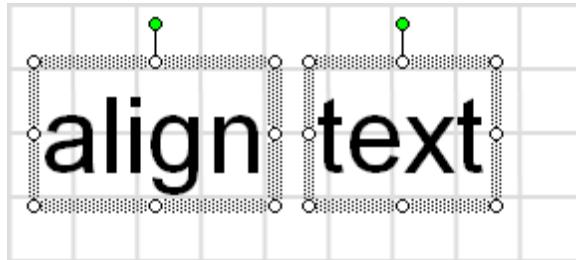
# Constraints



# Constraints

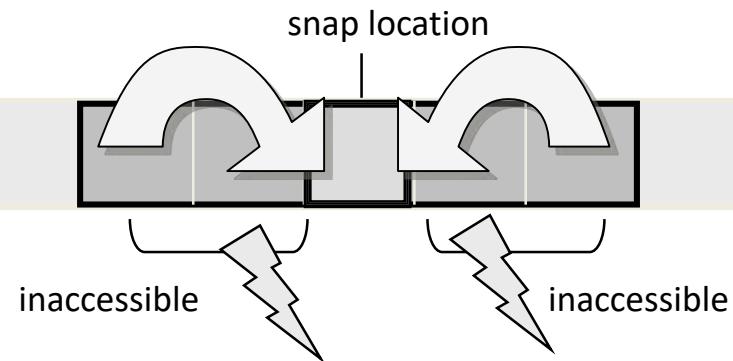
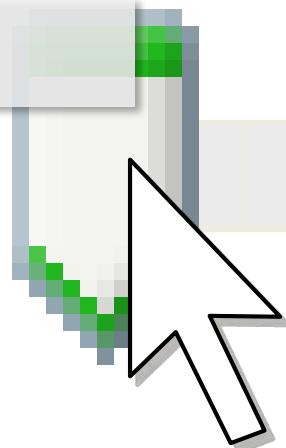


# Constraints

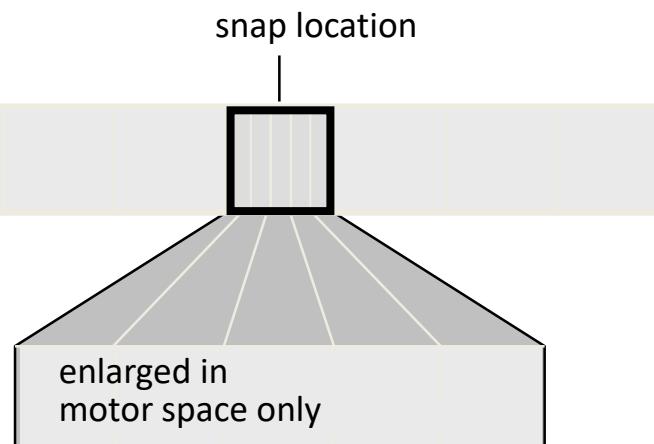
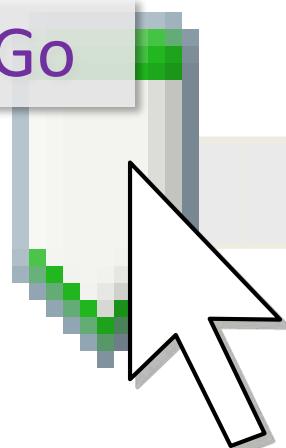


# Constraints

Traditional



Snap-And-Go



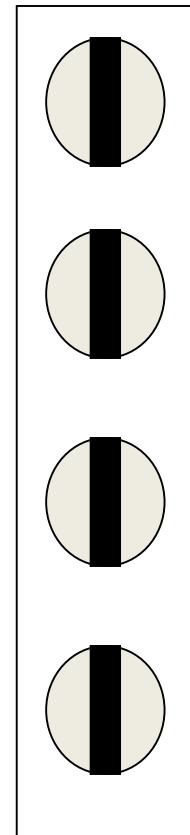
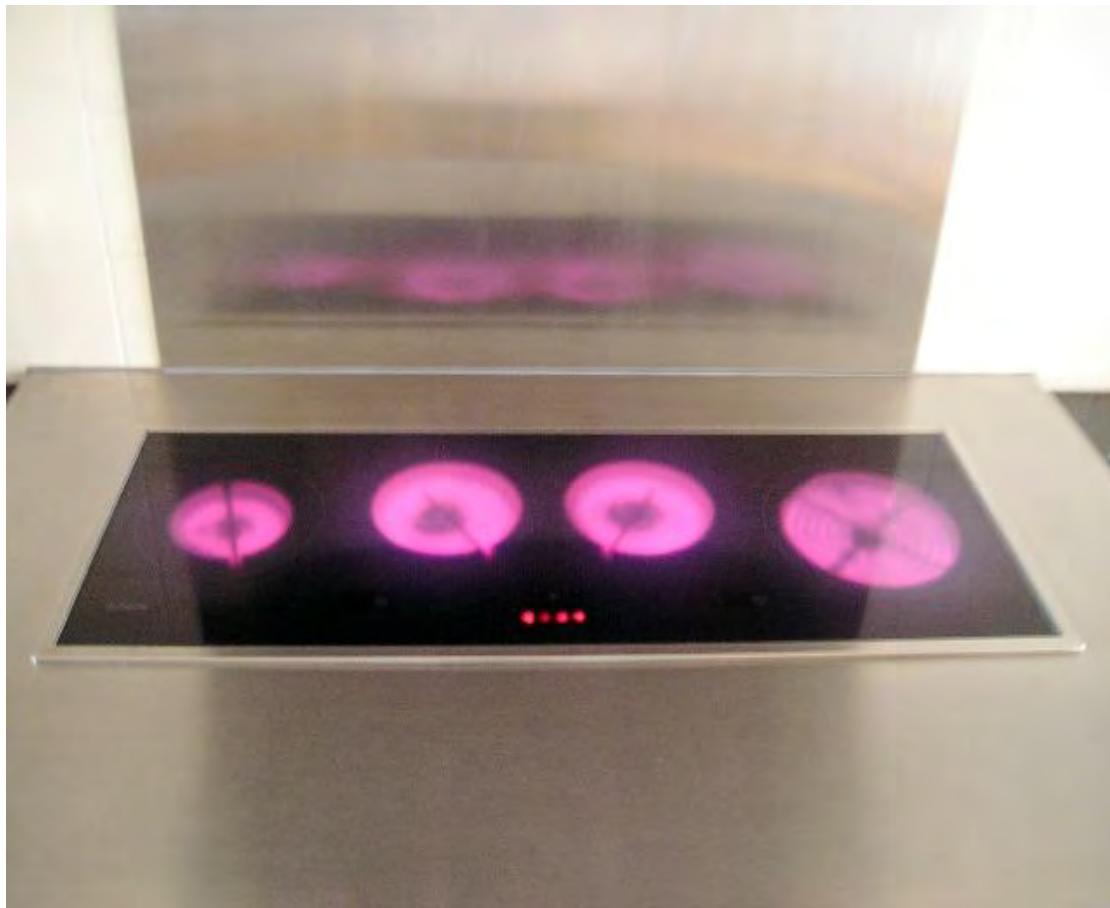
# Mapping

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

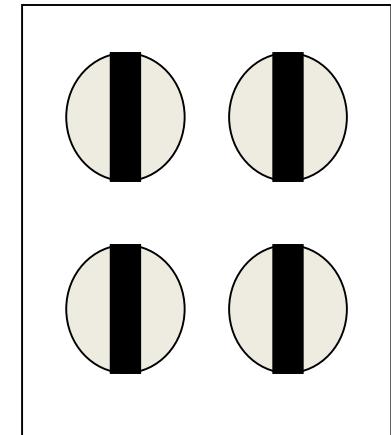
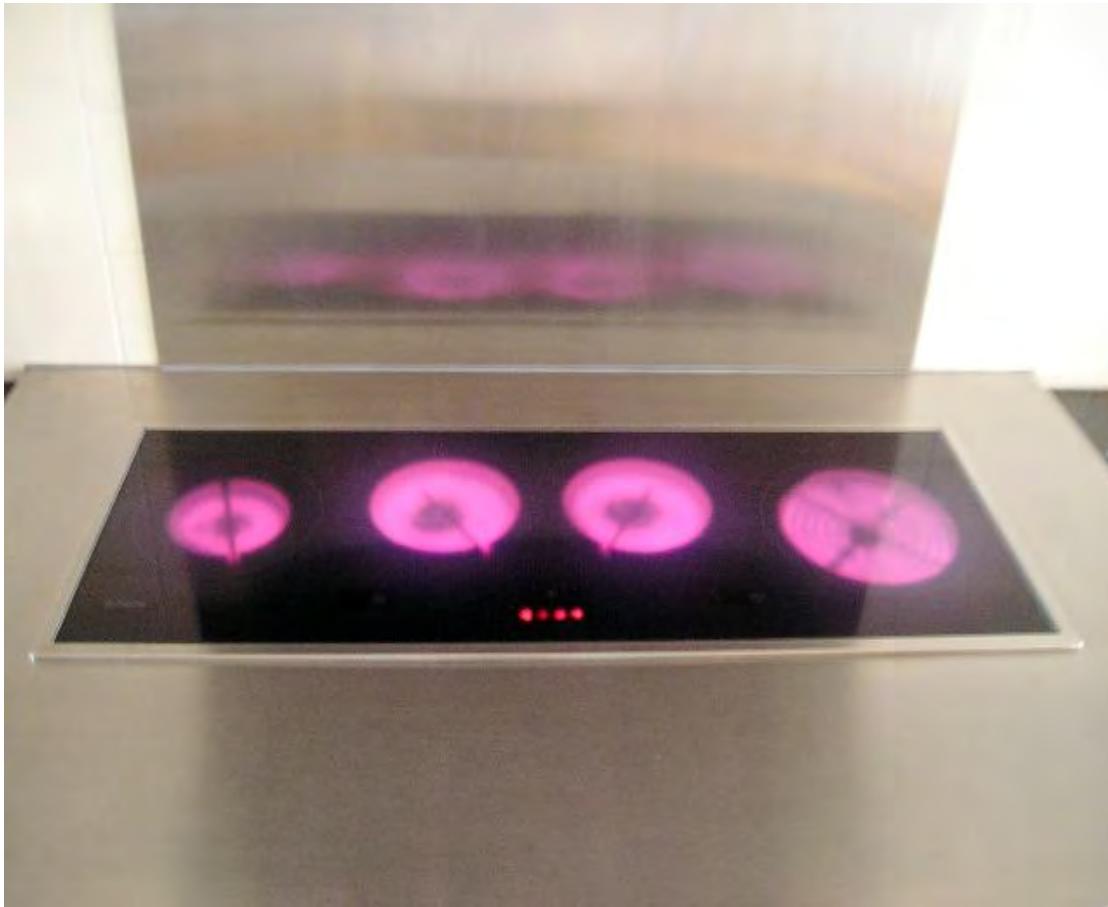
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# Very Bad Mapping



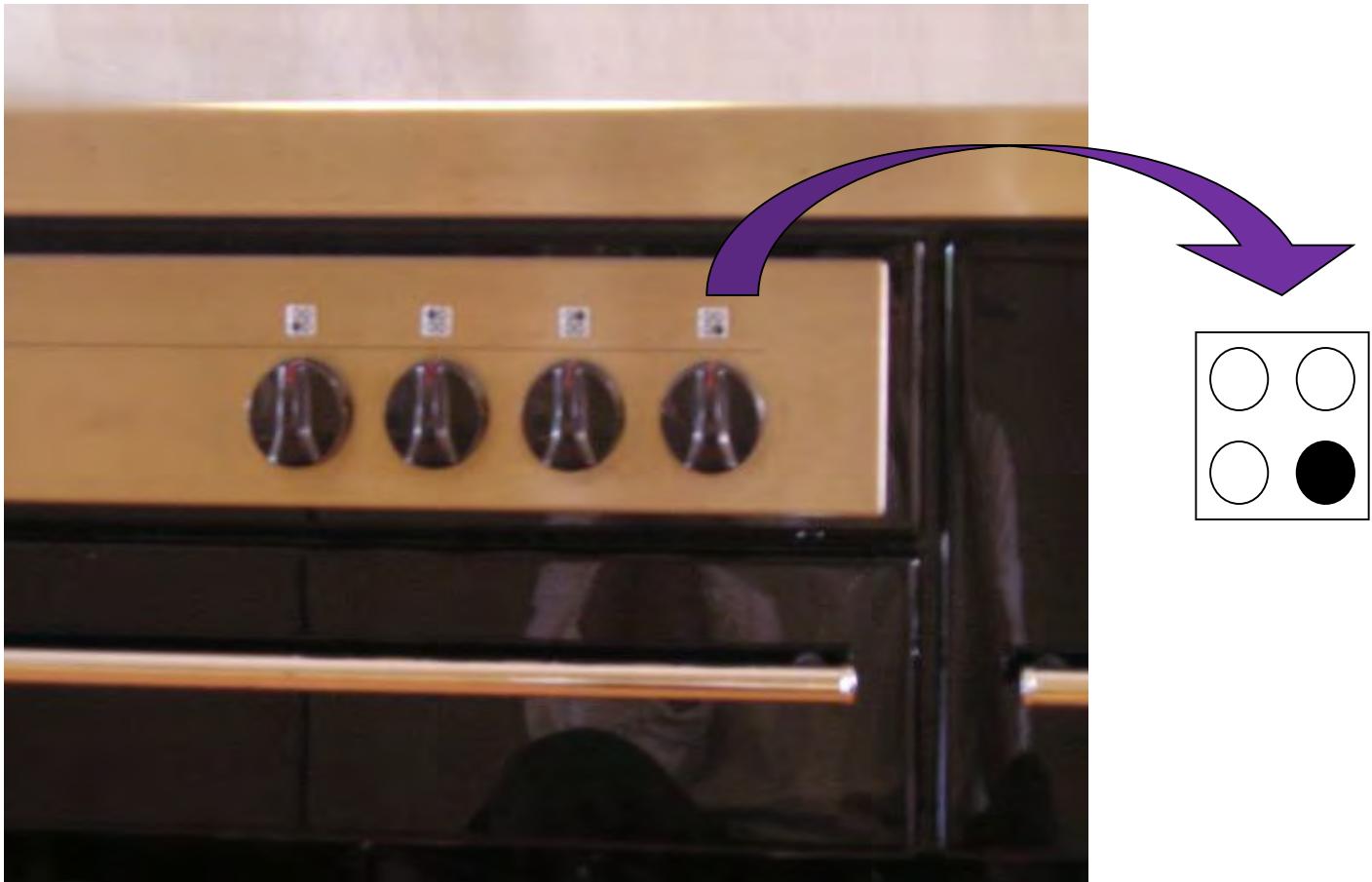
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# Good Mapping



# Not this Stove



# Great Mapping



# Mapping



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

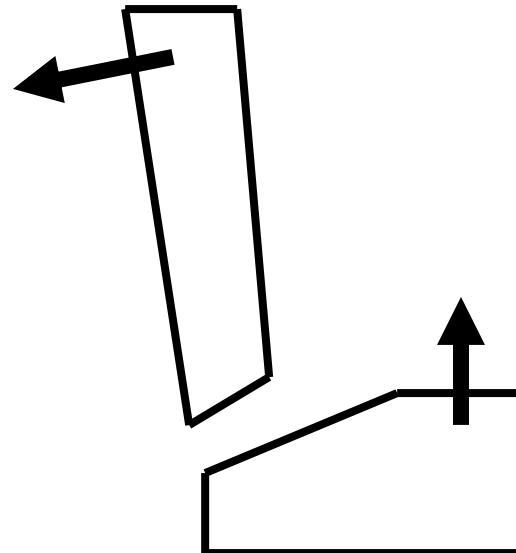
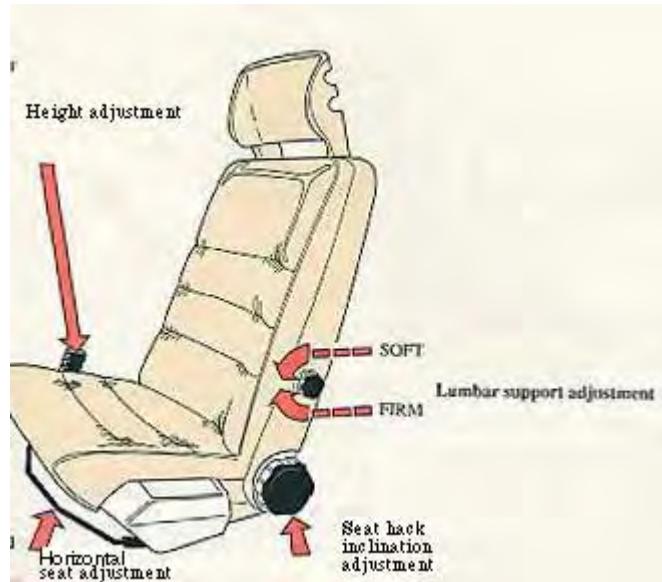


*From <http://fivesketches.com/2009/11/natural-mapping-of-switches/>*

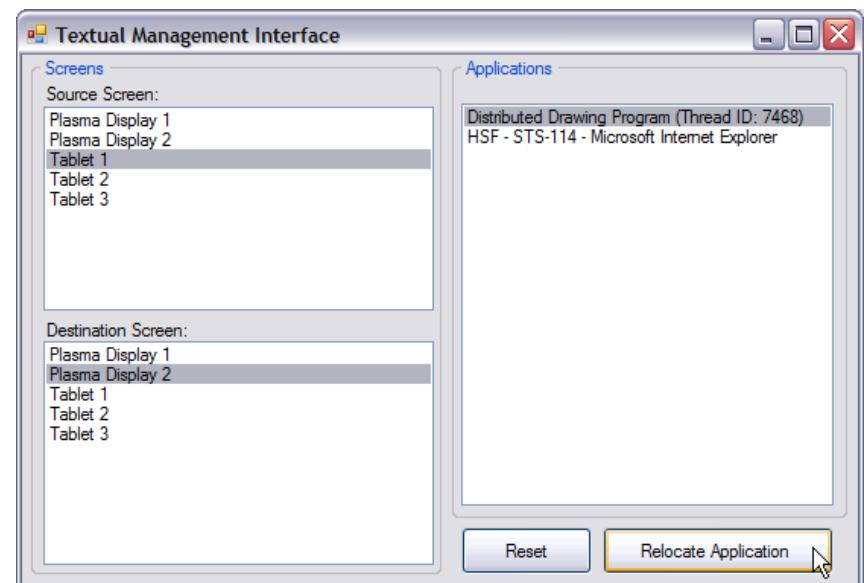
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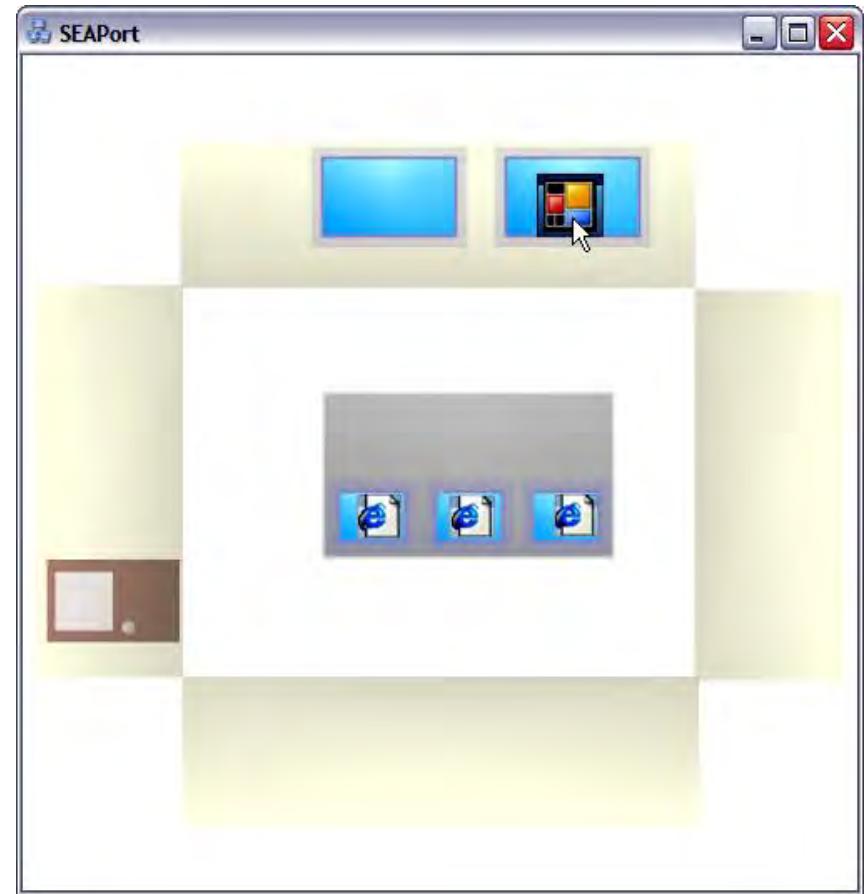
# Mapping



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# 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

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e.g., same terminology and layout throughout

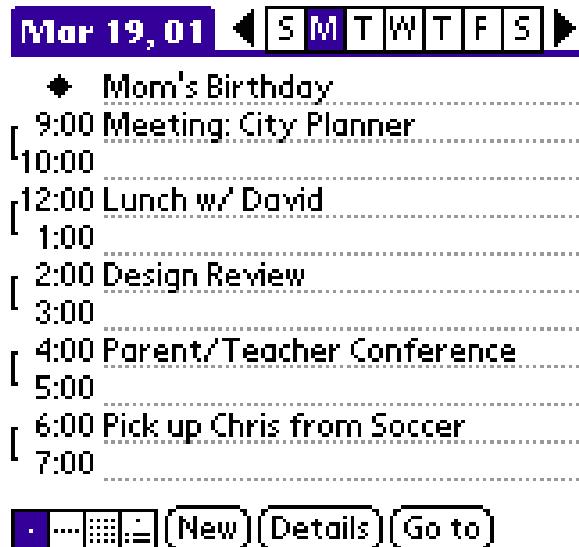
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e.g., common widget appearance

e.g., design patterns common across applications

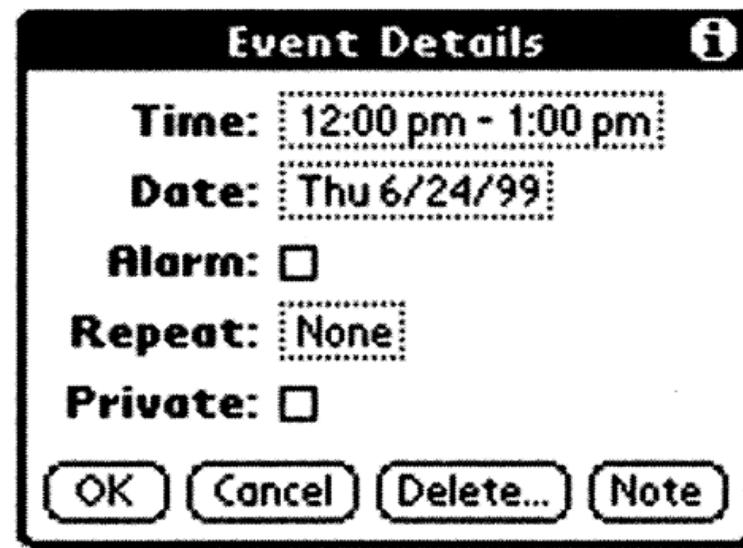
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**Time:** 12:00 pm - 1:00 pm

**Date:** Thu 6/24/99

**Alarm:**

**Repeat:**

None  Day  Week  Month  Year

Every: ...1 week(s)

End on: ▼ No End Date

Repeat on:  S  M  T  W  T  F  S

**Private:**

**OK** **Cancel** **Delete...** **Note**

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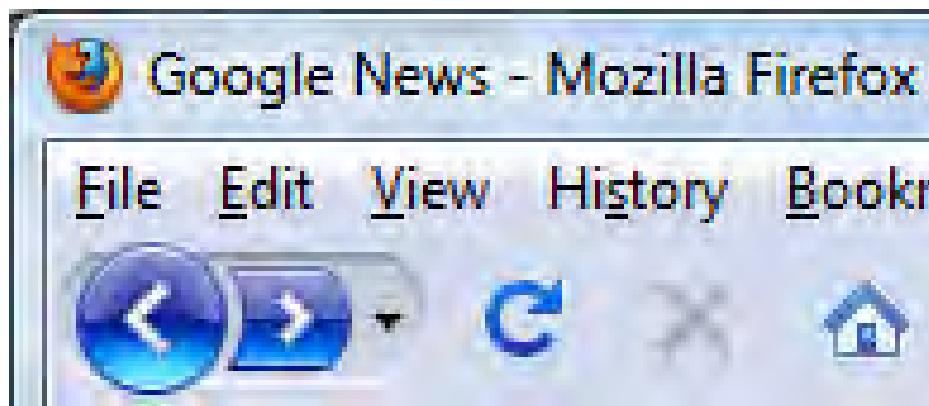
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**Private:**

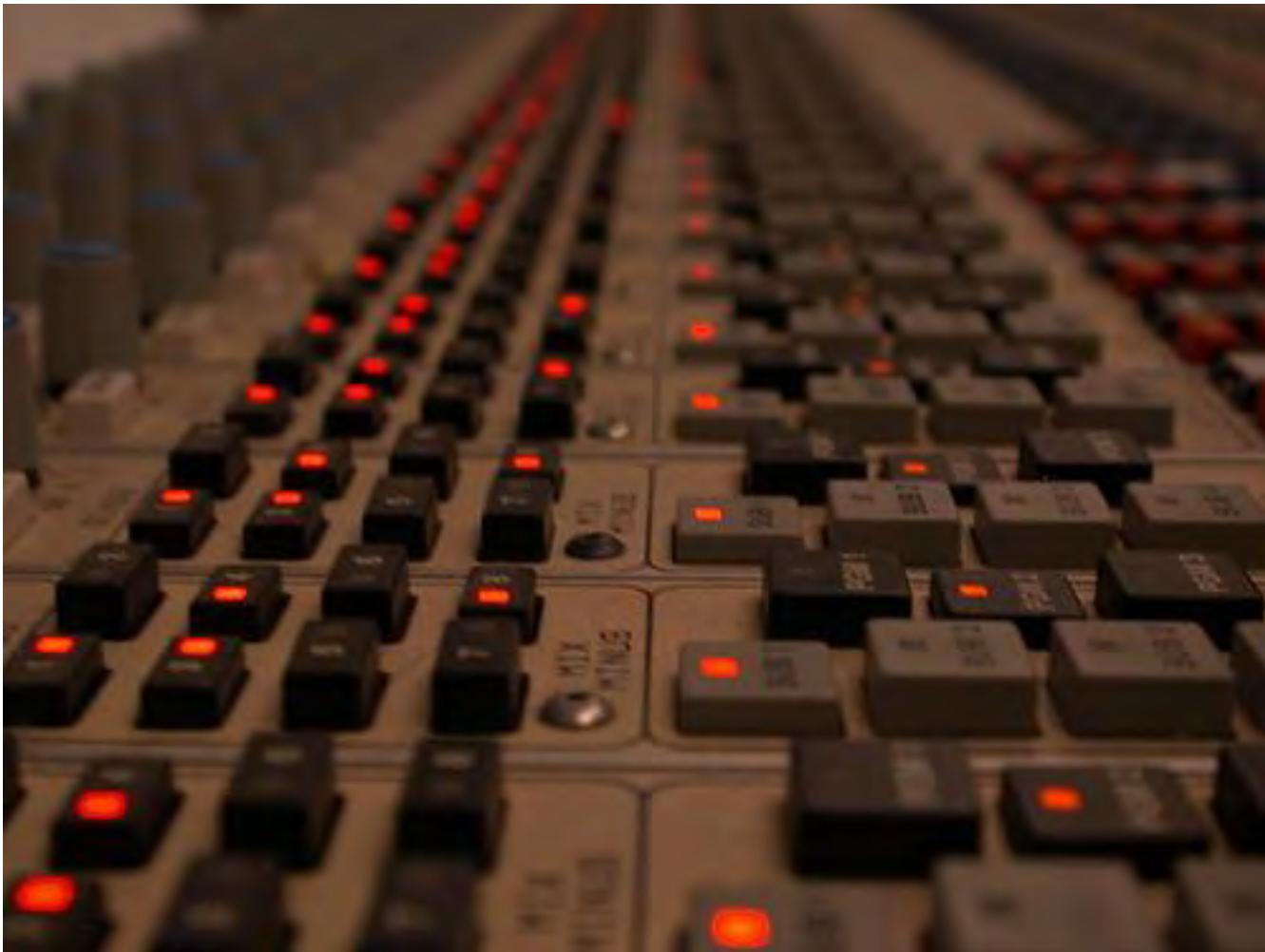
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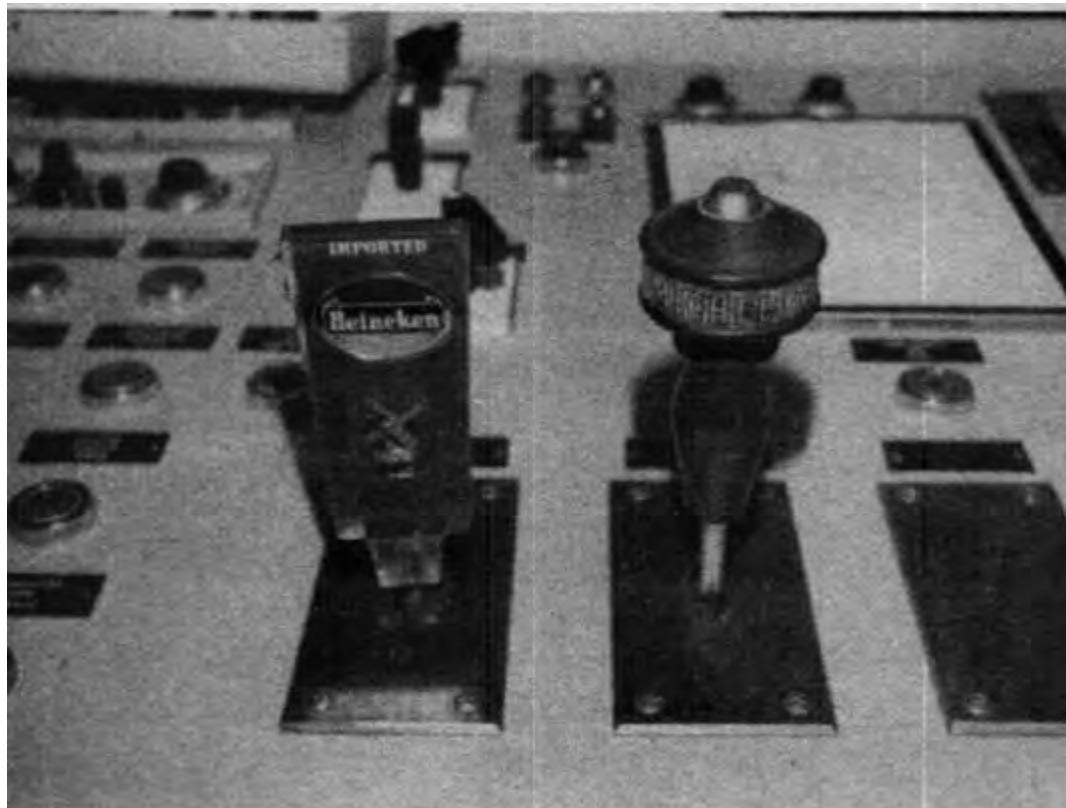
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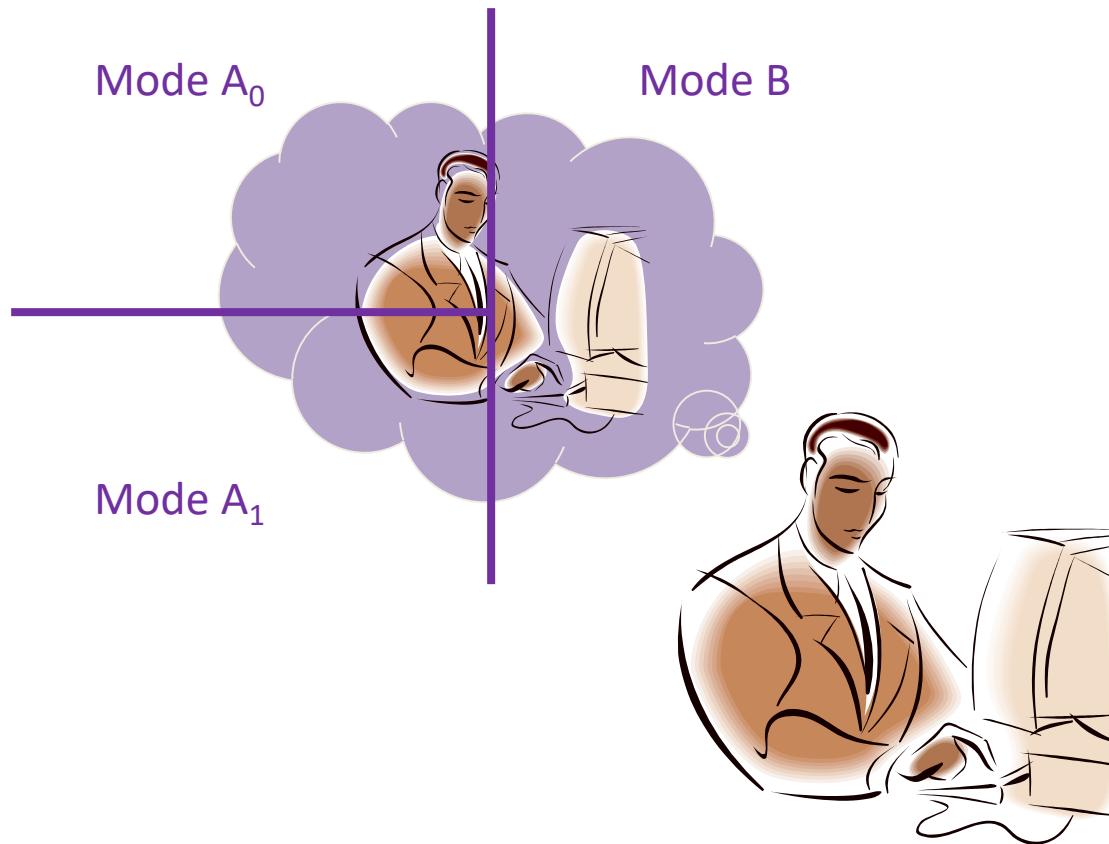


# Is Consistency Always Better?



# 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

# 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

# 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

The screenshot shows a web browser displaying the event page for the Computing Research: Addressing National Priorities and Societal Needs 2017 symposium. The page features a red header with the CCC logo and the text "Catalyzing the computing research community and enabling the pursuit of innovative, high-impact research". Below the header is a navigation menu with links to About, Visioning, Leadership Development, Task Forces, Resources, Events, and Blog. A search bar is also present.

## Computing Research: Addressing National Priorities and Societal Needs 2017

**October 23-24, 2017**  
The InterContinental Washington  
D.C. at the Wharf  
801 Wharf Street, SW, Washington,  
D.C. 20024

**Event Contact:** Ann Drobis, [adrobis@cra.org](mailto:adrobis@cra.org)

**Event Type:** 2017 Events, Special Event

**Event Category:** CCC

**Tags:** grand challenges, research, symposium

**Overview** | **Agenda**

Over the past several decades, computing and information technologies have shaped our lives, our society, and our physical world in ways we never would have imagined. An increasing number of jobs depend on IT, IT shrinks time and distance in our social lives, agriculture and transportation are rapidly becoming IT-based, and IT holds the promise of revolutionizing education and healthcare. Although many of the IT-powered innovations that are reshaping our society can be traced to fundamental computing-related research, their impact has been magnified through powerful applications in areas of broad societal need and opportunity.

Over the past 11 years, the Computing Community Consortium has hosted dozens of research visioning workshops to imagine, discuss, and debate the future of computing and its role in addressing societal needs. The second CCC Computing Research symposium draws these topics into a program designed to illuminate current and future trends in computing and the potential for computing to address national challenges.

The two days are organized around four main themes:

- Intelligent Infrastructure for our Cities and Communities
  - Intelligent infrastructure is already transforming our nation's cities and communities, but the technological revolution is just now beginning. The potential for major improvements in public health and safety, efficient use of our resources, and a higher quality of life for all citizens are enormous. At the same time, new risks arise as we attempt to integrate large scale data collection, advanced cyberphysical systems, and autonomous vehicles into our daily lives. This session will highlight some of the major advances now taking place, while at the same time emphasizing the substantial body of research, much of it crossing disciplinary boundaries, that still needs to be done.
- Security and Privacy for Democracy
  - Computing research enables new technology to help society cope with information security and privacy risks. Learn about how differential privacy will enable new understanding of the population while protecting privacy and about technologies used to help journalists and human rights workers to communicate safely in oppressive regimes.
- AI and Amplifying Human Abilities
  - This panel will examine the emerging role of AI in augmenting human abilities in new and powerful ways. In particular, this session will examine the spectrum of human and machine capabilities and how we develop systems that provide a seamless interface between the two. Speakers will also ground their remarks in application areas ranging from health, transportation, universal access, data analysis, and education.
- Data, Algorithms, and Fairness
  - Data-driven and algorithmic decision making increasingly determine how businesses target advertisements to consumers, how police departments monitor individuals or groups, how banks decide who gets a loan and who does not, how employers hire, how colleges and universities make admissions and financial aid decisions, and much more. As data-driven decisions increasingly affect every corner of our lives, there is an urgent need to ensure they do not become instruments of discrimination, barriers to equality, and threats to social justice.

**Livestream**

# Design Research Review in Critique

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

Helpful for “what in your 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

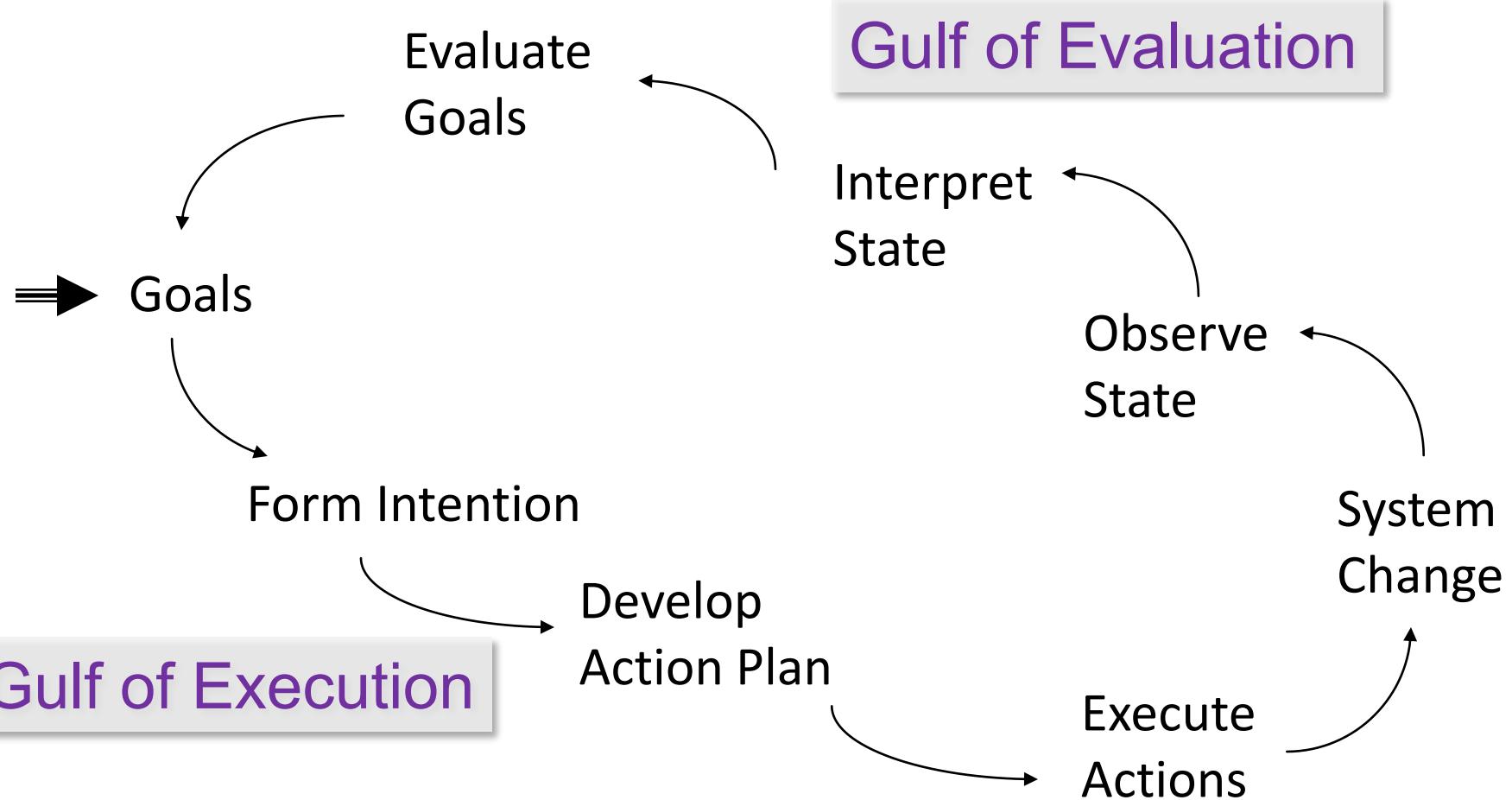
A common task might be found in those approaches, with designs exploring different tradeoffs relative to that tension

# Today

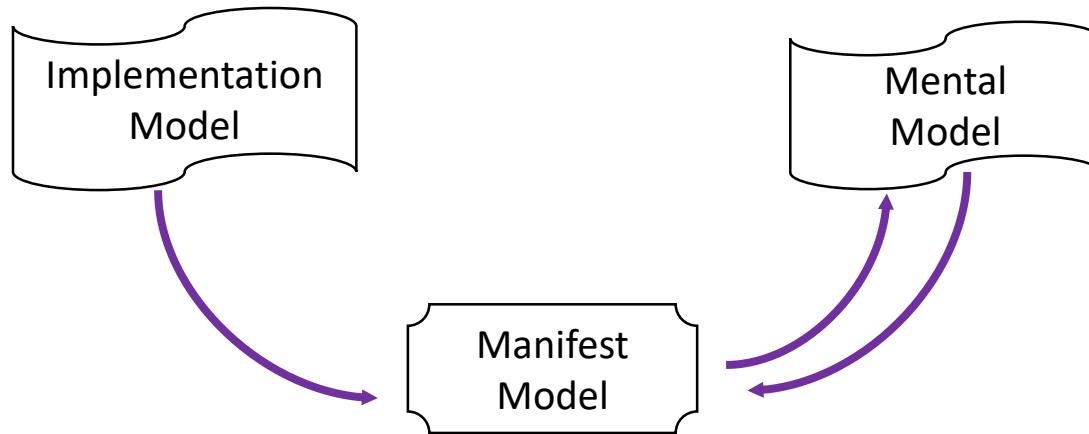
## Finishing Design of Everything Things

### 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

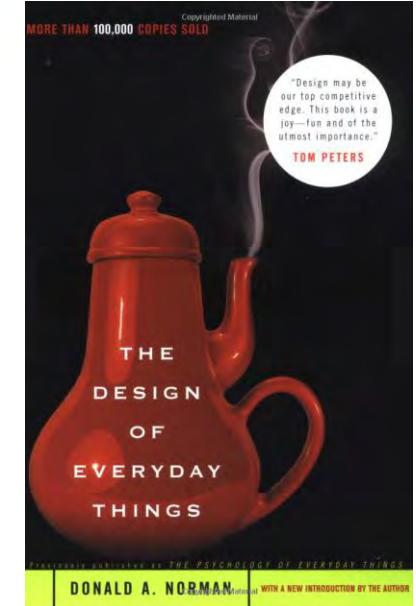
People struggle until model matches manifest model

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

Metaphors

Visibility

Knowledge in the World

Constraints

Mapping

Consistency

Modes

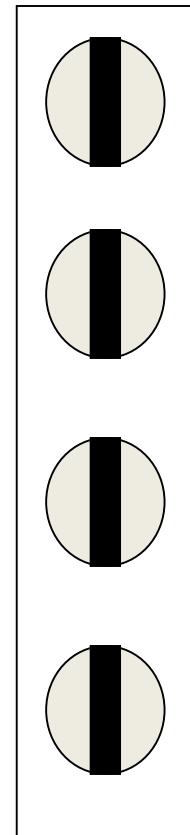
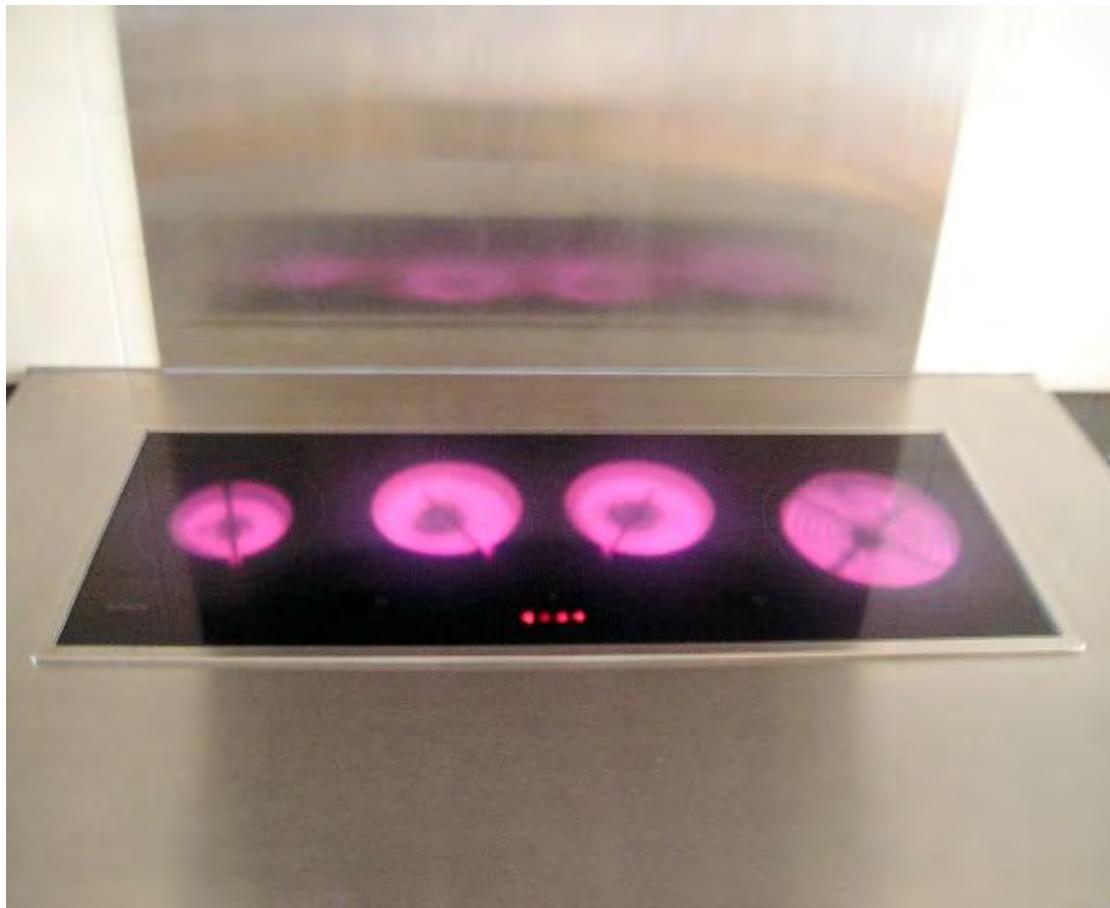
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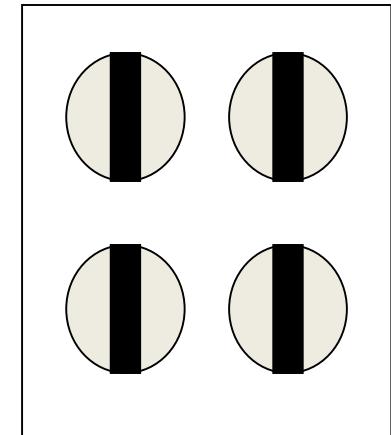
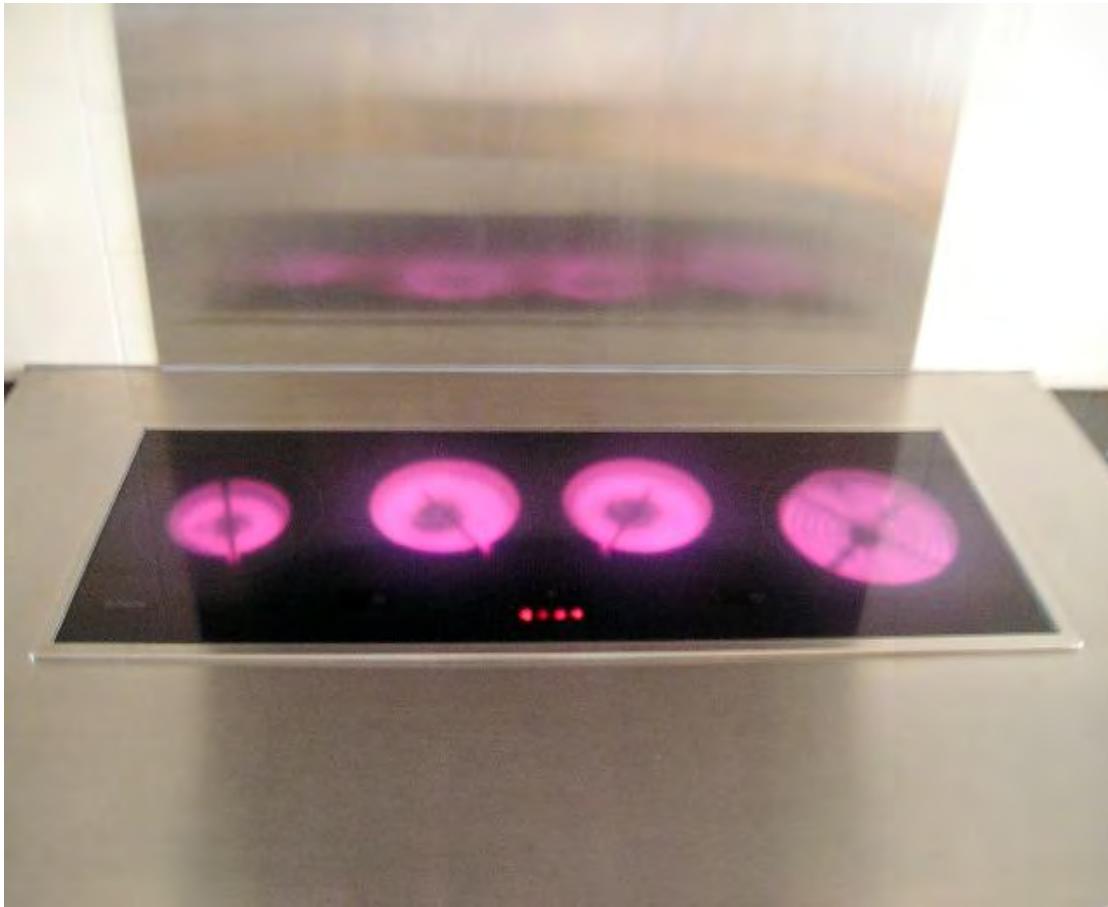
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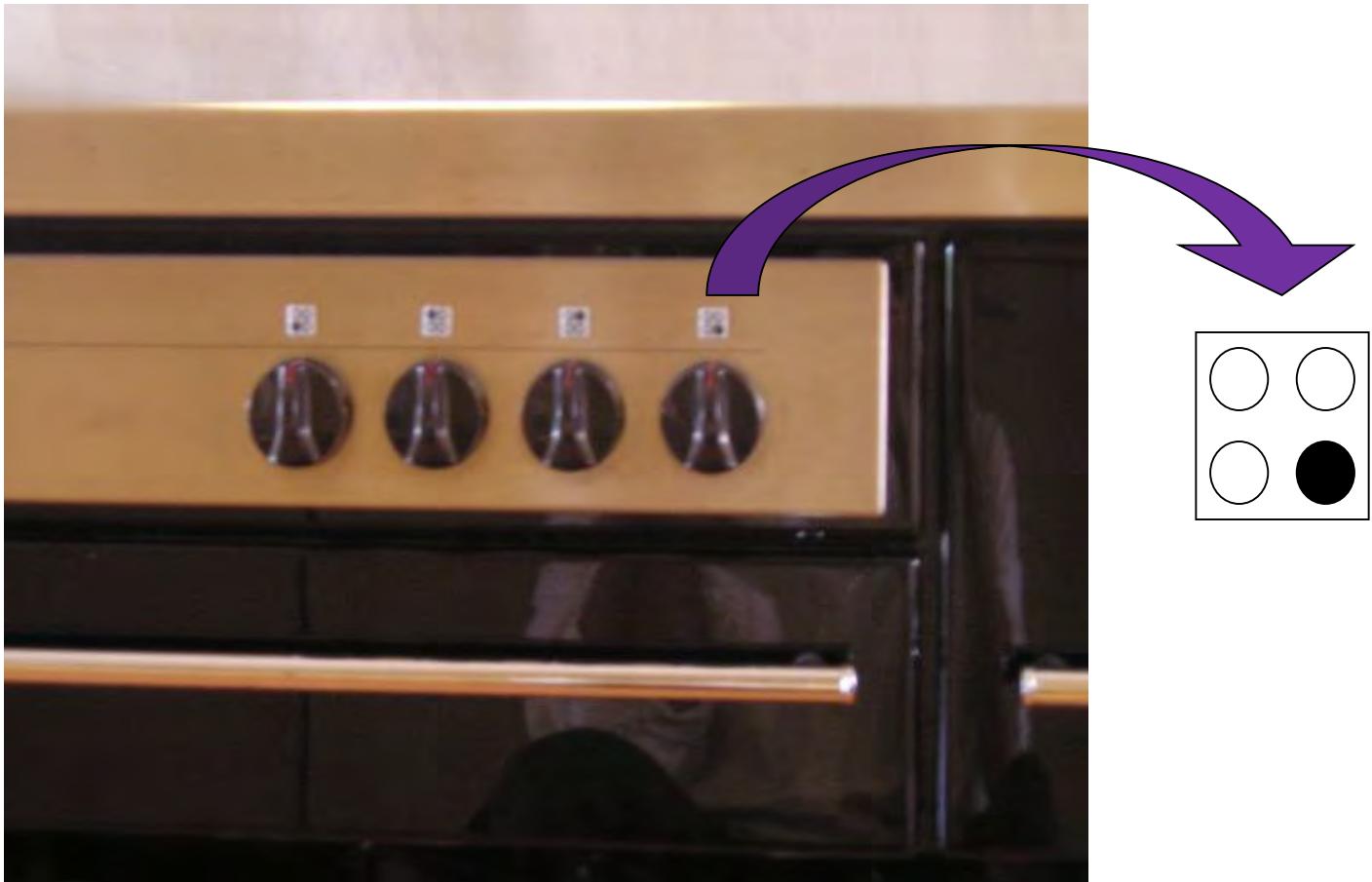
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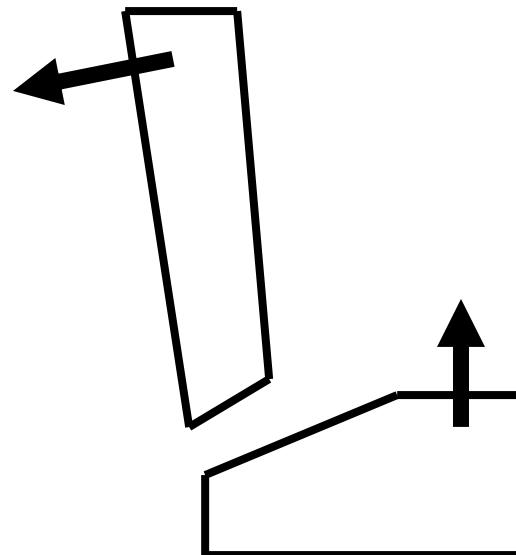
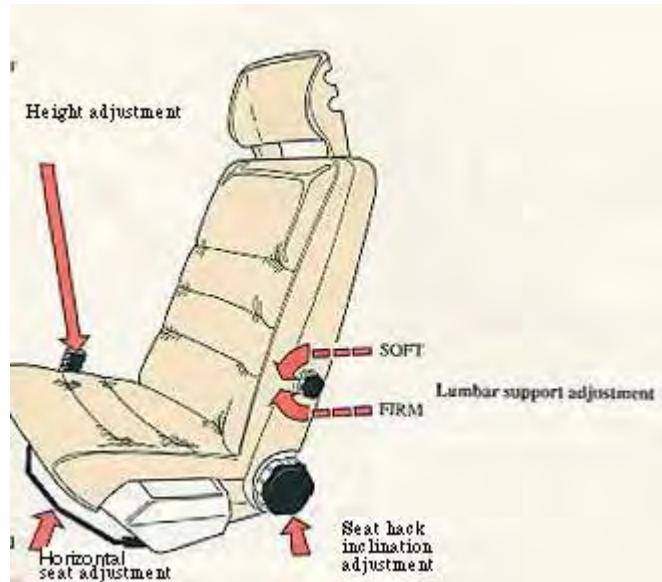


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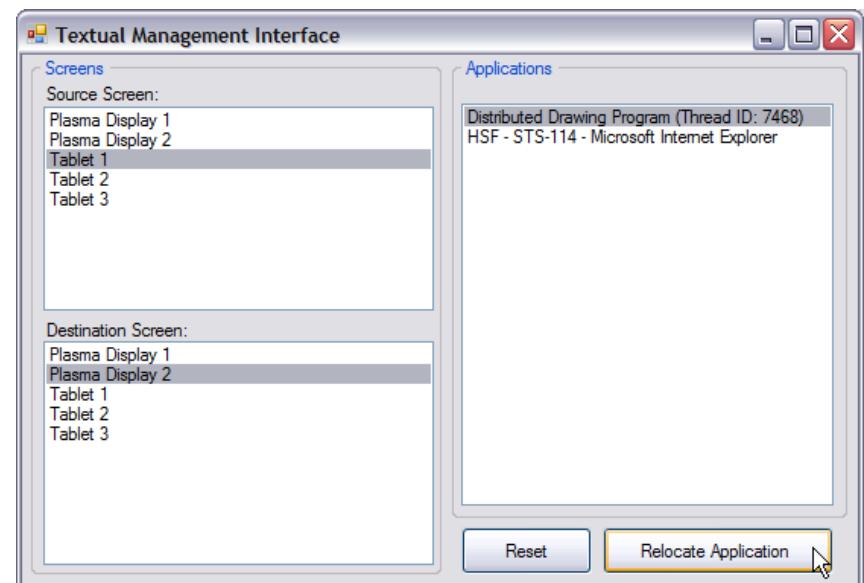
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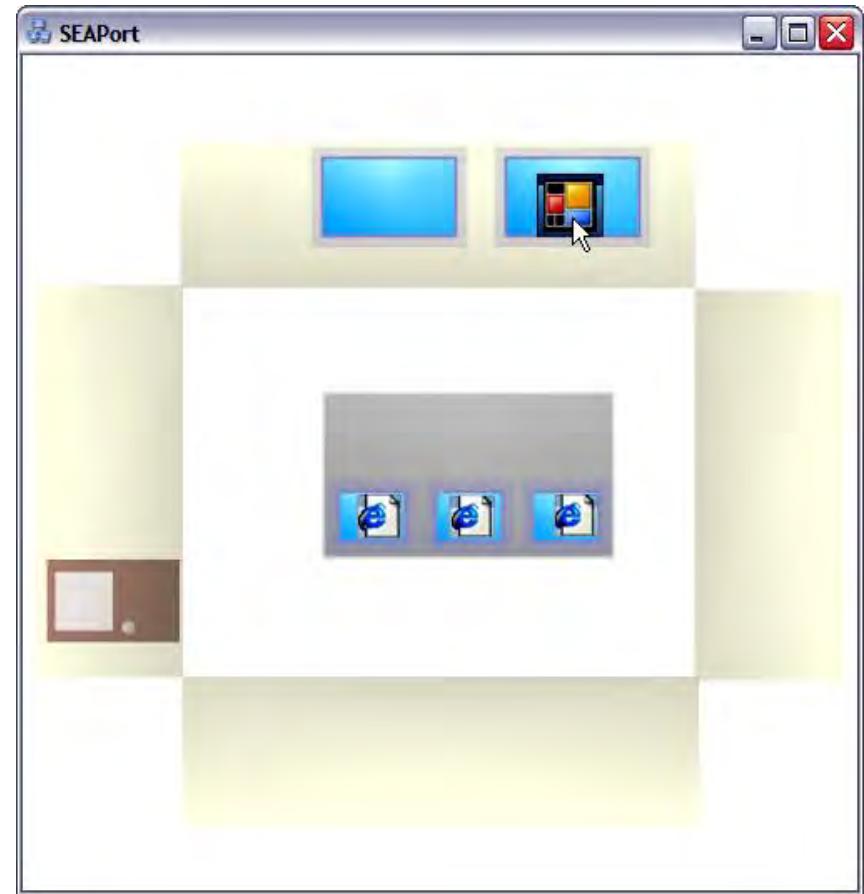
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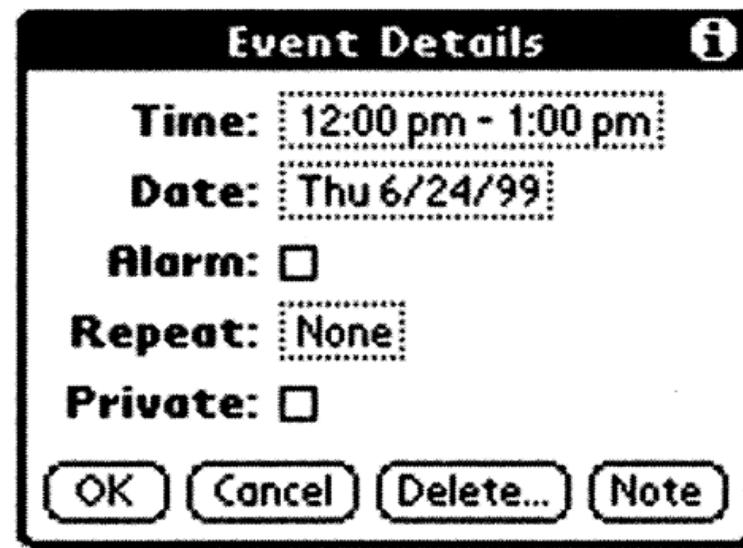
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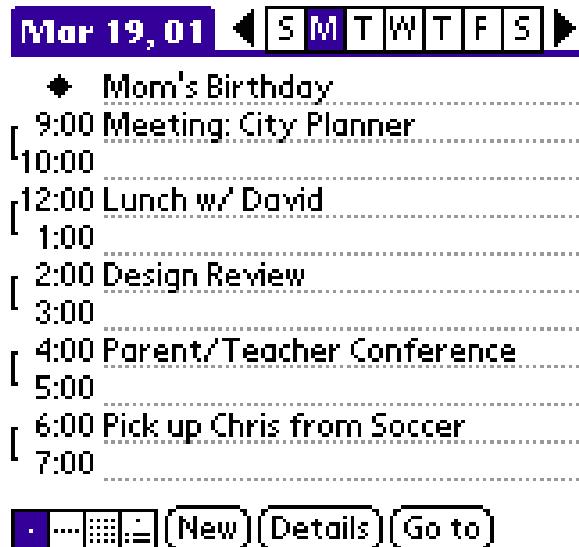
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End on: ▼ No End Date

Repeat on:  S  M  T  W  T  F  S

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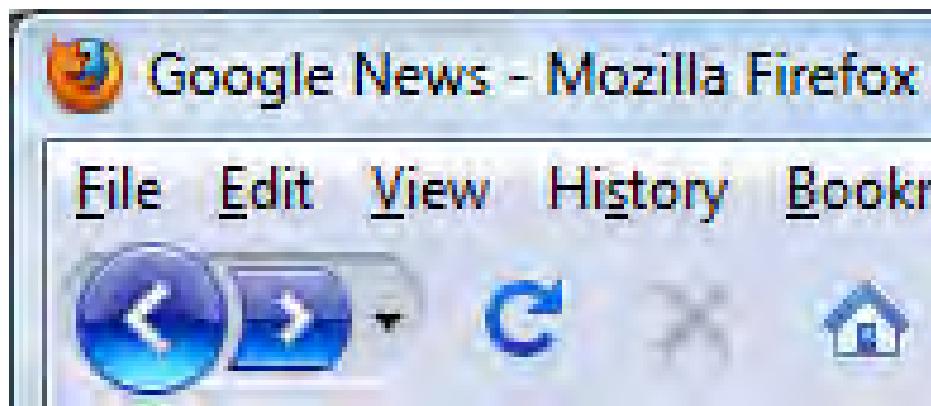
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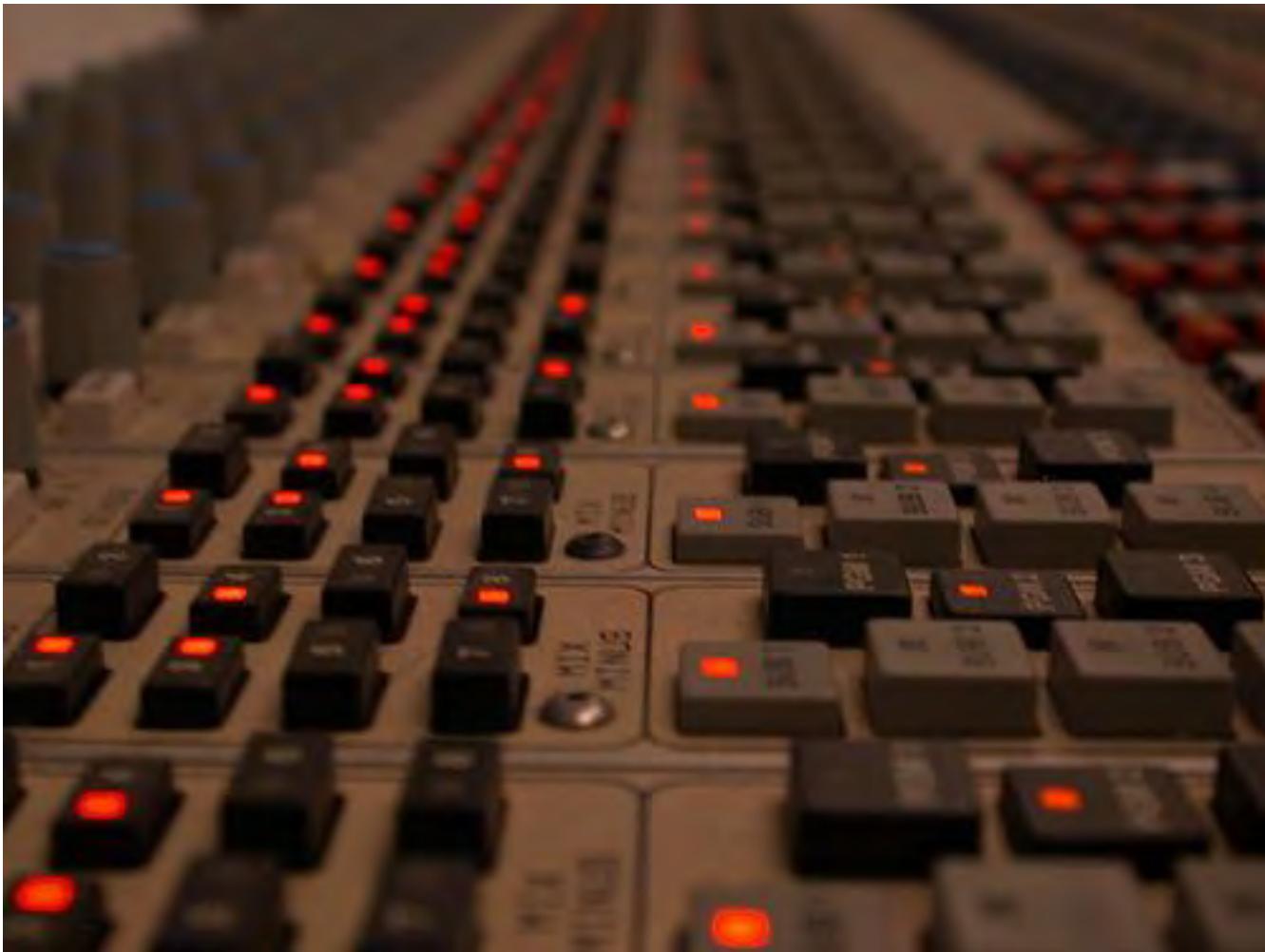
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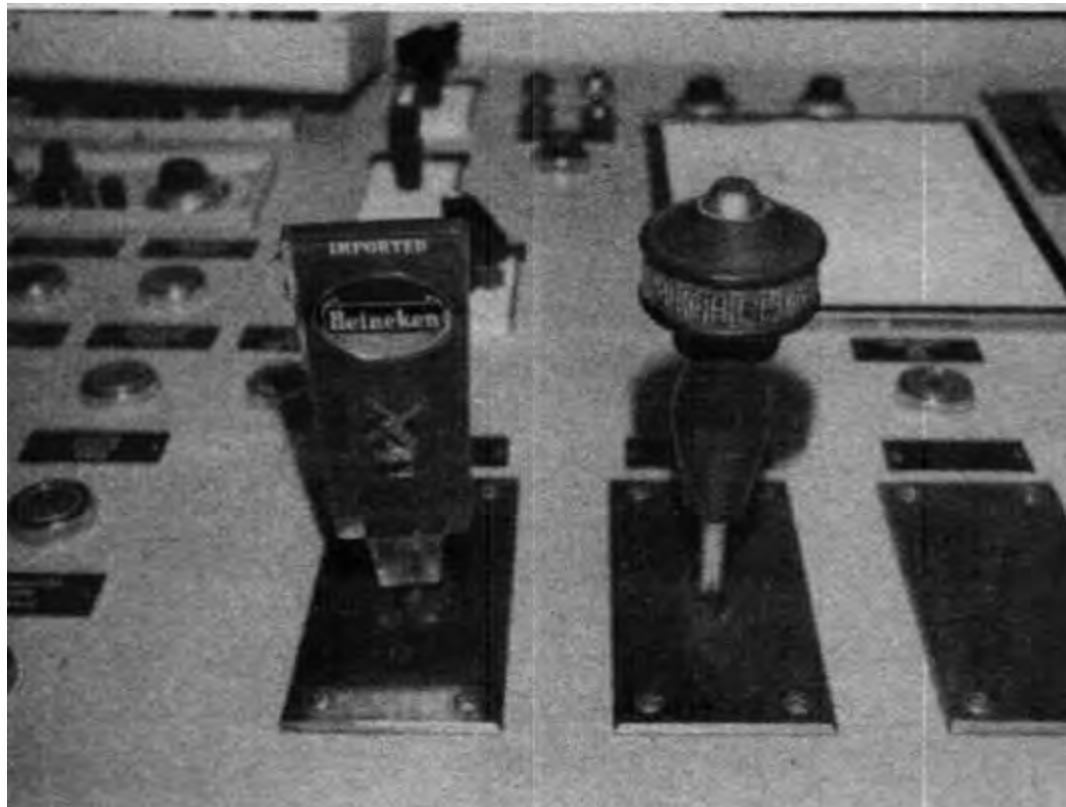
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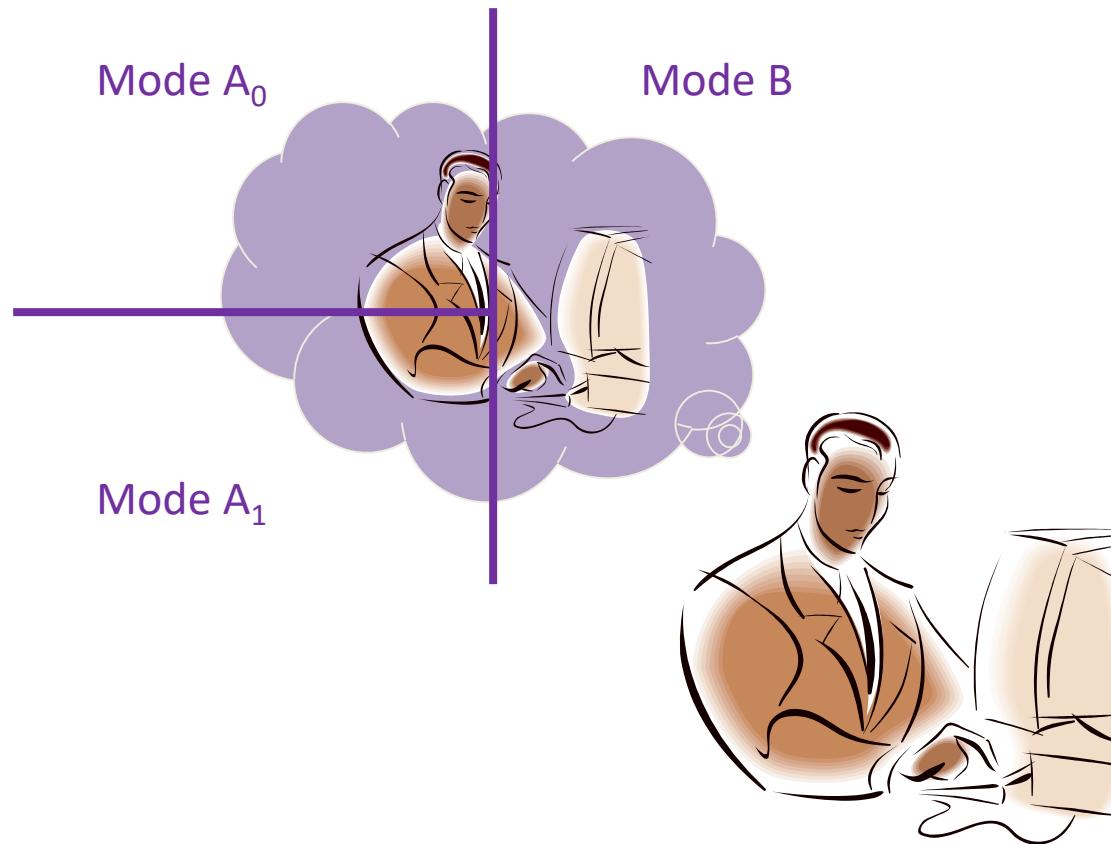


# Is Consistency Always Better?



# 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

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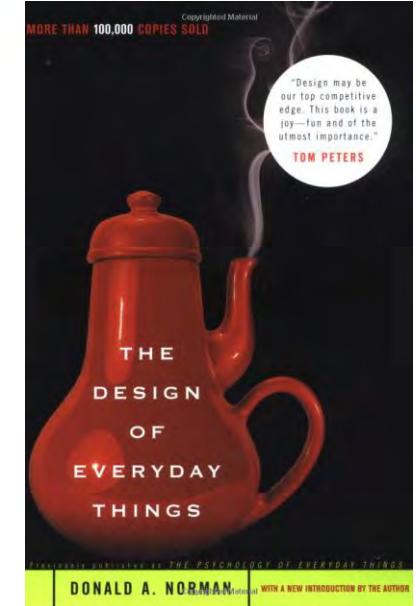
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Affordances

Metaphors

Visibility

Knowledge in the World

Constraints

Mapping

Consistency

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



## STORE FOR THE STYLE-CHALLENGED

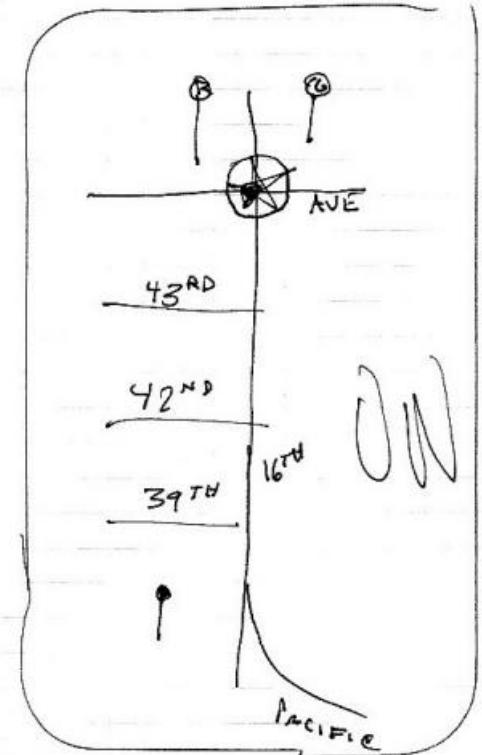


### As it should be...

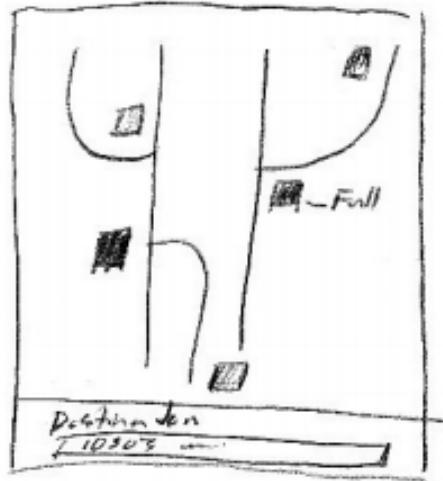


(pre-selected to match so you don't  
have to choose.)

# Sketching



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



- different colors
- highlights availability
-

# Sketching and Tasks

Attendance List

Sent By: Last Name Show Enrollment

Last Name	All
Lee, Benjamin	Enrollment
Santos, Allen	Waitlist
Schwartz, Jonah	Audit
Vernette, Joshua	Present
	Absent
	Section

12345678 Junior  
23456789 Senior  
34567890 Semi

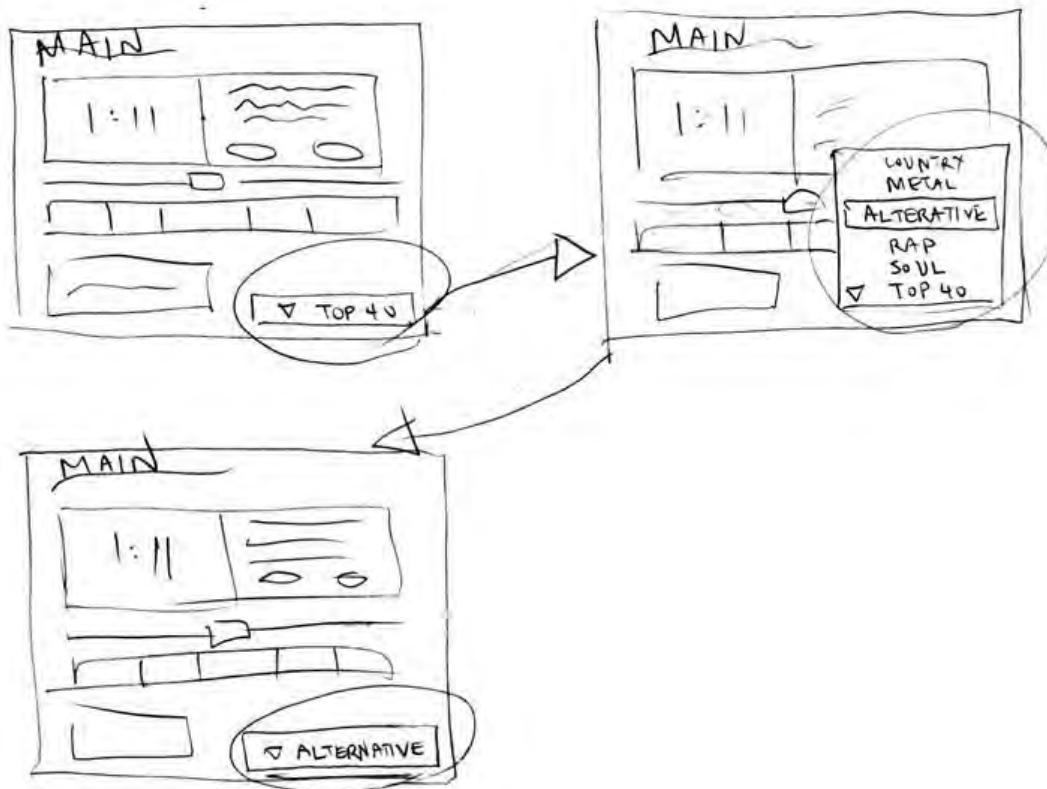
Go to Attendance View

Back to main menu refresh w/ new info  
38 Present, 2 Absent Take Attendance  
from students' PDF  
Done Look Up: Sc highlights student

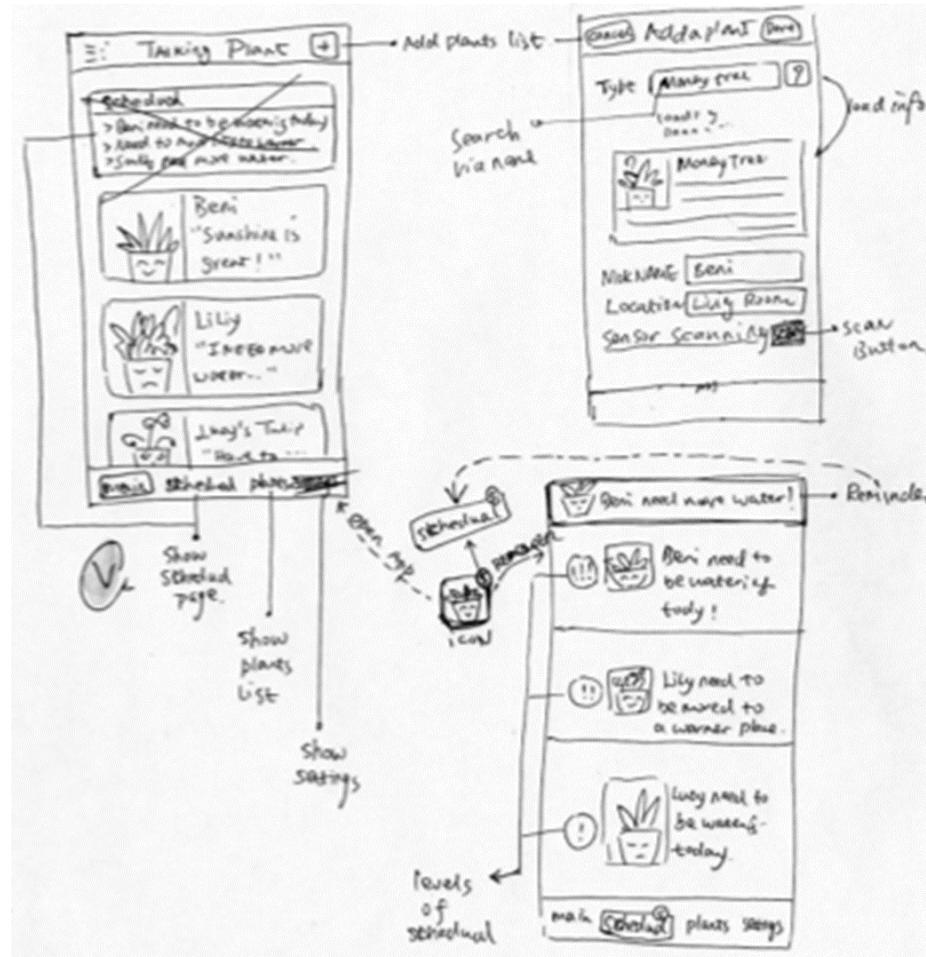
# Sketching and Tasks

SCENARIO 1

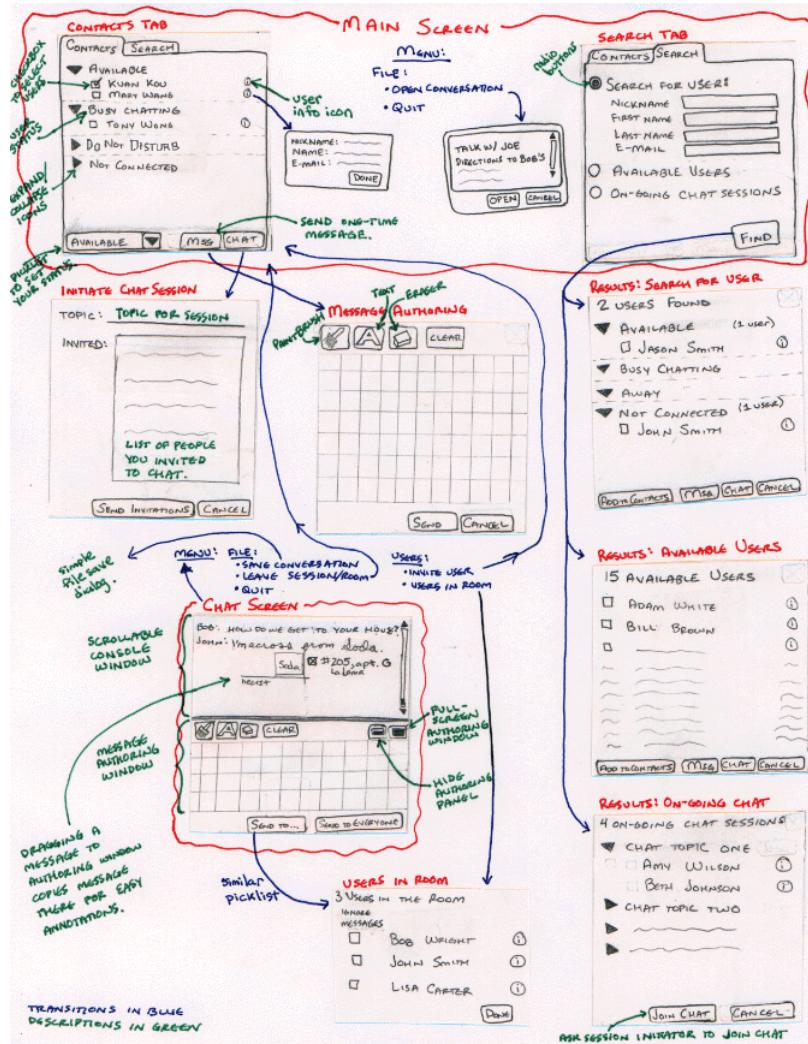
"I want to listen to alternative music"



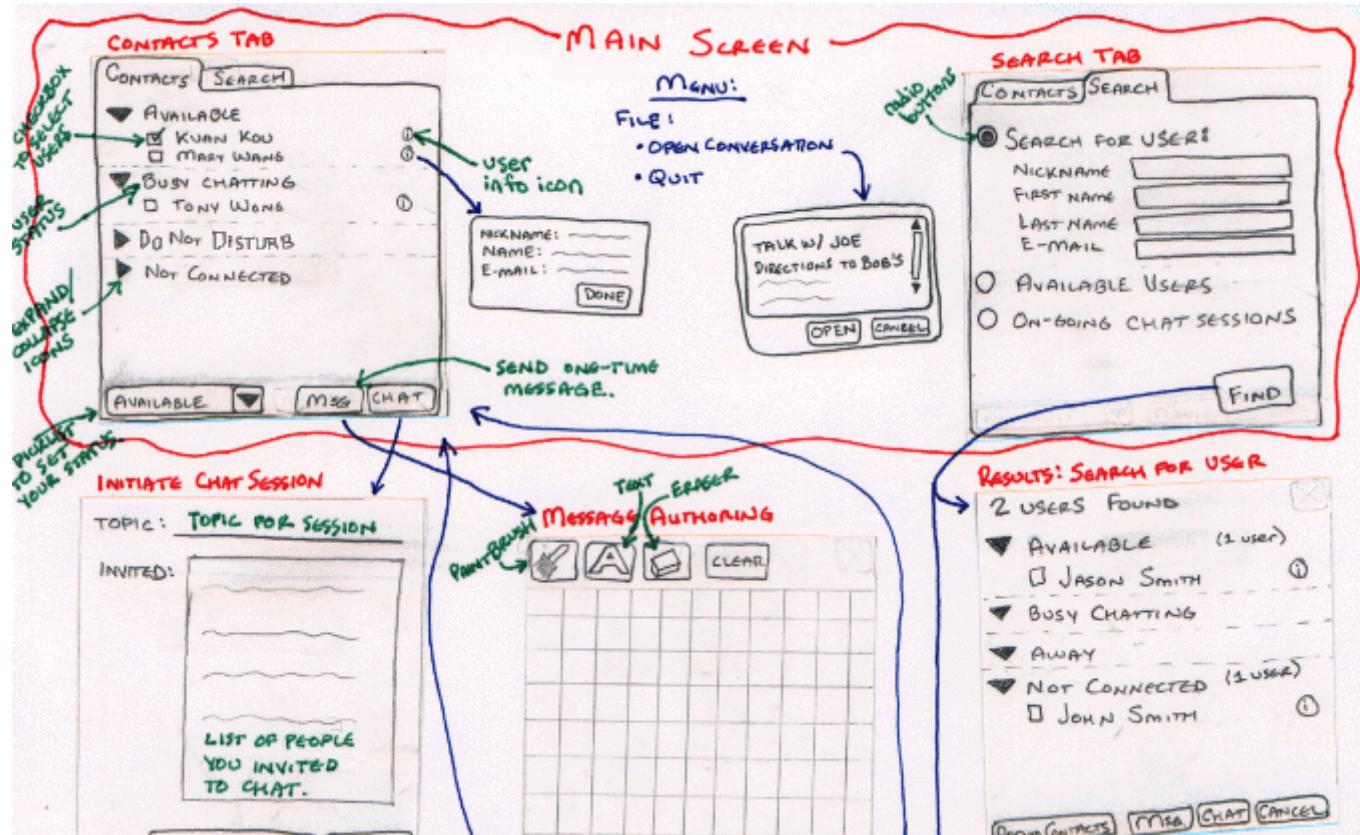
# Sketching and Tasks



# 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

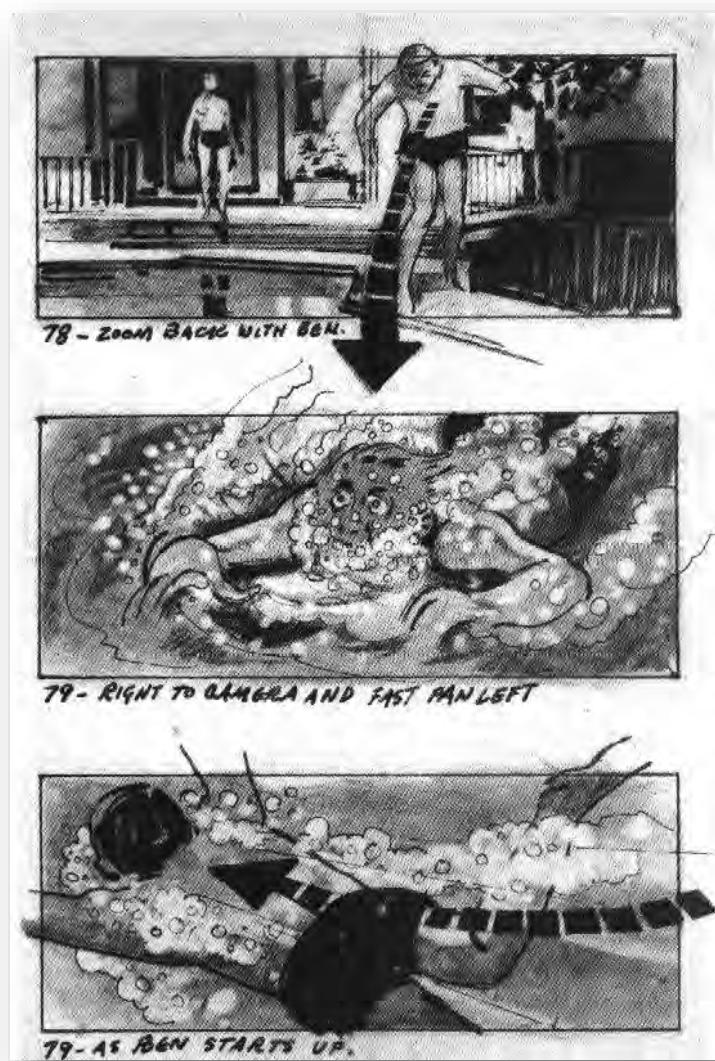
Can be used to explore

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

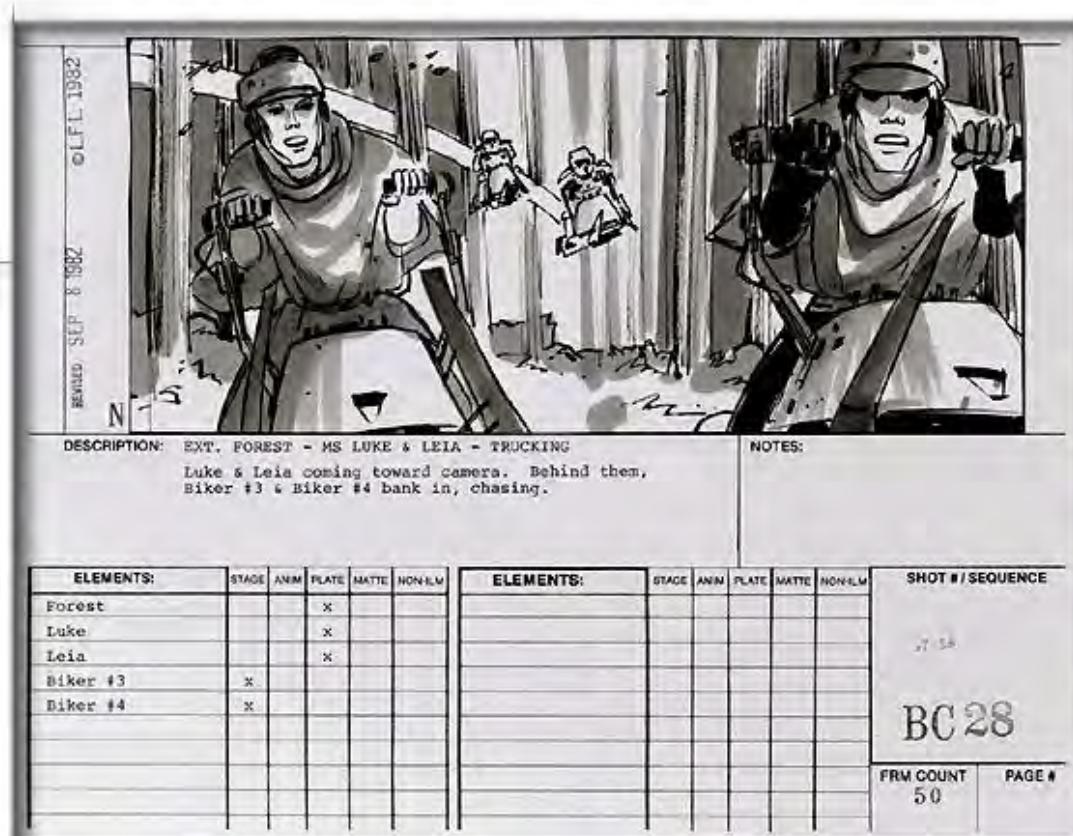
Effective storyboards can quickly convey information that would be difficult to understand in text

Imagine explaining this in text, for various audiences

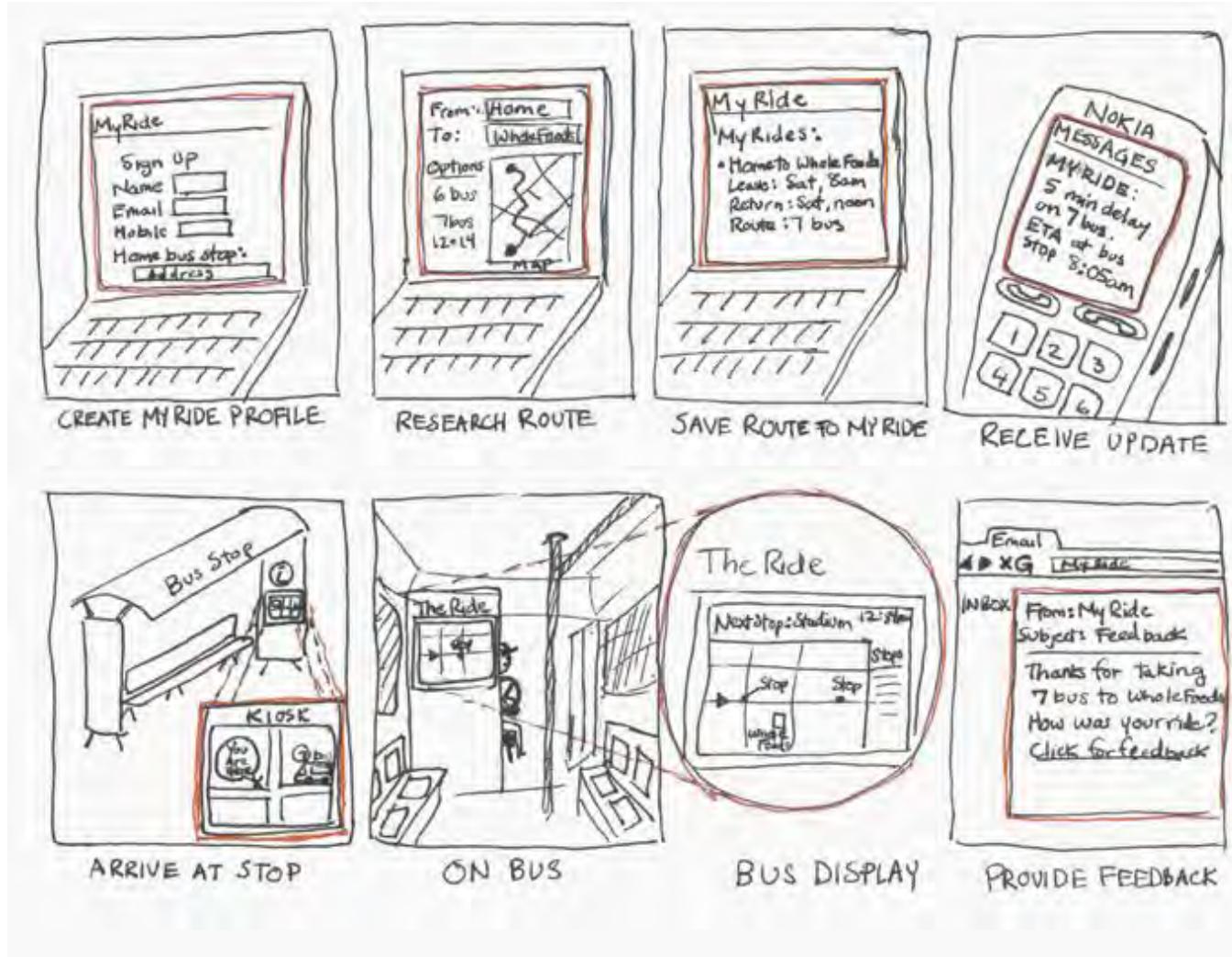


# Storyboards

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



# Basic Storyboard

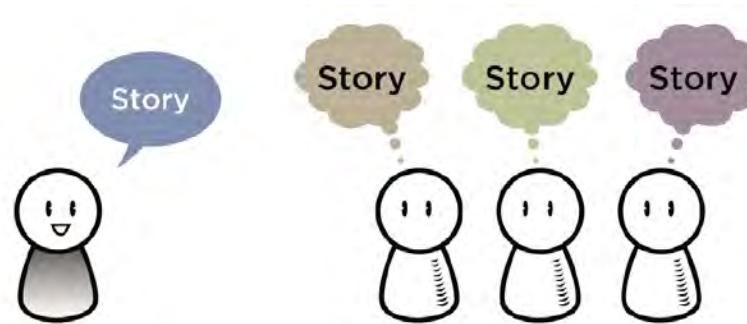


# Storytelling



Stories have an audience

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



Stories need to match audience and purpose

# 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

# 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 satisfied

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

The storyboard consists of two panels. The left panel shows a hand pointing at a list of cities: S.F, S.J, S.B, and HALIFAX. A large 'NO!' is written across the list. The right panel shows two characters, Red and Sean, talking about what to do after a festival.

