

The Power of Prototyping

Scott Klemmer
UC San Diego
The Design Lab

Raise your hand
if your team has
a Web page/site

Raise your hand if
the source of other
pages helped.

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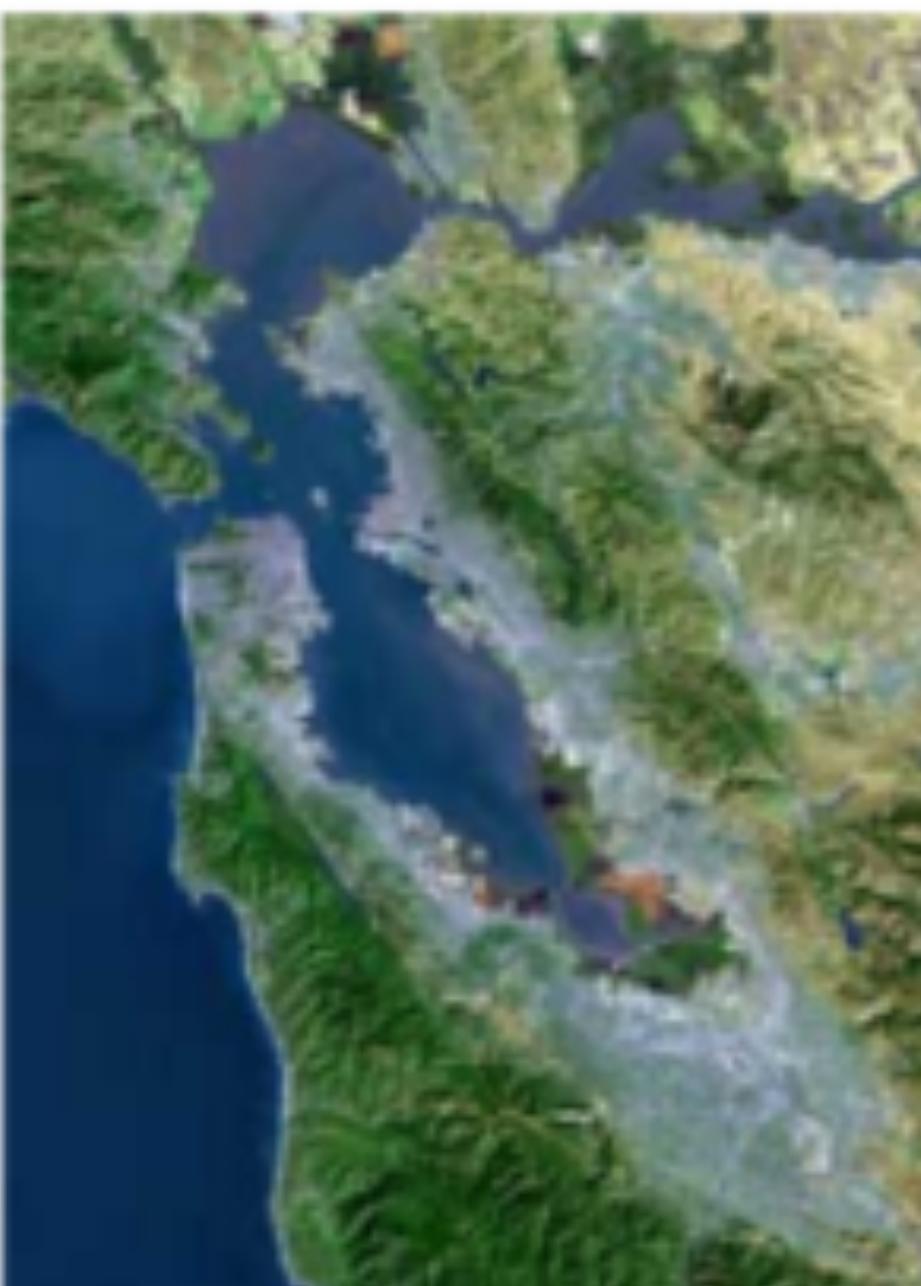
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Home

Research

Publications

Personal



San Francisco Bay Area

Satellite photo from www.sfbayquakes.org

I am a Ph.D. candidate in [Computer Science](#) at [UC Berkeley](#), specializing in human-computer interaction. My current research interests include end-user programming and informal tools to support the [design of user interfaces for applications that run on desktop PCs and mobile devices](#).

My advisor is [Professor James Landay](#). I am a member of the [Group for User Interface Research](#).

I graduated from the California Institute of Technology, popularly known as [Caltech](#), in 1997.



[UC Berkeley home page](#)
[CS home page](#)

Layout last modified on October 24, 2002



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CASCADING
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[Home](#)

[Research](#)

[Publications](#)

[Teaching](#)



I am an Associate Professor in [Computer Science & Engineering](#) at the [University of Washington](#), specializing in human-computer interaction. My current research interests include Automated Usability Evaluation, Demonstrational Interfaces, Ubiquitous Computing, User Interface Design Tools, and Web Design.

I was previously the Laboratory Director of [Intel Research Seattle](#), a university affiliated research lab that is exploring the new usage models, applications, and technology for ubiquitous computing.

I am a founding member of the University of Washington [Design:Use:Build \(DUB\) Center](#), a cross-campus interdisciplinary group of HCI and Design researchers.

I received my B.S. in EECS from [UC Berkeley](#) in 1990 and my M.S. and Ph.D. in CS from [Carnegie Mellon University](#) in 1993 and 1996, respectively. My Ph.D. dissertation was the first to demonstrate the use of sketching in user interface design tools. I was also the chief scientist and co-founder of [NetRaker](#), which was acquired by KeyNote Systems in 2004.

[My DUB Blog](#)

[Join](#) or [Sign in](#)

Members (5)

A grid of five small profile pictures showing the faces of five people, likely members of the DUB Center. The first two are men, and the last three are women.

[University of Washington home page](#)
[CSE home page](#)

Layout last modified on January 12, 2009



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Home

Research

Teaching

Positions

Service

Personal

RESEARCH

I am interested in techniques to improve the design of computer systems with respect to their usefulness and usability. To that end, I have investigated the effectiveness and usability of several HCI techniques (e.g., think-aloud usability studies, Cognitive Walkthrough, GOMS) and produced new techniques for bringing usability concerns to the design process (e.g., CPM-GOMS and software architecture evaluation for usability). Much of my work focuses on cognitive modeling, where I work within a unified theory of cognition to develop models of human performance that produce quantitative predictions of performance with less effort than prototyping and user testing. I also work on bridging the gap between HCI and software engineering, specifically including usability concerns in software architecture design.

Two active research projects have their own websites.

[Usability and Software Architecture \(U&SA\)](#)

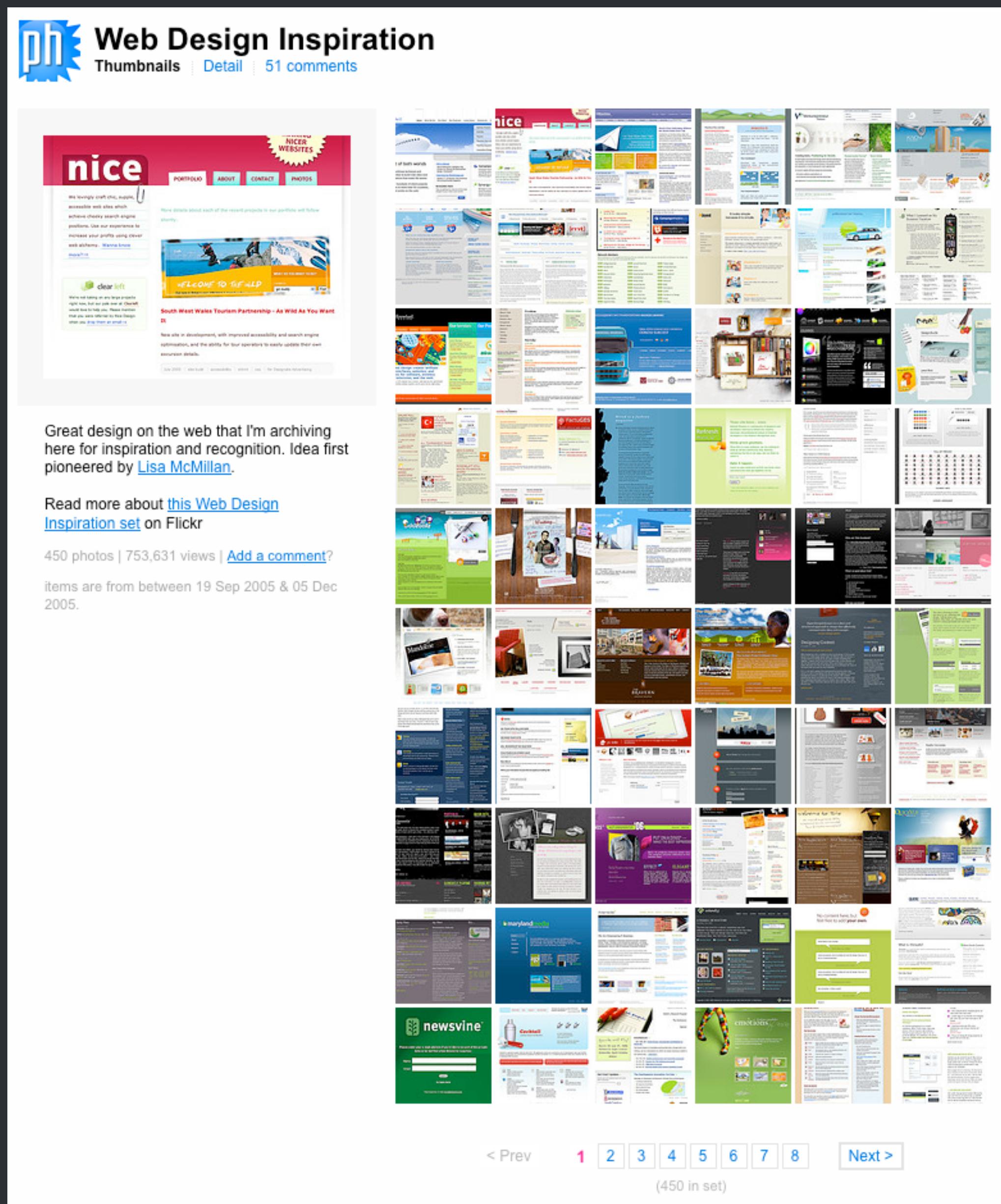
[The CogTool Project: a Tool for Cognitive Modeling](#)

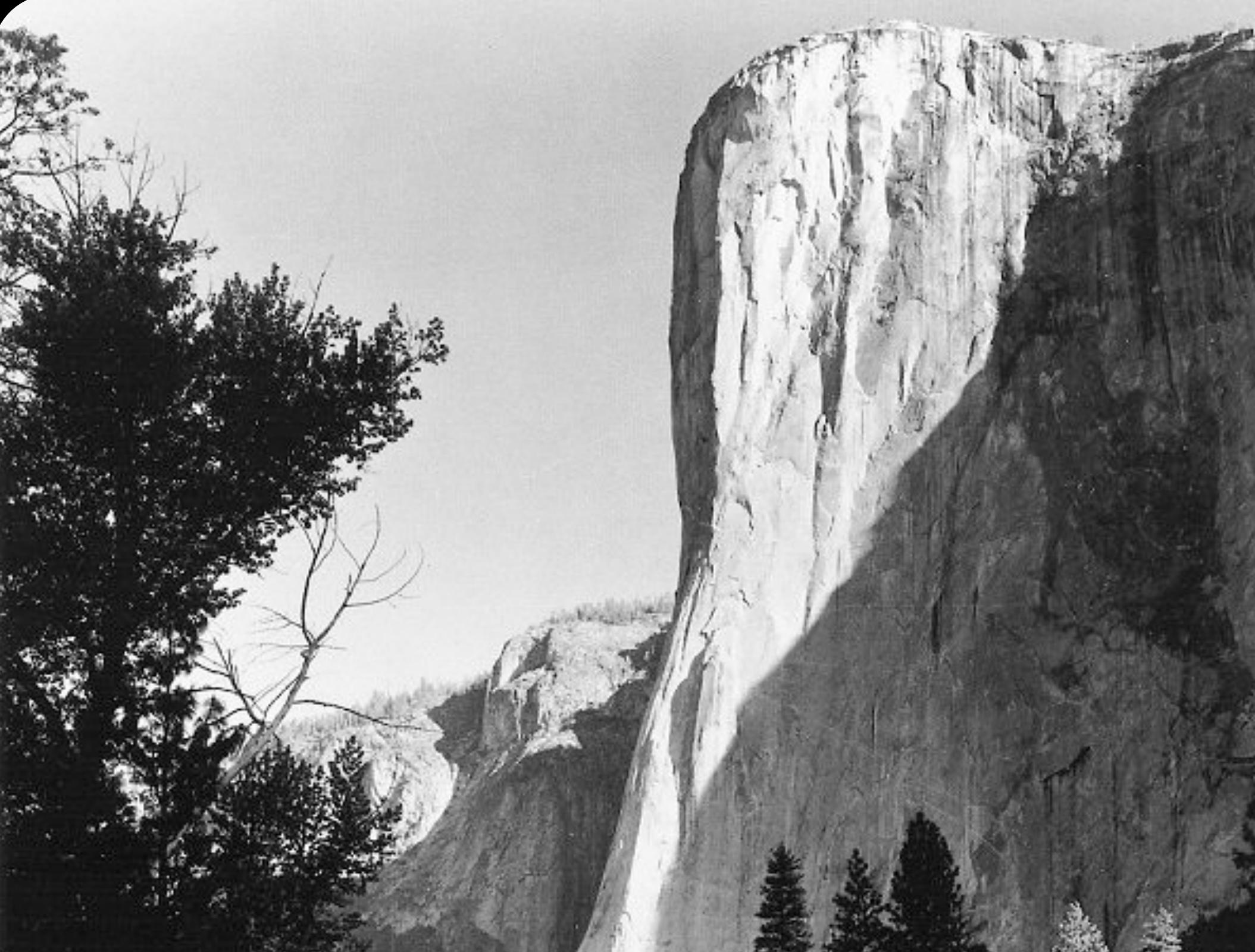
TEACHING

I teach courses in HCI design and evaluation methods. I was the Director of the [Master of Human-Computer Interaction Program](#) for almost a dozen years, stepping down in January 2009.

[FULL CURRICULUM VITA \(.pdf\)](#)

Examples provide context, implementation, and composition





When it comes to HIV,
everyone is a victim.

FACE AIDS
A student campaign to fight AIDS in Africa.

REAL FACES.
REAL FEARS.
REAL HOPE.

