PROTOTYPING

CS 147 + CS 77

Scott Klemmer and Michael Bernstein

Announcements

- First quiz two weeks from today: Needfinding + Prototyping
- Form teams in studio this Friday
- Assignment 2 due Thursday 11:59pm

Lab

- OK. That happened.
- Stanford is…
  - outfitting the room with five extra access points (beyond the three already here)
  - Upgrading to a gigabit switch in the room
- We are…
  - Posting the labs the night before so that you can load the page and clone the repo that morning

PROTOTYPING

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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."

Source: "The Philosophy of the Handheld."
Wired Magazine, October 1999.

Image Courtesy
http://en.wikipedia.org/wiki/PalmPilot

Image Courtesy IDEO

Screen + Two Wii Controllers = Wii U

Prototype: rapid approximation of a design idea used to gather feedback

Images Courtesy Bjoern Hartmann

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

Focus on Goals

Evolve the Designs

Flare and focus

inspired by Buxton, *Sketching User Experiences*

The rights of a prototype

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

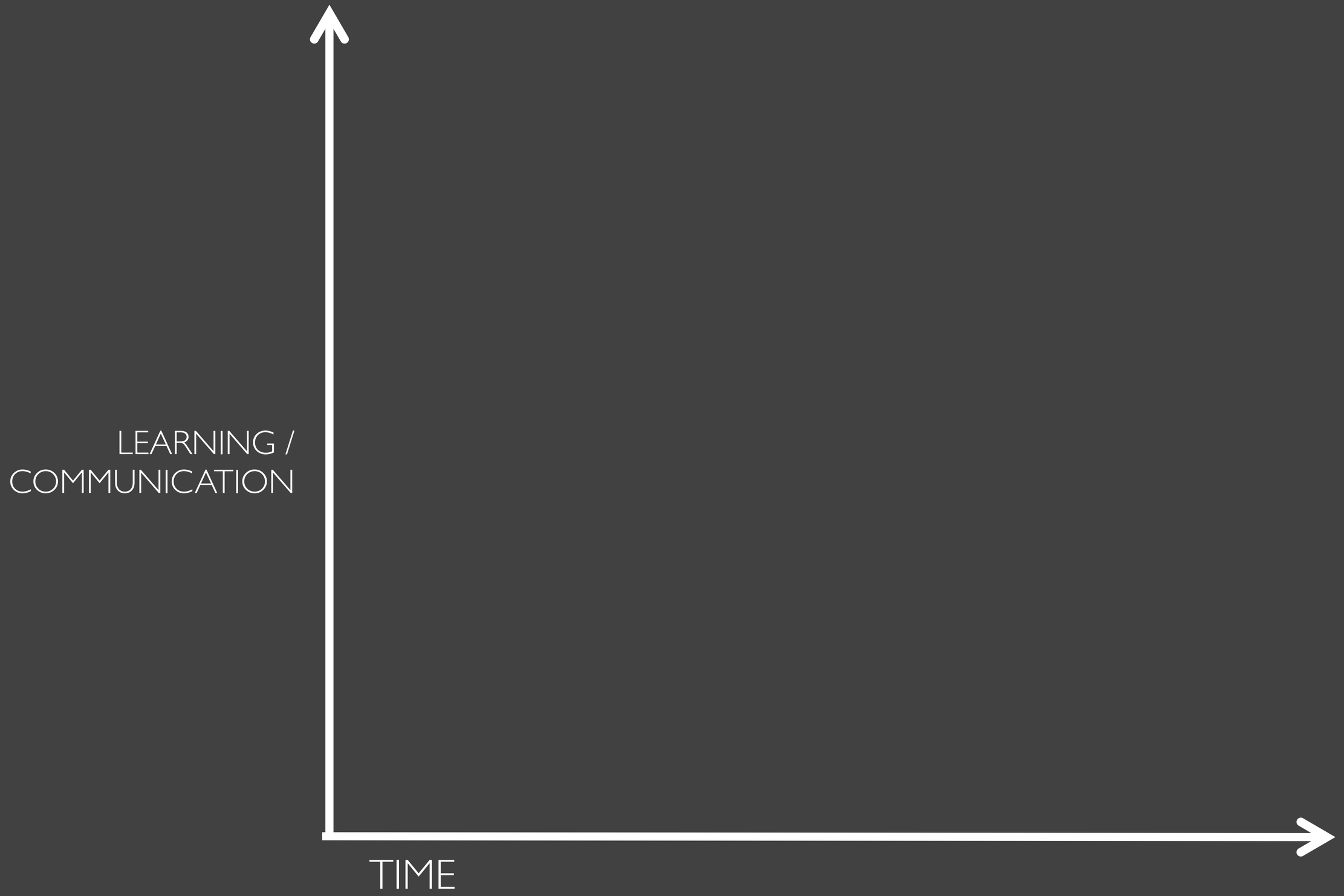
What Do Prototypes Prototype?