**CITIES →**

S.F
S.J
S.B
HALIFAX

**NO!**

**RED & SEAN WERE BORED AFTER GOING TO THE BLUEGRASS FESTIVAL, & DECIDED TO FIND OUT WHAT ELSE THEY COULD DO...**

**DUDE, WHAT DO WE DO?!**

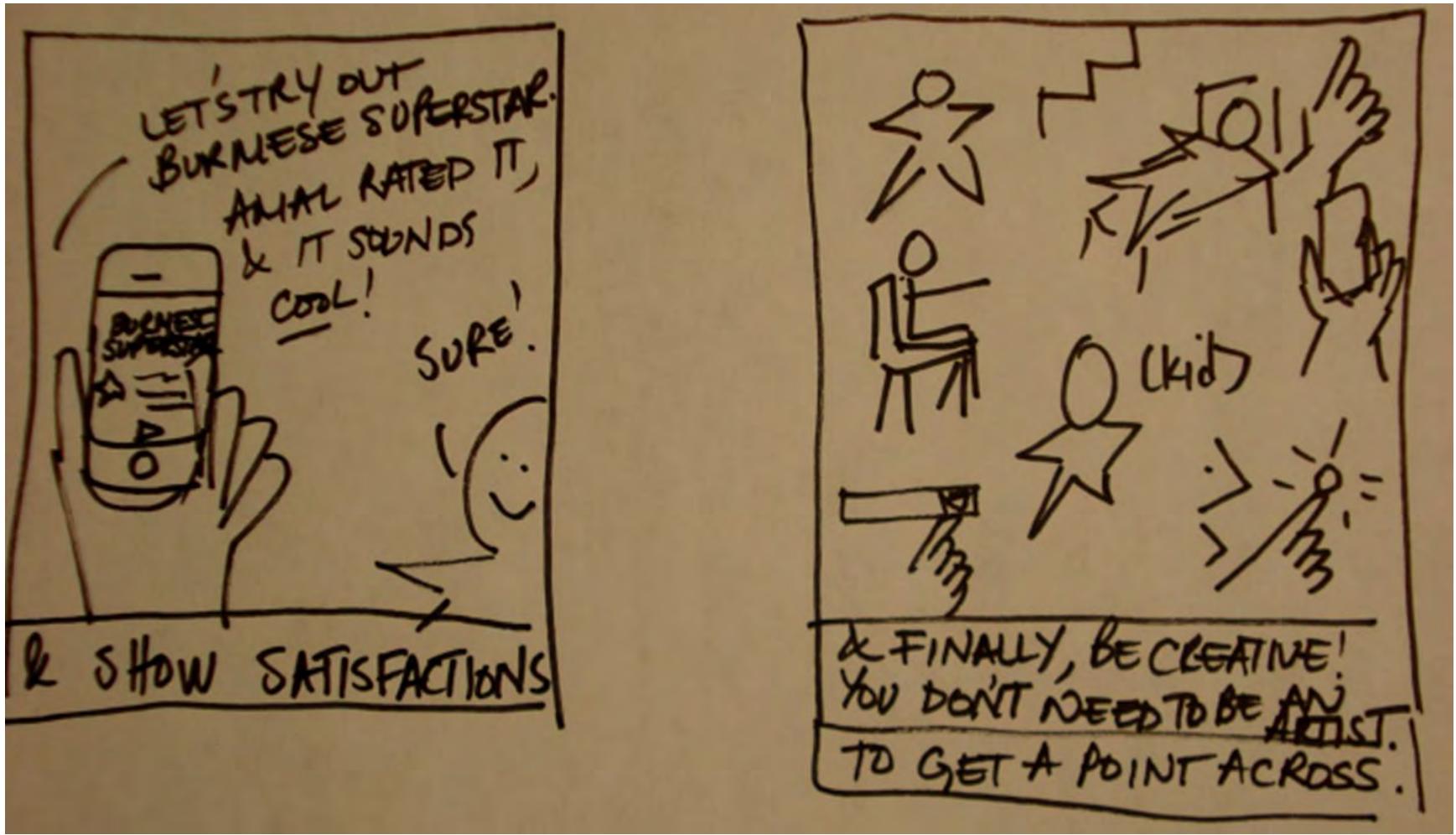
**LET ME USE TOURSAPP! ON MY iPhone!**

**DON'T USE THIS TO ILLUSTRATE ALL THE UI FEATURES & COMPONENTS...\***

**\*This is what paper prototyping is for!**

**INSTEAD, SHOW WHY & WHEN features would be used**

# 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

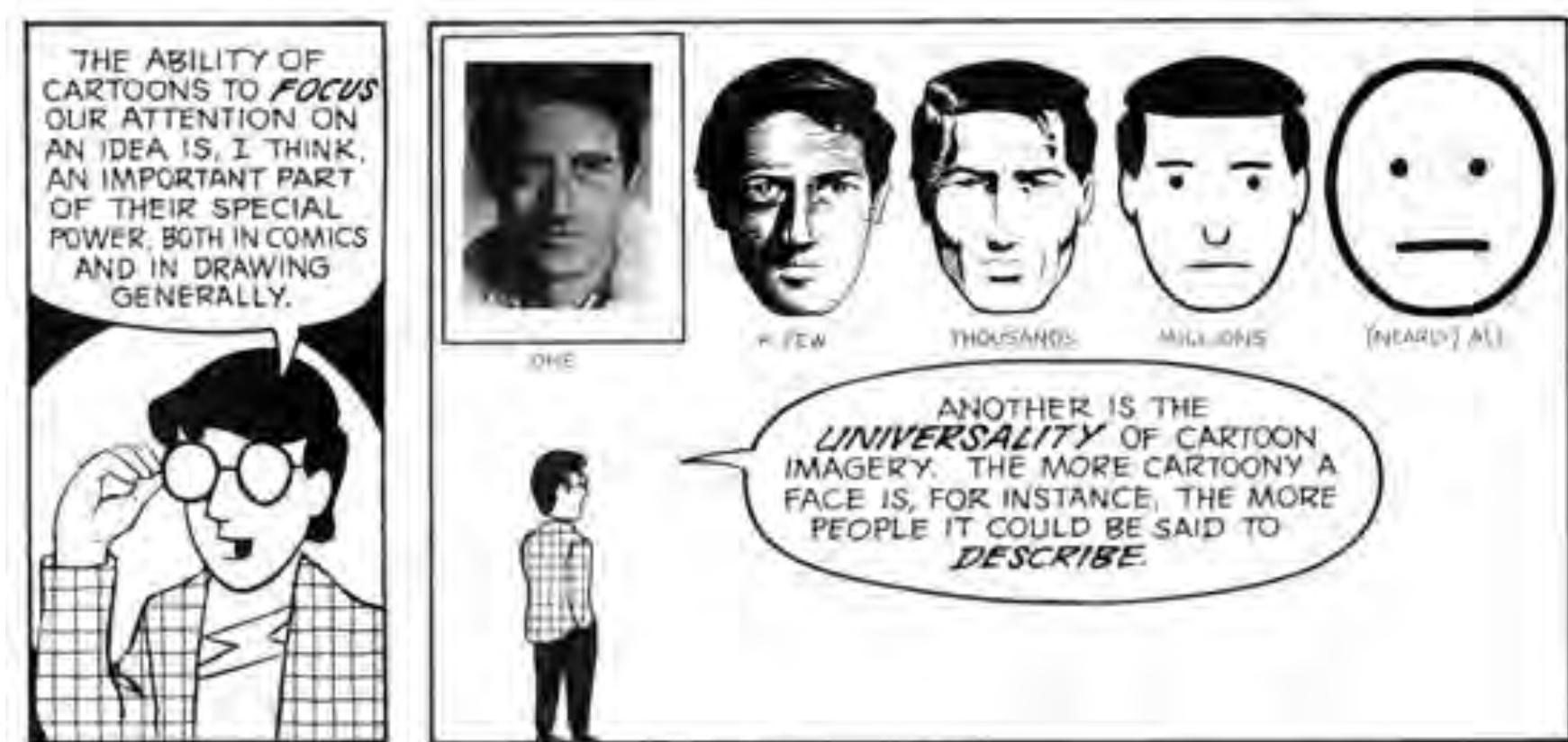
Portrayal of time



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

# 1. How Much Detail?

Guideline: too much detail can lose universality



Scott McCloud

# 1. How Much Detail?

## Sketching People

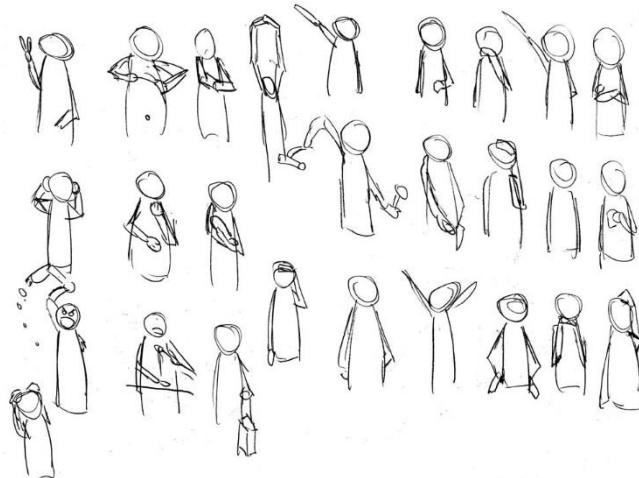


Star people  
by Bill Verplank

PERSON

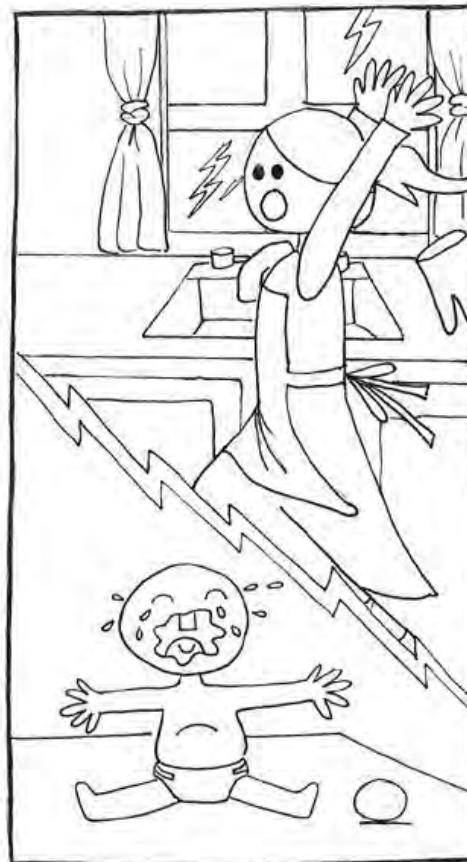


(c) 2009 SACHA CHUA

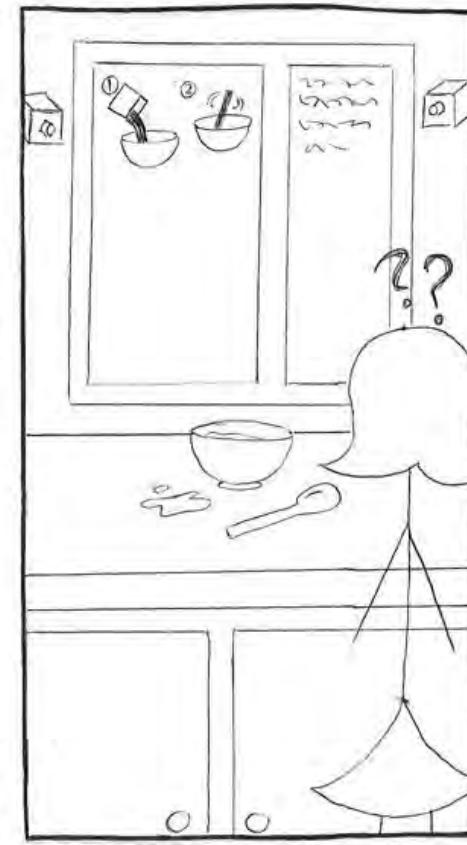
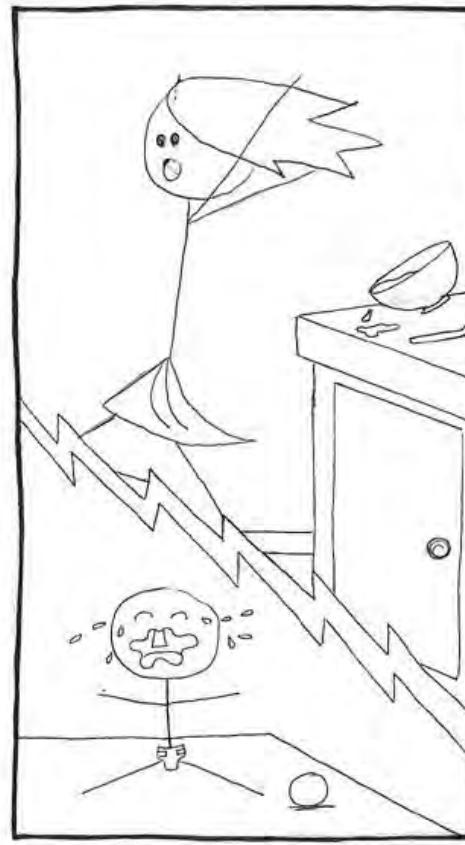
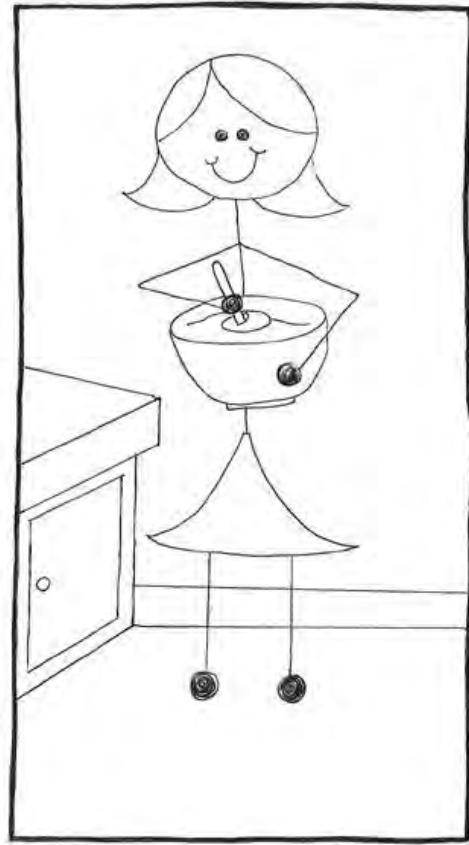


Keith Haring

# 1. How Much Detail?



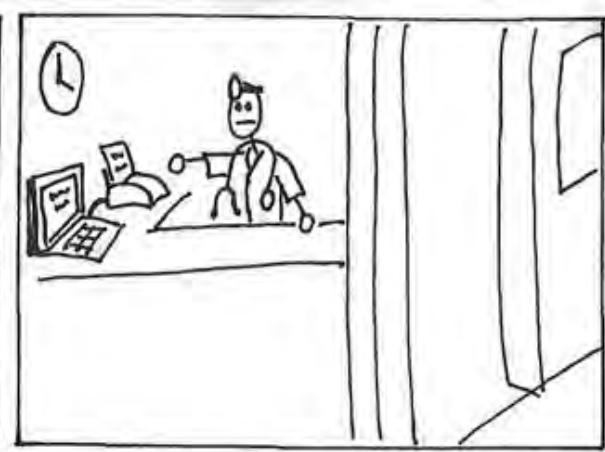
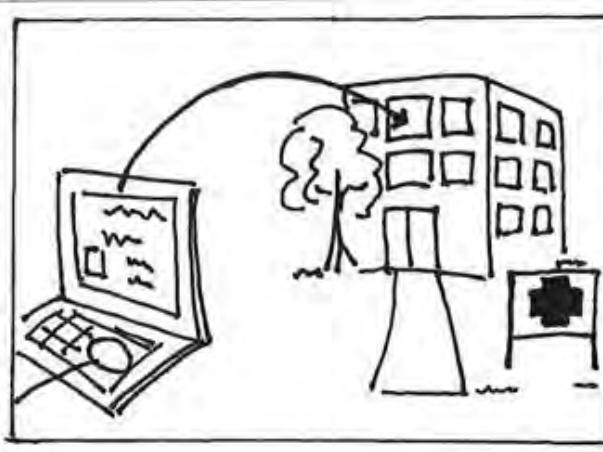
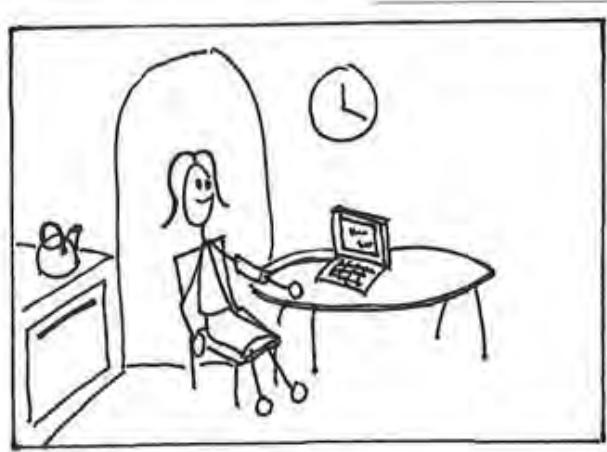
# 1. How Much Detail?



Unnecessary details distract from the story

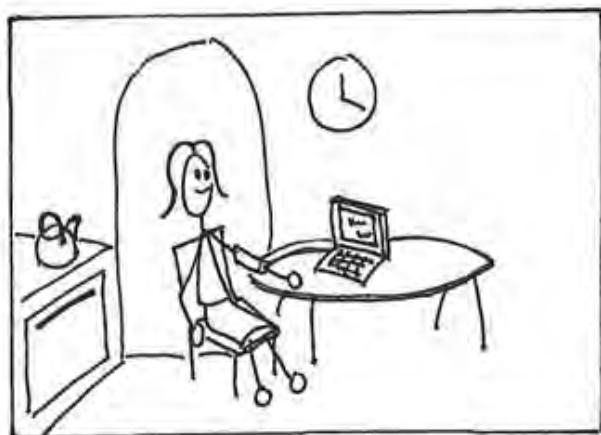
## 2. Use of Text

Guideline: It is often necessary, but keep it short

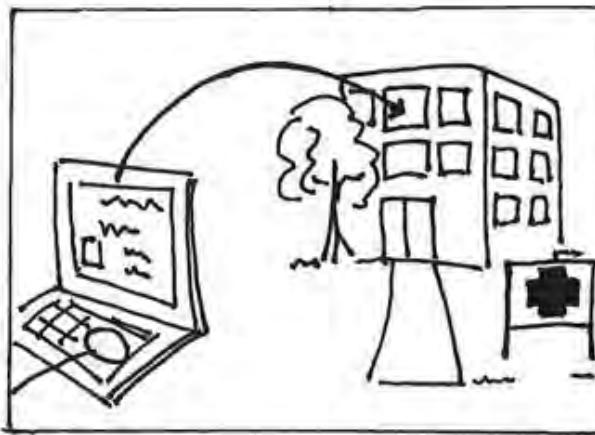


## 2. Use of Text

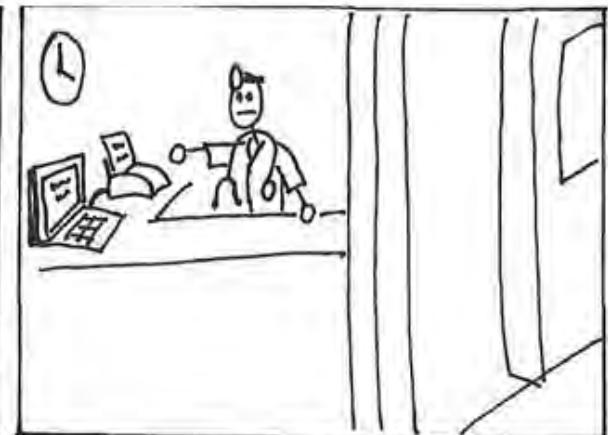
Guideline: It is often necessary, but keep it short



1. At home, Mary checks her blood pressure.



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



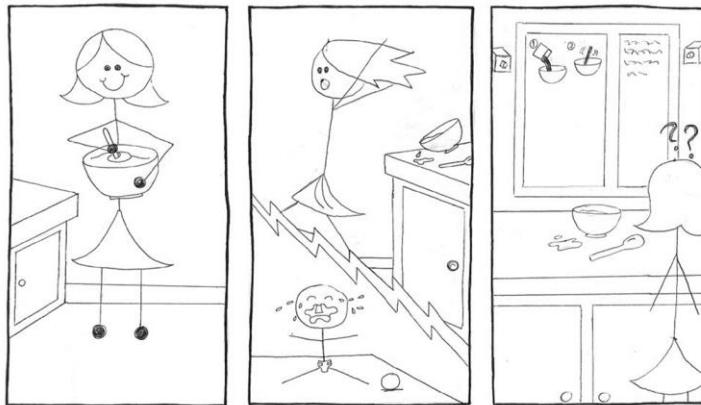
3. The information is made available to her doctor.

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

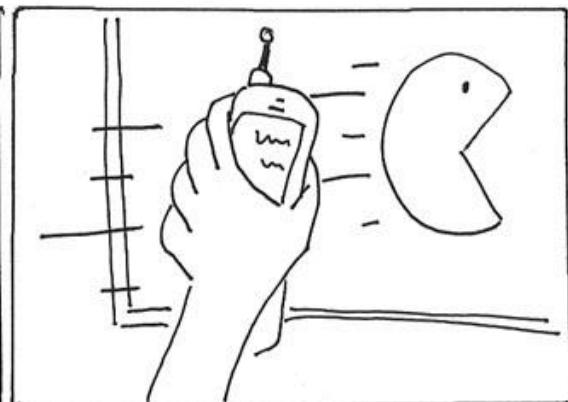
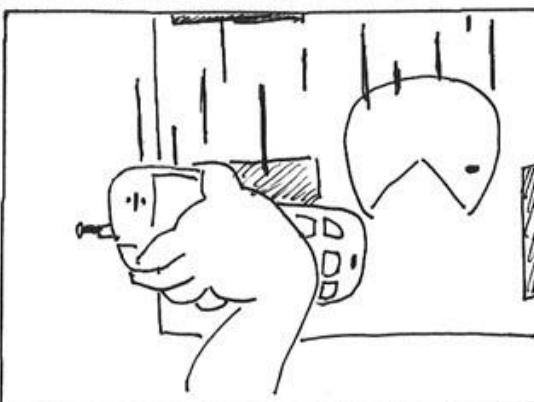
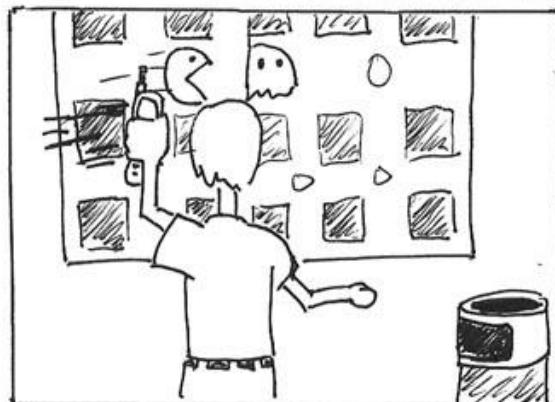
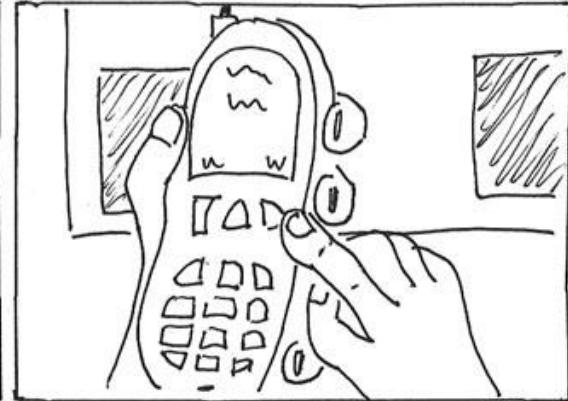
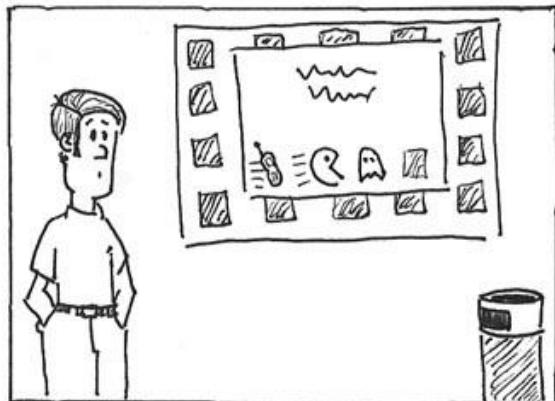
- Potentially longer for design clients

More is not always better

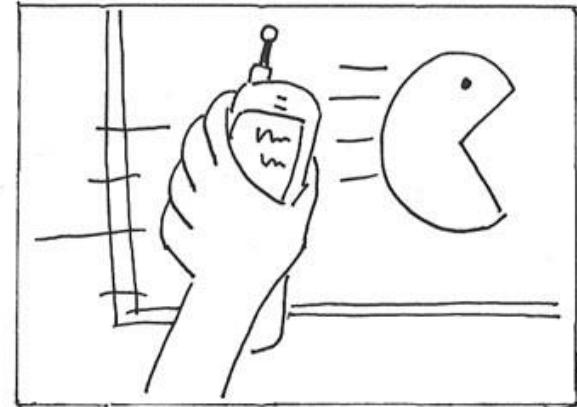
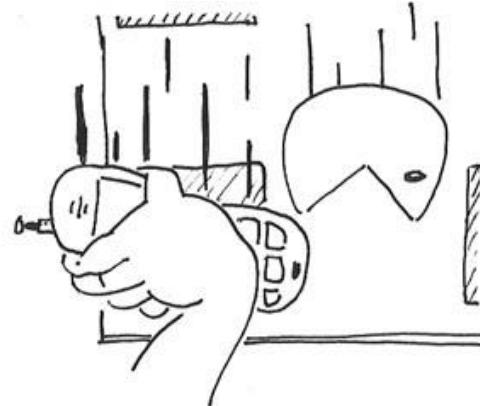
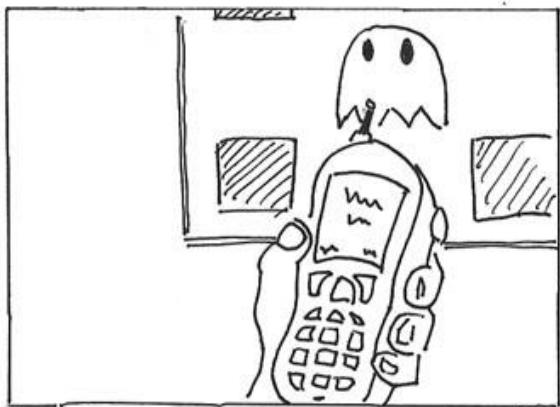
- May lose focus of story

- May lose attention

# 4. How many frames?



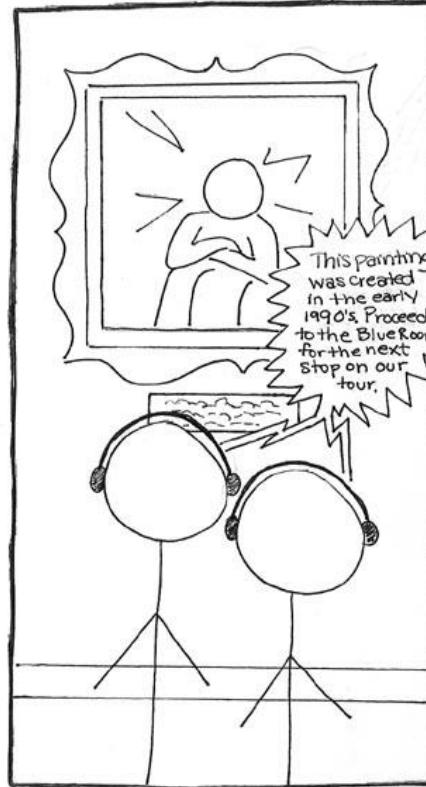
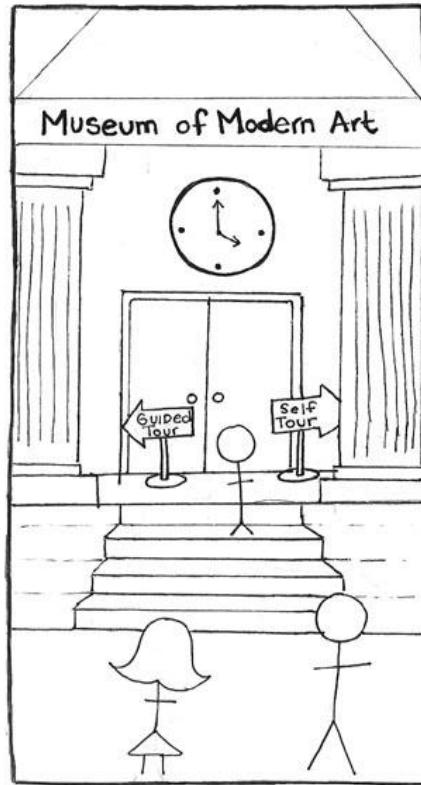
# 4. How many frames?



People found the extra panels were not needed

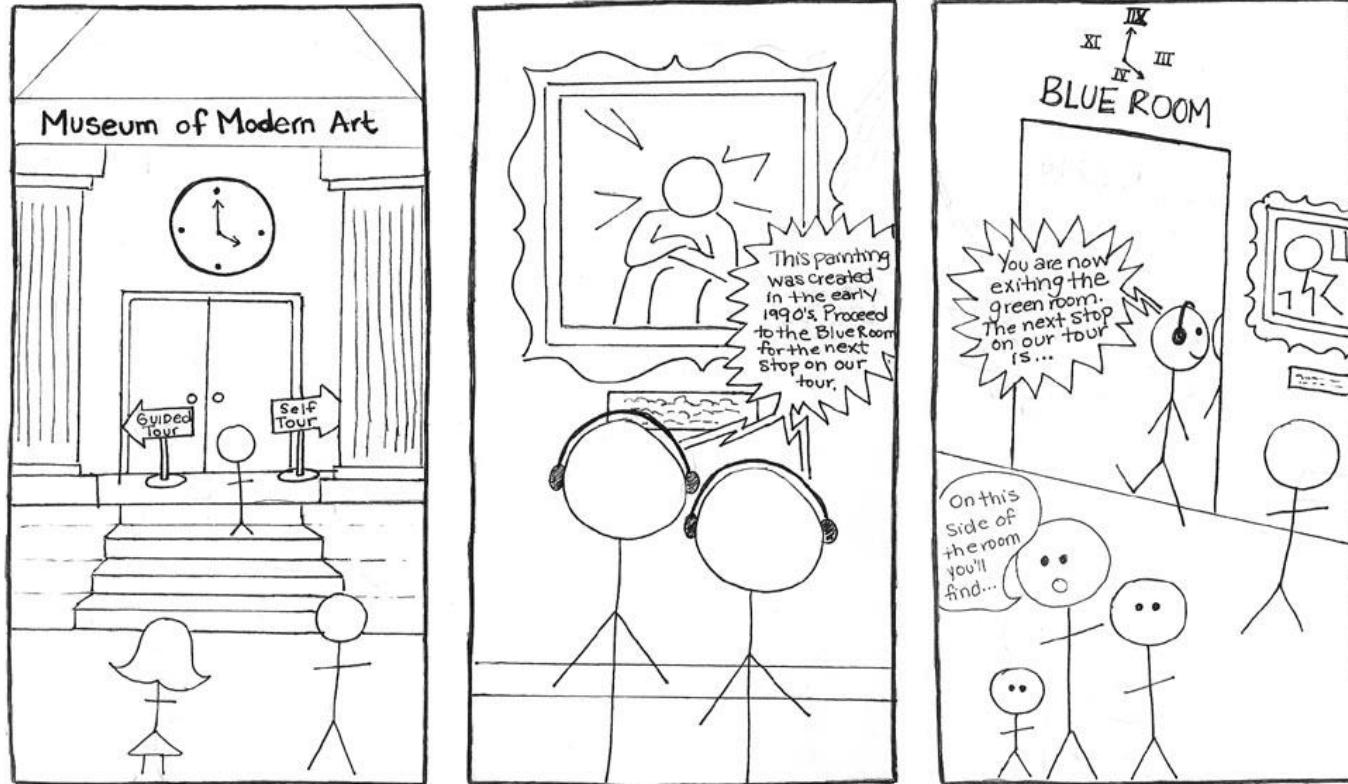
# 5. Passage of Time

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.

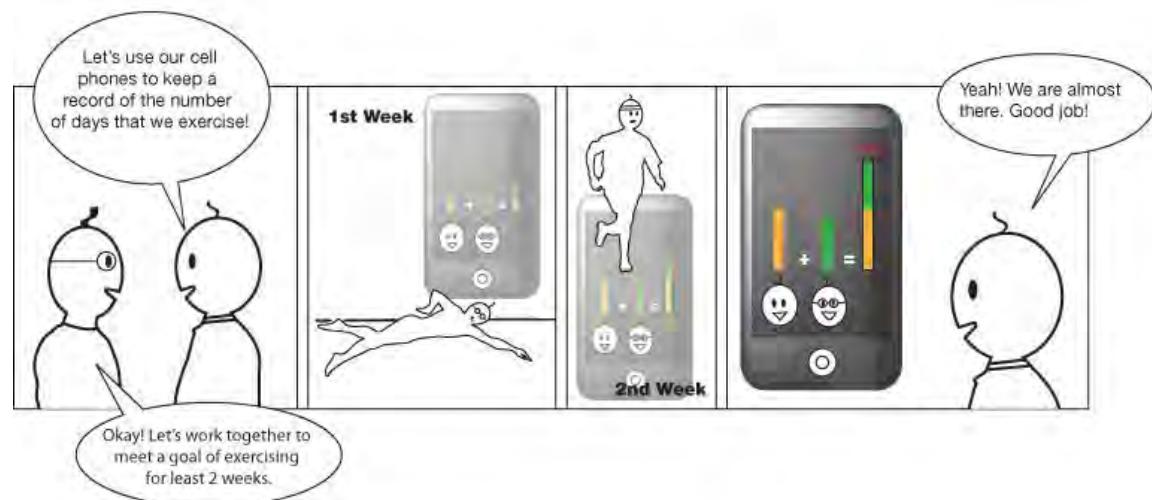
Supportive



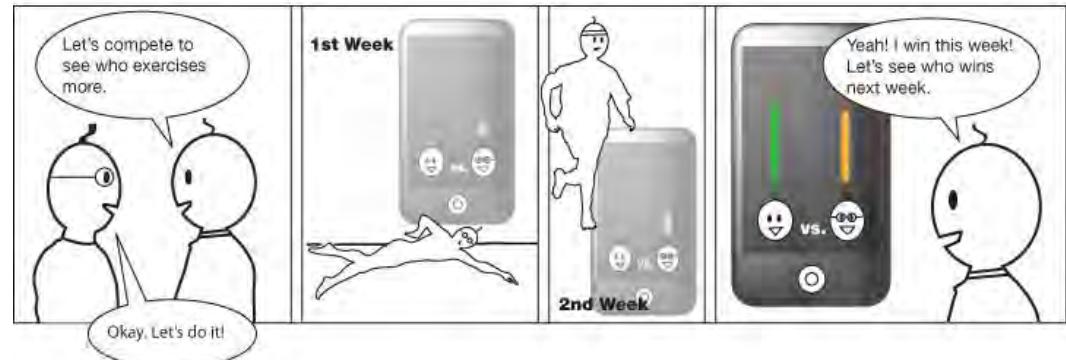
Cell phone is used to keep track of one's fitness goal.

# 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



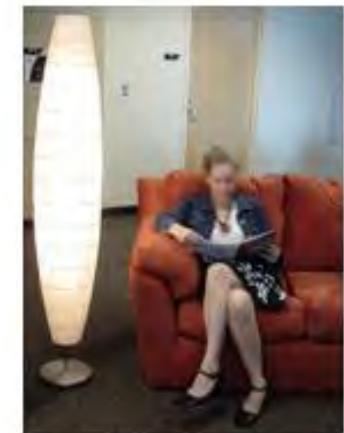
IT IS SO DARK JANE CAN  
HARDLY READ HER BOOK



SHE GESTURES IN FRONT OF HER  
SPECIAL PENDANT TO TURN ON  
THE LIGHTS



THE LIGHTS TURN ON!



FINALLY, SHE CAN  
READ HAPPILY.

Will a picture work instead?

# Existing Images from Other Sources



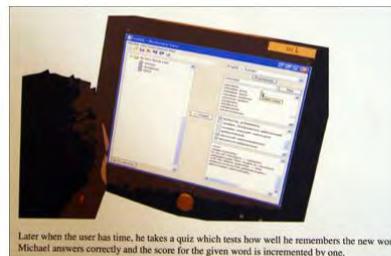
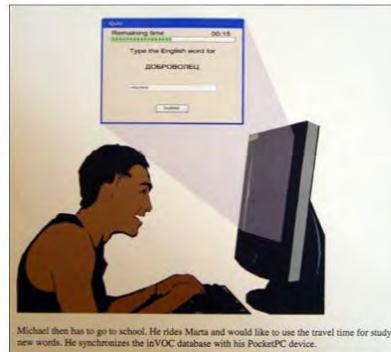
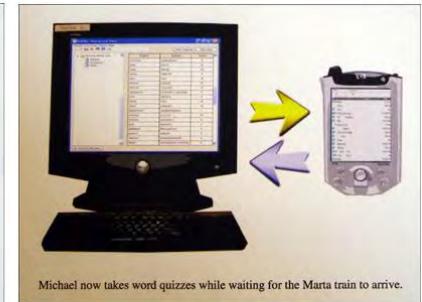
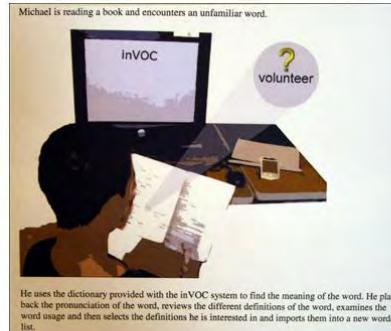
<http://designcomics.org/>

<http://www.pdclipart.org/>

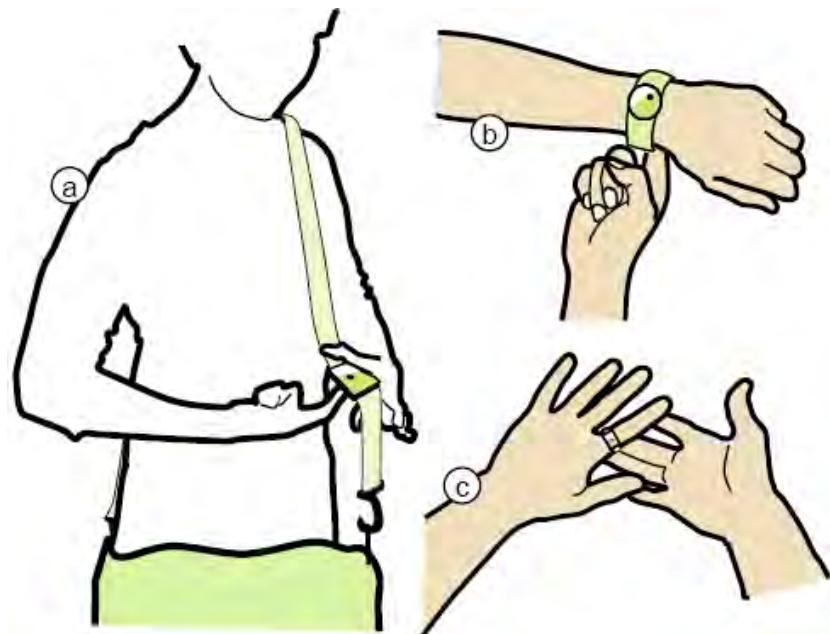
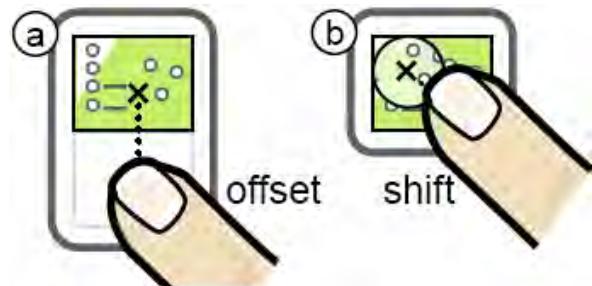


# Blur Out Distracting Details

Using image editing software to simplify photos into sketches

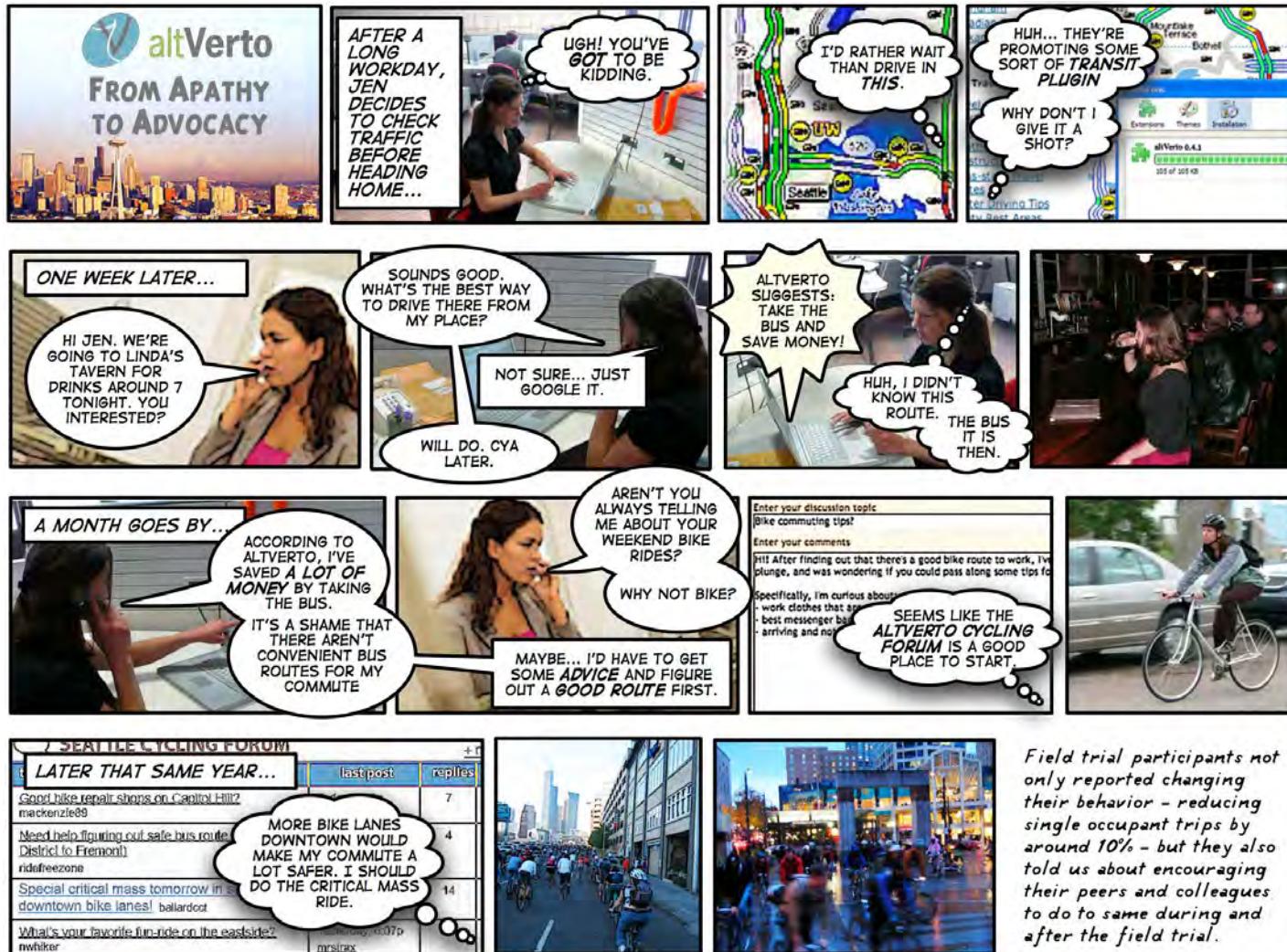


# Tracing Photos

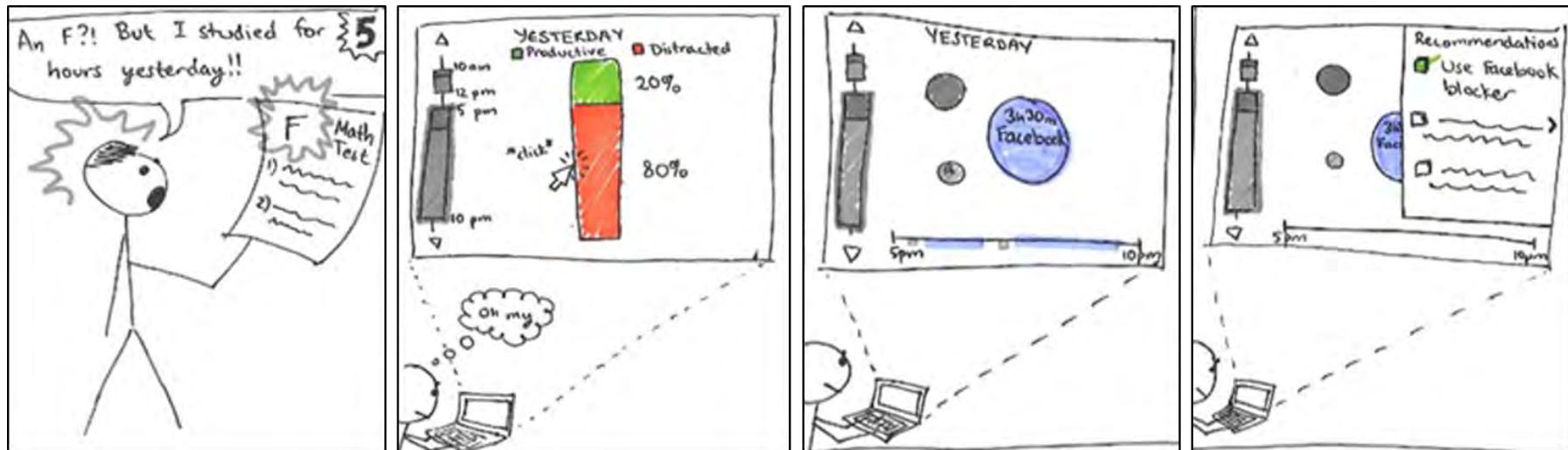


# Comic Presentation

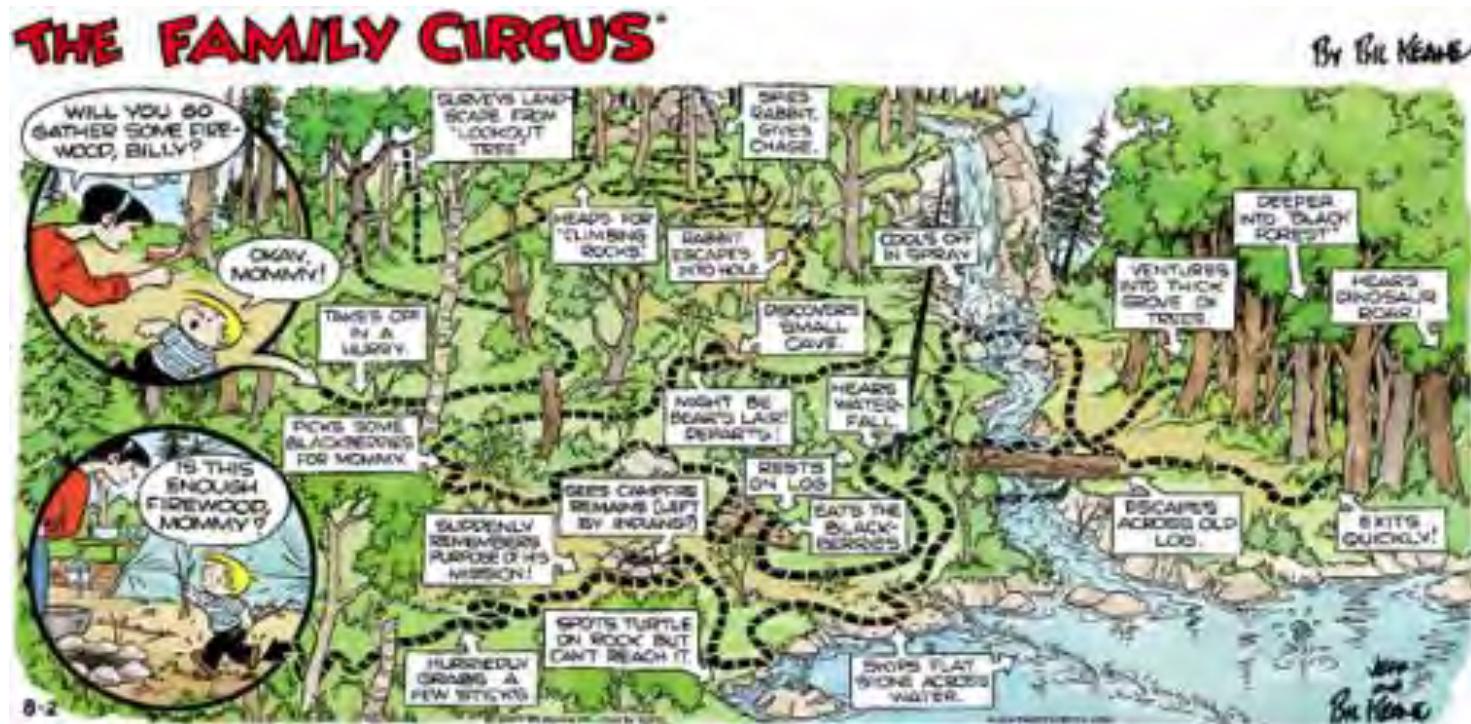
Thought bubbles argue for the design



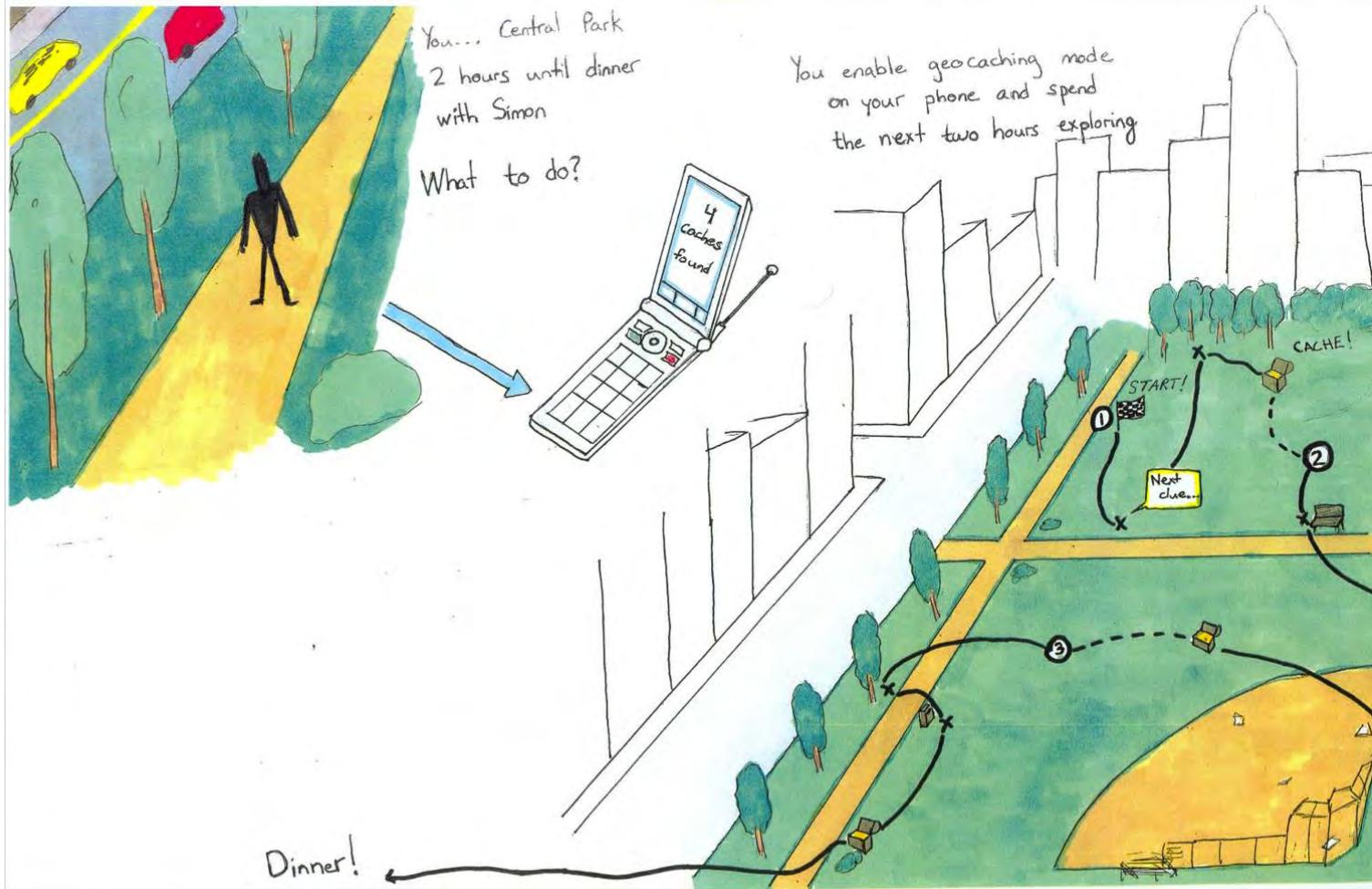
# Selective Use of Color



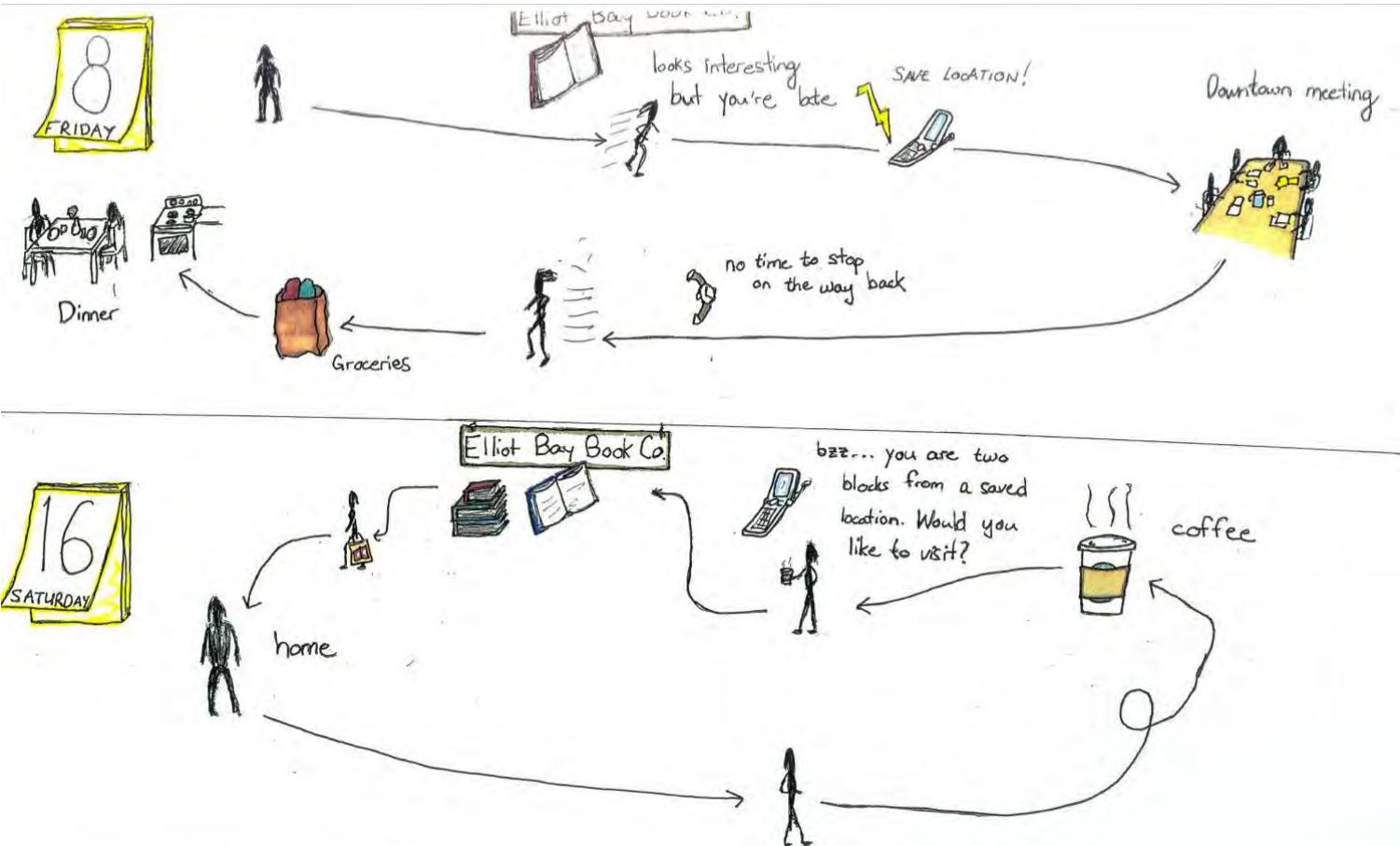
# Route Maps



# Route Maps



# Route Maps



# Route Maps



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



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

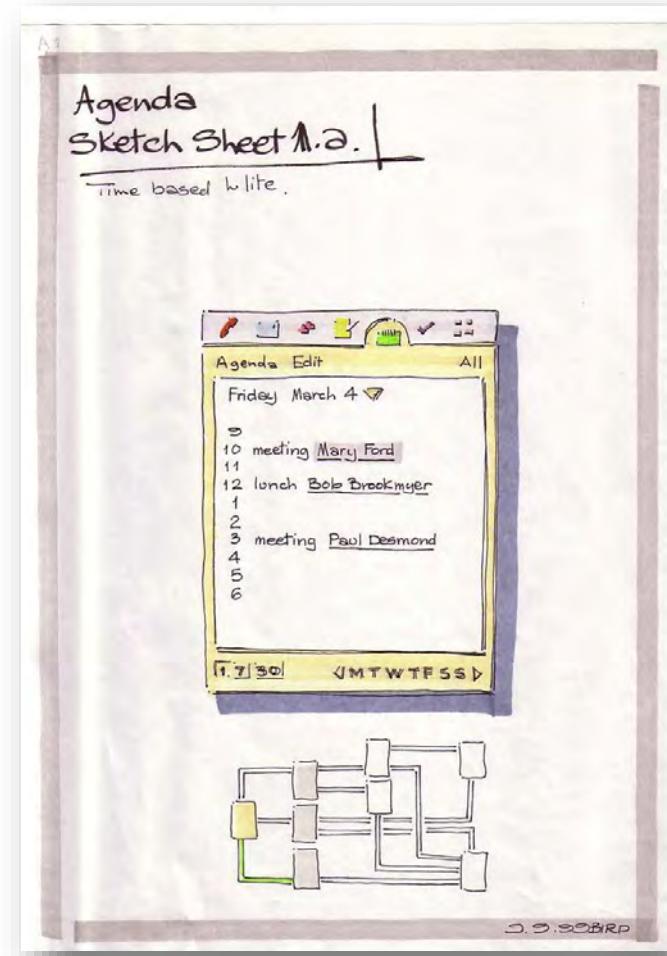
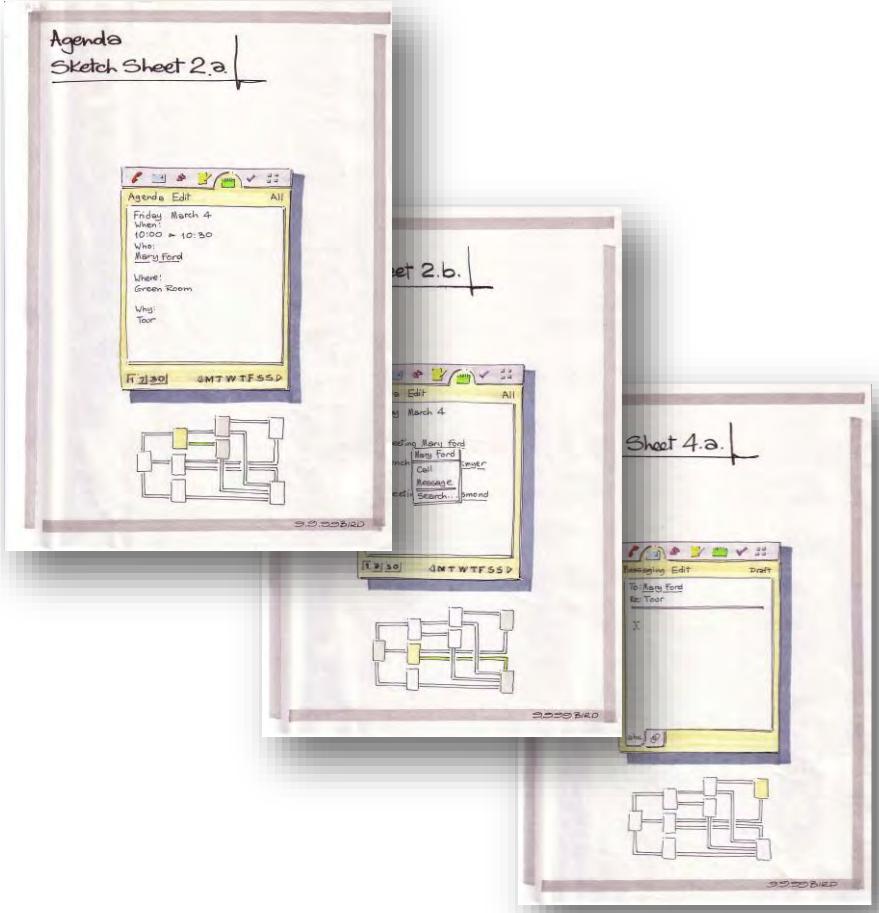


... eventually settling on  
a diner and getting directions  
through your phone.



and discuss the  
food options with  
your friends ...

# Mapping the Space of Interaction



# 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

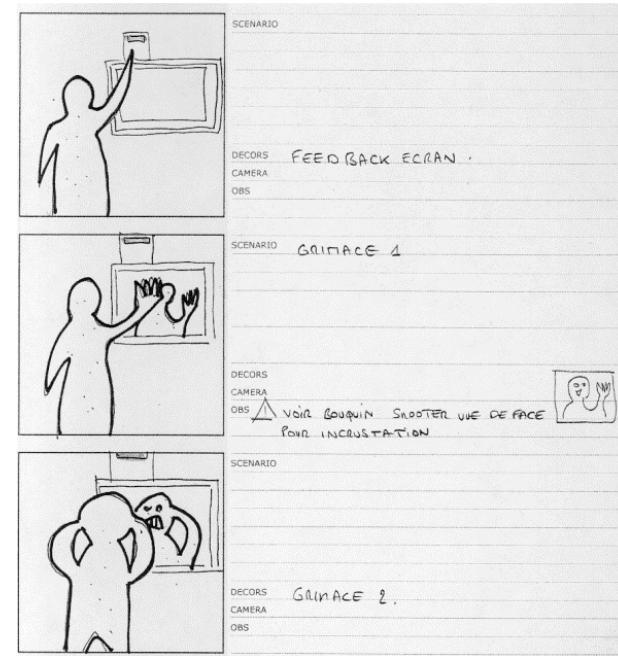
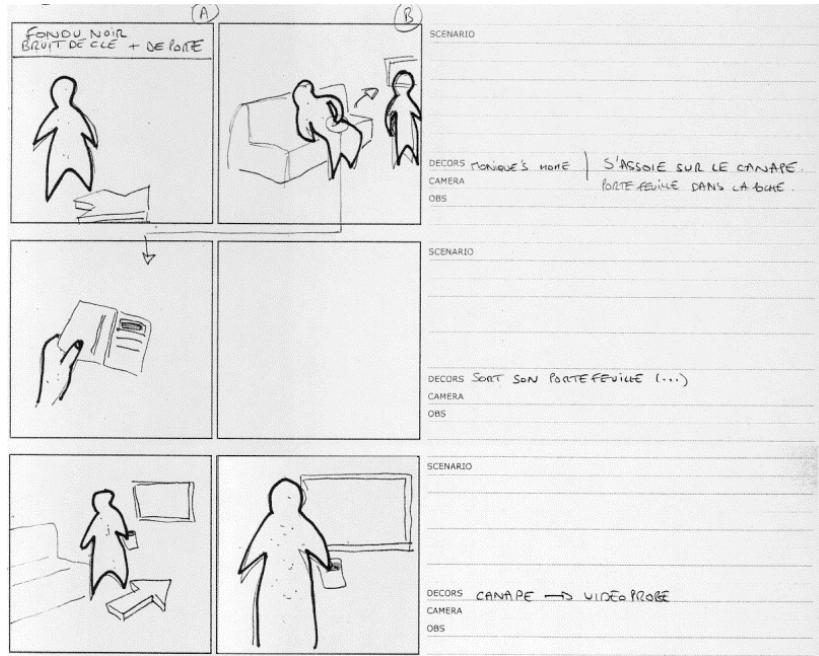
Review field data

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

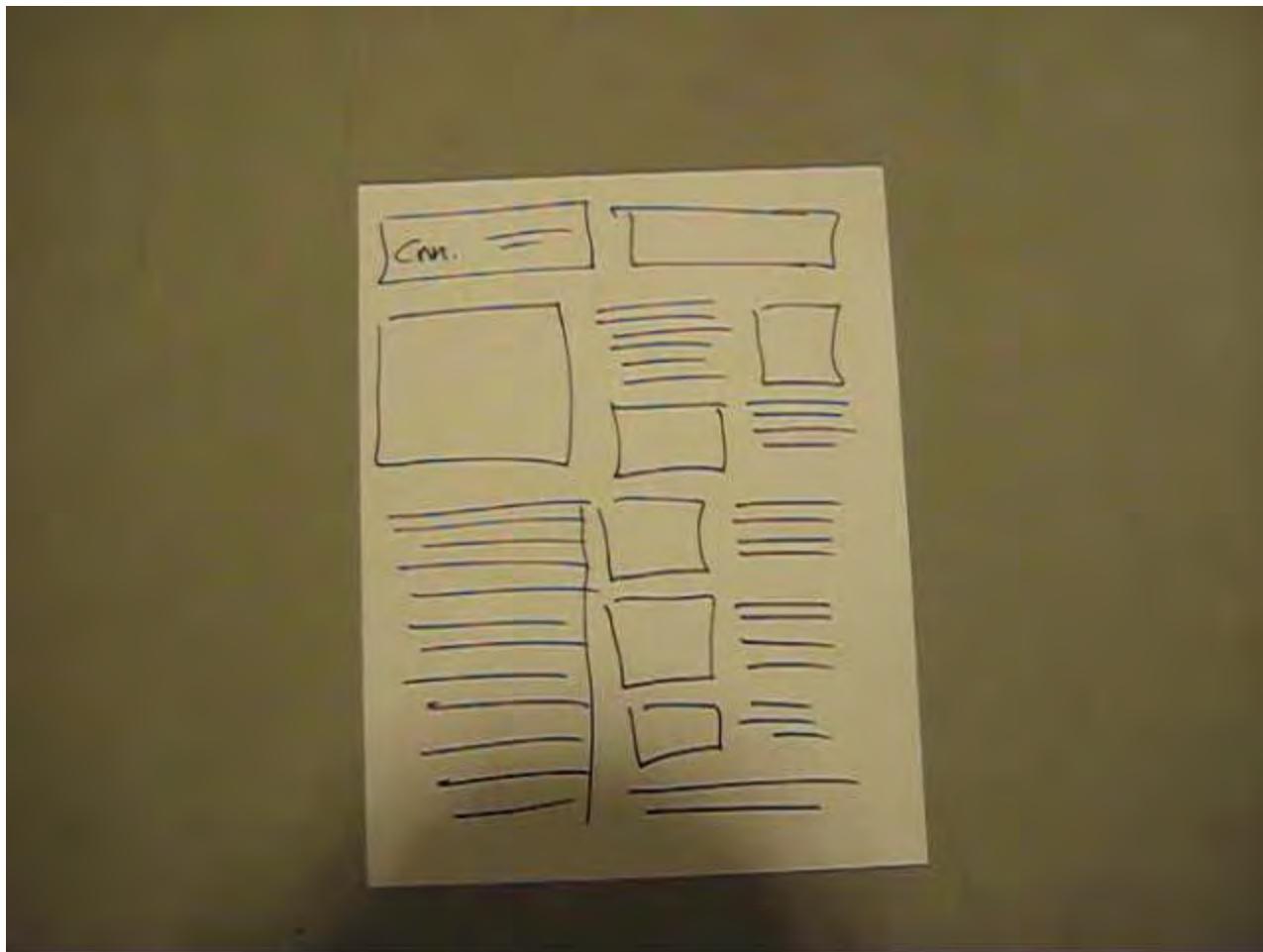
Use titles to separate clips

Like a silent movie

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

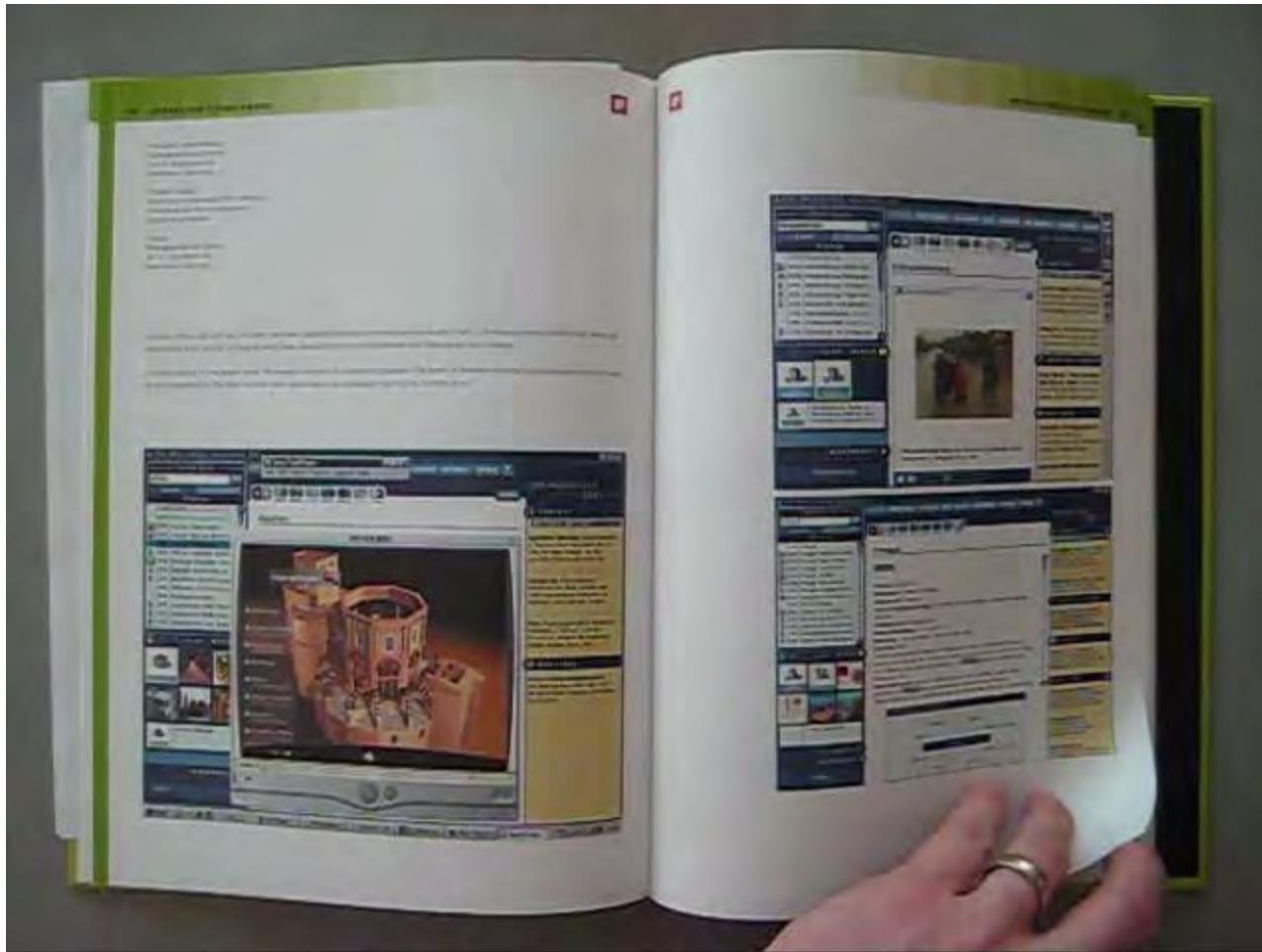
If you make an error, just reshoot it

# 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”

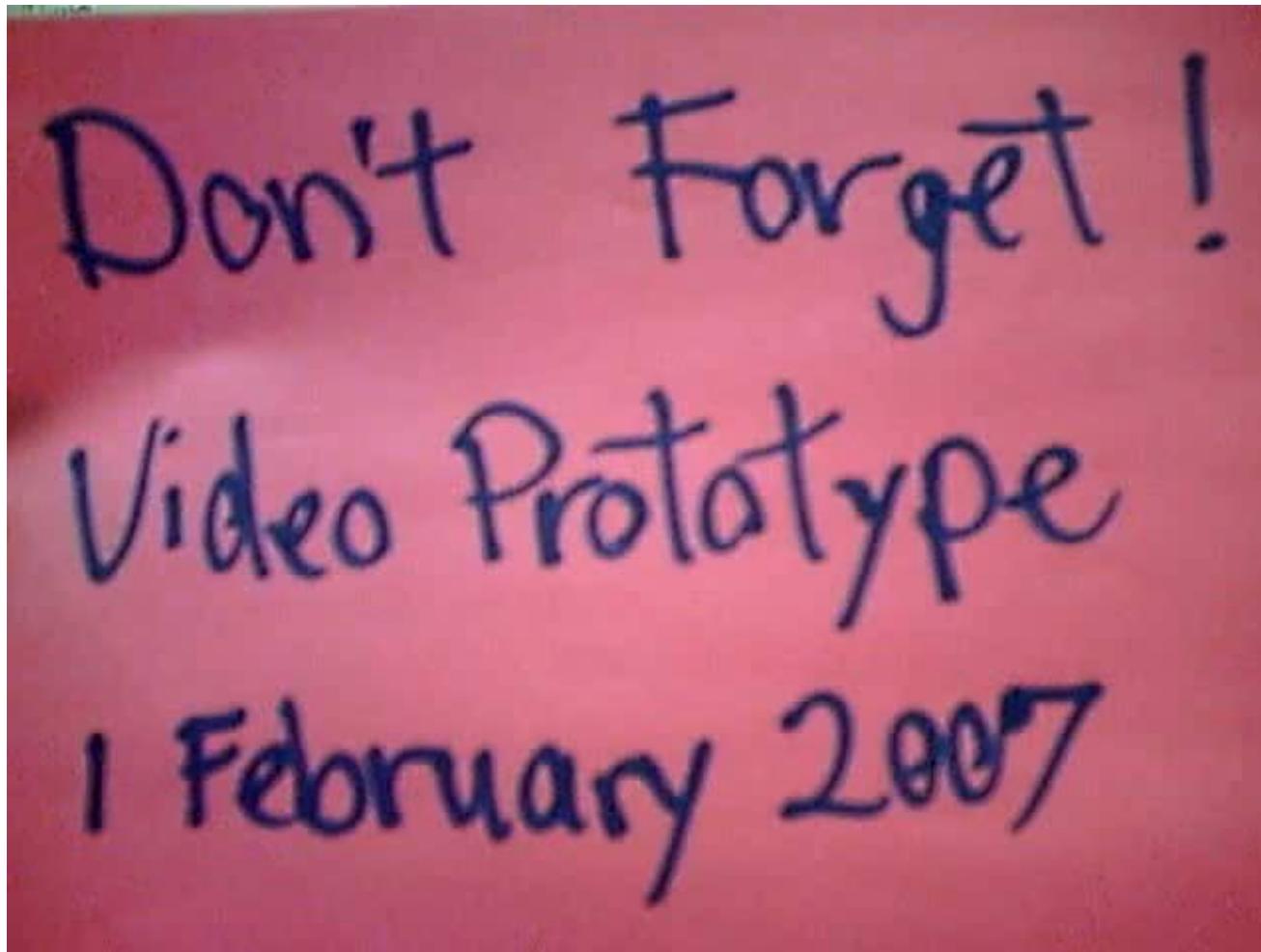
# Narration, Pace, and Flair

**Don't Forget**  
**by Carolyn Holmes and Fred Potter**

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

Don't Forget Version 1

# Narration, Pace, and Flair



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

Don't Forget Version 2

# Narration, Pace, and Flair



**"Don't Forget" Video Prototype**  
**Chris Govella - Peter Woodman**

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

Don't Forget Version 3

# Using Projectors and Simple Props

Team Buddy Map

Backcountry Savior

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

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

Buddy Map

# Watch for Pace and Scene Relevance

**Consumester**  
Video Prototype

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

Consumester

# Lessons from Prior Video Prototypes

Split Presentation, Simple Effects

“PickUp”

Still-Frame, More Effects

“Graffiti Karma”