FACE AIDS
A student campaign to fight AIDS in Africa

THINK GLOBALLY, ACT LOCAL

Click to Learn More

FACE AIDS TODAY

Flex Development - AIRTest/src/AIRTest.mxml

Fx *AIRTest.mxml X

Source Design

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <mx:WindowedApplication xmlns:mx="http://www.adob
3 <mx:Script>
4   <![CDATA[
```

“There are no rules of
composition in
photography, there are
only good photographs”

ANSEL ADAMS

The Camera



THE ANSEL ADAMS PHOTOGRAPHY SERIES 1

ANSEL ADAMS

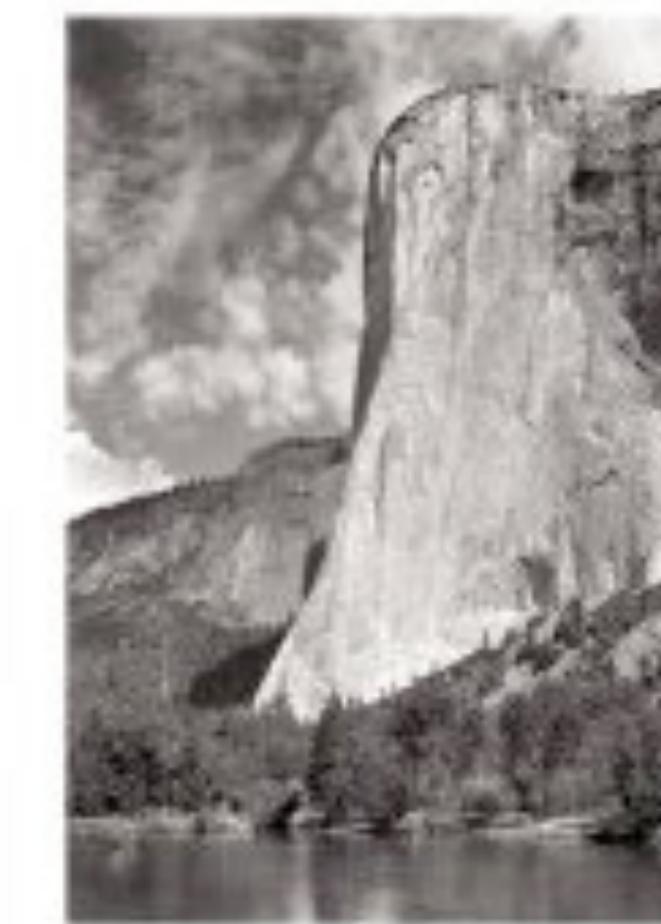
The Negative



THE ANSEL ADAMS PHOTOGRAPHY SERIES 2

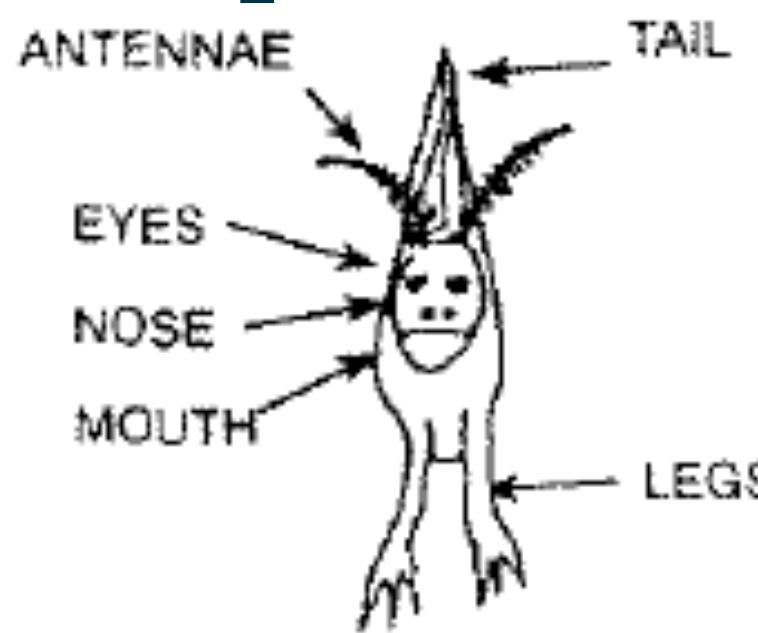
ANSEL ADAMS

The Print

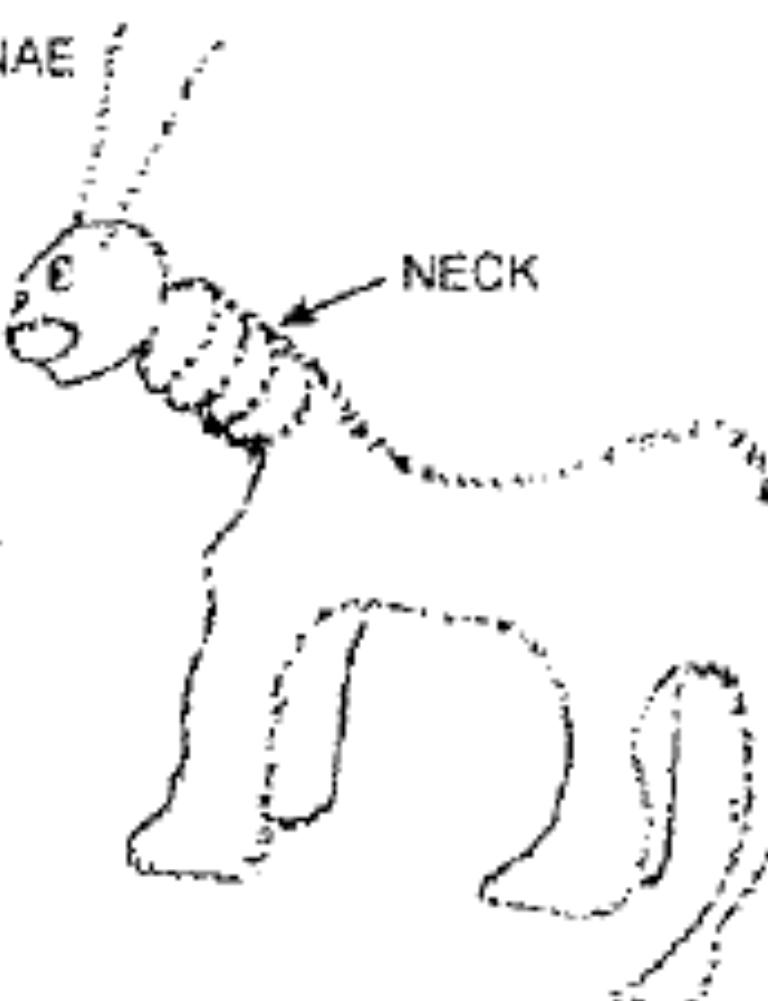
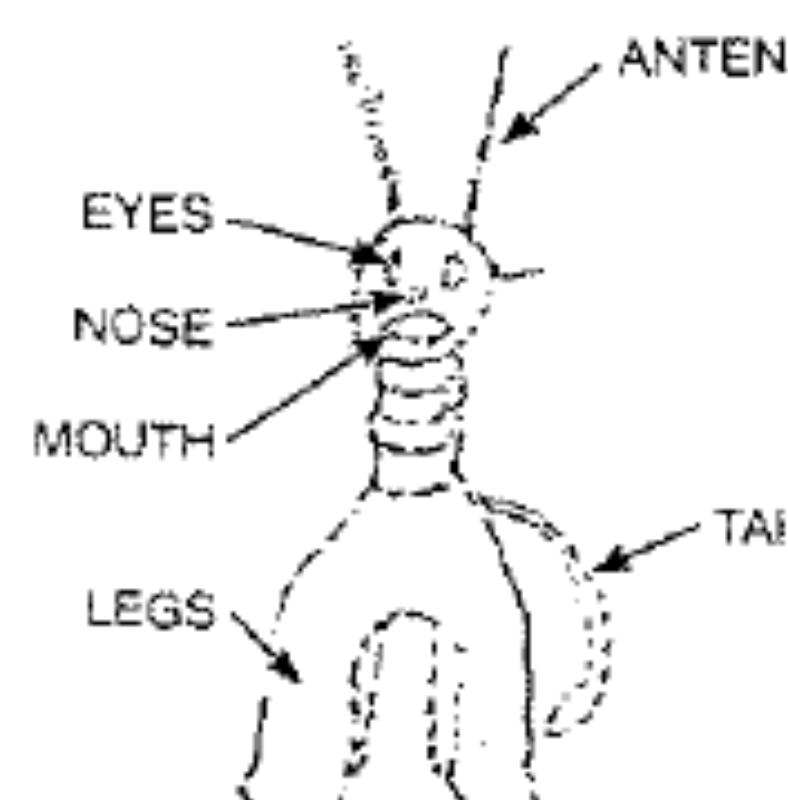


THE ANSEL ADAMS PHOTOGRAPHY SERIES 3

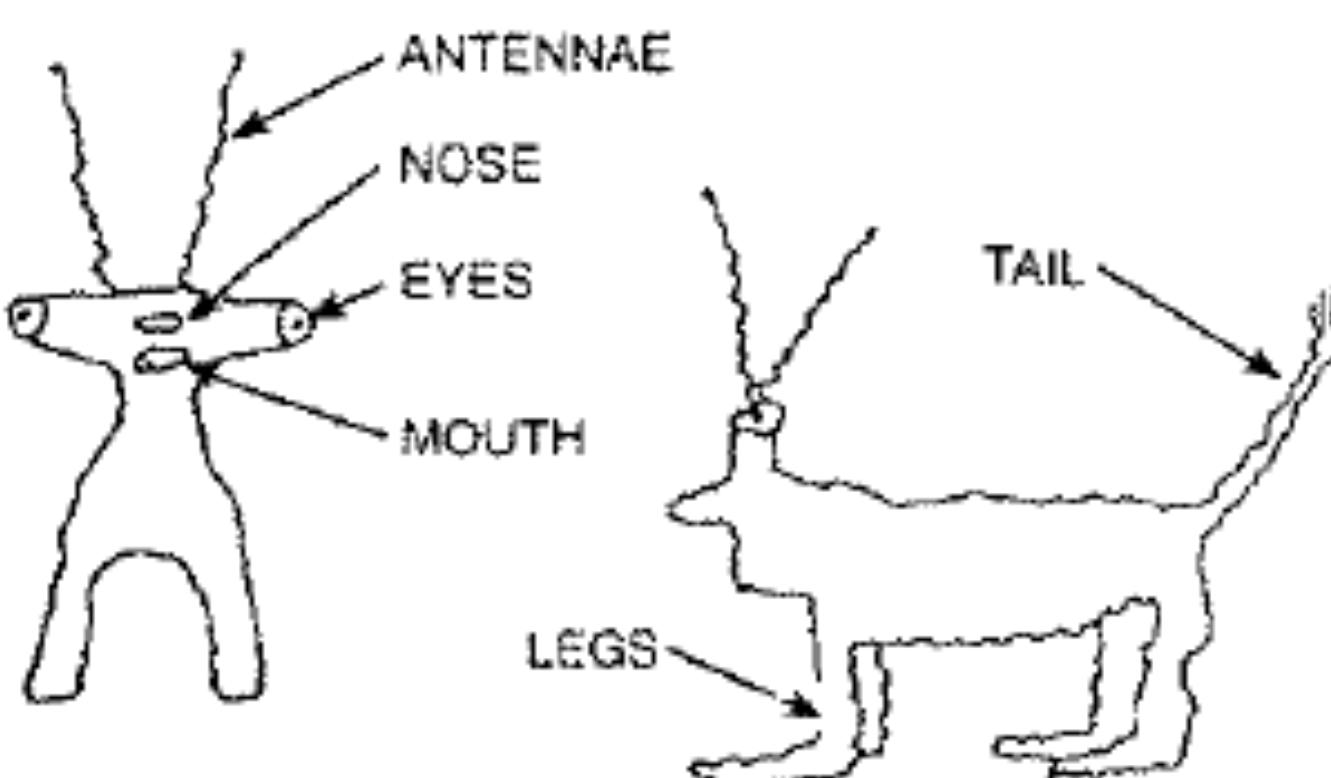
Examples can increase



This creature can walk
on land and swim in water
very well.



A very funny creature, it
is so soft that it makes no
noise when it walks.

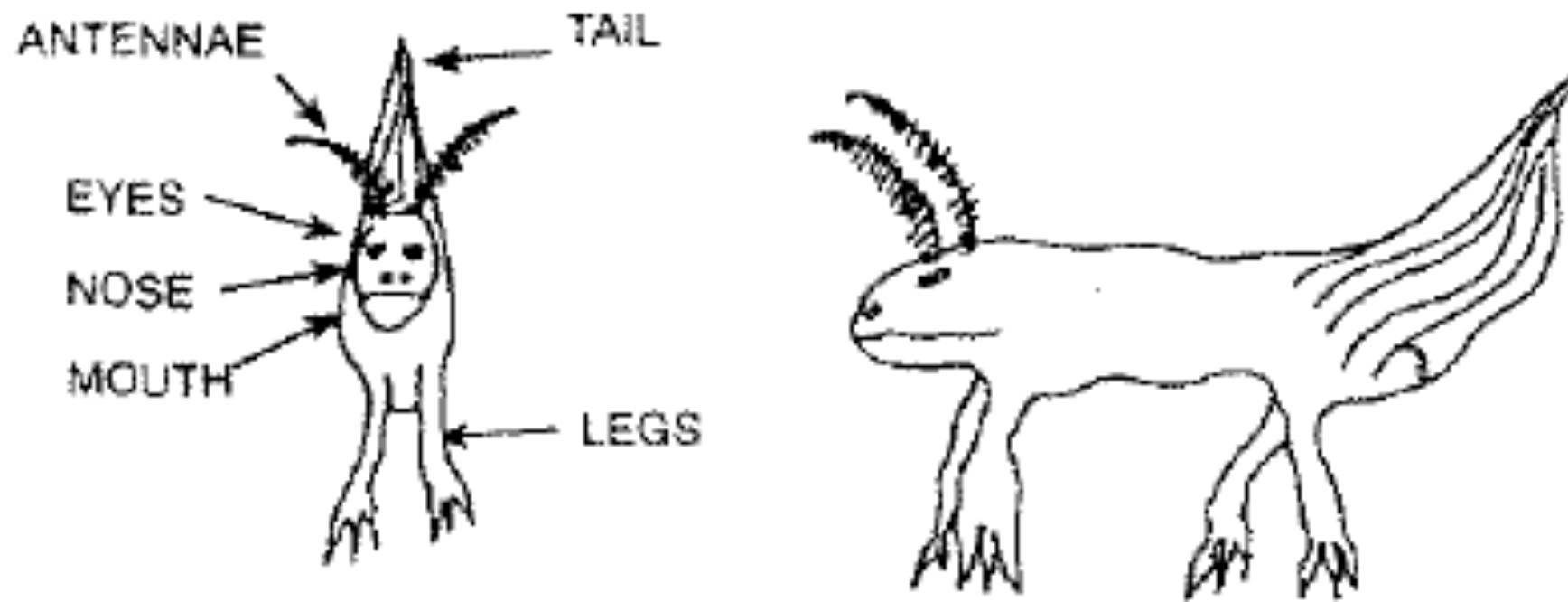


This is a blue-green
creature that is very