Feel *What might it look like?*

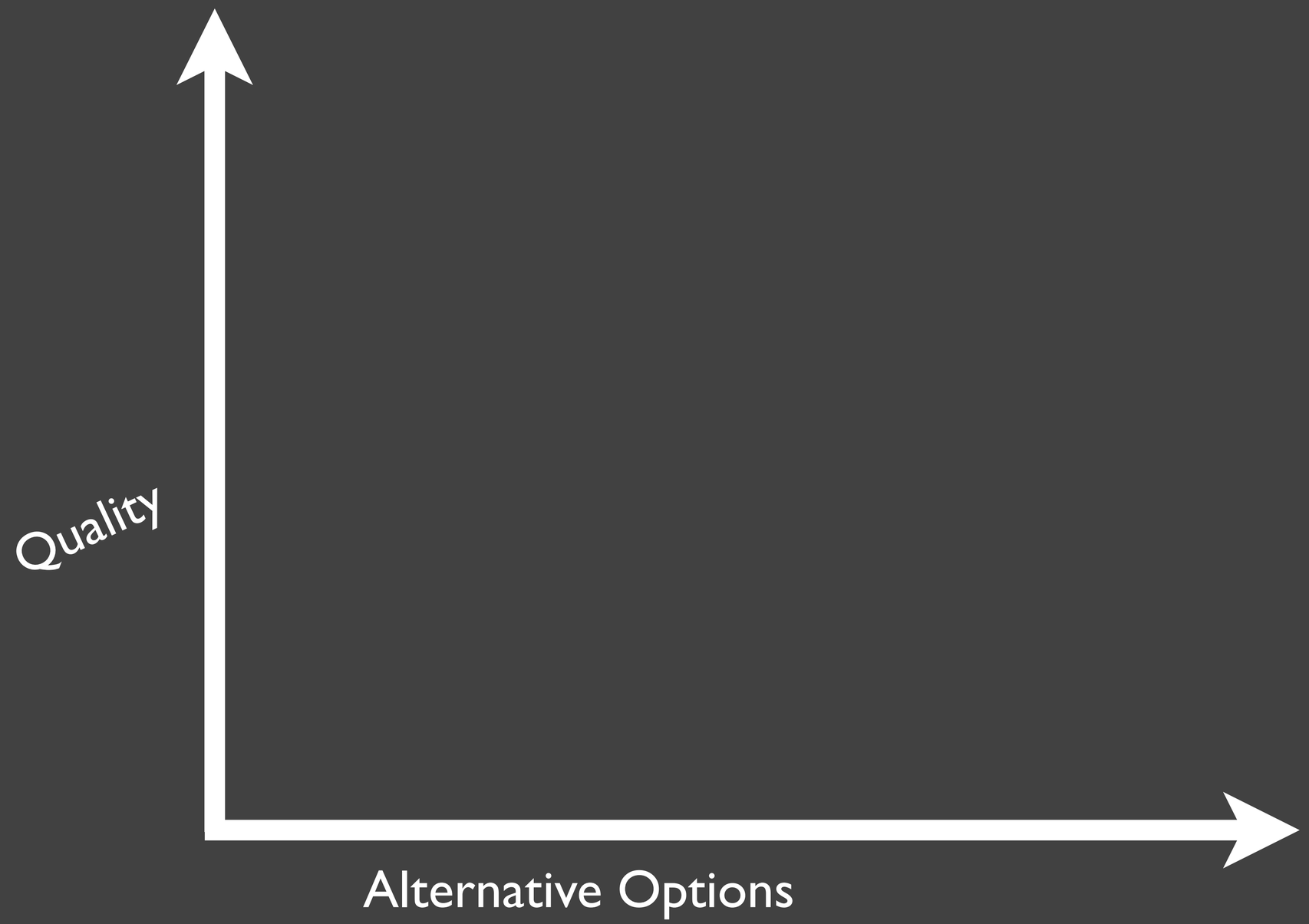
Implementation *What might it work like?*