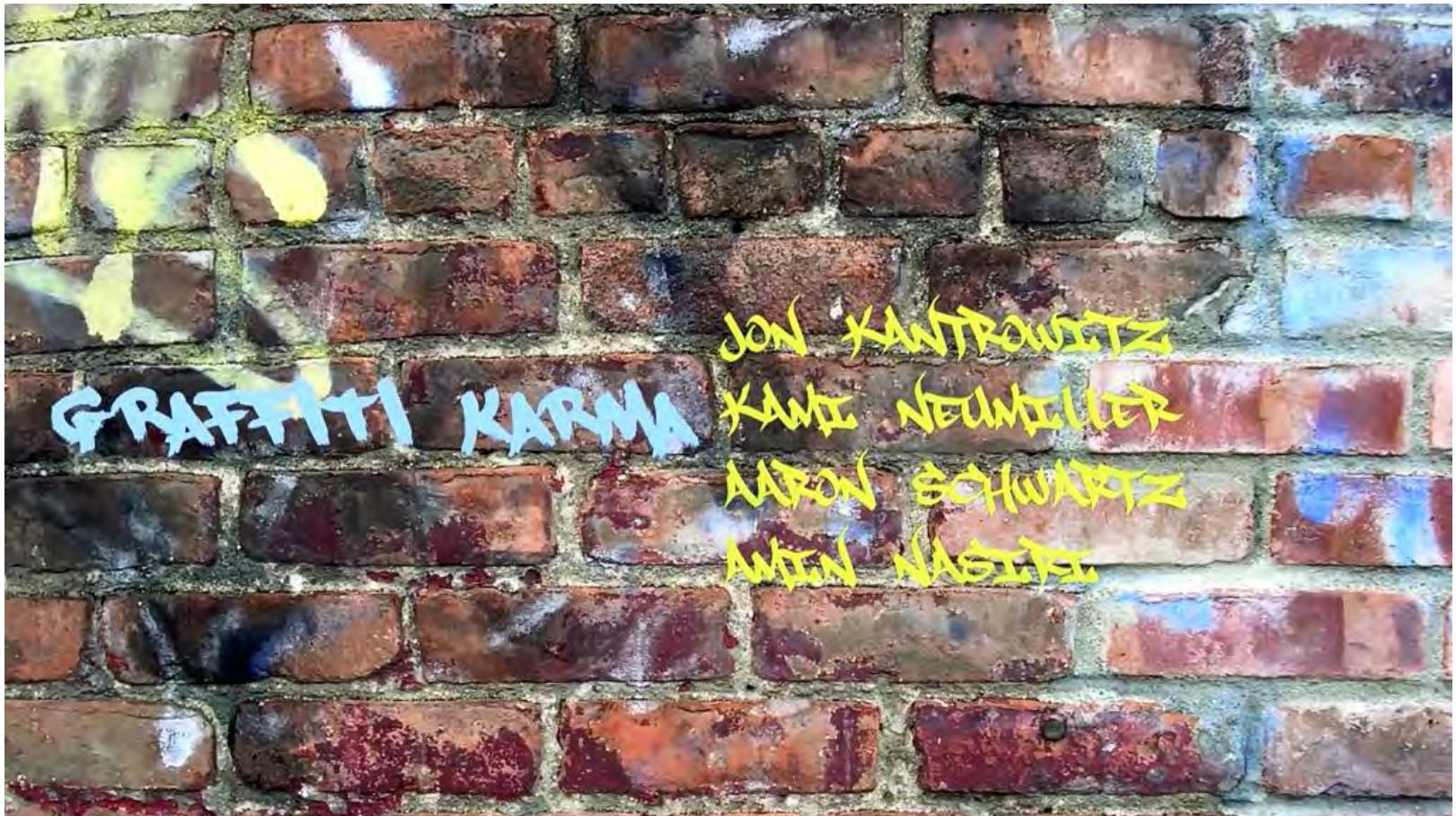
# Split Presentation, Simple Effects



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

Pickup

# Still-Frame, More Effects



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

Graffiti Karma

# Lessons from Prior Video Prototypes

Scenario with a Contrast

“ParkSmart” (note that screens are static images)

Playful while Keeping Pace

“Plantr”

# Scenario with a Contrast



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

But watch for pace and scene relevance

ParkSmart

# Playful while Keeping Pace



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

# Reminder on Fidelity



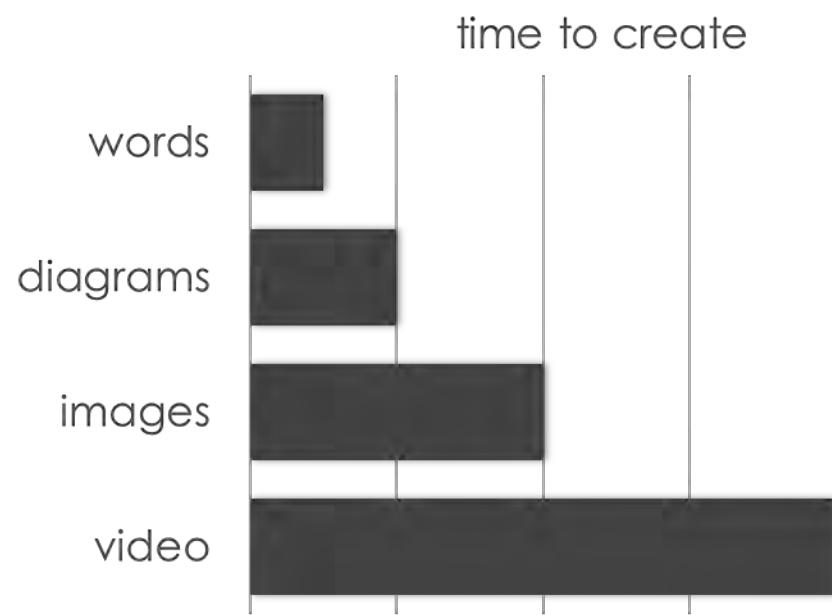
FLUIDUM



FLUIDUM

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

# Fidelity Takes 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

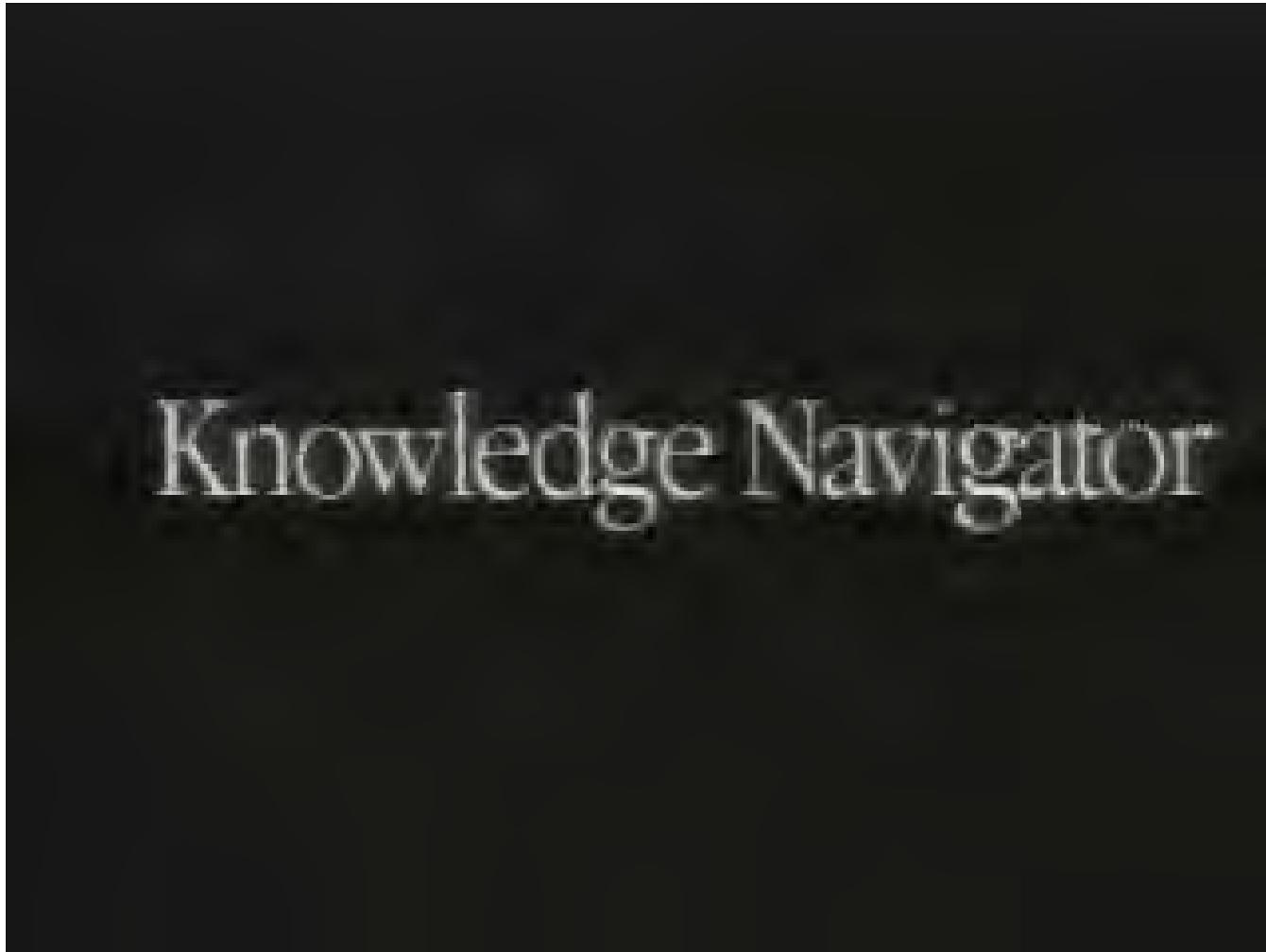
A Day Made of Glass

# 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

# 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

# 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



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



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

- 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

## 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

## 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

# 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

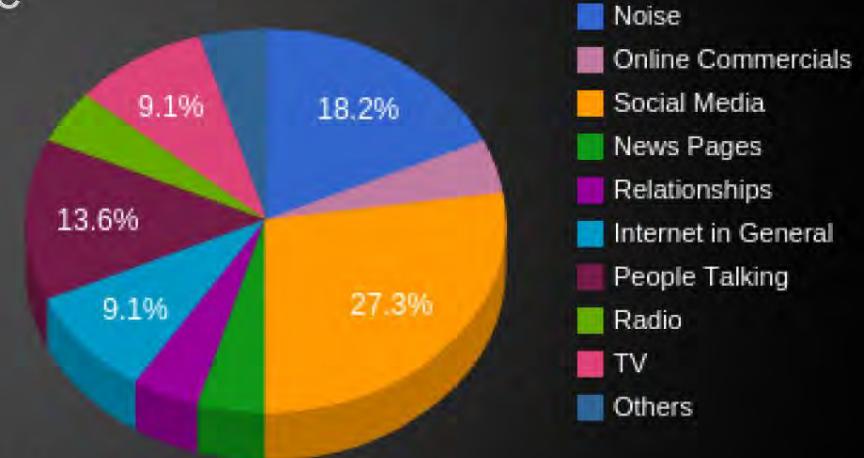
George (25, graduate, Odegaard Library)

- Turns notifications off while studying

Group (4 undergraduates, Yunnie Bubble Tea)

- Distracted by each other and apps
- Use headphones (music) to focus

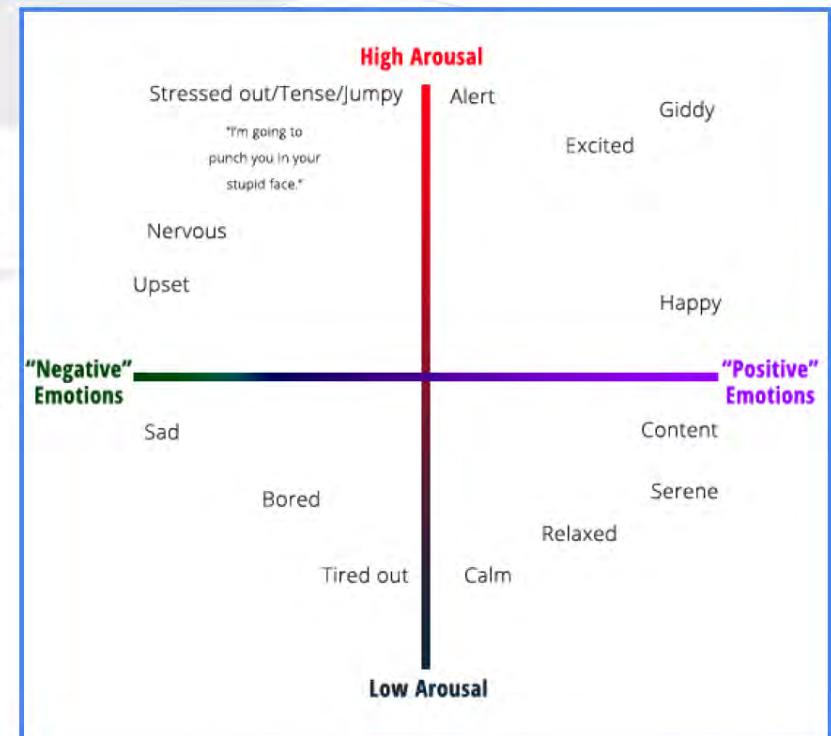
Distraction Sources



## 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



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)



Pictures  
are Good

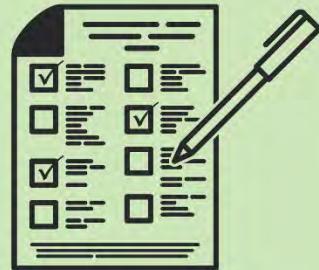
# Contextual Inquiry

- 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

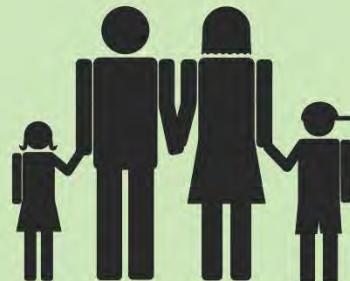


# Contextual Inquiry

Professional  
(20-40s)



Family



Undergrad  
Student



## In-Line References Versus Bibliography Slide

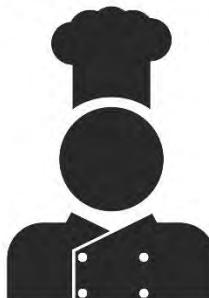
**15%** of Americans between the ages of 20 and 69 experience hearing loss that may have been caused by **noise at work or during leisure activities.**

## 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

# Tasks

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

# 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

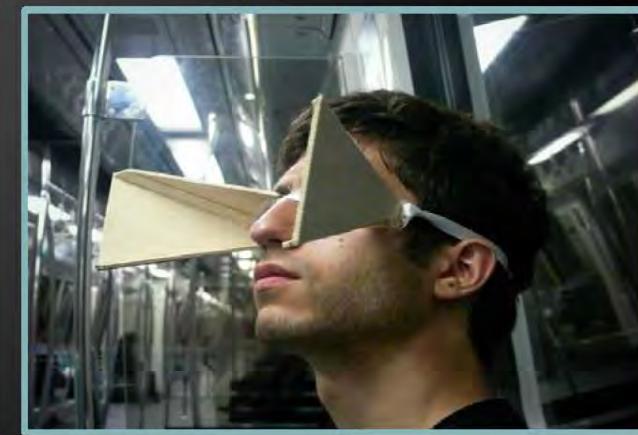
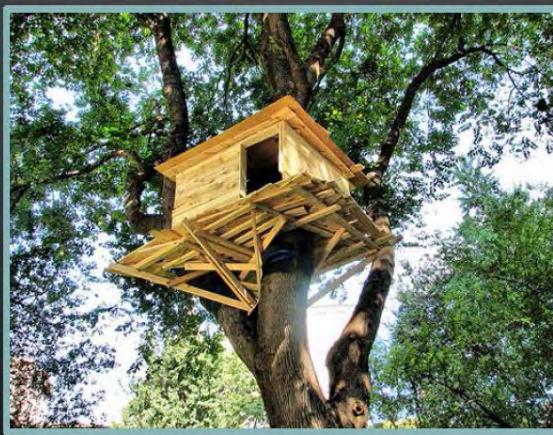
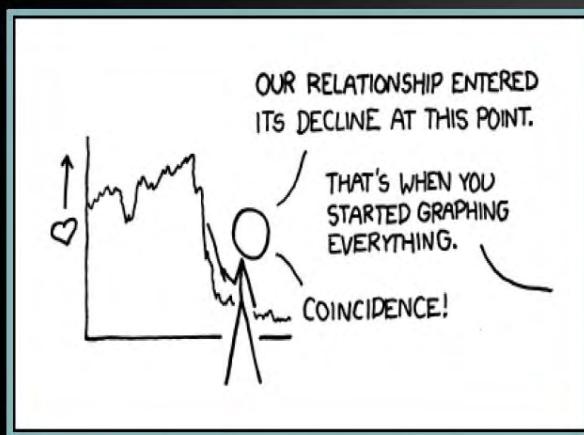
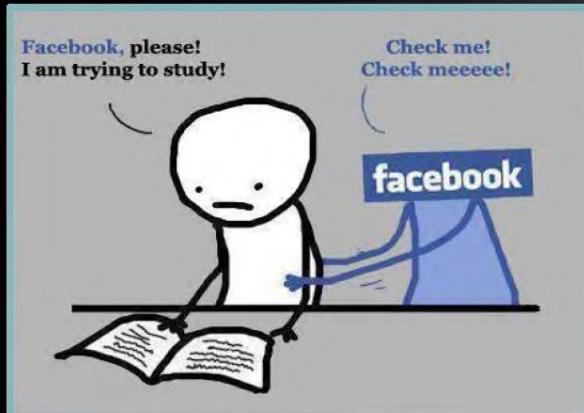
Find a productive work place.

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

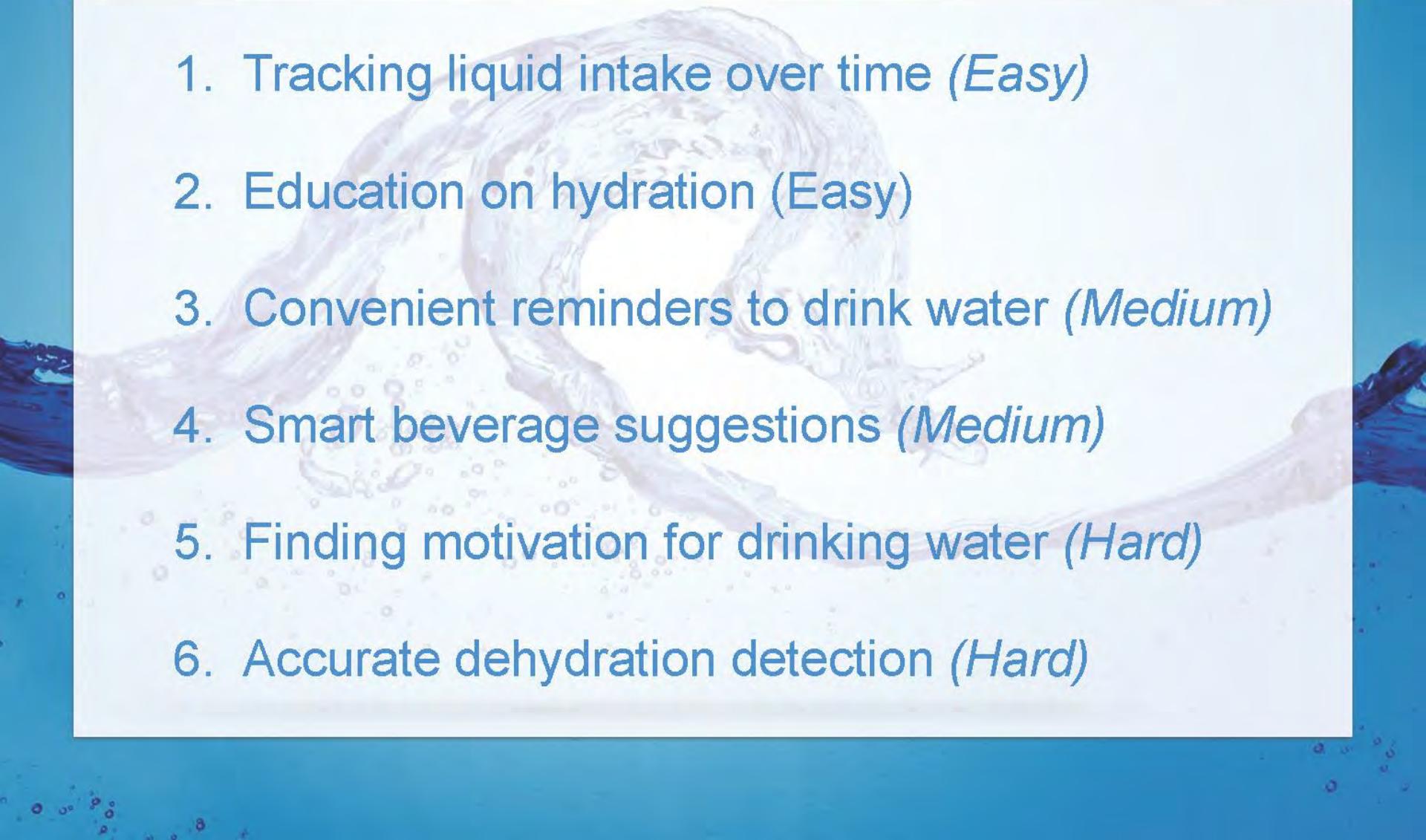
### **Current Tasks:**

- 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

- 
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



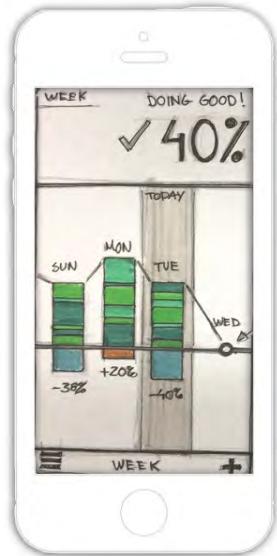
**Adjust** budget between  
different categories.

## 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.

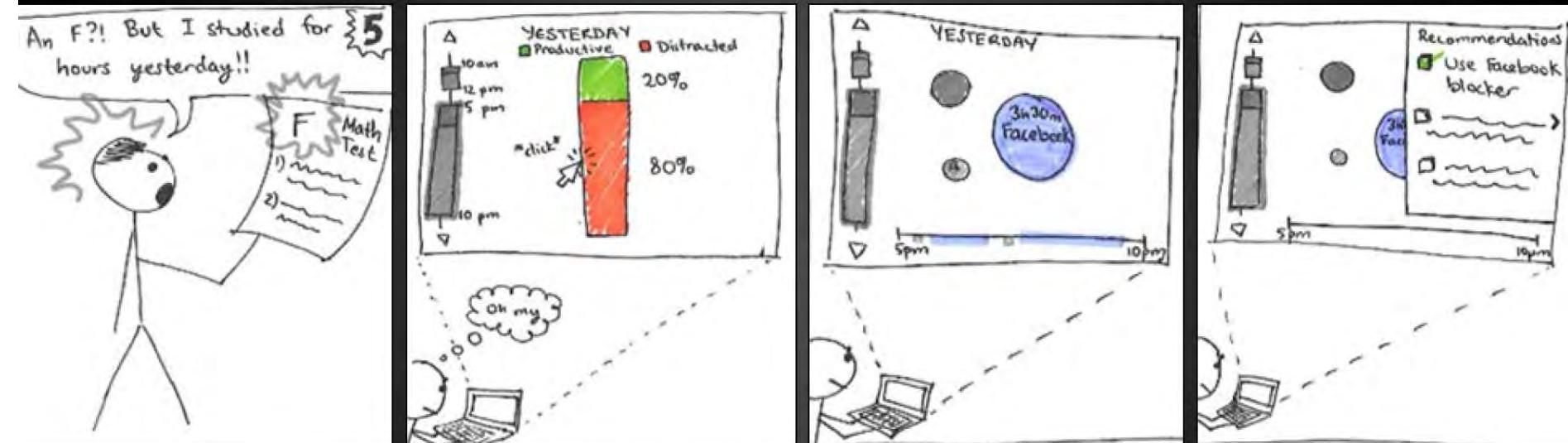
Small items cumulative impact  
**not considered**.

**Challenging** setting up budgets.

Complicated input leads to **less use**.

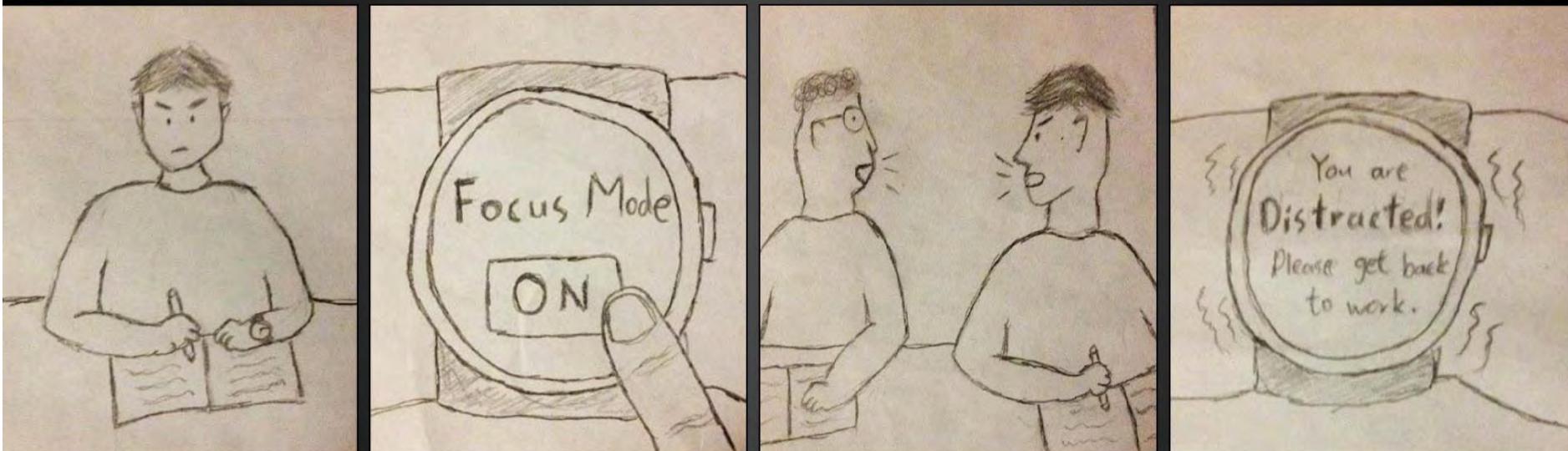
# Consistency of Emphasis

**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**



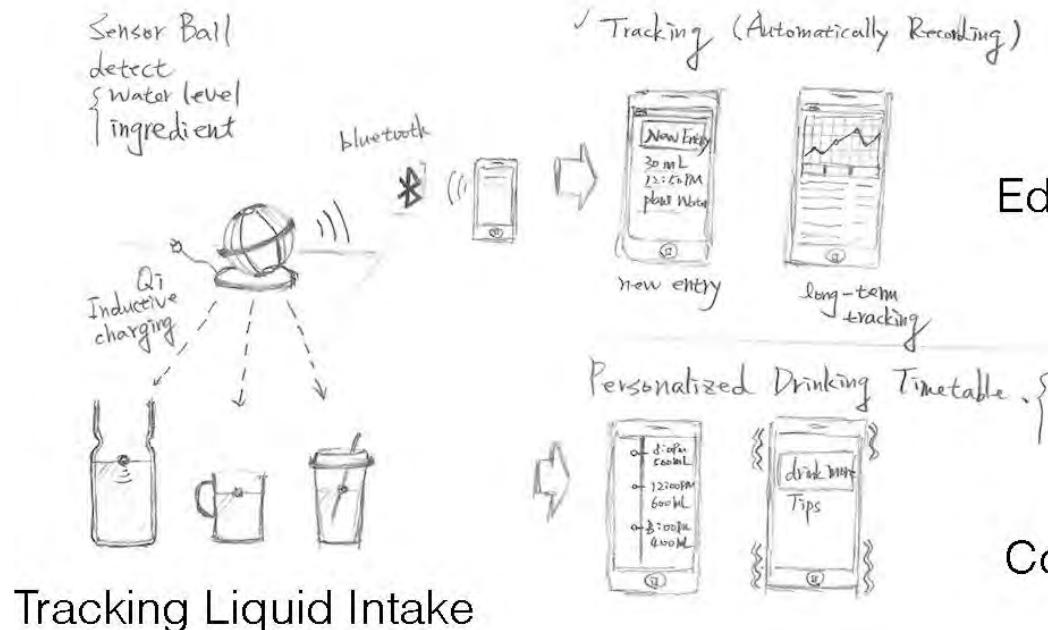
# Pre-shopping

# Design 1

Naming  
Designs



# Naming Designs



Tracking Liquid Intake

Convenient Reminders

detect ingredients  
& give suggestions

Smart Beverage Suggestions

# Naming Designs versus Slide Title Hierarchy of Information

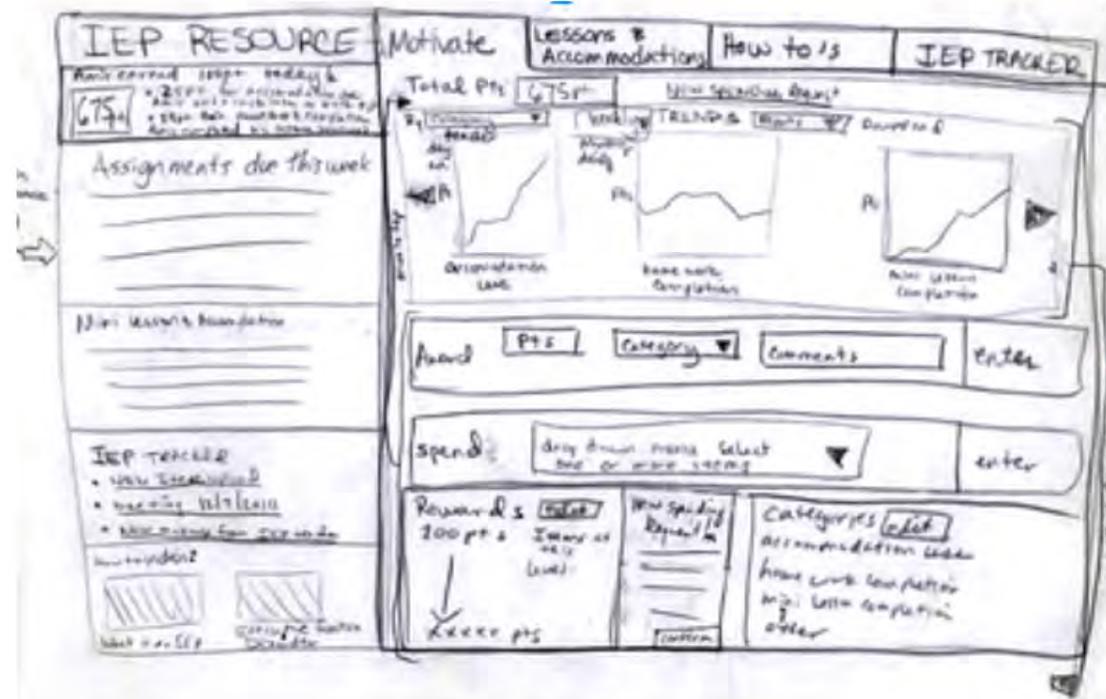
## Sketch 3

### Main Focus:

- Student Motivation

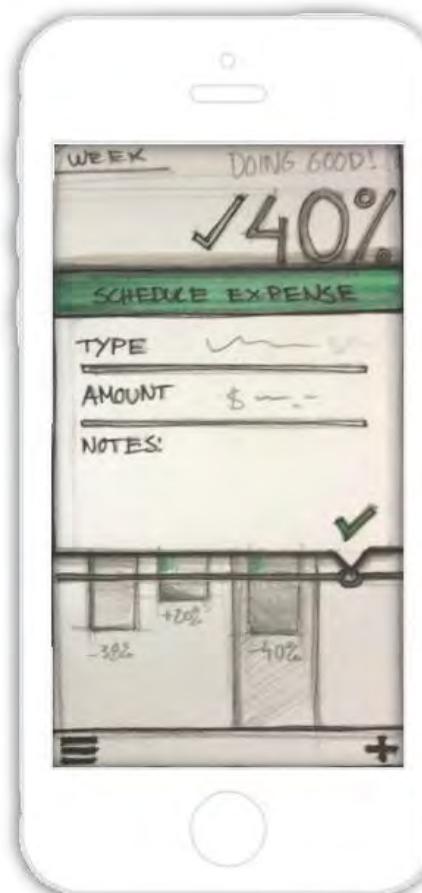
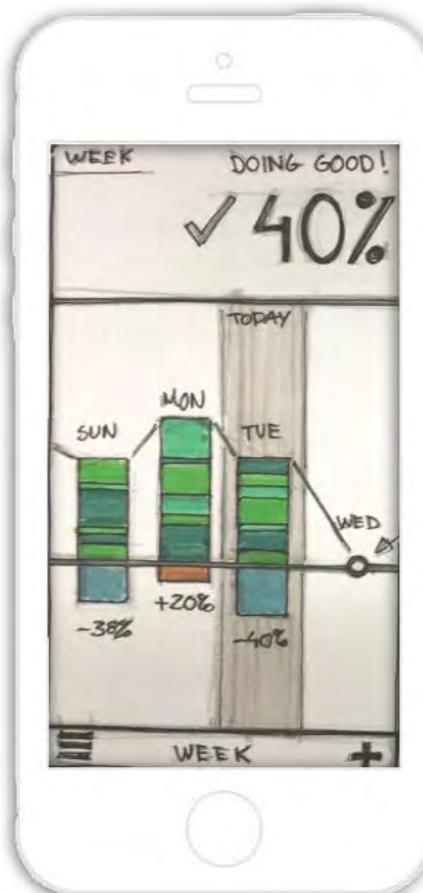
### Key Features:

- 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



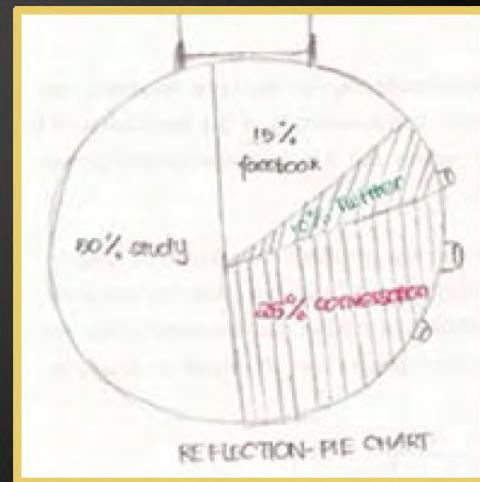
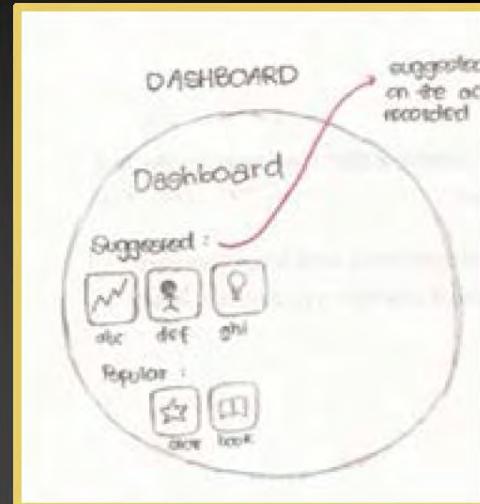
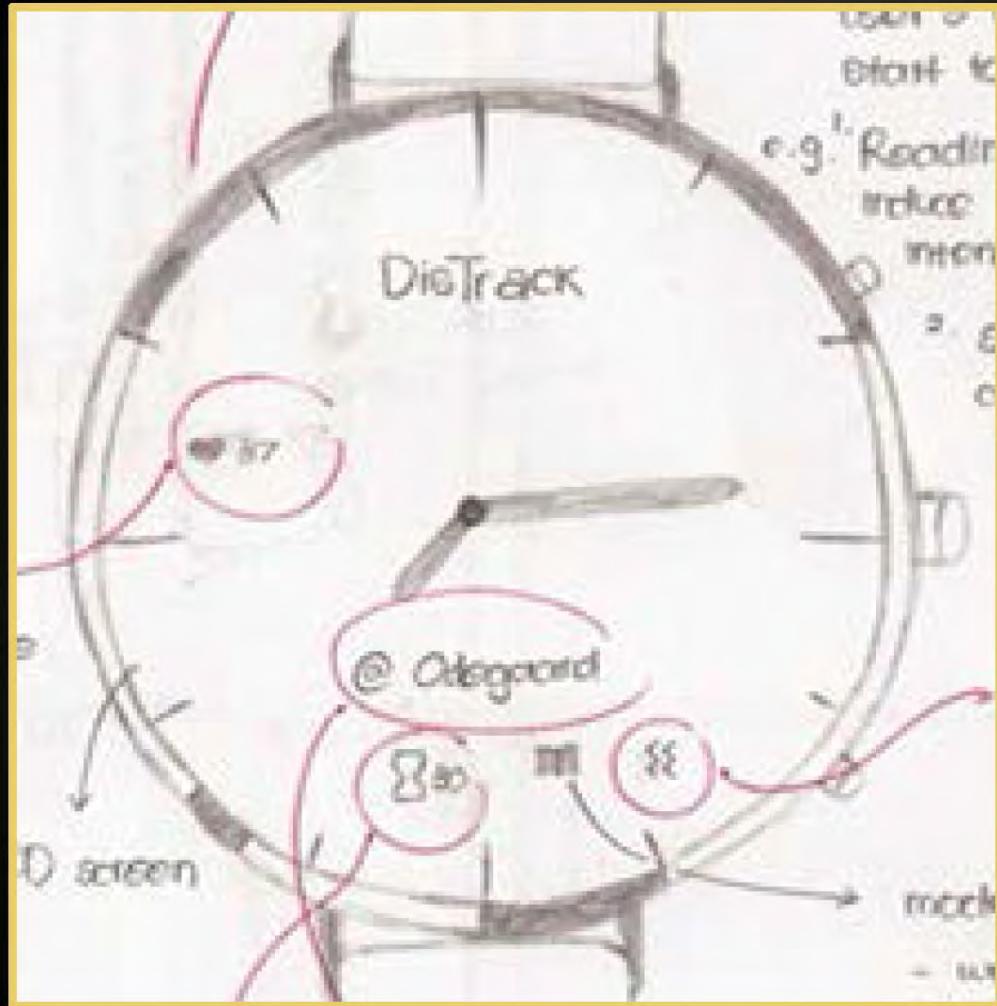
# Design 1

# Legibility of Sketches



# Blurry Images

## Design 3

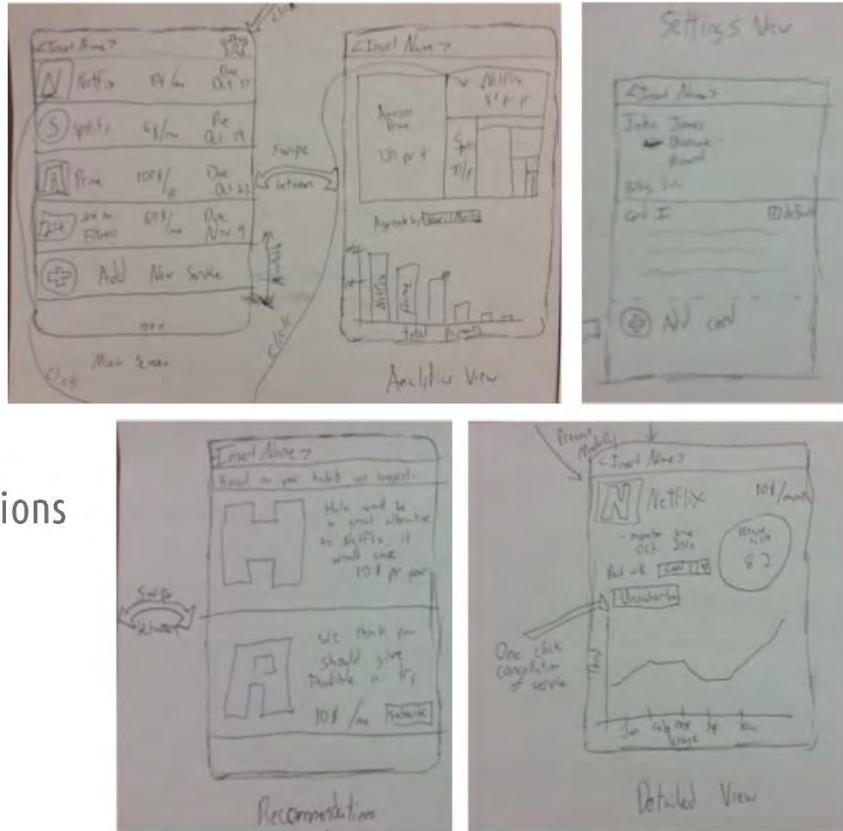


# Low Contrast Images Low Contrast Text

## 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

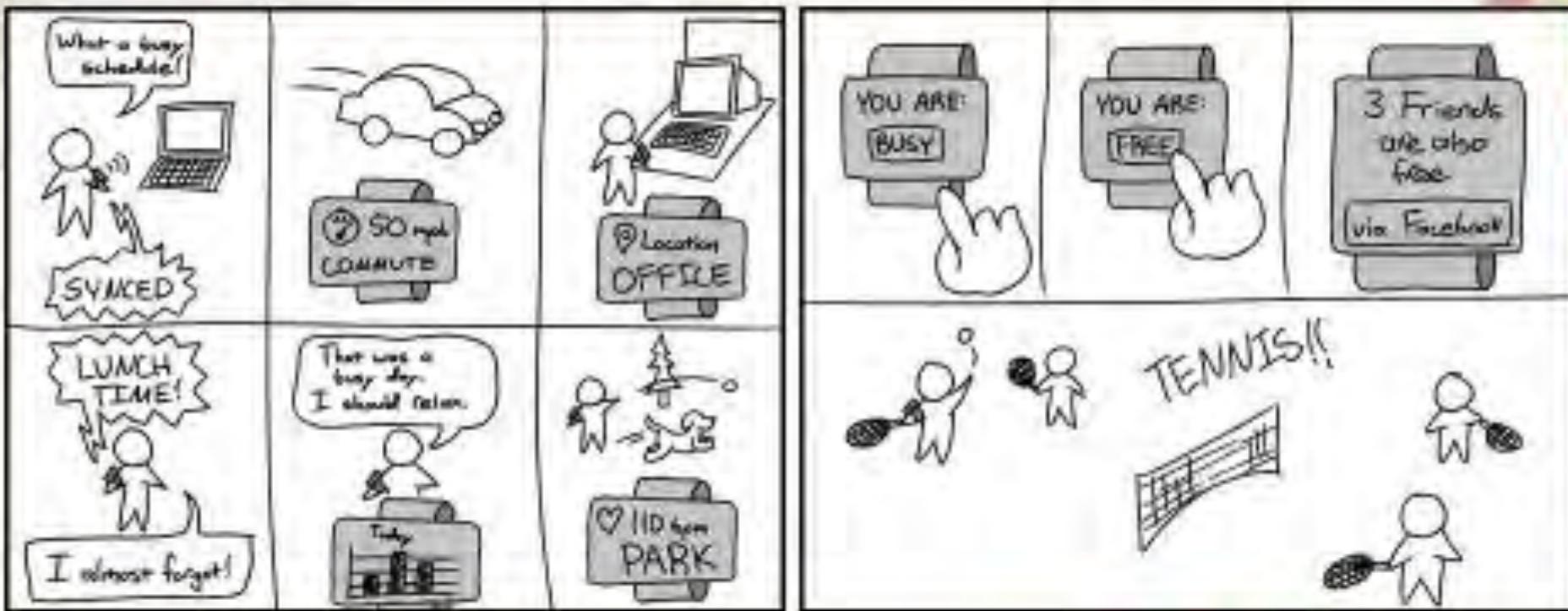
What can be pushed back and what has a solid deadline?

## Get Reminders for Flexible Tasks

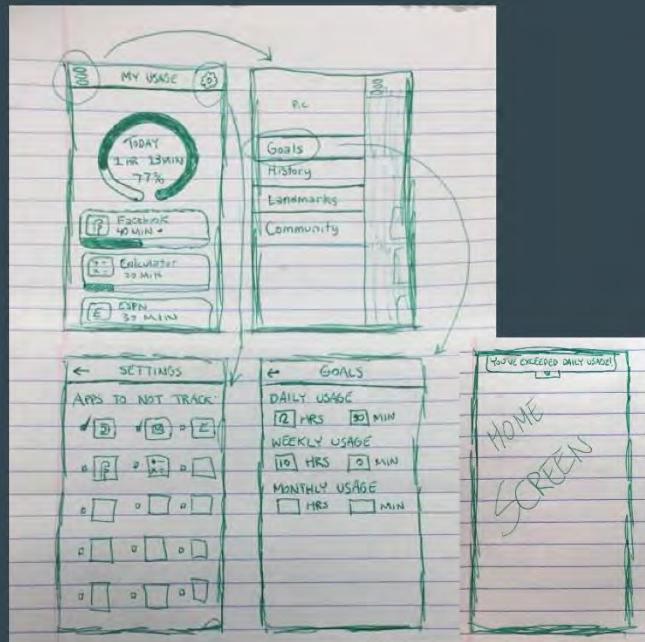
When is the best time for lunch?

# Storyboards

Star People!  
Hard to Follow  
on a Single Slide



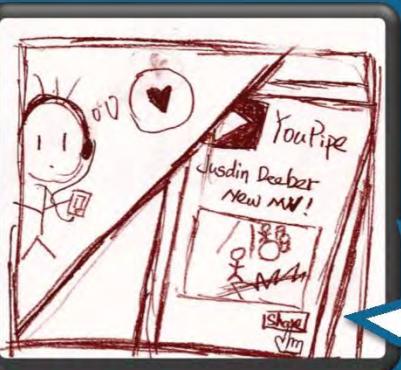
# Selected Design



- 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

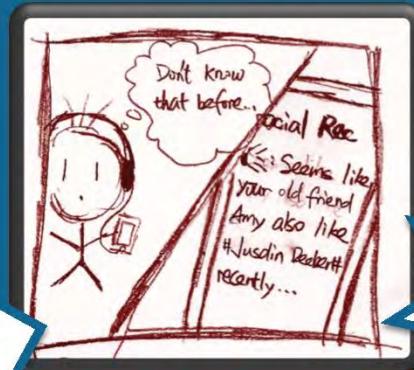
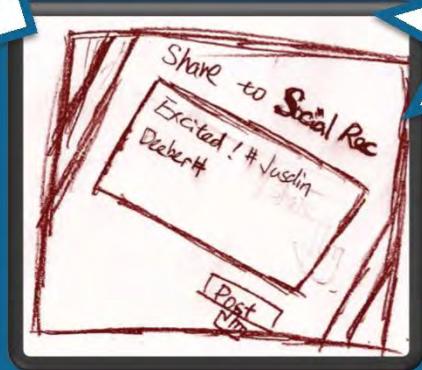
Easier to Follow  
Size / Clutter

## Storyboard 2:

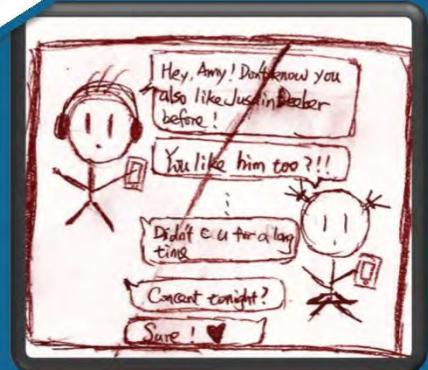


1. David likes the new song released recently, so he shares it on the SR app

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



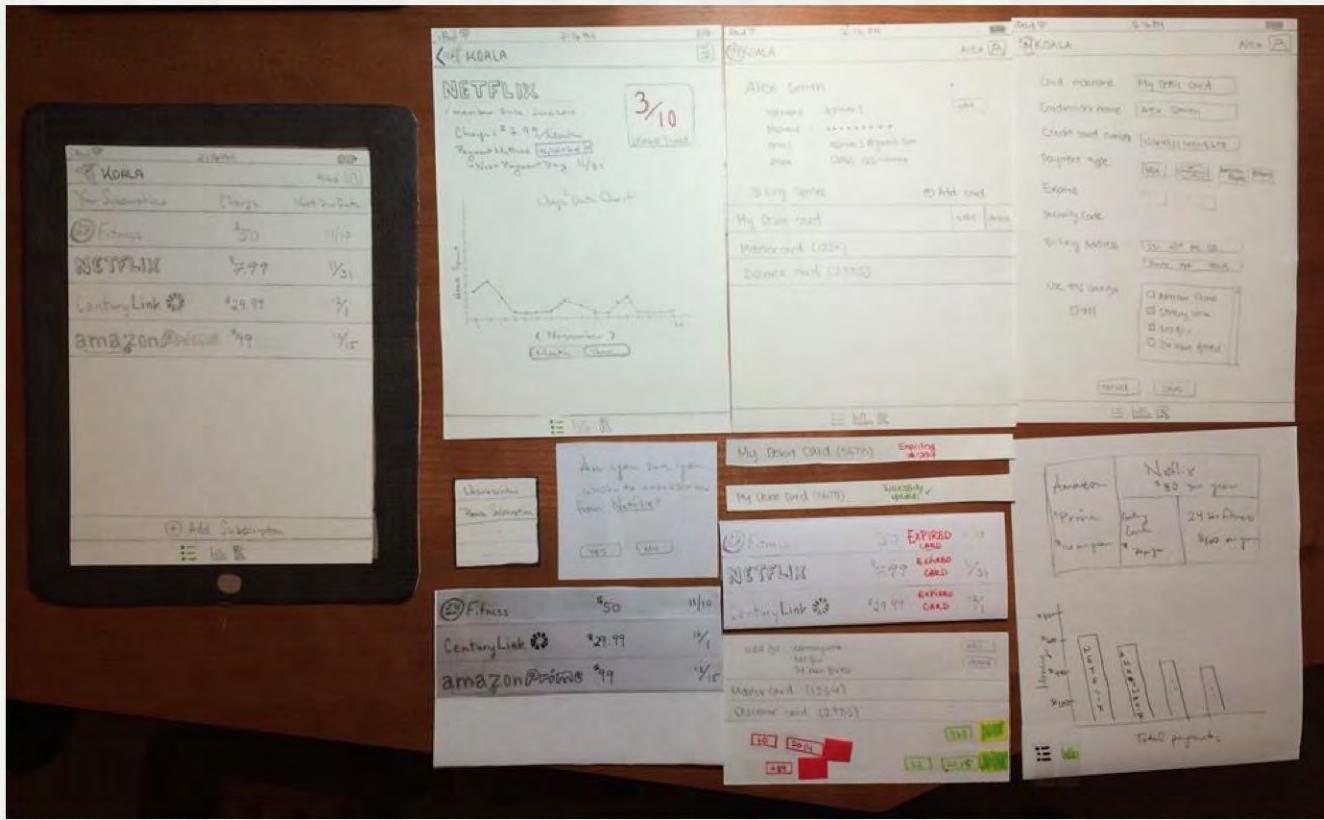
3. Daniel then gets a message showing that David likes the music



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

Criteria

Level	<input type="checkbox"/>
Avg Dist	<input type="checkbox"/>
Avg Time	<input type="checkbox"/>
Route Pref	<input type="checkbox"/>

Criteria

Level	<input checked="" type="checkbox"/>
Avg Dist	<input type="checkbox"/>
Avg Time	<input type="checkbox"/>
Route Pref	<input type="checkbox"/>

\* Finding Match

Frank



About: Happy guy who runs casually  
Level: Novice  
Rating: ★★★★

Jenn



No more matches found!!  
Rating: ★★★

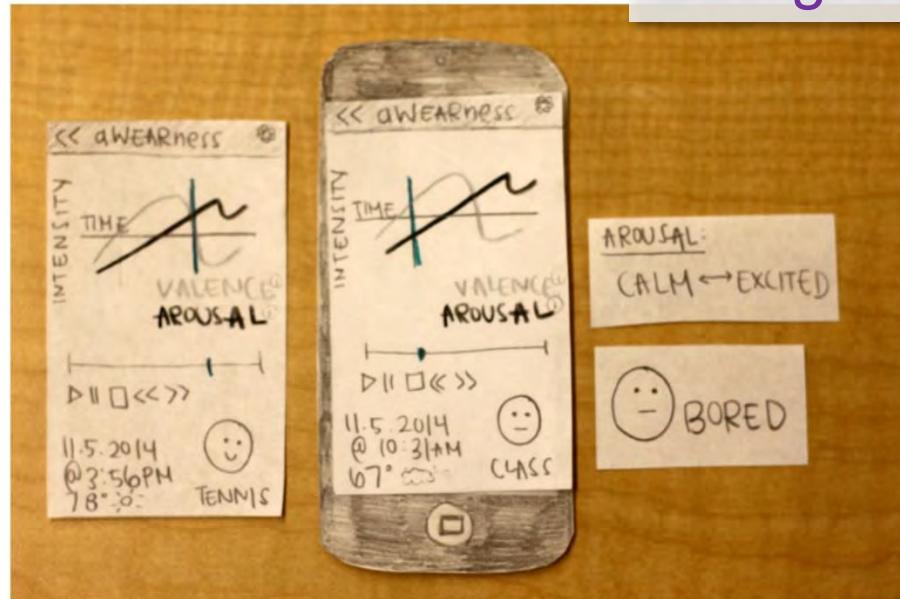
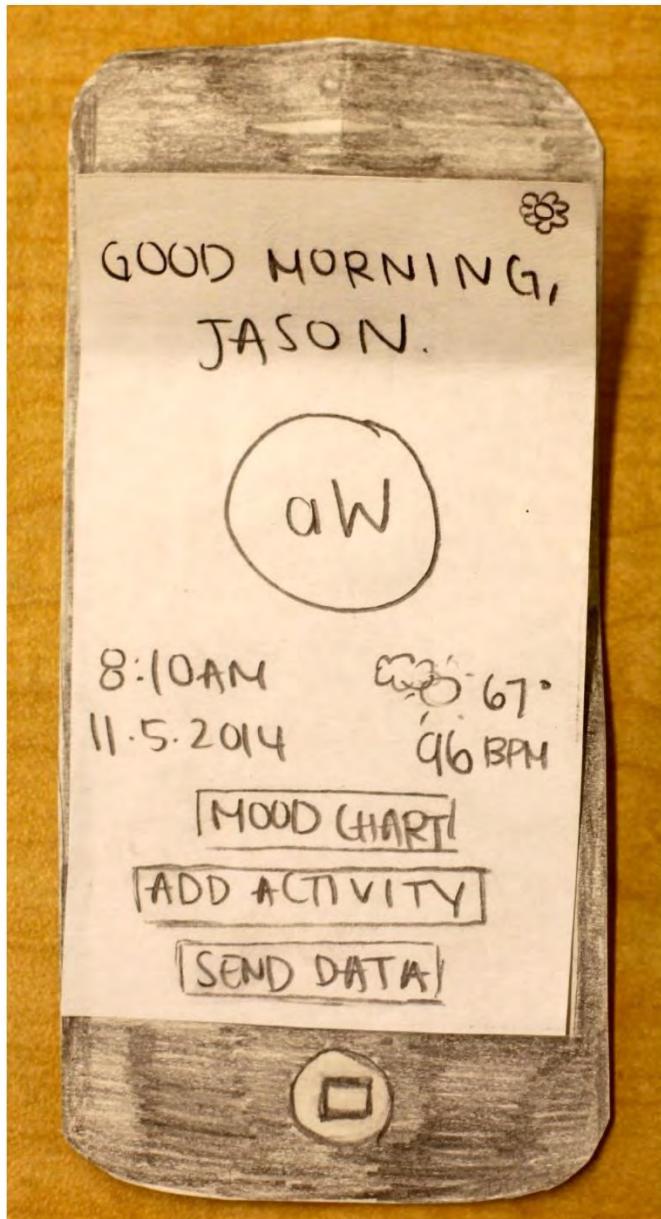
## Artificially Increase Contrast

# Testing - Results

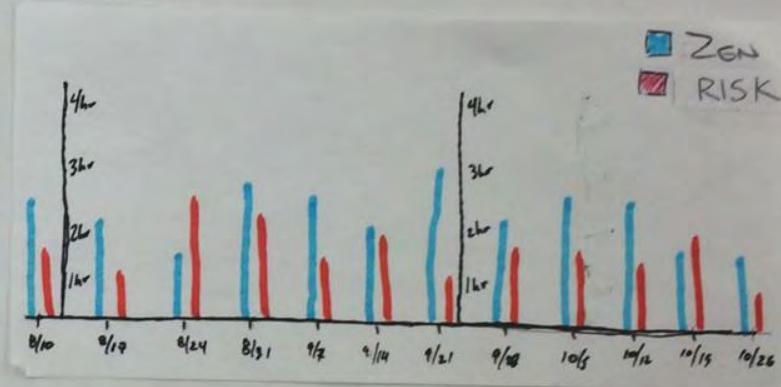
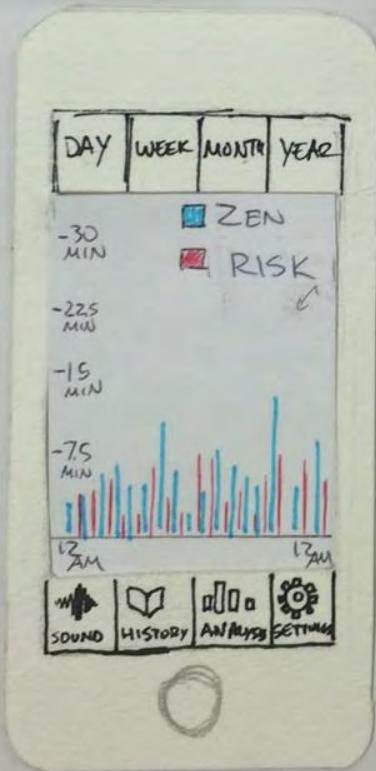
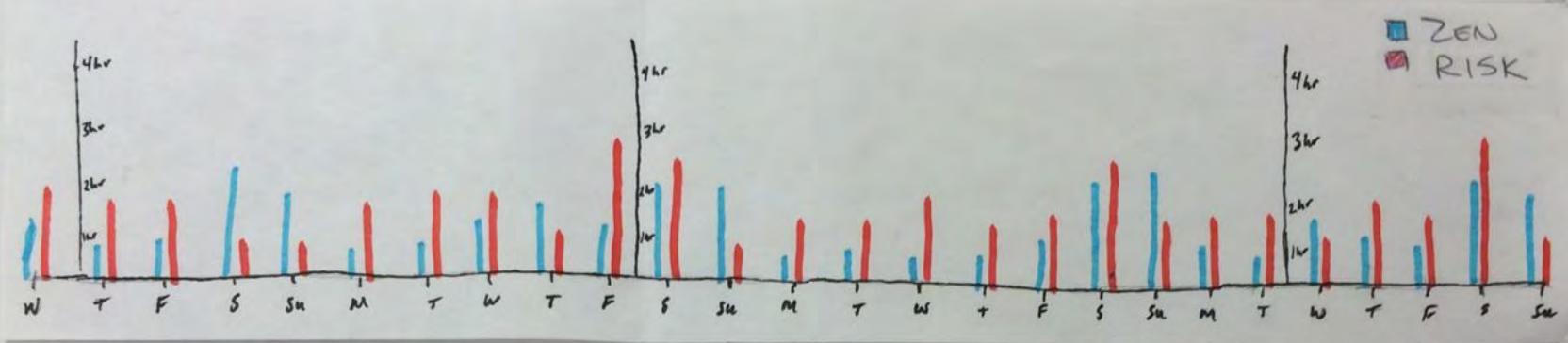
- **Heuristic Evaluation**
  - High Severity Issues
  - Example: “Go Shopping” mode was useless
- **User Testing**
  - High and Medium Severity Issues
  - Example: Takes too long to get to “Add Item”
- **Design Mockup Critique**
  - Low Severity and Aesthetic Issues
  - Example: Home screen too cluttered



# Background



# Background



# Final Paper Prototype

IEP-Connect Classroom

Many Screens  
on One Slide

K.F. > Goals | Accommodations | ⌂

All Students > K.F.

In progress

Write Paragraph Under 7m  ⌂

Make Eye Contact

IEP Goal: Student will maintain eye contact appropriately during conversation

• •

K.F. > Goals | Accommodations | ⌂

All Students > K.F.

In progress

Write Paragraph Under 7m  ⌂

C	.	/	%
0	1	2	3
4	5	6	7
8	9	Enter	

K.F. > Goals | Accommodations | ⌂

All Students > K.F.

Previously Tracked

Write Paragraph  m

Score on Math Test  %

• •

K.F. > Goals | Accommodations | ⌂

All Students > K.F.

Previously Tracked

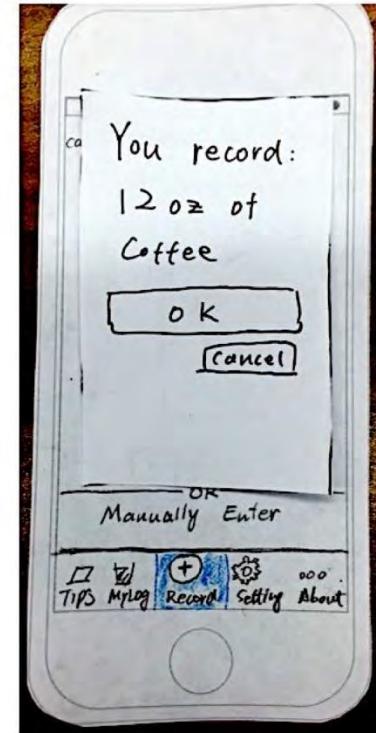
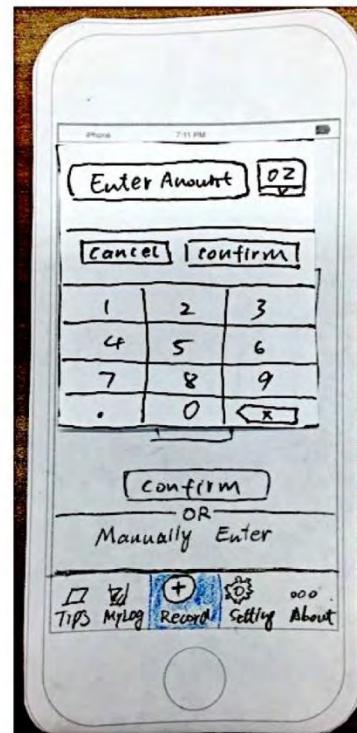
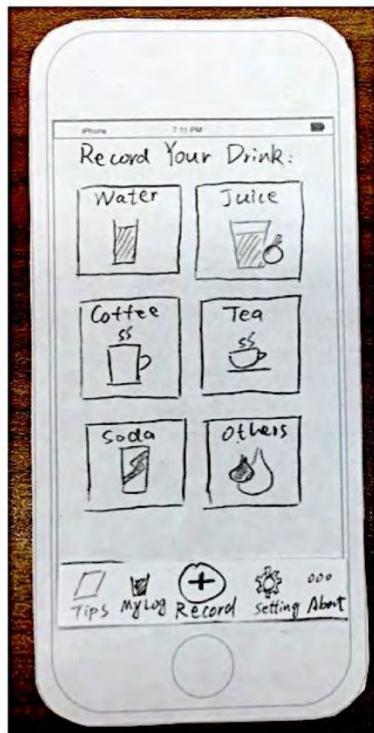
Score on Math Test  %

• •

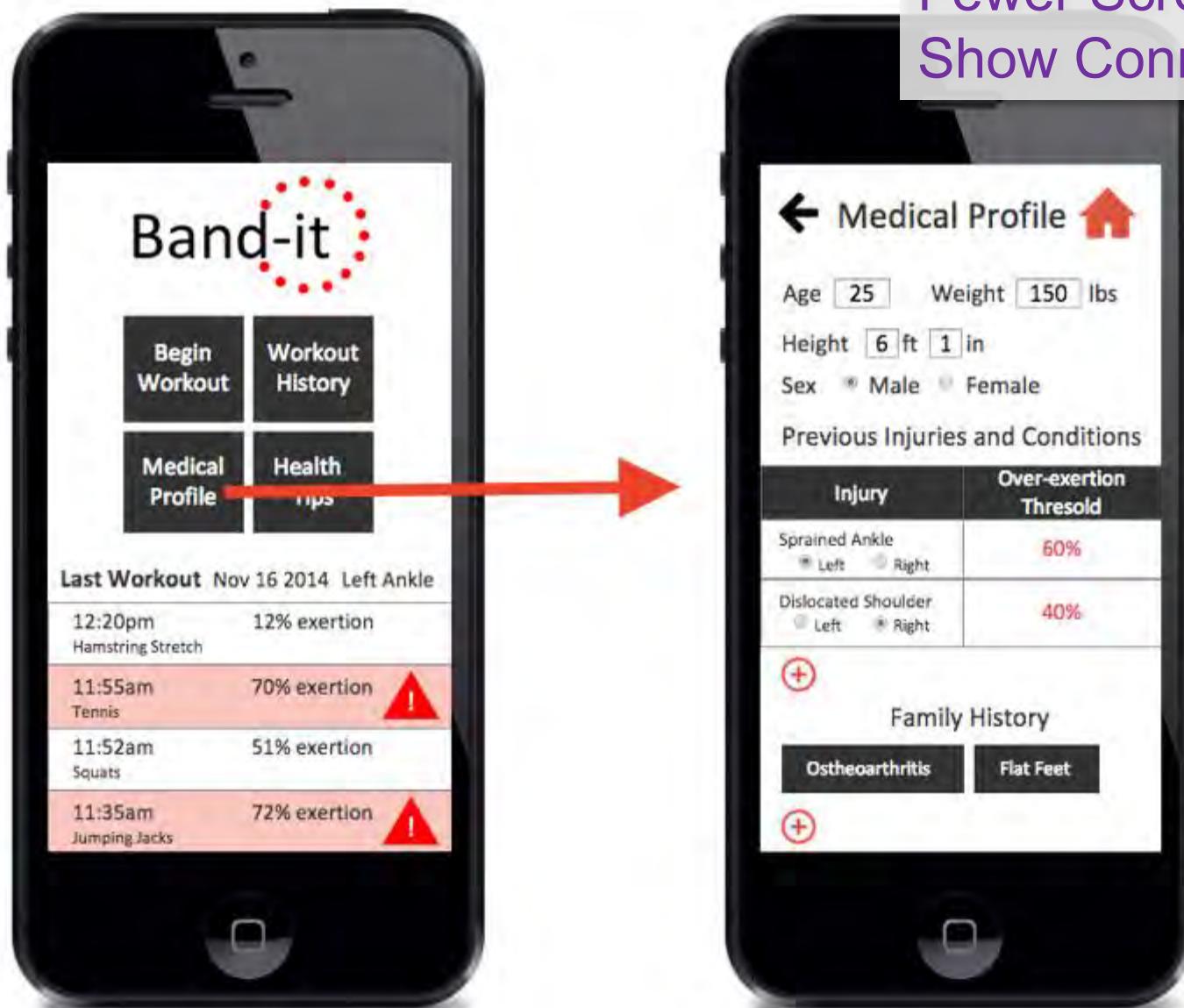
# Final Paper Prototype

## Task2 - Record Water Intake

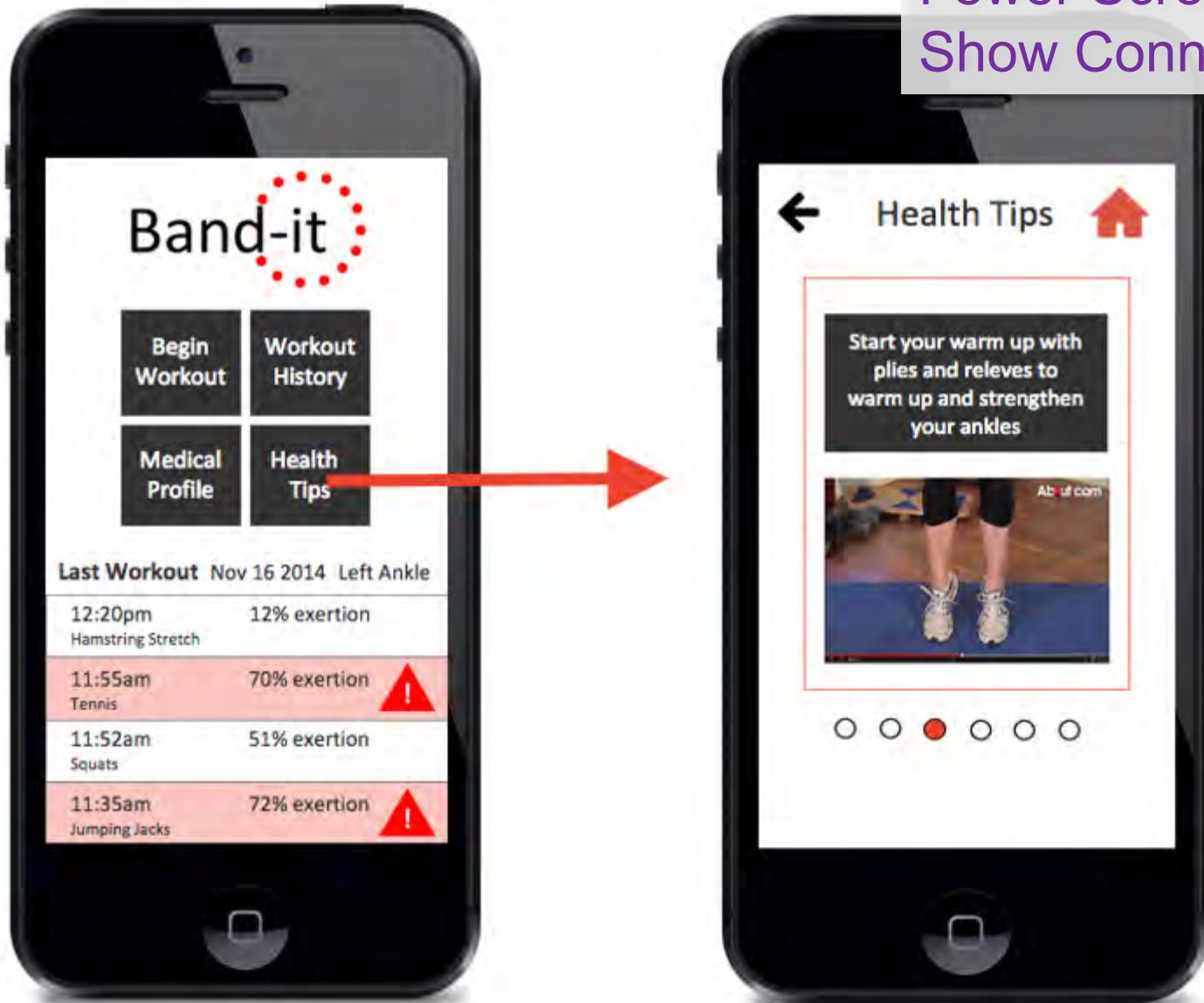
Many Screens  
on One Slide



Fewer Screens,  
Show Connections



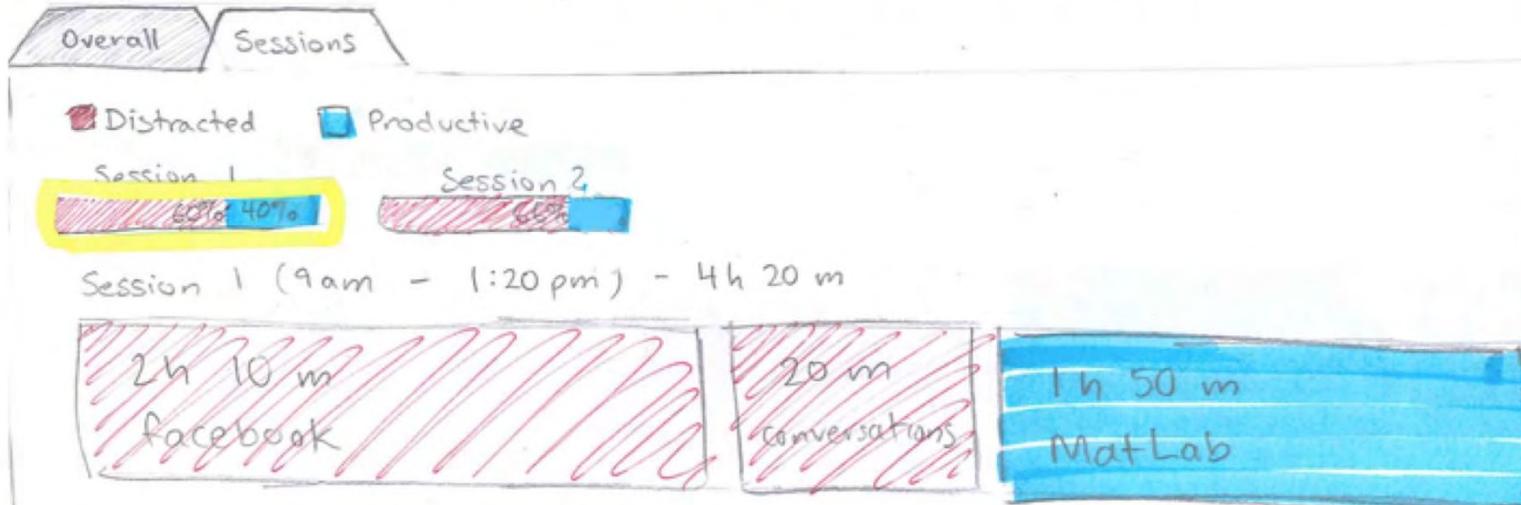
Fewer Screens,  
Show Connections



## Highlighting

# IMPROVED DESIGN

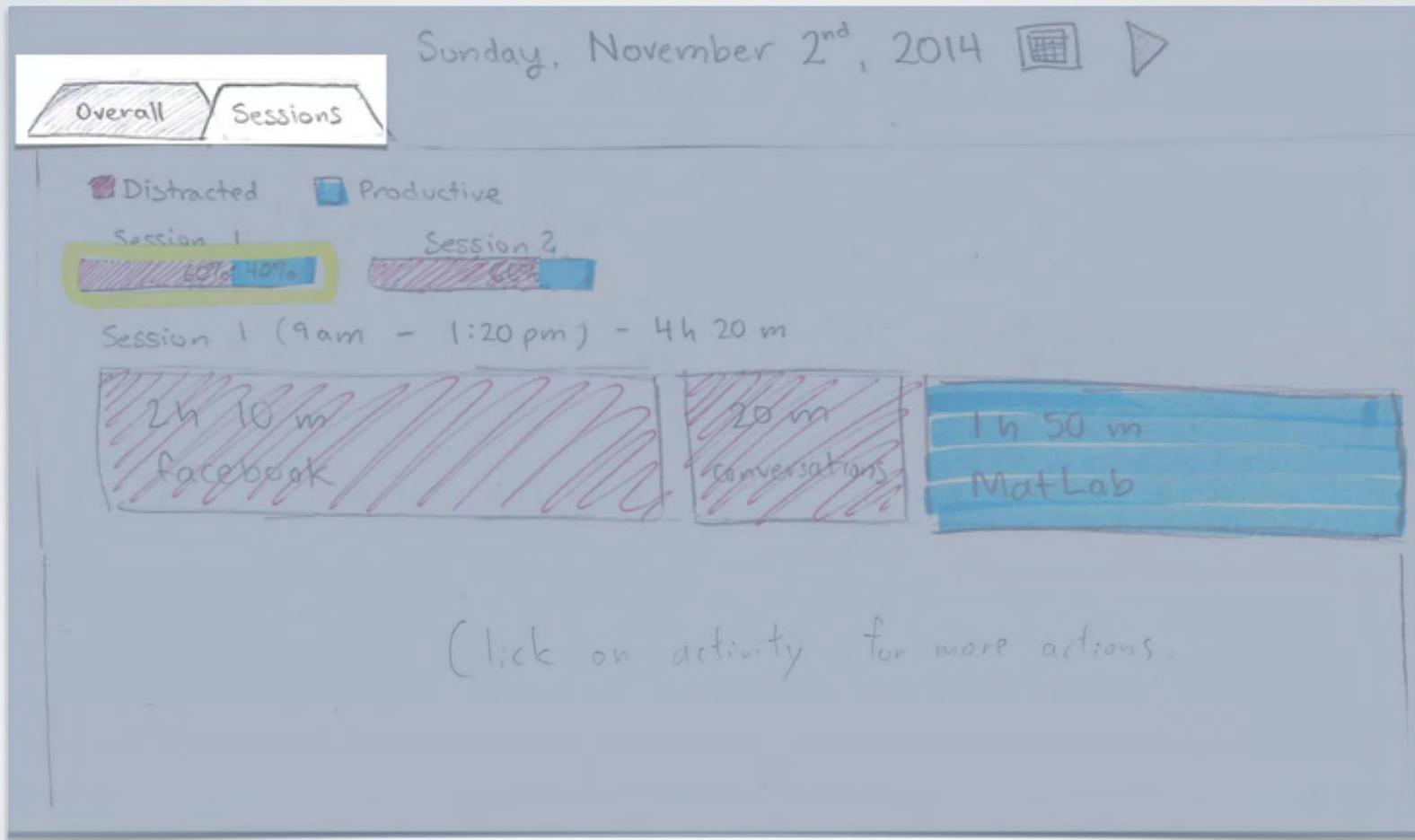
Sunday, November 2<sup>nd</sup>, 2014  



Click on activity for more actions.