wrinkled but gentle.

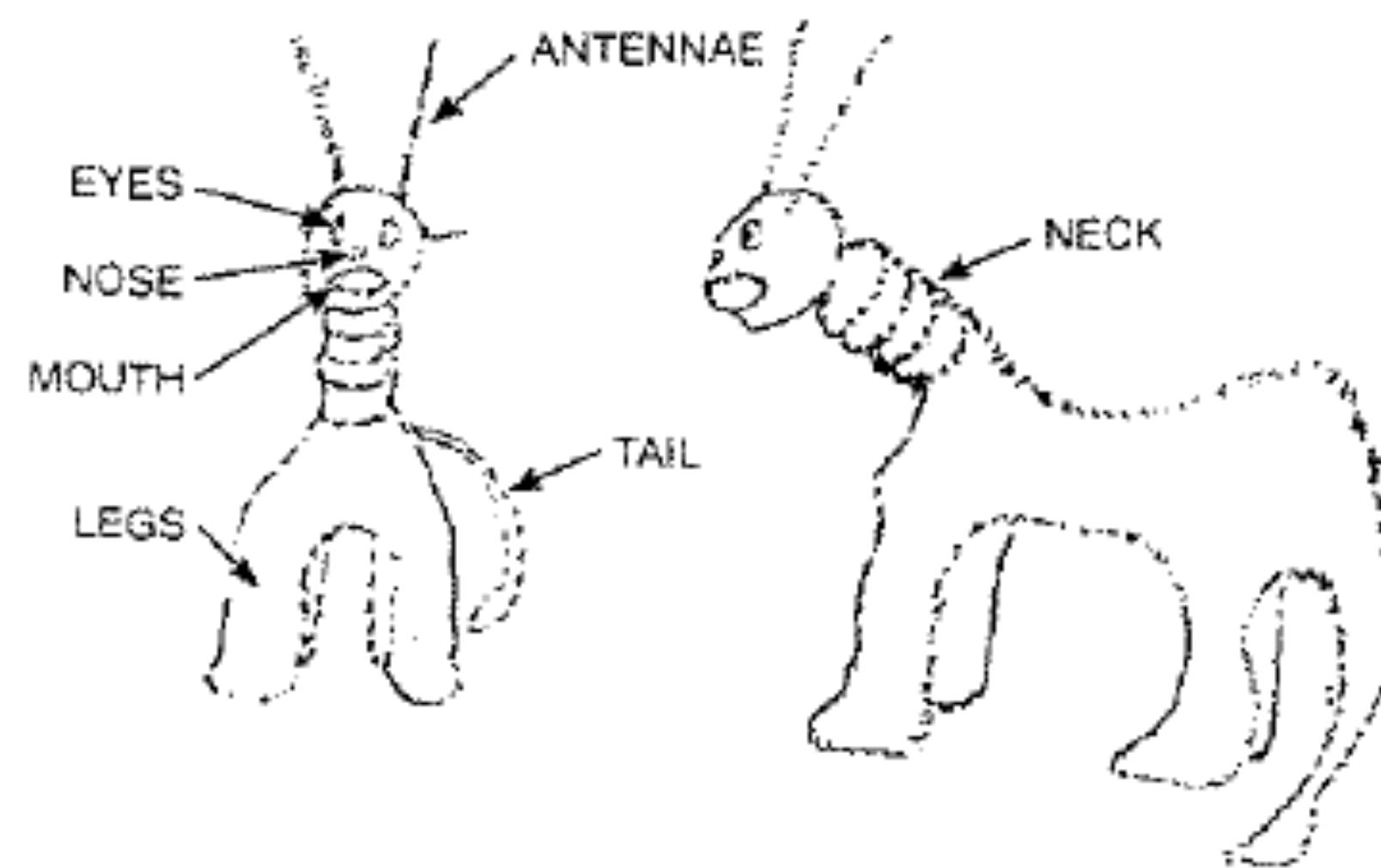
Smith et al. 1993

Will nothing new
ever be created?

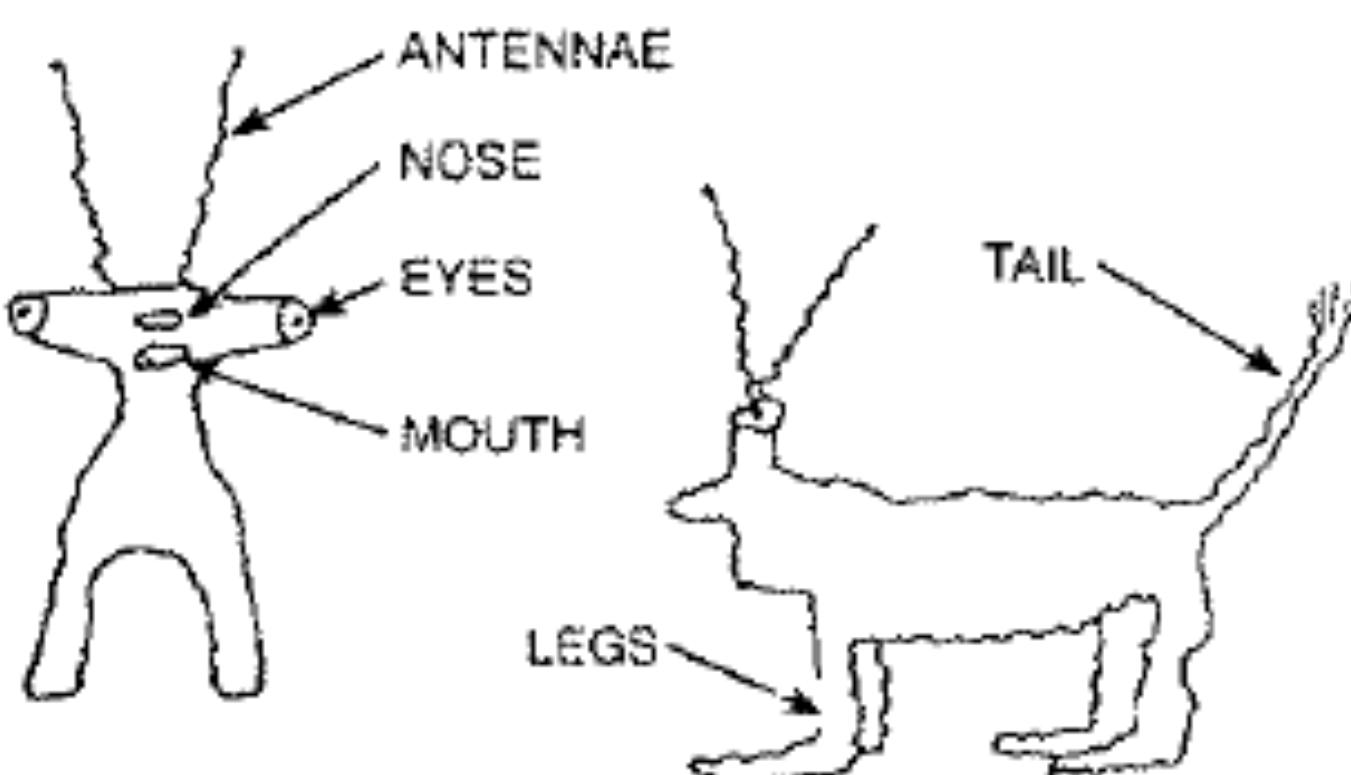
...without reducing novelty



This creature can walk
on land and swim in water
very well.



A very funny creature, it
is so soft that it makes no
noise when it walks.



This is a blue-green
creature that is very
wrinkled but gentle.

Just for Small Innovations?

“By ... metaphors and analogies we try to link the new to the old, the novel to the familiar. Under sufficiently slow and in the case of a sharp discontinuity, however, the method breaks down ... our past experience is no longer relevant, the analogies become too shallow, and the metaphors become more misleading

—E.W. Dijkstra, *On the Cruelty of Really Teaching Computer Science*

Quantity v. Quality?



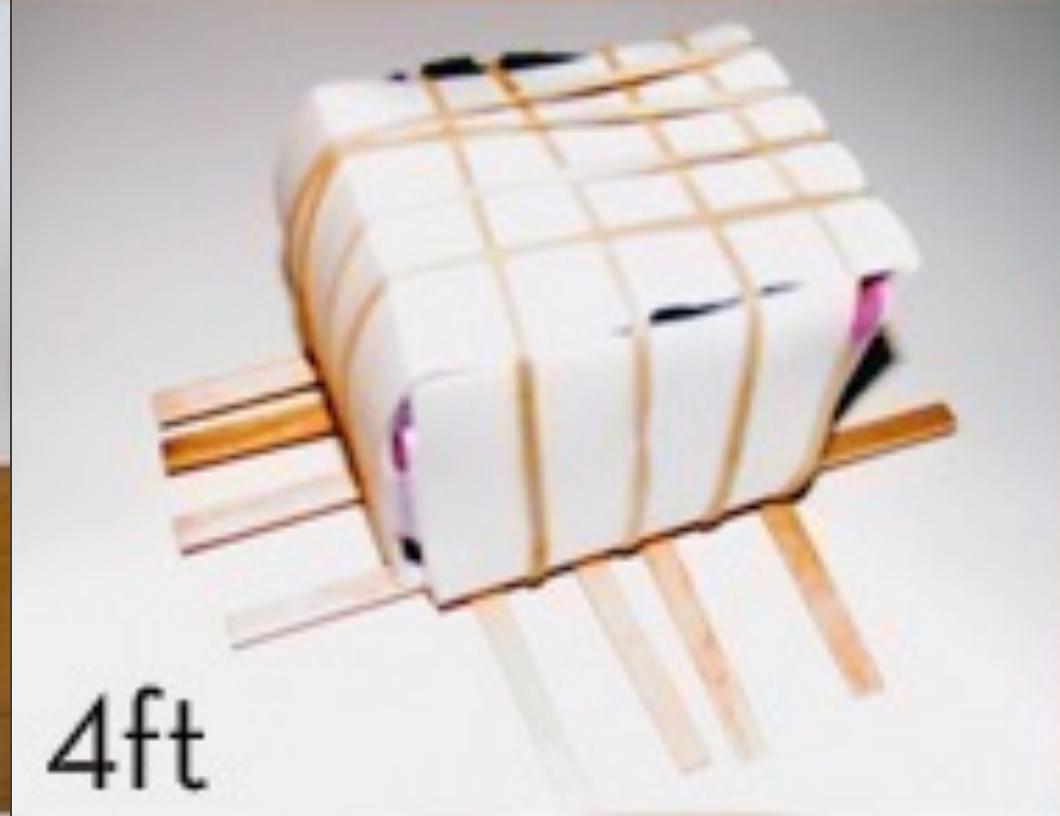
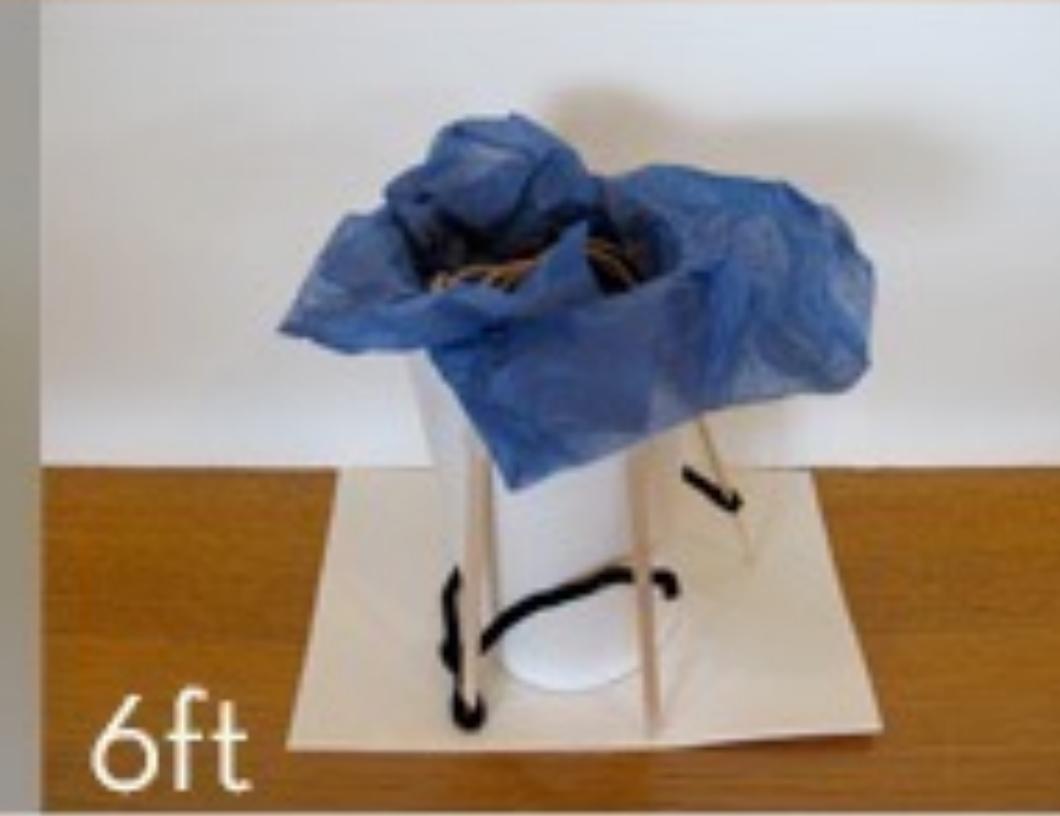
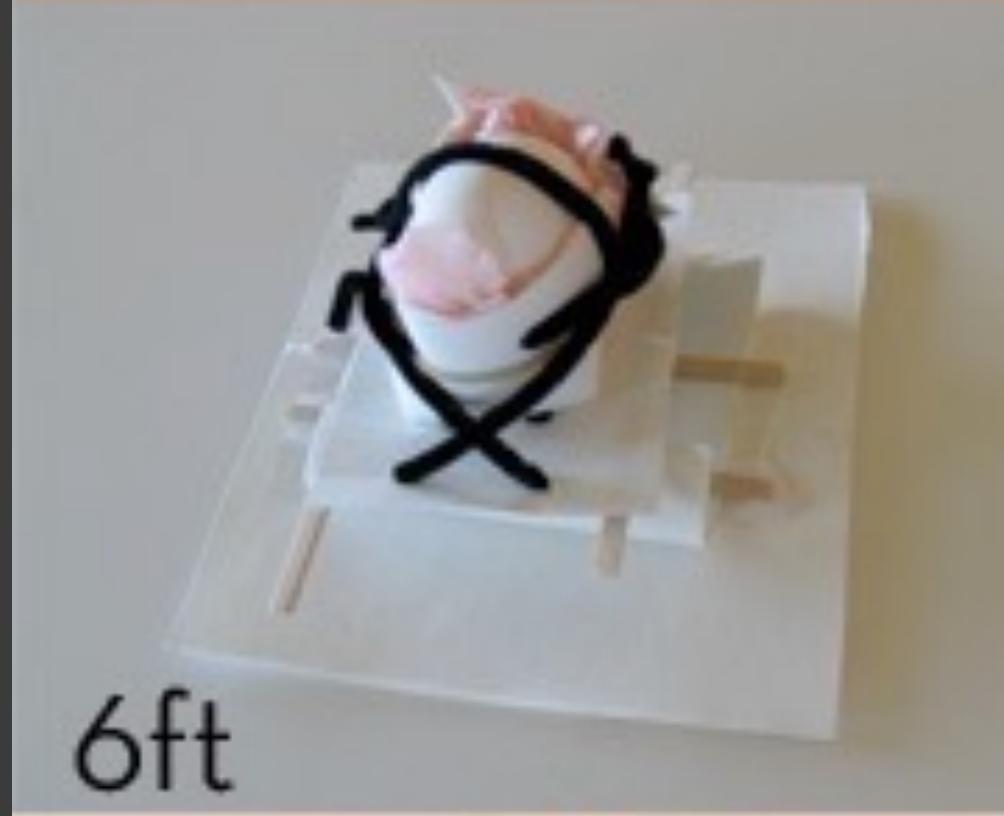
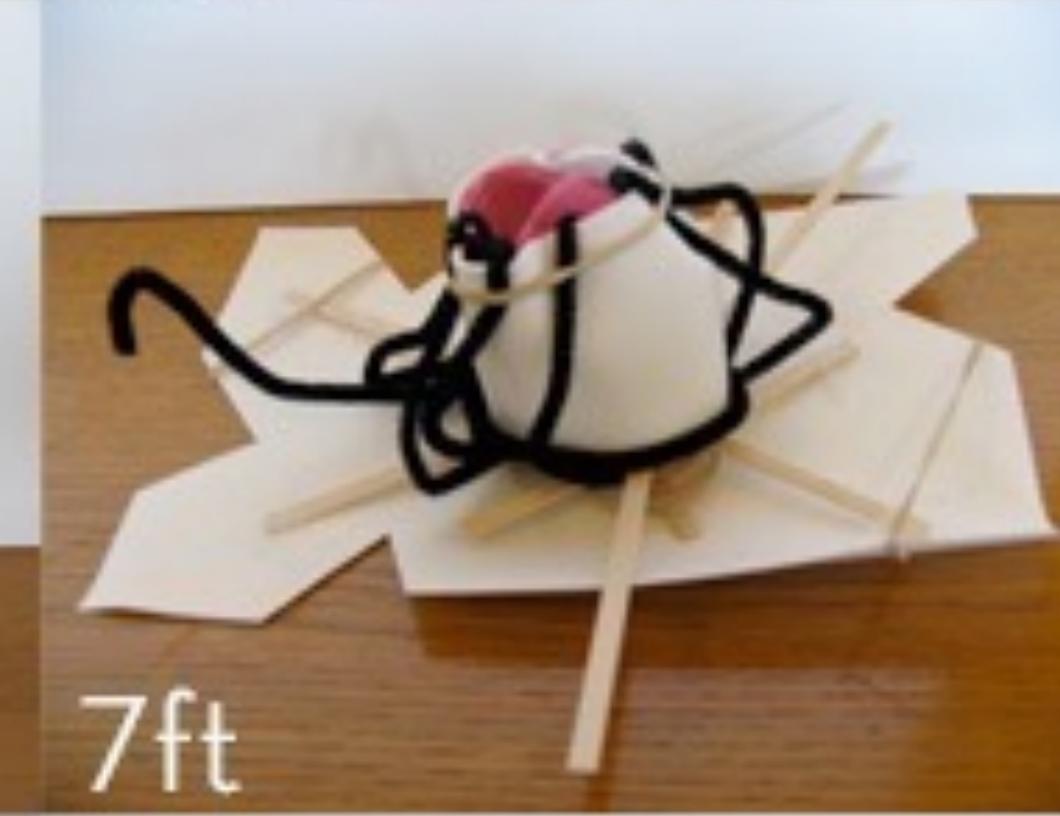
Bayles and Orland, 2001

Quantity v. Quality?

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