Role *What might the experience be like?*

Houde & Hill


LEARNING /
COMMUNICATION
TIME

Prototyping as Search w/ Random Restart

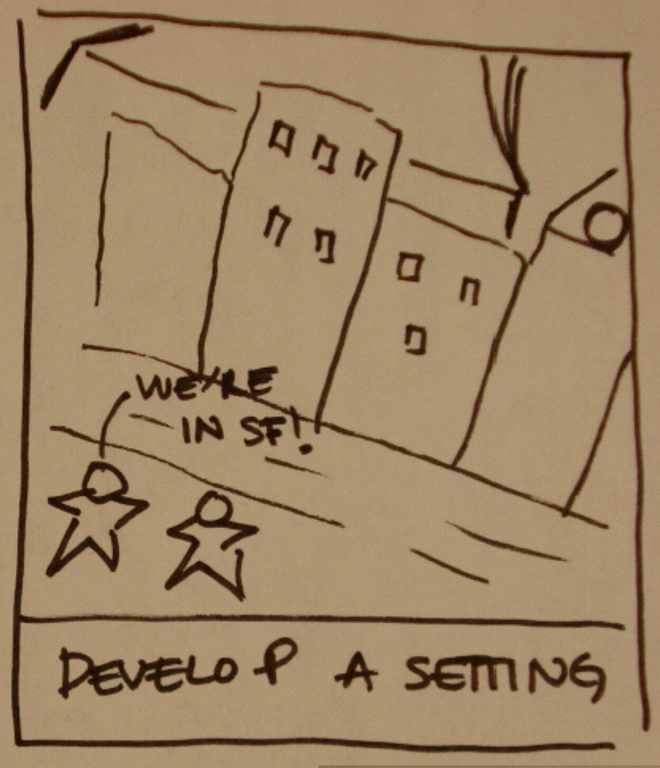


STORYBOARDING

Lifalyze: Greg Grenier, Luke Knepper, Alexandra Liptsey-Rahe, Vivian Shen

Storyboarding isn't about "pretty pictures"
it's about communicating ideas

Star People *(Bill Verplank)*



adapted with permission from Amal Dar Aziz, Guide to Storyboarding,

http://hci.st/story

Storyboards are…a story!

- Setting
  - People involved
  - Environment
  - Task being accomplished
- Sequence
  - What steps are involved?
  - What leads someone to use the app?
  - What task is being illustrated?
- Satisfaction
  - What's motivates people to use this system?
  - What does it enable people to accomplish?
  - What need does the system fill?

adapted with permission from Amal Dar Aziz, Guide to Storyboarding, http://hci.st/story

PROS

- Holistic focus: emphasize how an interface accomplishes a task
- Avoids commitment to a particular user interface (no buttons yet)
- Forces you to think through the idea in detail