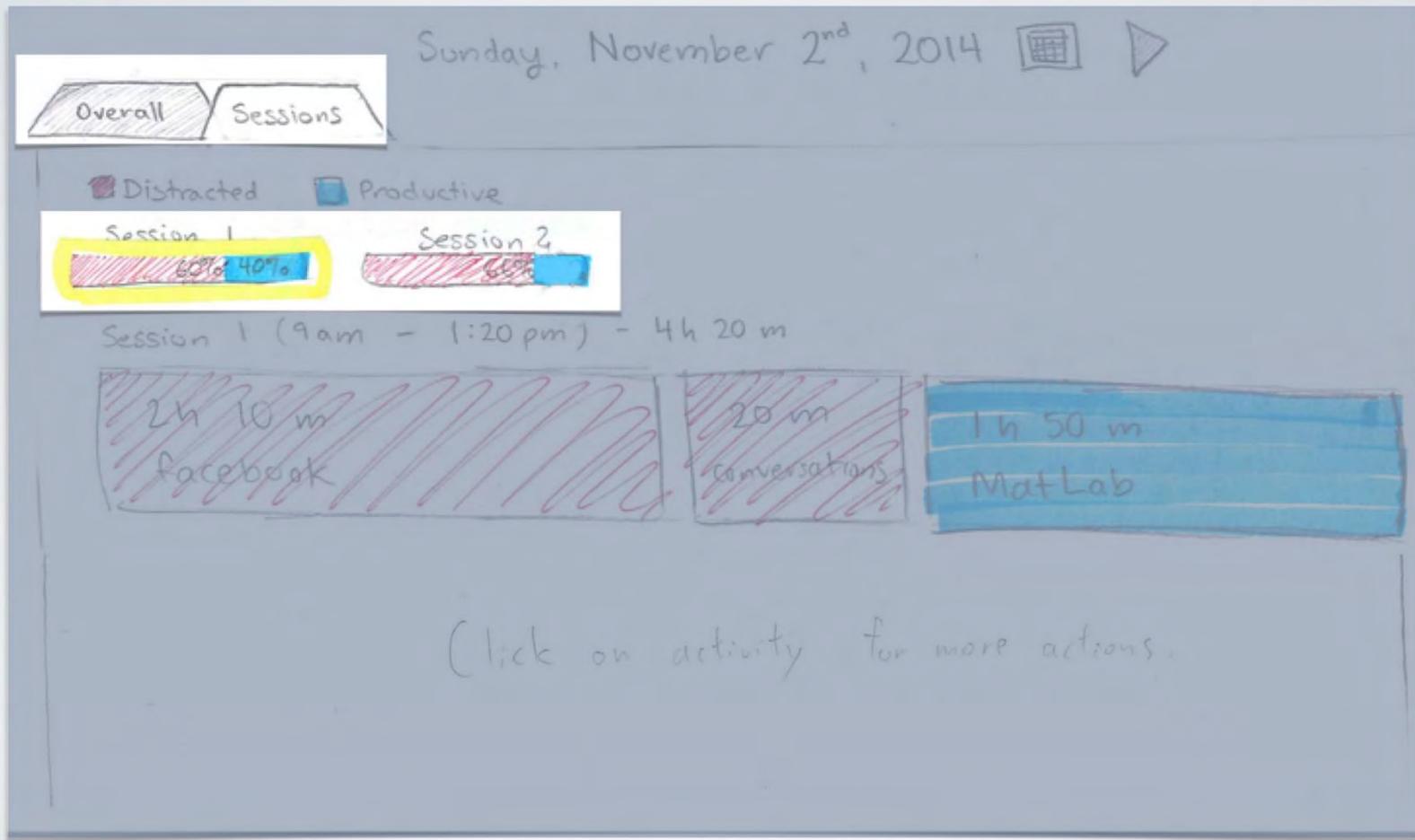
## Highlighting

# IMPROVED DESIGN



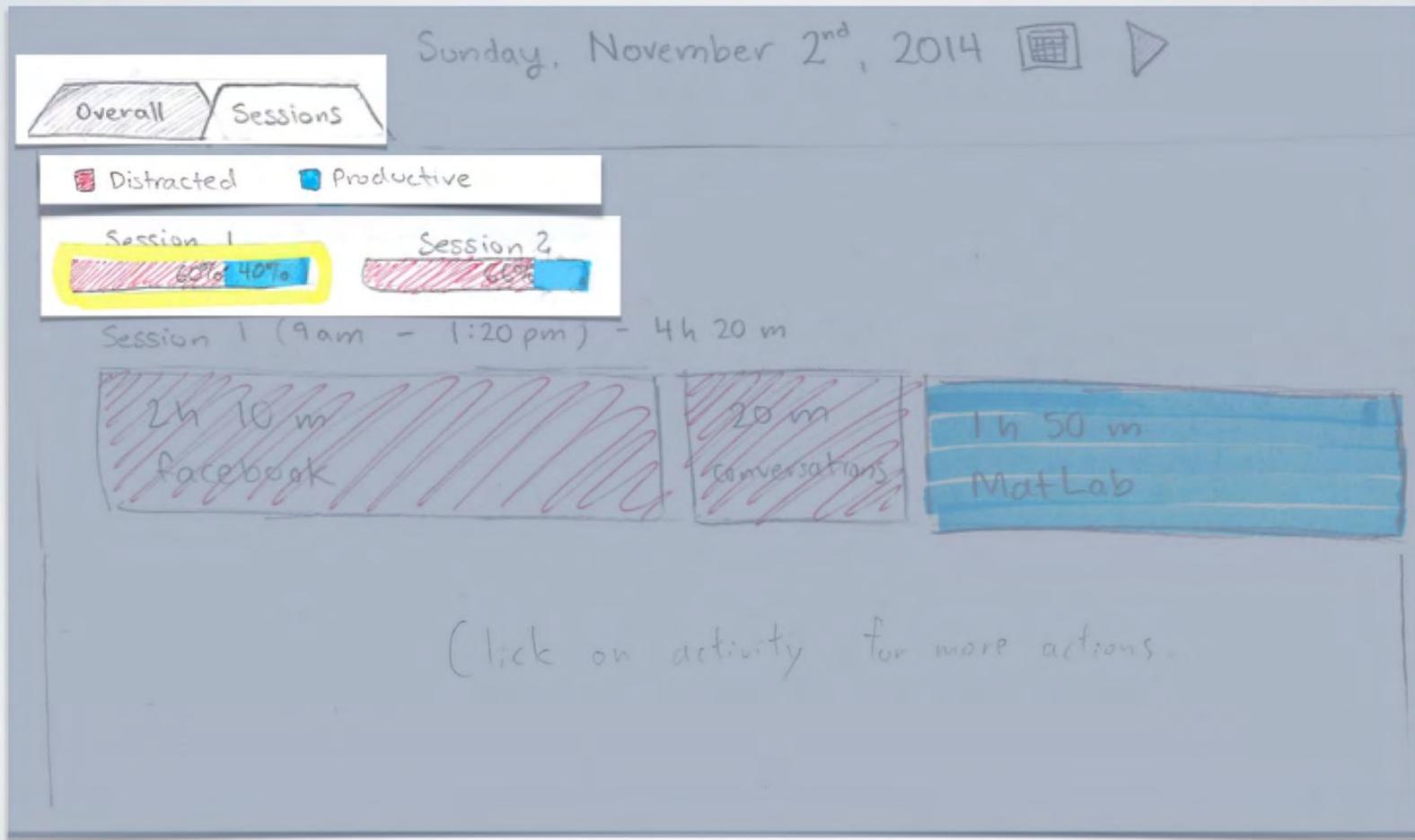
## Highlighting

# IMPROVED DESIGN



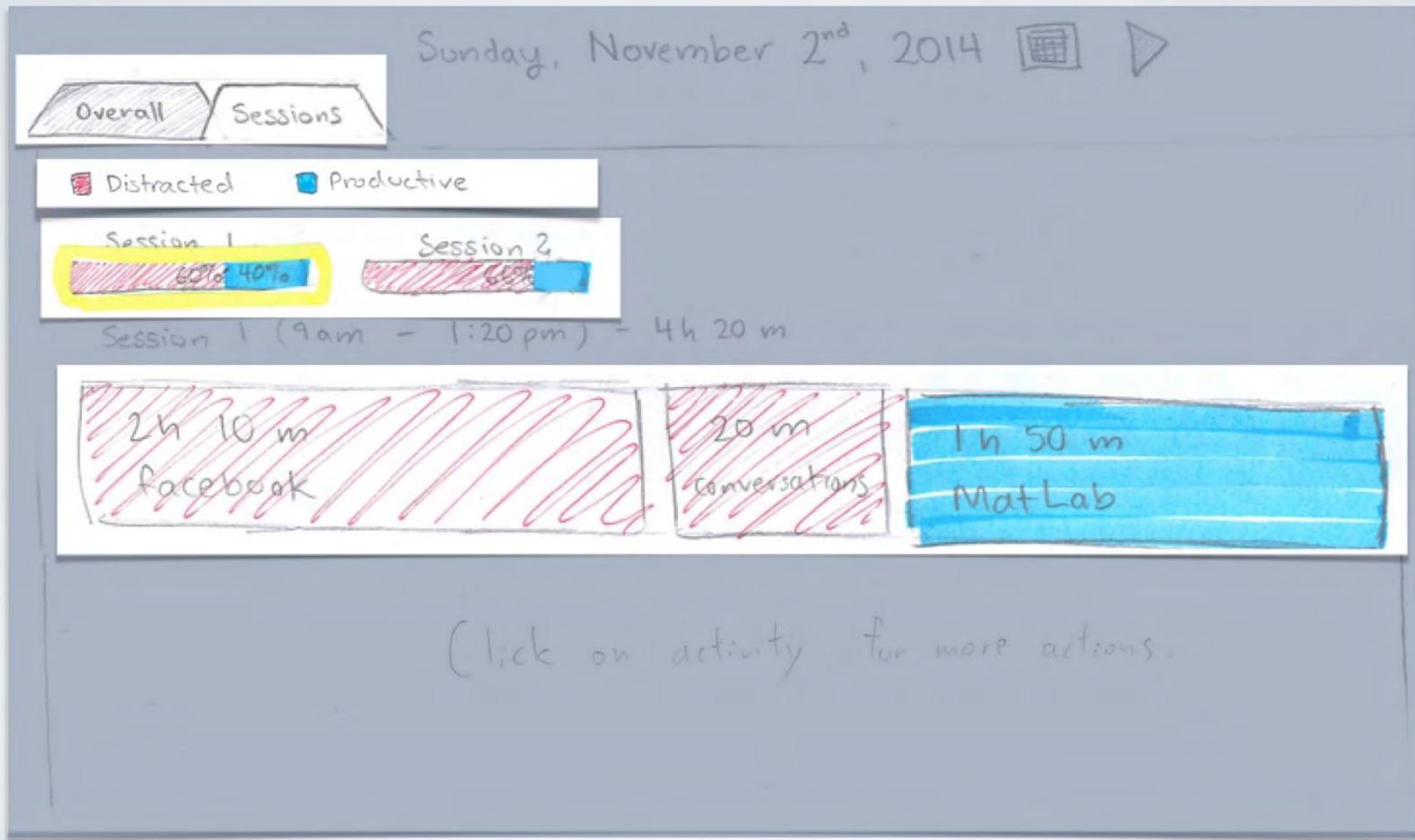
## Highlighting

# IMPROVED DESIGN



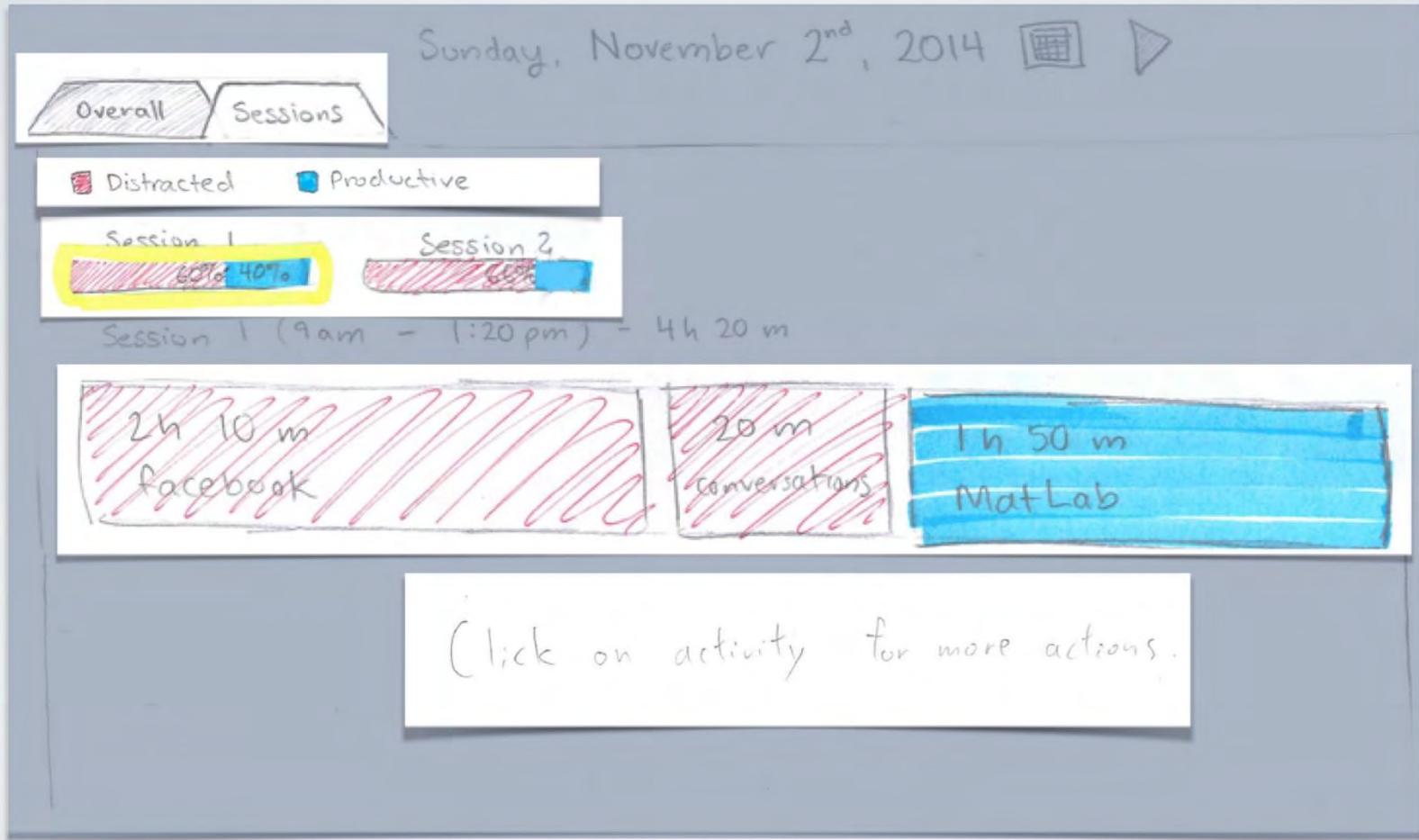
## Highlighting

# IMPROVED DESIGN



## Highlighting

# IMPROVED DESIGN

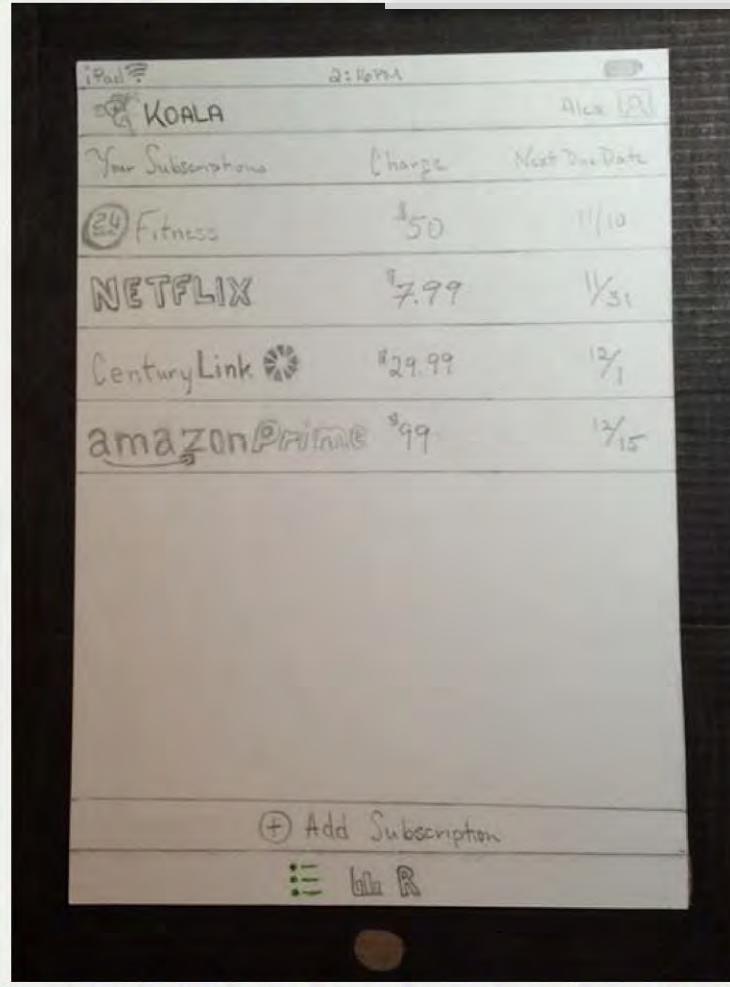


## Transition as Animation

# 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

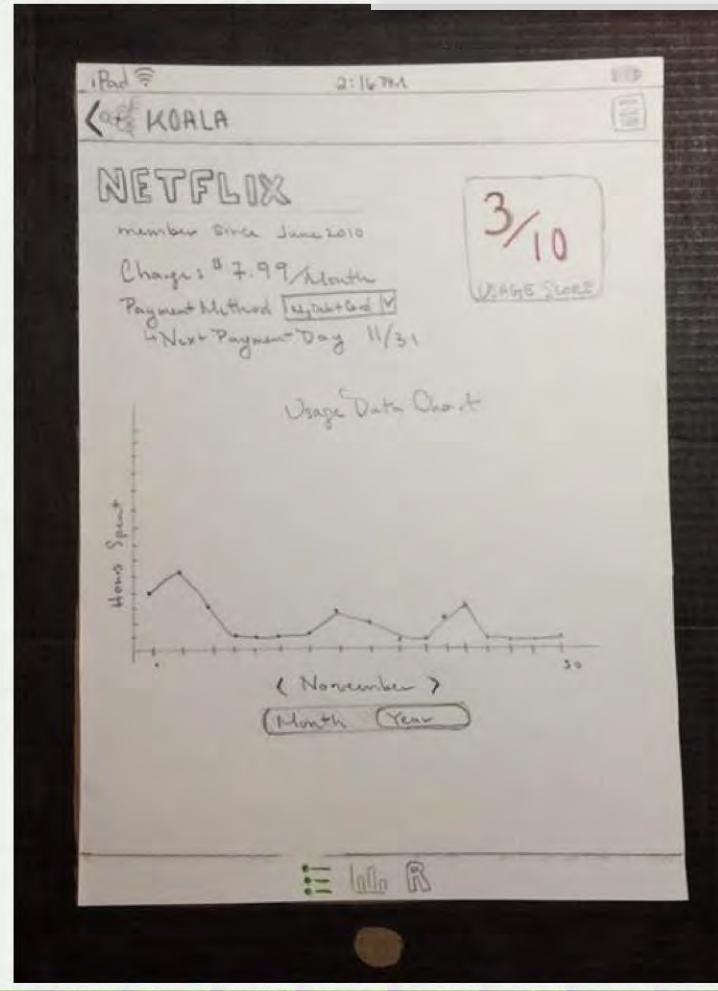


# Transition as Animation

## Initial Paper Prototype

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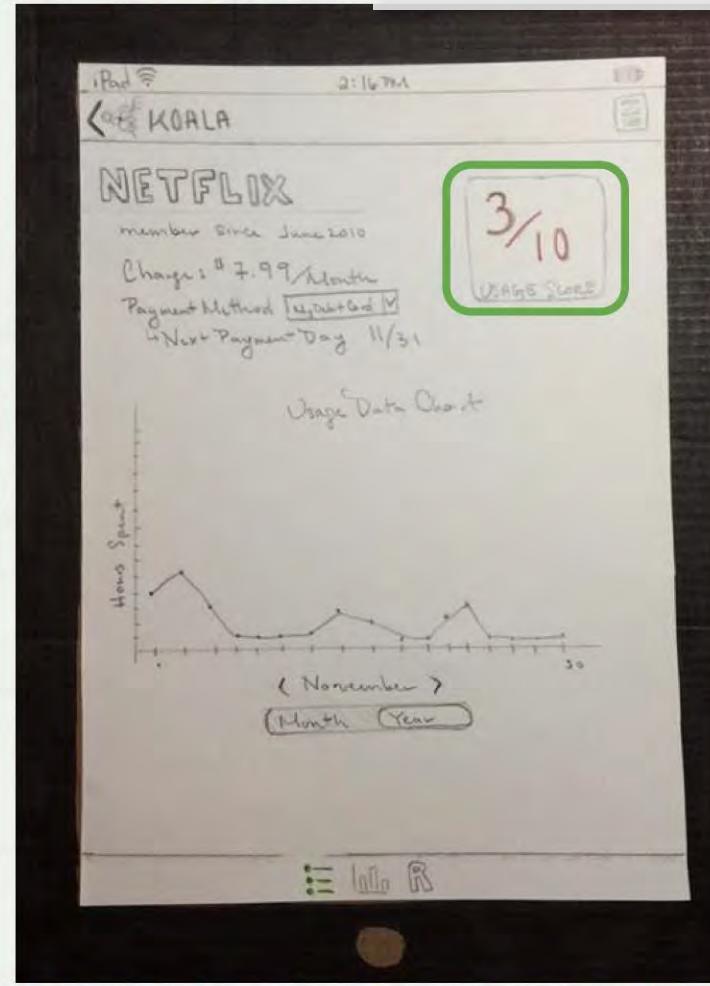


# Transition as Animation

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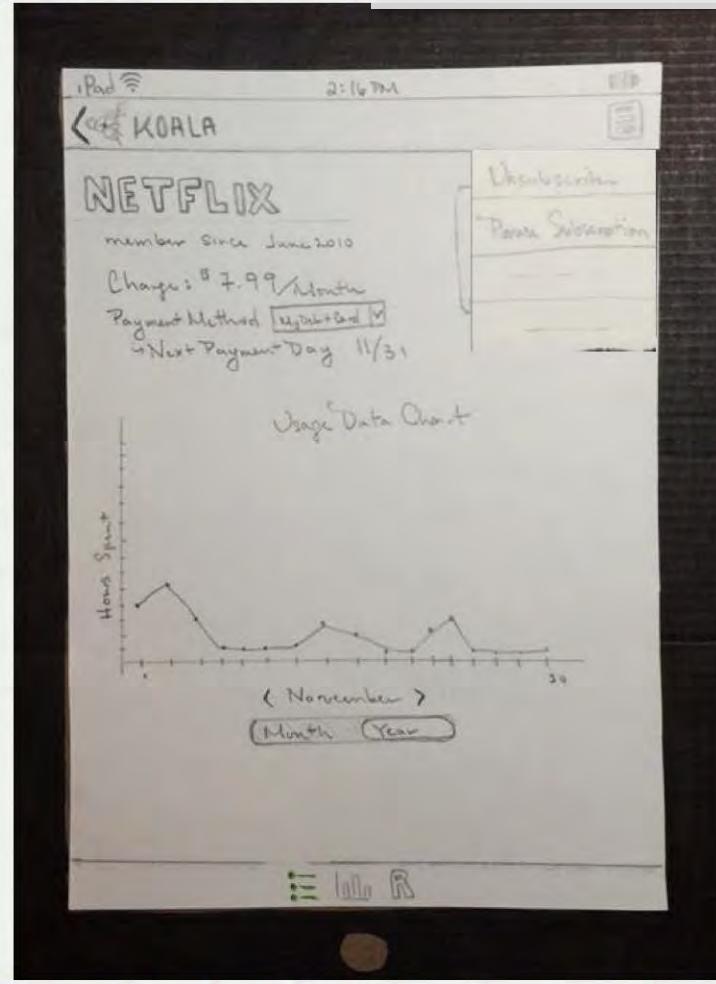


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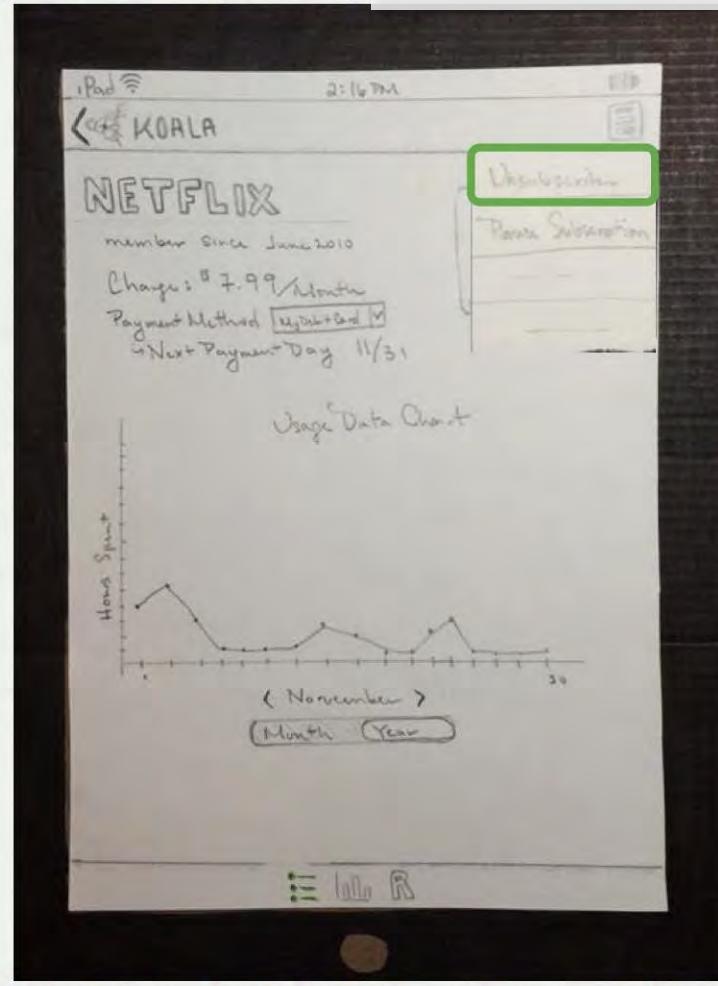


# Transition as Animation

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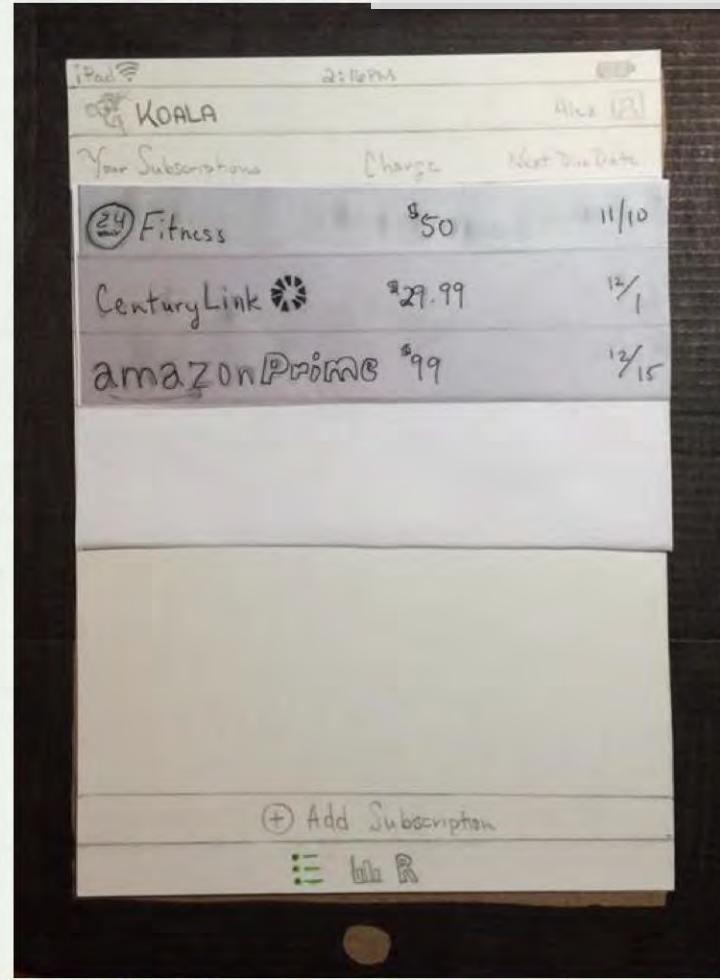


# Transition as Animation

## Initial Paper Prototype

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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

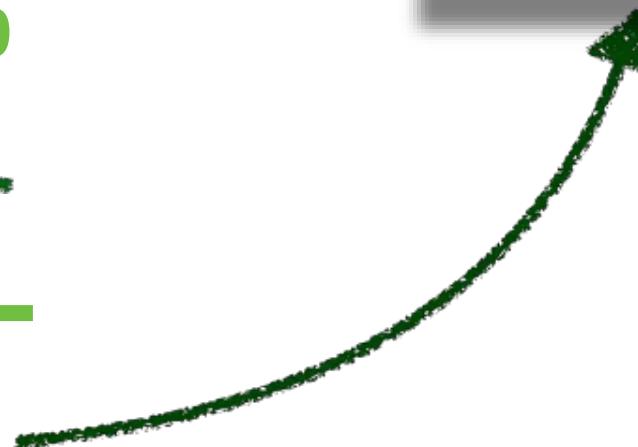
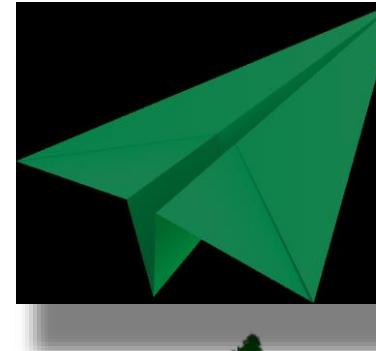
Interface  
Animation



# 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

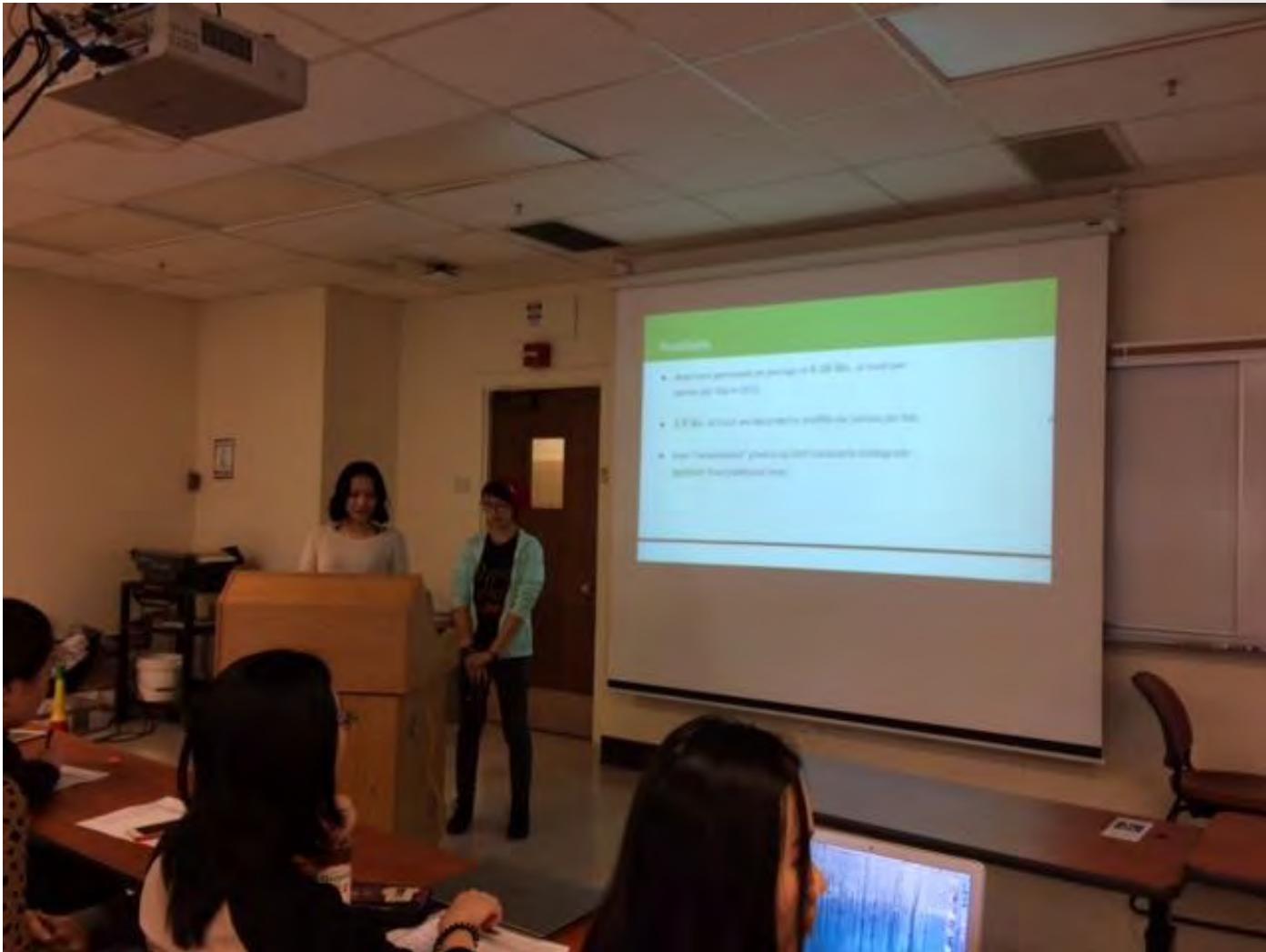
A lack of awareness about the long-term  
implications of noise exposure

Finishing  
Slide

# KACHING

# 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

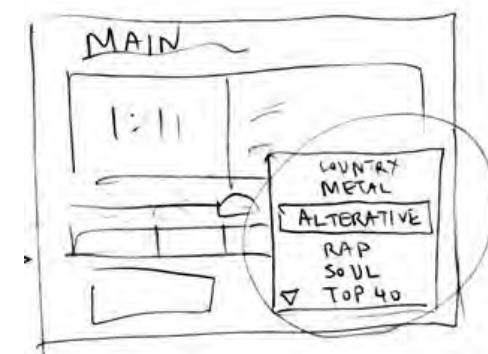
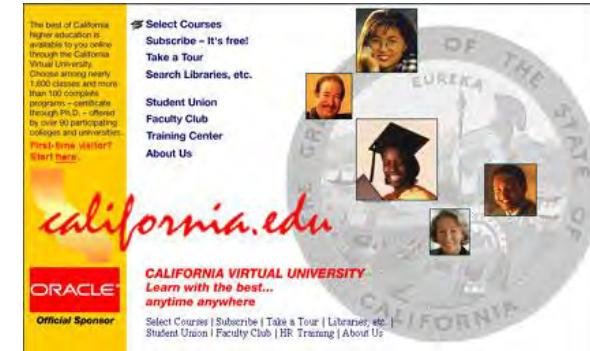
# Fidelity in Prototyping

## 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

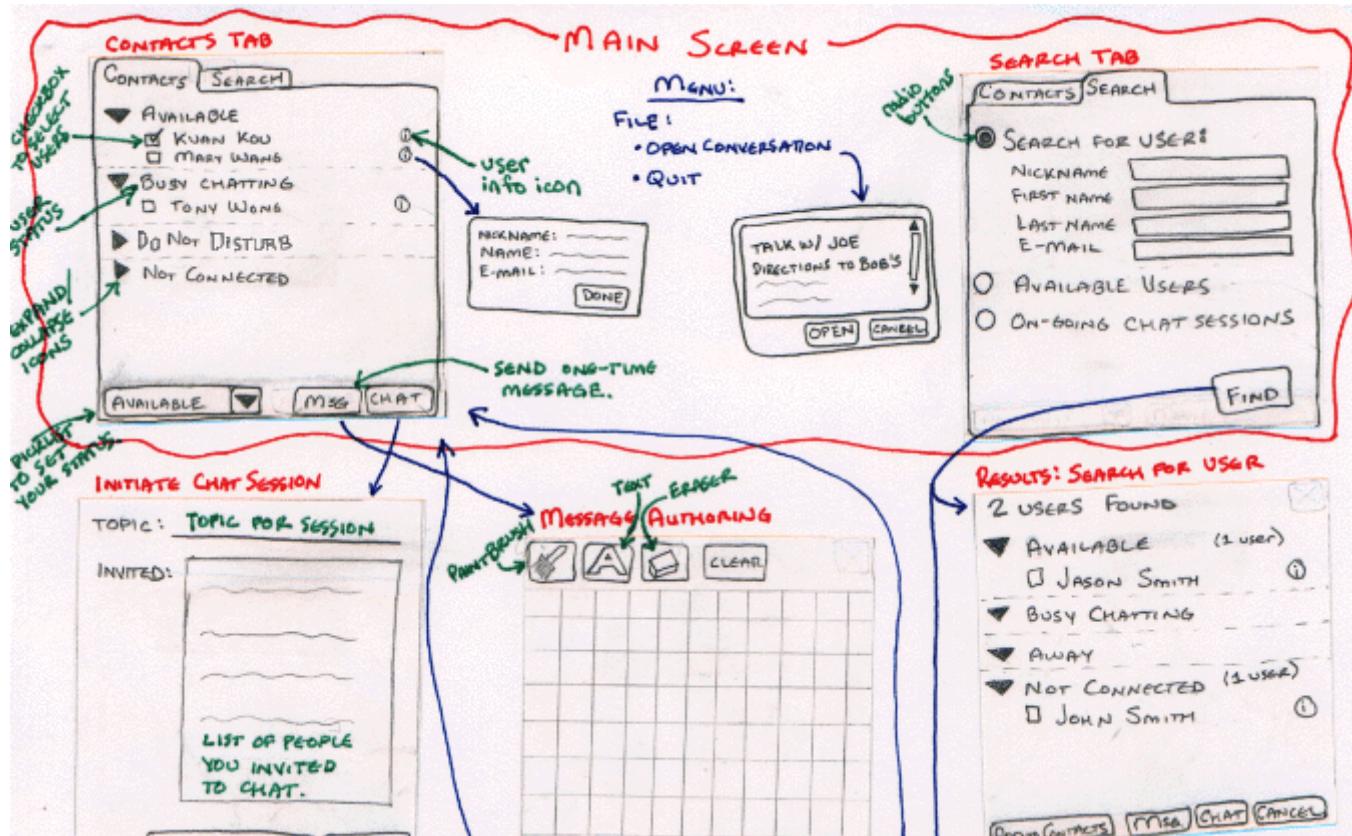
Sketches act as prototypes

A designer “plays computer”

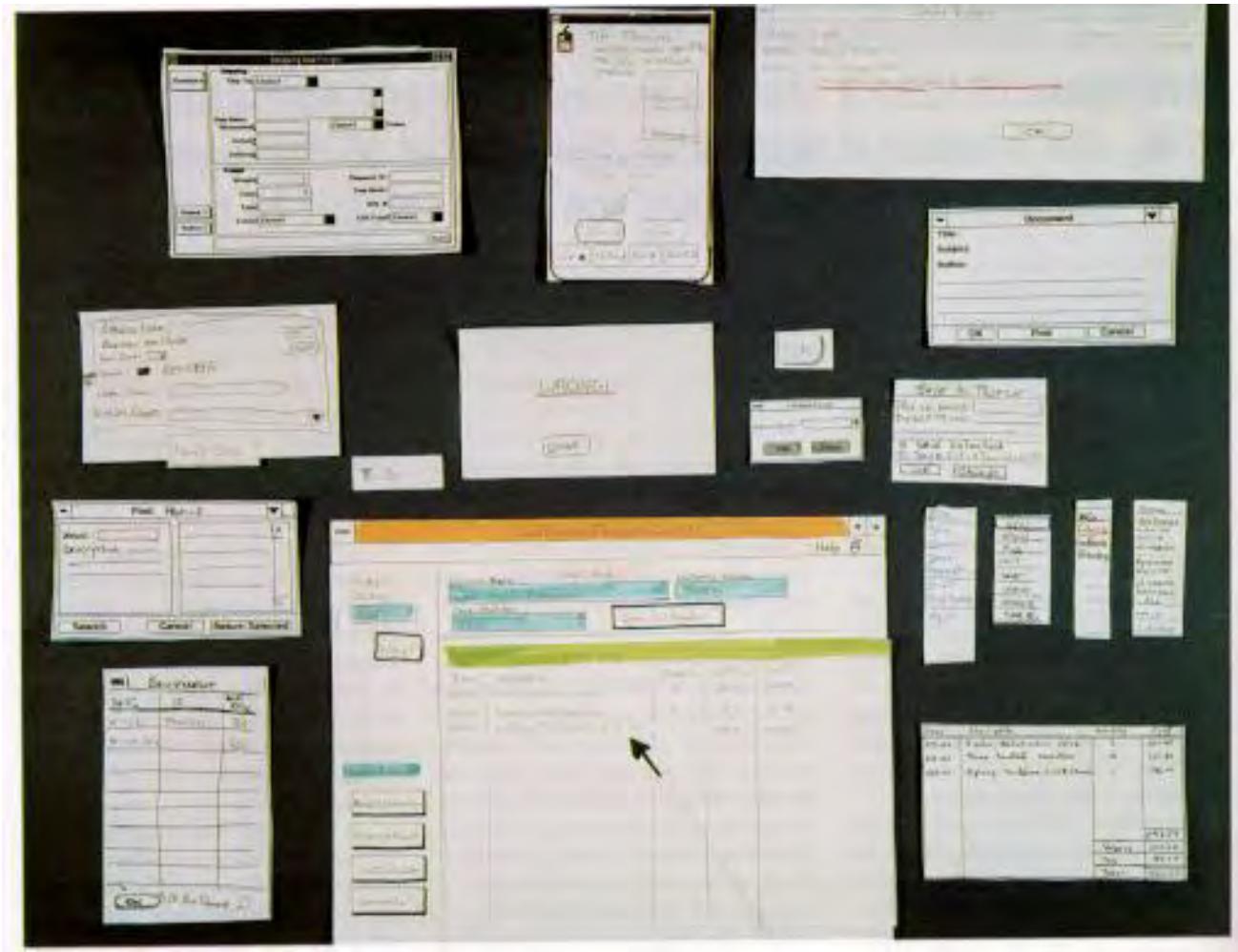
Other design team members observe & record

Kindergarten implementation skills reduce barriers to participation in design and testing

# Sketches



# Paper Prototype



# Basic Materials

Heavy, white paper

Index cards

Post-its

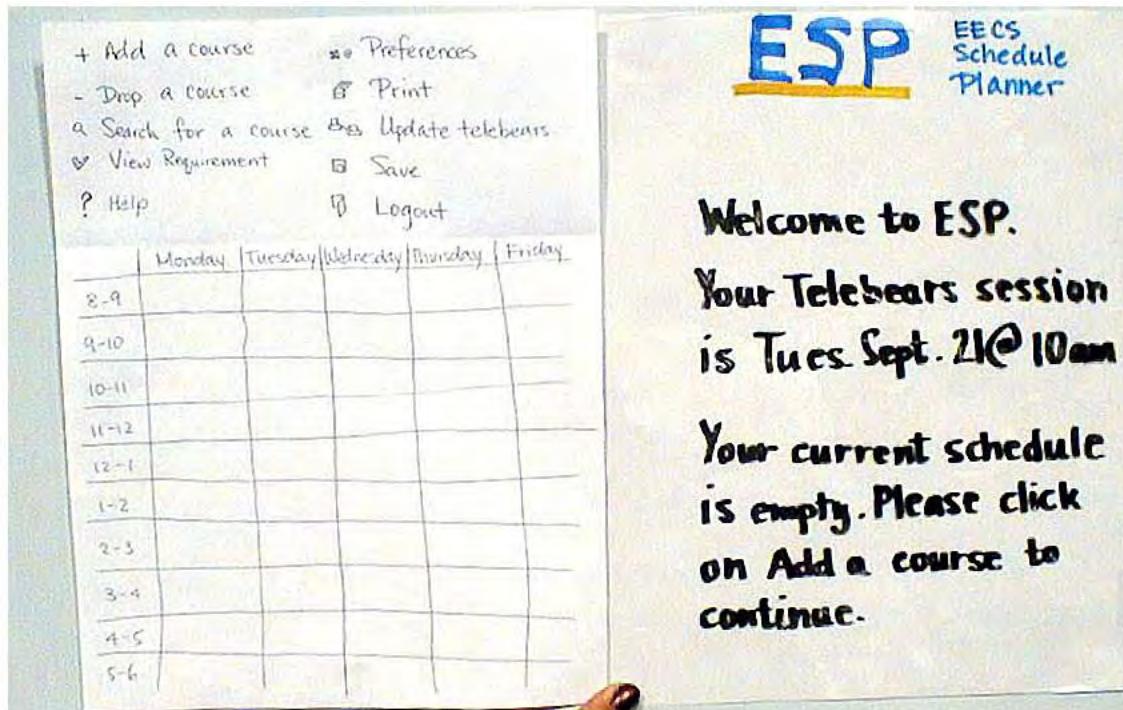
Tape, stick glue, correction tape

Pens and markers in many colors and sizes

Overhead transparencies

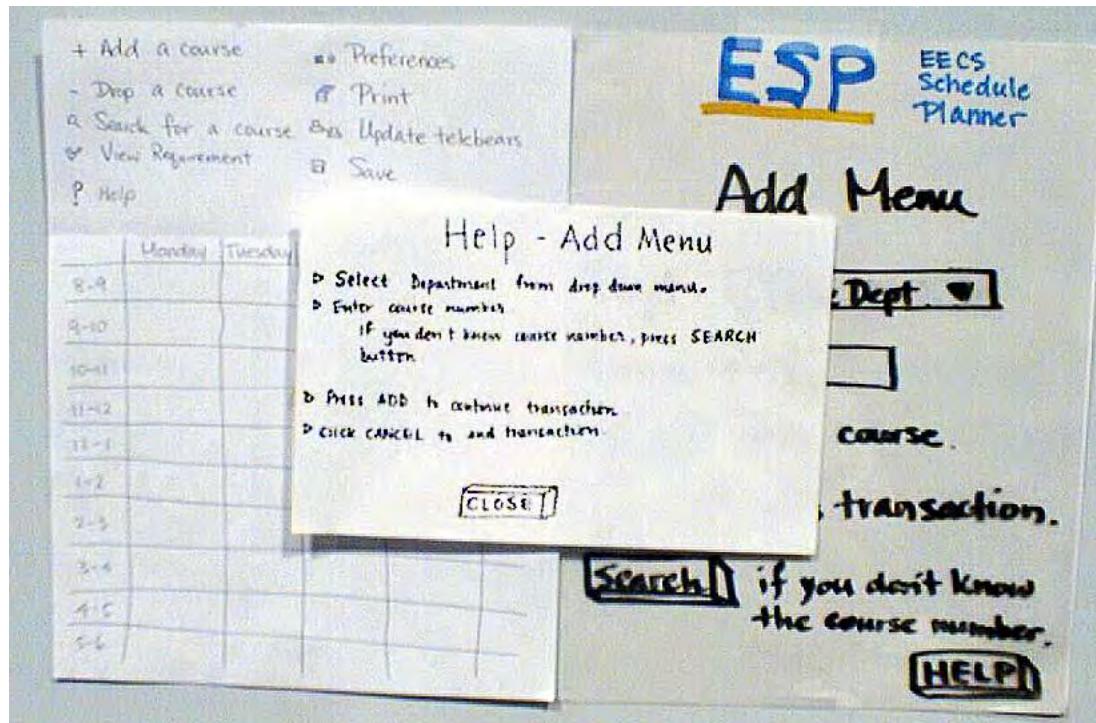
Scissors, X-Acto knife

# Paper Prototype



"Screen" faked with  
pre-constructed pieces

# Paper Prototype



New pieces added in response to interaction

# Paper Prototype

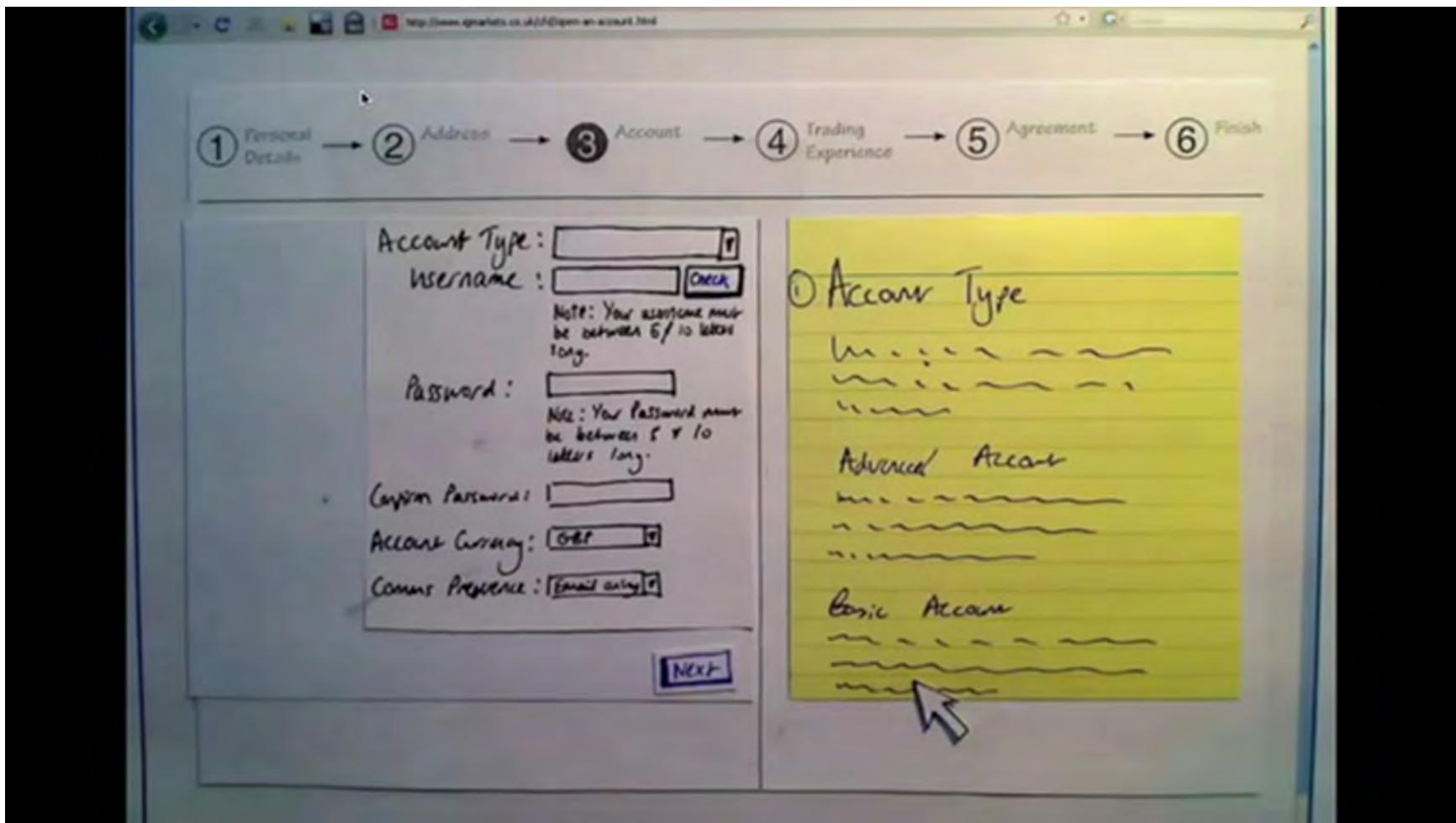
The image shows a hand-drawn paper prototype of a website interface for 'Kool Clothes'. At the top, there is a navigation bar with buttons labeled 'Back', 'Forward', 'Stop', 'Home', 'Search', and 'Print'. Below the navigation bar, the 'Kool Clothes' logo is on the left, followed by menu links 'Guys', 'Gals', 'Kids', and 'Customer Service'. A 'Shopping Cart' section is centered, showing a table of items:

Item	Description	Color	Size	Status	Qty	Price	Total
42773	Cashmere sweater	Green	M	In Stock	1	\$79.99	\$79.99
23476	Breakaway belt	BR	S/M	In Stock	1	\$24.00	\$24.00

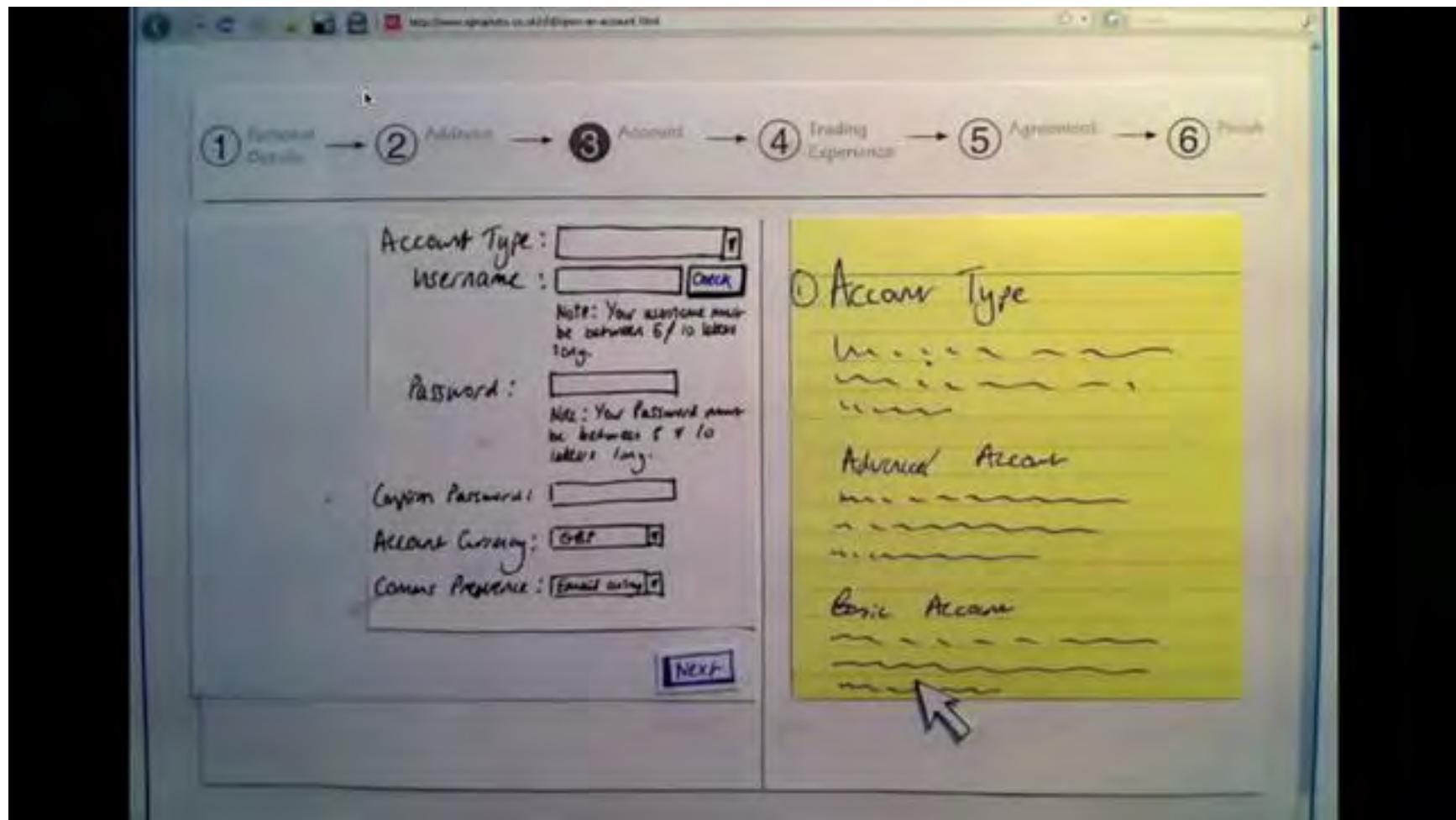
To the left of the cart, there is a note: 'Check out our no-hassle Return Policy'. To the right, there is a breakdown of costs: Subtotal \$207.99, S+H \$12.95, Tax \$0.00, and Total \$220.84. At the bottom, there are two buttons: 'Continue Shopping' and 'Checkout'.

Transparencies allow  
flexible use of text

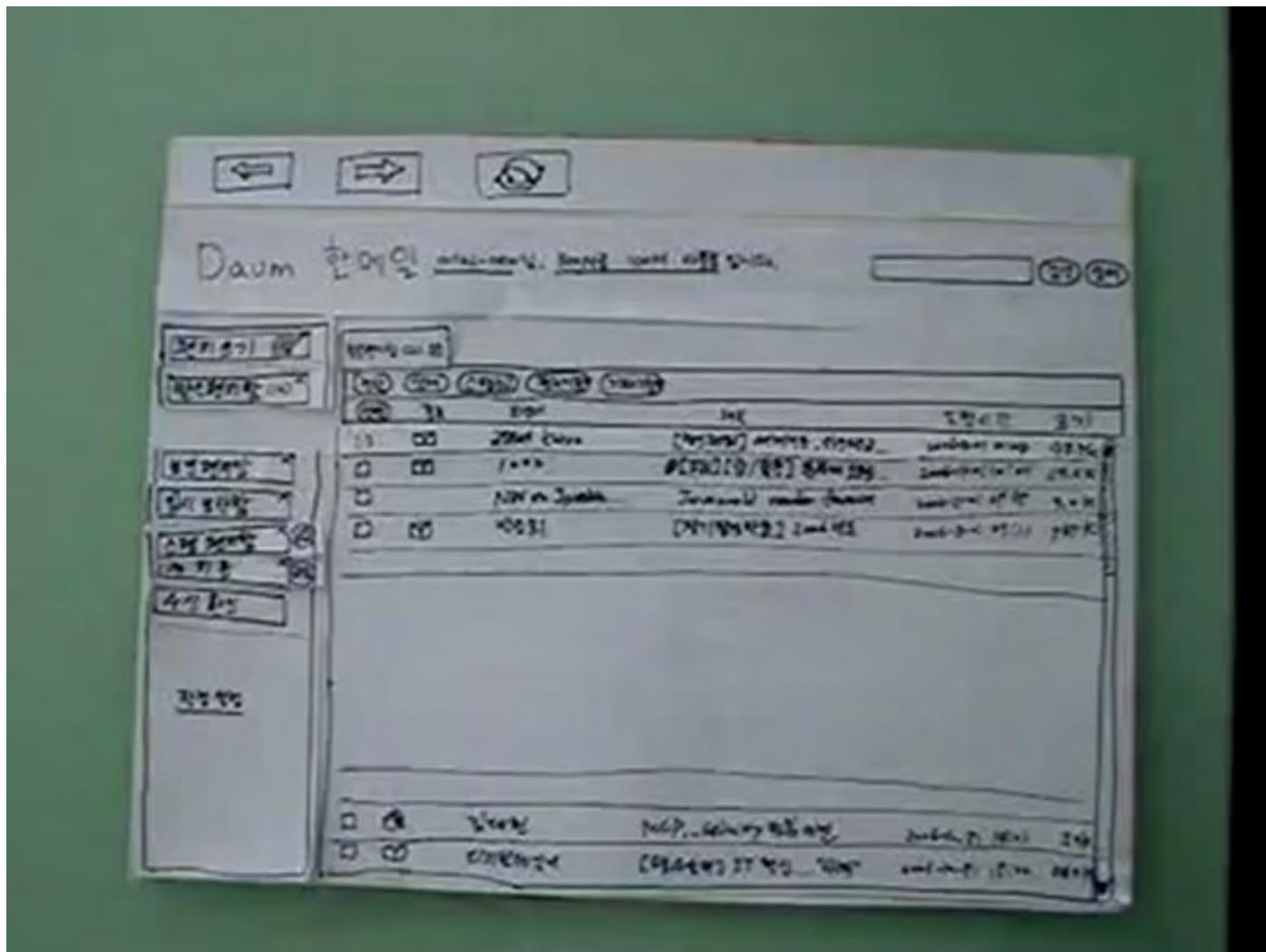
# Paper Prototype as Communication



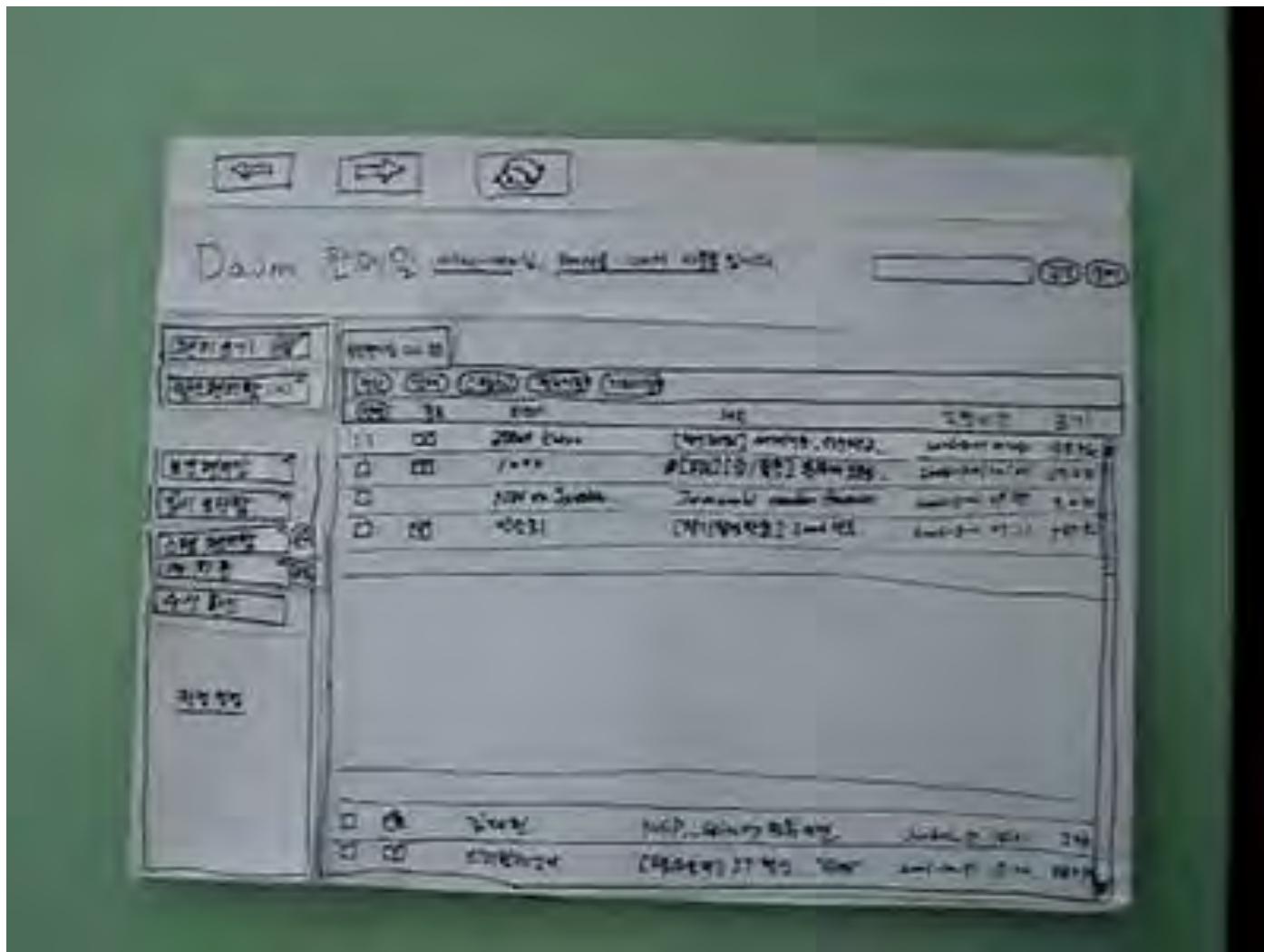
# Paper Prototype as Communication



# 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

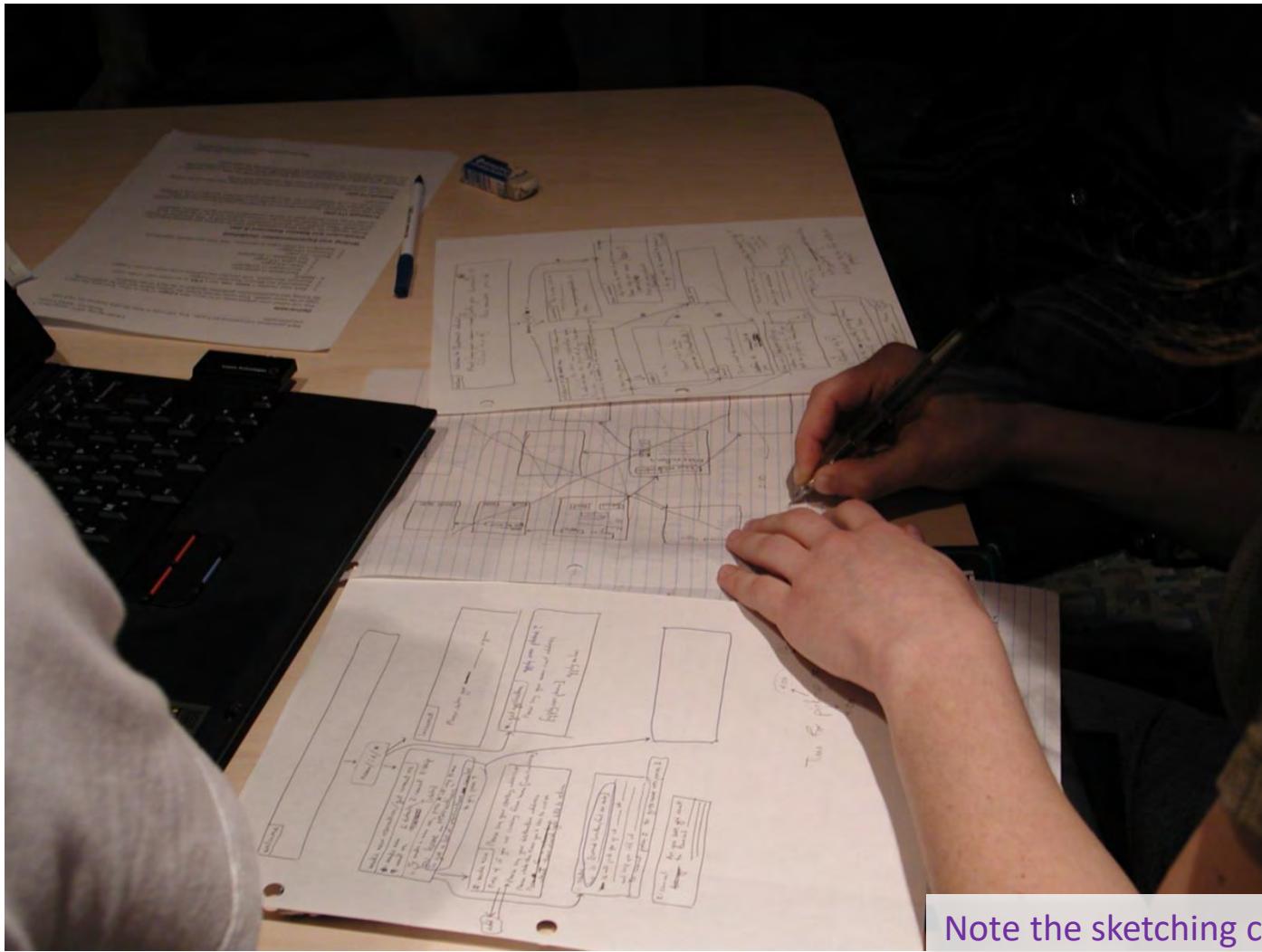
Ready responses for actions

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

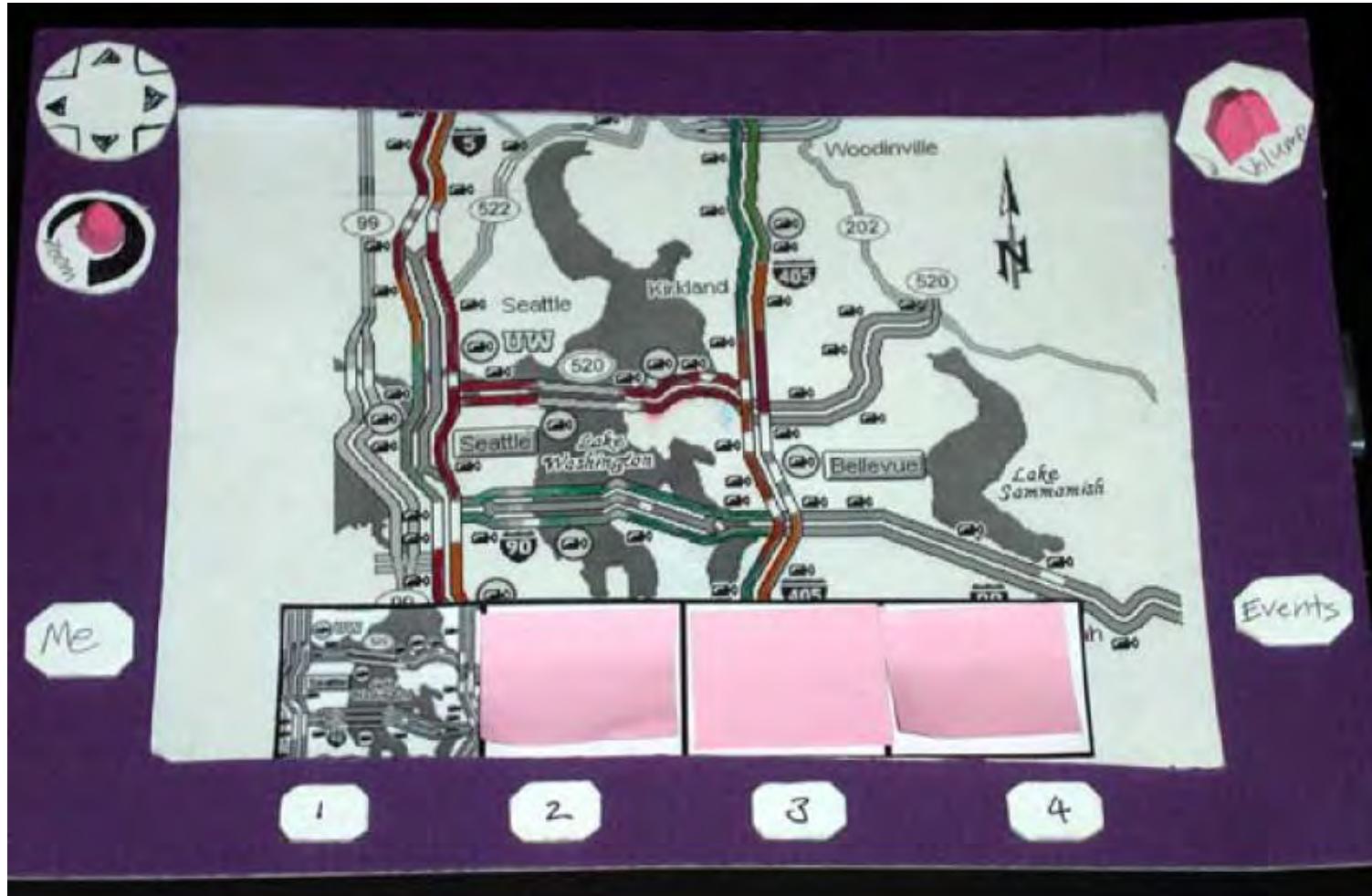
# Constructing the Prototype



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# Constructing the Prototype



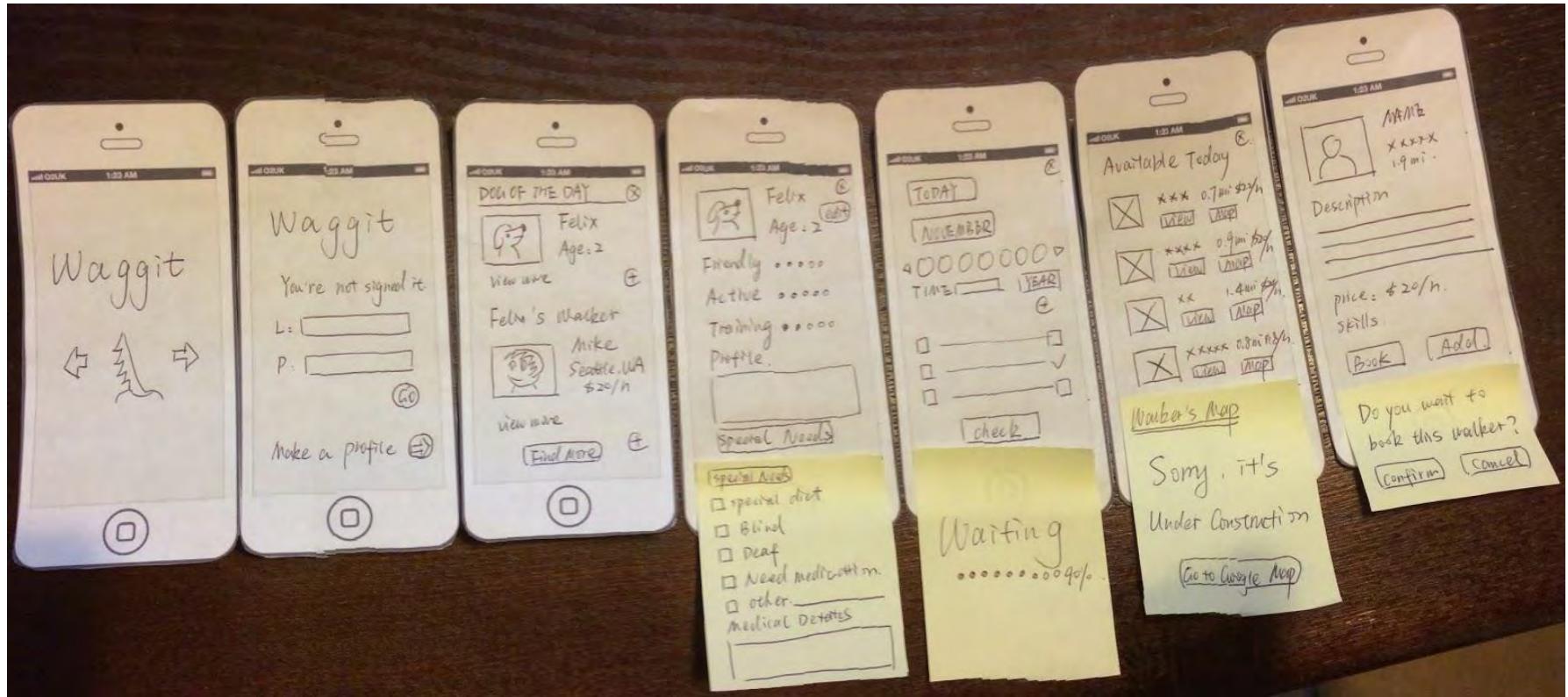
Prototyping physical form

# 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

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## 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

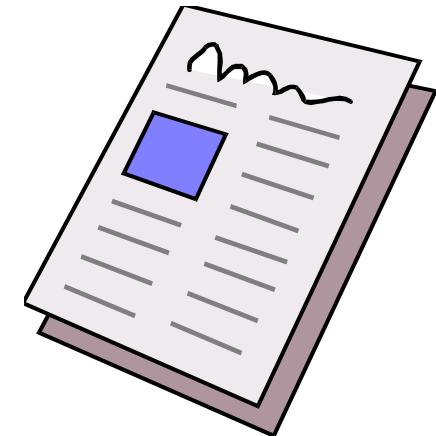
Analyzing the Data

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.”

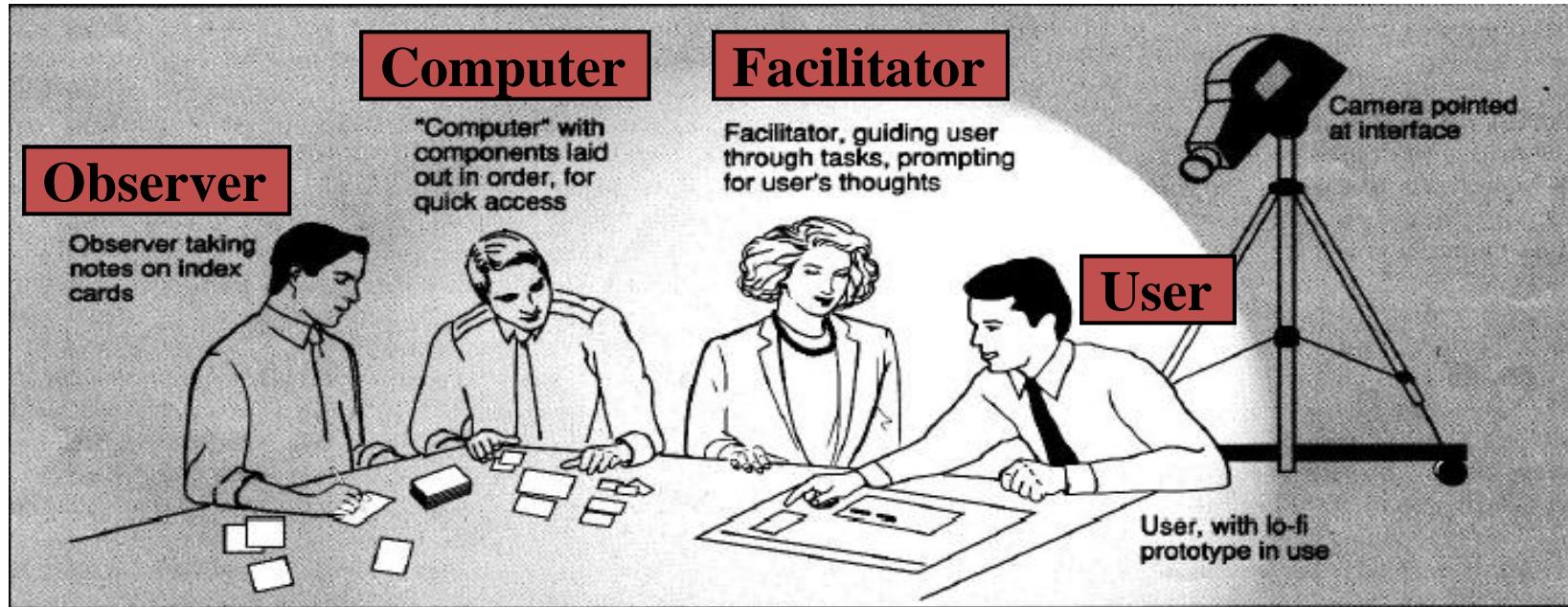
# Introducing the Test

## 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

# 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 or 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

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# Ethical Considerations



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people can leave in tears

You have a responsibility to alleviate

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\*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.

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

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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

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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.

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**lighten = contrast, sorted = collated?**

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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".

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Task design is difficult and important

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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

# CSE 440: Introduction to HCI

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Lecture 09:  
Tasks in Testing,  
Patterns

Tuesday / Thursday  
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# 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

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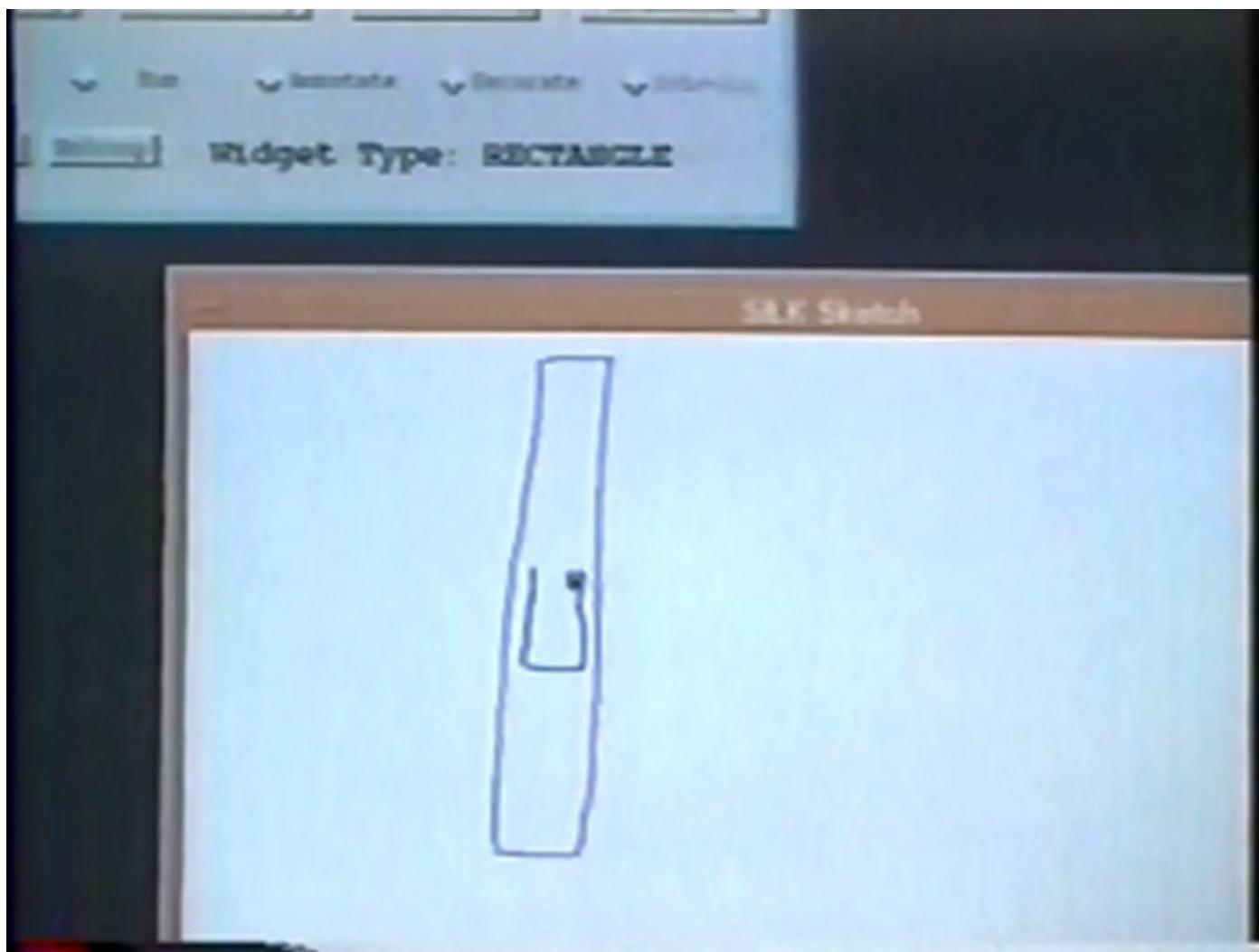
Tasks in Testing

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Remote Usability Testing

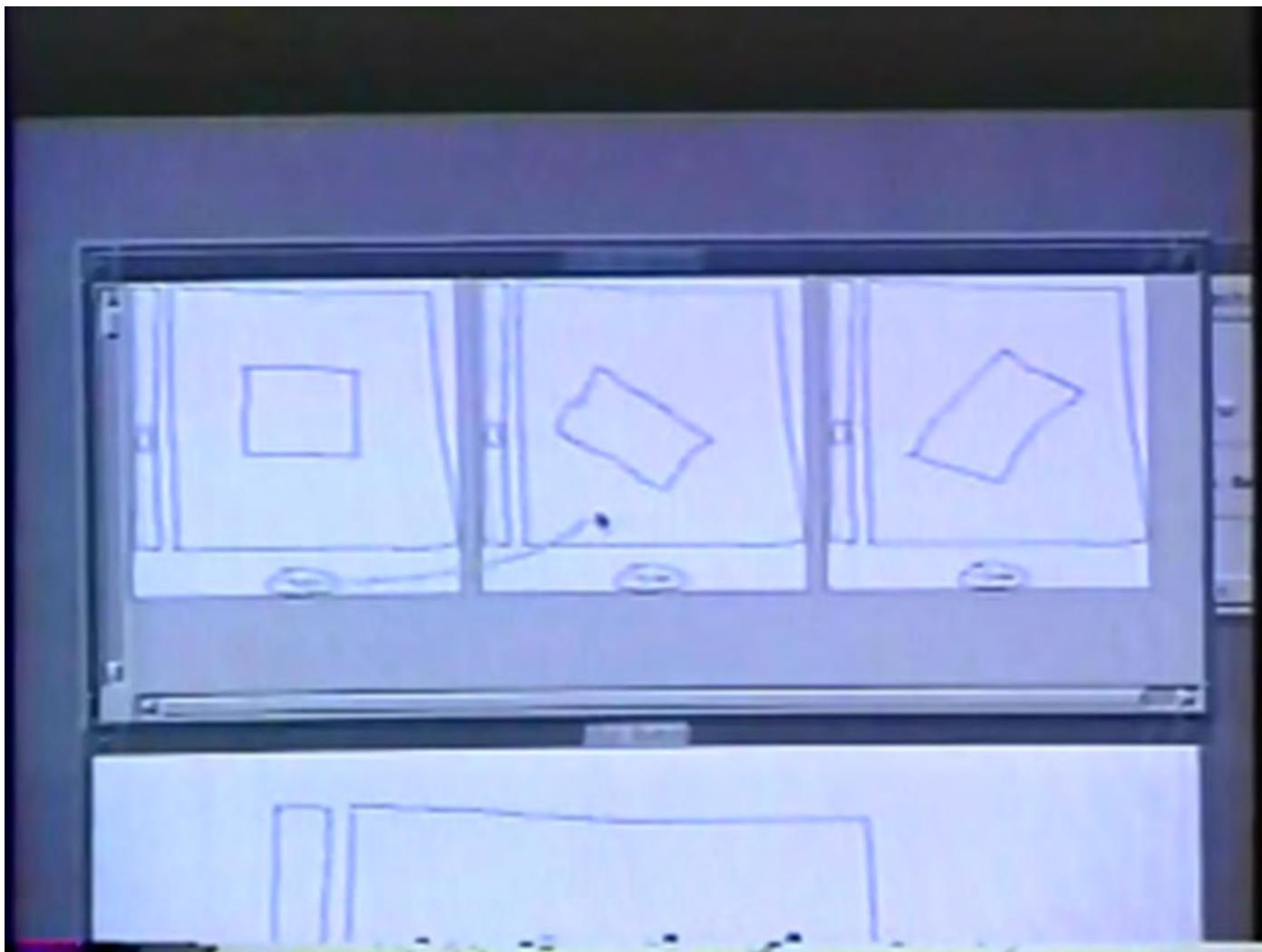
Patterns

# SILK (1996)



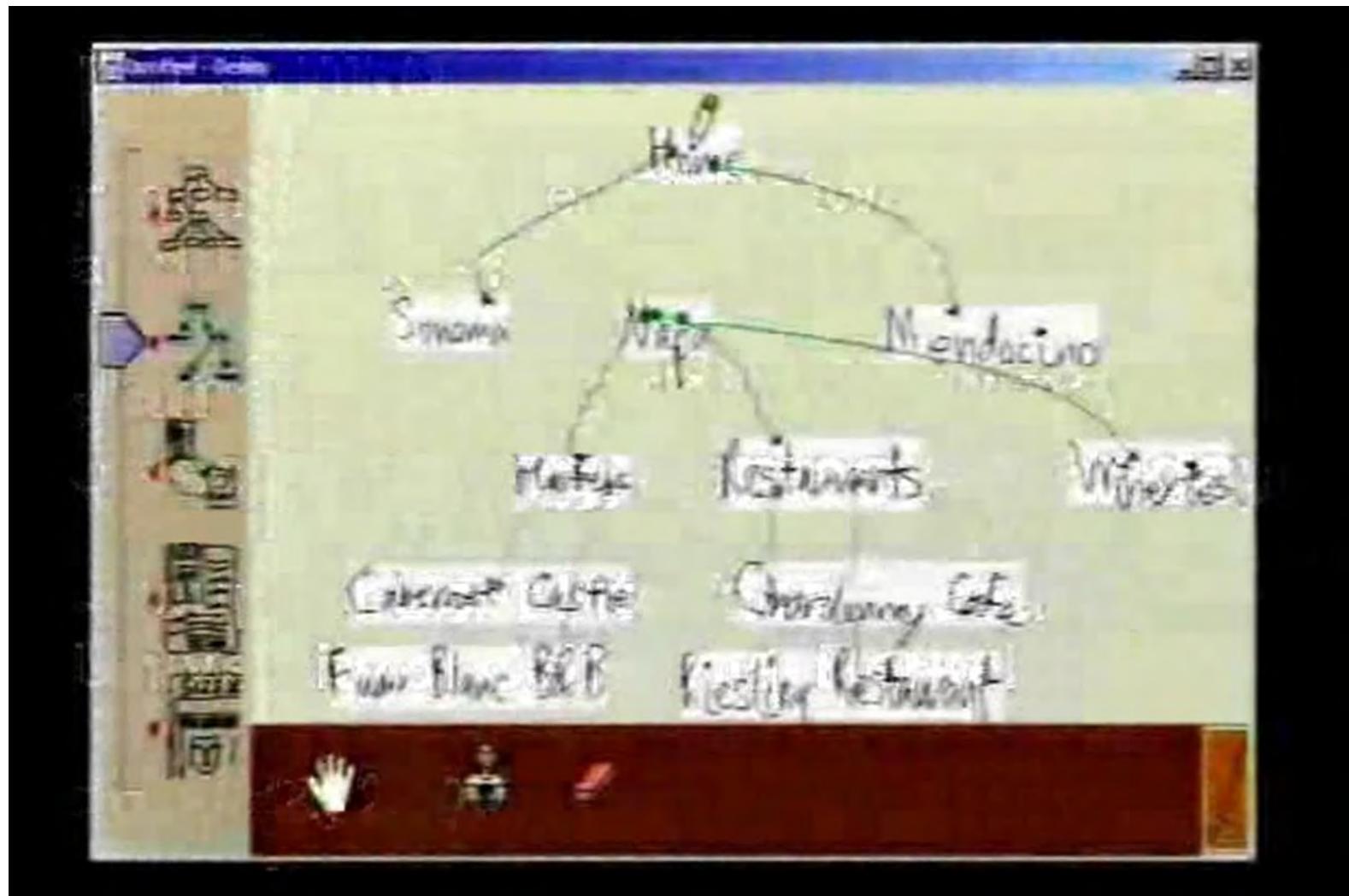
Informal Interaction

# SILK (1996)



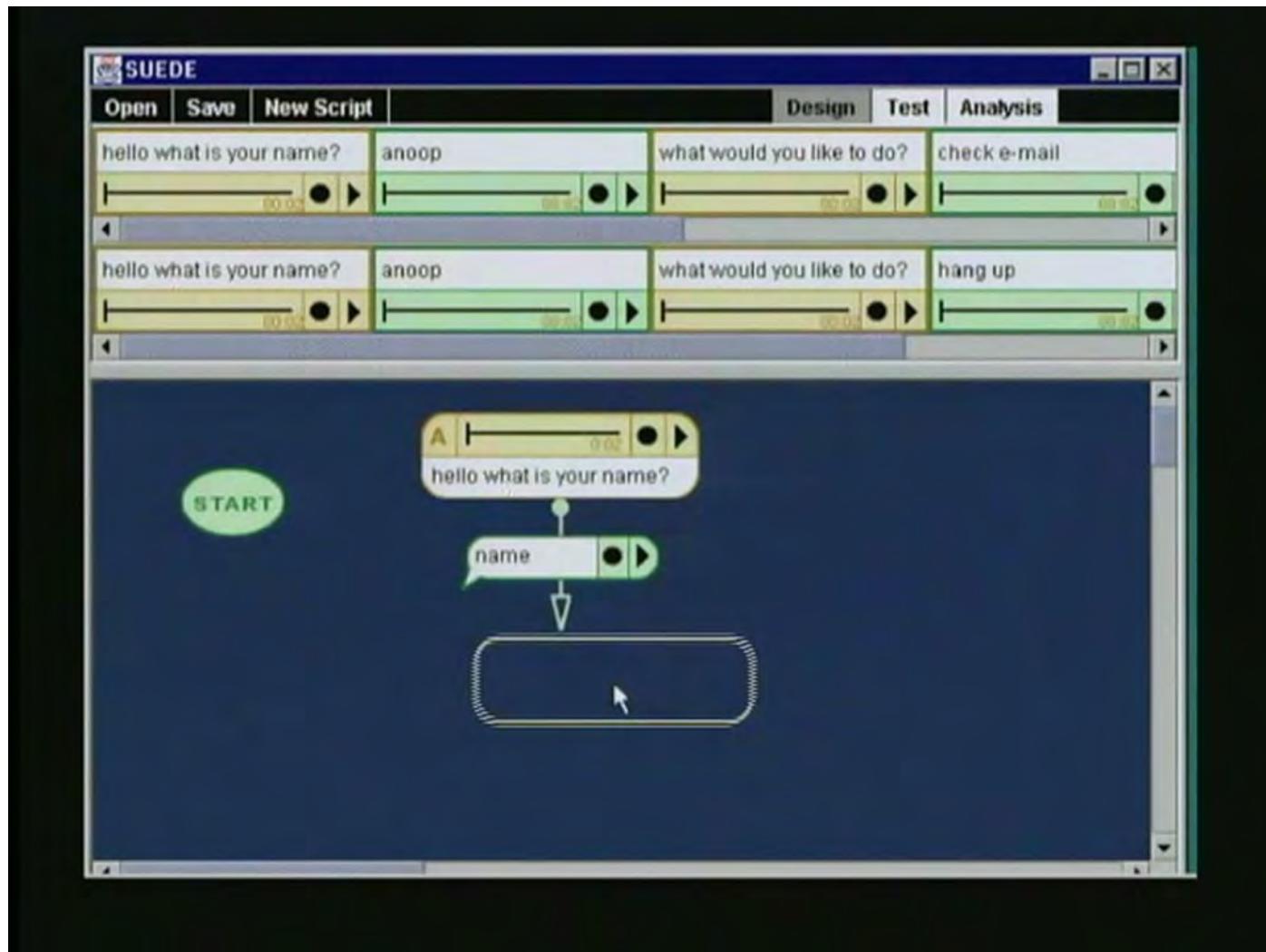
Migrate to Prototype, Storyboard-Based Programming

# DENIM (2000)



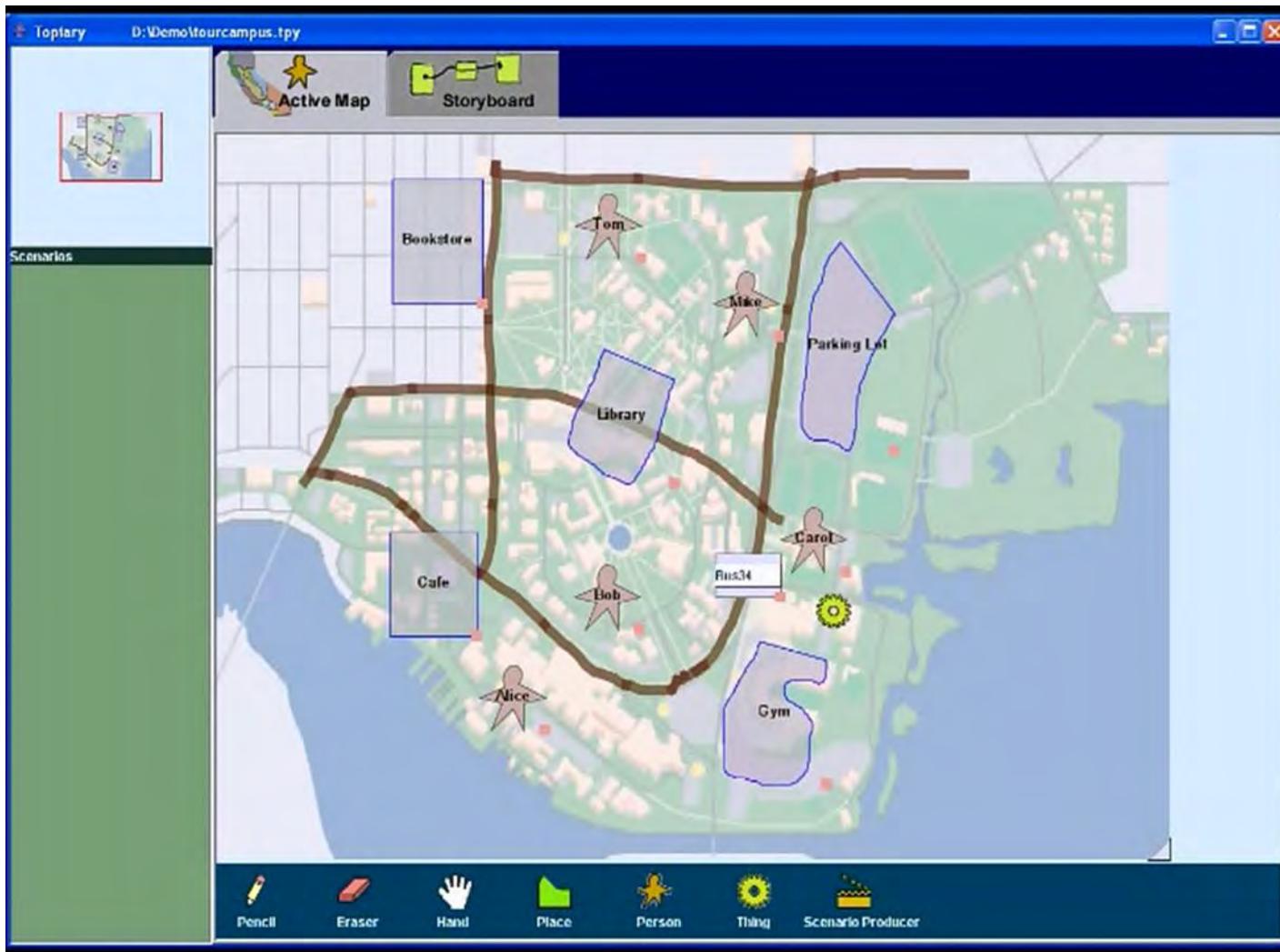
Early Stage, Multiple Levels of Details, Sketching, Pen Interaction

# SUEDE (2000)



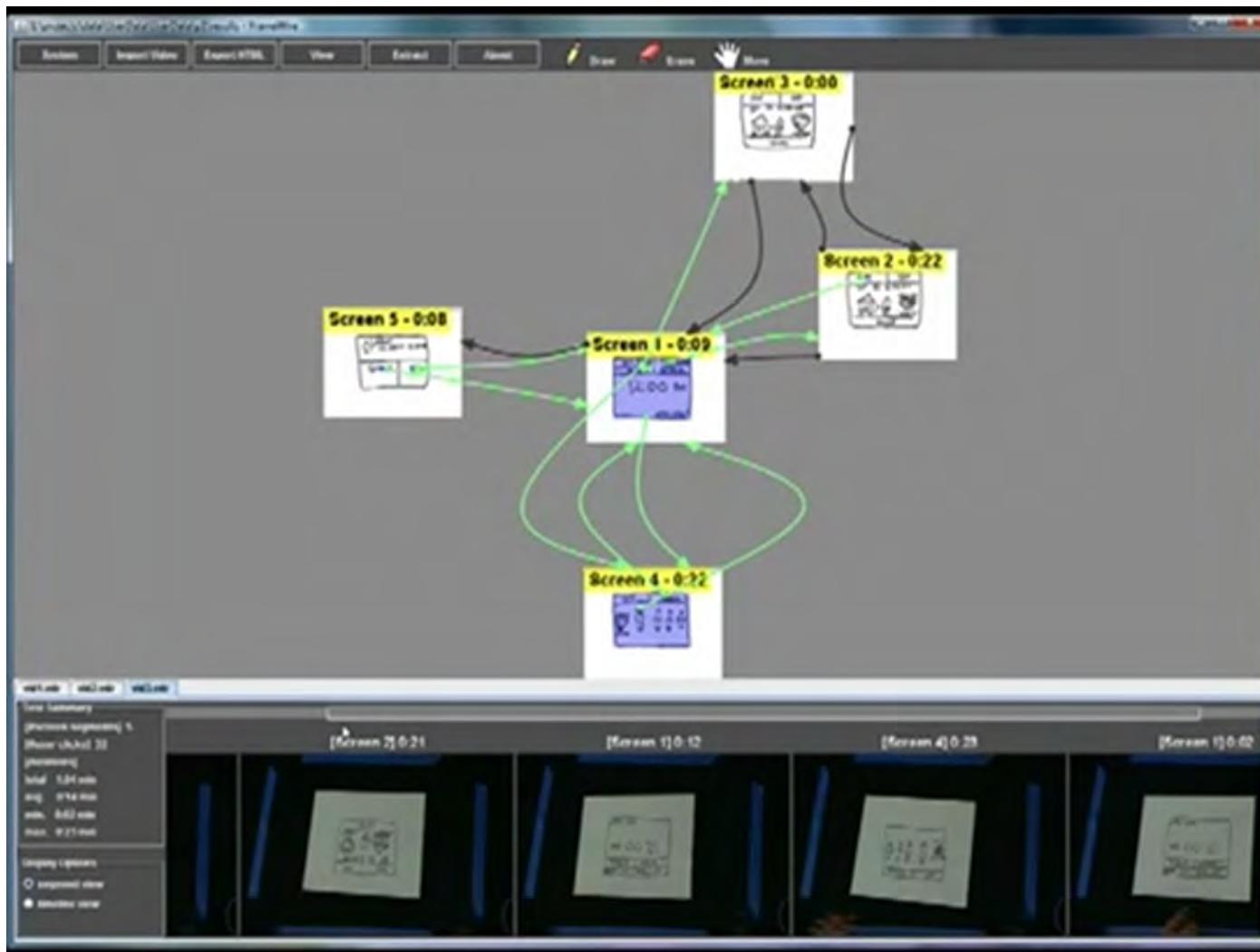
Low-Fidelity Is Not Just About Ink

# Topiary (2004)



Location Awareness, Wizard of Oz

# FrameWire (2010)



Tangible Interaction

# Sketch Wizard (2007)

## SketchWizard: Wizard of Oz Prototyping of Pen-based User Interfaces

Richard C. Davis  
U.C. Berkeley

T. Scott Saponas  
U. of Washington

Michael Shilman  
ChatterPop, Inc.