Design an Egg Drop Device





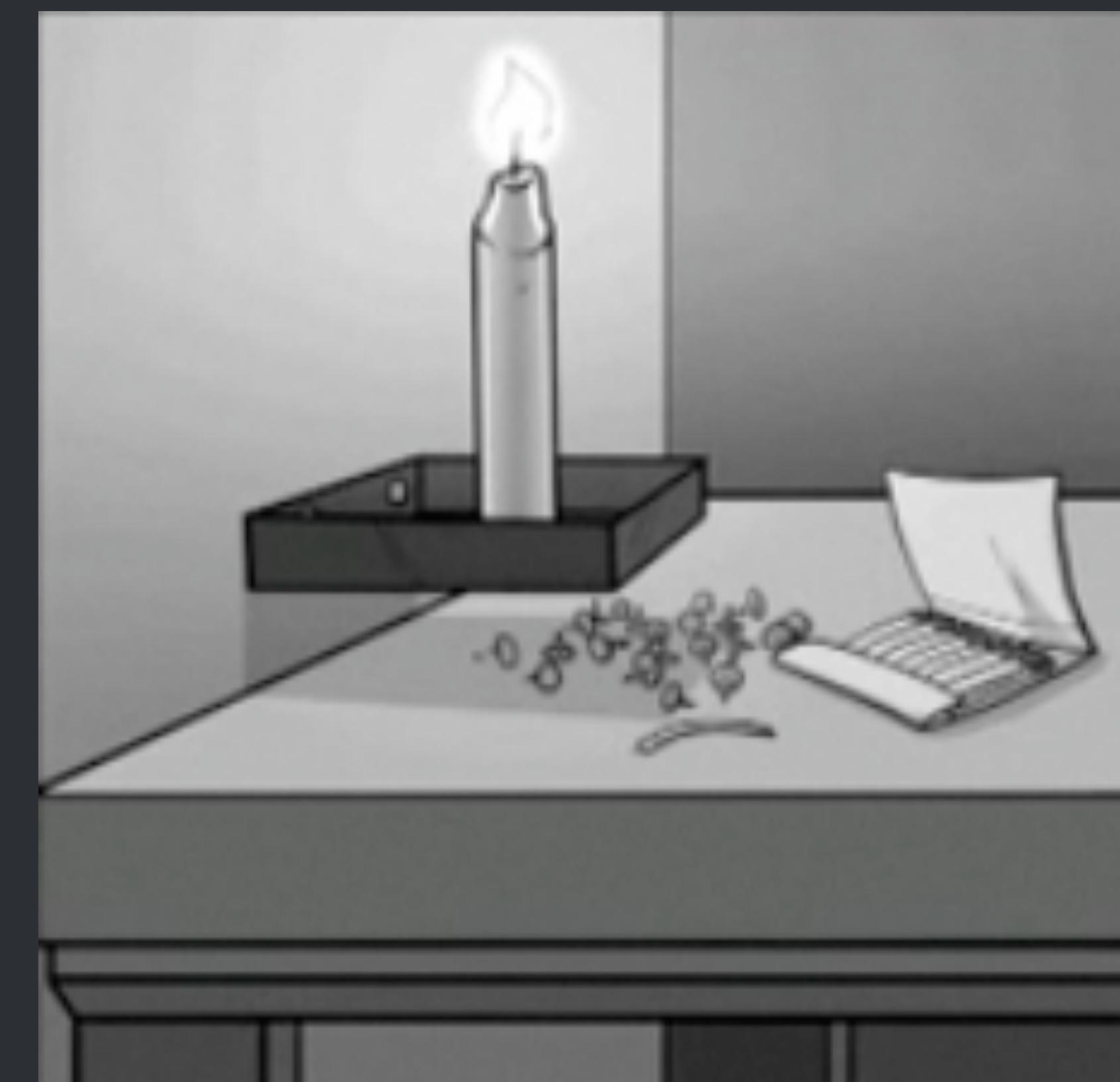
Participants picked their concept



INTERACTION
PARTICIPANT

"They helped me pick up all the best parts that I had already made so I didn't have to start from scratch."

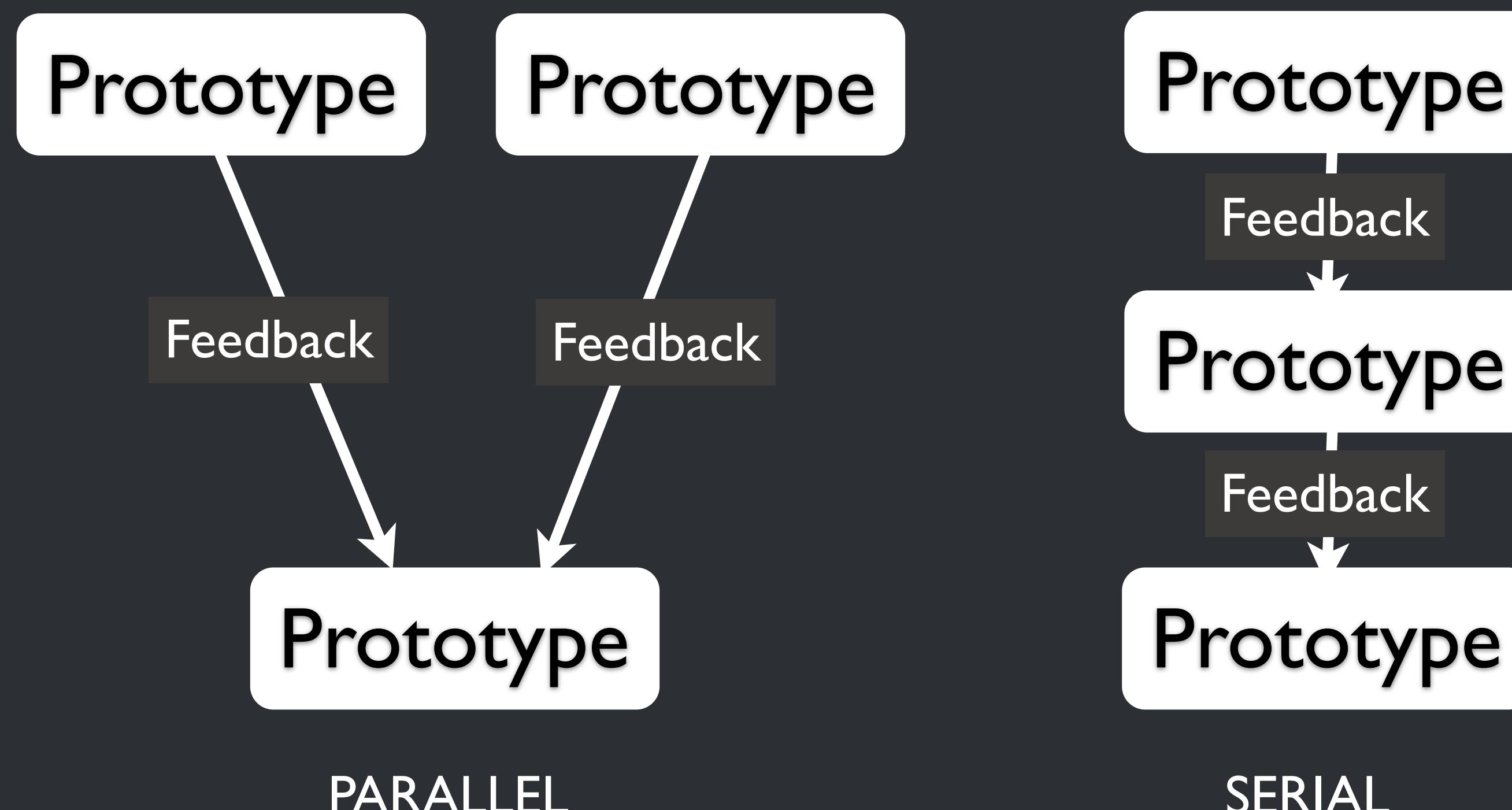
Functional Fixation



Duncker, 1945

Research question

How does parallel design
— rather than a serial approach —
affect performance?



Task: design an advertisement

The screenshot shows the homepage of the Ambidextrous website. At the top, the word "AMBIDEXTROUS" is written in large, bold, orange letters. Below it is a navigation bar with links: "subscribe", "issues", "blog", "store", and "contact us". On the left side, there's a thumbnail image of "issue 11" which features a black and white photograph of a window looking out onto a city skyline. The issue title "AMBIDEXTROUS" is at the top, followed by "STANFORD UNIVERSITY'S JOURNAL OF DESIGN", "ISSUE ELEVEN", "SOMMERTIME SPRING 2009", and "615 USD". Below the image, the word "SPACE" is written