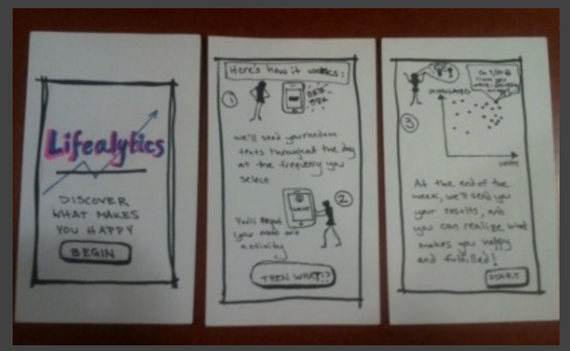
CONS

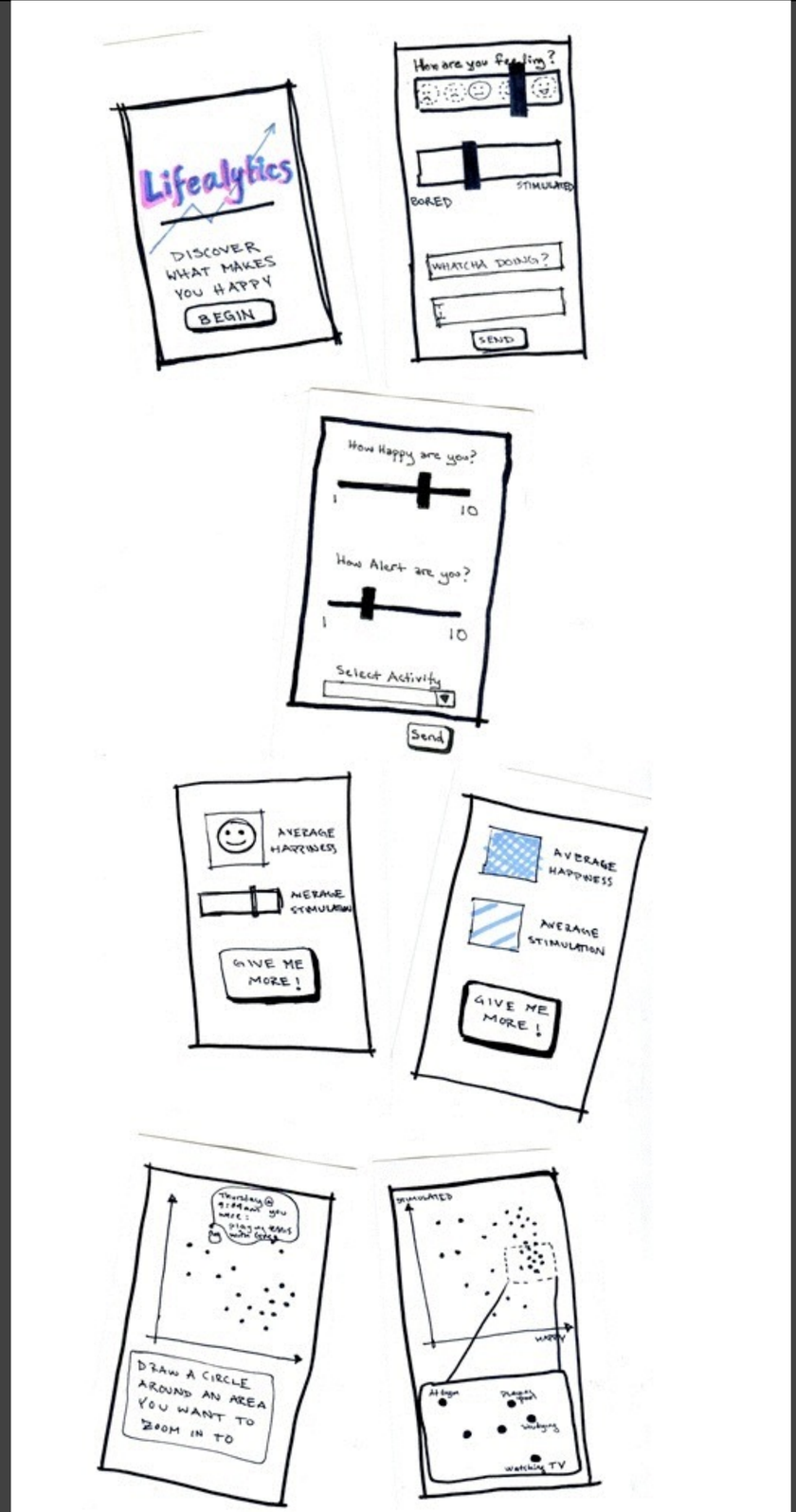
- Can be easy to leave out important details
- Communication sketching is a new skill for h4xx0rz