James A Landay  
U. of Washington  
Intel Research Seattle

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

UserZoom

TryMyUI

Validately

Userlytics

WhatUsersDo

Usertesting.com

YouEye

Unlikely you need to bake your own

Some include mobile testing

Crowds for automated testing in build processes

# 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

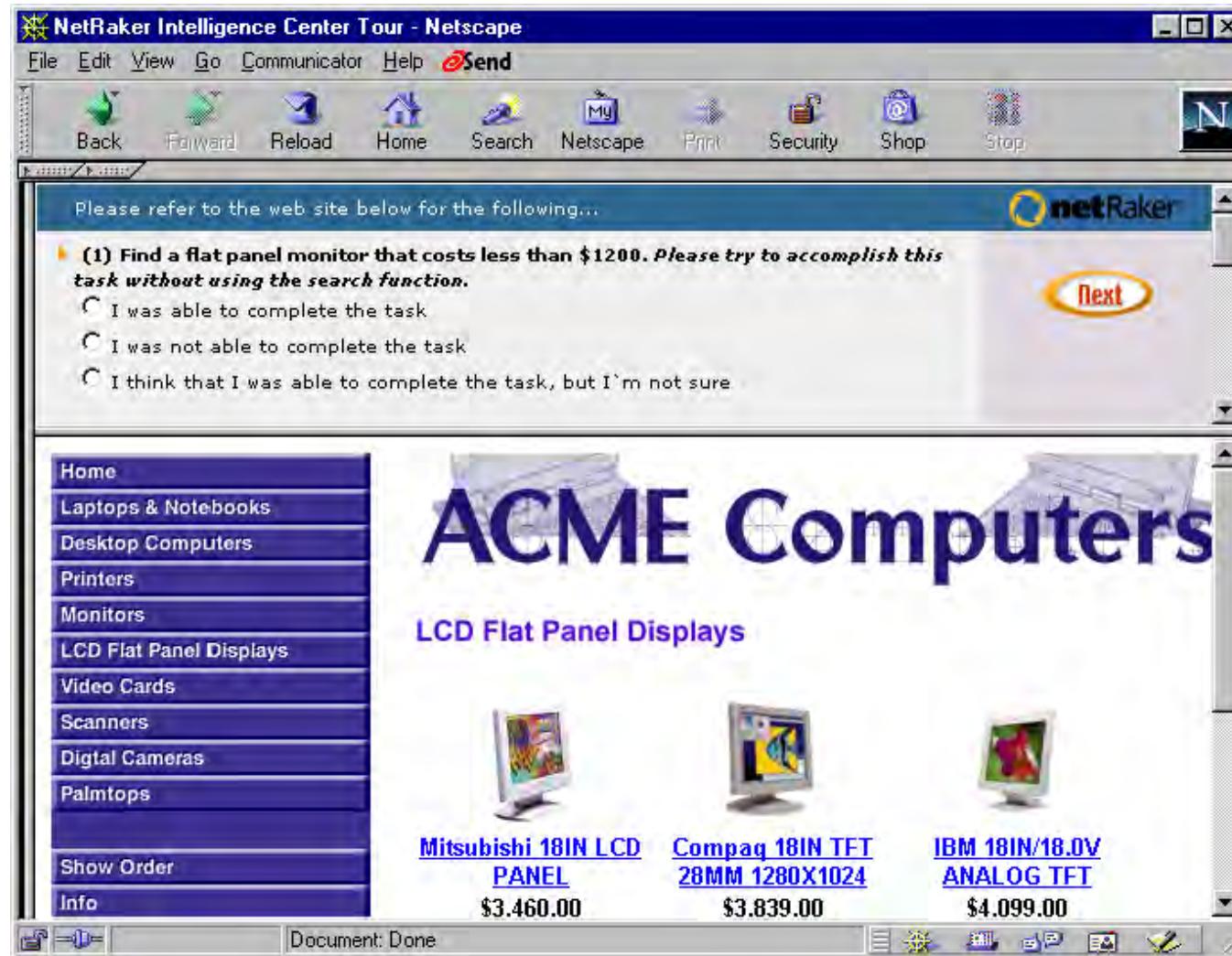
Analyze data individually or in aggregate

playback individual sessions

find general problem areas

if needed, look closely with traditional methods

# Semi-Automated Remote Usability



# Semi-Automated Remote Usability

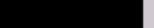
**NetRaker Intelligence Center Tour - Netscape**

File Edit View Go Communicator Help 

Back Forward Reload Home Search Netscape Print Security Shop Stop 

**Percentages      Totals      Respondents      Details      Demographics**

► 1. Find a flat panel monitor that costs less than \$1200. Please try to accomplish this task without using the search function.

Task	Response(s)
I was able to complete the task	90% 
I was not able to complete the task	10% 
I think that I was able to complete the task, but I`m not sure	0% 

**Response Times**

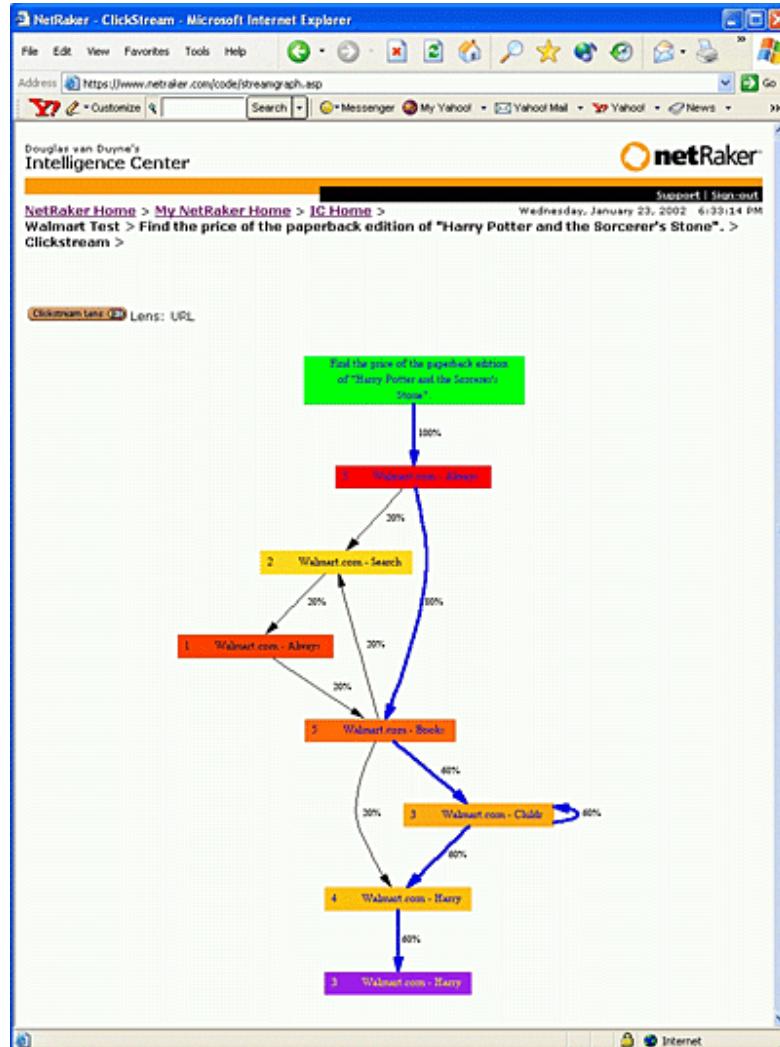
Fastest: 00:00:28  
Median: 00:00:41  
Average: 00:00:48.4  
Slowest: 00:01:14

► 2. What is the price of the monitor you just found?

**Short Freeform**

\$1129

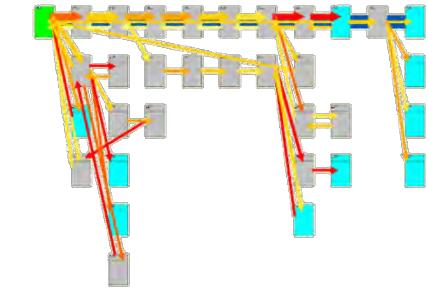
# Semi-Automated Remote Usability



# WebQuilt: Visual Analysis

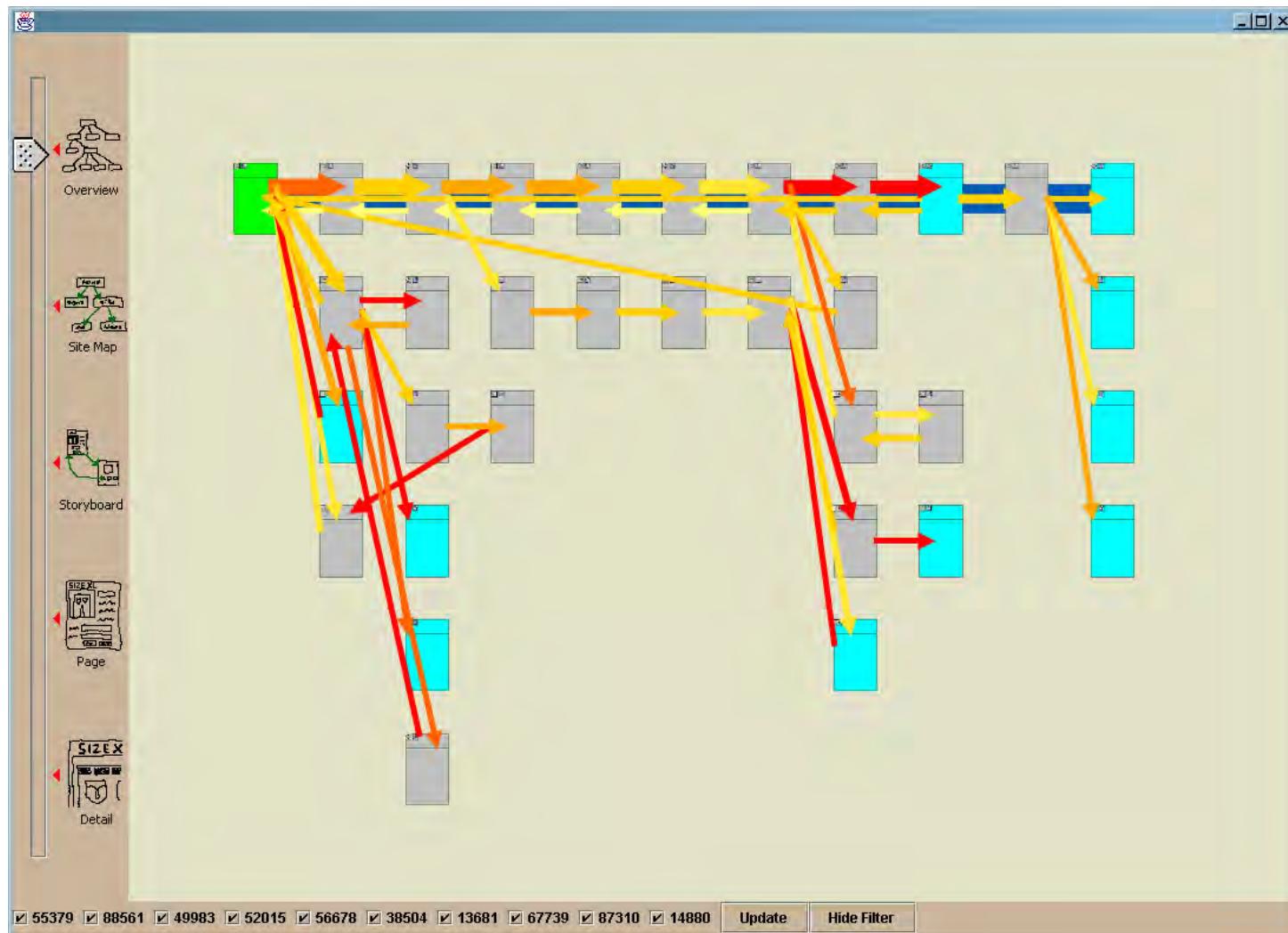
## Goals

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

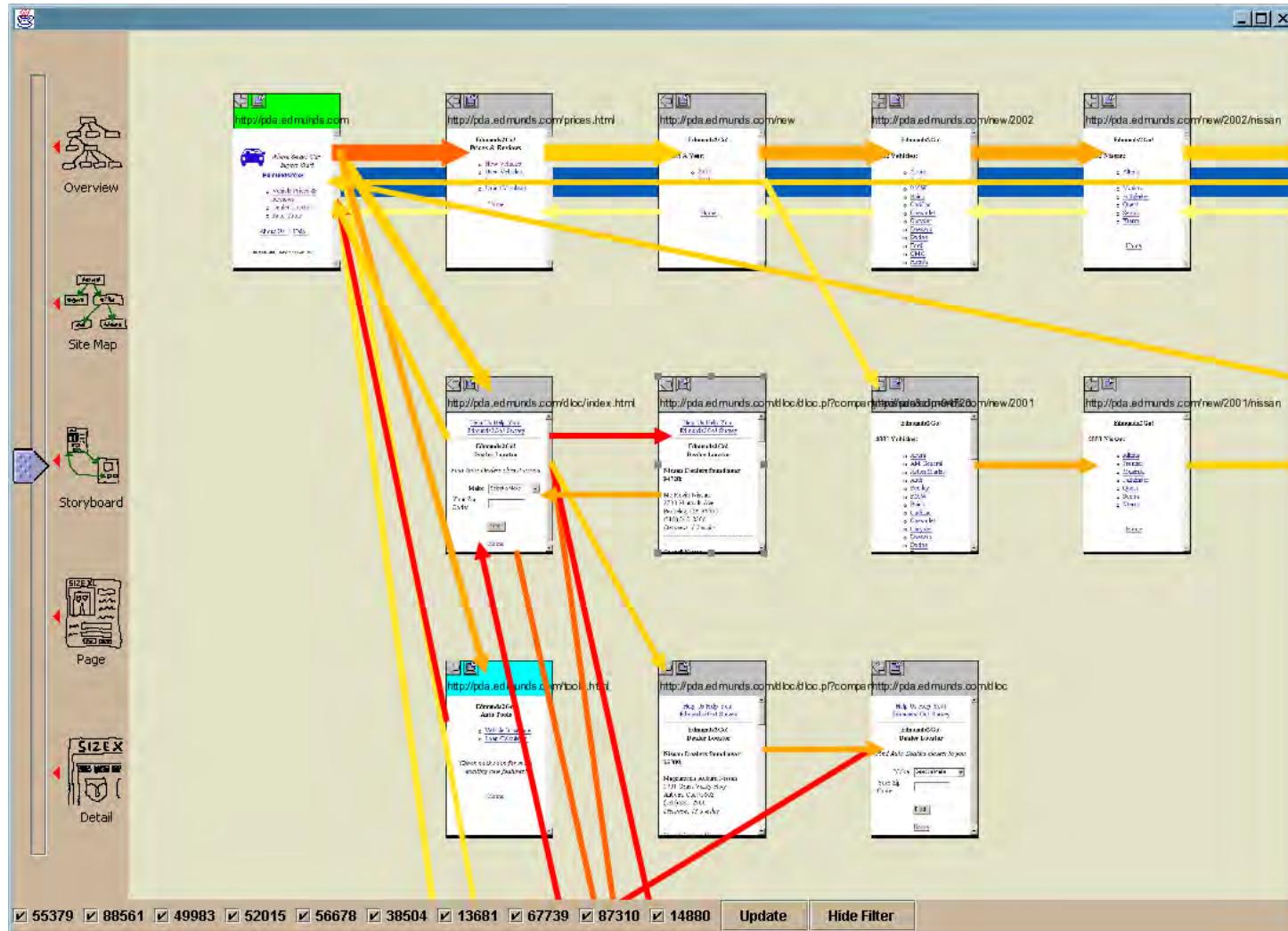


Interactive graph based on web content  
designers can indicate expected paths  
color code common usability interests  
filtering to show only target participants  
use zooming for analyzing at varying granularity

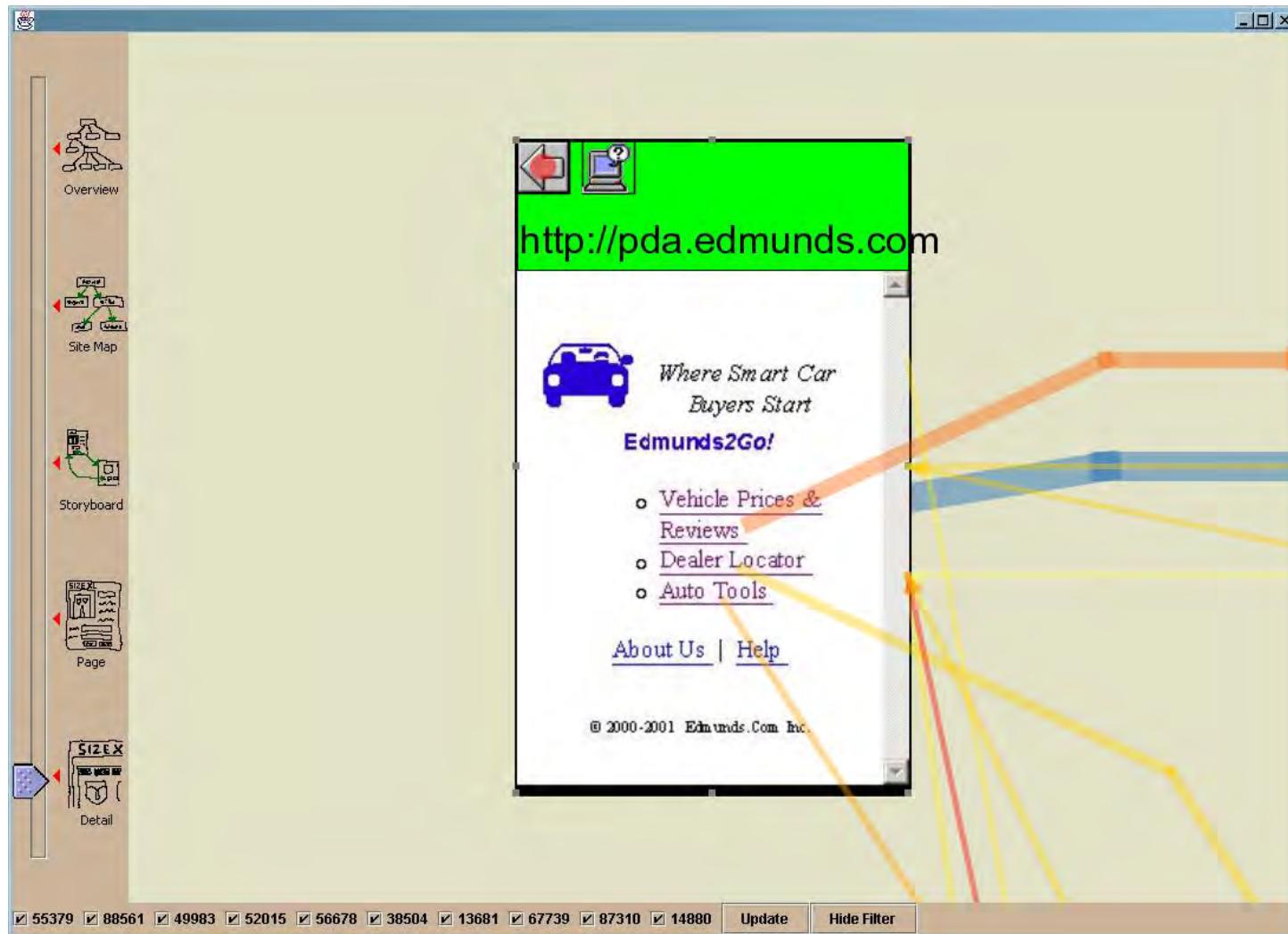
# WebQuilt: Visual Analysis



# 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

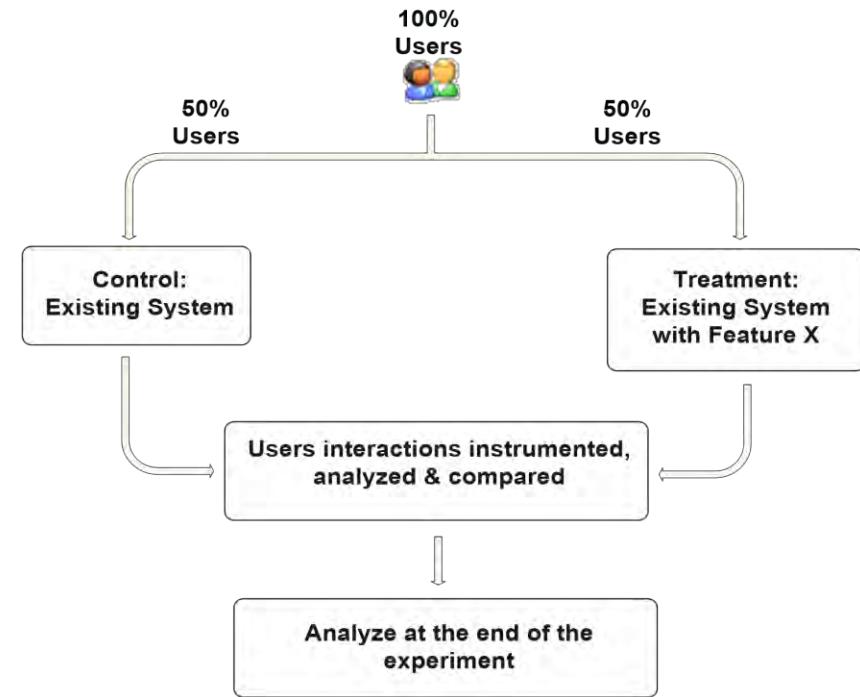
A/B tests or  
Control/Treatment

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

# 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

# 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?

The screenshot shows the Windows Marketplace interface. A red circle highlights the product listing for "Solitaire Master 2" by Egames. The listing includes a thumbnail image, the game title, developer information, a brief description mentioning 300 games including Klondike, Free Cell, Deuces Queens, Cats Cradle, Four Leaf Clover, Spider Web, and many more, and a price of \$12.99. Below the listing is a green "ADD TO CART" button.

A: Solitaire game

A is 61% better

The screenshot shows the Windows Marketplace interface. A red circle highlights the product listing for "5 Card Draw Poker" by Andrei Jurko. The listing includes a thumbnail image, the game title, developer information, a brief description mentioning it's one of the most popular poker variations, smart AI players, nice graphics and sound, and a price of \$9.95. Below the listing is a green "ADD TO CART" button.

B: Poker game

# Never Underestimate Solitaire

SIX CHIX

BY RINA PICCOLO



# Never Underestimate Solitaire

Candy Crush maker bought by Activision

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

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TECH ACTIVISION

Activision Acquires Candy Crush Maker King Digital For \$5.9 Billion 12:34 AM EST

Voters In This State Could Make Marijuana History Today 11:18 AM EST

Cisco's Chambers Issues a Warning 8:04 AM EST

Look at what is being sold to kids in school 8:00 AM EST

While cable TV "unbundles," streaming services bulk up 6:00 AM EST

Fast-Flying Drone Avoids Obstacles: Here's How 5:57 AM EST

Obama Slams Republicans Over CNBC Debate Drama 4:51 AM EST

Amazon Is Opening An Actual, Real-Life Bookstore 7:38 AM EST

Alphabet's Ambitions 2:36 AM EST

How Uber's Top Lawyer Wins Equal Pay For Women 7:35 AM EST

Xiaomi's expansion to Africa comes with concessions 7:22 AM EST

Why Activision Spent \$5.9 Billion on "Candy Crush" Creator King Digital 6:30 AM EST

Standard Chartered is the latest big bank to slash and burn 6:29 AM EST

Activision's candy crush and Tesla 3Q ~ 5 things to know today 6:14 AM EST

Here's why the company behind Keystone just asked for a delay 6:06 AM EST

Protestors occupy Airbnb HQ on eve of San Francisco vote 6:29 AM EST

How Google Co-founder Larry Page Decides On His Next Big Bet 2:20 AM EST

California Gov. Jerry Brown: Time is Running Out For Cleaner Energy 1:45 AM EST

Use Your AmEx Points to Book on Airbnb — Just Like With Hilton NOVEMBER 2, 2015

Theranos' Elizabeth Holmes Says The Company Will "absolutely" Get FDA Approval NOVEMBER 2, 2015

## Activision Acquires Candy Crush Maker King Digital For \$5.9 Billion

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

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Theranos' Elizabeth Holmes Says The Company Will "absolutely" Get FDA Approval NOVEMBER 2, 2015

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

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

Is Candy Crush over? Photo: Andrew Harrer — Bloomberg/Getty Images

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

Doctor FootCare™

Home | Products | Learn More | Tips | Testimonials | FAQ | About Us | Contact Us 1-866-211-9733

Shop With Confidence

Satisfaction Guaranteed  30-day, hassle-free Returns

100% Safe, **Secured** shopping  We assure your Privacy

100% Secured Checkout

Item Name	Item Number	Quantity	Remove	Unit Price	Subtotal
Trial Kit	FFCS	1	<input type="button" value="Remove"/>	\$0.00	\$0.00

Total: \$0.00

Select Shipping Method: Standard (\$5.95)

B

Doctor FootCare™

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100% Secured Checkout

Item Name	Item Number	Quantity	Remove	Unit Price	Subtotal
Trial Kit	FFCS	1	<input type="button" value="Remove"/>	\$0.00	\$0.00

Total: \$0.00

Enter Coupon Code:

Select Shipping Method: Standard (\$5.95)

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**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

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100% Secured Checkout

Item Name	Item Number	Quantity	Remove	Unit Price	Subtotal
Trial Kit	FFCS	1		\$0.00	\$0.00

Update Total: \$0.00

Select Shipping Method Standard (\$5.95)

Continue Shopping > Proceed To Checkout

100% Secured Checkout Recalculate Continue Shopping > Proceed To Checkout

Home | Products | Learn More | Tips | Testimonials | FAQ | About Us | Contact Us | Shopping Cart

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100% Safe, **Secured** shopping  We assure your Privacy

100% Secured Checkout

Item Name	Item Number	Quantity	Remove	Unit Price	Subtotal
Trial Kit	FFCS	1		\$0.00	\$0.00

Discount Total: \$0.00

Enter Coupon Code

Select Shipping Method Standard (\$5.95)

Continue Shopping > Proceed To Checkout

100% Secured Checkout Recalculate Continue Shopping > Proceed To Checkout

Home | Products | Learn More | Tips | Testimonials | FAQ | About Us | Contact Us | Shopping Cart

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**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**

The image shows two versions of a checkout page, labeled A and B, side-by-side. Both pages have a blue header with the logo 'Doctor FootCare™' and a navigation bar with links: Home, Products, Learn More, Tips, Testimonials, FAQ, About Us, Contact Us, and a phone number 1-866-211-9733. Below the header is a section titled 'Shop With Confidence' containing four checked checkboxes: Satisfaction Guaranteed, 30-day, hassle-free Returns, 100% Safe, Secured shopping, and We assure your Privacy.

Both pages feature a yellow '100% Secured Checkout' banner with a lock icon. Below it is a table showing a single item: Trial Kit, Item Number FFCS, Quantity 1, Unit Price \$0.00, and Subtotal \$0.00. There is an 'Update' button and a 'Total: \$0.00' button. To the right of the table are two buttons: 'Continue Shopping' and a yellow 'Proceed To Checkout' button.

At the bottom of each page is a footer with links: Home, Products, Learn More, Tips, Testimonials, FAQ, About Us, Contact Us, and a 'Shopping Cart' link. The footer also includes a copyright notice: Copyright © 2003 Doctor Foot Care Inc. All Rights Reserved. [Privacy Policy](#).

Red circles highlight several elements across both pages:

- A red circle surrounds the 'Continue Shopping' button on both pages.
- A red circle surrounds the yellow 'Proceed To Checkout' button on both pages.
- A red circle surrounds the 'Shopping Cart' link in the footer of both pages.
- A red circle surrounds the 'Proceed To Checkout' button in the '100% Secured Checkout' banner on both pages.
- A red circle surrounds the 'Enter Coupon Code' input field on page B.
- A red circle surrounds the 'Recalculate' button on page B.

Coupon Code decreases by factor of 10

# Office Online Feedback

A

Please let us know if this content was helpful.

Rate this content:



Tell us why you rated the content this way (optional):

Remaining characters: 650

Submit

B

How helpful was this information?

Click a star.

Not  
helpful



Very  
helpful

Click to rate: 3 out of 5 stars

How helpful was this information?

Click a star.

Not  
helpful



Very  
helpful

Why did you rate the information this way?

Remaining characters: 650

Submit

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

Please let us know if this content was helpful.

Rate this content:



Tell us why you rated the content this way (optional):

Remaining characters: 650
Submit

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.

B

How helpful was this information?

Click a star.

Not  
helpful



Very  
helpful

**Click to rate: 3 out of 5 stars**

How helpful was this information?

Click a star.

Not  
helpful



Very  
helpful

Why did you rate the information this way?

Remaining characters: 650
Submit

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

Was this information helpful?

Yes    No    I don't know

How was this information helpful?

What are you trying to do?

How can we make this information more helpful?

Back    Submit

Back    Submit

Back    Submit

# Another Feedback Variant

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

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

C

Was this information helpful?

Yes    No    I don't know

How was this information helpful?

What are you trying to do?

How can we make this information more helpful?

Back    Submit

Back    Submit

Back    Submit

C outperforms B by a factor of 3.5

# Office Online

## Clicks on revenue generating links (red links)

A

Online Build Ver: 12.0.5572.1000

Products Help and How-to Downloads Clip Art Templates Microsoft Office Live

Welcome to Office Online Search

Read the Inside Office Online blog Make your own help video Check for Updates

Community Clips Office Updates

Today on Office Online

Get out of town! Find out how Office makes travel easy

Check out our tips and templates for planning a smooth business trip, or perfect holiday.

Free travel templates

Business trip itinerary with meeting details

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Find training Get started All training

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Work At work Small business

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Training Office training courses Office demos

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MICROSOFT

B

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MICROSOFT

# Office Online

## Clicks on revenue generating links (red links)

A

Online Build Ver: 12.0.5572.1000

Products Help and How-to Downloads Clip Art Templates Microsoft Office Live

Welcome to Office Online Search

Read the Inside Office Online blog Make your own help video Check for updates

Community Clips Office Updates

Today on Office Online

Get out of town! Find out how Office makes travel easy

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Free travel templates

Business trip itinerary with meeting details

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B

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Microsoft

A gets many more clicks

# Office Online

## Clicks on revenue generating links (red links)

A

Office Online Build Ver: 12.0.5572.1000

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Free travel templates

Business trip itinerary with meeting details

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Work At work Small business

Community Share your templates Get help from others

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Microsoft

B

Office Online

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SEARCH

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Create documents, notes, spreadsheets and presentations with speed and ease

... just \$149.95

BUY NOW

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Word Excel PowerPoint OneNote

Compare all 2007 Office suite prices and products >

Get out of town! Find out how Office makes travel easy

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Microsoft

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

**Shopping**

- Lancôme: Free deluxe compact w/ purchase
- Special promotions at your favorite stores
- Warm fall fashion styles are here
- Save on top brand digital cameras
- Free shipping on furniture for every room

Advertisements

**A smart way to buy a diamond**

- Wal-Mart: Back-to-school
- Our editor picks budget electronics
- Get fit & save money: Sports sale

Control

**Shopping**

- Lancôme: Free deluxe compact w/ purchase
- Special promotions at your favorite stores
- Warm fall fashion styles are here
- Save on top brand digital cameras
- Free shipping on furniture for every room

Advertisements

**A smart way to buy a diamond**

- Wal-Mart: Back-to-school
- Our editor picks budget electronics
- Get fit & save money: Sports sale

**Offers**

**Search GM Certified**

With our 117-Point Inspection  
GM Certified means no worries

**Online University**

Earn degree from a top school  
100% Online. Get Free Info!

**\$200k Loan, Get Low Rates**

Secure Financing and Increase  
Cash Flow. Click Here Now!

Treatment

# Experiment Results

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

# 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

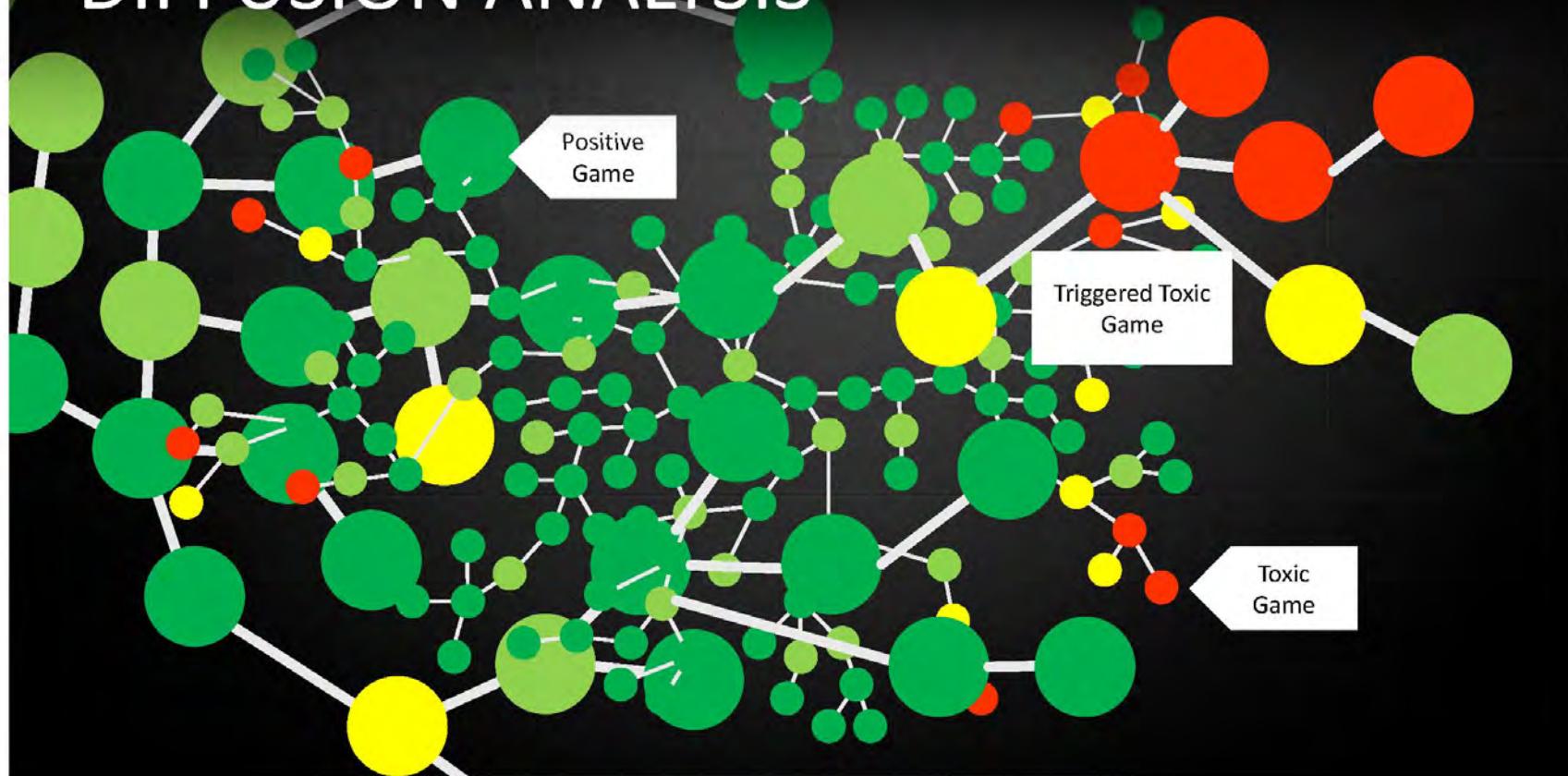
# **ONLINE PLATFORMS**

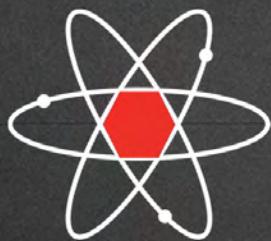
## AS THE FUTURE OF RESEARCH



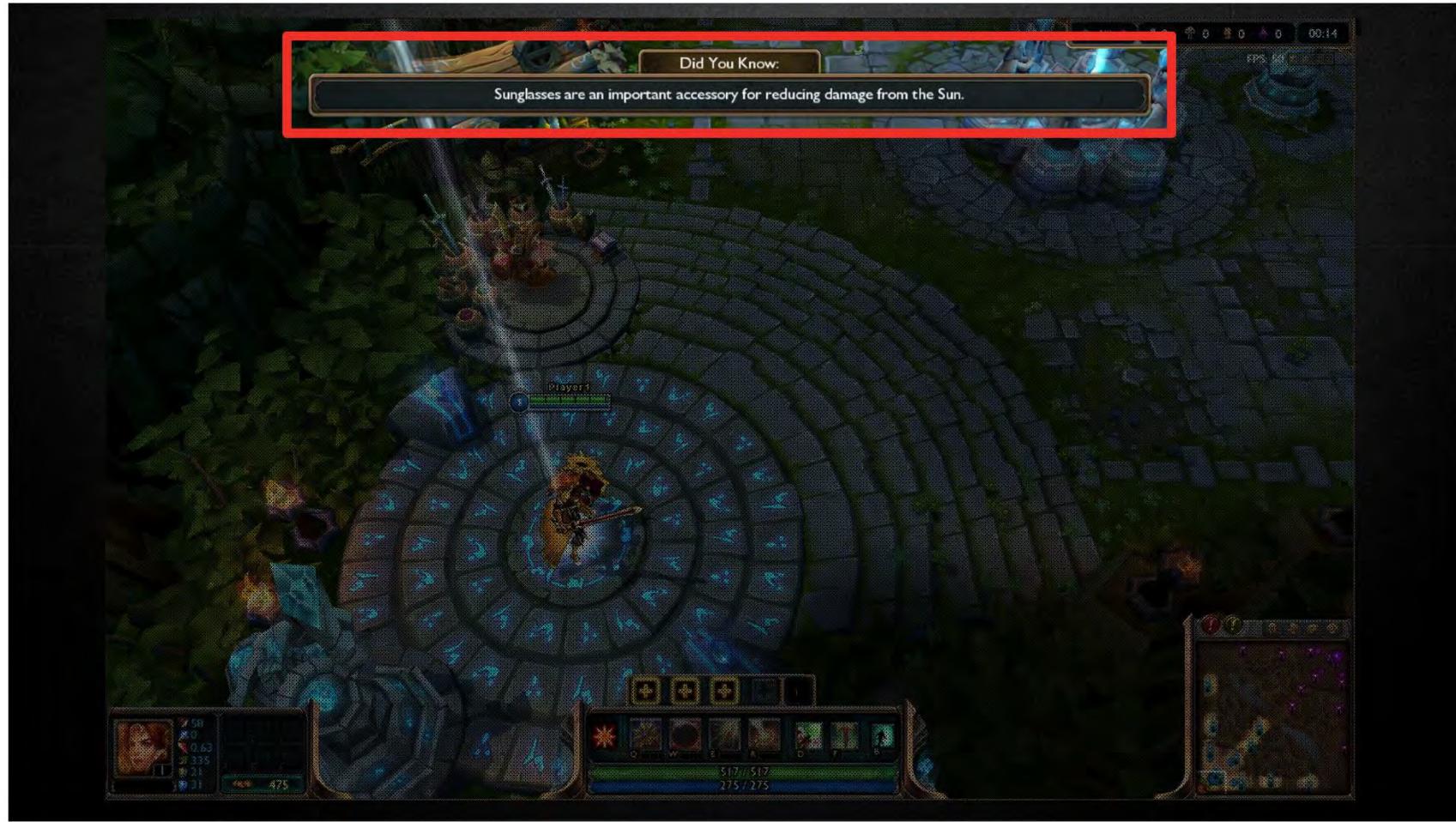
JEFFREY “LYTE” LIN  
[jlin@riotgames.com](mailto:jlin@riotgames.com) | @RiotLyte

# DIFFUSION ANALYSIS





# **OPTIMUS PRIME EXPERIMENT**



# 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

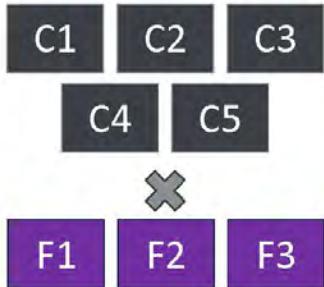


## CATEGORY 5: GAMEPLAY TIPS

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

# OPTIMUS PRIME

## EXPERIMENTAL DESIGN



## FONT COLORS

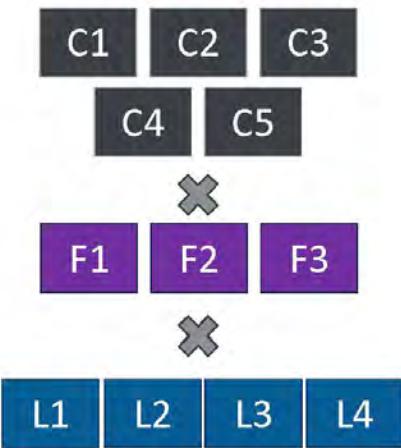
Font Color 1 | Red

Font Color 2 | Blue

Font Color 3 | White (Control)

# OPTIMUS PRIME

## EXPERIMENTAL DESIGN

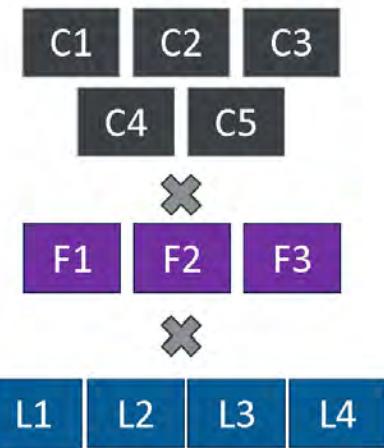


## LOCATIONS

- 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

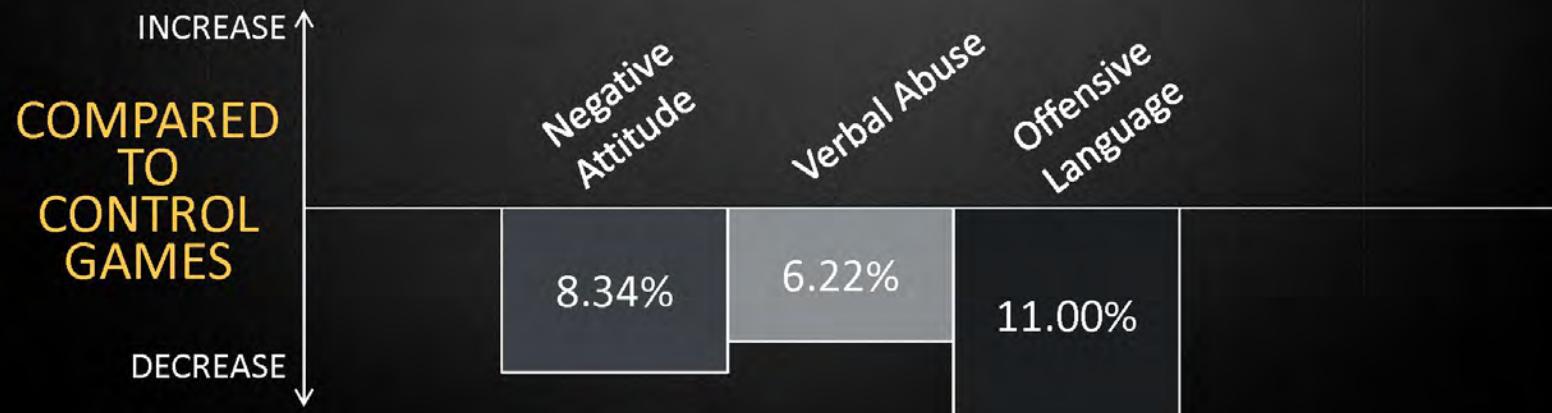
HOW DO **FONT COLORS** INTERACT  
WITH TIP CATEGORIES?

# OPTIMUS PRIME RESULTS

**TIP:** “Teammates perform worse if you harass them after a mistake.”

**FONT:** Red

**LOCATION:** Loading Screen



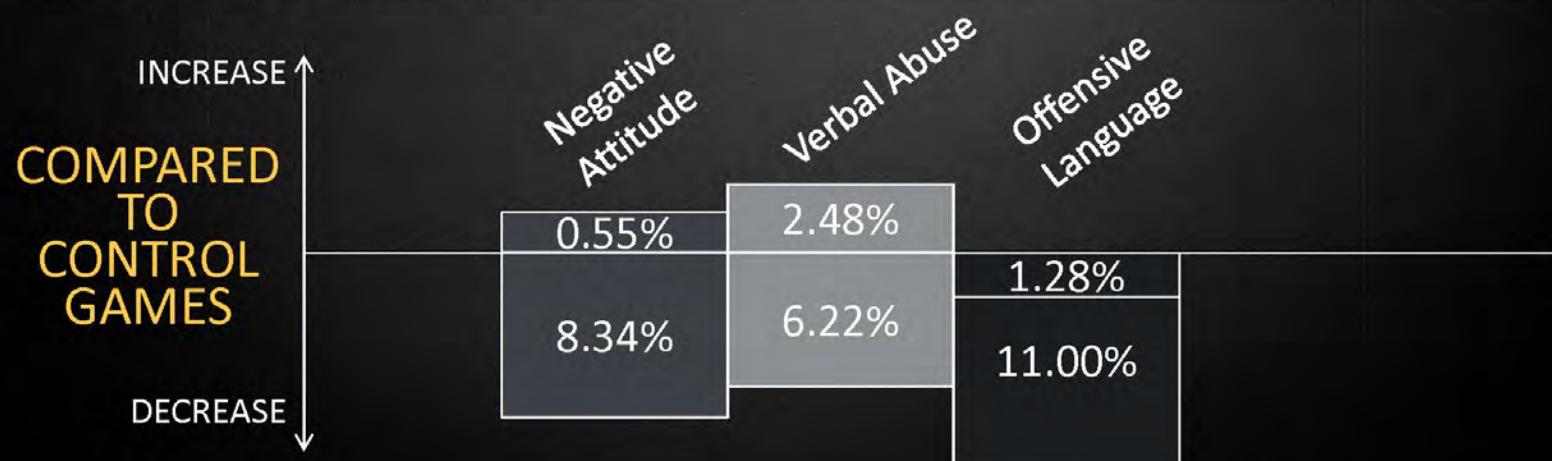
\*Optimus data from 11/2012

# 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



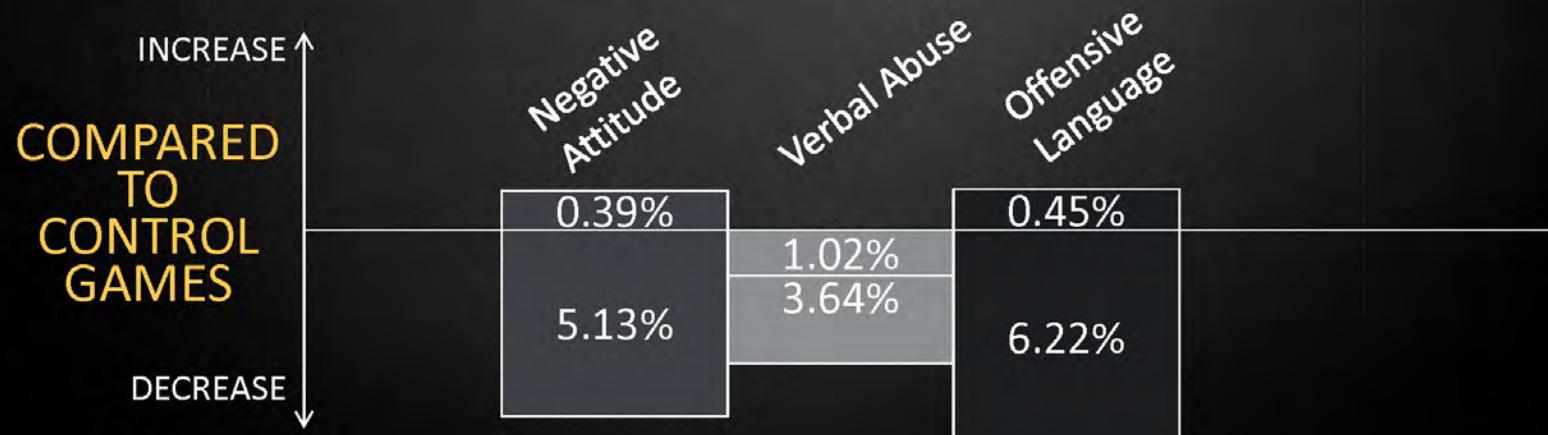
\*Optimus data from 11/2012

# OPTIMUS PRIME RESULTS

**TIP:** “Players who cooperate with their teammates win X% more games.”

**FONT:** Red

**LOCATION:** Loading Screen



\*Optimus data from 11/2012

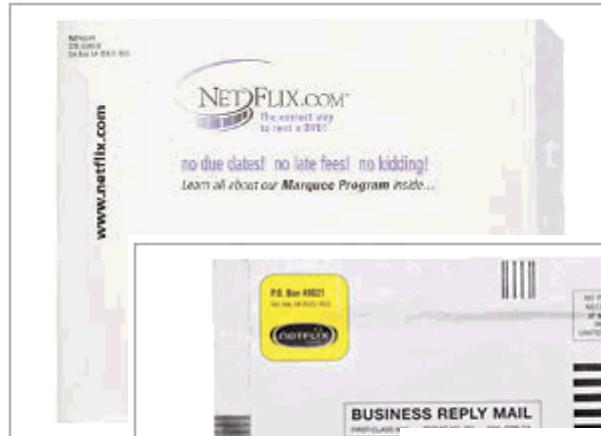
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## AS THE FUTURE OF RESEARCH

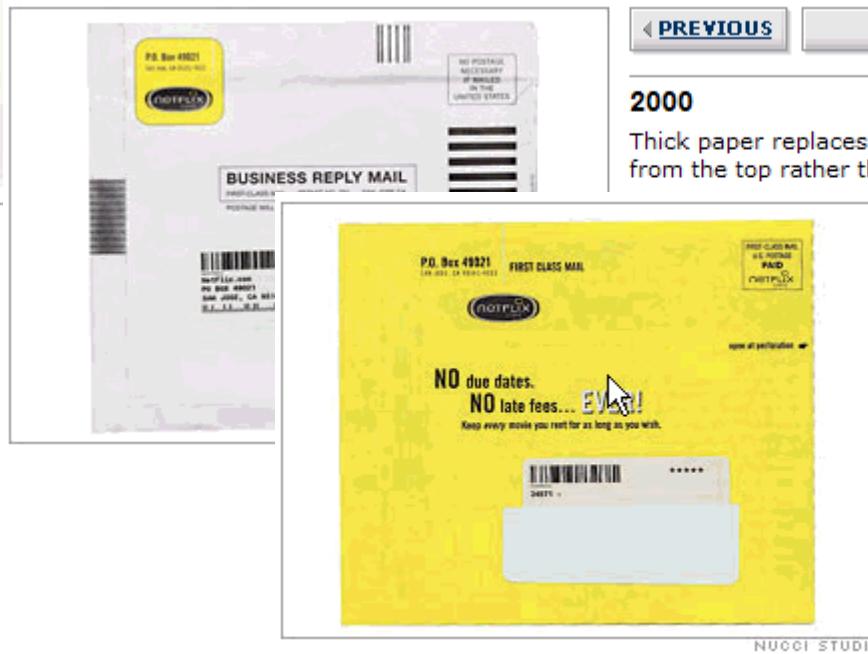


JEFFREY “LYTE” LIN  
[jlin@riotgames.com](mailto:jlin@riotgames.com) | @RiotLyte

# 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.



[PREVIOUS](#)

[NEXT](#)

[Back to story](#)

**2001**

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



NUCCI STUDIO

[NEXT»](#)

# Data Driven Methods Not Just Online

The image displays four sequential prototypes of Netflix mailers, each with a red background and the word "NETFLIX" printed on it. The prototypes illustrate a progression in design:

- 2001:** Shows a horizontal slot for inserting discs. The text indicates that foam padding was dropped because the benefits don't justify the cost.
- 2001:** Shows a vertical slot for side-loading discs. The text notes that this is a direct ancestor of the current design.
- 2003:** Shows a circular window sticker on the top edge.
- 2004:** Shows a larger rectangular window at the top center, labeled "NUCCI STUDIO".

Each prototype includes a "PREVIOUS" and "NEXT" navigation button, a "Back to story" link, and a small "NUCCI STUDIO" credit at the bottom right of the fourth prototype.

# 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

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Our Price	List Price
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\$11.25

\$24.99

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## Weezer (2001)

[Weezer](#)

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 045Standard shipping ([USPS Media Mail](#)) for this item is \$2.30.[Like New](#) [Sorted by Price](#)

74 items in stock

Price	Total Price	Seller (Rating)	Seller Comments	
<b>\$7.75</b>	<b>\$10.20</b>	<a href="#">custodian46</a> (149)	best buy	<a href="#">More info...</a>
<b>\$8.00</b>	<b>\$10.45</b>	<a href="#">stargaze13</a> (3)	Disk, case, and liner all in excellent c <a href="#">more...</a>	<a href="#">More info...</a>
<b>\$8.25</b>	<b>\$10.70</b>	<a href="#">dazzyliz</a> (1205)	SEALED NEW BMG	<a href="#">More info...</a>
<b>\$8.30</b>	<b>\$10.75</b>	<a href="#">naojia@hotmail.com</a> (35)	Perfect condition	<a href="#">More info...</a>

[» View all Like New Items](#)[Very Good](#) [Sorted by Price](#)

17 items in stock

Price	Total Price	Seller (Rating)	Seller Comments	
<b>\$8.00</b>	<b>\$10.45</b>	<a href="#">lucidsky</a> (14)	perfect	<a href="#">More info...</a>
<b>\$8.84</b>	<b>\$11.29</b>	<a href="#">steveeq1</a> (82)		<a href="#">More info...</a>
<b>\$9.00</b>	<b>\$11.45</b>	<a href="#">saint.timothy</a> (18)	Great shape...first class ship	<a href="#">More info...</a>

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3

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(CD, 1996)

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Sum 41, Sum 41

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## Shopping Cart

**Weezer (2001)** Weezer, Weezer (Music)

CD, Release Year: 2001

Seller: [naojia@hotmail.com](mailto:naojia@hotmail.com) (35)

Condition: Like New • Notes: Perfect condition

Item: \$8.30

Media Mail: \$2.45

[\(Change Shipping Method\)](#)[Move to WishList](#) • [Remove from Cart](#) • [Find another one](#)**TOTAL: \$10.75**

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Ship my order to:

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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**

6

Checkout

1 Shipping

2

3 Place Order

Secure  
Shipping**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**

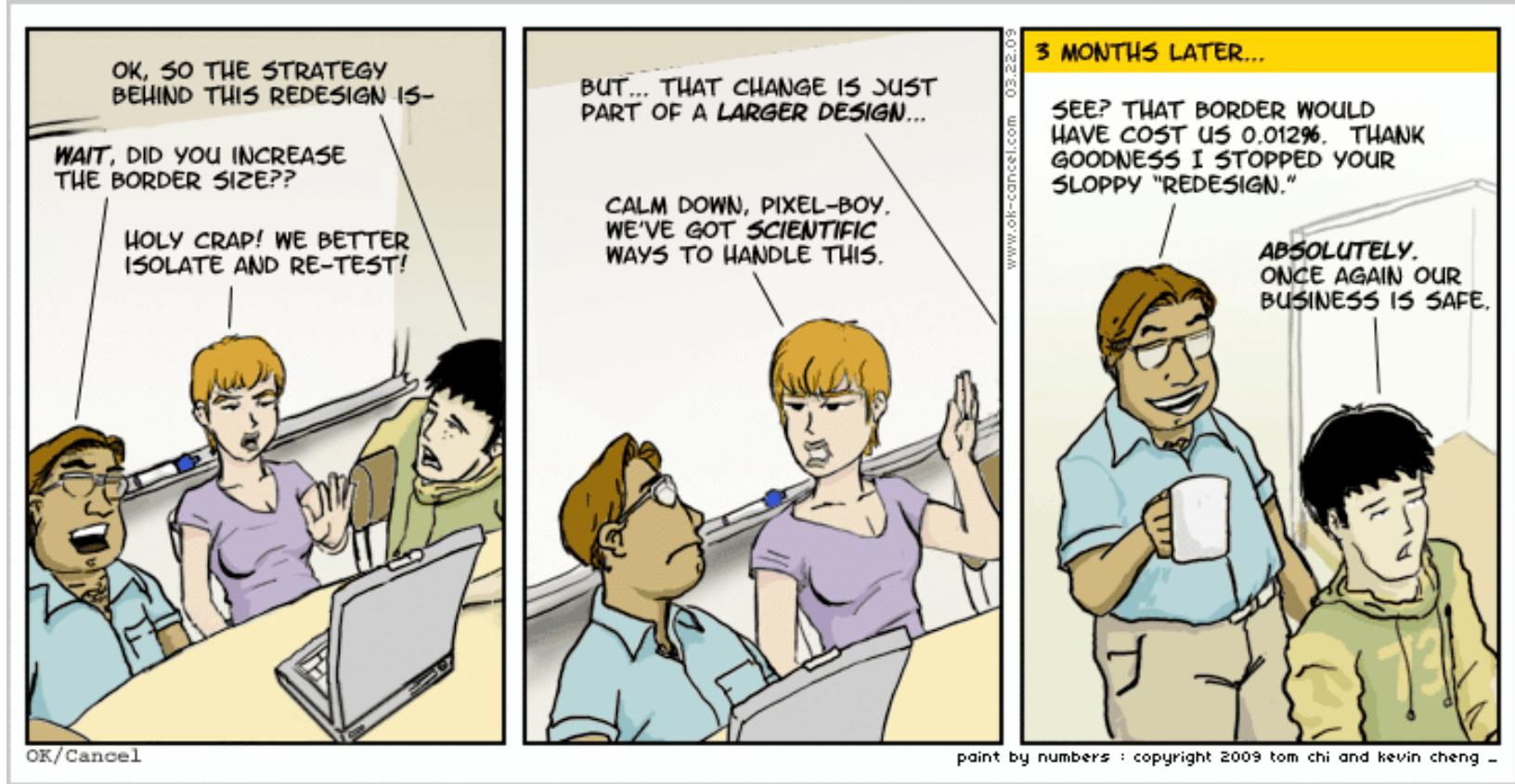
MasterCard ending with 0155  
Expires 11/2003  
Zipcode: 94709

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# Testing in a Larger Design



S Goodbye, Google | Stopdesign.com

stopdesign creative outlet of Douglas Bowman

home about also  
posts & links background info 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

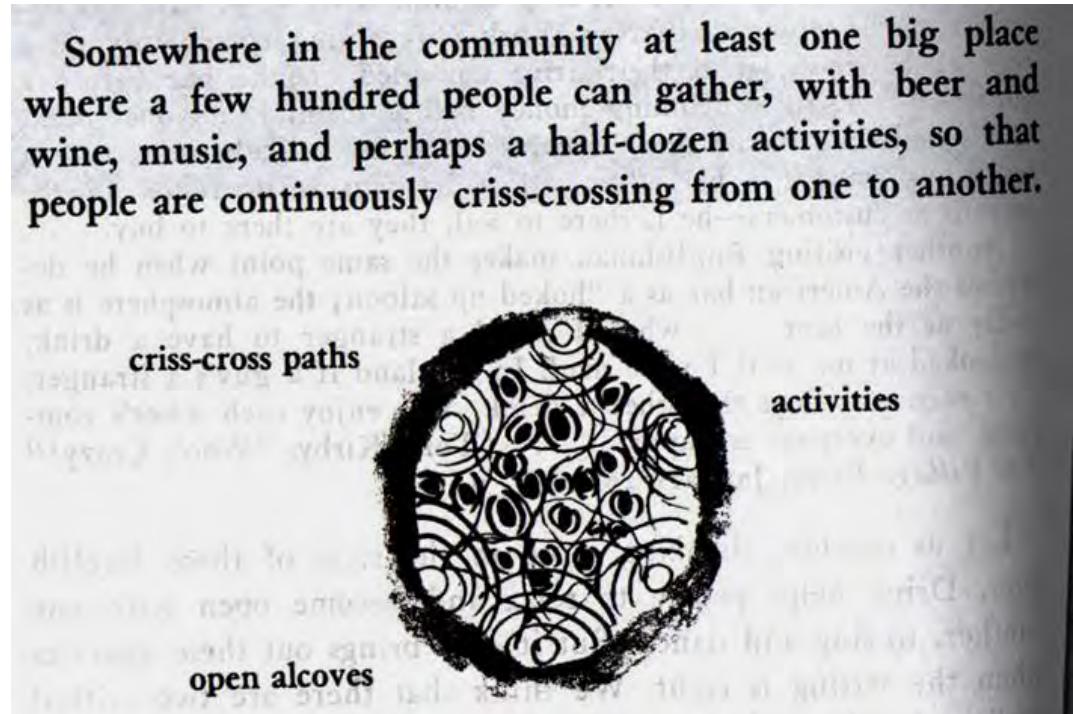
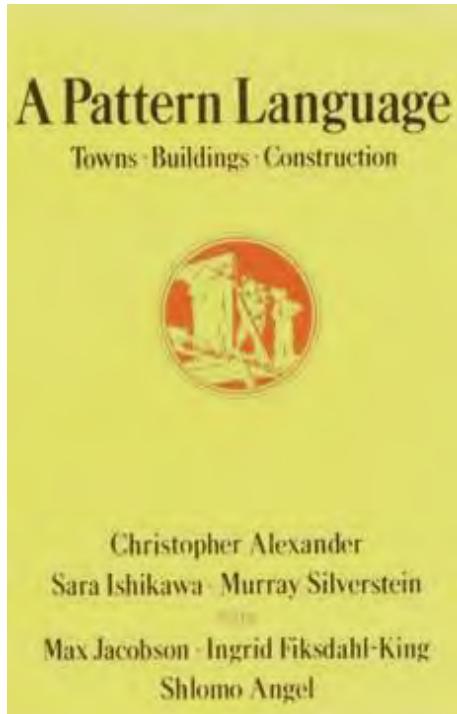
But this is also why we point you at research

# 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.

criss-cross paths



activities

open alcoves

# 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

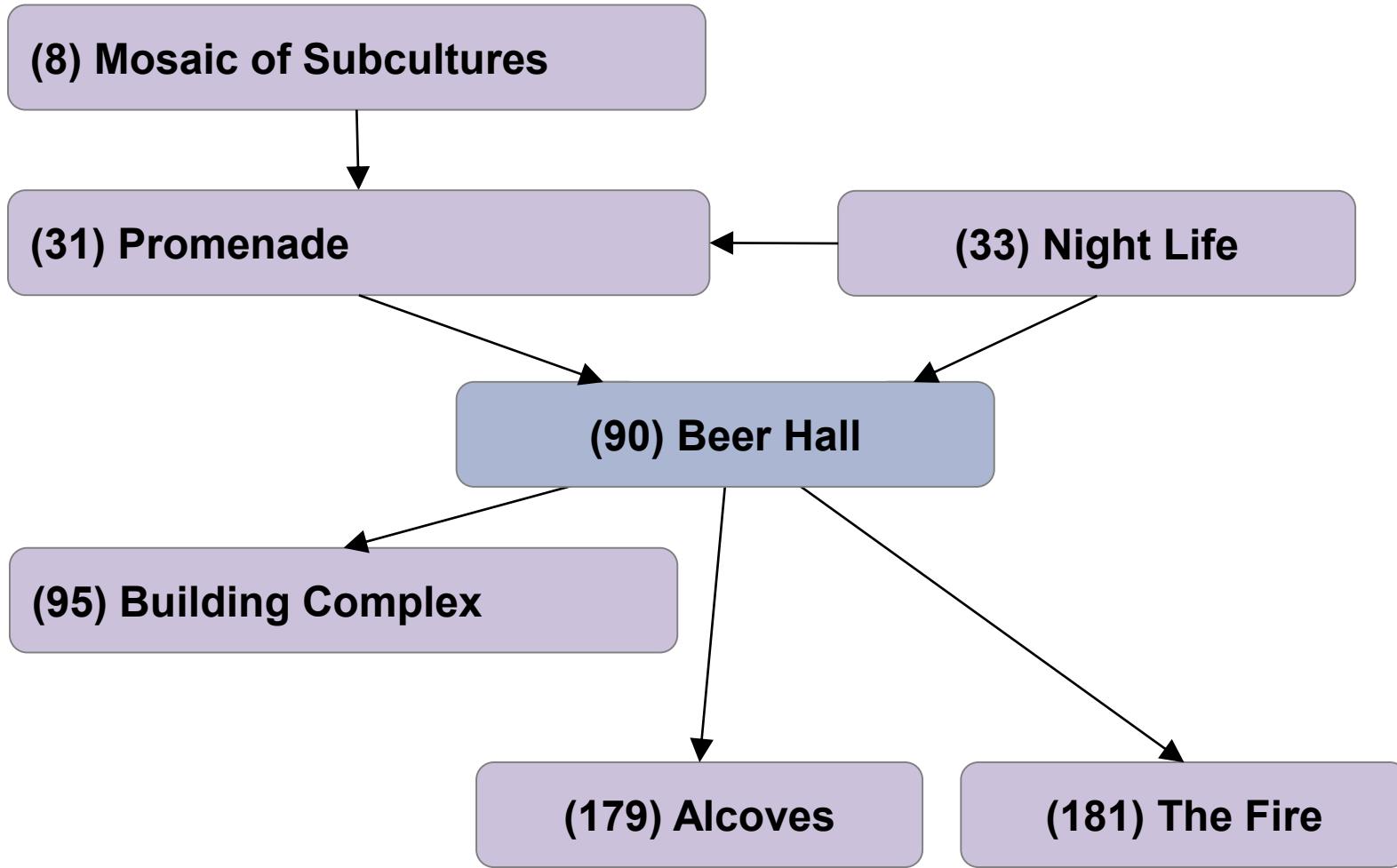
for “building and planning towns,  
neighborhoods, houses, gardens, and rooms”

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



Cities  
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1. Don't Let Go
2. Photograph
3. Hashpipe
4. Island In The Sun
5. Crab
6. Knock-Down Drag-Out
7. Smile
8. Simple Pages
9. Glorious Days
10. O Girlfriend

**Album Credits**

Ken Allerdyce, Engineer  
Ric Ocasek, Producer

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**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 2001  
 Ranked #13 in AP's 25 Best Albums of 2001  
 beast...Rolling Stone (6/7/01, p.110) - 4 excellent tunes in less than half an hour  
 Rivers Cuomo's shrink another hot tub...On the observed power pop of their '94 debut, a

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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](#).

② Having problems signing in? [Get help now.](#)

For more information about sign in, visit [sign in help](#).

Or sign in to eBay using:



- **What if I don't have a User ID?**
- **What if I forgot my password?**
- **SIGN-IN/NEW ACCOUNT options**



### Step 1 - Choose Shipping Address

Ship my order to:

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

[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](#)

1 Shipping

Checkout

2

3

Secure  
Shipping**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

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

ZIP code

Country

**Save Changes****• What site?**

- Logo, layout, color, fonts

**• Where in site?**

- Checkout, step 1 of 3
- “Choose shipping address”
- **QUICK-FLOW CHECKOUT**



### 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

State

ZIP code

Country

USA

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

### • This is a PROCESS FUNNEL

- Extraneous info and links removed to focus customers

**Save Changes**

 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!

6

Checkout  
1 Shipping    2    3 Place Order



Place my order!

### Order Summary

Weezer (2001) Weezer, Weezer (Music)  
Seller: naojia@hotmail.com (35)  
Condition: Like New • Notes: Perfect condition

### Ship to

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

[Edit / Change Shipping Address](#)

- **Last step of process**

- Step 3, “Place Order”
- “Place my order” button

- **Two HIGH-VISIBILITY ACTION BUTTONS for fold**

[Edit / Change Billing](#)

Use this shipping and billing information for my future Check out settings.

Place my order!



- **No nasty surprises**

- Can see order
- Total price is same as shopping cart
- **ORDER SUMMARY**

**order!**

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!

A red rectangular button with white text and a yellow starburst graphic on the left.



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

**order!**

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: 94700

[Edit / Change Billing](#) Use this shipping and billing information as my Speedy Checkout settings.

# Web Design Patterns

Communicate design  
problems & solutions

how to create navigation bars  
for finding relevant content

how to create a shopping cart  
that supports 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

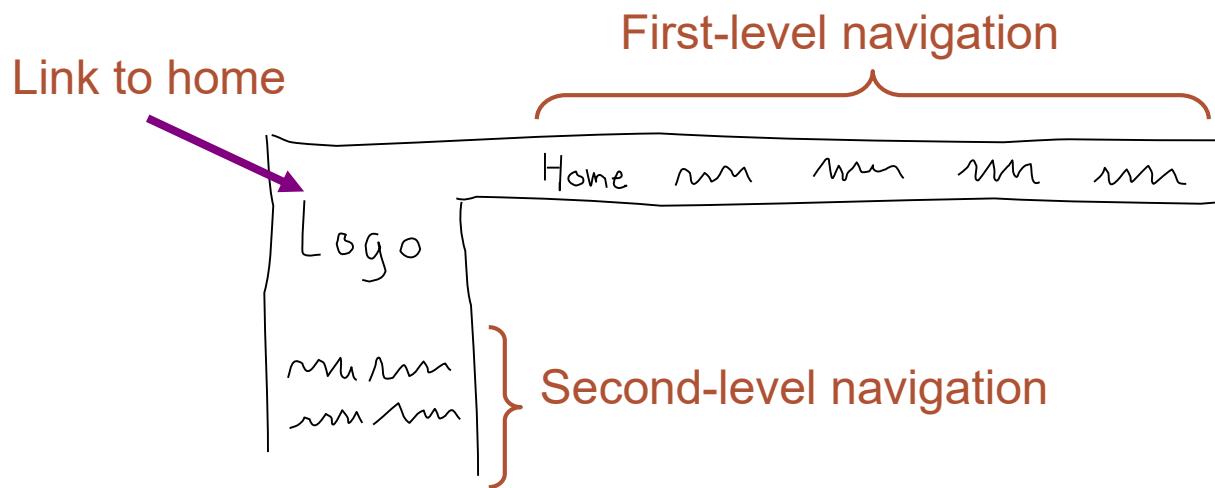
The image displays three examples of navigation bars, each enclosed in a red rectangular border:

- Group for User Interface Research:** A dark brown header bar with a stylized profile icon on the left. The text "Group for User Interface Research" is displayed. To the right are five menu items: "Home", "Projects" (which is bolded), "People", "Publications", and "Links".
- DENIM and SILK:** A light gray sidebar on the left contains links: "DENIM and SILK", "Download Documentation", "Support", "Research", "Publications", and "More Projects".
- IBM:** A blue header bar with the "IBM" logo and "United States" text. Below it is a dropdown menu titled "Select a country" with options: "Industries" (selected), "Home / home office", "Small business", "Medium business", "Government", and "Education". To the right, there's a search bar and a "Search" button. The main content area features a laptop image and the slogan "Buy today, ship today".

# NAVIGATION BAR (K2)

Solution diagram

Captures essence on how to solve problem



# Pattern Groups

## Patterns organized by group

- |   |                        |   |                       |
|---|------------------------|---|-----------------------|
| A | Site genres            | G | Advanced ecommerce    |
| B | Navigational framework | H | Completing tasks      |
| C | Home page              | I | Page layouts          |
| D | Content management     | J | Search                |
| E | Trust and credibility  | K | Page-level navigation |
| F | Basic ecommerce        | L | Speed                 |
|   |                        | M | The mobile web        |

# PROCESS FUNNEL (H1)

Problem:

Need a way to help people complete highly specific stepwise tasks

Ex. Create a new account

Ex. Fill out survey forms

Ex. Check out

# PROCESS FUNNEL (H1)

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

my account  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:

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)

[Redeeming a Gift Certificate or Coupon?](#)

[Proceed to Checkout](#)   
[Speedy Checkout](#)

**Shopping Cart**

**Weezer (2001)** Weezer, Weezer (Music)  
CD, Release Year: 2001  
Seller: [naotis@hotmail.com](#) (35)  
Condition: Like New • Notes: Perfect condition

Item: \$8.30  
Media Mail: \$2.45  
([Change Shipping Method](#))

[Move to WishList](#) • [Remove from Cart](#) • [Find another one](#)

**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](#)

# PROCESSES

- What's different?

- No tab rows
- No impulse buys
- Only navigation on page takes you to next step

The screenshot shows a web browser window for the half.com website. At the top, there is a header with the half.com logo and a "Checkout" button. Below the header, a progress bar indicates "Step 1 Shipping" and "Step 2". To the right of the progress bar is a "Secure Shopping" link with a lock icon.

**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: [Text input field]

Street address: [Text input field]  
[Text input field]

City: [Text input field]

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

State: [Select State dropdown menu]  
Select State

If U.S. Military, select AE, AP or AA from Select State

ZIP code: [Text input field]  
[Text input field]

Country: USA

**Save Changes**

- What's the same?

- Logo, layout, color, fonts

# PROCESS FUNNEL (H1)

Problem:

What if users need extra help?

# PROCESS FUNNEL (H1)

Dell.com | About Dell | Contact | Search | Support | Order Status | My Cart | HOME & HOME OFFICE

DELL | Computers | Software & Accessories | Service & Support | Learning Center | Main | Desktops | Notebooks | Handhelds | Hot Deals!

## FEATURED SYSTEM

### Featured Dimension 4100



The Dimension 4100 desktop offers you amazing power and flexibility at a price that won't break your budget.

- Intel® Pentium® III processor at 933Mhz
- 40GB<sup>5</sup> Hard Drive
- 128MB SDRAM
- 32MB Nvidia GeForce2 MX 4X AGP Graphics Card

Free Ground (3-5 day) Shipping with purchase of any new Dell Home System. Offer ends 4/23/01.  
[Click Here for Details.](#)

**Dimension 4100** [View - Add One Item in This System](#) [Price](#)

Intel® Pentium® III processor at 933Mhz

**\$1,199**

As low as \$36<sup>4</sup> /46 pmts  
No payment for 90 days  
(Click or scroll for details)<sup>4</sup>

Check any item(s) you wish to add to this system, then click Customize It.

3 Year On-Site Service [Add](#)  
With on-site service, you don't have to leave your home or ship your computer to us should you have a problem.

[More Details](#)

**E-Value Code** 8W71-4100po1

**Customize It**

**Processor** [?](#) Intel® Pentium® III processor at 933MHz

**Keyboard** [?](#) QuietKey® Keyboard

**Hard Drive** [?](#) 40GB<sup>5</sup> Ultra ATA/100 Hard Drive (7200 RPM)

**Epson Stylus Color 880 Ink Jet Printer** [Add](#) \$149  
A creative and versatile printer that features super fast print speeds.

[More Details](#)

**Epson 640U Scanner** [Add](#)

# CONTEXT-SENSITIVE HELP (H8)

Dell.com      About Dell | Contact | Search | Support      Order Status | My Cart

DELL HOME & HOME OFFICE

Buy Online or Call  
1-800-915-3355

Purchase Assistance

- Payment Solutions
- Tax & Shipping Info
- Secure Shopping Guarantee
- Privacy Policy

Recommended Systems

Click here for more Dimension 4100 recommended systems.

**FEATURED**

Featured Dimension 4100

Free Ground (3-5 day) Ship  
Click Here for Details.

Dimension 4100

Intel® Pentium® III processor  
933Mhz

**\$1,199**

As low as \$36<sup>4</sup>/mo.<sup>4</sup> pmts  
No payment for 90 days  
(Click or scroll for details)<sup>4</sup>

Customize It

E-Value Code  
8V771-450p01

Processor      Keyboard      Hard Drive

Intel® Pentium® III processor at 933MHz

QuietKey® Keyboard

40GB<sup>5</sup> Ultra ATA-100 Hard Drive (7200 RPM)

More Details

Order Status | My Cart

KEYBOARDS - Netscape

?

DELL LEARN MORE

Close

Keyboards  
Great Keyboard Choices to Suit Your Needs:

- Choose from standard-size and "space-saver" designs
- Ergonomic design for added comfort
- Hot Keys provide quick, one-touch access to frequently used programs and Web sites
- USB ports allow for quick and easy access to USB peripherals, such as digital cameras, scanners and joysticks

Dell™ Enhanced Performance Keyboard

DELL GLOSSARY

Need a definition?  
Click on a term.

Keyboard Type	Dell™ QuietKey	Microsoft® Internet Keyboard, Dell Edition	Dell™ Enhanced QuietKey	Dell™ Enhanced Performance
ZOOM!	For a closer look.			
Benefits	<ul style="list-style-type: none"><li>Quiet key response</li><li>Soft "rubberdome" touch</li></ul>	<ul style="list-style-type: none"><li>10 Hot Keys for easy access to your internet and e-mail</li><li>E-mail Hotkey</li></ul>	<ul style="list-style-type: none"><li>3 programmable keys</li><li>Soft "rubberdome"</li></ul>	<ul style="list-style-type: none"><li>7 programmable keys</li><li>Built-in 2 port USB HUB</li></ul>

More Details

Epson 640U Scanner

Add

A red arrow points from the question mark icon in the "Customize It" button on the left side of the page to the question mark icon in the "Keyboard" section of the context-sensitive help window on the right.

# FLOATING WINDOWS (H6)

The screenshot shows the Netflix interface with a floating window overlay. The main header bar includes the Netflix logo, user information (Arthine van Duyne), and navigation links (Browse, Recommendations, Friends, Queue, Buy DVDs). Below this, there are links for 'Get Recommendations (636)', 'Rate Movies', and 'Movies You've Rated (210)'. The main content area is titled 'Recommendations' with the subtitle 'Movie suggestions based on your ratings'. A section for 'NEW RECOMMENDATIONS' lists two movies: 'Gladiator: Extended Edition' and 'Samurai Champloo'. The 'Gladiator: Extended Edition' entry is highlighted with a red border and a yellow star icon. It features a thumbnail image of Russell Crowe, a five-star rating, and a 'Not Interested' button. A detailed description of the movie follows, along with its cast (Russell Crowe, Joaquin Phoenix), director (Ridley Scott), genre (Action & Adventure), and MPAA rating (R). A note at the bottom of this card states 'Recommended based on 1 rating'. The 'Samurai Champloo' entry also includes a thumbnail, a five-star rating, and an 'Add All' button.

NETFLIX

Arthine van Duyne | Your Account

Browse Recommendations Friends Queue Buy DVDs

Get Recommendations (636) Rate Movies Movies You've Rated (210)

Recommendations

Movie suggestions based on your ratings

NEW RECOMMENDATIONS

**Gladiator: Extended Edition**

(2000)

Fans of Gladiator's original theatrical release will appreciate this extended version of the epic Ridley Scott film, packed with 17 extra minutes of action footage and gripping dialogue. Featuring a strong supporting cast and an Oscar-winning performance from actor Russell Crowe as the dauntless Roman general Maximus, this big-budget Best Picture winner became an instant classic -- and helped elevate its leading man to icon status.

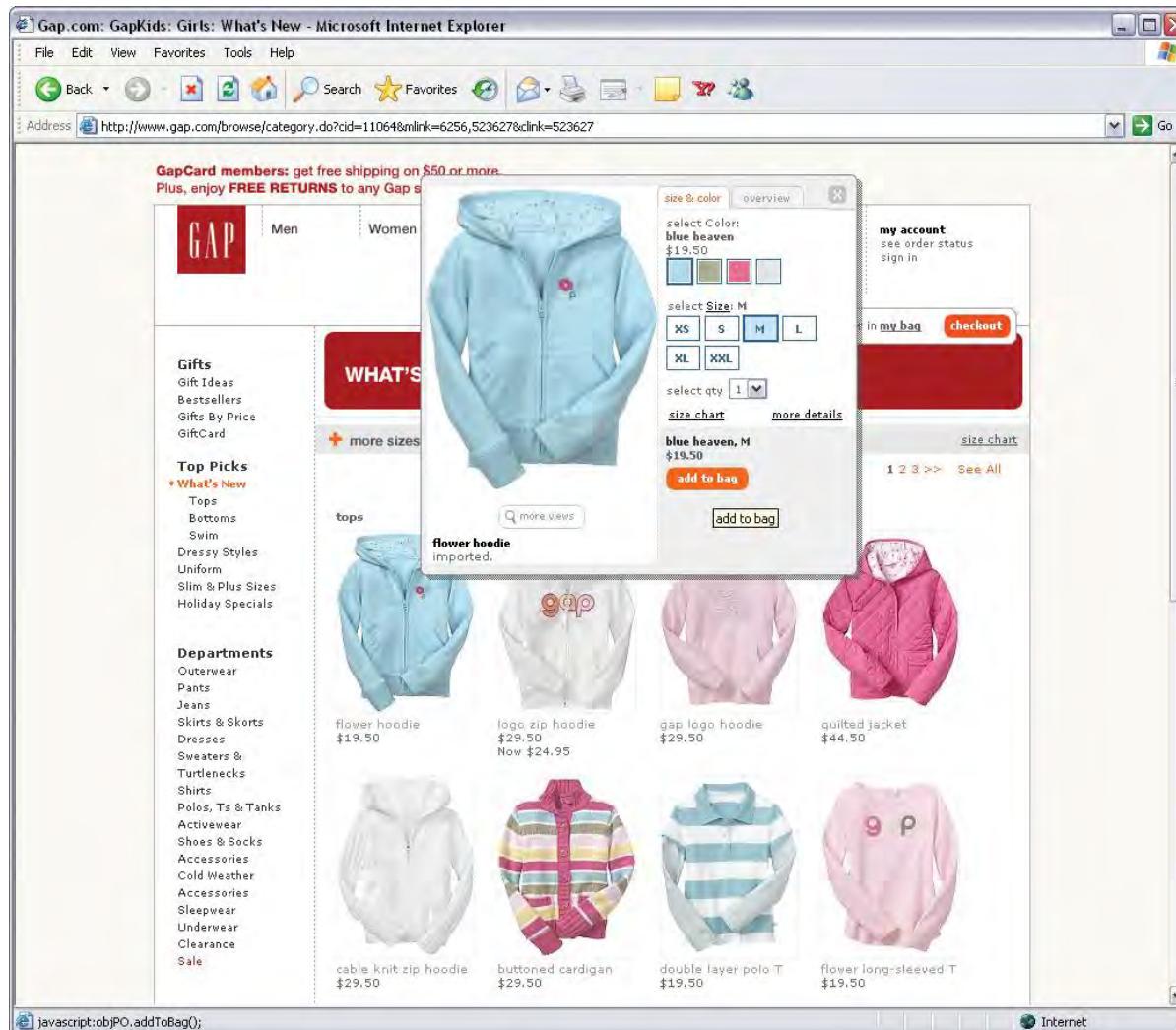
Starring: Russell Crowe, Joaquin Phoenix  
Director: Ridley Scott  
Genre: Action & Adventure  
MPAA: R

Recommended based on 1 rating

**Samurai Champloo** (7-10)

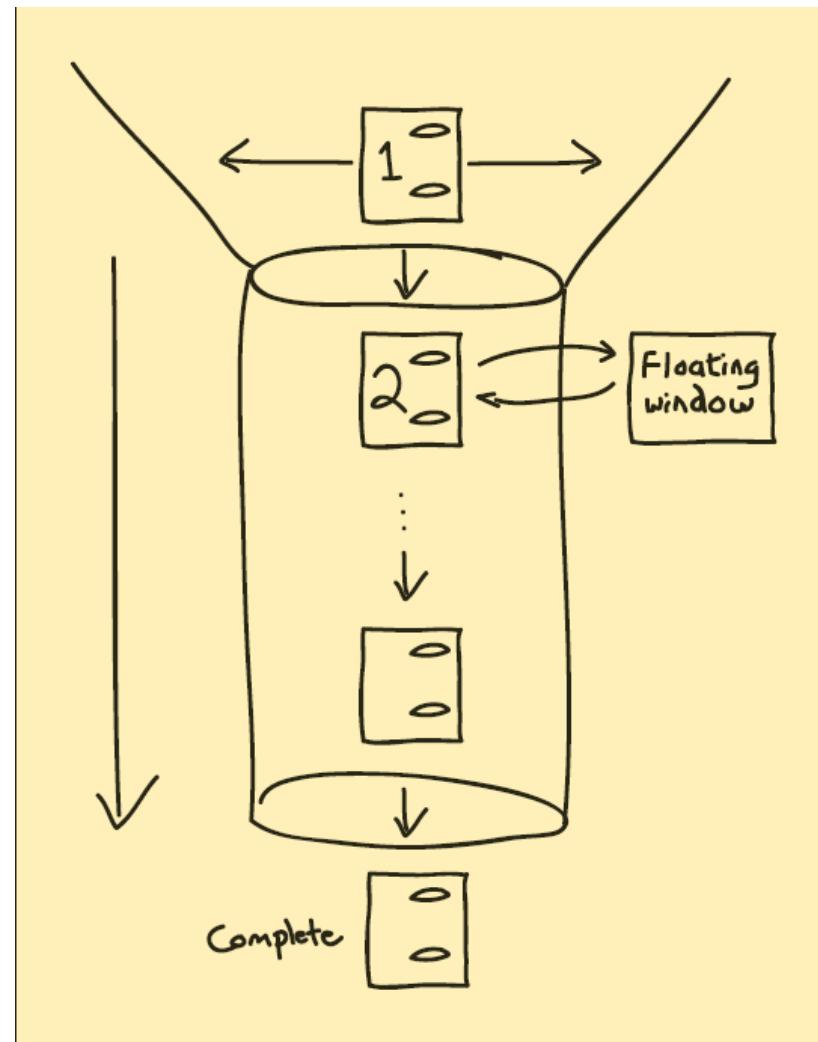
Director Shinichiro Watanabe mixes a maturity rarely found in anime with a historical Japanese setting and a funky hip-hop soundtrack. Fuu is a spacey waitress at a teahouse where a sword fight breaks out between Mugen, a wild warrior, and Jin, a ... [Read More](#)

# FLOATING WINDOWS (H6)

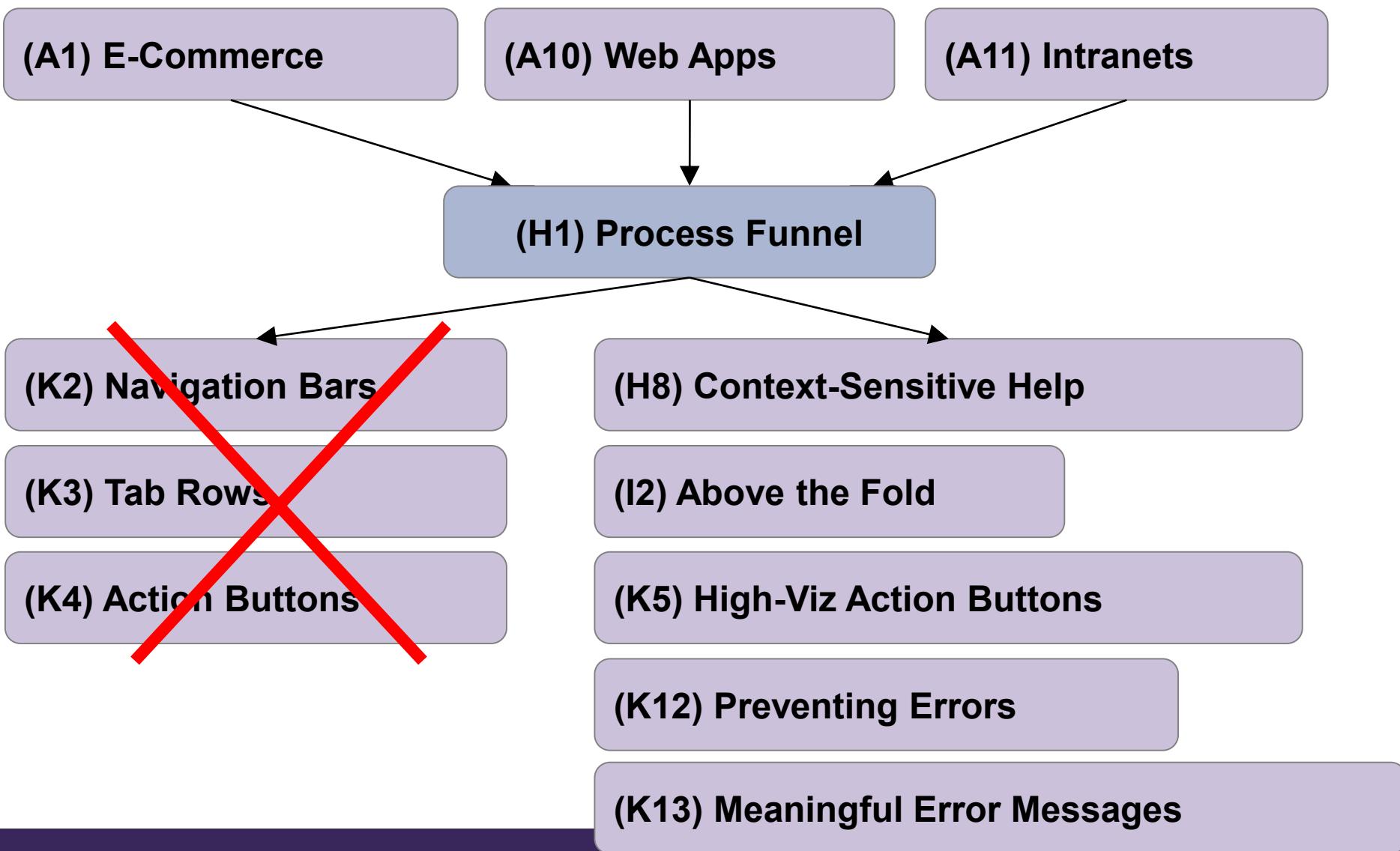


# PROCESS FUNNEL (H1)

## 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

H1 PROCESS FUNNEL

A screenshot of the Dell website's "SELECT BASE SYSTEM" page. At the top, there's a navigation bar with links like "Home", "Contact Us", "Feedback", "Support", "Helpful Tools", "Order Status", "My Account", "Logout", and "Order & Home Office". Below the navigation, there's a main heading "SELECT BASE SYSTEM" with a sub-headline "SmartStep 1500". It shows a computer monitor and text: "Create products 114 pieces of hardware in 10 categories or individual systems. For a full list of components, choose the Dell option." A "Learn More" button is at the bottom right. On the left, there's a sidebar with sections like "Purchase Options", "Tax & Shipping", "Returns", "Order Security", and "Privacy Policy". A red arrow points from the "Background" section below to the "Learn More" button.