in large, bold, black letters. To the right of the thumbnail, the text "issue 11" is displayed in a large, bold, black font. Underneath it, the text "Spring 2009: Space" is written in a smaller, bold, black font. Below that, a paragraph of text reads: "As children some of you may have dreamed of becoming astronauts, or at least vied for a spot in Space Camp. Maybe you were inspired by the worlds of Flash Gordon or those created by Frank Lloyd Wright. In this issue of *Ambidextrous*, we tackle space and beyond in all of its frontiers." At the bottom of the page, there's a small image of a bookshelf and a computer monitor displaying a green letter "L". To the right of the monitor, the text "An Ode to White Space" and "Ellen Lupton" is written.

AMBIDEXTROUS
STANFORD UNIVERSITY'S JOURNAL OF DESIGN
ISSUE ELEVEN
SOMMERTIME SPRING 2009
615 USD

SPACE

issue 11

Spring 2009: Space

As children some of you may have dreamed of becoming astronauts, or at least vied for a spot in Space Camp. Maybe you were inspired by the worlds of Flash Gordon or those created by Frank Lloyd Wright. In this issue of *Ambidextrous*, we tackle space and beyond in all of its frontiers.

An Ode to White Space
Ellen Lupton

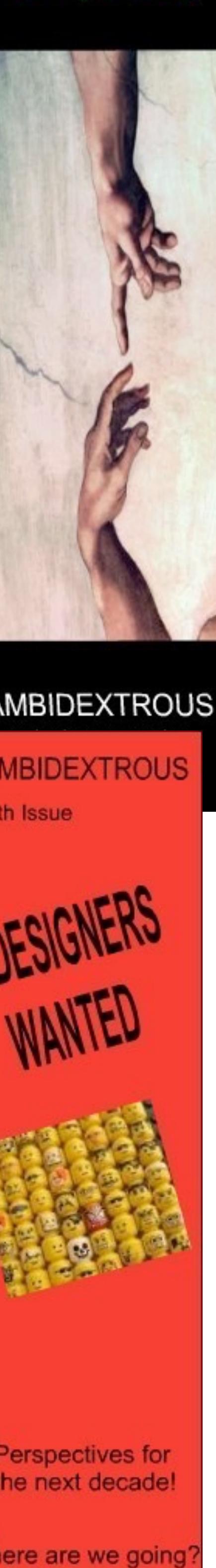
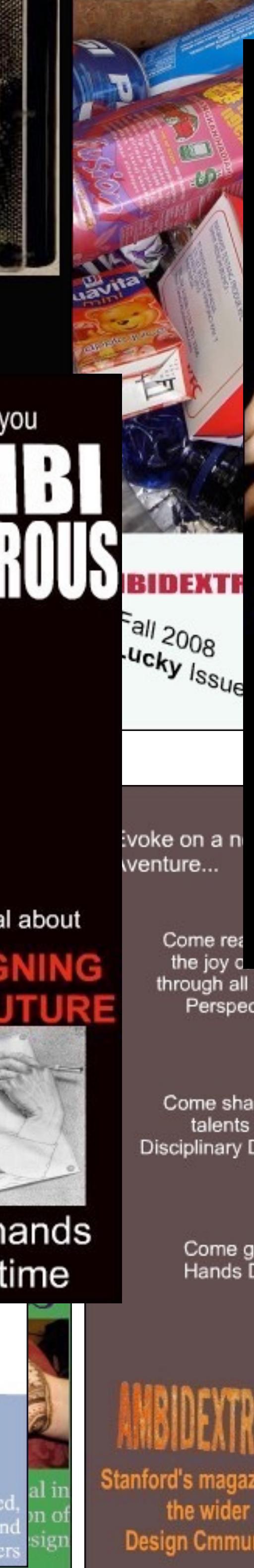
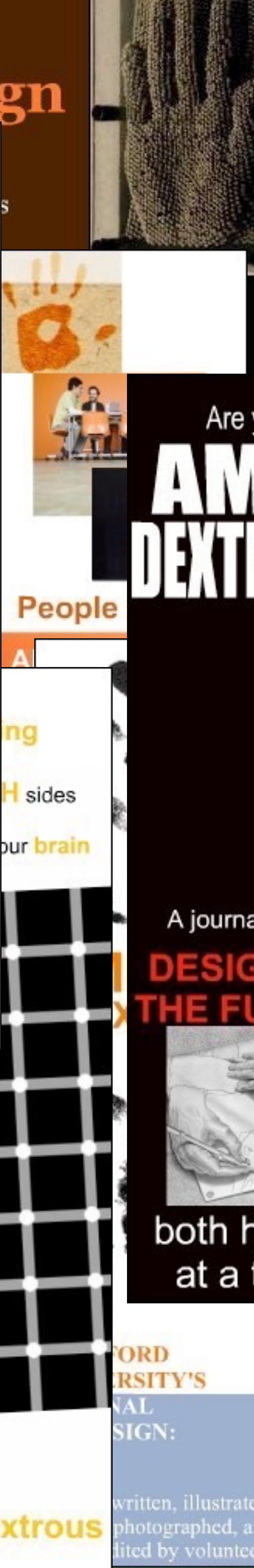
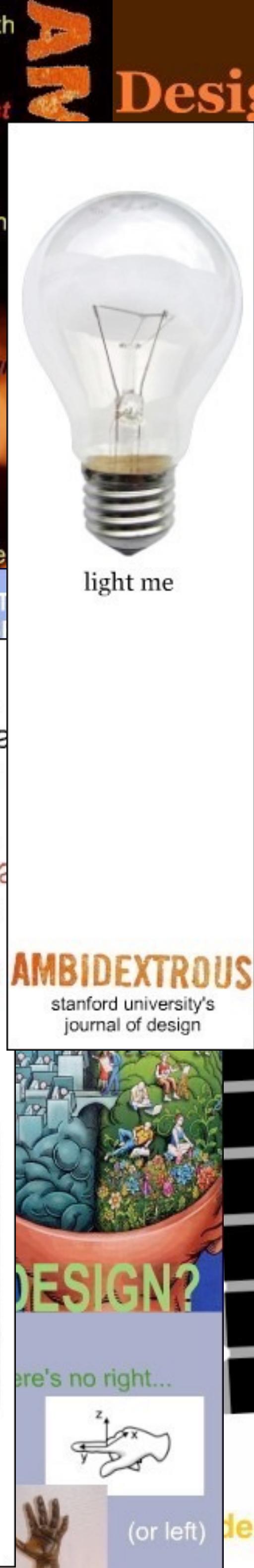
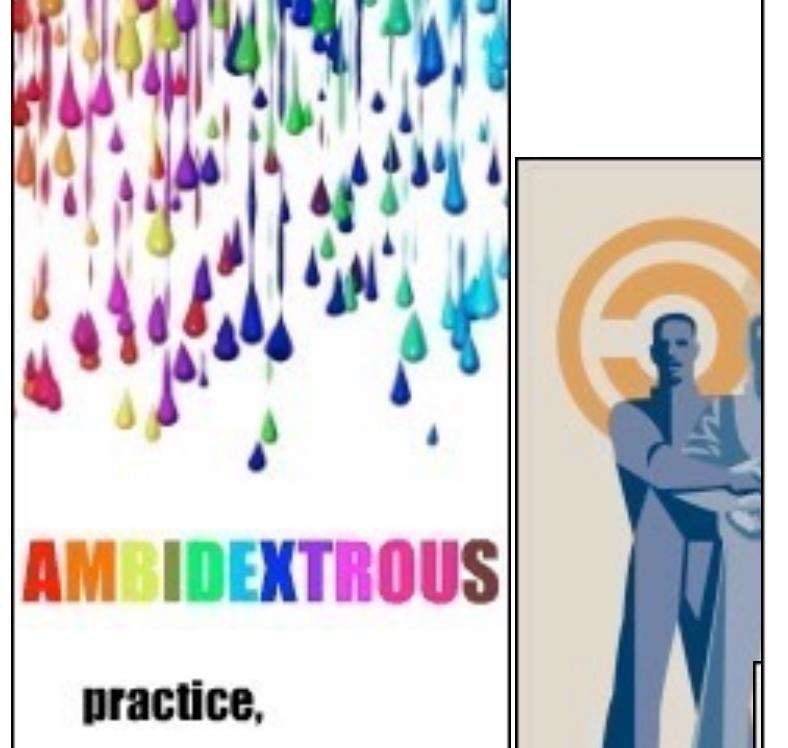
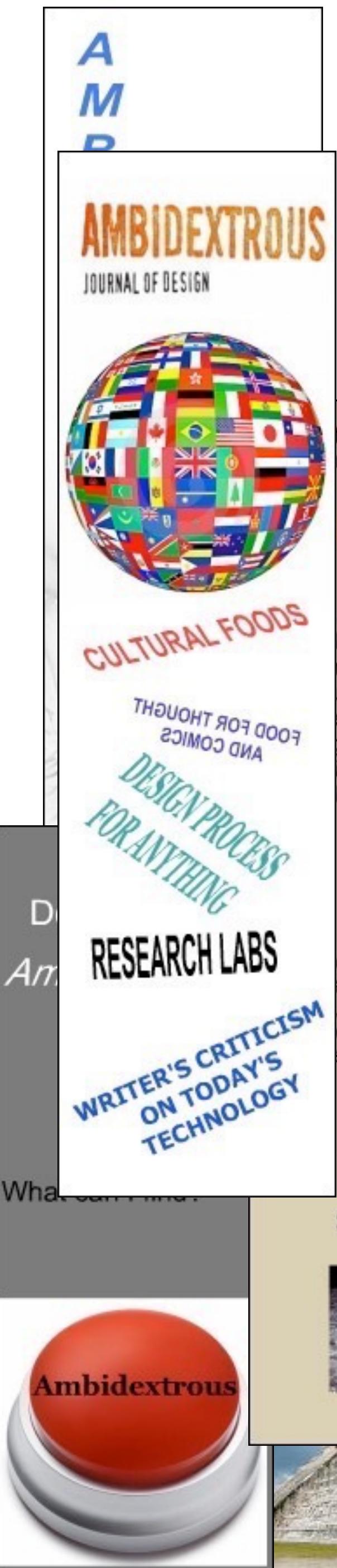
Procedure (N=33)

serial
prototyping
condition

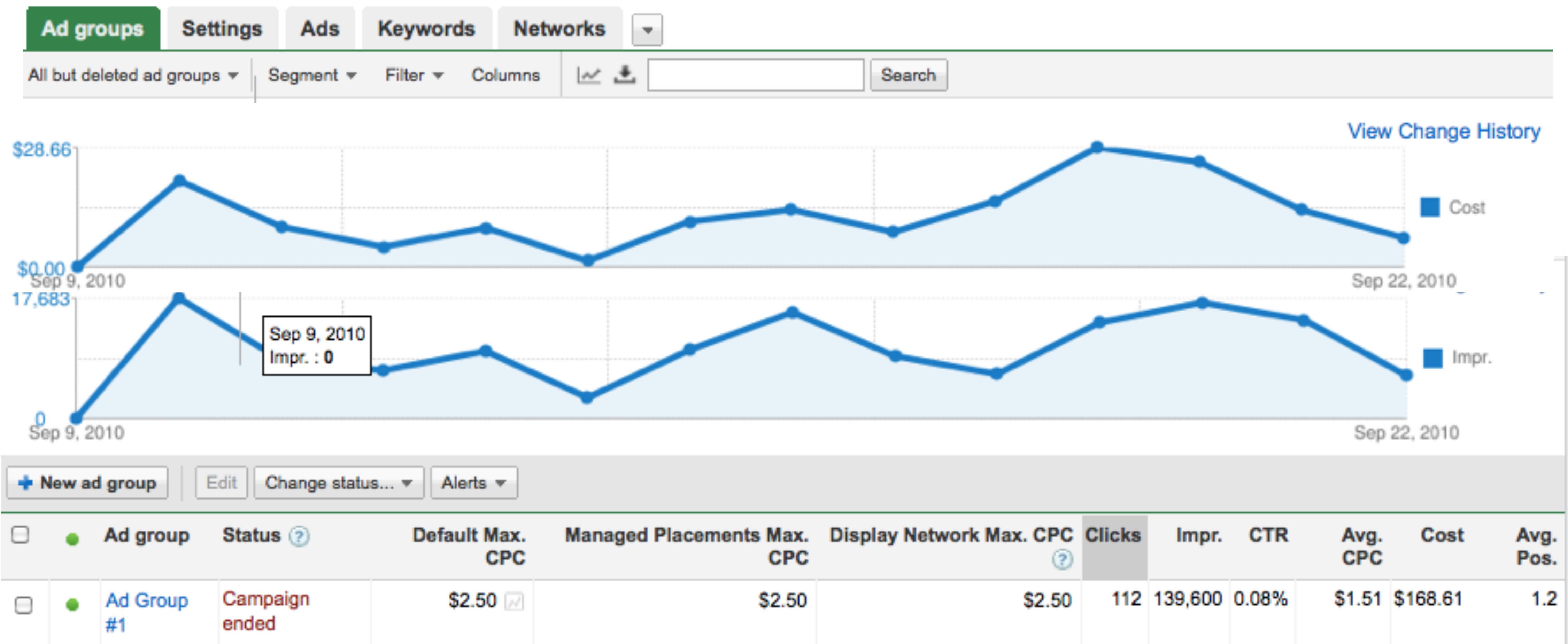


parallel
prototyping
condition



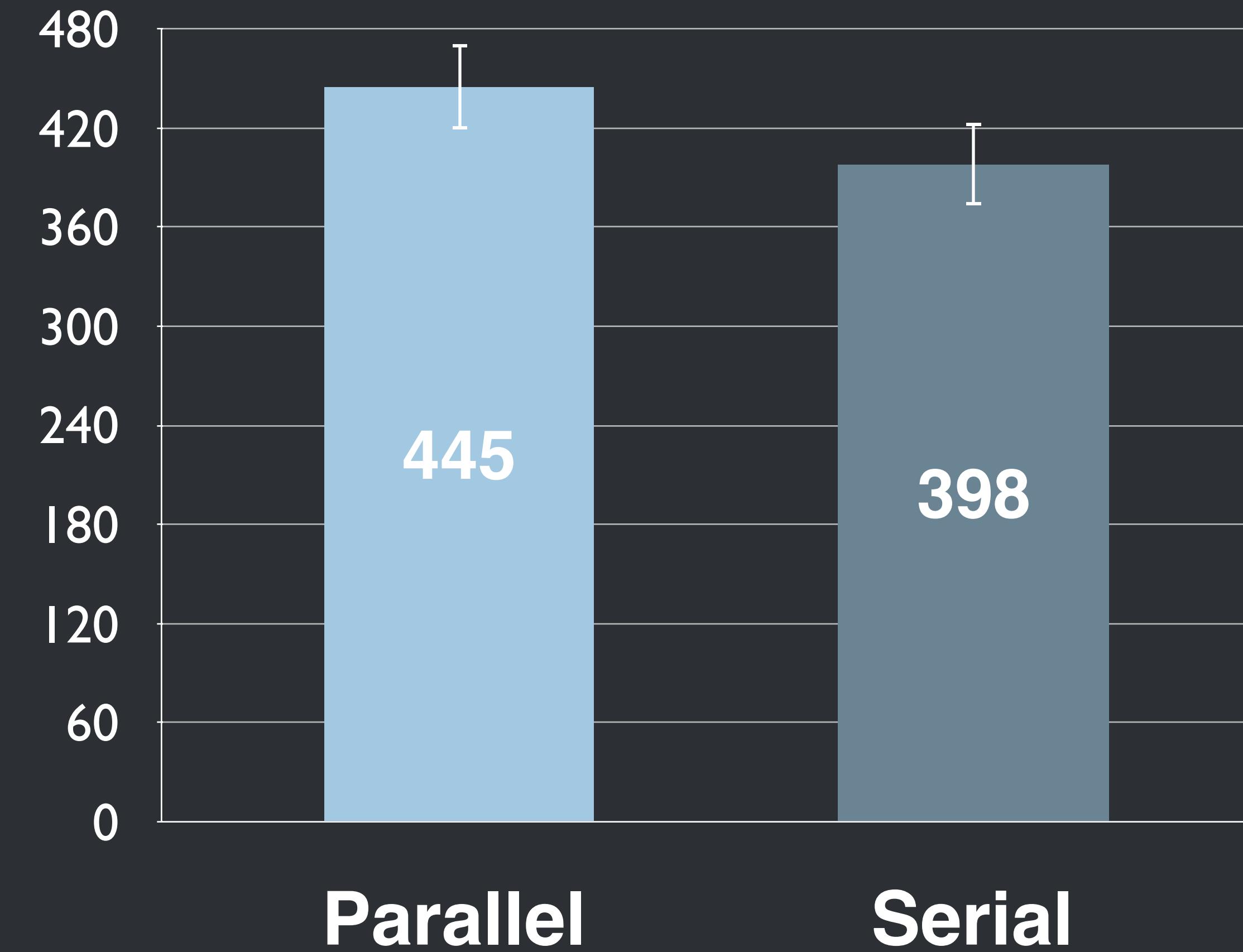


Web advertising analytics



Parallel design -> more

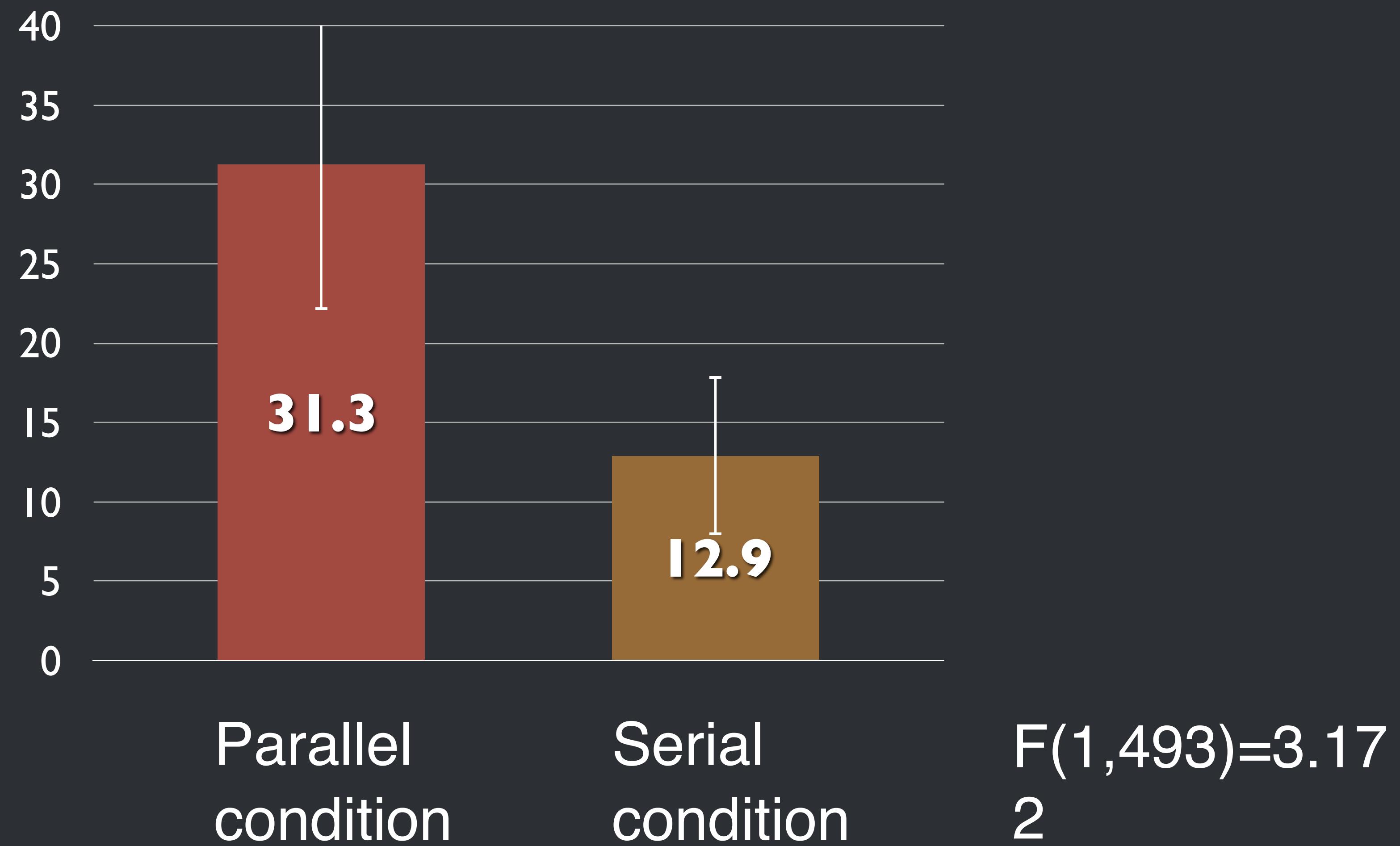
Clicks per
million
impressions



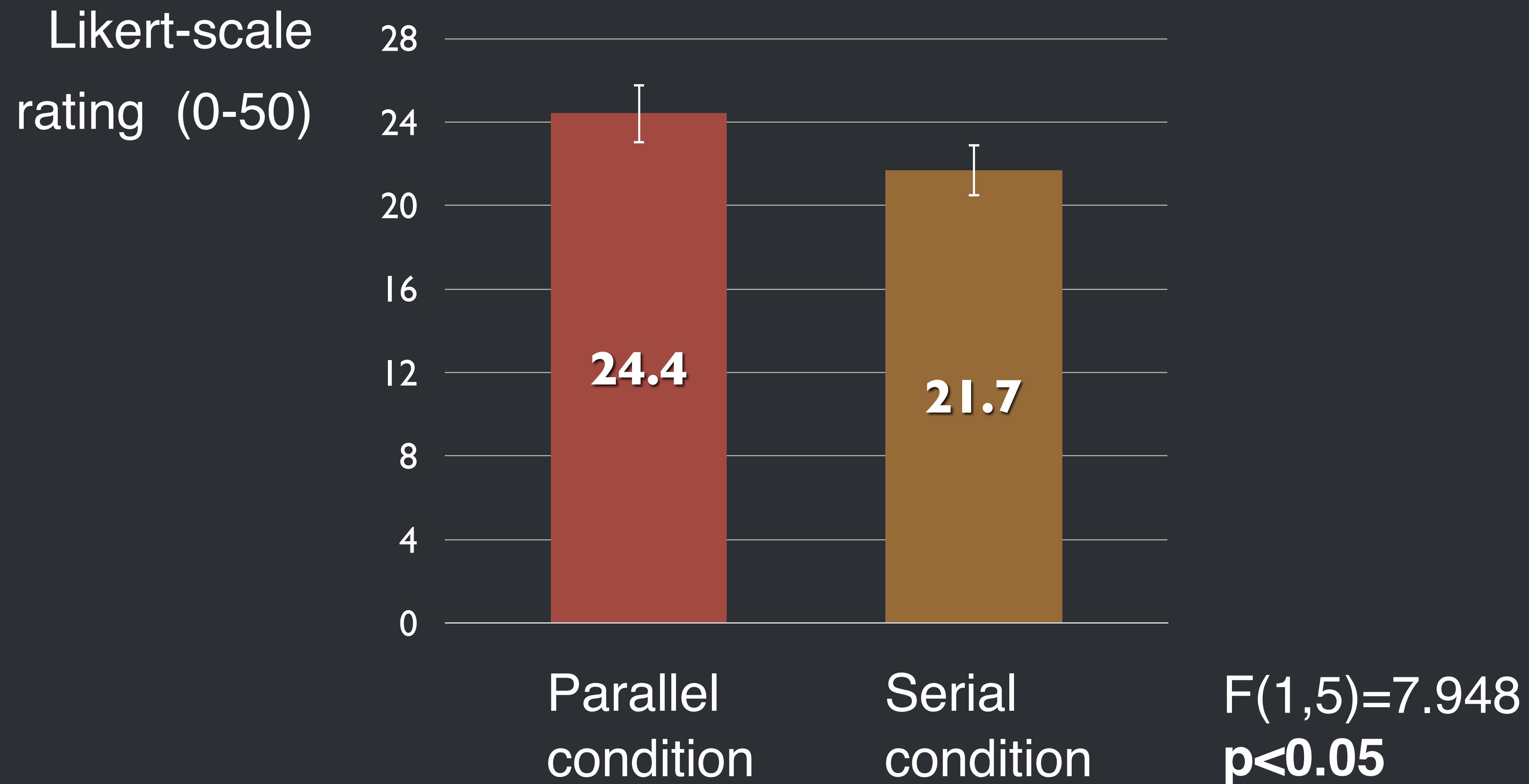
$F(1,30)=4.227$
 $p<.05$

...and more time on the site

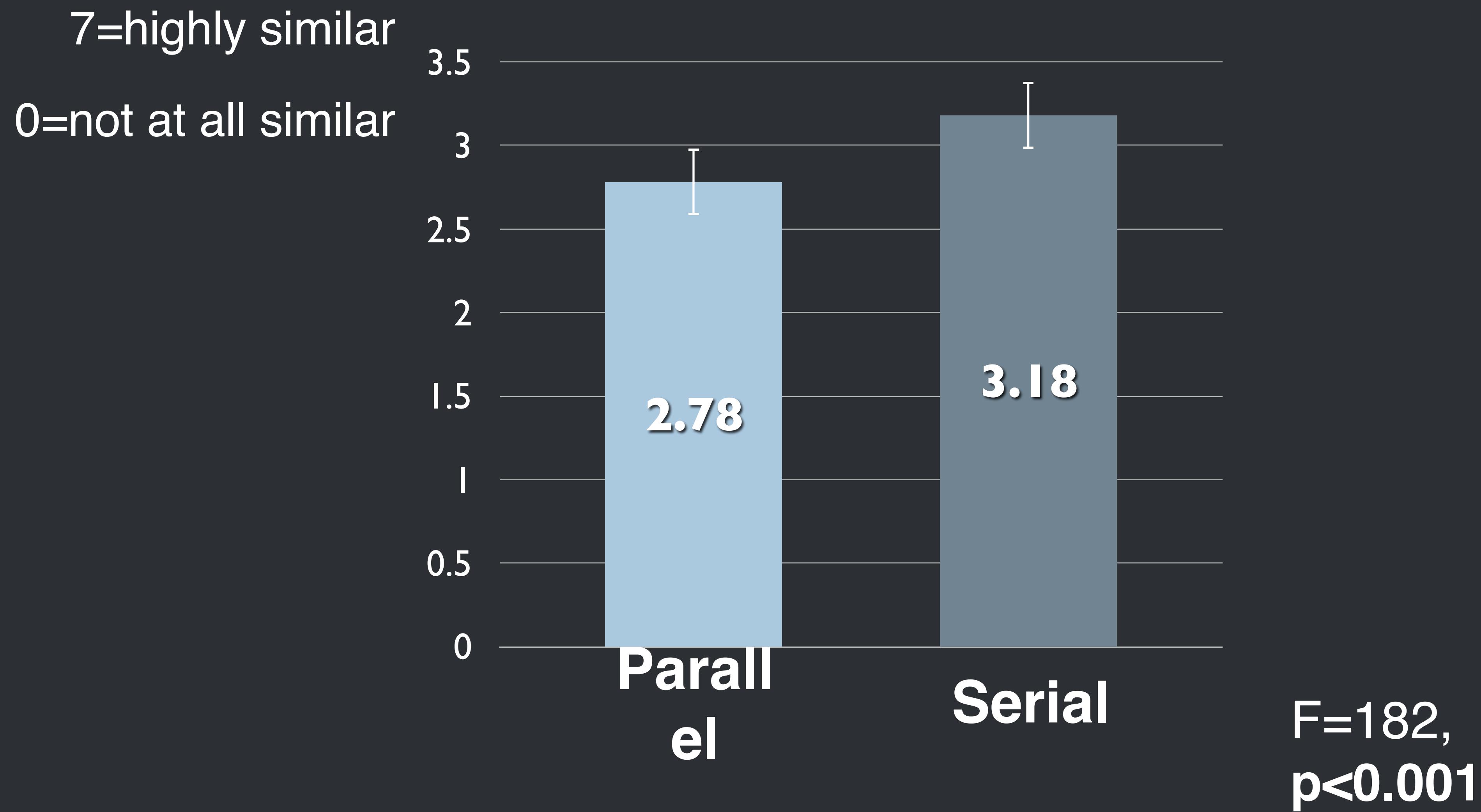
Average time
on client site
per visitor



...and higher expert ratings



...and more diverse designs



*Why does a parallel
approach yield
better results?*

Separating *Ego*

from *Artifact*

Parallel encourages
comparison and
transfer