Time Limits Help

PAPER PROTOTYPING

Paper prototyping





Lifalyze: Greg Grenier, Luke Knepper, Alexandra Liptsey-Rahe, Vivian Shen

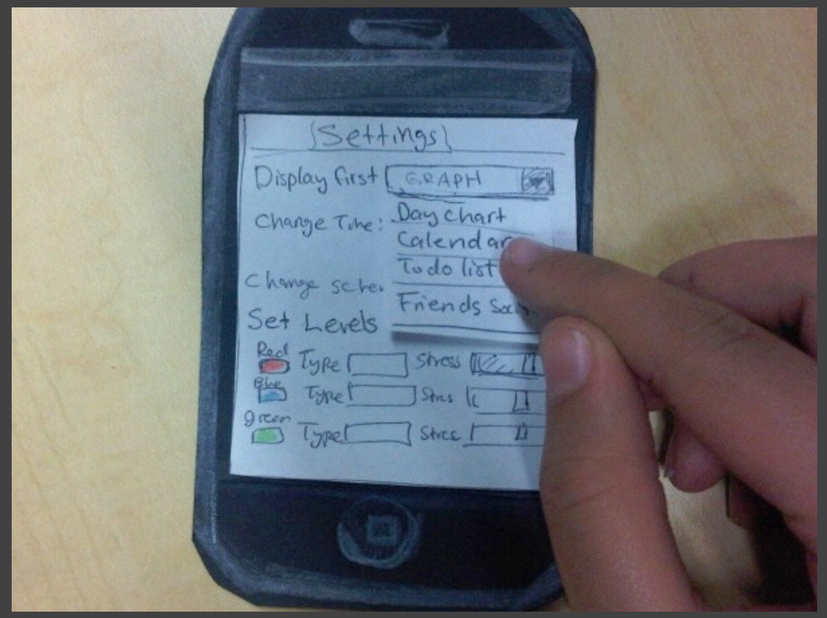
6 Paper Prototyping Tips & Tricks

1. Keep all your materials in one place!
2. Work quickly and make reusable components (buttons, etc)
3. If something is difficult to simulate (progress indicators, right mouse menus, hyperlinks), verbally describe the interaction
4. Backgrounds (11”x14” poster board) can be useful to contain the prototype and provide context for the user
5. Don’t be afraid to mix and match hardware and software!
6. When appropriate, add context by including familiar operating system elements

Get Creative with Materials

- Widgets: Paper, Cardboard, Transparencies
- Connectors: Tape, Glue, Rubber Cement
- Drawing: Pens, Pencils, Markers
- ...and more

Comparison between tabular and graphical data report (sliding window)



With permission from cs147 2011 Lifalyze team: Greg Grenier, Luke Knepper, Alexandra Liptsey-Rahe, Vivian Shen

Give your users the pen too.

FAKING IT

WIZARD OF OZ PROTOTYPING

What if we could…

- Make an interactive prototype without (much) code

Wizard-of-Oz prototyping

- Simulates machine behavior with human operators

Why do we do this?

- Time travel ahead to when the system is built…
- …so we can find out if the system is worth building in the first place.