\* BACKGROUND

All Web applications that lead visitors through stepped tasks—PERSONAL E-COMMERCE (A1), SELF-SERVICE GOVERNMENT (A4), WEB APPS THAT WORK (A10), and ENABLING INTRANETS (A11)—need ways to help people succeed at completing the tasks.

\* PROBLEM

Customers often need to complete highly specific tasks on Web sites, but pages with tangential links and many questions can prevent them from carrying out these tasks successfully.

People enjoy completing the tasks they start. Yet all kinds of distractions—including links that lead off the critical path, extra steps, and extra

## Pattern Name and Number

PROCESS FUNNEL H1

Figure H1.1

Dell uses a process funnel consisting of several logical steps that guide customers to quickly configure and purchase a personal computer. Information in a pop-up window shows additional details but keeps customers in the funnel so that they can continue to completion.

A screenshot of the Dell website's "LEARN MORE INTEL PROCESSORS" page. It features a large Intel logo and text: "The Intel Pentium® 4 Processor is a breakthrough processor that delivers 3 times faster performance in an array of applications and streaming Internet movies." Below this, there's a "Processor" section with a "View Processor" button. A red arrow points from the "Problem Statement" section below to the "Processor" button.

## Problem Statement

where they are in the process funnel and how much farther they have to go.

H1.2

(www.dell.com, May 18, 2002)

Patterns: Helping Customers Complete Tasks 463

content—can inadvertently lead them away from accomplishing their goals. These diversions can have legitimate purposes, however, such as providing continuity, giving visitors opportunities to explore, providing instructions, or providing extra details. Striking a balance between these needs and the critical task can be challenging.

## Exemplar

Required to Complete a Task • Customers need to complete a task with many steps. A process funnel should have two to eight steps. Anything less than two steps is not a process, and a process of more than eight steps is unmanageable. If there are more than eight steps, try to split the process into two or more separate process funnels, or try combining multiple steps into one page. However, this is not always a viable solution because one choice may precede another, and not every page can hold all the information that customers might need at certain points.

Provide a Progress Bar to Let Customers Know Where They Are in the Funnel • Showing a progress bar at each step lets customers know how much farther they have to go to complete the task. It is often not worth your time to make a progress bar clickable because doing so is not a benefit for customers.

Remove Unnecessary Links and Content While Reinforcing the Brand • Removing links and content unrelated to the task at hand will reduce the number of choices available to customers, making it more likely that your customers will complete the task. Remove all NAVIGATION BARS (K2), TAB AD CRUMBS (K6), and EMBEDDED LINKS (K7), leaving only ACTION BUTTONS (K4) that help visitors reach their goal. Take out any content that is superfluous to the task.

Reinforce the Web site brand to minimize any disorientation customers might feel from sudden changes in navigation options. Use the same colors, font, and logo throughout the Web site so that no customer knows they're still on the same site.

## Forces & Solution

## Background

Process funnels are a common way to guide users through a series of steps to complete a task. They are particularly useful for e-commerce sites where users need to follow a specific sequence of actions to purchase a product.

One challenge with process funnels is ensuring that users stay on the critical path and don't get distracted by other links or content. This can be achieved by using a progress bar to show users where they are in the funnel and how much farther they have to go.

A screenshot of the Half.com website's "Place Order" page. At the top, there's a navigation bar with links like "Home", "About Us", "Our Story", "Our Products", "Our Services", "Our Locations", "Our Team", "Our Partners", "Our News", "Our Events", "Our Contact", and "Our Support". Below the navigation, there's a main heading "Place Order" with a sub-headline "Place Order". It shows a progress bar with three steps: "Select Product", "Select Shipping", and "Place Order". A red arrow points from the "Problem Statement" section below to the "Place Order" button.

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Patterns: Helping Customers Complete Tasks 463

# Web Design Patterns

**H1** PROCESS FUNNEL

**Use Pop-Up Windows to Provide Extra Information, without Leading Visitors Out of the Process Funnel** • Sometimes customers need additional information that you have not provided on a page, such as extra help or product details. Provide a link to a pop-up window (H6) containing CLEAN PRODUCT DETAILS (F2) (see Figure H1.1), CONTEXT-SENSITIVE HELP (H8), or information from the FREQUENTLY ASKED QUESTIONS (H7) page, to make the extra information less intrusive. Your challenge is to implement this extra content without detracting from the main purpose.

**Make Sure the Back Button Always Works** • Customers often use the **Back** button on browsers to modify answers they have typed in on previous pages. However, if the Web site is not implemented correctly, the information they have already entered may be lost when they hit the **Back** button, forcing them to type everything again. In the worst case, people get a cryptic error message saying that the posted information was lost. You can address this annoying problem by temporarily storing the information they type in on each page, redisplaying this information if customers hit the **Back** button, and then overriding the temporarily stored information on the page if it is changed.

**Always Make It Clear How to Proceed to the Next Step** • Some Web pages are longer than can be displayed on a customer's Web browser. The problem is that people sometimes get lost if the critical ACTION BUTTON (K4), the one that takes them to the next step, is hidden below the fold. Place HIGH-VISIBILITY ACTION BUTTONS (K5) both high *and* low on the page, ensuring that at least one of the critical action buttons is visible without scrolling.

**Prevent Errors Where Possible, and Provide Meaningful Error Messages If They Do Occur** • People will always make mistakes. You can provide good customer support by providing clear error signs. You can provide good customer support by providing clear error messages and sample input to help prevent errors. You can also provide MEANINGFUL ERROR MESSAGES (K13) to help customers correct their mistakes.

**SOLUTION**

Minimize the number of steps required to complete a task, keeping them between two and eight. Remove unnecessary and potentially confusing links and content from each page, while reinforcing the brand to maintain a sense of place. Use pop-up windows to provide extra information, without leading people out of the process funnel. Make sure the Back button always works so that customers can correct errors. Make it clear how to proceed to the next step.

**H1** PROCESS FUNNEL

**Bus Stops**

Figure H1.3  
A process funnel lets people complete their goals by breaking down complicated tasks into a small number of steps, using pop-up windows for detailed information, and reducing the number of links to only the critical ones, so that people are never distracted.

**Solution Diagram**

**Related Patterns**

**\* CONSIDER THESE OTHER PATTERNS**

A1 A4  
A10 A11  
F1  
H2  
G4  
K1 K2 K3  
K4 K5 K6 K7  
E1 E2 E3  
H8 H9 H10 H11 H12 H13  
K12 K13  
H5  
H6 H7 H8 H9 H10 H11 H12 H13  
I2 I3  
K12 K13

- Remove NAVIGATION BARS (K2), TAB ROWS (K3), irrelevant ACTION BUTTONS (K4), LOCATION BREAD CRUMBS (K6), and EMBEDDED LINKS (K7) to ensure that customers stay on their paths. However, keep strong SITE BRANDING (E1) so that customers still know where they are.
- Design process funnels to PREVENT ERRORS (K12), and provide MEANINGFUL ERROR MESSAGES (K13) when errors do occur.
- Track your customers through PERSISTENT CUSTOMER SESSIONS (H5) to avoid problems with the **Back** button, and to save customer-entered information.
- Move extra content, such as CONTEXT-SENSITIVE HELP (H8) and FREQUENTLY ASKED QUESTIONS (H7), to POP-UP WINDOWS (H6) to keep the main task page on the screen. Make the next action visible by keeping it ABOVE THE FOLD (I2) and by using HIGH-VISIBILITY ACTION BUTTONS (K5).

# Pre-Patterns

Patterns require broad adoption and examples

Many versions 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



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.

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.

# UbiComp Pre-Patterns

B6 • FIND A FRIEND

NOKIA

Find Friends

- 1 Find Friends
- 2 Be visible / Invisible
- 3 Meet friend
- 4 Find nearest
- 5 Add/edit friends
- 6 Tell a friend
- 7 Help

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-called "Little Brothers," including teachers,

# 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

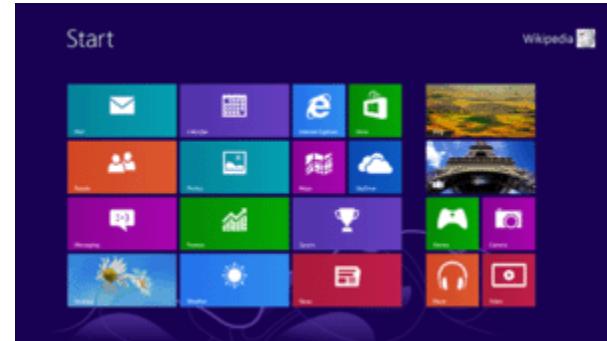
Be aware of misapplying patterns

- And be aware of anti-patterns

# Touch and Microsoft Windows



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

The screenshot shows a web browser window with the URL [https://www.fastcodesign.com/3051906/fast-feed/after-lawsuit-settlement-linkedin-dishonest-design-is-now-a-13-million-problem?utm\\_source=facebook](https://www.fastcodesign.com/3051906/fast-feed/after-lawsuit-settlement-linkedin-dishonest-design-is-now-a-13-million-problem?utm_source=facebook). The page is from the website EVID3NCE, which is described as "WHAT THE SCIENCE HAS TO SAY ABOUT DESIGN, CREATIVITY, INNOVATION, AND VISUAL CULTURE".

The main headline reads: "After Lawsuit Settlement, LinkedIn's Dishonest Design Is Now A \$13 Million Problem". Below the headline, a sub-headline says: "HOPEFULLY, THIS WILL BE A LESSON TO OTHER COMPANIES WHO USE DARK UX PATTERNS TO TRICK THEIR USERS." There are social sharing icons: 10 NOTES, 5 PIN, 108 PLUS, 853 SHARE, 1.2K TWEET, and 1.5K LIKE.

The text of the article discusses how LinkedIn used dark UX patterns to trick users into signing up for follow-up emails, leading to a class-action lawsuit and a \$13 million settlement. It includes a photo of a smartphone displaying the LinkedIn login screen.

Below the main article, there is a sidebar with a heading "TRENDING" and a list of five articles:

- 1 Google Goes Analog With Its New Note-Taking Tools
- 2 Will Flat Design Ever Die?
- 3 This Note-Taking System Turns You Into An Efficiency Expert
- 4 3 Radical Ideas To Totally Disrupt Air Travel
- 5 UI, UX: Who Does What? A Designer's Guide To The Tech Industry

At the bottom of the article, there is a note about the *Perkins v. LinkedIn* case, mentioning that it was presented in San Jose's U.S. District Court and involved spamming users without permission.

# 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

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# 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'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

# 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.

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## 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.

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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

Time Left: 00:00:19



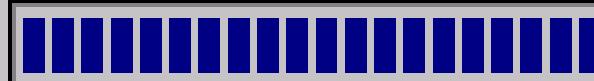
46%

# Heuristics

Time Left:

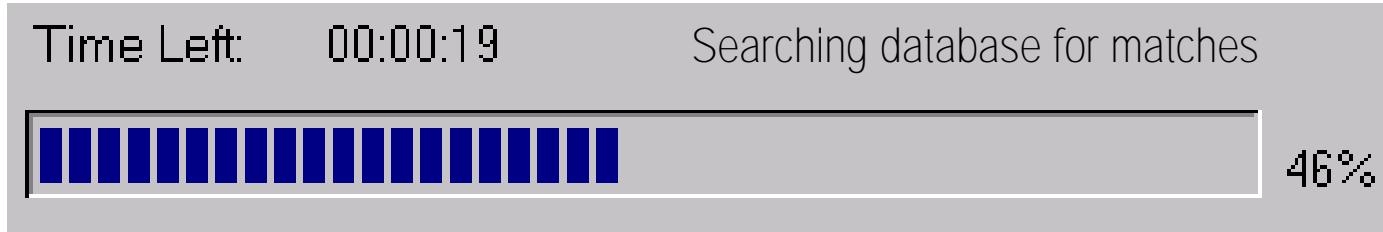
00:00:19

Searching database for matches



46%

# 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



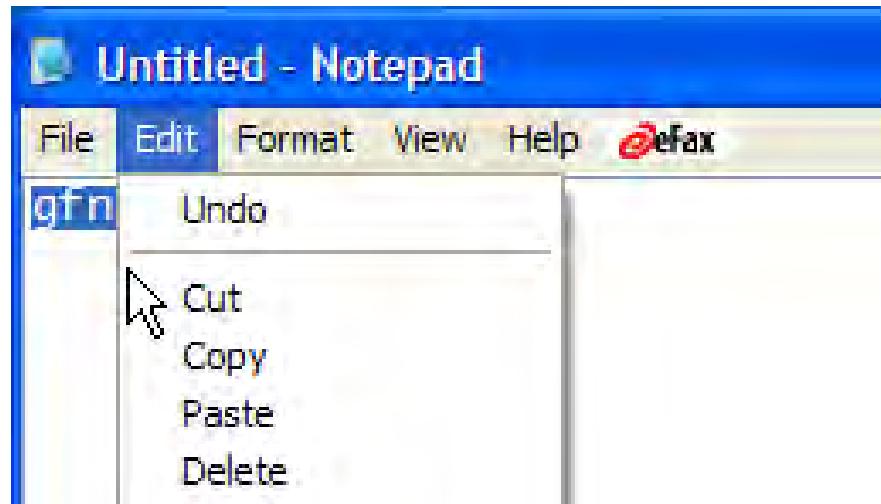
# Heuristics



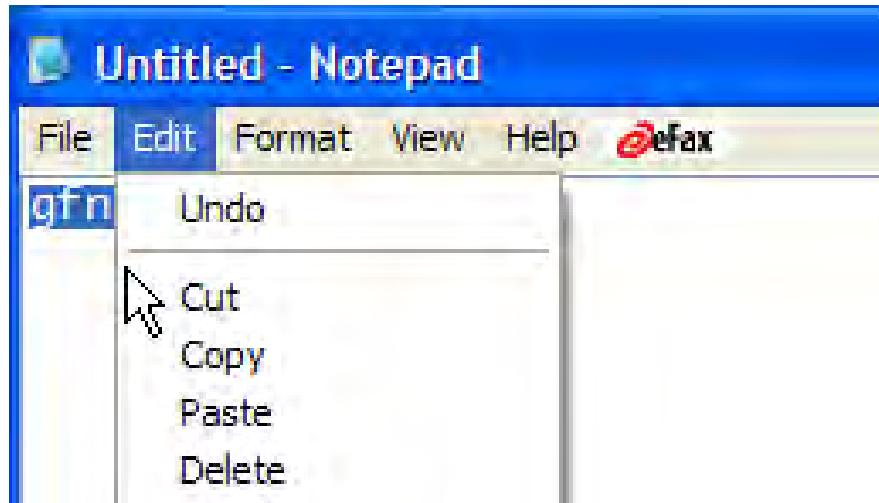
“Mailto”, “protocol”?

Match system to real world  
Speak the person's language

# Heuristics



# Heuristics



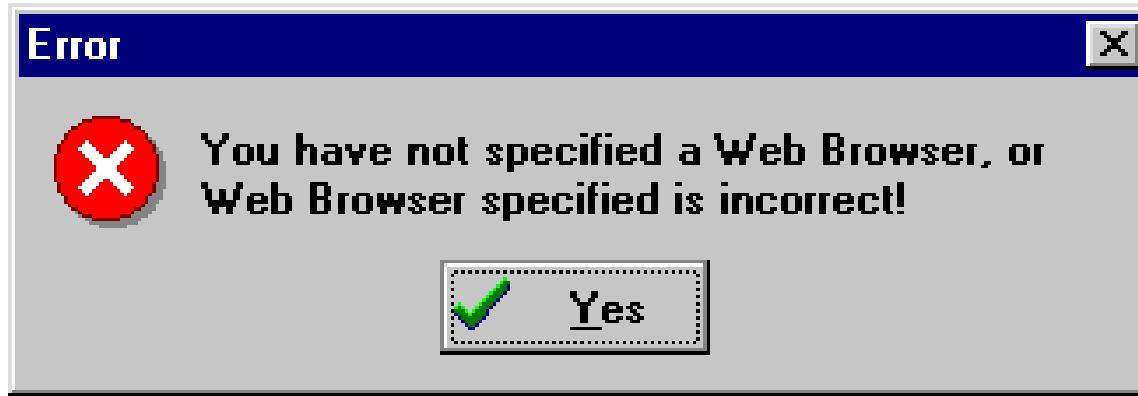
## Flexibility and Efficiency of Use

accelerators for experts (e.g., keyboard shortcuts)  
allow tailoring of frequent actions (e.g., macros)

# Heuristics

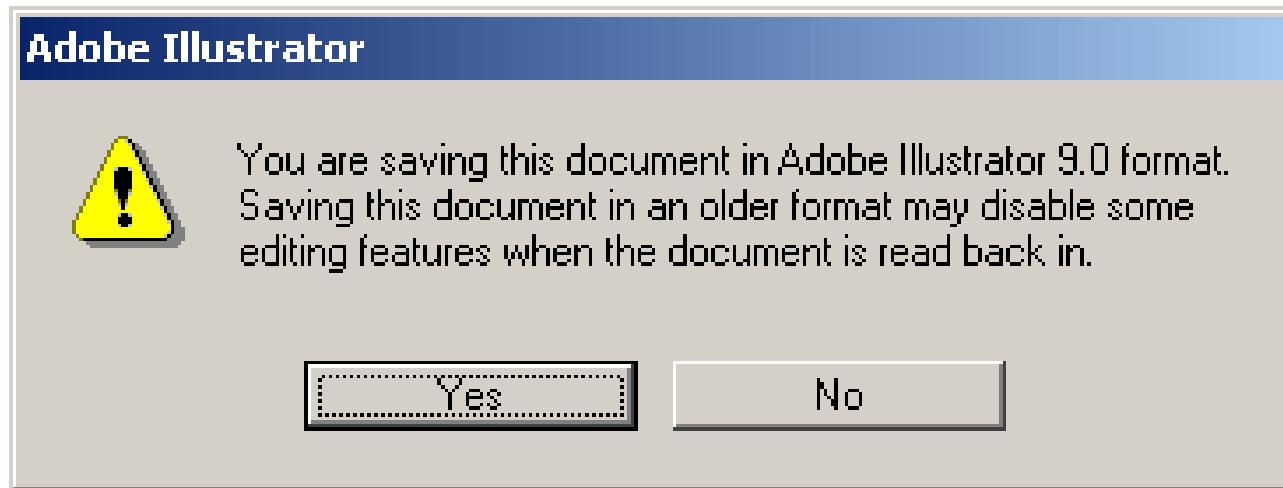


# Heuristics

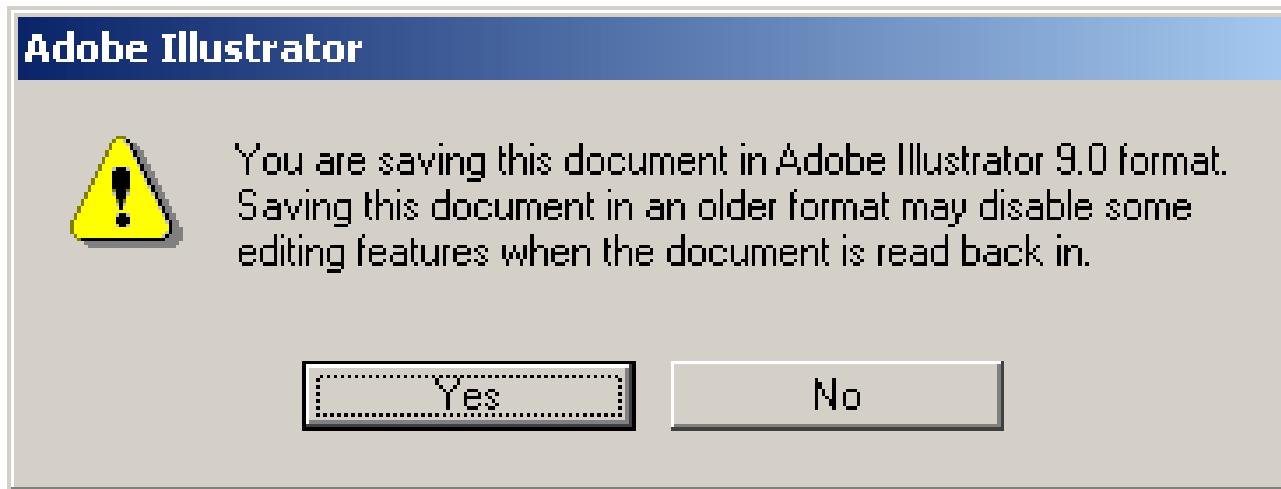


Help recognize, diagnose, & recover from errors  
error messages in plain language  
precisely indicate the problem  
constructively suggest a solution

# Heuristics



# 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

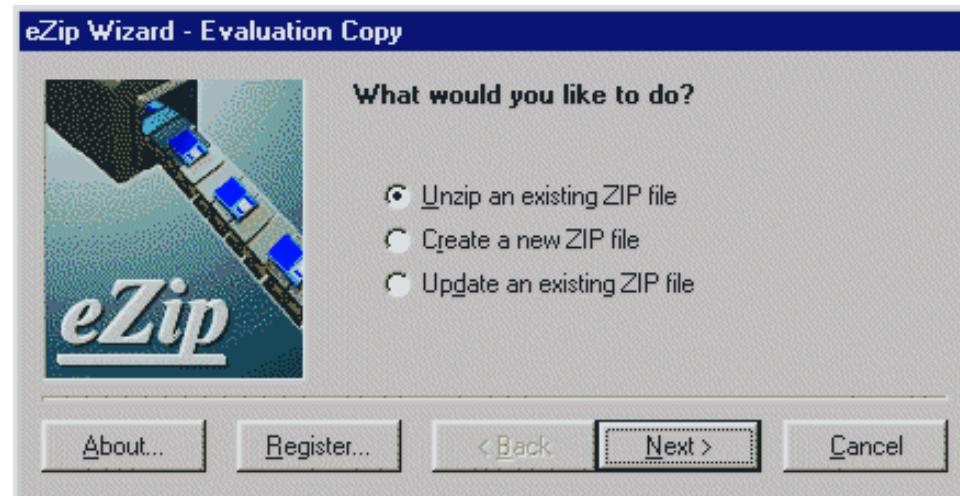
# Heuristics

## The Radiation Dosimetry Program

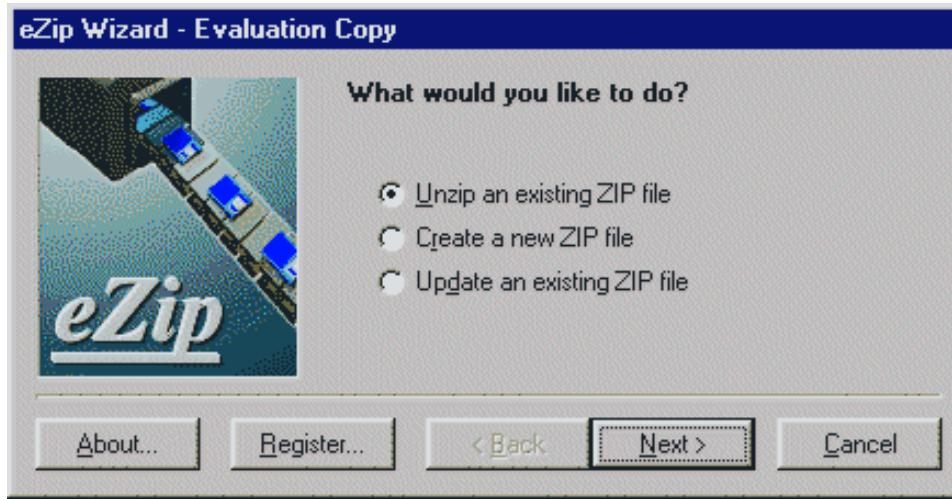
Please Enter Desired Dose (in Rems)	0.0001
Enter Substance	Polonium
Isotope Number	211

## Prevent Errors

# Heuristics



# Heuristics



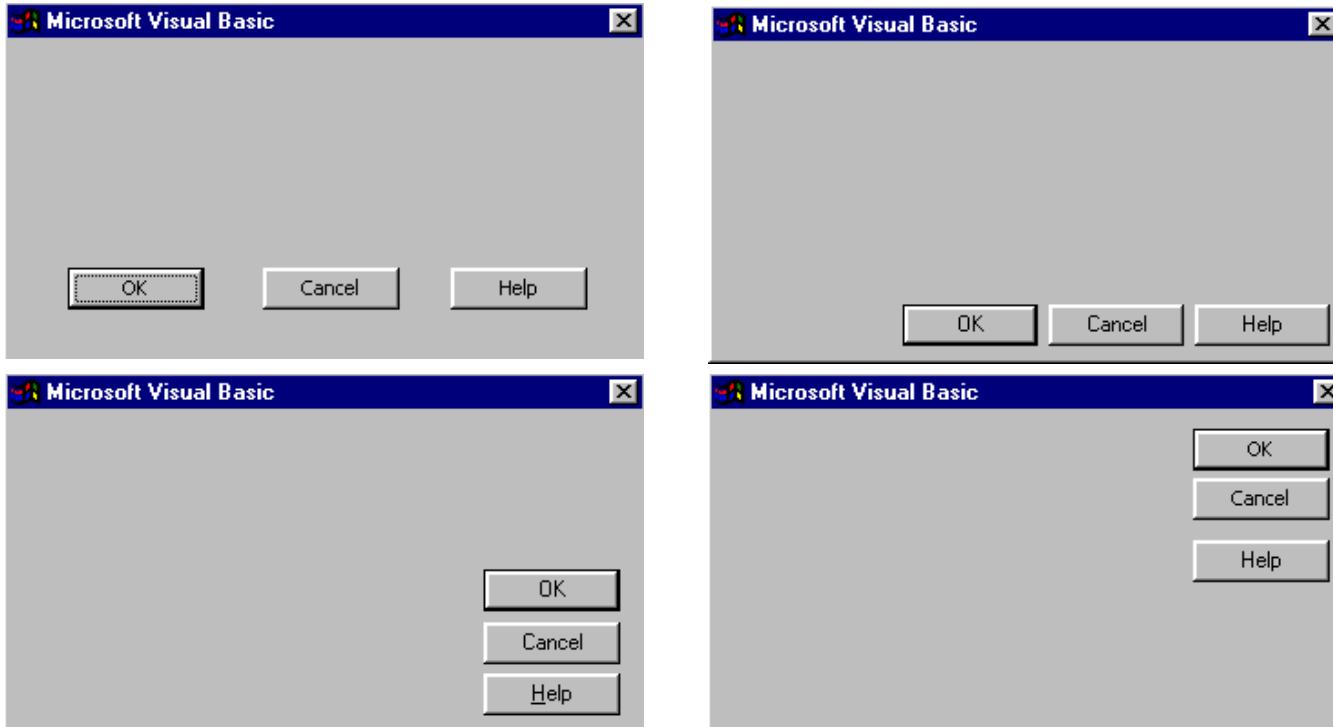
## User control & freedom

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

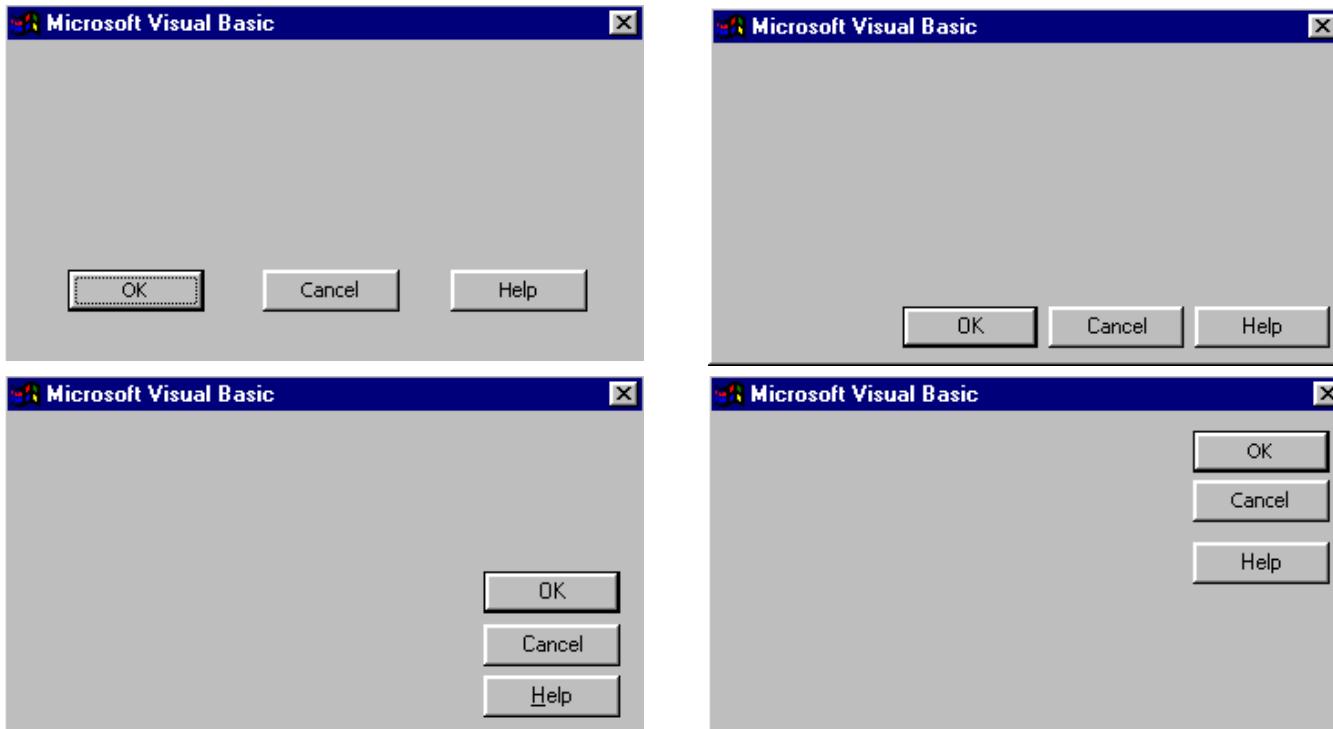
## Wizards

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

# Heuristics



# Heuristics

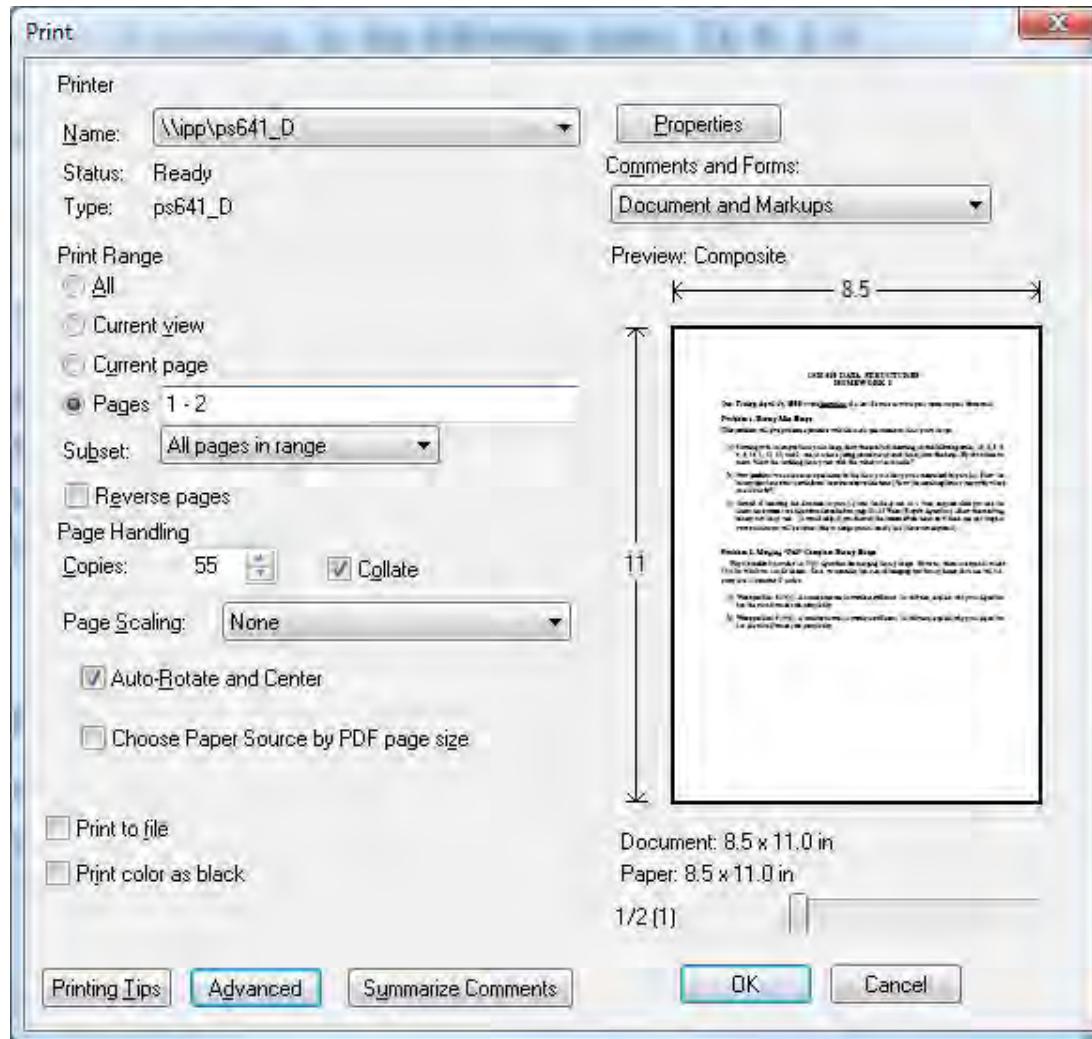


Consistency & Standards

# Heuristics



# Heuristics



# Heuristics

UR Rewarding Experiences - Mozilla Firefox

File Edit View History Bookmarks Tools Help

chase.com https://ultimaterewards.chase.com/edelain/servlet/ExecMacro?ctl\_nbr=10630&nurl=control%2FS☆ ~ Google

Most Visited Getting Started Latest Headlines

UR Rewarding Experiences

My Chase Accounts Manage Ultimate Rewards Help Log Off

CHASE

Rewards Home Travel Experiences Merchandise Gift Cards Cash Back Earn Faster Spotlight

Your rewards balance is **25,601 Points**

All Rewards Search GO

**Featured Experiences & Auctions**

**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.

**Quick Search**

City: All Cities Category: All Categories From To Search

**Five-Night Vacation to Rome for Two**

Auction

Rome, Italy

Opening Bid: 128,575 points

[View Details](#) | [View More Like This](#)

**Culinary & Wine**

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

**Sports & Leisure**

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.

**Art & Entertainment**

More Art & Entertainment (4)

Museums (1)

Music (1)

See All Art & Entertainment

**Gift Ideas**

**Featured Experiences**

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

**How It Works**

There are two types of rewards:  
**Auctions**  
For some items, 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 ultimaterewards.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]

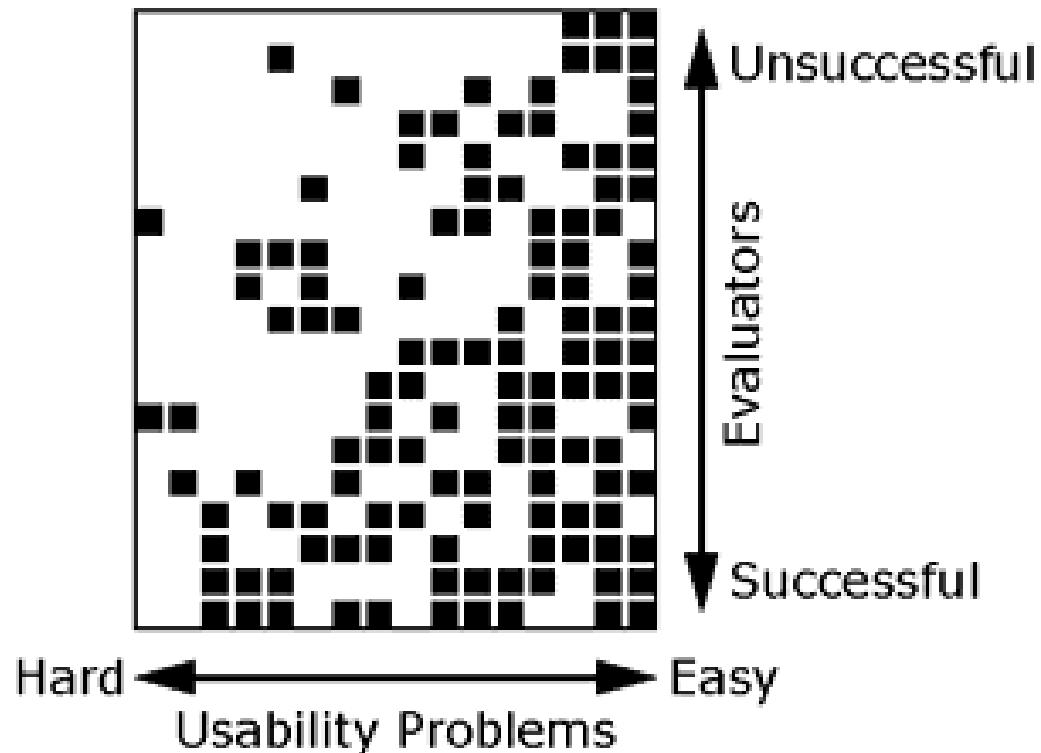
The interface used the string "Save" on the first screen for saving the person's file, but used the string "Write file" on the second screen.

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

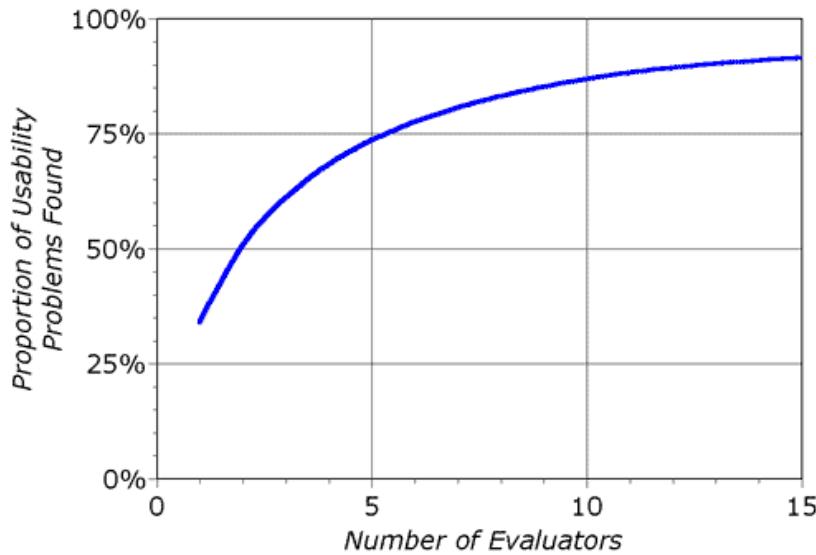
only finds 35% of usability problems

5 evaluators find ~ 75% of usability problems

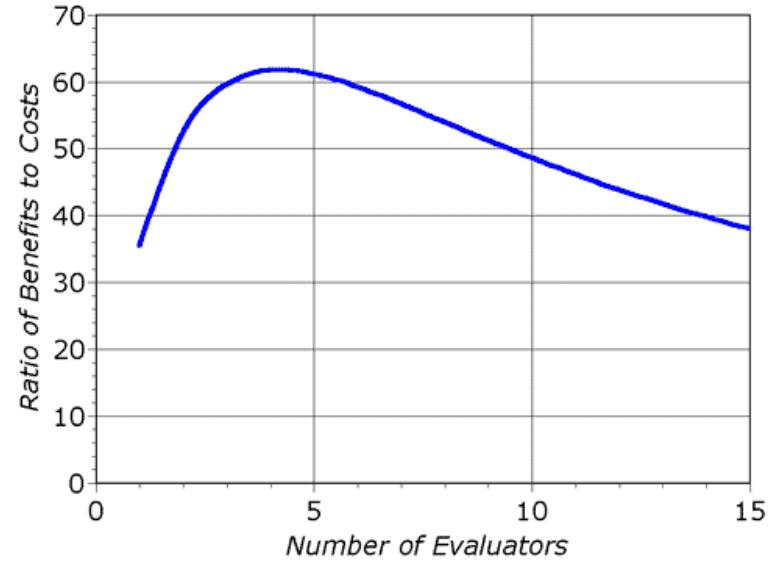
why not more evaluators?

# Decreasing Returns

problems found



benefits / cost



# 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

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User Interface Design, Prototyping, and Evaluation

Lecture 11:  
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- 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

# 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

$$x = x_0 + v_0 t + \frac{1}{2} a t^2$$

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

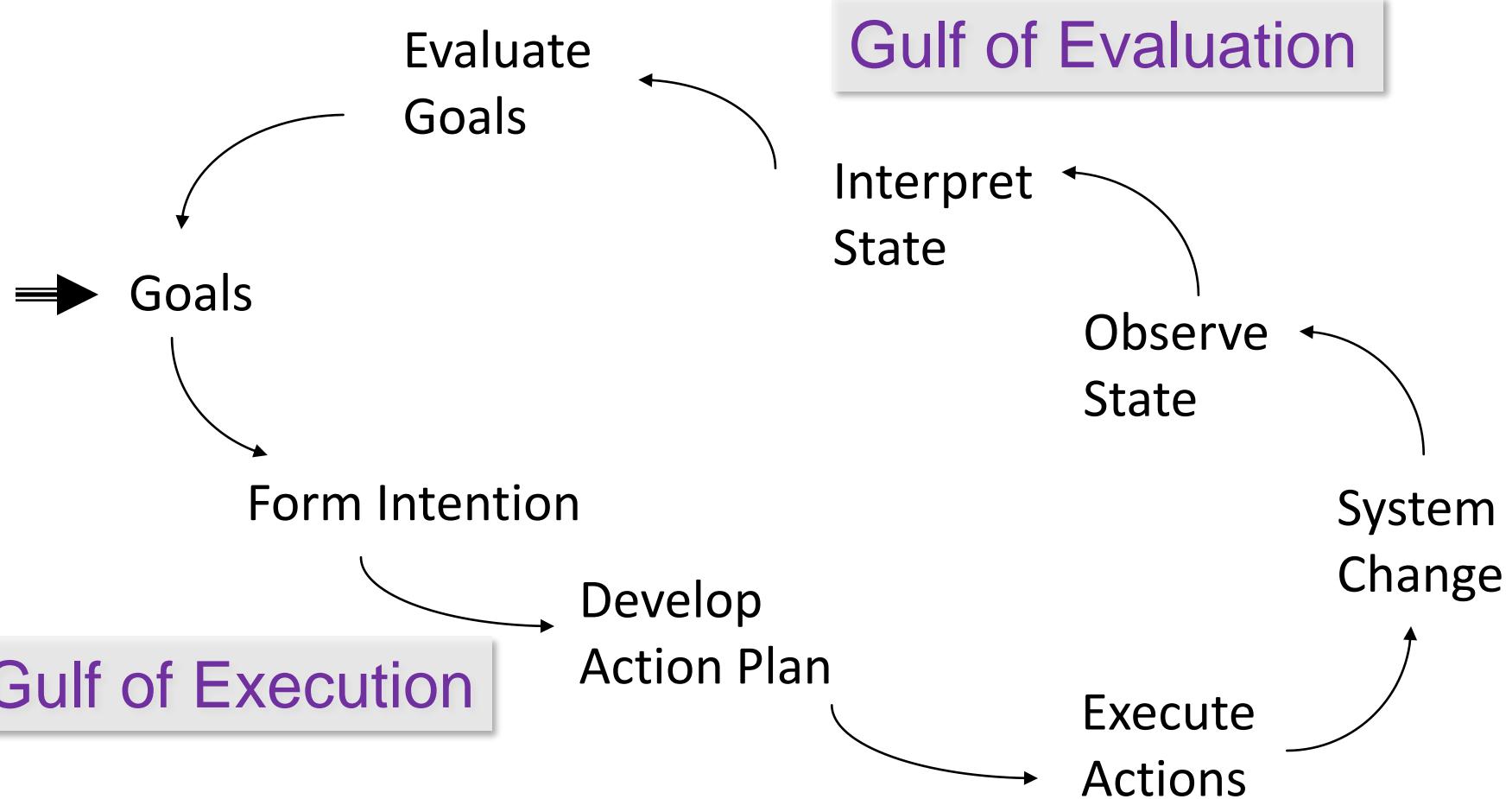
- Norman's Execution-Evaluation Cycle

- Buxton's 3-State Model

“All models are wrong, but some are useful”

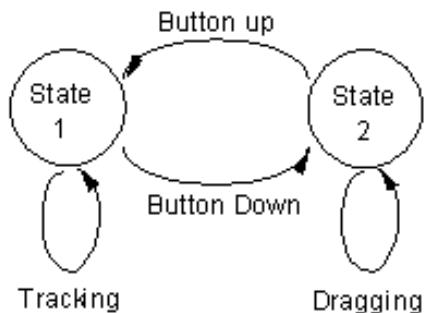
George Box

# Norman's Execution-Evaluation Cycle

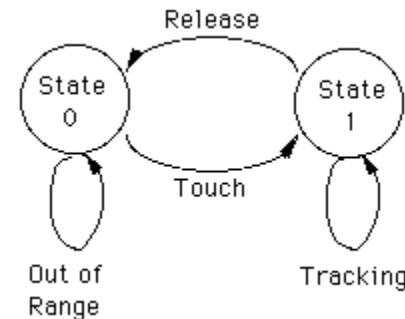


# Buxton's 3-State Model

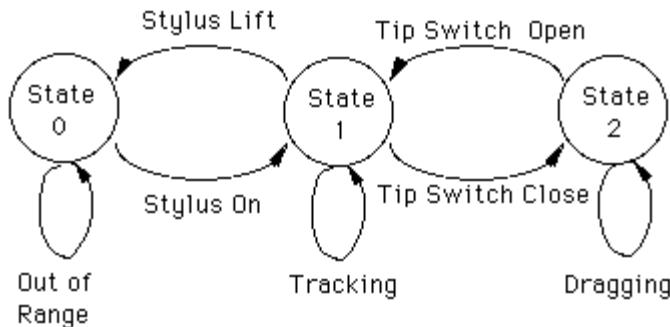
Mouse



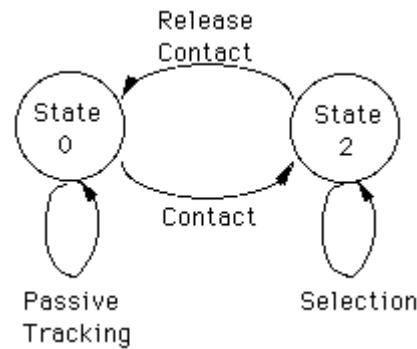
Touchpad



Stylus

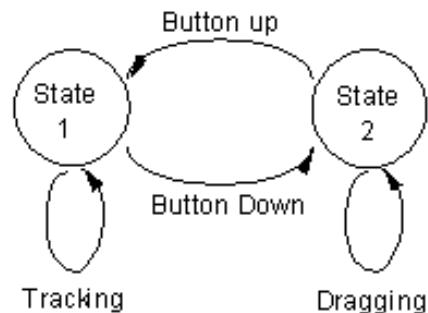


Touch Screen

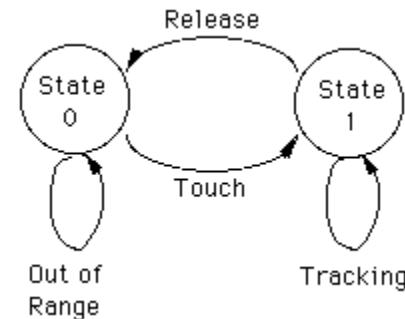


# Buxton's 3-State Model

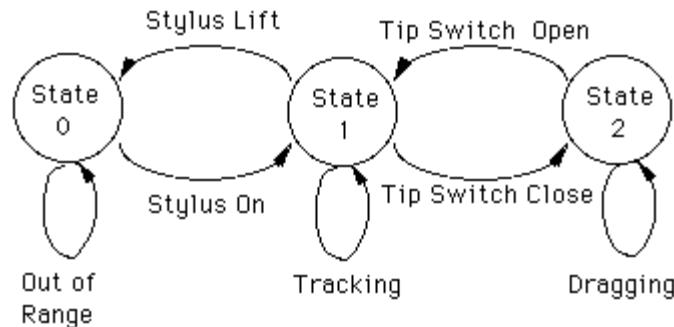
Mouse



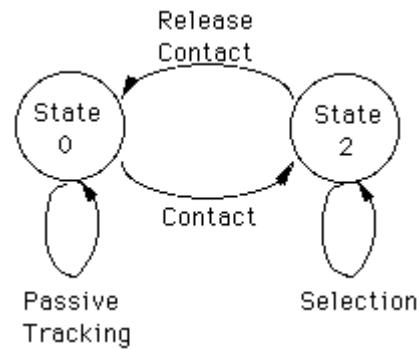
Touchpad



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

Model Human Processor

Fitts's Law

Gestalt Principles

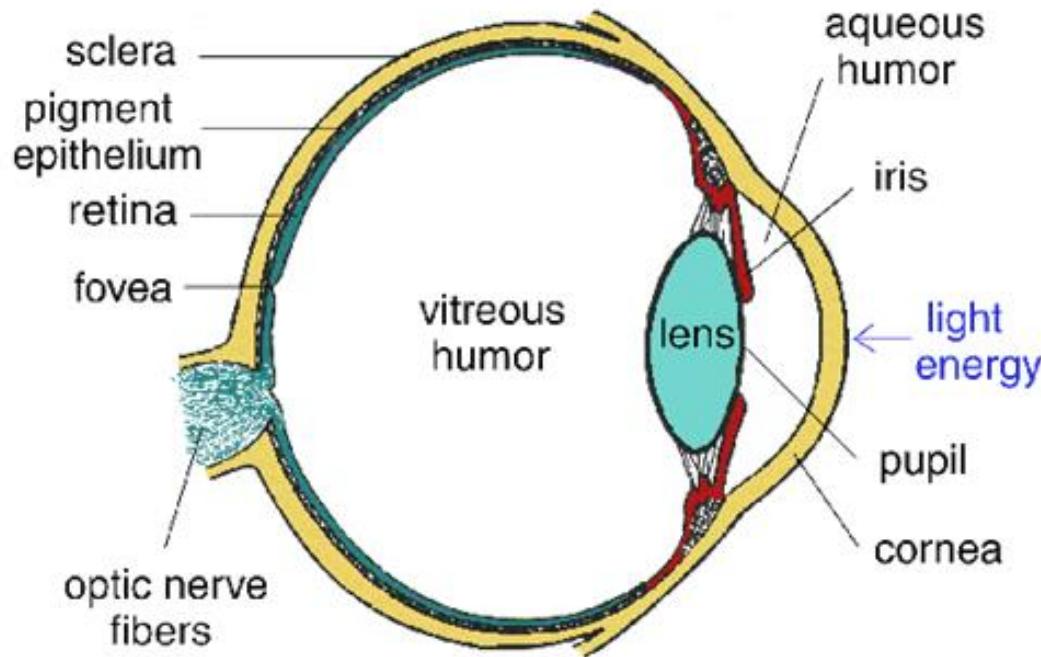
Biological Model

Higher-Level Model

Model by Analogy

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



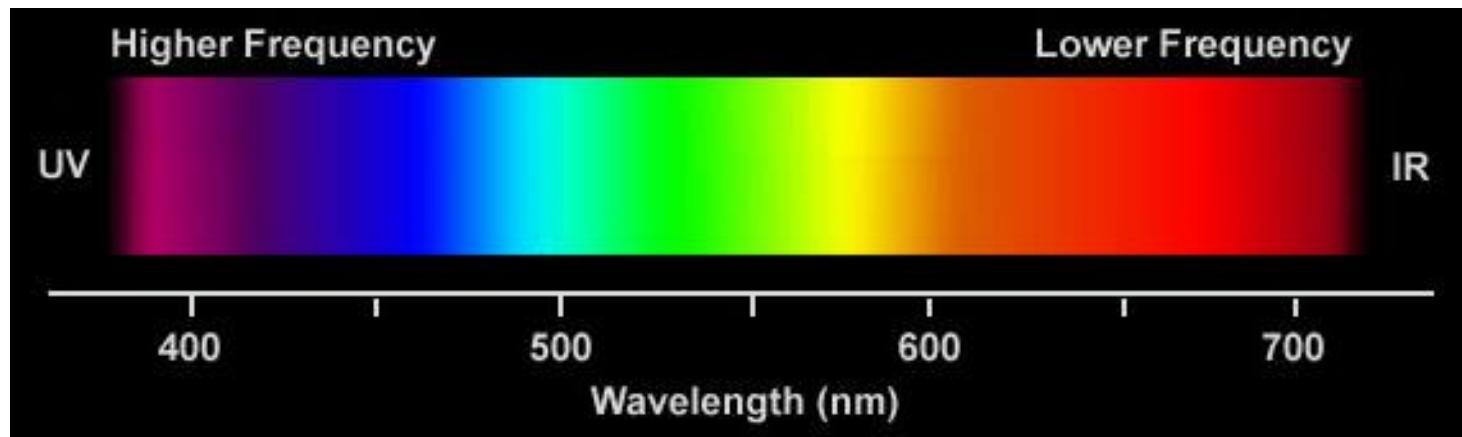
Use right eye, look at letters

# 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 ...

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What does that mean for you?

# Retina

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What does that mean for you?

Peripheral movement is easily distracting

# Retina

Center of retina has most of the cones

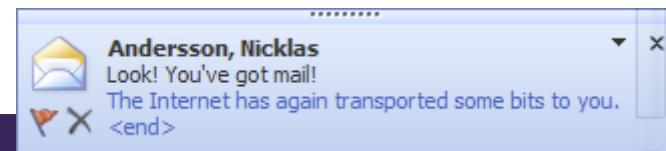
Allows for high acuity of objects focused at center

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

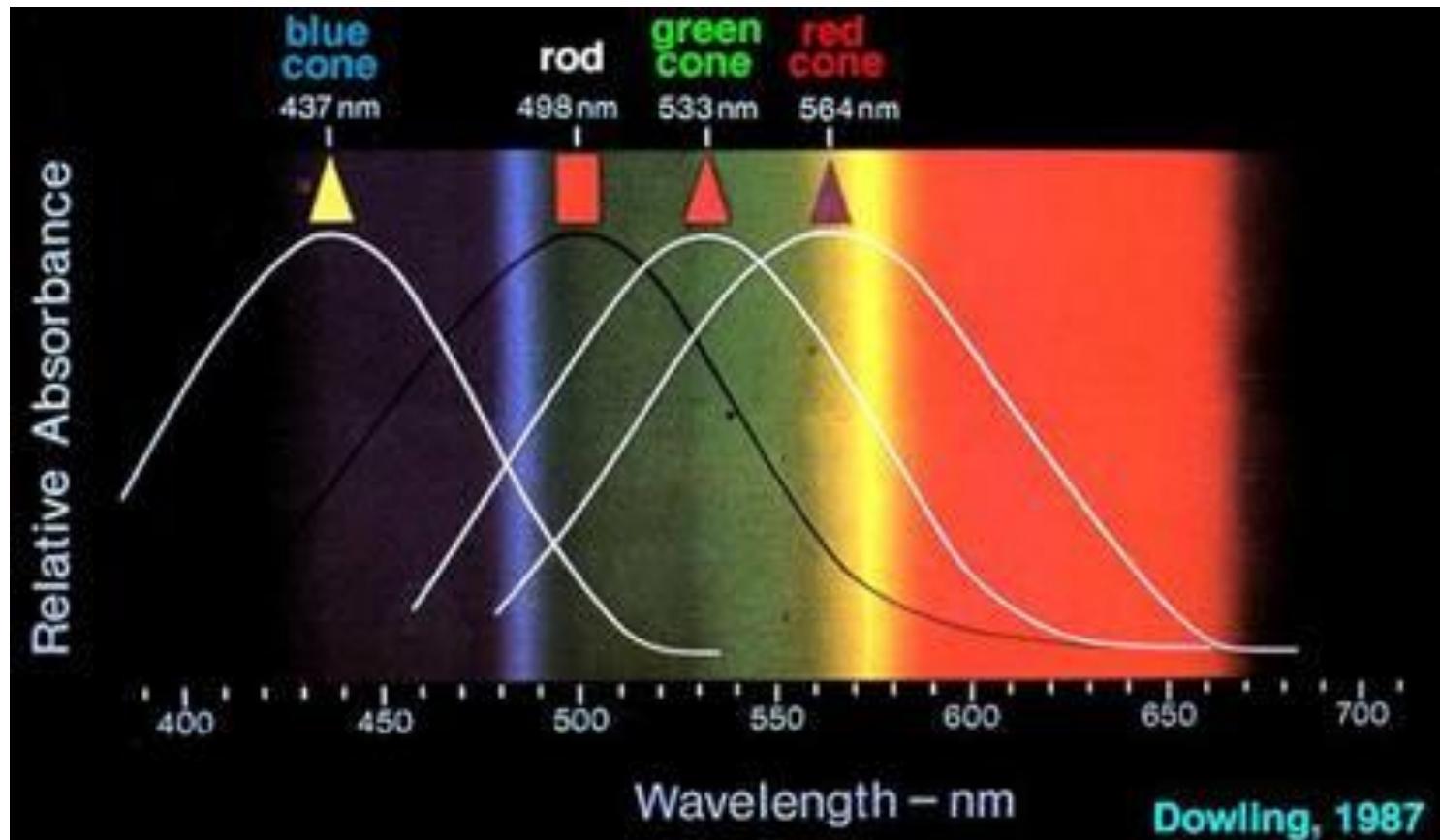
Photopigments used to sense color

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

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

Shapes detected by finding edges

We use brightness and color difference

Implication

Blue edges and shapes are hard



# Color Sensitivity & Image Detection

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# Focus

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

Constant refocusing causes fatigue

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

# Focus

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

Constant refocusing causes fatigue

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

The Falklands Society

This hurts, why?

# Color Deficiency

Trouble discriminating colors

Affects about 9% of population

Two main types

Different photopigment response most common

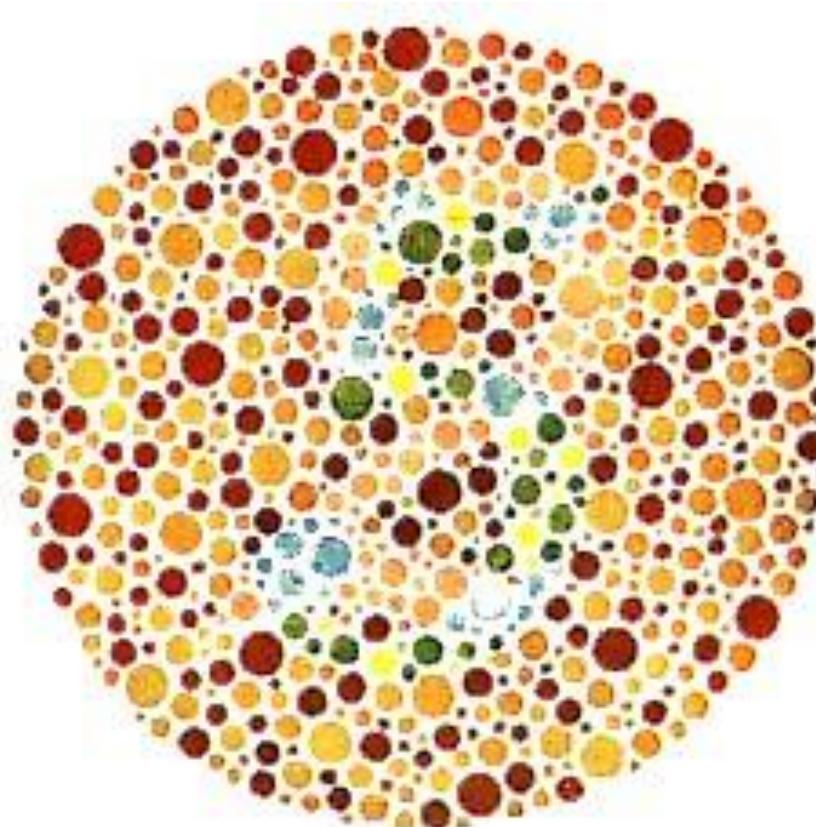
Reduces capability to discern small color differences

Red-Green deficiency is best known

Lack of either green or red photopigment, cannot discriminate colors dependent on red and green

Also known as color blindness

# Red-Green Deficiency Test



# Dual / Redundant Encoding



Apples to Apples



Pandemic

# Dual / Redundant Encoding

Add/Update Shipping Information

We found an error while verifying your shipping address.  
We've marked the problem in red for you.

Update the address book of

Required information is marked in GREEN CAPS.

[HELP](#) for questions about shipping.

**NICKNAME:**  Please assign a "nickname" for the person you're shipping to.  
You may change or delete this information at any time.

**FIRST NAME:**  **MIDDLE INITIAL:**

**LAST NAME:**

**ADDRESS:**   
  
  
 (International use only)

**CITY:**  **STATE/PROVINCE:**  Includes APO and FPO. Use "Other" if country is not USA or Canada.

**ZIP/POSTAL CODE:**

**COUNTRY:**

**SHIPPING METHOD:** In the U.S.: [HELP](#) International: [HELP](#)  
 Standard UPS  Canada Post  
(2 business days plus) (4-10 business days)

# Today

Some example models of human performance

Visual System

Model Human Processor

Fitts's Law

Gestalt Principles

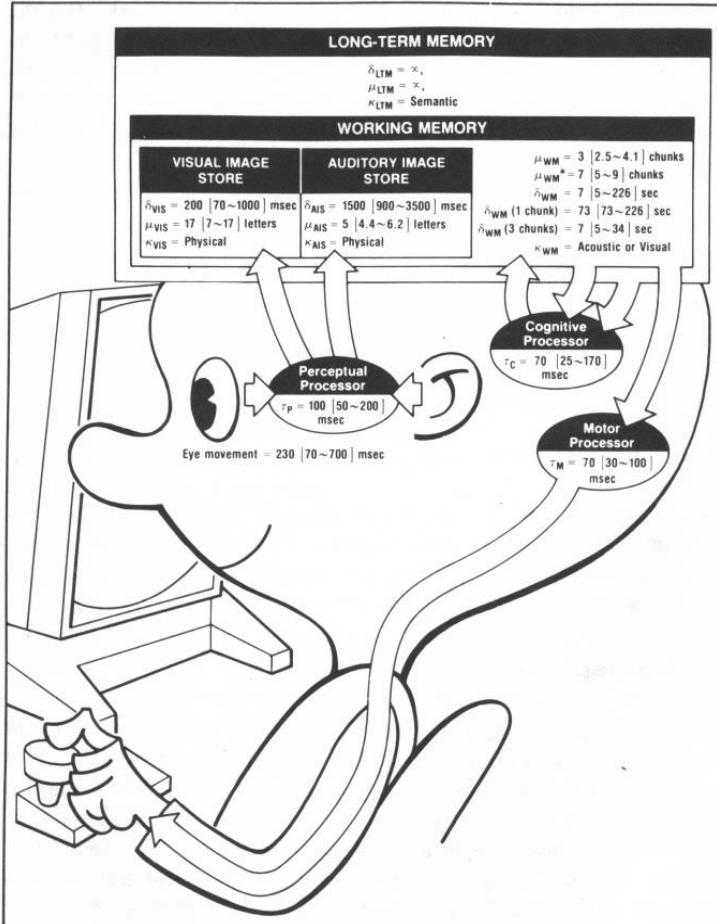
Biological Model

Higher-Level Model

Model by Analogy

Predict Interpretation

# The Model Human Processor

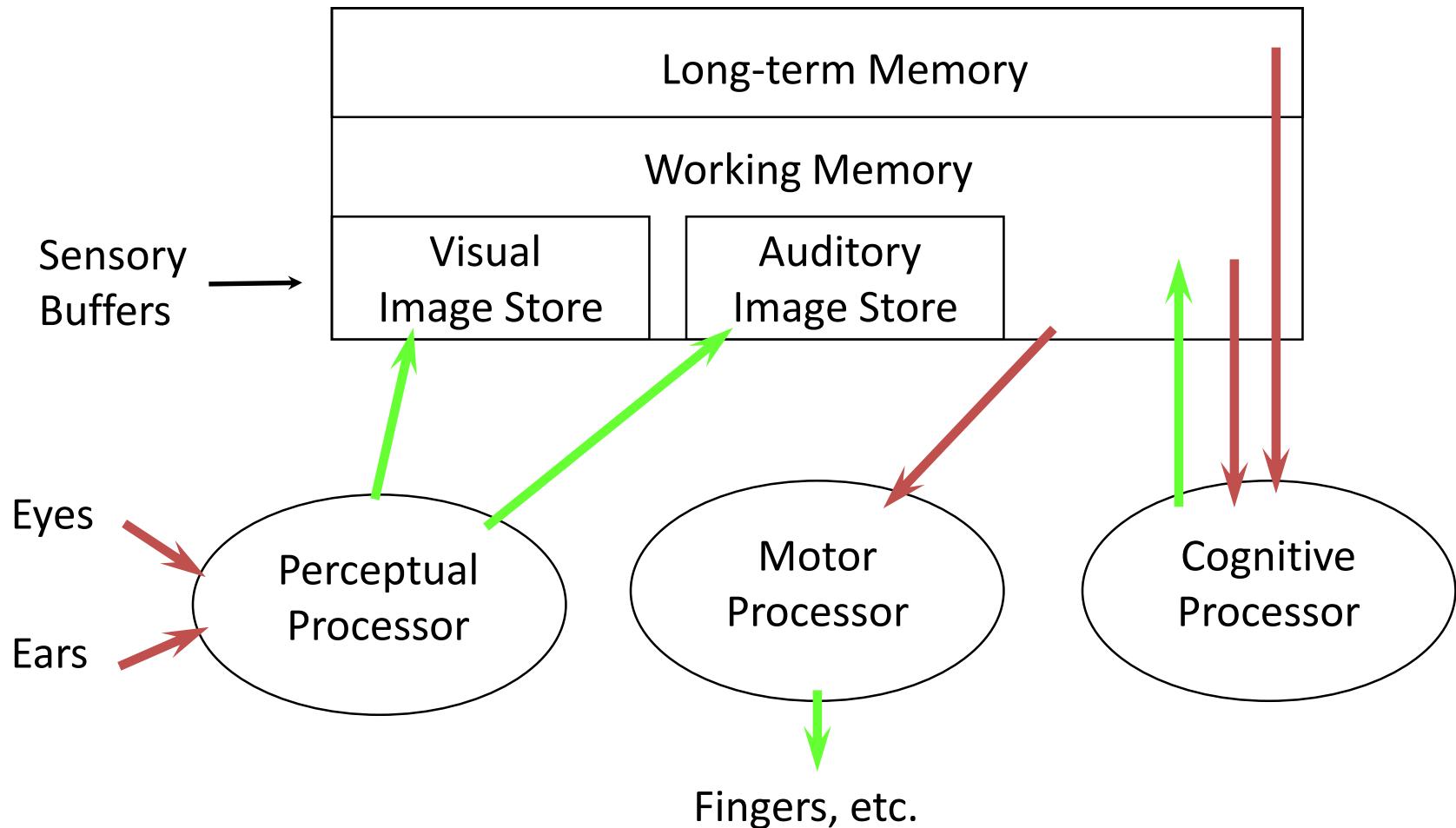


Developed by Card,  
Moran, & Newell (1983)

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 ( $7 \pm 2$  “chunks”)

6174591765 vs. (617) 459-1765

IBM CIACSE 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

# Activation Experiment

Volunteer

**red**

**yellow**

**blue**

**green**

**red**

**green**

**yellow**

**blue**

**yellow**

**green**

**blue**

**red**

**blue**

**red**

**green**

# Activation Experiment

Do it again

Say “done” when finished

**ivd**

**ncudgt**

**mkbh**

**bhfe**

**cnofgt**

**olftcs**

**zjdcv**

**xbs**

**cnhdes**

**uhths**

**fwax**

**lxngyt**

**cfto**

**fwa**

**dalcrd**

# Activation Experiment

Do it again

Say “done” when finished

red

blue

green

yellow

blue

red

yellow

green

blue

yellow

green

red

green

blue

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

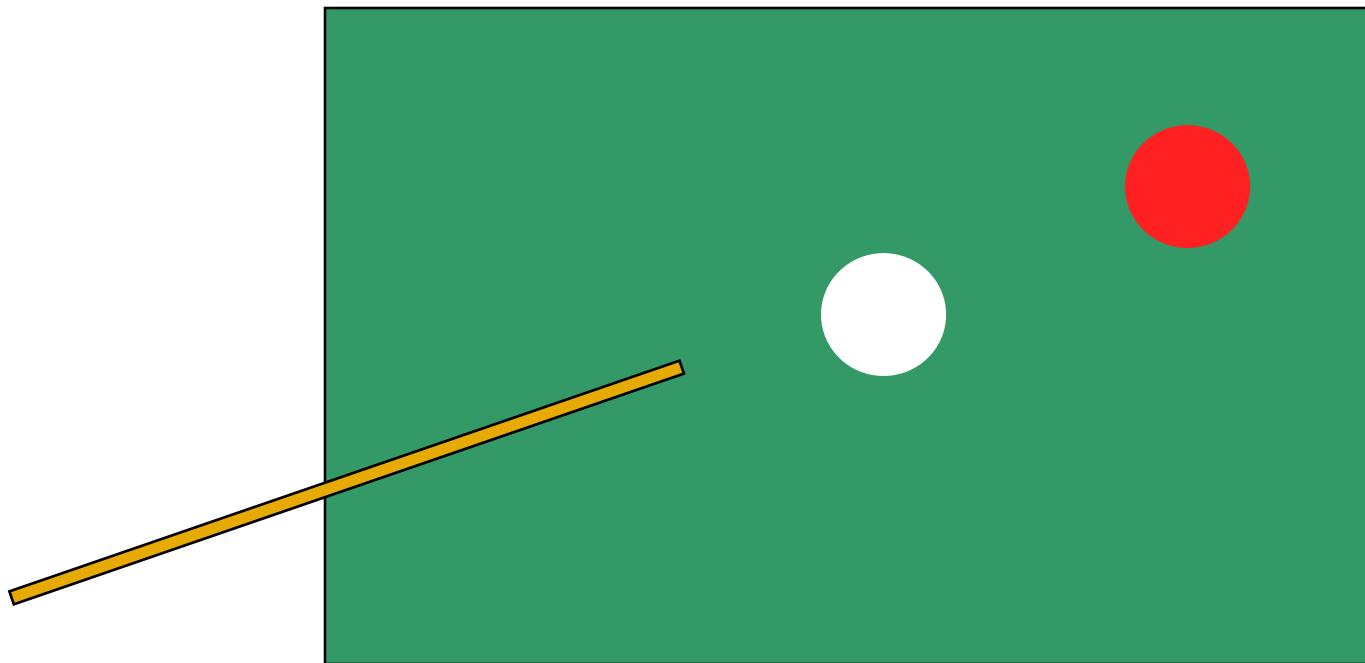
## Discrimination Principle

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

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# 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)

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

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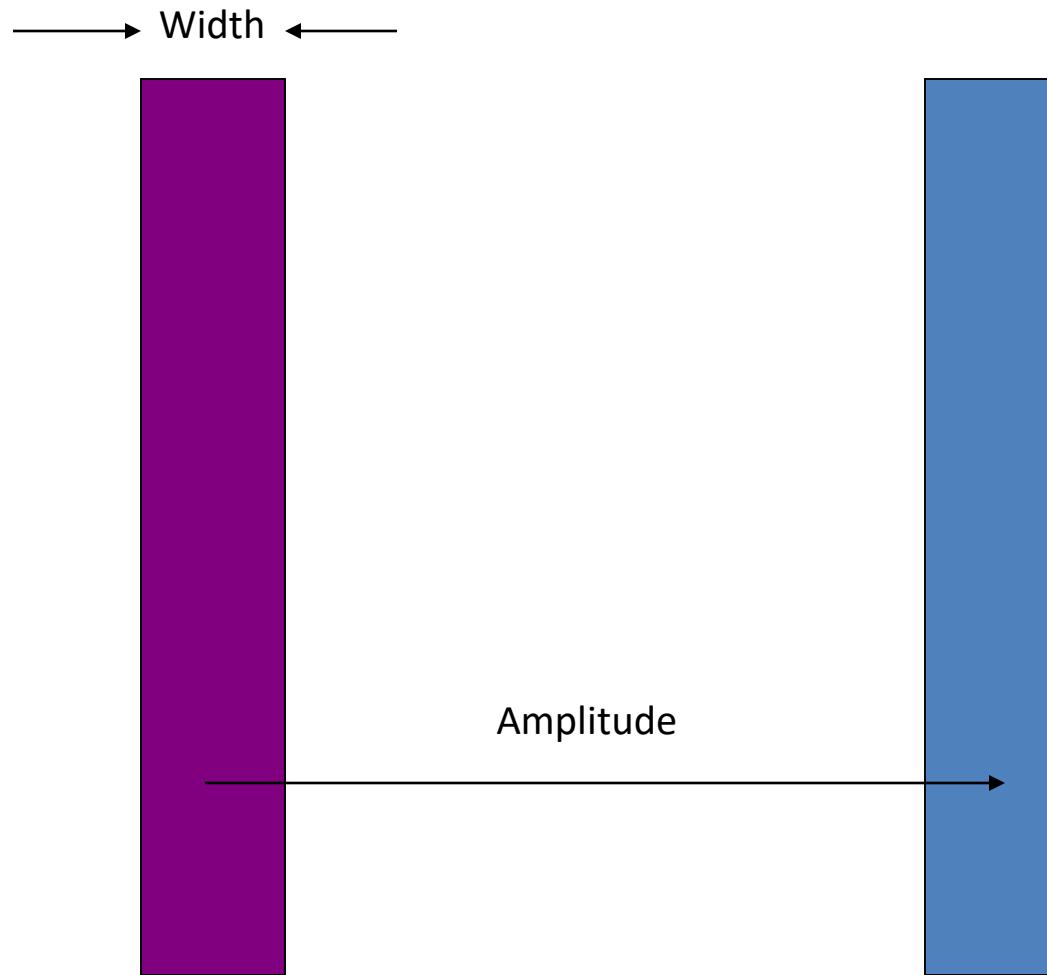
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[https://en.wikipedia.org/wiki/Fitts's\\_law](https://en.wikipedia.org/wiki/Fitts's_law)

# 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

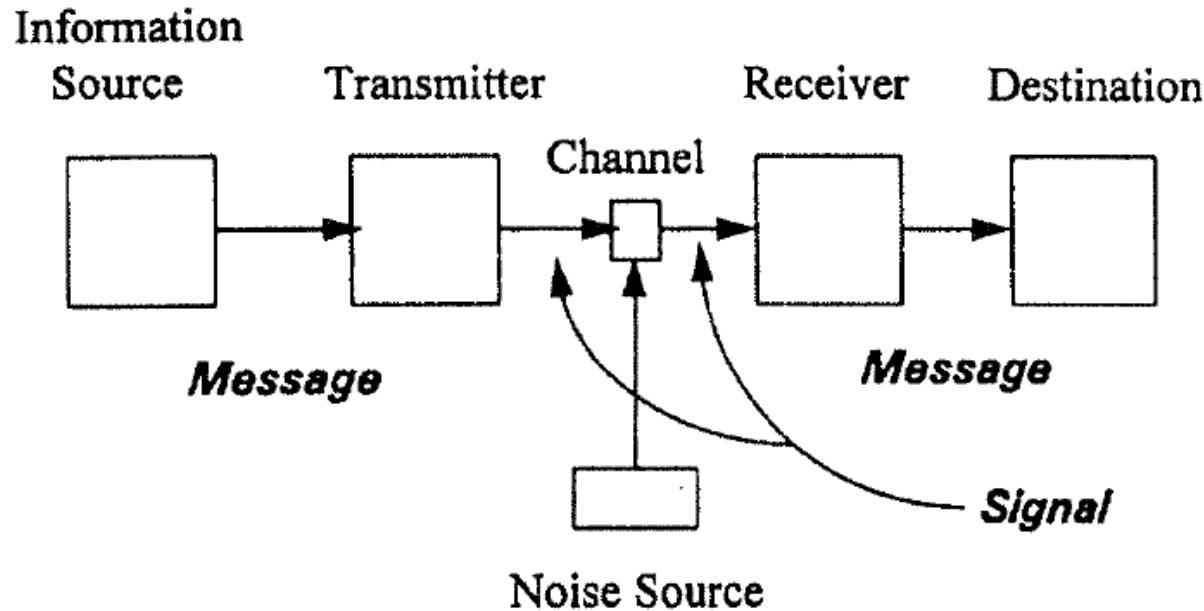
What is open loop motion?

Ballistic movements without feedback correction

Example: Throwing a dart

See Schmidt's Law (1979)

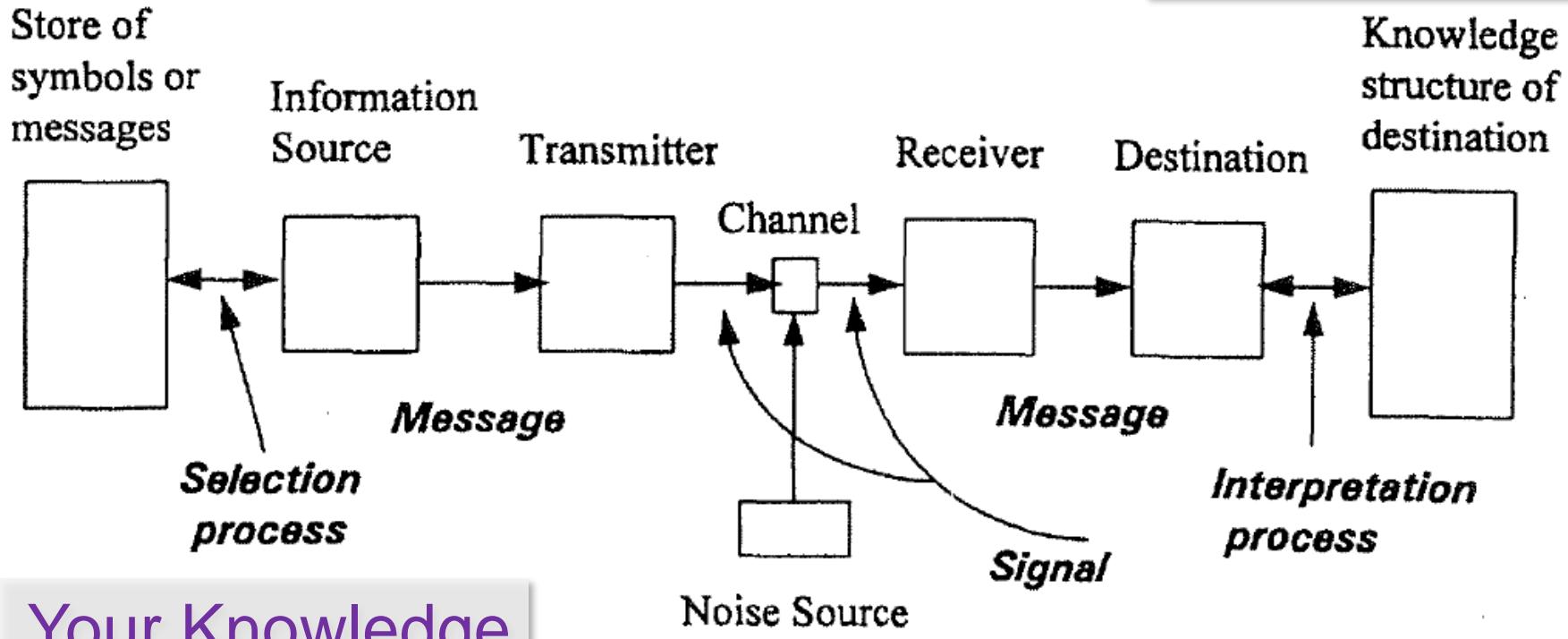
# Model by Analogy



Analogy to Information Transmission  
Shannon and Weaver, 1959

# Model by Analogy

The Interface



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?

$$y = mx + b$$

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

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)

$$\log_2(A / W + 1)$$

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)

$$\log_2(A / W + 1)$$

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)

$$\log_2(A / W + 1)$$

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)

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

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

# “Beating” Fitts’s law

It is the law, right?

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

So how can we reduce movement time?

Reduce A

Increase W

# Fitts's Law Related Techniques

Put targets closer together

Make targets bigger

Make cursor bigger

Area cursors

Bubble cursor

Use impenetrable edges

# Fitts's Law Examples

Which will be faster on average?

Pop-up Linear Menu



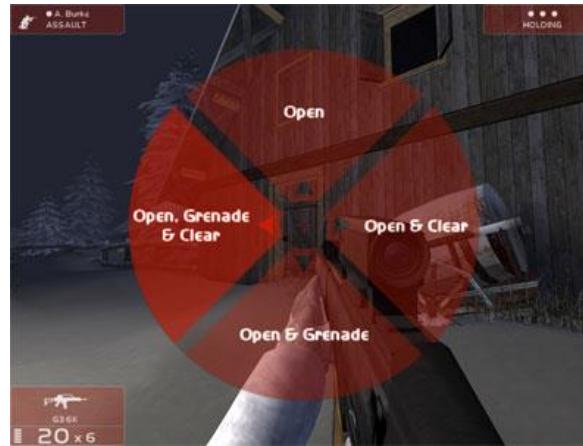
Pop-up Pie Menu



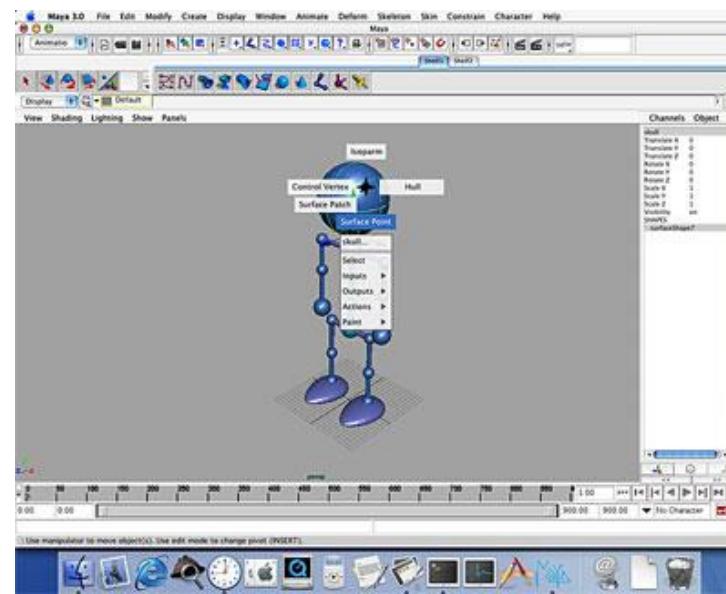
# Pie Menus in Use



The Sims



Rainbow 6



Maya

# Fitts's Law Examples

Which will be faster on average?

Pop-up Linear Menu



Pop-up Pie Menu



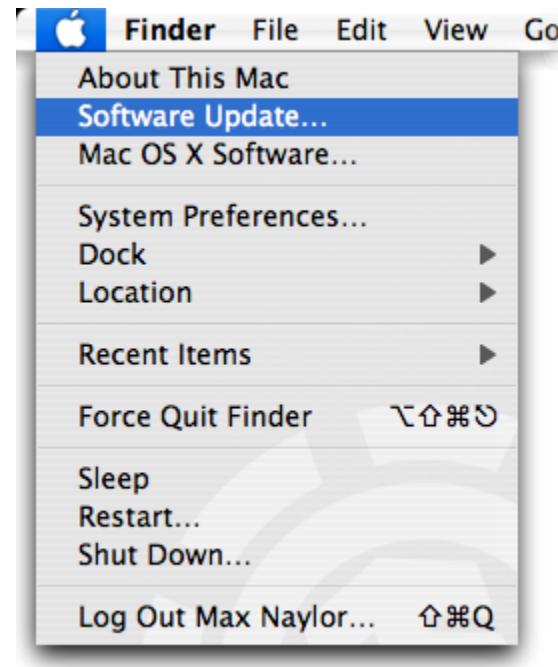
What about adaptive menus?