Comparison aids learning

training session

SEPARATE CASES

CASE#1

“Describe the solution.”

CASE#2

“Describe the solution.”

COMPARISON CASES

CASE#1

CASE#2

“Describe the
parallels of
these solutions”

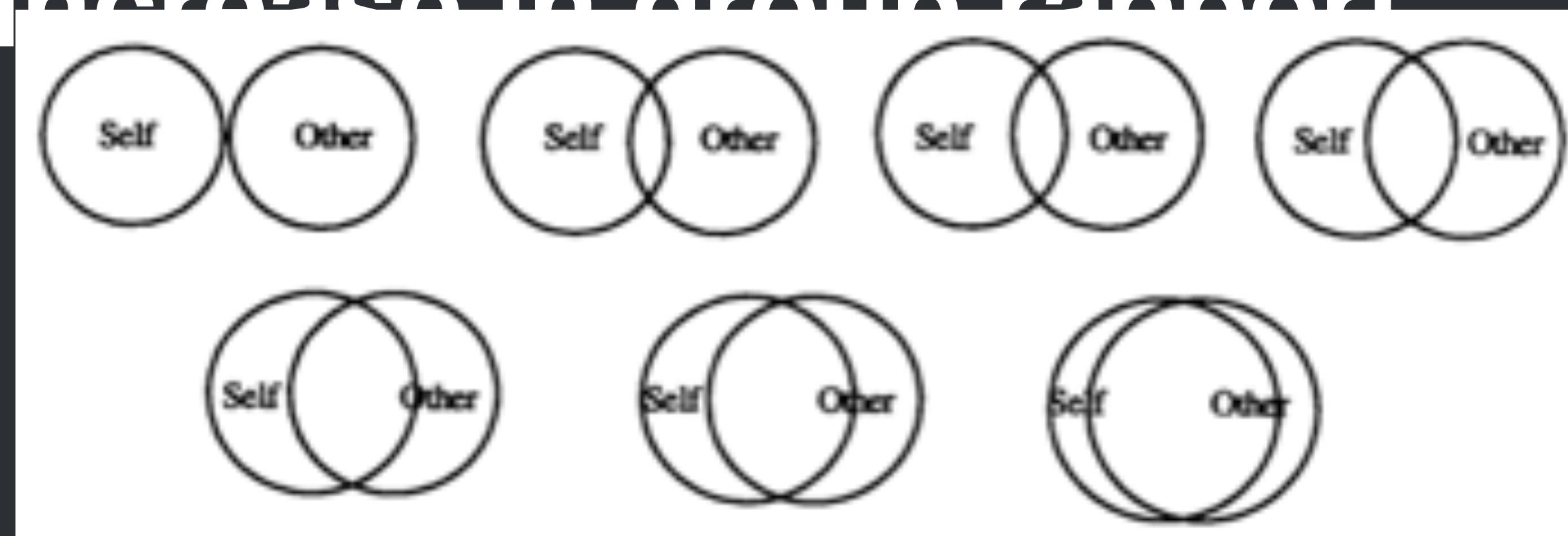
~ 3x

learning outcome

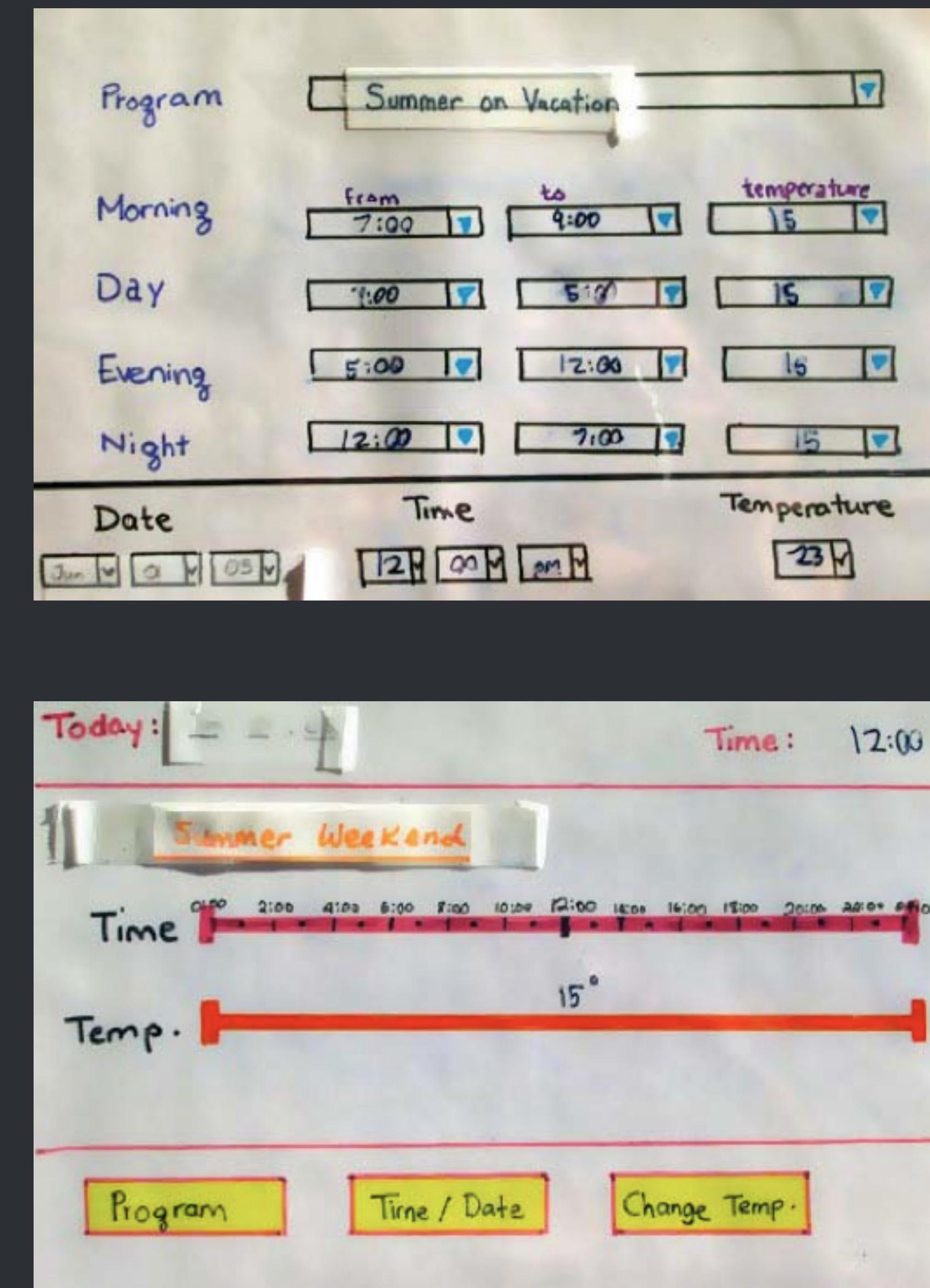
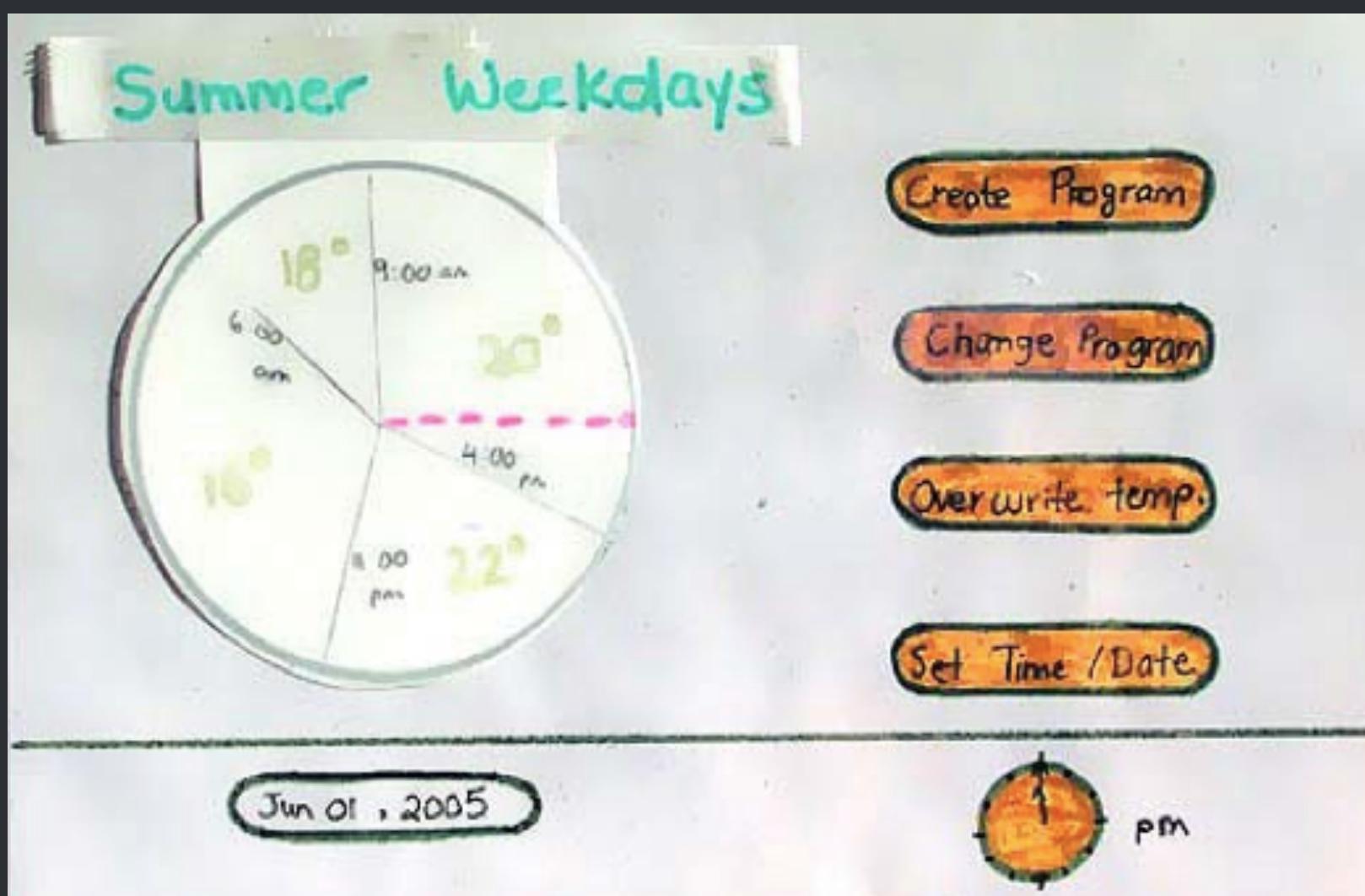
Solutions to a landlord-renter lease

Benefits of sharing multiple

- More individual exploration
- More feature sharing
- More conversational turns
- Better consensus
- Increase in group rapport



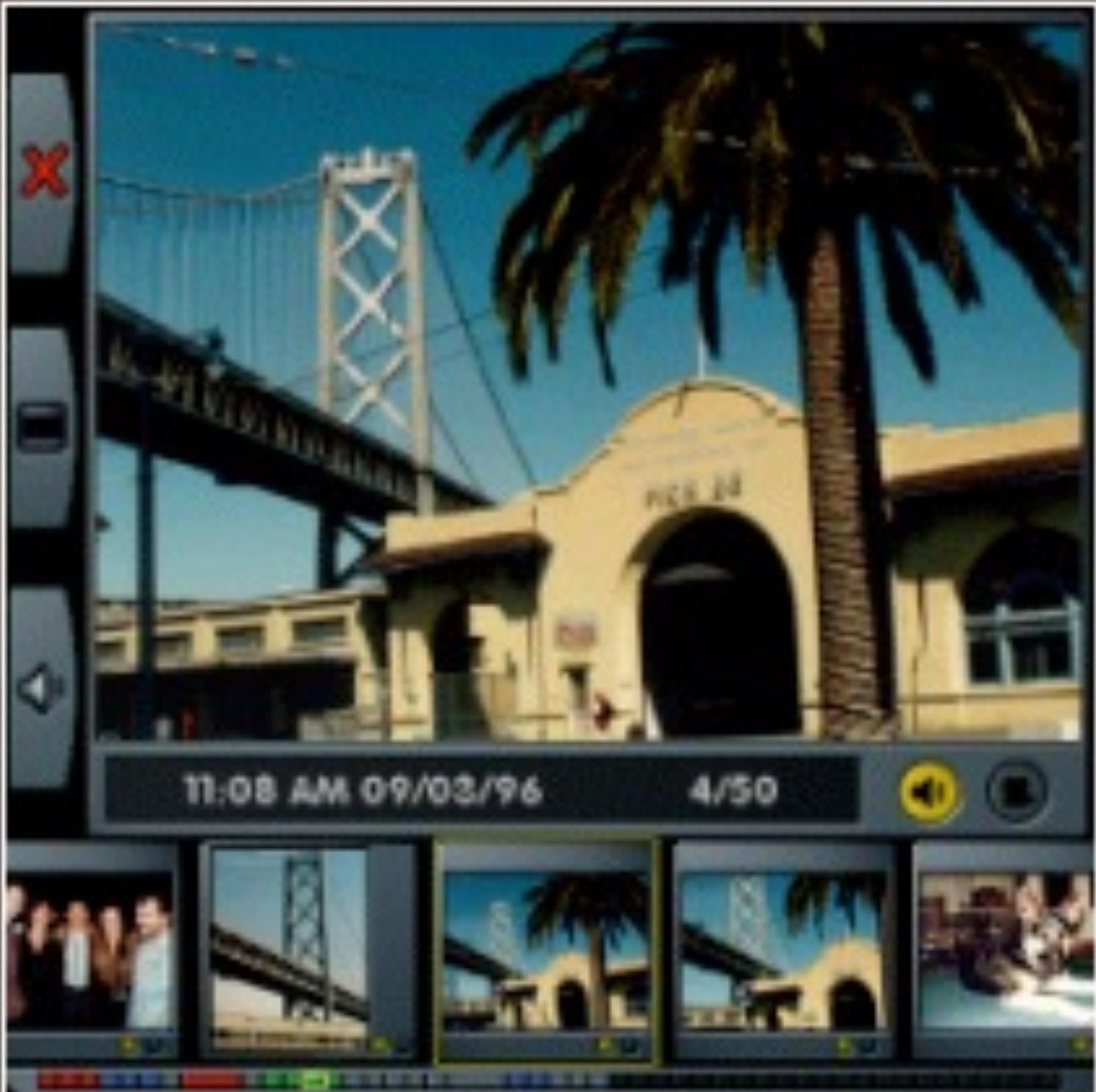
Alternatives Provide a



Tohidi, Buxton, Baecker,

Prototyping Grounds Communication





Prototyping is a strategy
for efficiently dealing
with things that are
hard to predict

Focus on Goals
Evolve the Designs



SANTA CLARA, California -- People thought Jeff Hawkins was crazy when they saw him taking notes, checking appointments, and synchronizing a small block of wood with his PC, pretending all the while that the block was a handheld computer.