# Fitts's Law in Windowing



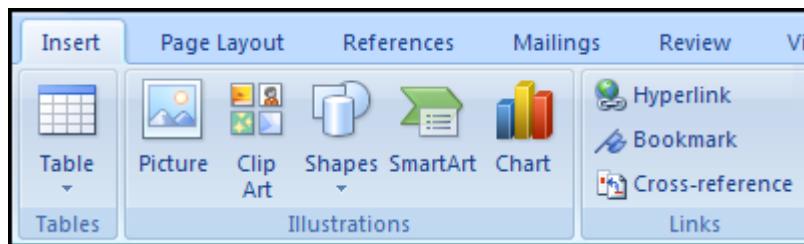
Windows 95: Missed by a pixel

Windows XP: Good to the last drop

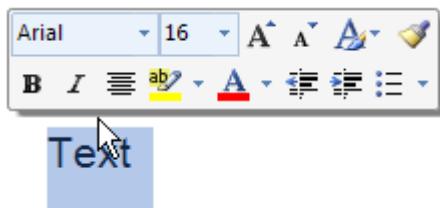


Macintosh Menu

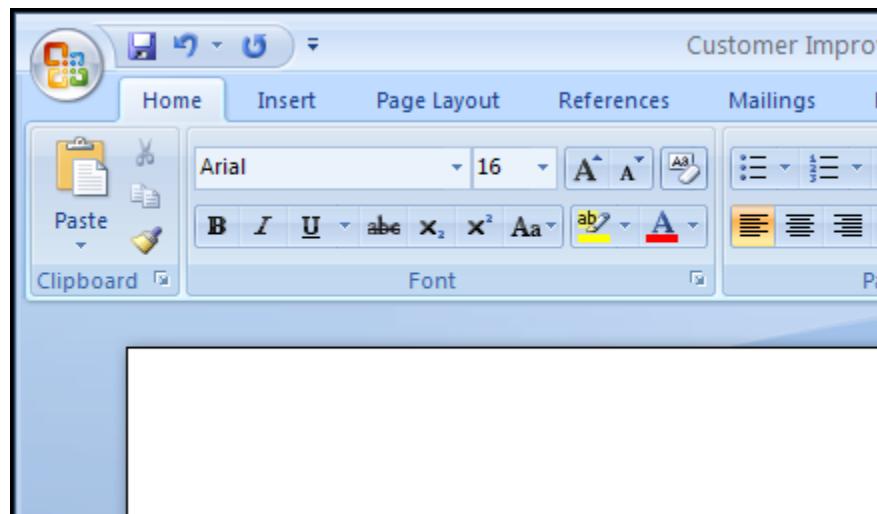
# Fitts's Law in MS Office 2007



Larger, labeled controls  
can be clicked more quickly



Mini toolbar is close to the cursor



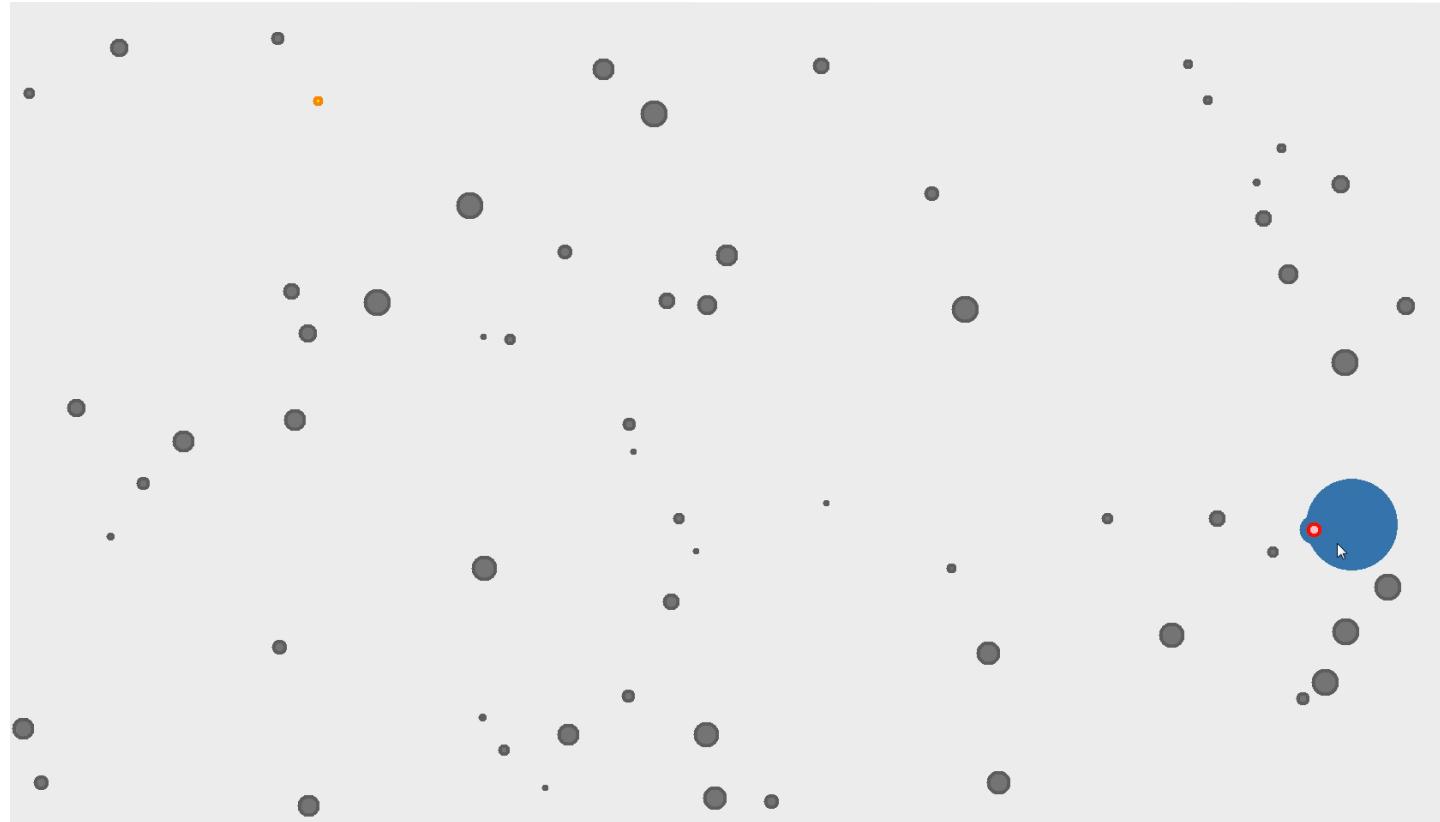
Magic Corner:  
Office Button in the upper-left corner

# Bubble Cursor



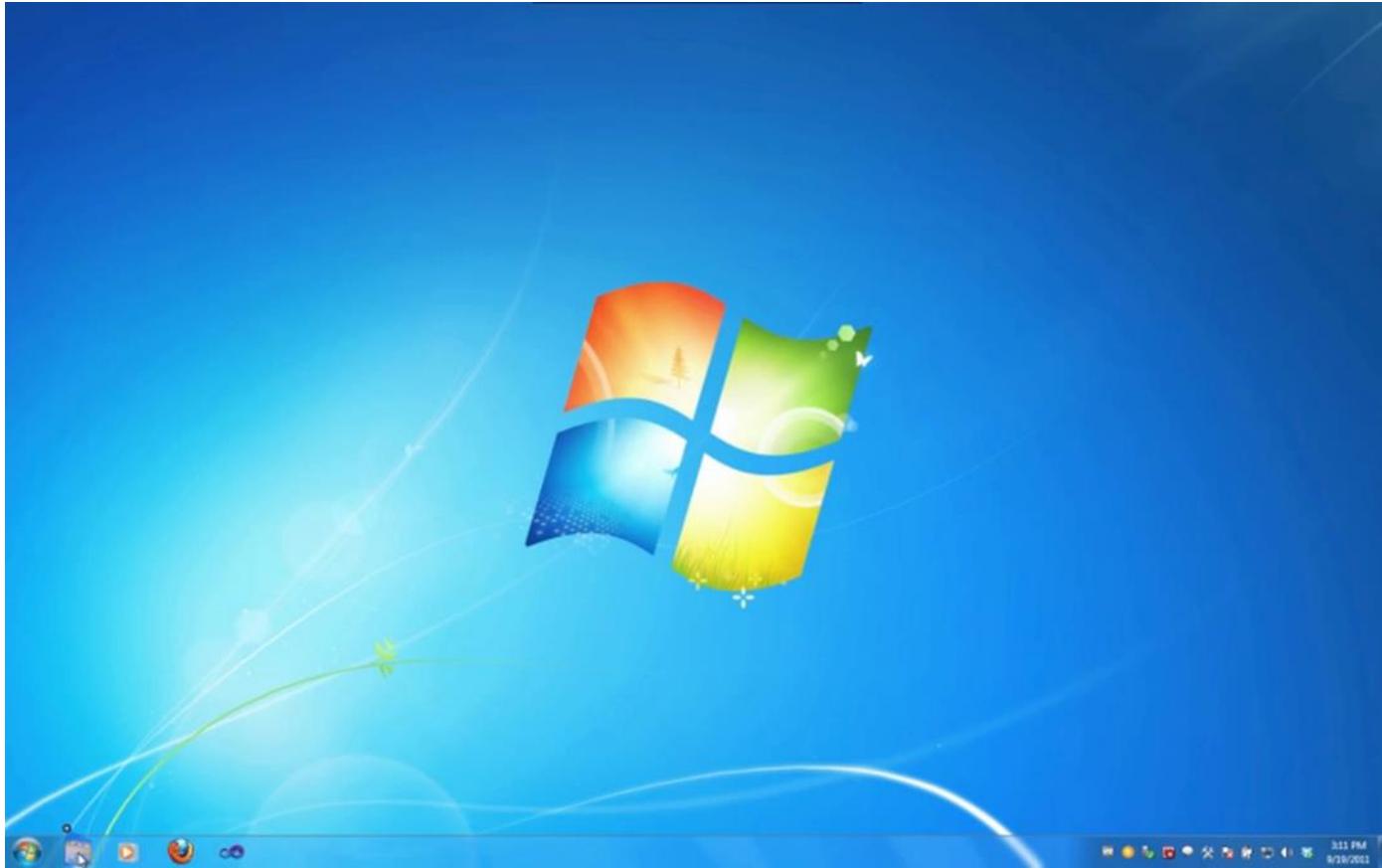
Grossman and Balakrishnan, 2005

# Bubble Cursor



Grossman and Balakrishnan, 2005

# Bubble Cursor with Prefab



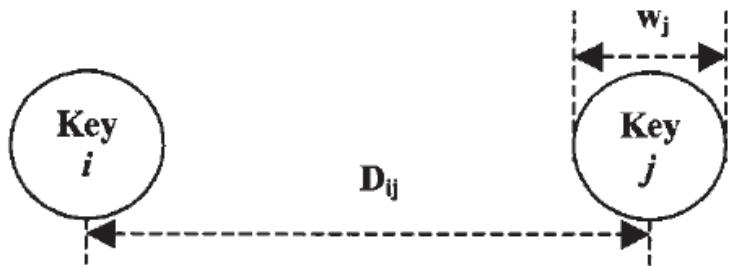
Dixon et al, 2012

# Bubble Cursor with Prefab



Dixon et al, 2012

# Fitts's Law and Keyboard Layout



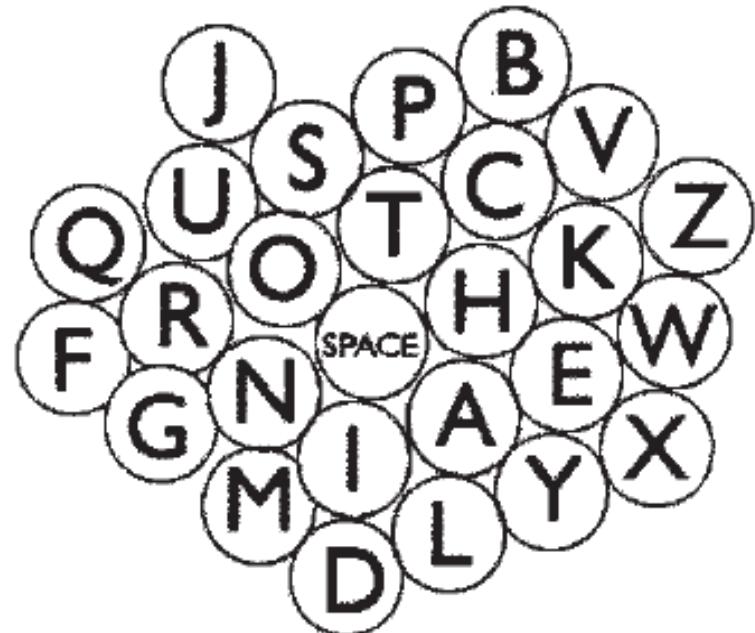
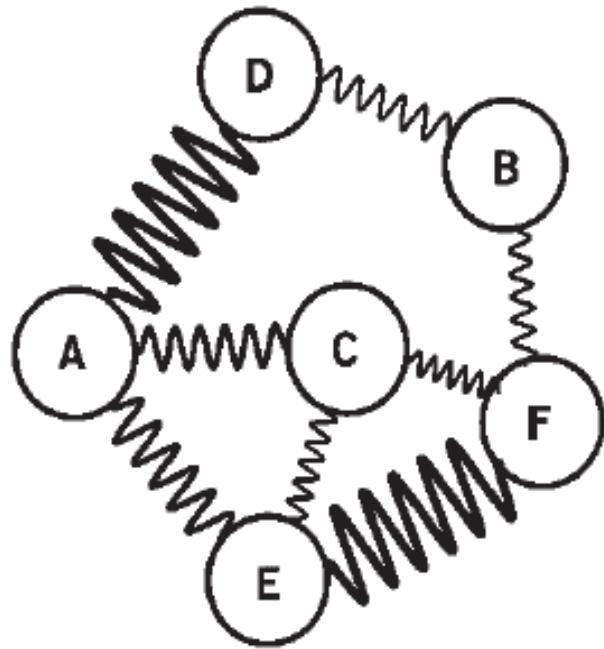
Zhai et. al (2002) pose stylus keyboard layout as an optimization of all key pairs, weighted by language frequency

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

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

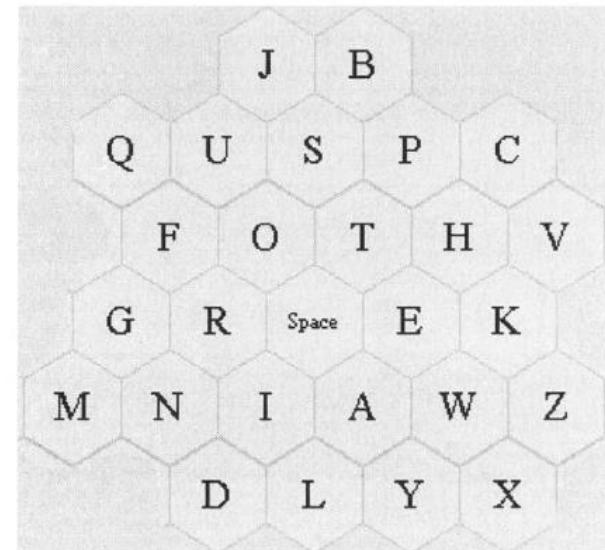
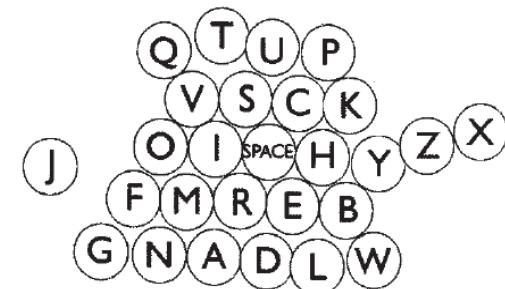
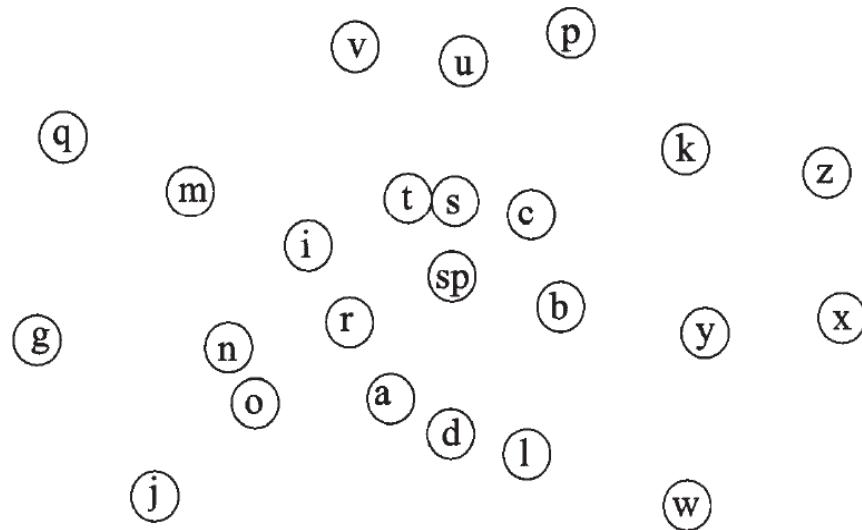
# Hooke's Keyboard

Optimizes a system of springs



# Metropolis Keyboard

Random walk minimizing scoring function



# Considering Multiple Space Keys

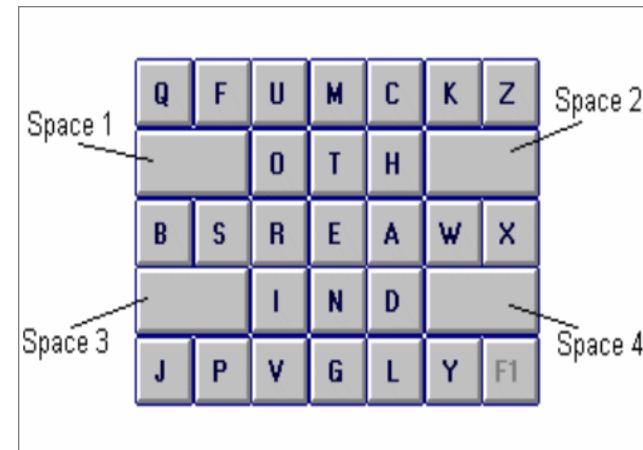
FITALY Keyboard

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

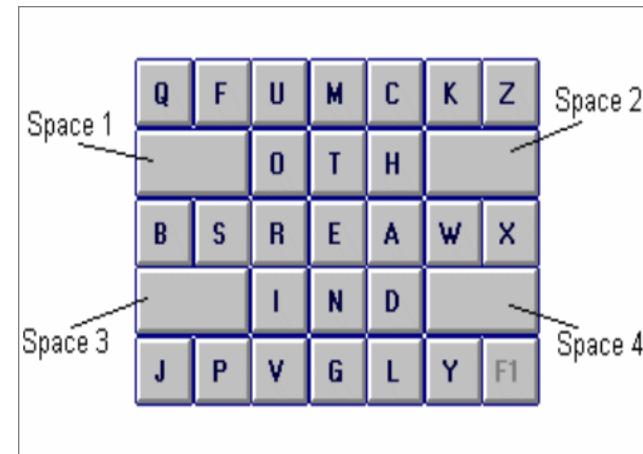
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F	I	T	A	L	Y
		N	E		
G	D	O	R	S	B
Q	J	U	M	P	X

OPTI Keyboard

MacKenzie and Zhang 1999

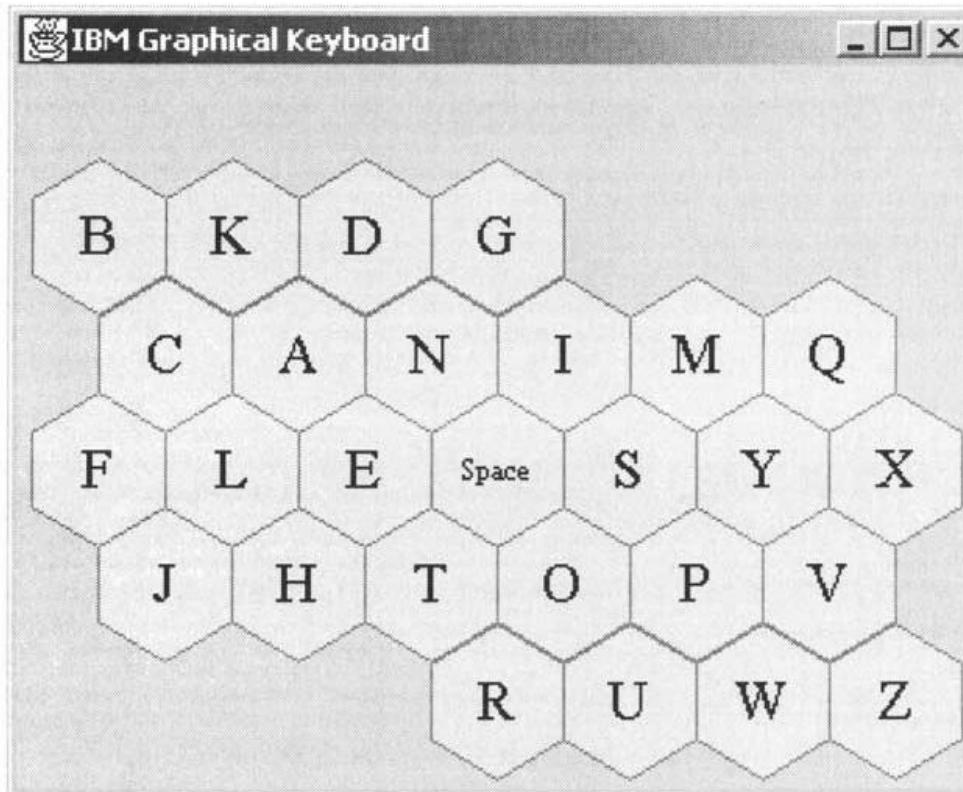


Correct choice of space key becomes important

Requires planning head to be optimal

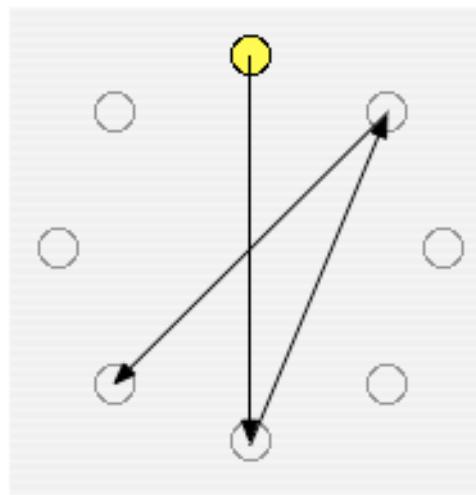
# ATOMIK Keyboard

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

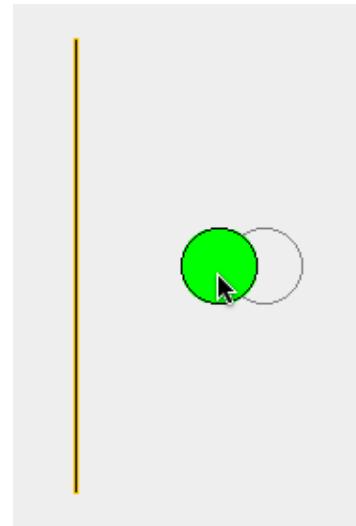


# Using Motor Ability in Design

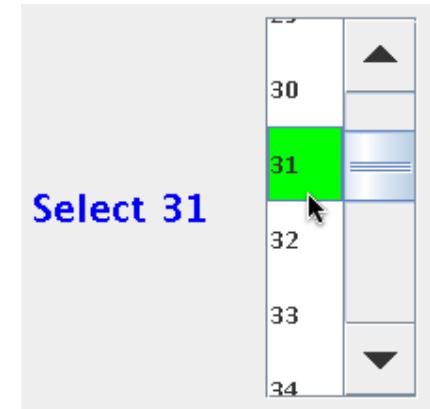
Pointing



Dragging

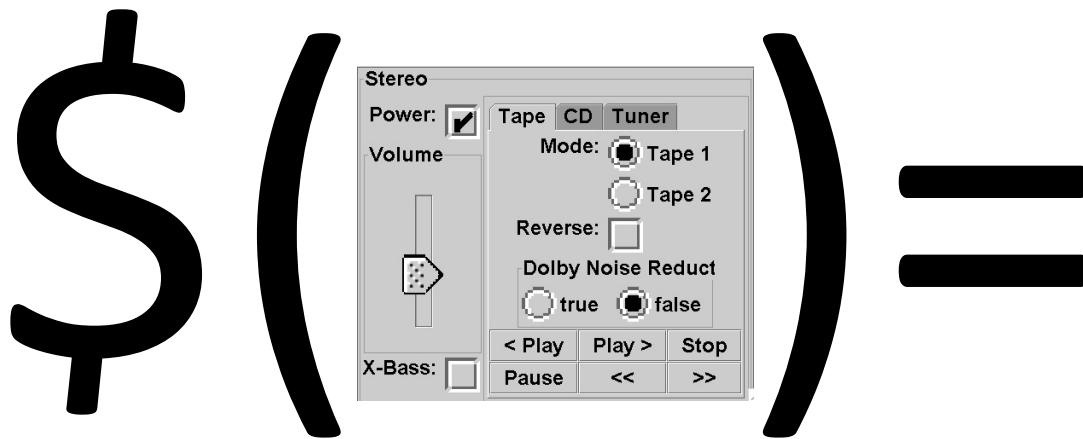


List Selection



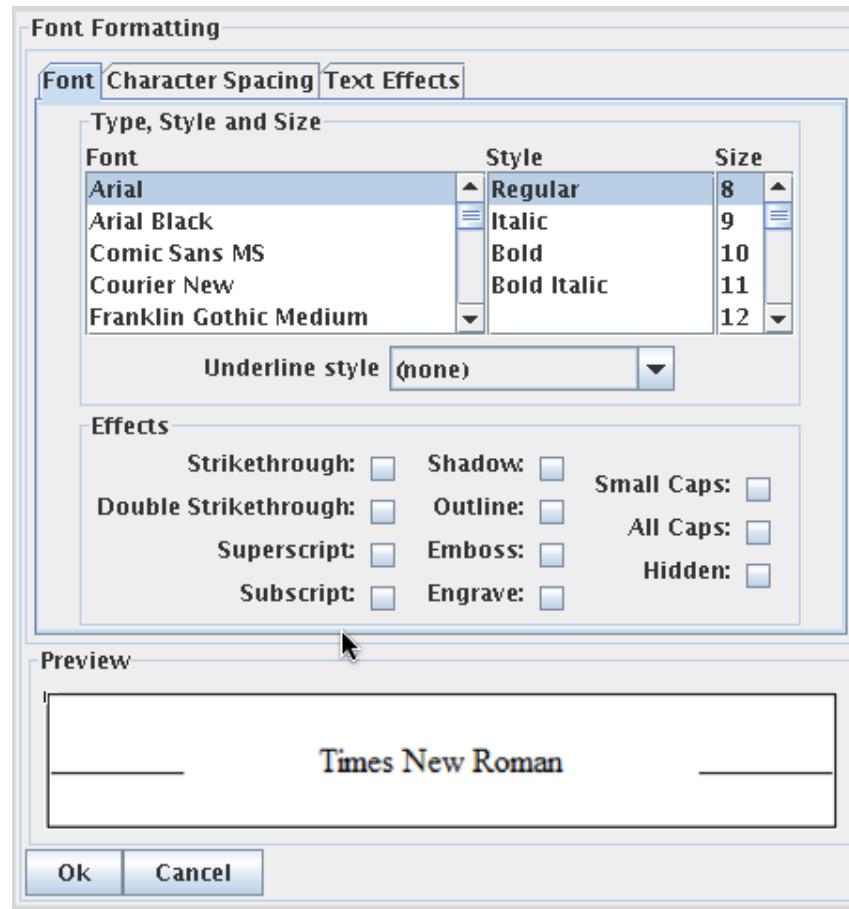
Gajos et al 2007

# Interface Generation As Optimization

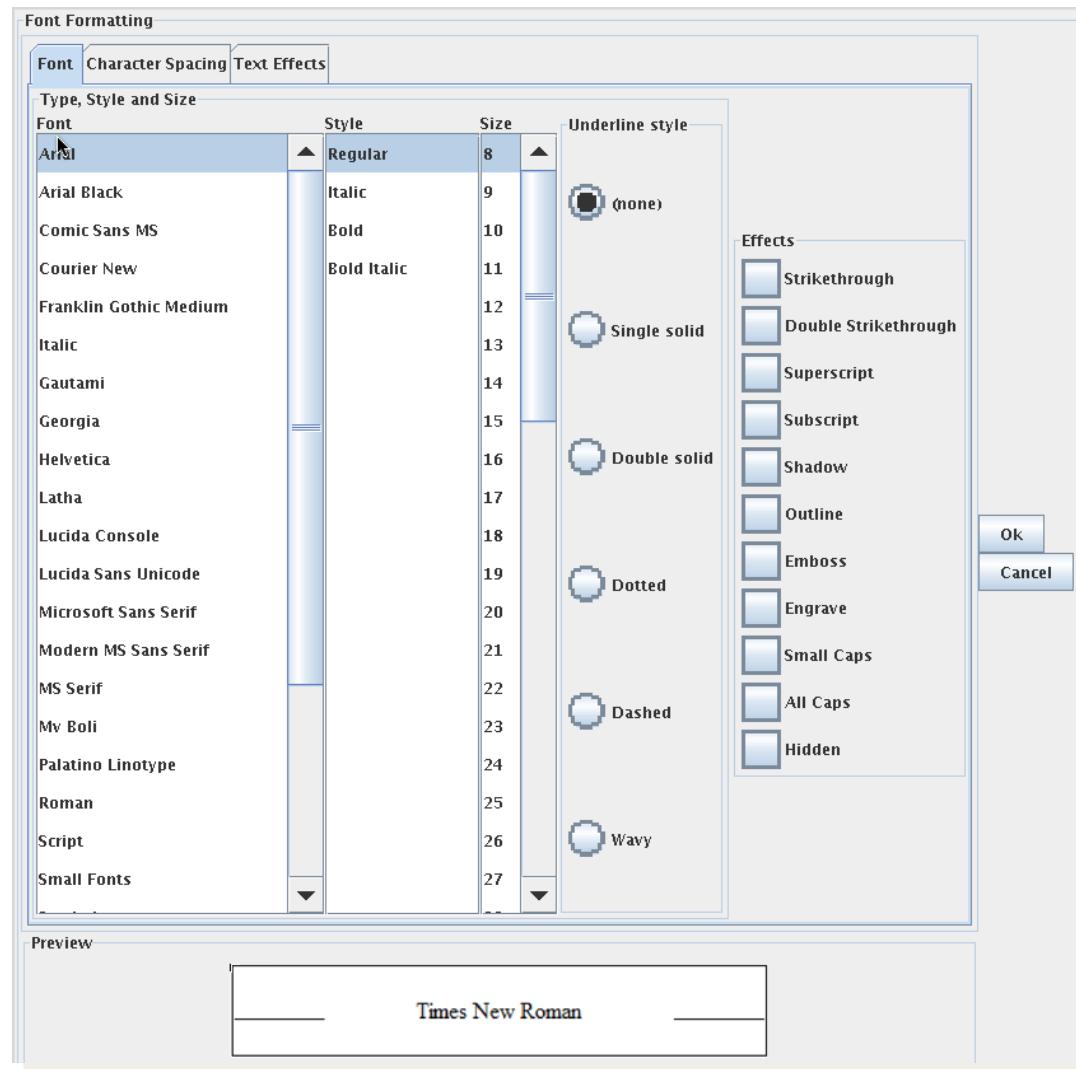


Estimated  
task  
completion  
time

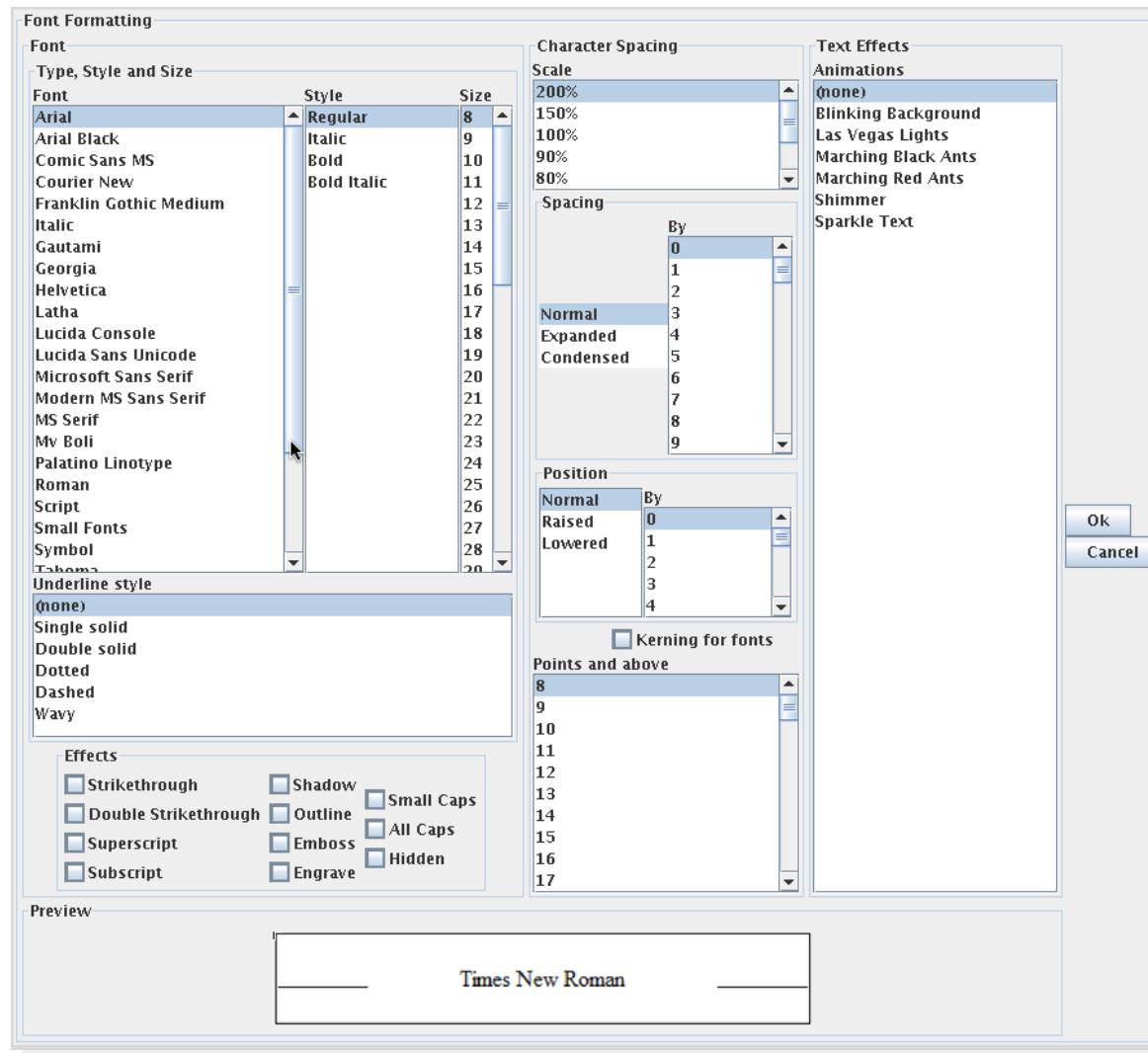
# Manufacturer Interface



# 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”

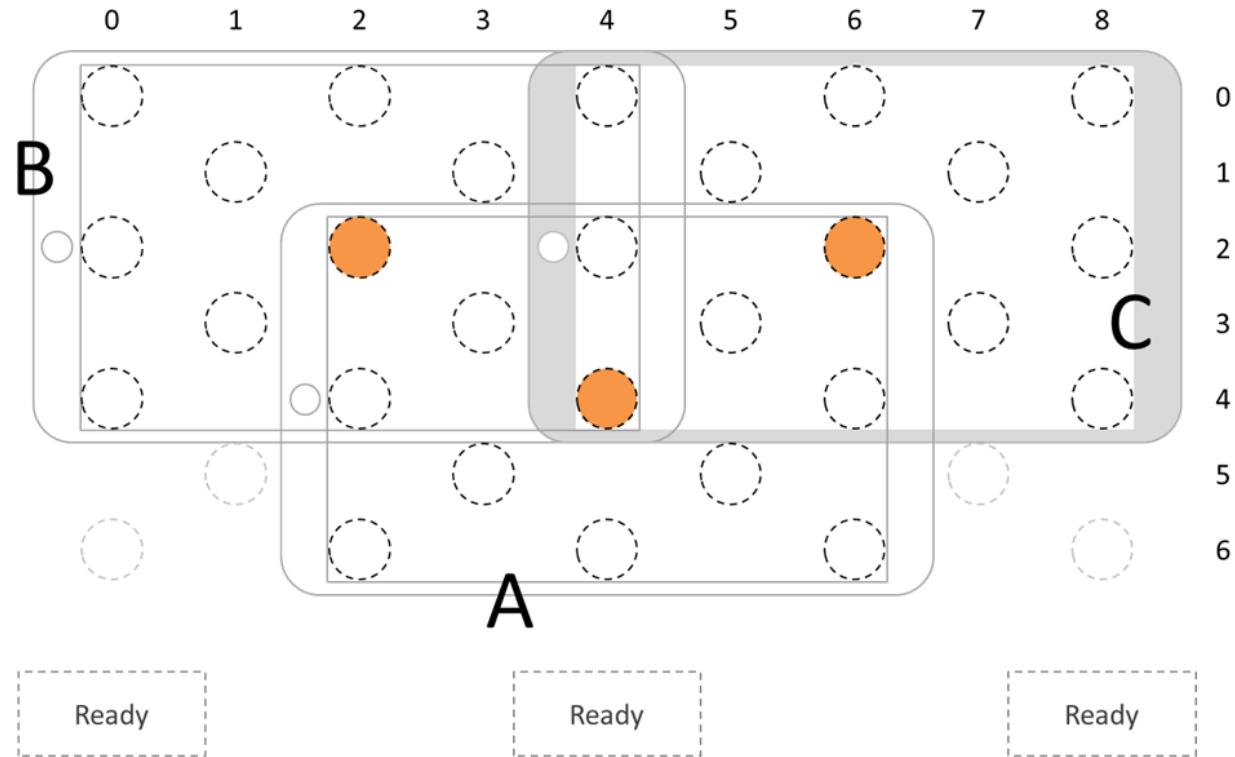
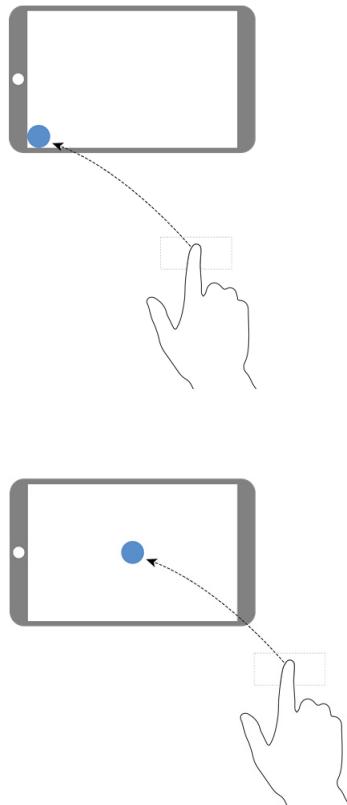
## Constrained Motion

Snapping,  
holding Shift to limit degrees of movement

## Target Prediction

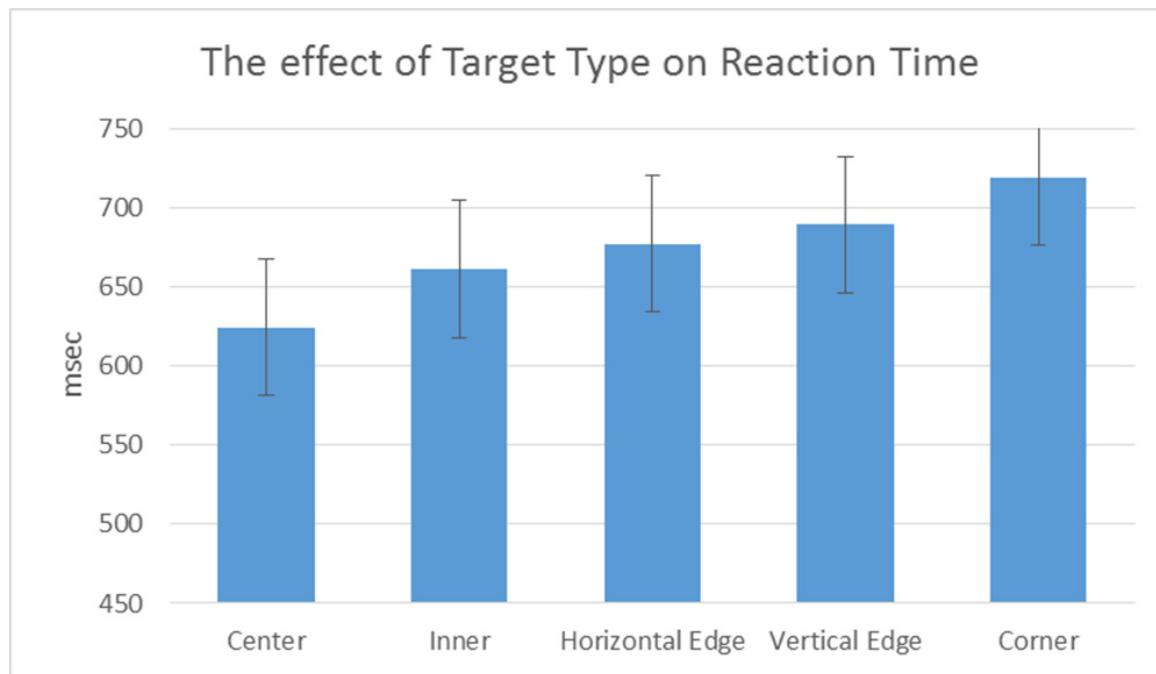
Determine likely target,  
move it nearer or expand it

# 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

Model Human Processor

Fitts's Law

Gestalt Principles

Biological Model

Higher-Level Model

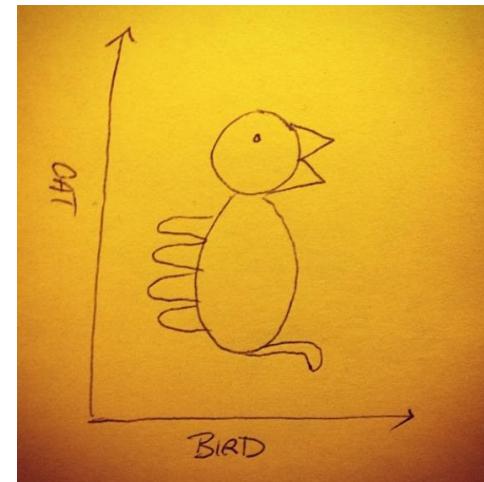
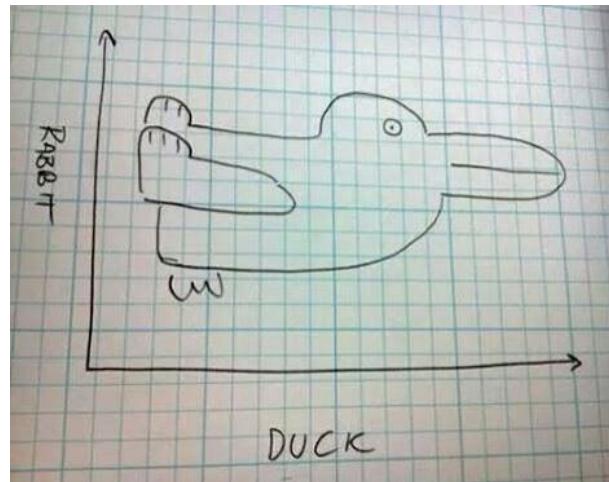
Model by Analogy

Predict Interpretation

# Gestalt Psychology

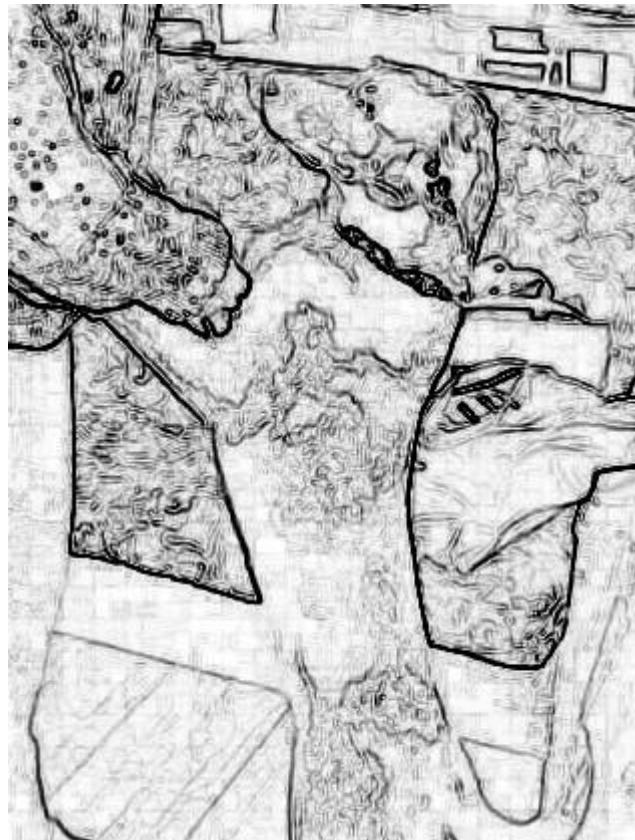
Described loosely in the context of this lecture and associated work, not a real definition

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



# Gestalt Psychology

You can still see the dog...

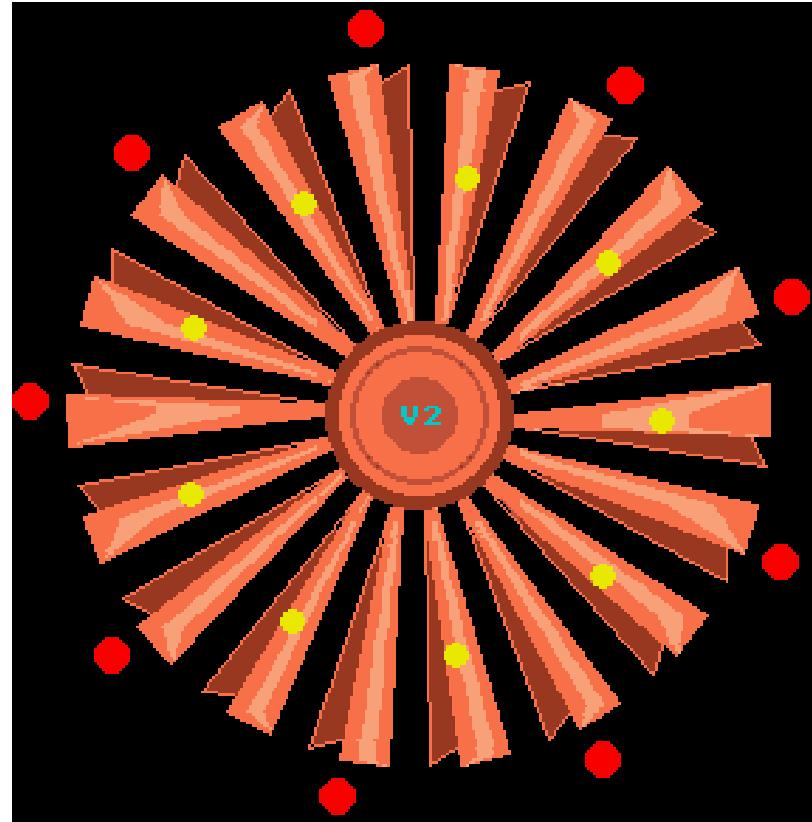


# Gestalt Psychology

You can still see the dog...



# Spinning Wheel



Follow the red dots vs  
follow the yellow dots

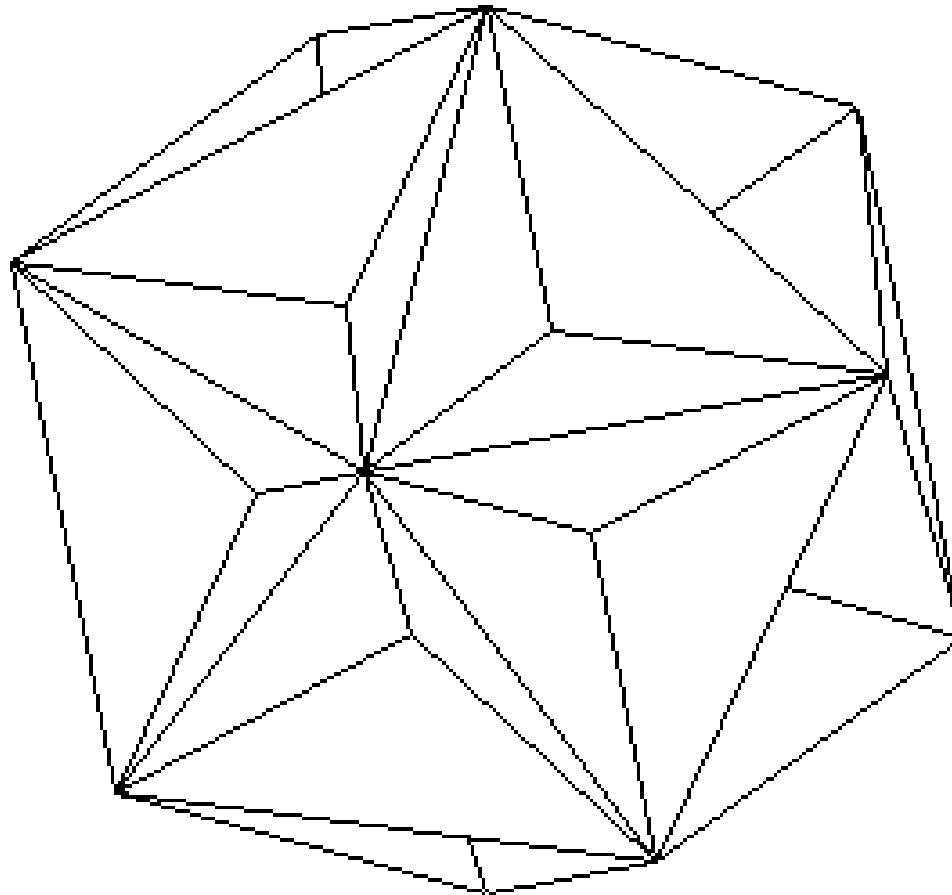
# Blind Spot Interpolation



Use right eye, look at letters

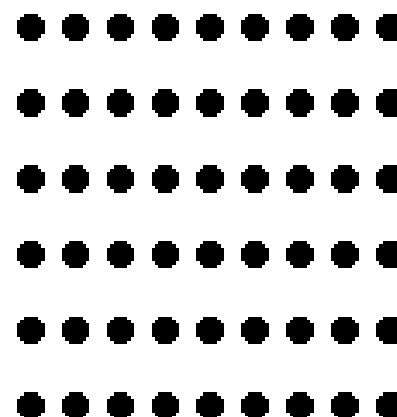
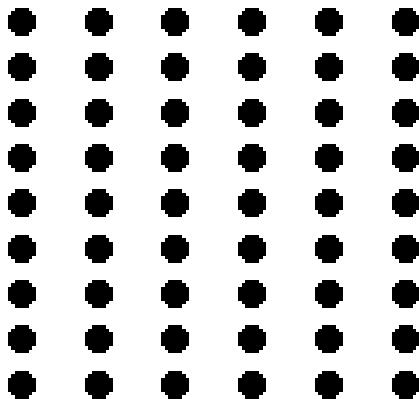
# Painful Image Warning

# 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

Gender

Birthday

I live in

Postal Code

## 2. Select an ID and password

Yahoo! ID and Email  @

Password  Password Strength

Re-type Password

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

Alternate Email

1. Security Question

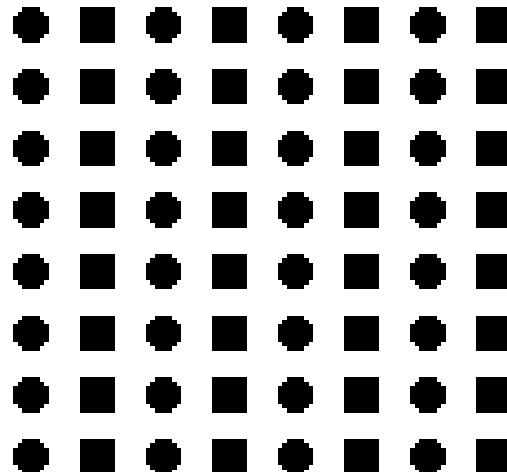
Your Answer

2. Security Question

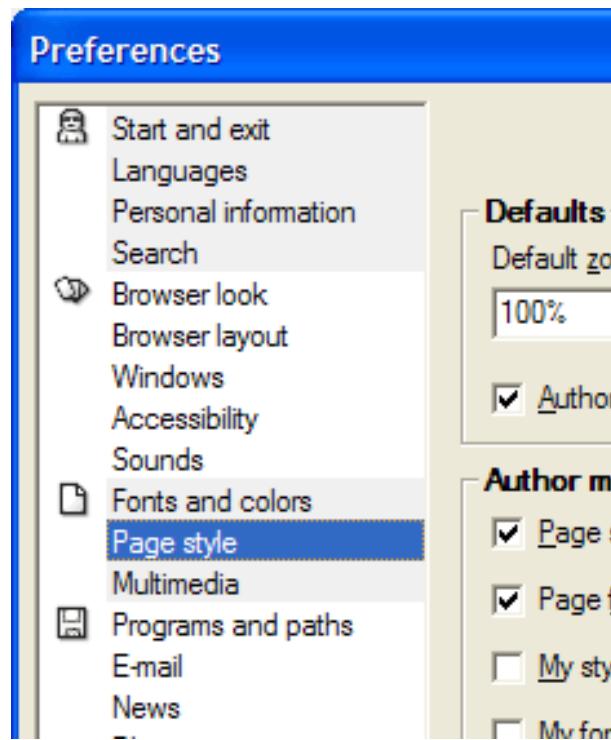
Your Answer

# Similarity

Objects that are similar form a group



# Similarity



# Proximity and Similarity



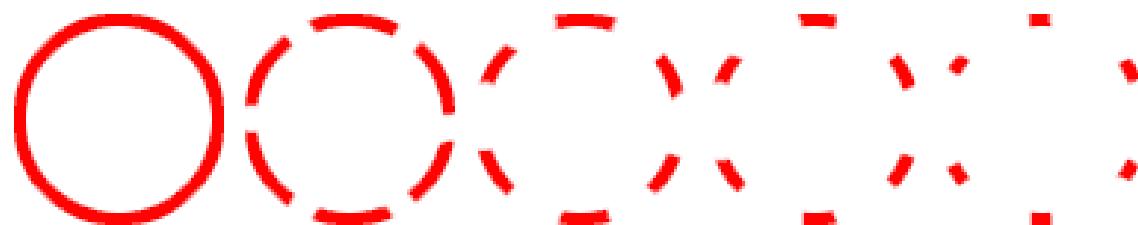
# Proximity and Similarity



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

# Closure

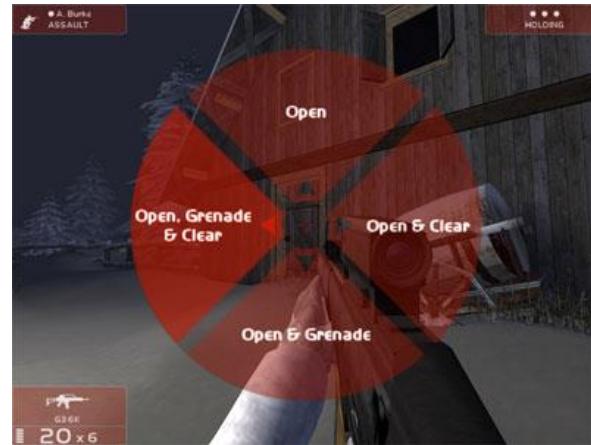
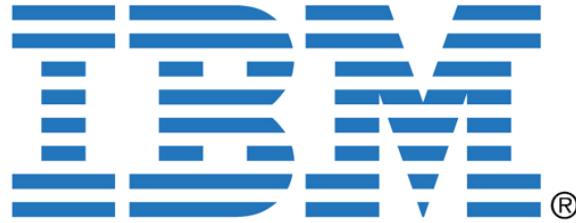
Even incomplete objects are perceived as whole  
Increases regularity of stimuli



# Closure



The Sims



Rainbow 6

# Symmetry

Objects are perceived as symmetrical  
and forming around a center point



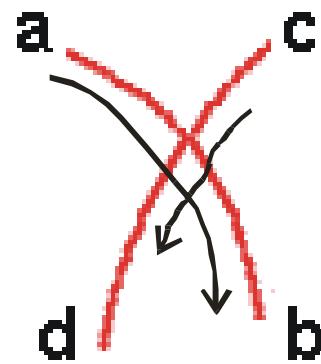
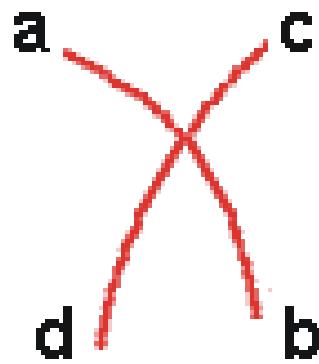
If you fight  
symmetry,  
be sure you  
have a reason

# Continuity

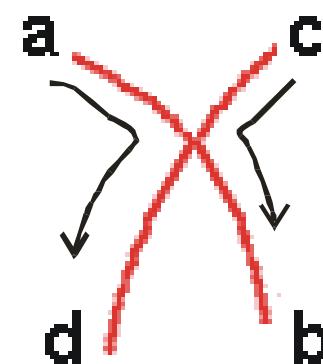
Objects perceived as grouped when they align

Remain distinct even with overlap

Preferred over abrupt directional changes



what most  
people see



not this

# Continuity

The screenshot shows a website for 'Anderzorg'. On the left, there's a dark mode switch with the text 'met jouw bezoekers.' and 'versie!' above it. To the right, there's a comparison between a mobile view (dark background) and a desktop view (light background). The desktop view shows a navigation bar with 'Home', 'Over ons', 'Diensten', 'Contact', and 'Nieuws'. Below this is a grid of service cards. To the right of the grid are sections for 'Direct inschrijven' (with a logo of a person jumping), 'Uitvoering en Tip voor vriend' (with a euro sign icon), and 'Zelfadministratie' (with a gear icon). At the bottom, a grey banner reads 'Met Concept7 realiseert Anderzorg toppositie in klanttevredenheid' with an upward-pointing arrow.

met jouw bezoekers.  
versie!

Direct inschrijven  
Uitvoering en Tip voor vriend  
Zelfadministratie

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

# 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

# Exam

In-Class  
Next Tuesday 11/21

Mostly short answer,  
some long answer

Content drawn from  
lecture and readings

Compilation of the lecture slides is posted

Q&A scheduled Monday at  
1:00 in CSE 403?  
3:00 in CSE 403?  
5:00 in CSE 305/503?

A screenshot of a Facebook post from Don Patterson. The post asks if there will be a study guide for the exam, with a response from Don Patterson stating that it's a robust study guide. The post has received 4 likes and 21 hours ago.

Don Patterson 21 hrs ·

Student: "Will there be a study guide for the exam?"  
Me: "Yes, the textbook, my lectures and any supplemental information from the Internet that you find helpful!"

Like Comment Share

You, John Krumm, Stephen Voida and 44 others

James Fogarty I'll point my students at your guide.  
Like · Reply · 3 · 21 hrs

Don Patterson It's actually quite a robust study guide.  
Like · Reply · 4 · 21 hrs

Write a reply...

# 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

# 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

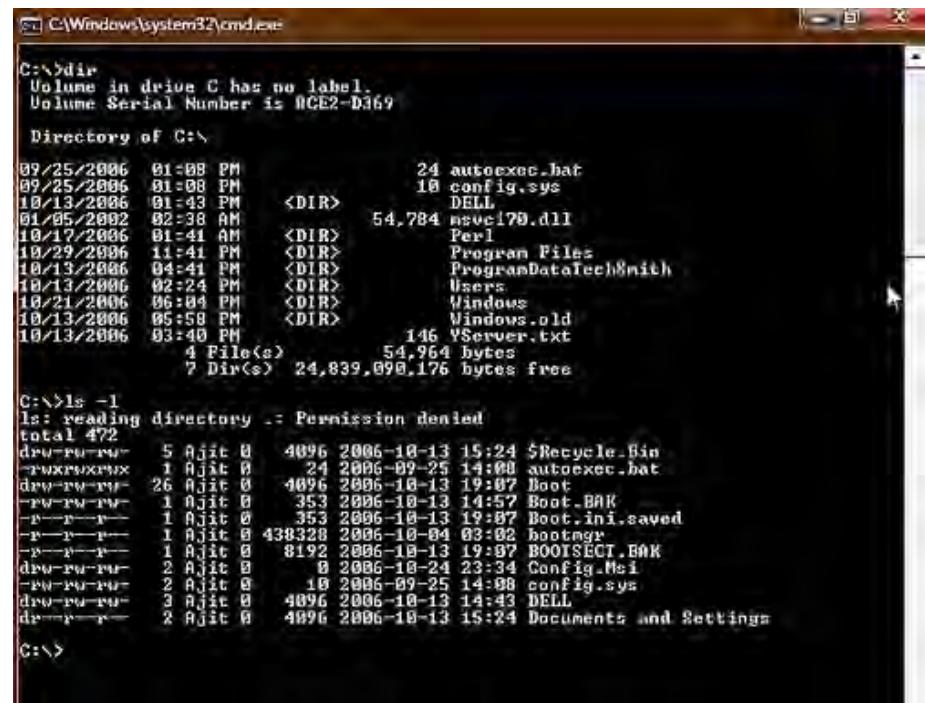
Describe why tools eventually limit design thinking

# 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



```
C:\>dir
Volume in drive C has no label.
Volume Serial Number is 0CE2-D369

Directories of C:\

09/25/2006  01:08 PM                24 autoexec.bat
09/25/2006  01:08 PM                10 config.sys
10/13/2006  01:43 PM      <DIR>          DELL
01/05/2002  02:38 AM      <DIR>          54,784 msvc170.dll
10/17/2006  01:41 AM      <DIR>          Perl
10/29/2006  11:41 PM      <DIR>          Program Files
10/13/2006  04:41 PM      <DIR>          ProgramDataTechSmith
10/13/2006  02:24 PM      <DIR>          Users
10/21/2006  06:04 PM      <DIR>          Windows
10/13/2006  05:58 PM      <DIR>          Windows.old
10/13/2006  03:40 PM      146 YServer.txt
                           4 File(s)   54,964 bytes
                           7 Dir(s)  24,839,090,176 bytes free

C:\>ls -l
ls: reading directory .: Permission denied
total 472
drw-rw-rw-  5 Ajit 0  4096 2006-10-13 15:24 $Recycle.Bin
-rwxrwxrwx  1 Ajit 0  24 2006-09-25 14:00 autoexec.bat
drw-rw-rw-  26 Ajit 0  4096 2006-10-13 19:07 Boot
-rw-rw-rw-  1 Ajit 0  353 2006-10-13 14:57 Boot.BAK
-r--r--r--  1 Ajit 0  353 2006-10-13 19:07 Boot.ini.saved
-r--r--r--  1 Ajit 0  438328 2006-10-04 03:02 bootmgr
-r--r--r--  1 Ajit 0  8192 2006-10-13 19:07 BOOTSECT.BAK
drw-rw-rw-  2 Ajit 0  0 2006-10-24 23:34 Config.Msi
-rw-rw-rw-  2 Ajit 0  10 2006-09-25 14:00 config.sys
drw-rw-rw-  3 Ajit 0  4096 2006-10-13 14:43 DELL
drw-rw-rw-  2 Ajit 0  4096 2006-10-13 15:24 Documents and Settings
C:\>
```

# Sequential Programs

```
while true {  
    print “Prompt for Input”  
    input = read_line_of_text()  
    output = do_work()  
    print output  
}
```

Person is literally modeled as a file

# Event-Driven Programming

A program waits for a person to provide input

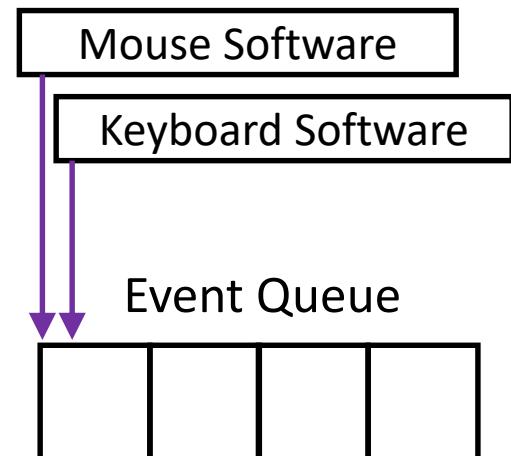
All communication done via events

“mouse down”, “item drag”, “key up”