“If I wanted to check the calendar I'd take it out and press the wooden button.”



The rights of a prototype

- Should not be *required* to be complete
- Should be easy to change
- Gets to retire

What Do Prototypes Prototype?

Feel *What might it look like?*

Implementation *What might it work like?*

Role *What might the experience be like?*



image source still unclear - we are searching for another one

“The best way to have a good idea is to have lots of ideas.”

-Linus Pauling



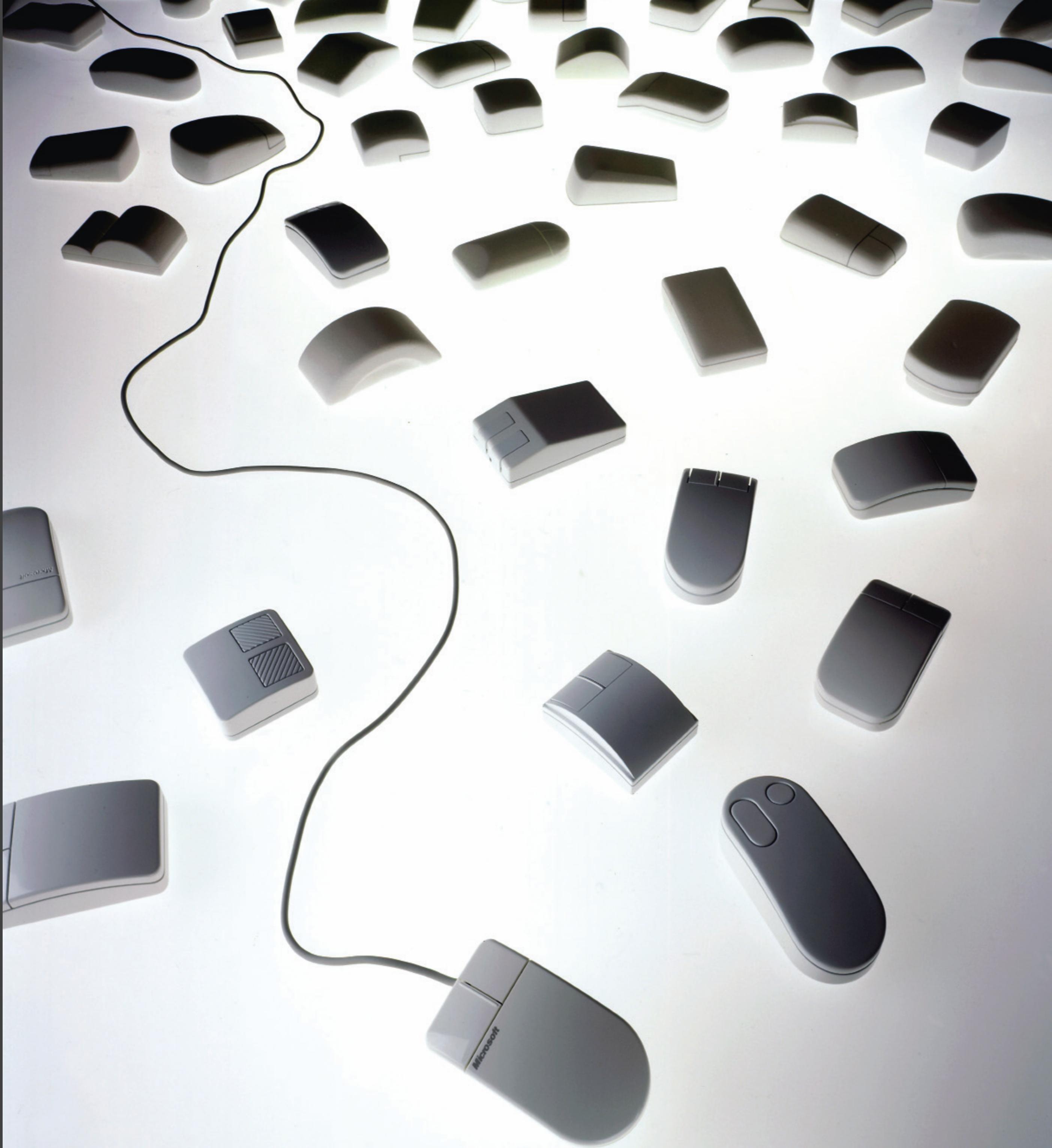


Image Courtesy IDEO

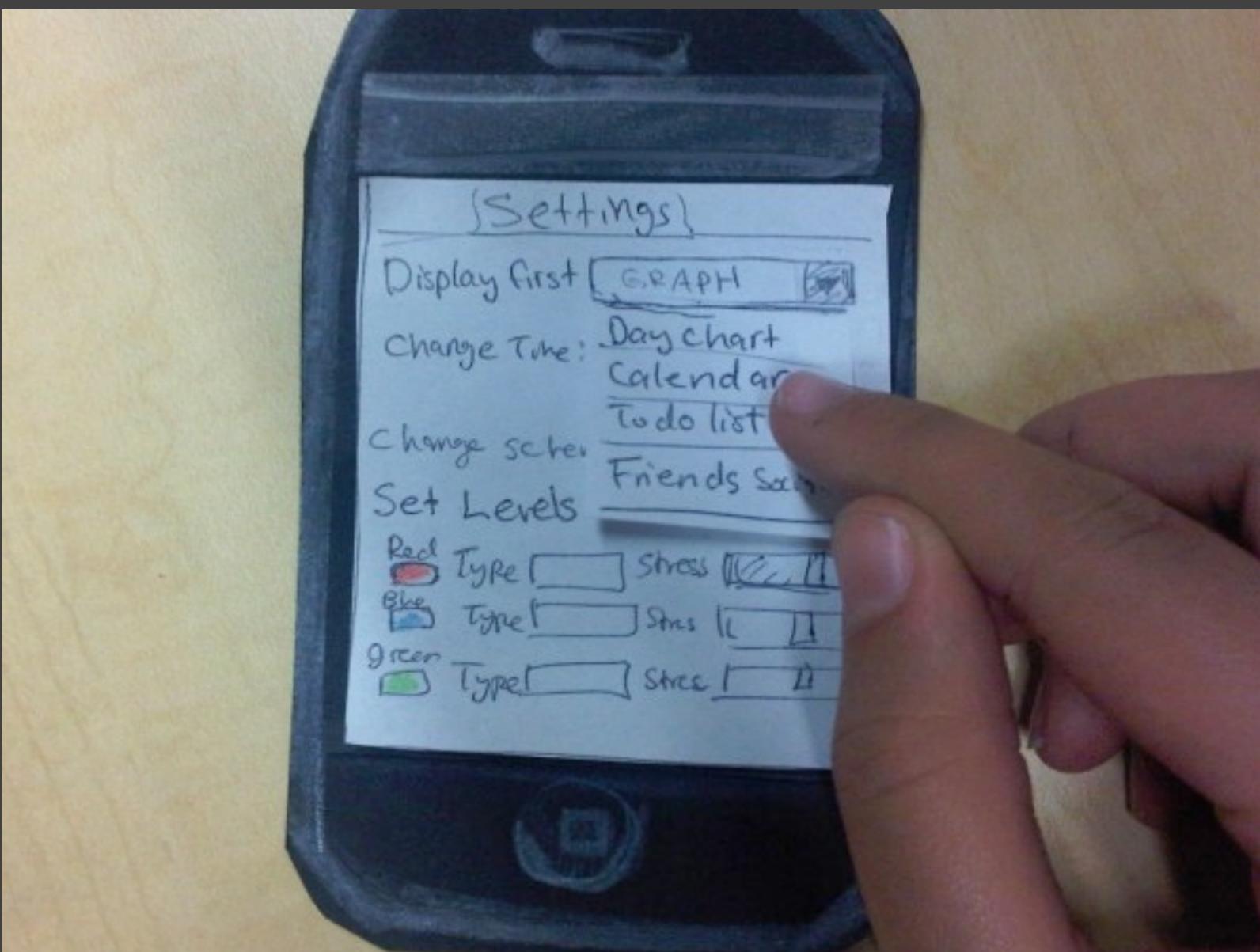
- Prototypes
- Are questions
- Ask lots of them

Try Prototypes with People

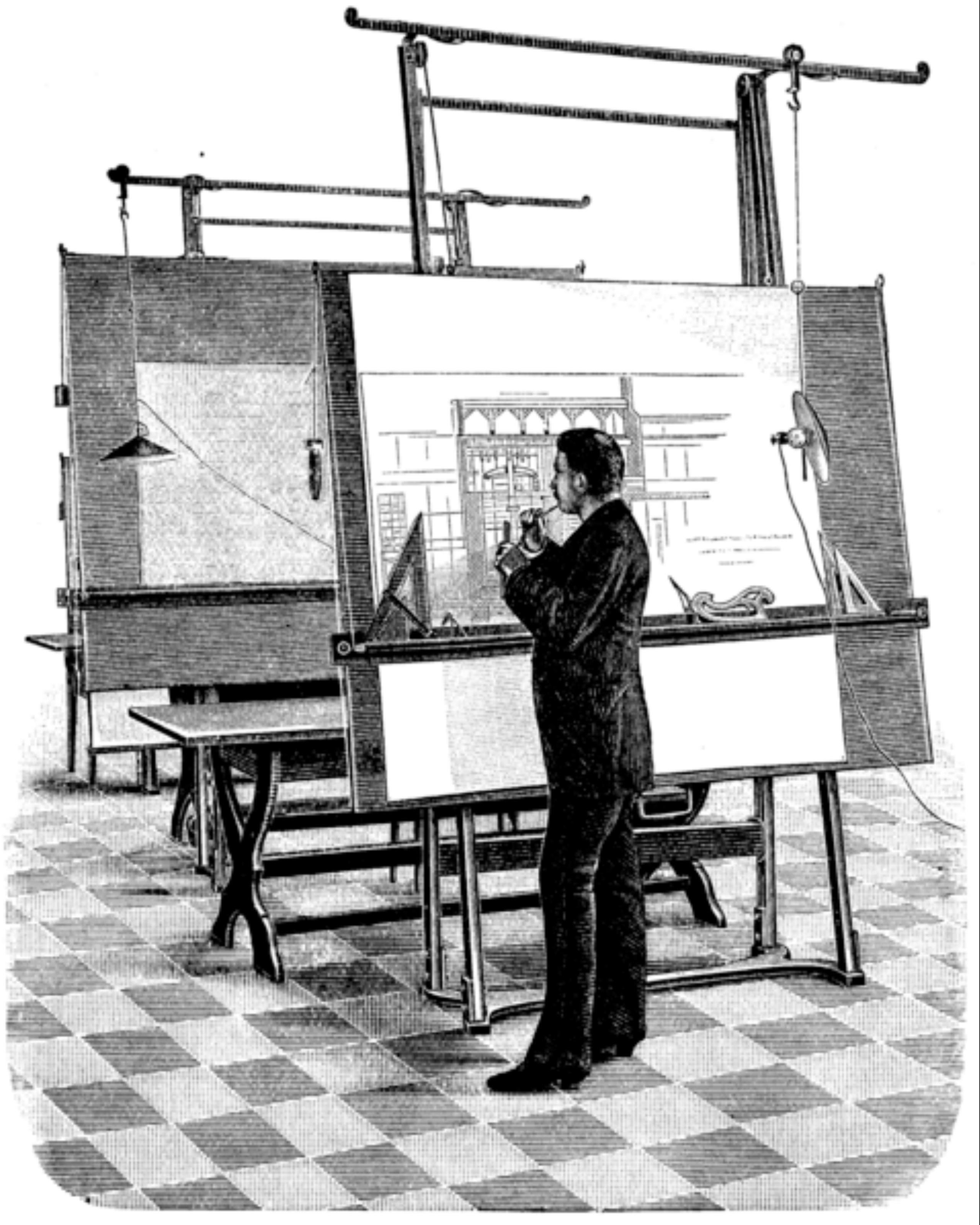
- Need a picture
- Test multiple
- Emphasis on conversation



Test multiple prototypes simultaneously to get most value



Get users (and other stakeholders)
to help design. Scaffold their efforts



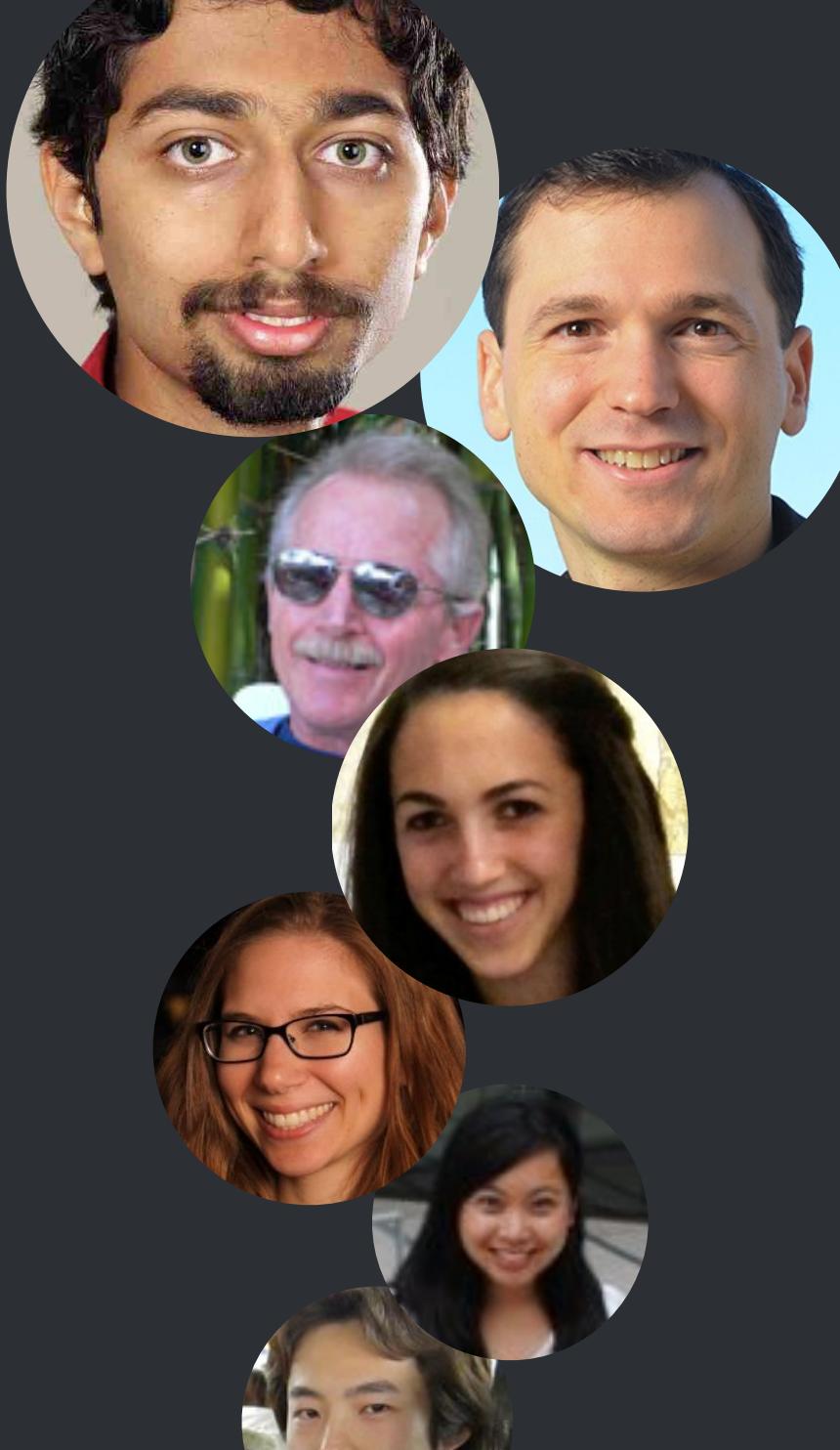


Let's match this enthusiasm with insight



Be the thermostat, not the thermometer

<http://designlab.ucsd.edu>



Scott Klemmer



@DesignAtLarge