All events go to a queue

Ensures events handled in order

Hides specifics from applications



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);
```

The code is annotated with purple braces on the right side to group it into three phases:

- A brace spanning `e = read_event();` is labeled "input".
- A brace spanning `dispatch_event(e);` is labeled "processing".
- A brace spanning `update_display();` is labeled "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

# 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?

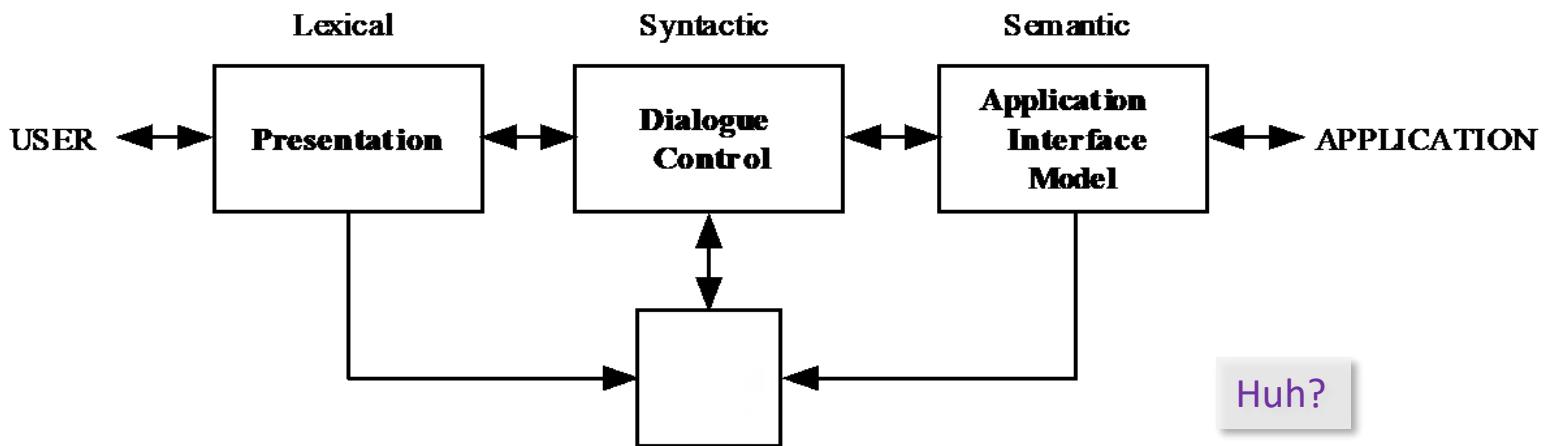
This is a surprisingly complicated question, with unstated assumptions requiring significant background to understand and resolve

# 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

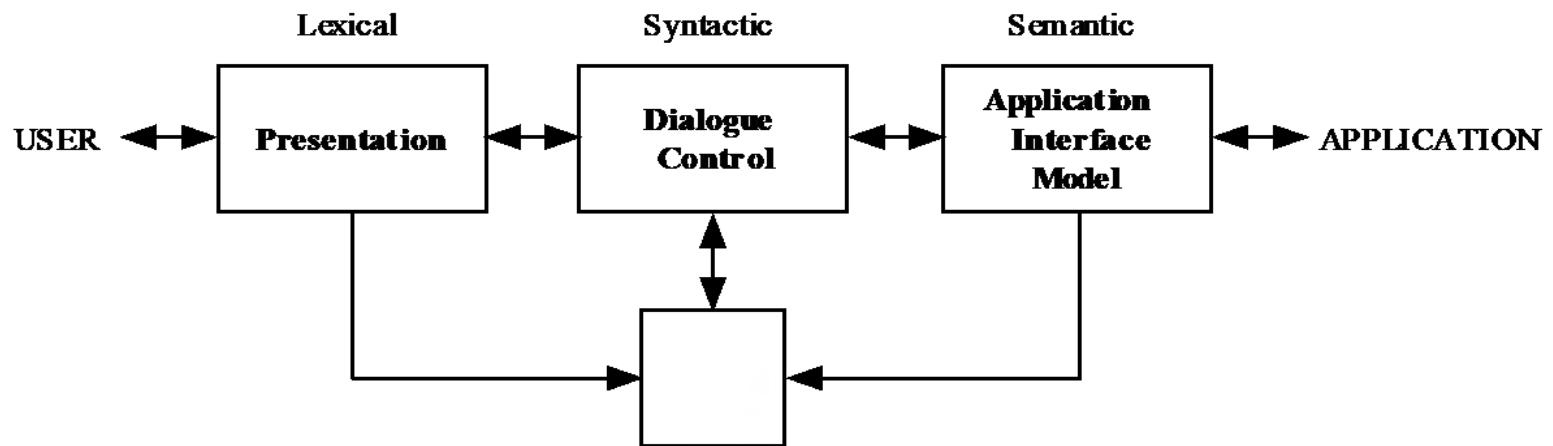
Maintain state

## Semantic - Application Interface Model

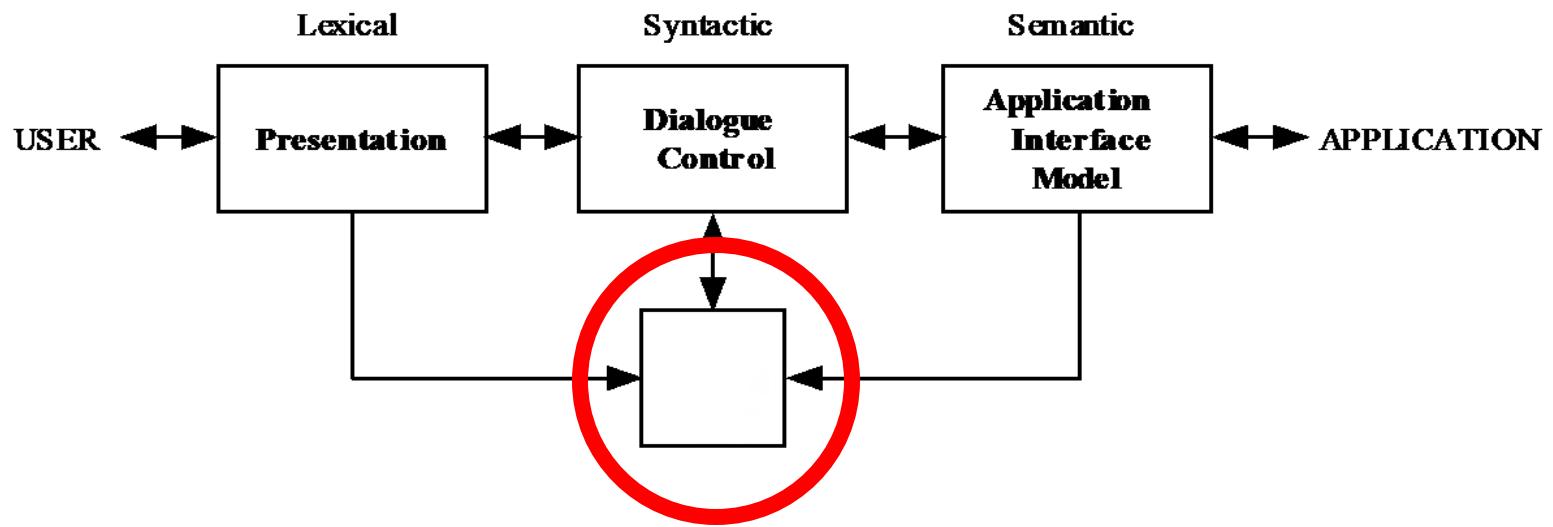
Defines interaction between  
interface and rest of software

e.g., drag-and-drop target highlighting

# Seeheim Model

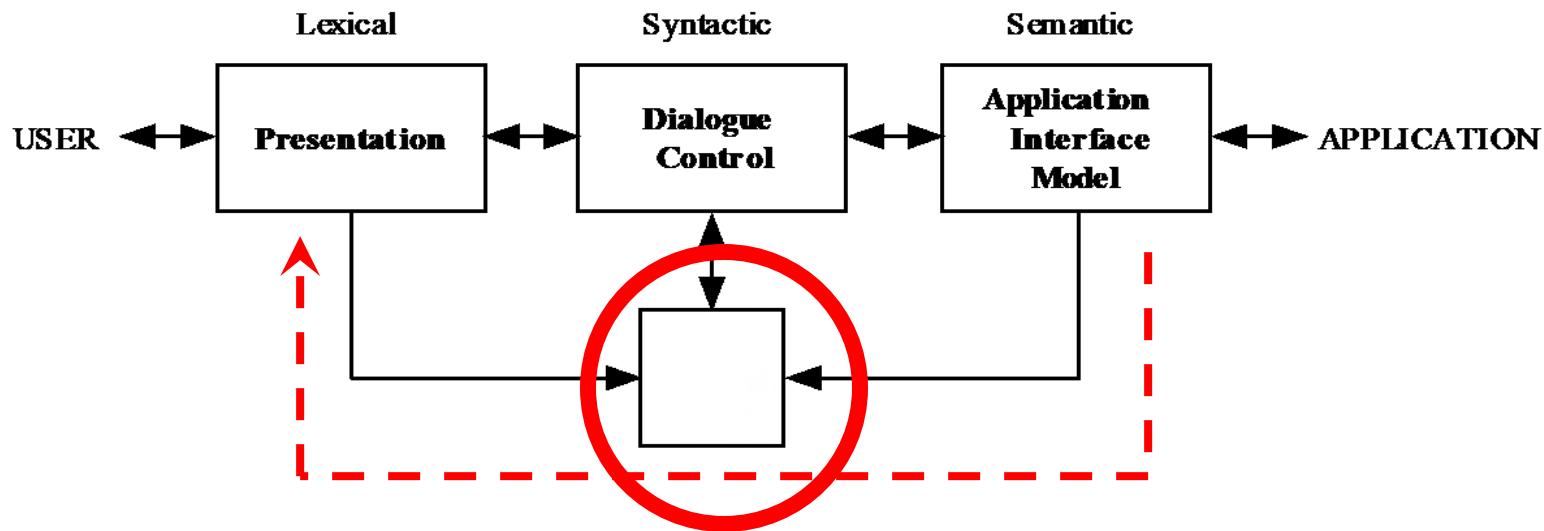


# Seeheim Model



Huh?

# Seeheim Model

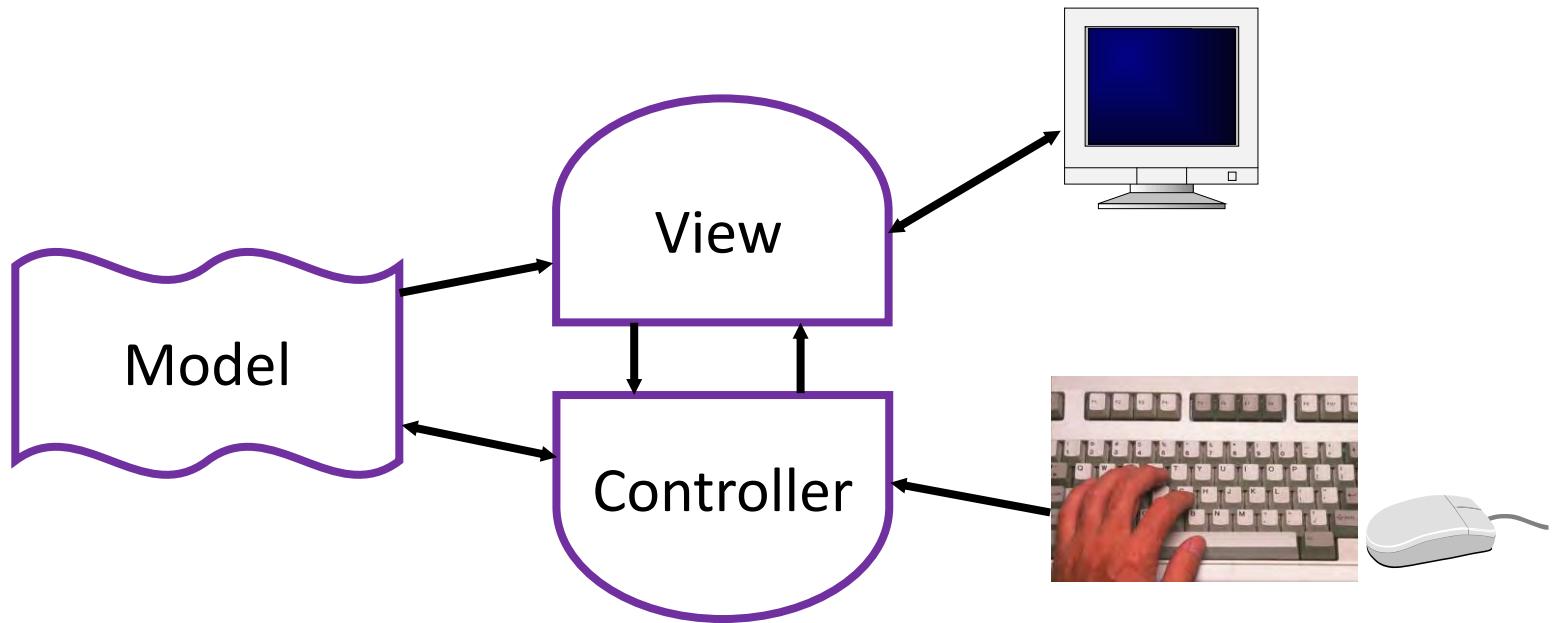


Rapid Semantic Feedback

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)

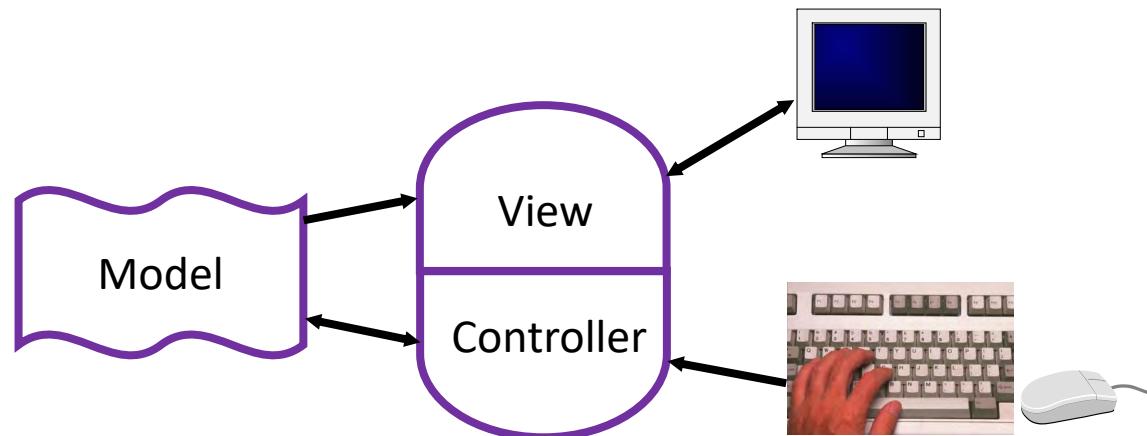
Controller contacts view to interpret what input events mean in context of a view (e.g., selection)

# 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

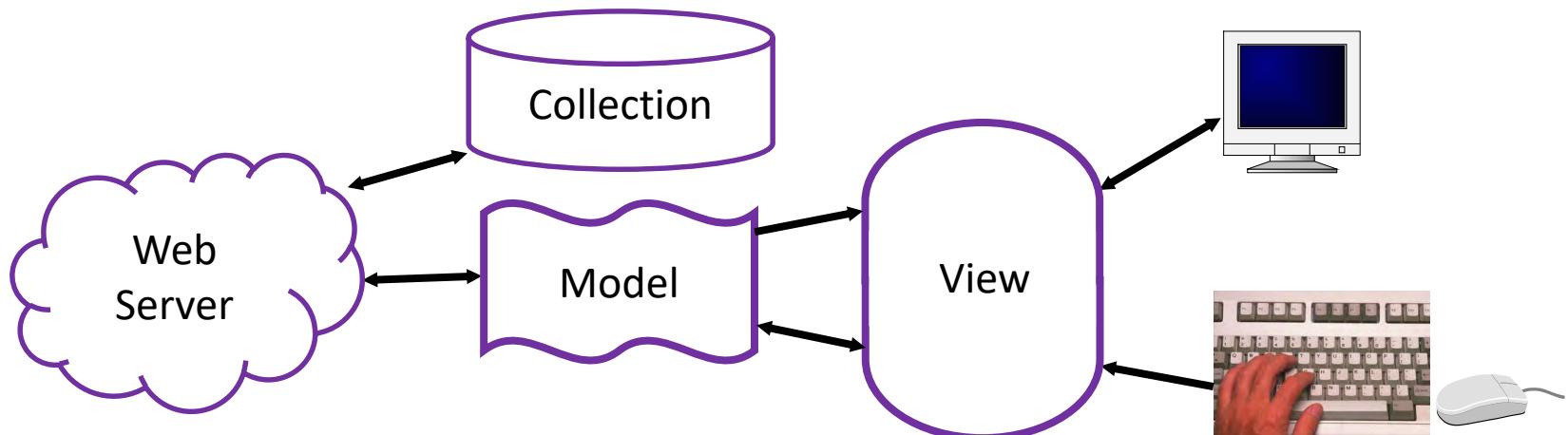
- May help to think of model as the client model

# 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

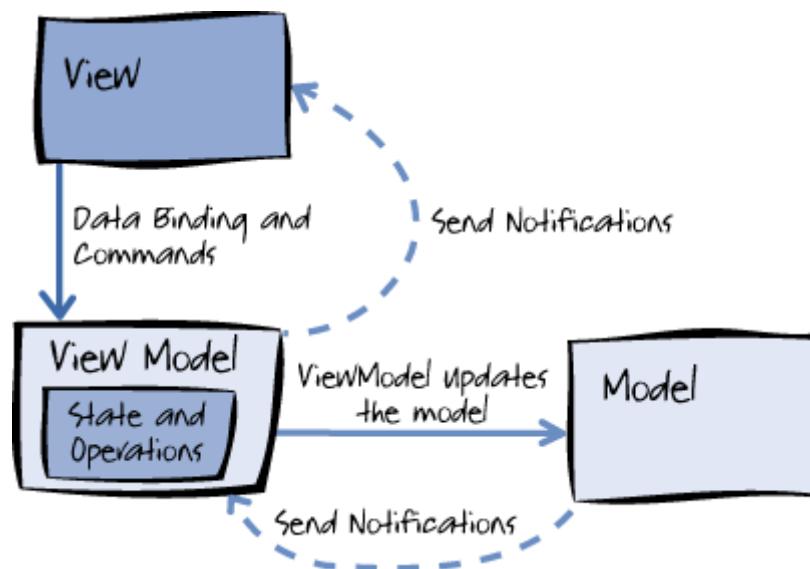
Web tools often implement views as templates



# 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

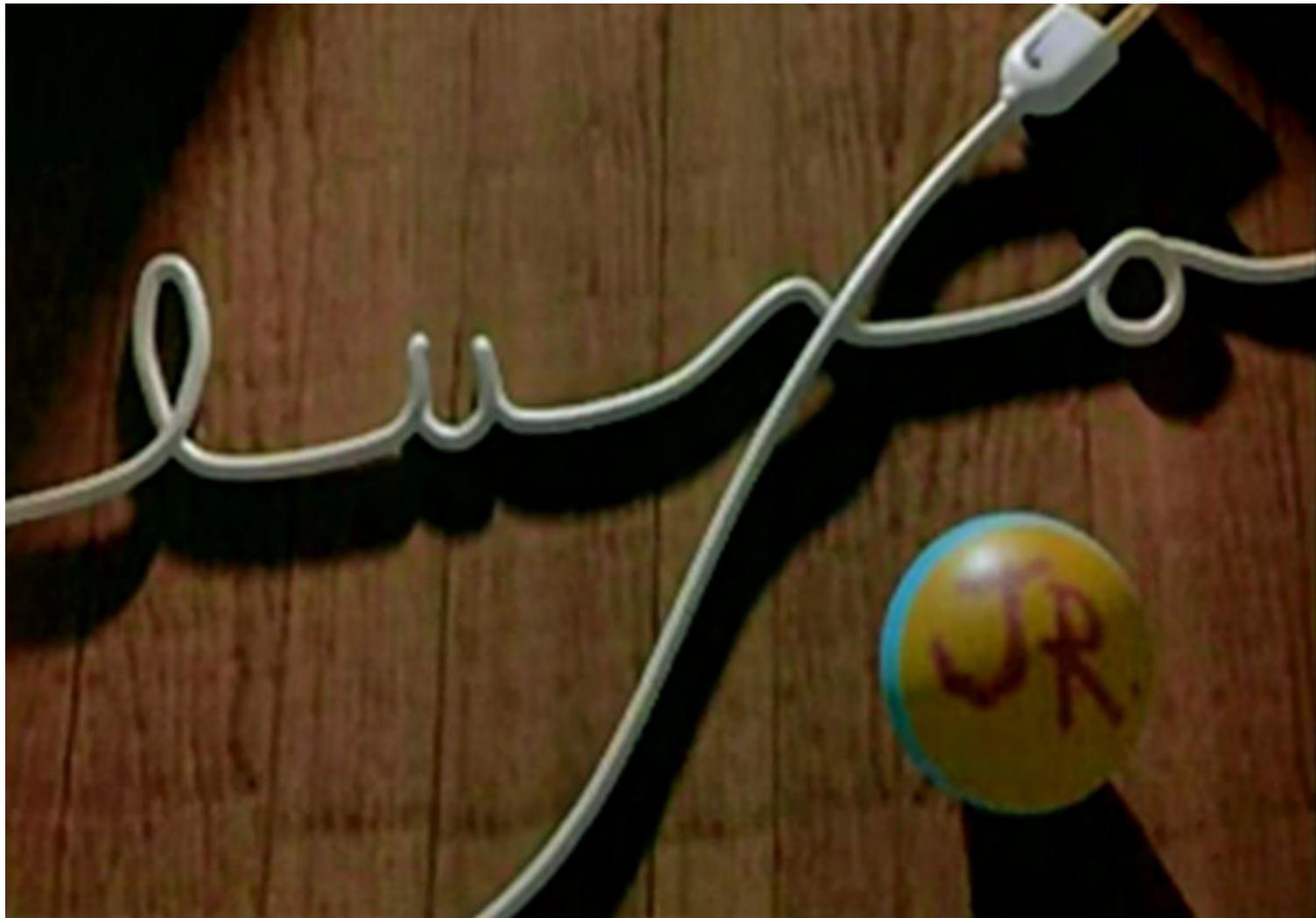
Case Study of Animation

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>

© ACM 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 were derived, the fundamental principles are detailed, addressing them first in 2D hand drawn animation and then their application to 3D computer animation. This will demonstrate the importance of these principles to qualify 3D computer animation.

CR Categories and Subject Descriptions:

I.3.6 Computer Graphics : Methodology and Techniques - Interaction

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] frame sequencing, [16,22] scan/pins, and multiplane backgrounds [11] were used to apply the art of animation to the computer. As 3D computer animation systems 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 systems designed for film animators [23]. But these systems were developed by computers for internal use, and so very few traditionally trained animators found their way into 3D computer animation.

"Luxo" is a trademark of Iac Jacobsen Industries AS.

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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 (RIB), [1] Verity 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 types of people 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

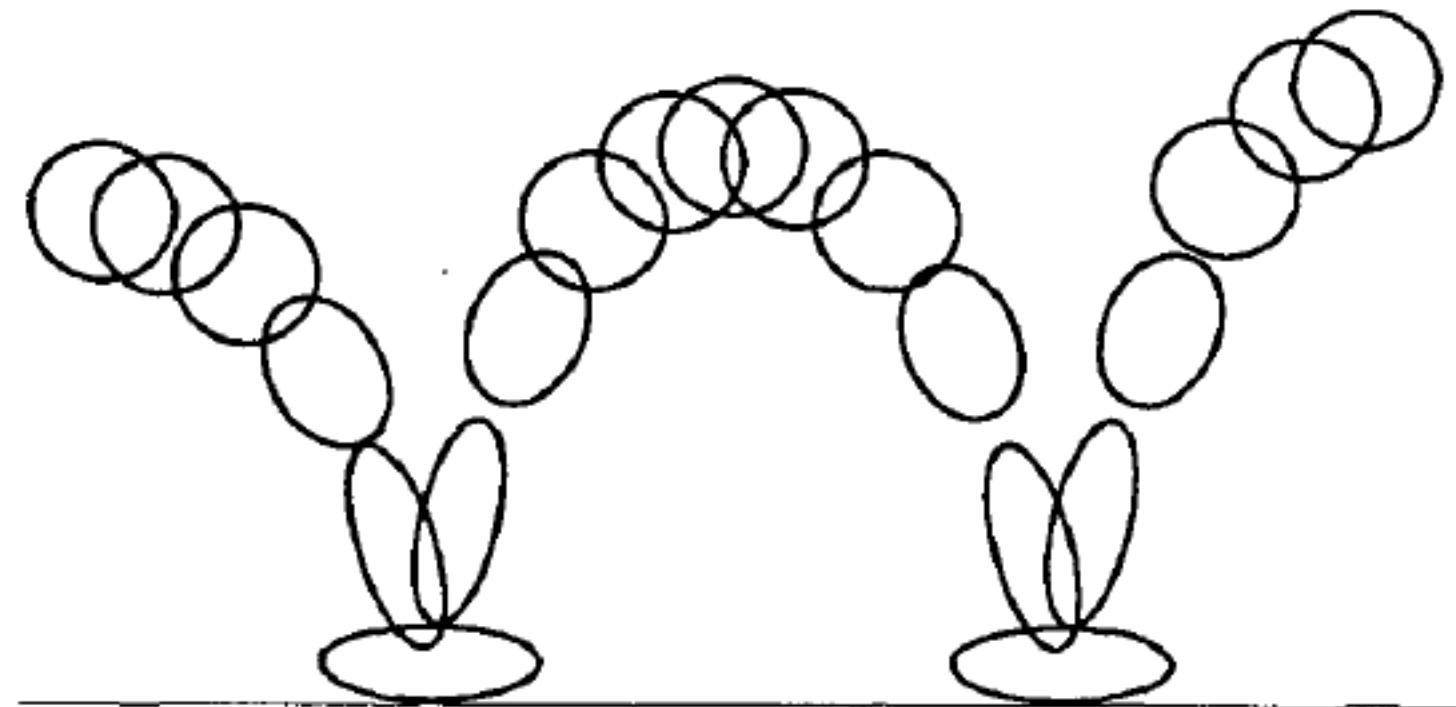
Between the late 1920's and the late 1930's animation grew from a novelty to an art form at the Walt Disney Studio. With every picture, actions became more complex and the stories more meaningful as the perception of audiences were enhanced and more of the audience was satisfied; however it was clear 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 decided to have Disney hire one of the best character modelers in the business, Ub Iwerks. 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 cont. Flip pages from last page of paper to front. The top figures are frames 1-5, the bottom are frames 6-10.

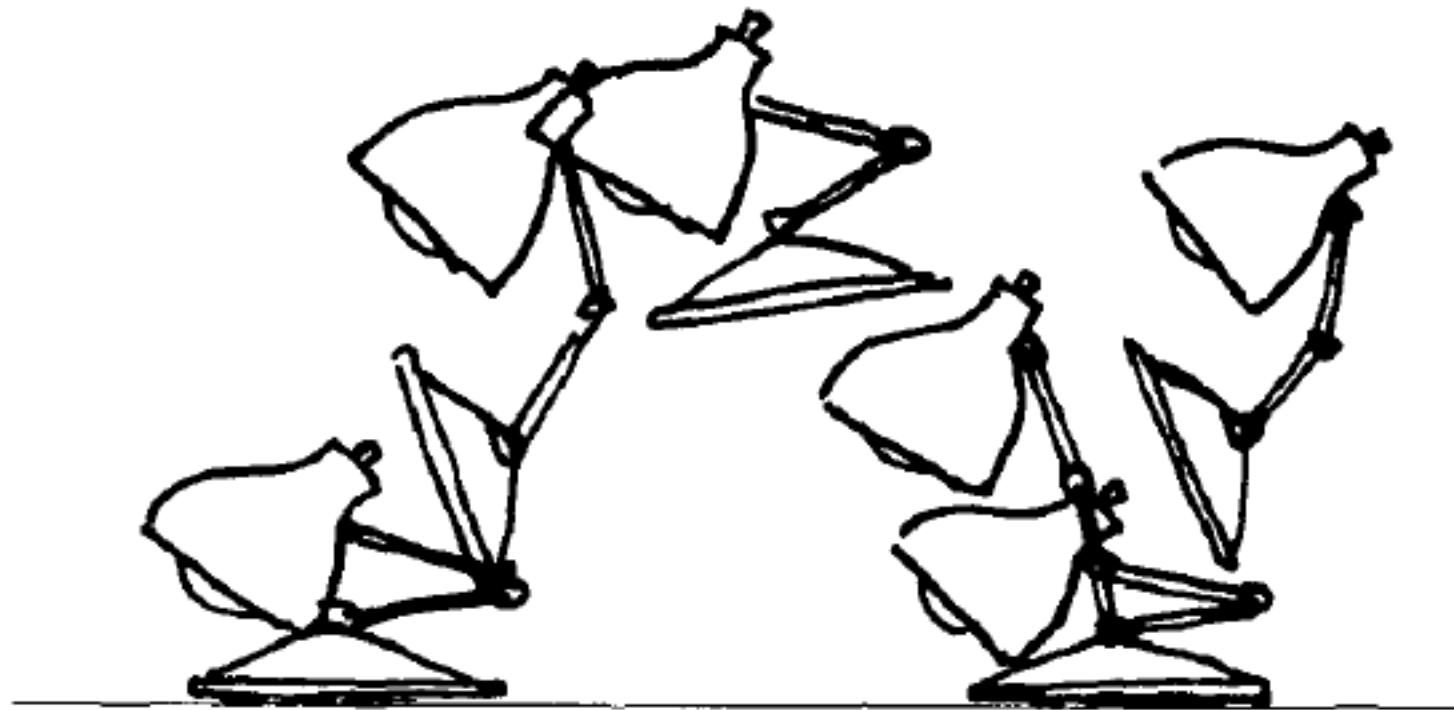


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# Squash and Stretch



# Squash and Stretch



# Squash and Stretch

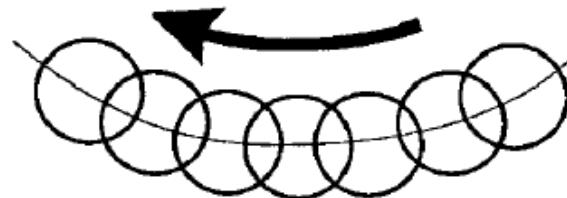


FIGURE 4a. In slow action, an object's position overlaps from frame to frame which gives the action a smooth appearance to the eye.

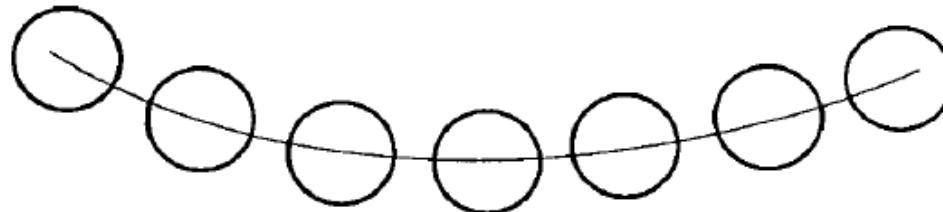


FIGURE 4b. Strobing occurs in a faster action when the object's positions do not overlap and the eye perceives separate images.

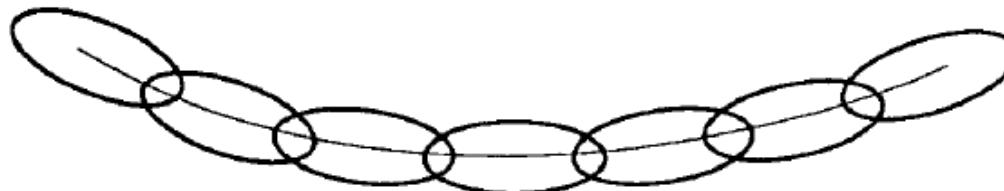


FIGURE 4c. Stretching the object so that it's positions overlap again will relieve the strobing effect.

# 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-hurty!"*

*SIX inbetweens..... The Character sees a good looking girl, or the sports car he has always wanted.*

*SEVEN inbetweens..... The Character tries to get a better look at something.*

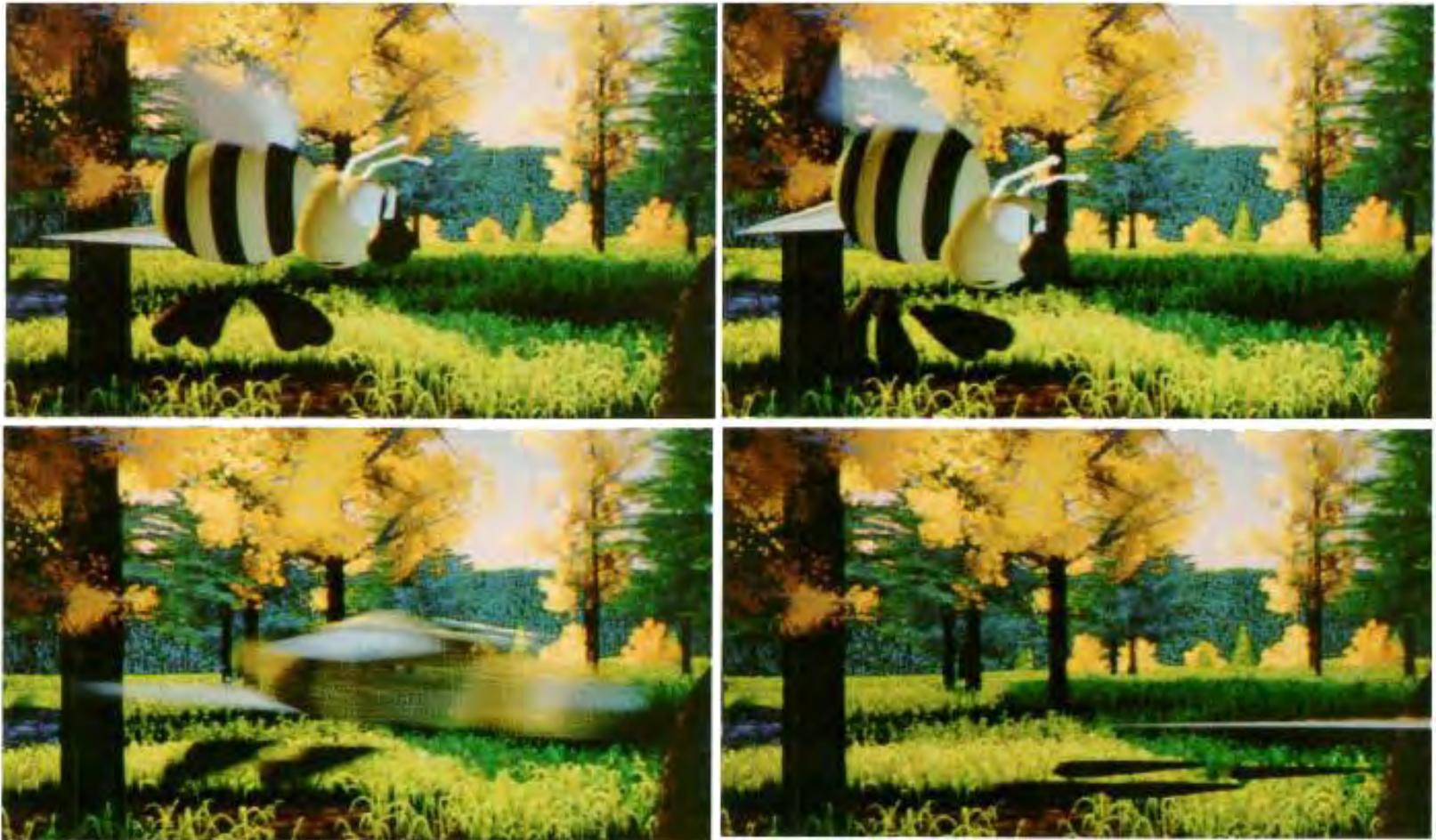
# Timing

*EIGHT inbetweens..... The Character searches for the peanut butter on the kitchen shelf.*

*NINE inbetweens.....The Character appraises, considering thoughtfully.*

*TEN inbetweens..... The Character stretches a sore muscle.*

# Anticipation



# Staging

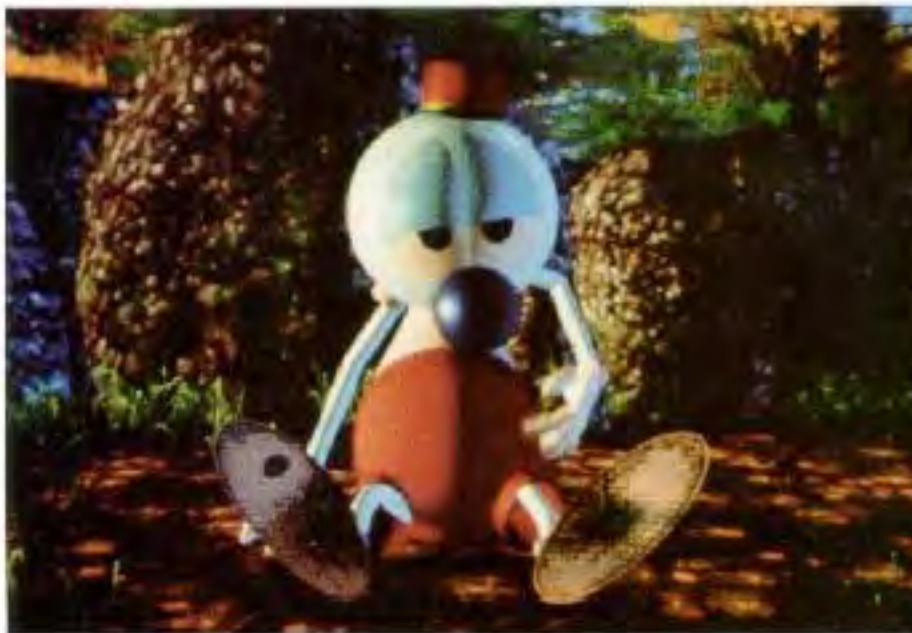


FIGURE 6. Andre's scratch was staged to the side (in "silhouette") for clarity and because that is where his itch was.

# Staging



FIGURES 7-8. In *Luxo Jr.*, all action was staged to the side for clarity.

# Follow Through, Overlap, Secondary



# Pose-to-Pose, Slow In, Slow Out

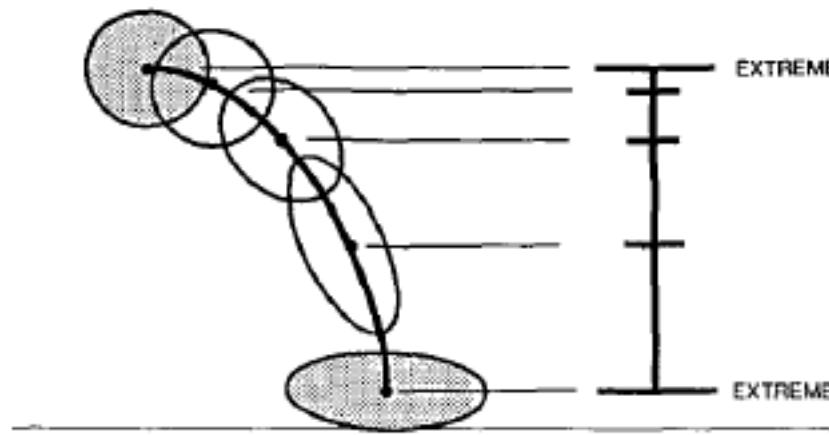
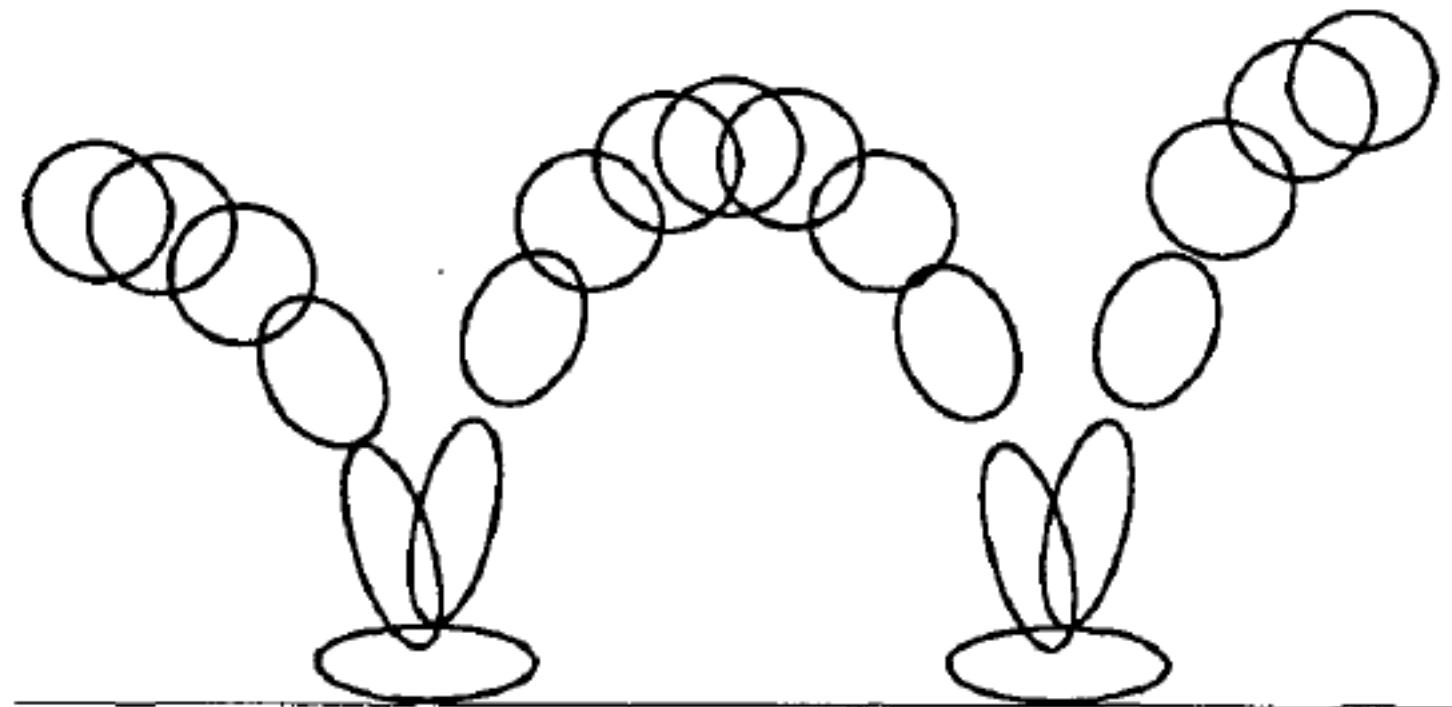


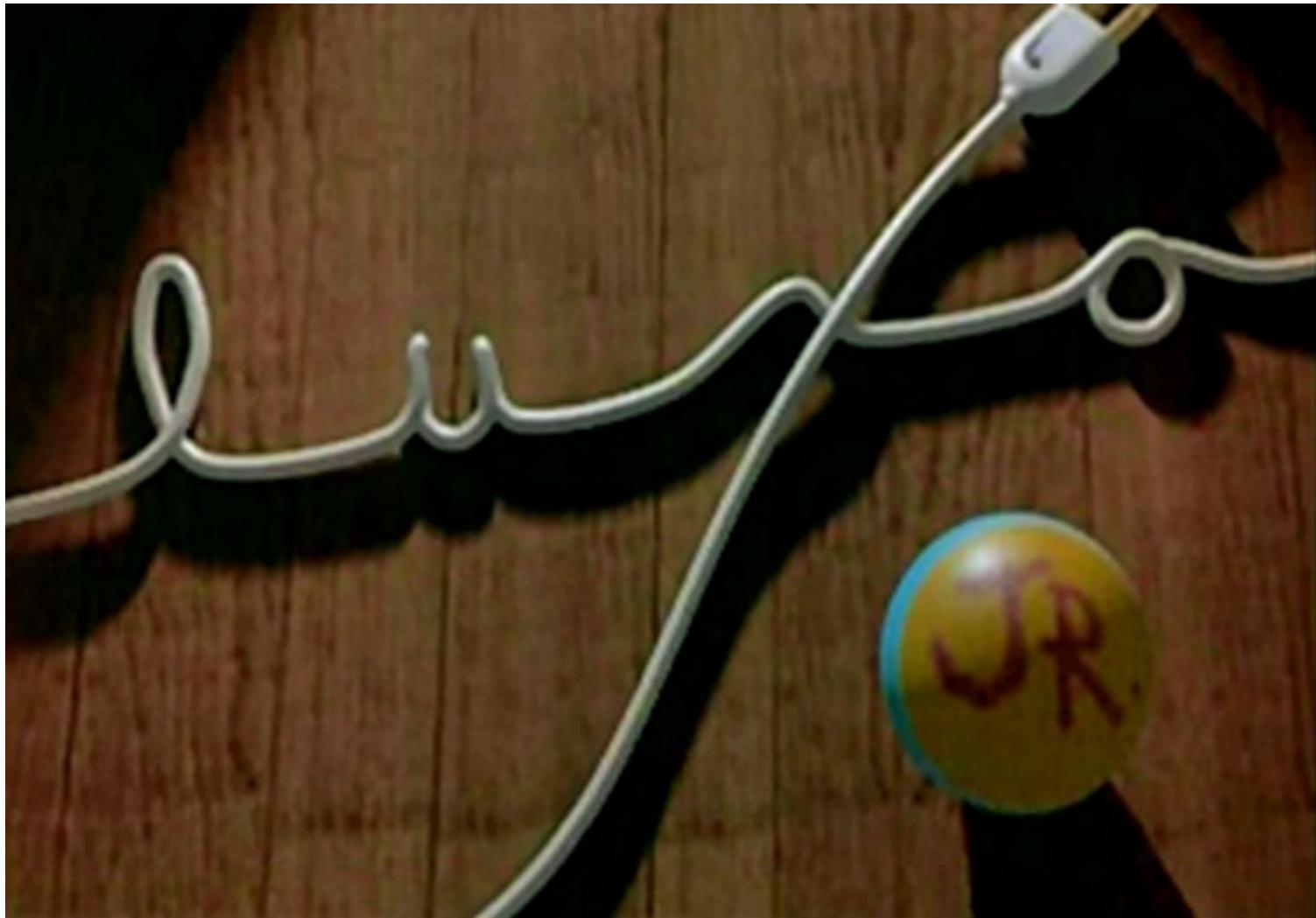
FIGURE 9. Timing chart for ball bounce.

Objects with mass must accelerate and decelerate  
Interesting frames are typically at ends,  
 tweaks perception to emphasize these poses

# Arches



# 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

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*You must learn to respect that golden atom, that single frame of action, that 1/12th of a second, because the difference between lightning and the lightning bug may hinge on that single frame.*

—Chuck Jones [10]

#### ABSTRACT

User interfaces are often based on static presentations, a model ill suited for conveying change. Consequently, events on the screen frequently startle and confuse users. Cartoon animation, in contrast, is exceedingly successful at engaging its audience; even the most bizarre events are easily comprehended. The Self user interface has served as a testbed for the application of cartoon animation techniques as a means of making the interface easier to understand and more pleasant to use. Attention to timing and transient detail allows Self objects to move solidly. Use of cartoon-style motion blur allows Self objects to move quickly and still maintain their comprehensibility. Self objects arrive and depart smoothly, without sudden materializations and disappearances, and they rise to the front of overlapping objects. This research demonstrates that applying animation techniques to user interfaces can produce a dynamic, interesting motion with a small contrary motion and pausing 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 permission to copy without fee all or part of the article is granted provided that the copier pay the per-copy fee directly to the copyright owner. The ACM copyright notice and the title of the publication and its date appear, and notice is given that copying is permitted by the Association for Computing Machinery. To copy otherwise, or to republish, requires a fee and/or specific permission.

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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 animated interfaces, this expectation can only come by experiencing 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 static presentation of the screen with the icon in the next to 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 finished the move, the screen suddenly changes in two places: the object in the old location vanishes and the object appears in the new location. Sudden change, flash of the screen, no hint how the two states are related: the user must compare the current state and the preceding state and deduce the connection.

Users overcome obstacles like these by experience. The first few encounters are the worst; eventually users learn the behavior of the interface and come to interact with it efficiently. Yet while some of the cognitive load of

# Frames Three Principles

## Solidity

Desktop objects should appear to be solid objects

## Exaggeration

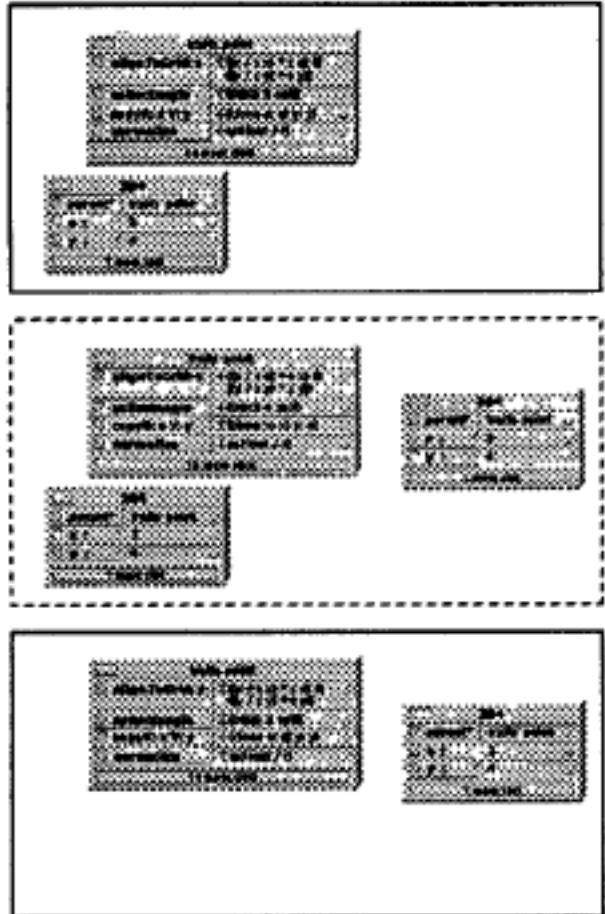
Exaggerate physical actions to enhance perception

## Reinforcement

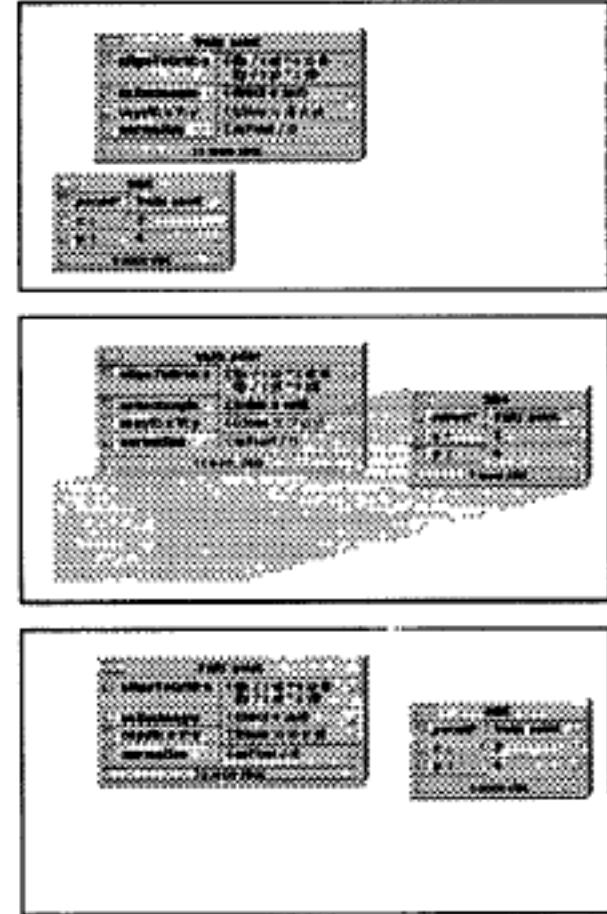
Use effects to drive home feeling of reality

# Solidity: Motion Blur

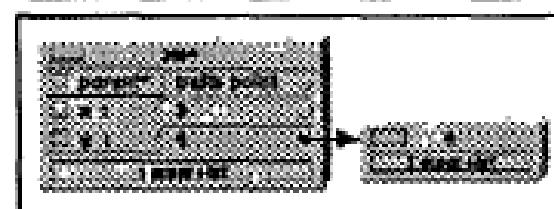
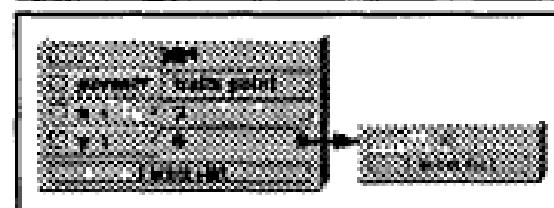
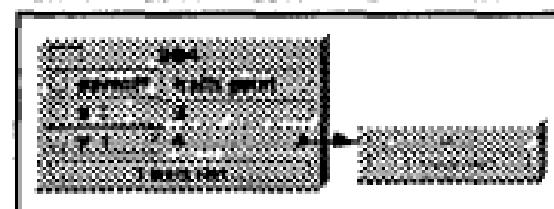
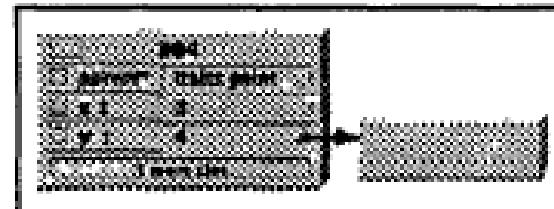
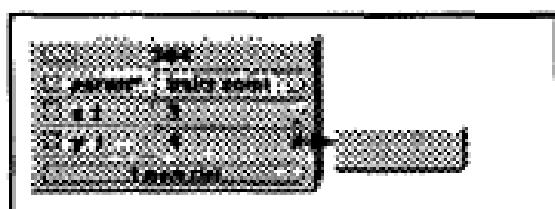
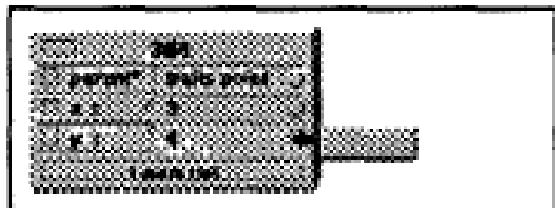
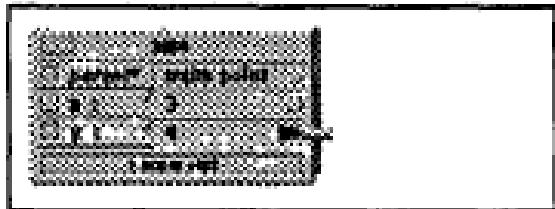
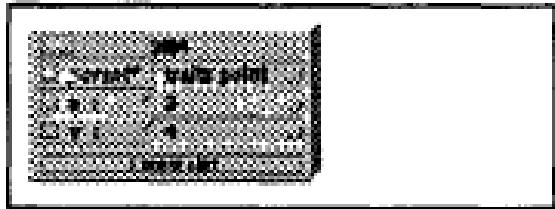
No Motion Blur



Motion Blur



# Solidity: Arrival and Departure



# Solidity: Arrival and Departure

	384
<input checked="" type="checkbox"/> parent* traits point	...
x:	→
y:	→
	87@19
<input checked="" type="checkbox"/> parent* traits point	...
x:	→
y:	→
	19
	more size

<input checked="" type="checkbox"/> parameter	trials-point
<input type="checkbox"/> x :	3
<input type="checkbox"/> y :	4
	1. trials-point
<input type="checkbox"/> y :	19
	1. trials-point

# Exaggeration: Anticipation

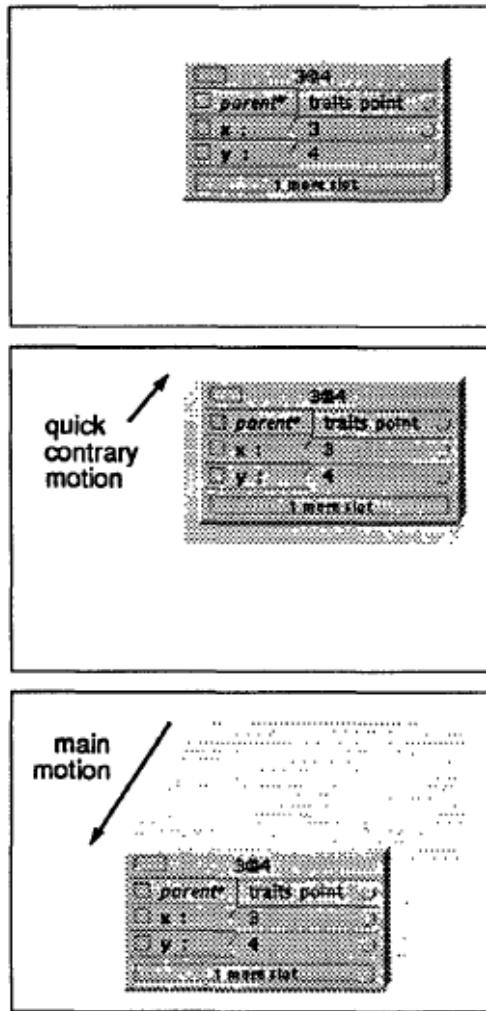


Figure 7. Objects anticipate major actions with a quick contrary motion that draws the user eye to the object in preparation for the main motion to come.

# Reinforcement: Slow In Slow Out

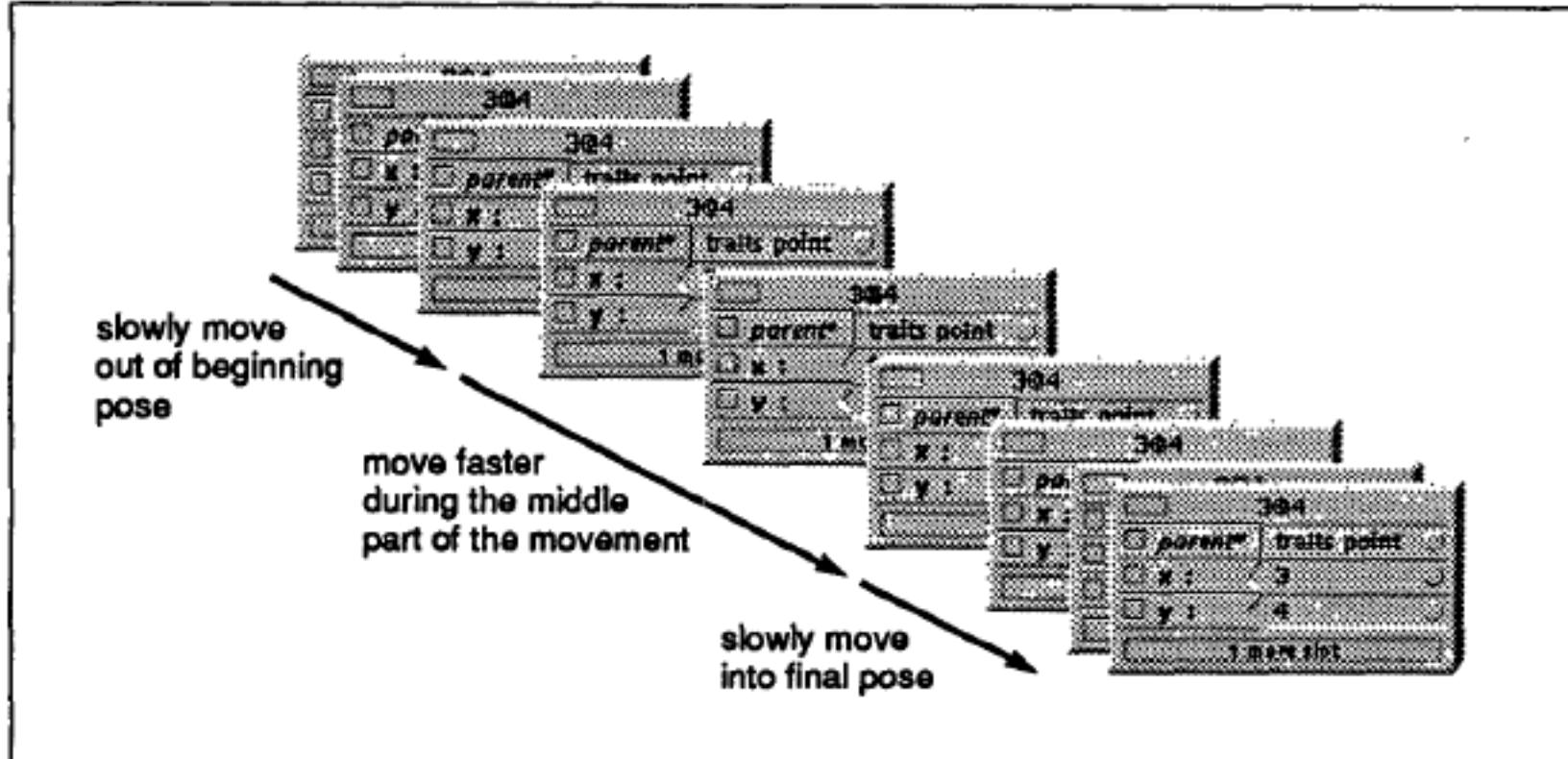
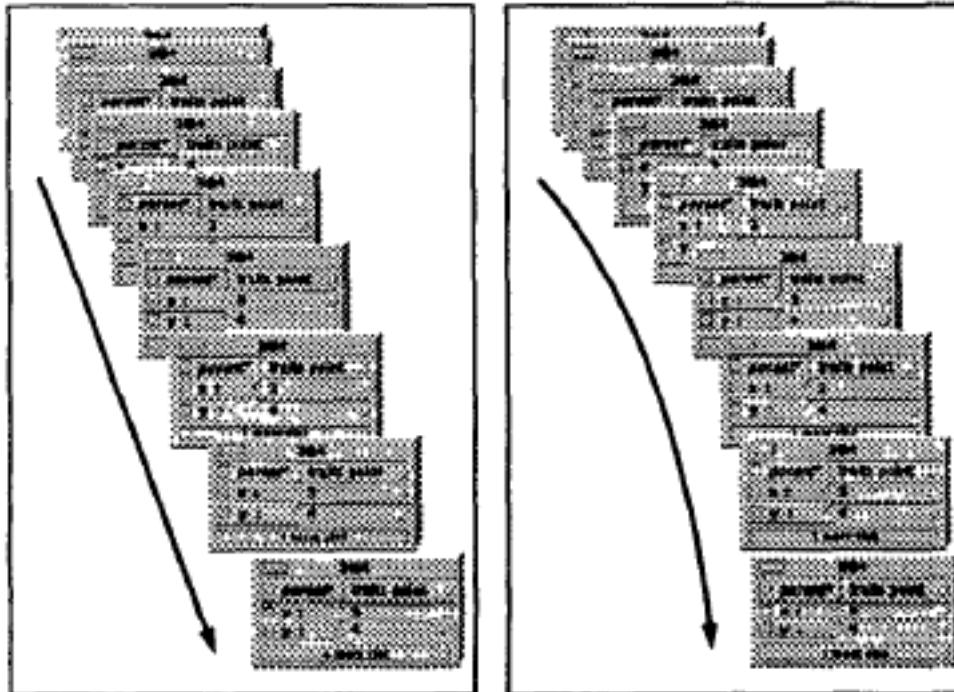


Figure 8. Objects ease out of their beginning poses and ease into their final poses. Although these motions are slower than that during the main portion of the movement, they are still quite fast.

# Reinforcement: Arcs



**Figure 9.** When objects travel under their own power (non-interactively), they move in arcs rather than straight lines.

# Reinforcement: Follow Through

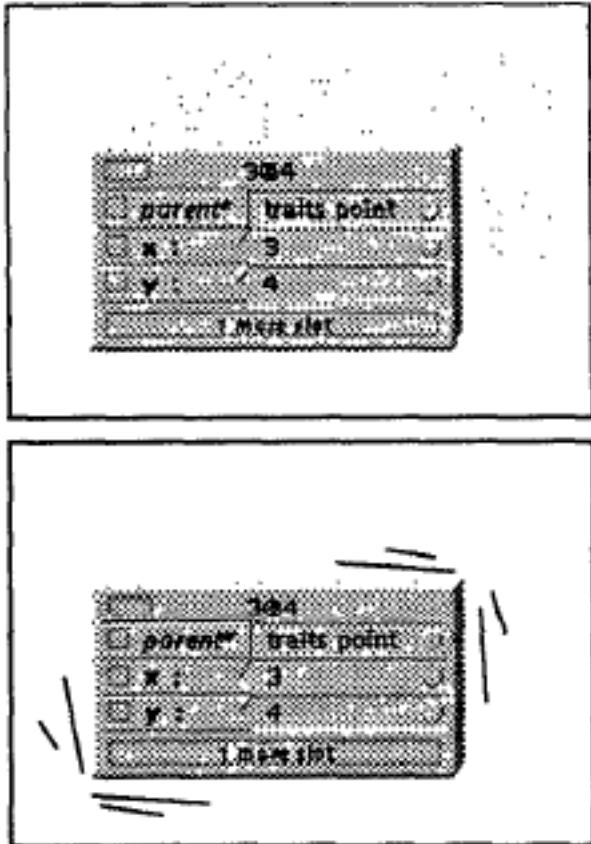


Figure 10. When objects come to a stop after moving on their own, they exhibit follow through in the form of wiggling back and forth quickly. This is just suggested by the "wiggle lines" in the figure—in actuality, the object moves back and forth, with motion blur.

# Animation Case Study

## Animation Support in a User Interface Toolkit: Flexible, Robust, and Reusable Abstractions

Hudson and Stasko, 1993

<http://dx.doi.org/10.1145/168642.168648>

**Animation Support in a User Interface Toolkit:  
Flexible, Robust, and Reusable Abstractions**

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### ABSTRACT

Animation can be a very effective mechanism to convey information in visualization and user interface settings. However, integrating animated presentations into user interfaces has typically been a difficult task since, to date, there has been little or no explicit support for animation in window systems or user interface toolkits. This paper describes how the Arkit 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 Arkit 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.

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### 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 ([Baez-90] 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 Arkit—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 Arkit systems 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

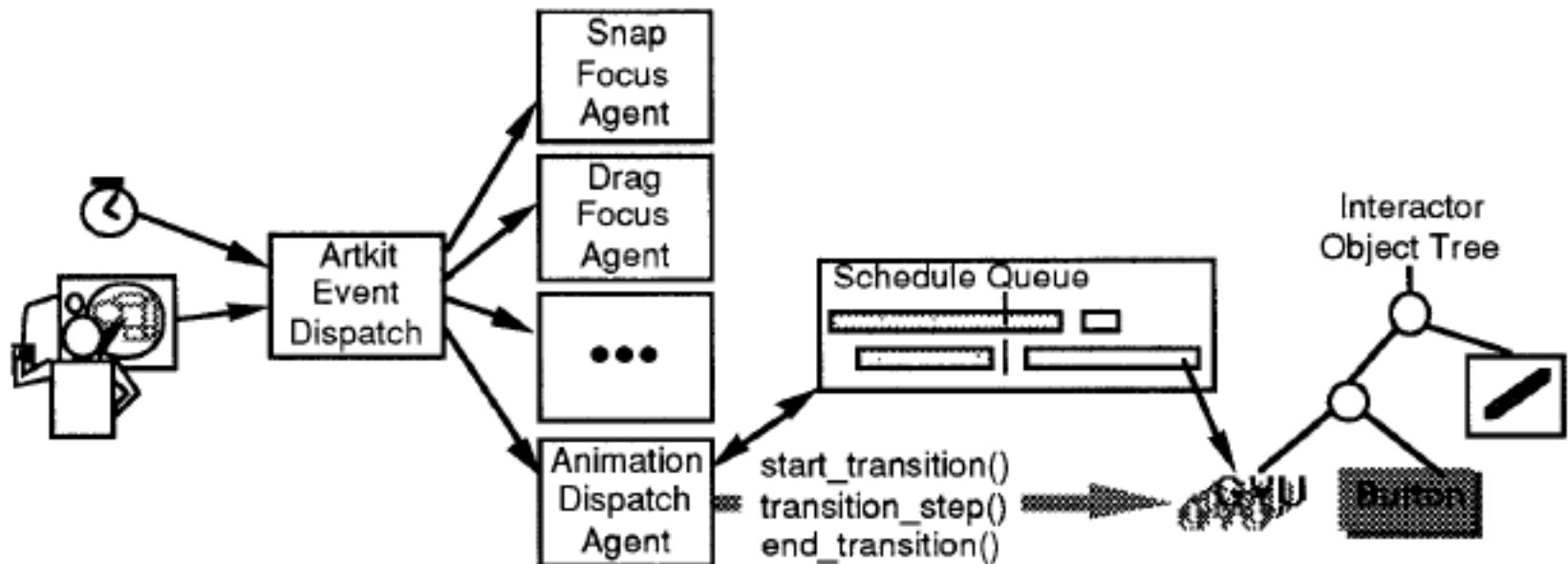


Figure 5. Animation Event Translation and Dispatch

# 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

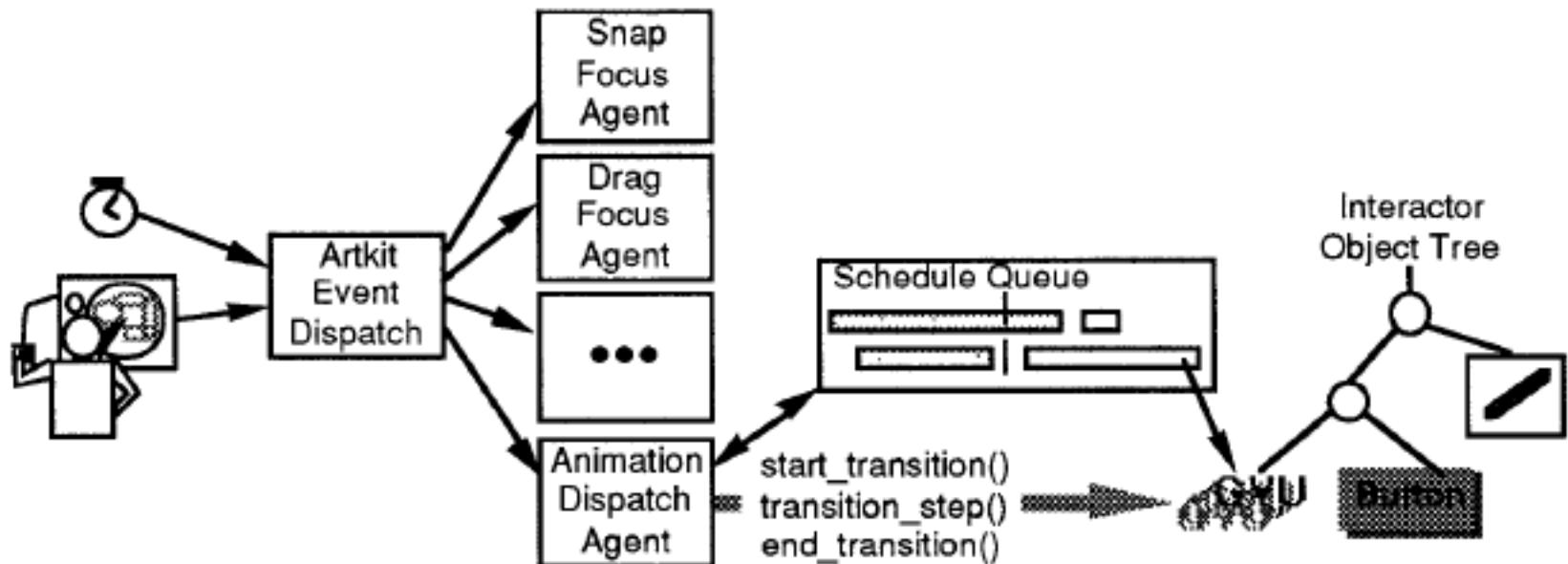


Figure 5. Animation Event Translation and Dispatch

# Transition Object

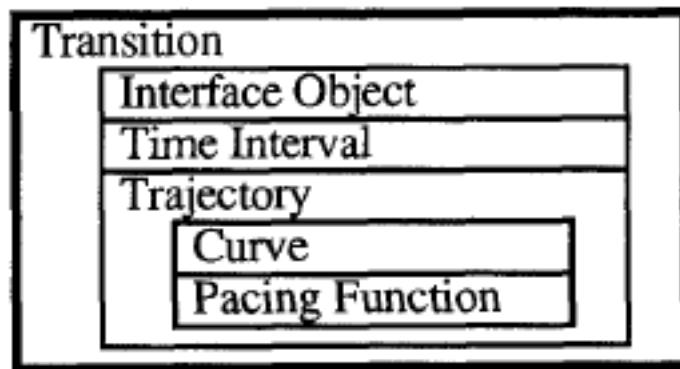


Figure 3. Parts of a Transition Object

# Pacing Function

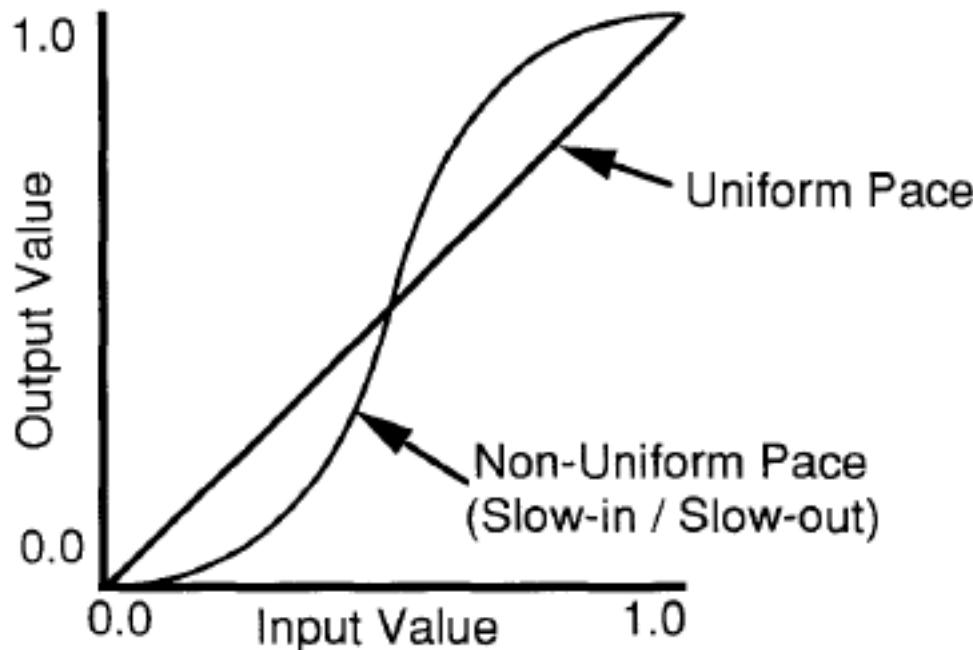


Figure 4. Two Example Pacing Functions

# Computing a Frame

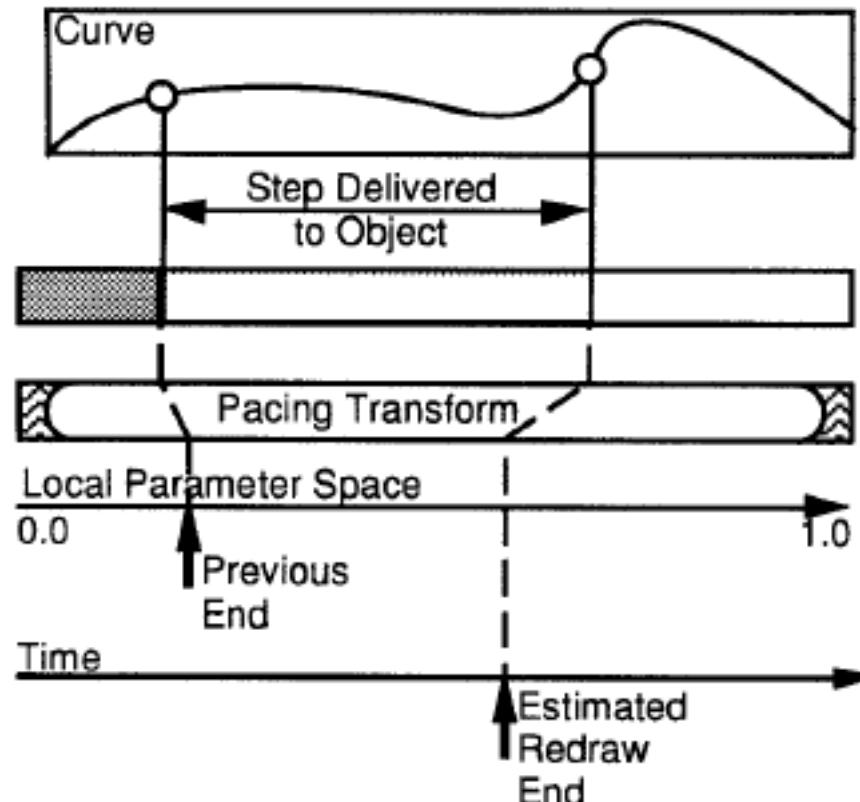


Figure 8. Translation from Time to Space

# 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

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#### ABSTRACT

*Kinetic typography* – text that uses movement or other temporal change – has recently emerged as a new form of communication. As we hope to illustrate in this paper, kinetic typography can be seen as bringing some of the expressive power of film such as its ability to convey emotion, portray compelling characters and visually direct attention to the strong communicative properties of text. Although kinetic typography offers substantial promise for expressive communication, 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 difficulties 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.

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SIGART, October 27-30, 2002, Paris, FRANCE  
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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 [Jordy97]. 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, [Tallal87] studies perceptual effects of a number of text presentations, such as scrolling text. One of the more 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 [Poth84]. 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**

Johnny Lee, Jodi Forlizzi, Scott Hudson  
Carnegie Mellon University  
Human-Computer Interaction Institute  
2002

# Kinetic Typography Engine

## **Kinetic Typography**

Johnny Lee, Jodi Forlizzi, Scott Hudson  
Carnegie Mellon University  
Human-Computer Interaction Institute  
2002

# Kinetic Typography Engine

## Goals of Kinetic Type

Emotional content

Creation of characters

Direction of attention

## Animation Composition

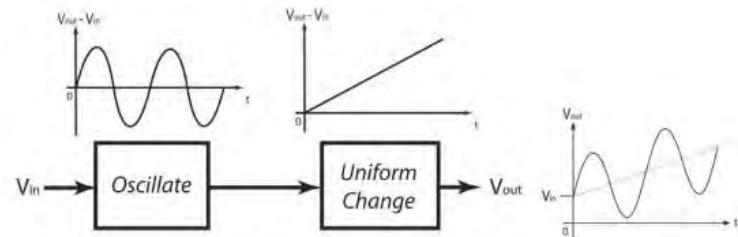


Figure 6. Waveform addition by chaining"

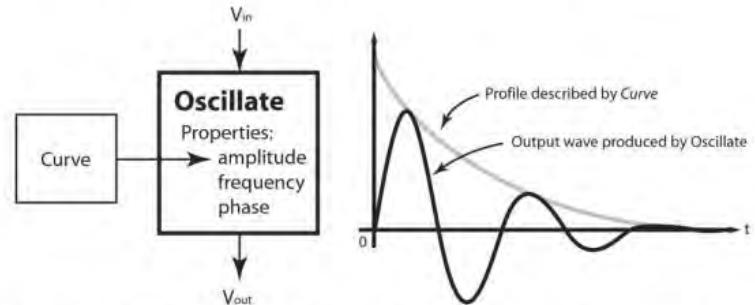


Figure 7. Waveform scaling by functional composition with amplitude

# 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



# 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

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Ken Hinckley, Maneesh Agrawala, Shenglong Zhao, and Gonzalo Ramos  
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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 confused 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: H.5.2 [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 challenges that users need to keep track of continue to rise with increasing user interface complexity; more concurrently running applications, large screens where the user may be attending to the wrong location, and

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UIST '06, October 15–18, 2006, Montreux, Switzerland.  
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the possibility of remote collaboration. Without knowing what changed and how it changed, users can find it hard to detect and correct unintended or unexpected actions.

Animated transitions have been proposed to help users understand changes in the user interface [9, 19] and have found their way into a range of products. *Windows Media Player 10*, for example, hides its play controls in fullscreen mode by slowly moving them off screen. While this can help users understand where the controls went and how to get them back, it also introduces “lag” into the interaction, i.e., it forces users to wait for the animation to complete. For experienced users who do not need an explanation, this forced pause can be cumbersome and may break their concentration.



Figure 1: These phosphor widgets use green afterglow effects to show how they have changed. The slider labeled ‘volume’ was dragged all the way to the left. Two of the checkboxes in the next row were unchecked. The combo box was set from 1 to 2.

#### PHOSPHOR USER INTERFACE OBJECTS

We propose explaining user interface transitions without forcing users to wait. We define a *phosphor transition* as a transition that:

1. shows the outcome of the change *instantly* and
2. explains the change in retrospect using a diagrammatic depiction

The space of retrospective diagrammatic descriptions encompasses a great number of possible designs. In this paper, we concentrate on a specific subset based on the notion of afterglow. Figure 1 shows an example. When a user op-

# Phosphor

Animation can help people follow interface transitions

But the right speed is crucial

Too fast increases error rate

Too slow increases task time

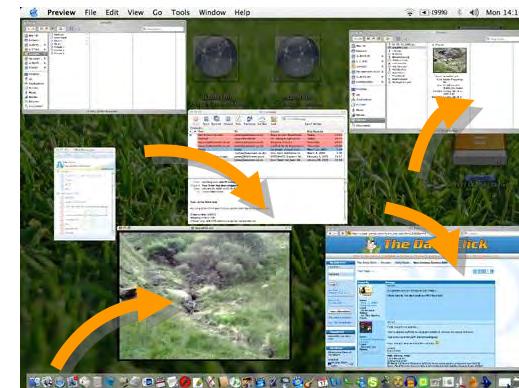
The right speed depends on familiarity, distraction, etc.

It cannot be determined

Windows Media Player

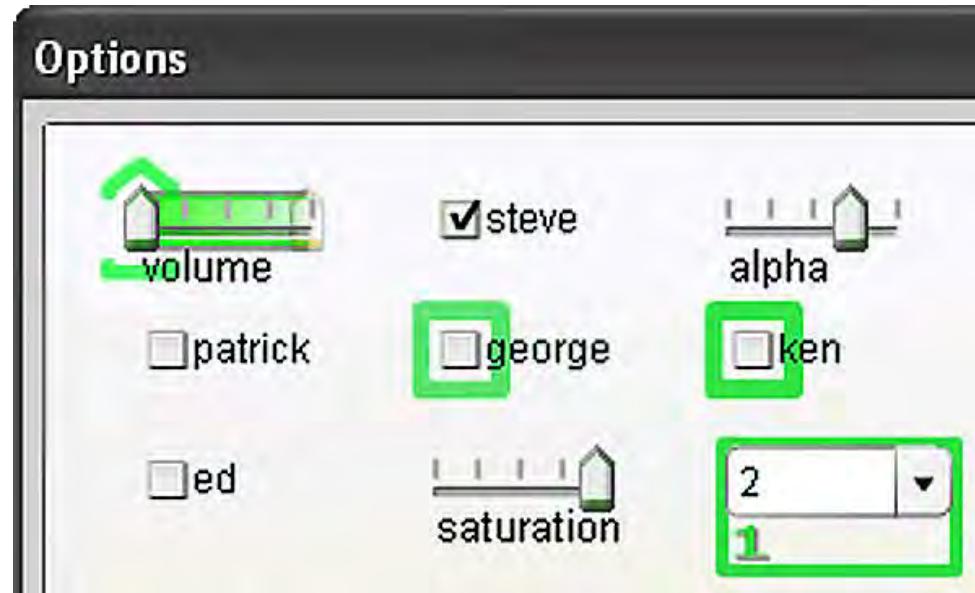


Apple Expose



# Phosphor

Phosphor shows the outcome immediately, then explains change in retrospect using a diagrammatic depiction



# Phosphor

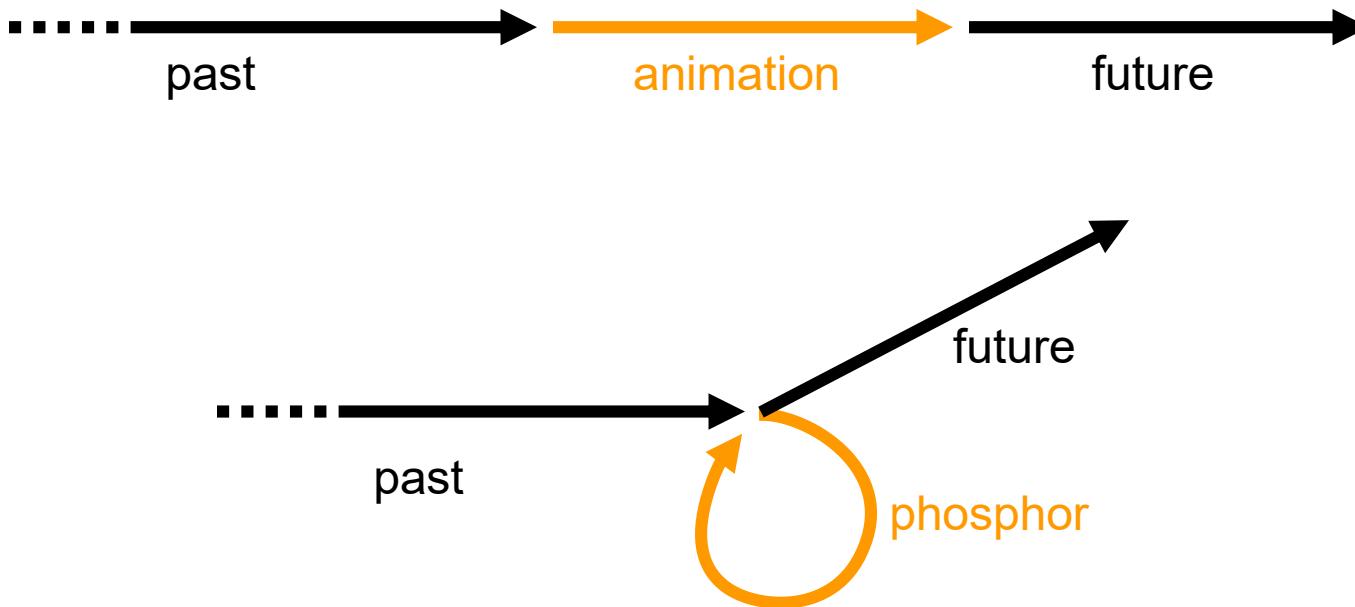
phosphor

# Phosphor

phosphor

# Challenging Assumptions of Tools

Phosphor breaks from the assumptions that have evolved into current transition tools



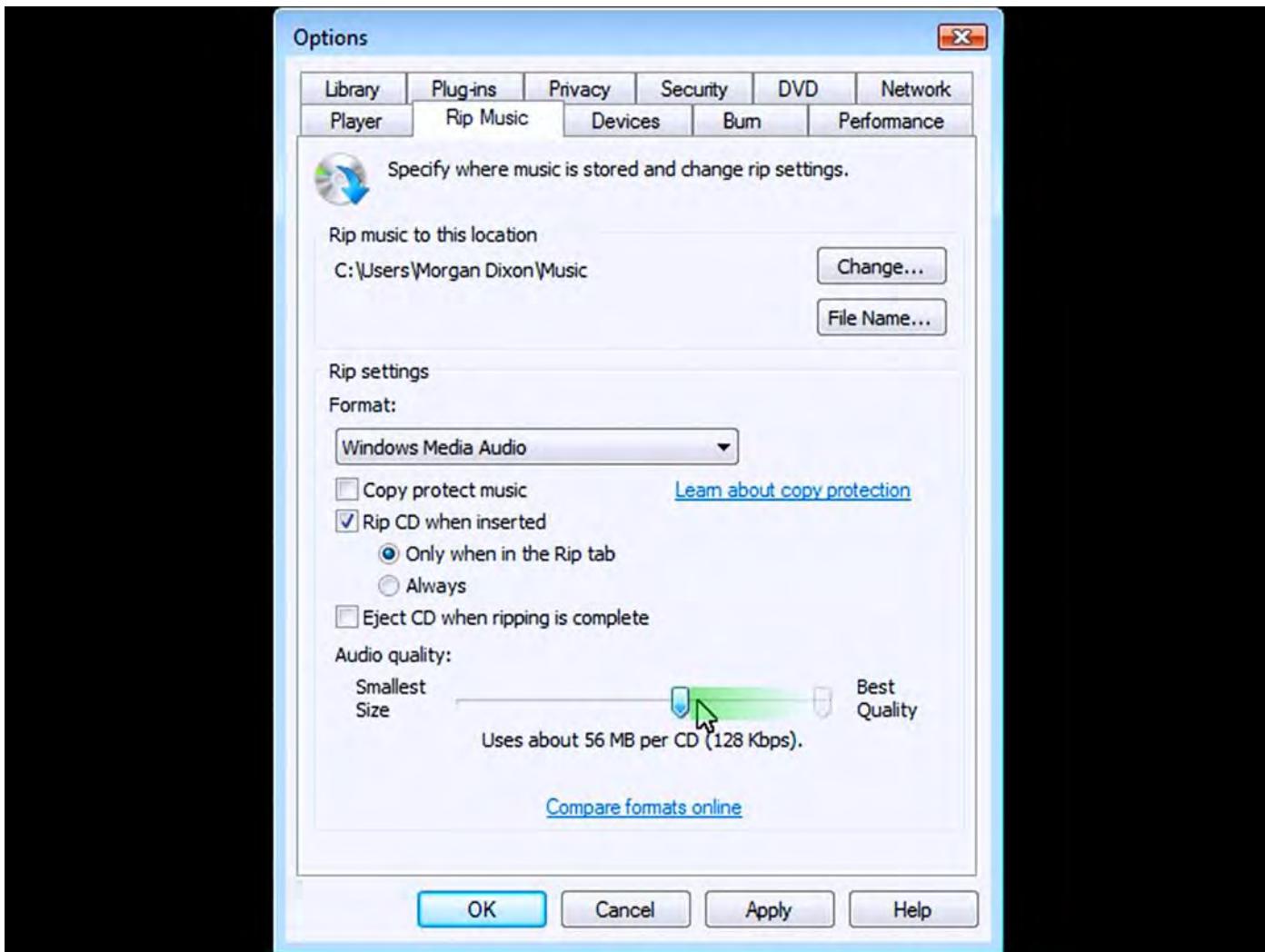
# Prefab

Prefab uses pixel analysis to modify existing applications from the outside, using only pixels

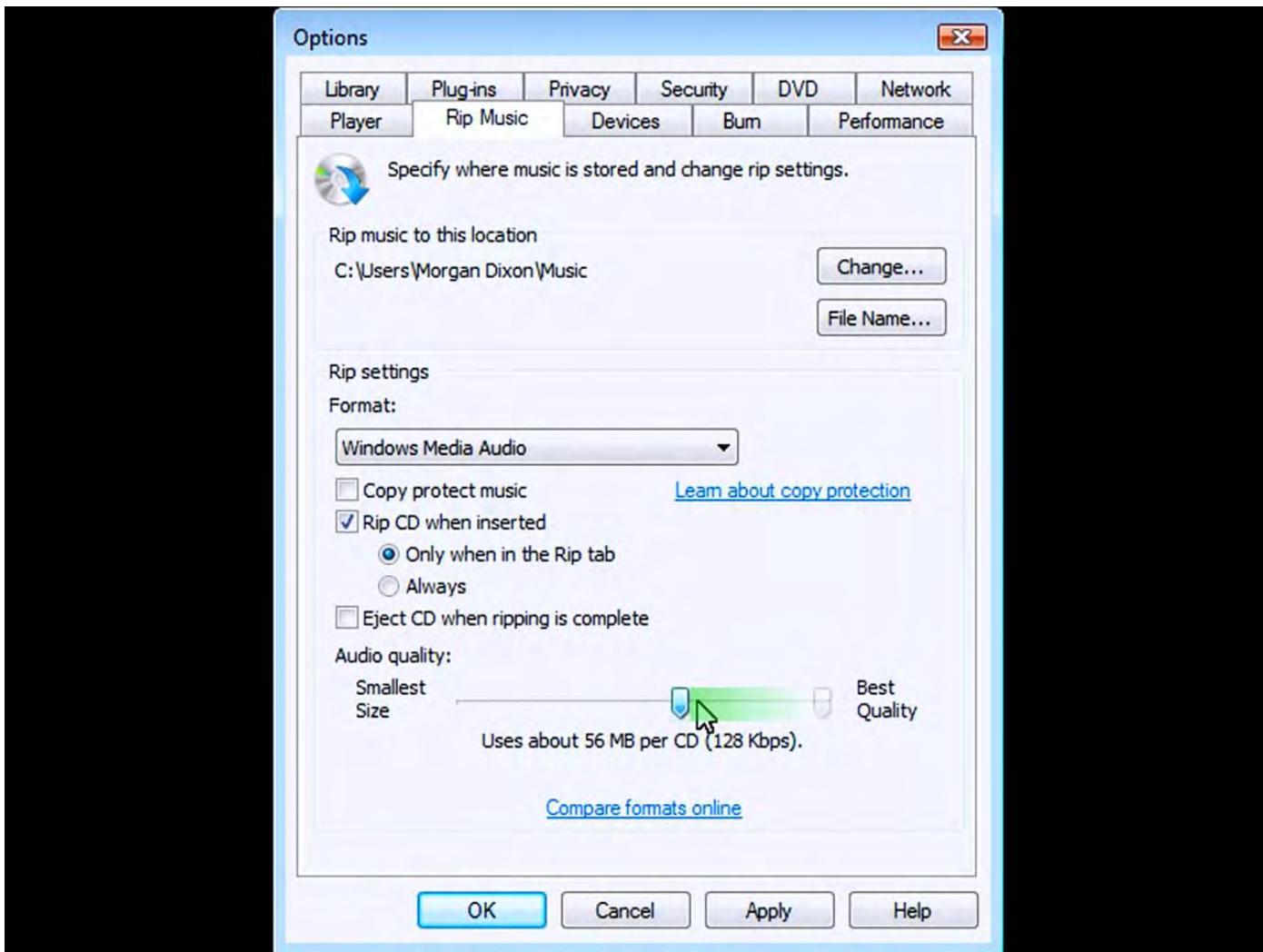
Prefab is informed by how toolkits work, but not linked to any particular toolkit implementation

Allows trying and fielding new ideas that are not supported by existing applications or toolkits

# Prefab



# Prefab



# 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

# 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

# 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

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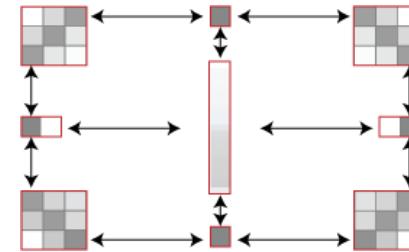
Proof of Concept

Engineering

Implementation

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Unspeakably Dirty Hacks



Prefab is not just about ‘do everything with pixels’, but about exploring new possibilities in the current ecosystem of interface tools

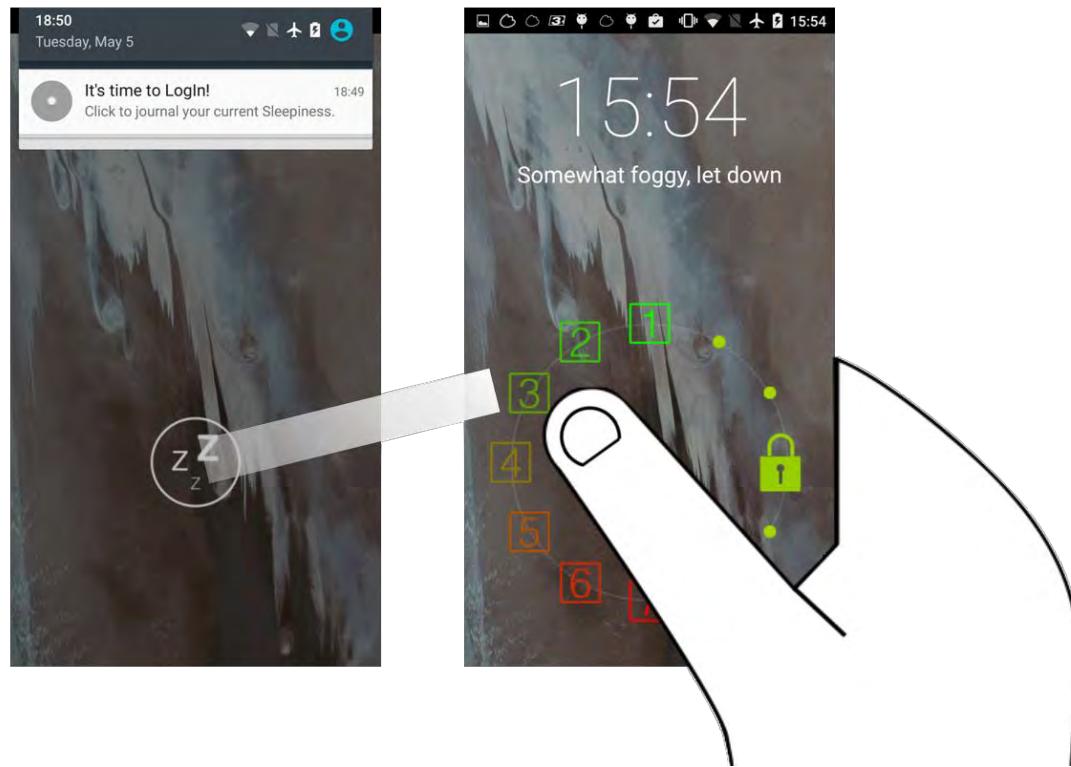
# Mobile Phones as Pagers

Our notion of technology design for journals / ESM / EMA has been anchored by paper journals and pager-based reminders



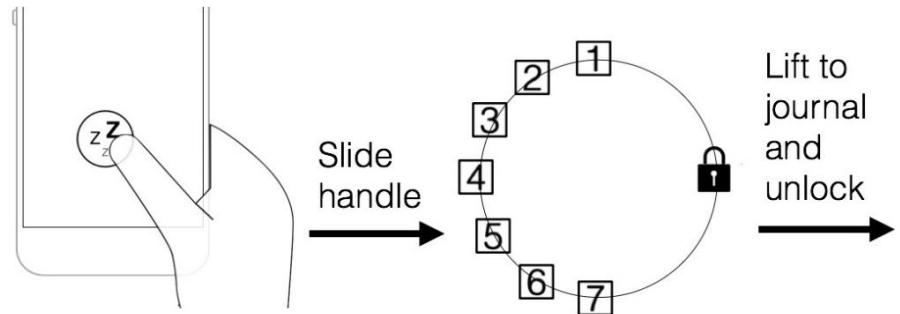
Csikszentmihalyi, Larson. Validity and Reliability of the Experience-Sampling Method. *J Nerv Ment Dis* 1987.  
Feldman Barrett, Barrett. An Introduction to Computerized Experience Sampling in Psychology. *Soc Sci Comput Rev* 2001.  
Froehlich, Chen, Consolvo, Harrison, Landay. MyExperience ... *MobiSys* 2007.

# Unlock Journaling for Self-Report



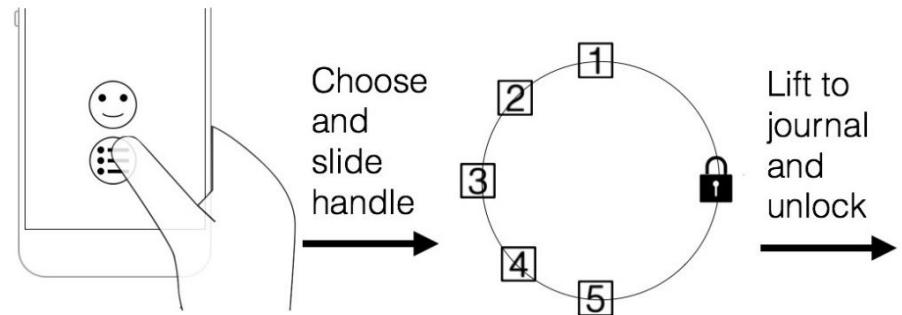
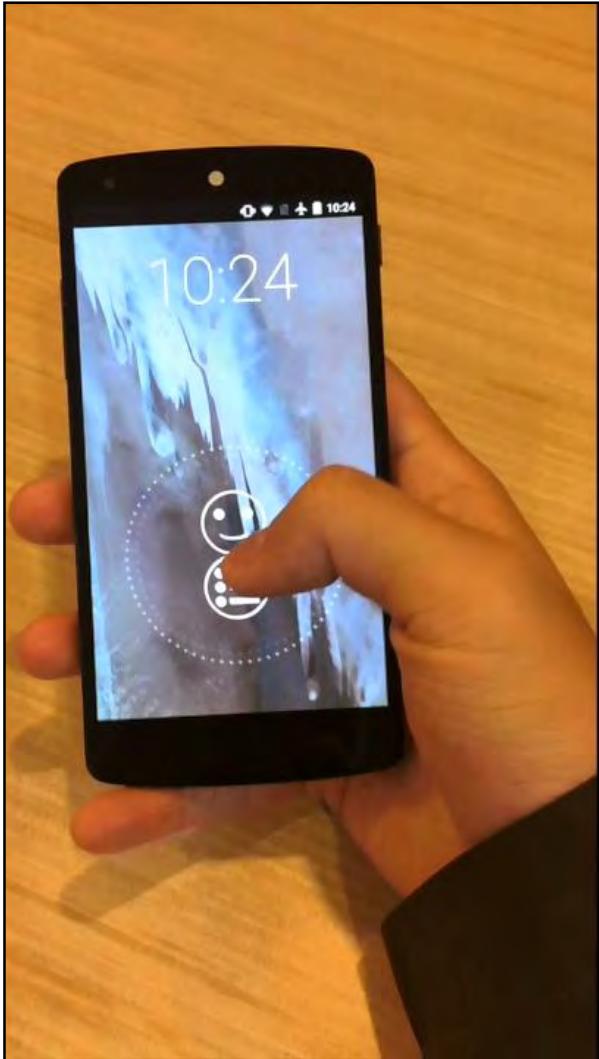
Truong, Shihipar, Wigdor. Slide to X: Unlocking the Potential of Smartphone Unlocking. CHI 2014.  
Zhang, Pina, Fogarty. Examining Unlock Journaling with Diaries and Reminders ... CHI 2016.

# Unlock Journaling for Self-Report



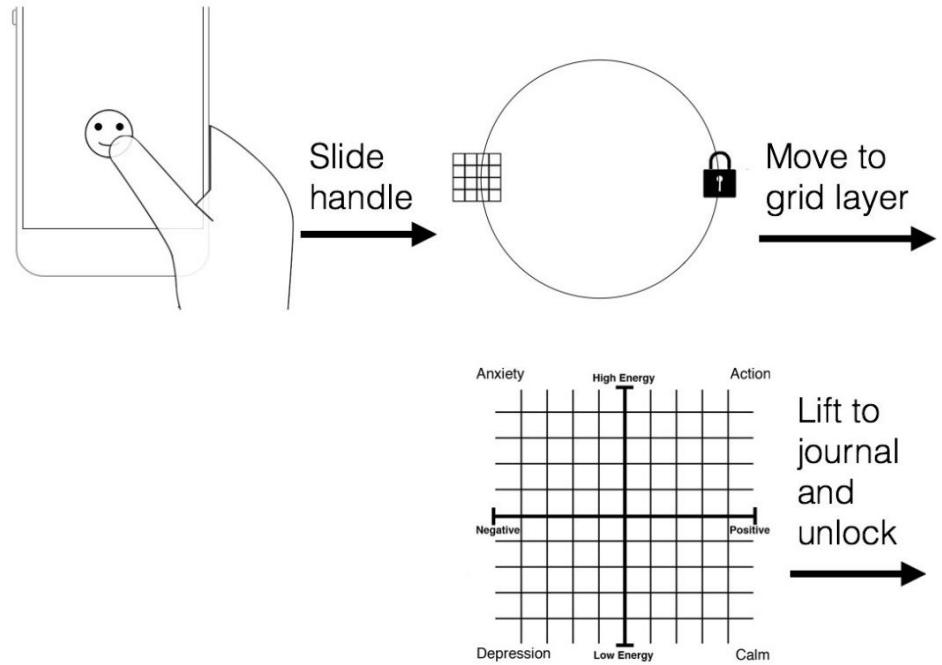
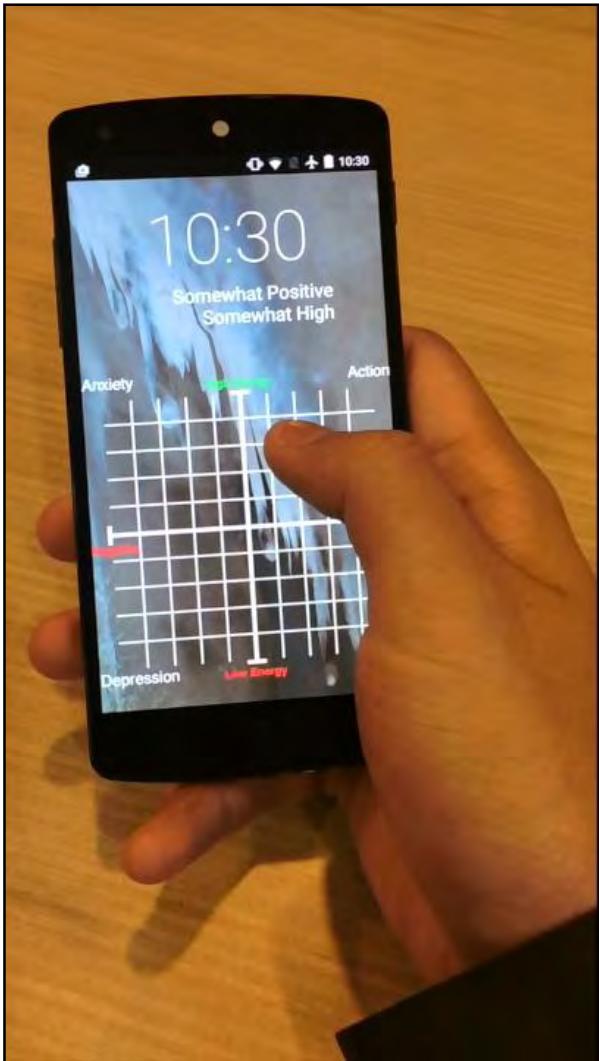
Stanford Sleepiness Scale

# Unlock Journaling for Self-Report



Pleasure and Accomplishment  
(e.g., self-monitoring depressive symptoms)

# 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

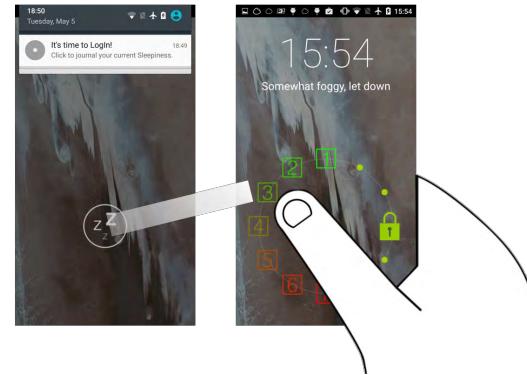
(1.77 vs. 2.22 on a 5-point scale)

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 "Atypical" Joe Mckay 11

Food & Beverages and Amount	Symptoms if any (circle):
Breakfast Time: 1/4 c oatmeal w/ 2T rice syrup eggs/bacon/1/4 sugar	Nausea Vomiting Heartburn Stomach Pain <input checked="" type="checkbox"/> Diarrhea Constipation Sense of Urgency Gas Cramping Bloating Other: <i>doctor breakast</i>
water, tea 1/2 Tbs wheat-free waffle	
water, tea 100z. peppermint tea	
Snack Time: 11:40 - 1.5 slice French toast w/ white, silk	
water, tea 12:30 3 oz Fresh cold broiled salmon	
water 4oz blueberry juice	
water flour tortilla, sauteed avocados, olives	
calcium chew	
cheese 1/4 cup orange juice w/ whole breads	
Snack Time: 3:30 Rice Cakes, rice milk, blueberries	
water, tea 4:30 1C chicken broth / rice	
water, tea 4oz organic braised chicken breast	
turkey 1/2 cup yogurt, fruit salad, granola	
water, tea 5:30 1/2 cup yogurt, fruit salad, granola	
water, tea 5:30 crackers, raspberry jam	
Snack Time: 8:30 crackers, raspberry jam	
Breakfast Time: 7:30 1/4 c oatmeal w/ 1T rice cereal,	
water 3T rice milk - CA enriched - Trident	
water 3 wheat-free waffle, maple syrup, grit	
water, tea 1/4 c yogurt, fruit salad, granola	
Snack Time: 11:45 1/4 avacado, mustard, romaine	
water, tea 12:30 hard boiled egg white, baked potato	
water chips, tea, 2oz cranberry juice	
Snack Time: 2:30 pretzels, 1/2 peanut butter, crackers	
Dinner Time: 6:30 Flour tortillas - 4oz Tilapia, ham	
water, tea 1/2 cup green beans, fresh, carrots, corn	
water, tea 1/2 cup pear, apple sauce 1/2 cup blt berries	
water 1/2 cup raspberries, 1/2 cup blueberries	
Bedtime - water 600 mg gabapentin - every night	
align probiotic 4-6 times a week after lunch	

© 2004 Stanford University

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

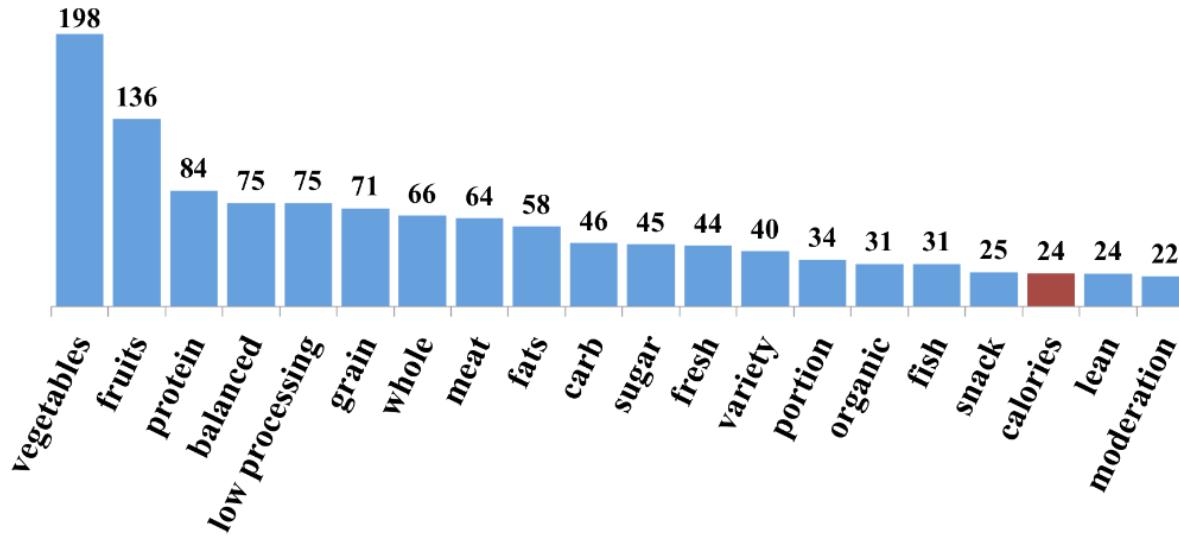
Typically provide calorie-based feedback

High burdens detract from potential benefit, data is often wrong

The screenshot shows a mobile application interface for a food journal. At the top, there's a header with the date "Friday, Oct 5, 2012". Below the header, the main area displays a list of meals and snacks with their respective calorie counts. The meals include "Homestyle Breakfast Potatoes" (340 cal), "Breakfast Sausage Links - Original" (167 cal), and "No Pulp Orange Juice" (88 cal). The snacks listed are "Homemade Turkey Sandwich(3 Slices)" (250 cal), "Garden Veggie Crisps - All Natural..." (110 cal), "Lowfat 1% Milkfat" (28 cal), "Sugar" (15 cal), and "Coffee - Brewed from grounds" (4 cal). At the bottom of the screen, there are navigation icons for "Home", "My Diary", "Progress", "Friends", and "More".

# 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”

# Difficulty as a Negative Nudge

“I just avoided eating things that were hard to log” – SP132

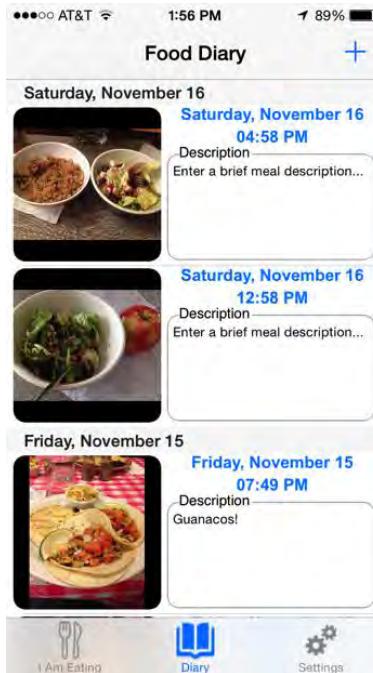
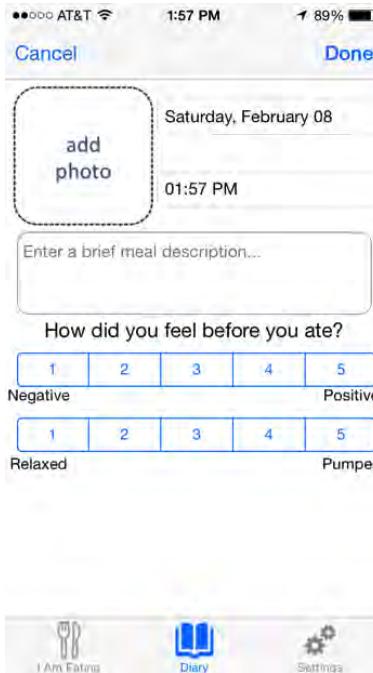
“Prepackaged meals were the easiest because of bar codes but those aren’t healthy” – SP123

“I could make life easier by eating the same things regularly” – SP97

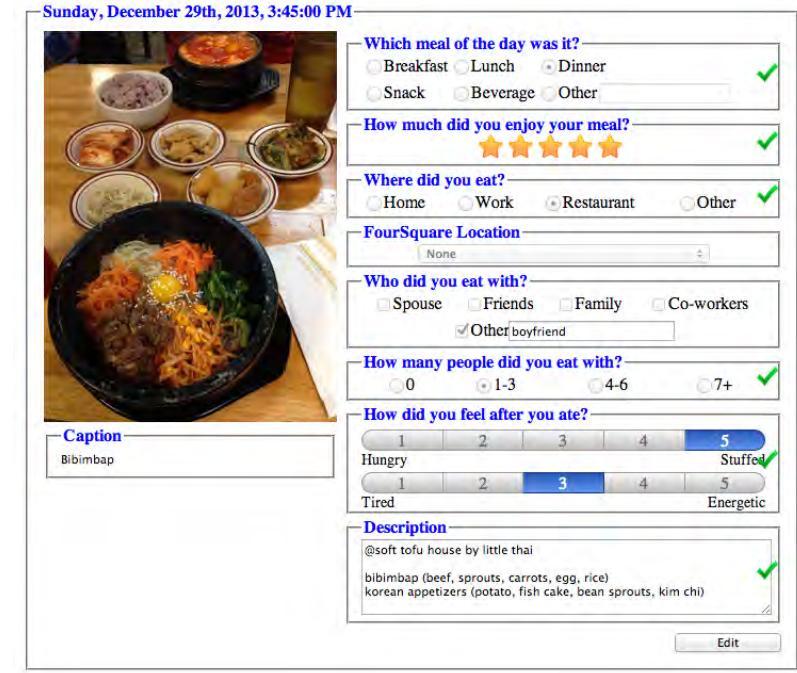
“It discourages you from eating out or at a friend’s, even if it is healthy” – SP42



# Deploying a Photo-Based Journal



Mobile capture and review



Web review and annotation

# 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