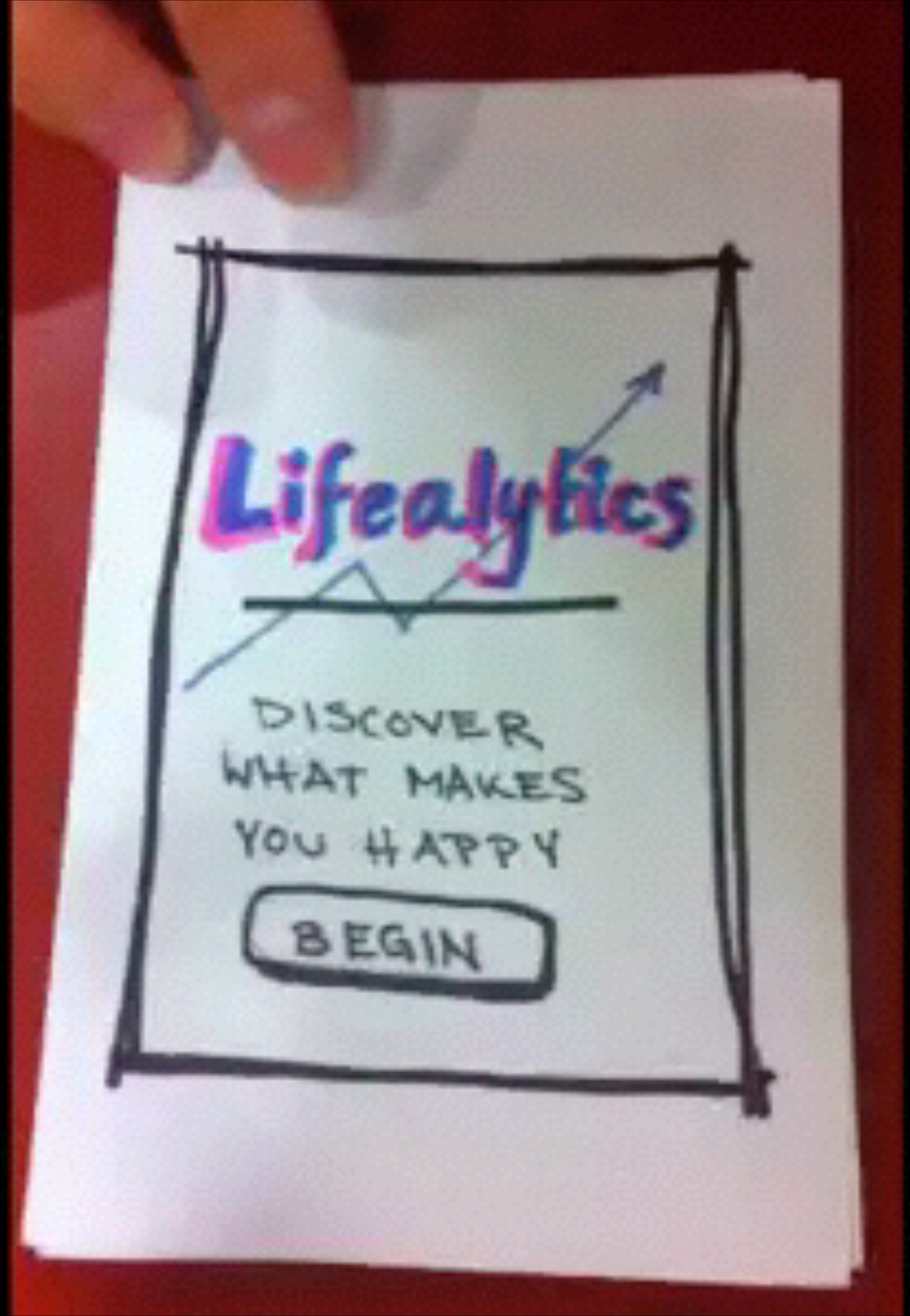
Making a Wizard-powered prototype

- Map out scenarios and application flow
  - what should happen in response to user behavior?
- Put together interface "skeletons", often using paper
- Develop "hooks" for wizard input
- Where and how the wizard will provide input
  - selecting the next screen, entering text, entering a zone, recognizing speech, etc.
  - remember that later you'll need to replace with computer
- Rehearse wizard role with a colleague

Courtesy Steven Dow. This segment draws heavily on his materials on Wizard-of-Oz prototyping

Running Wizard-Powered Prototypes

- Practice with a friend first
- Two roles: facilitator and wizard.
  - **Facilitator** provides tasks (paper) and takes notes
  - **Wizard** operates interface
    (more authentic if hidden or remote)
- User feedback can be...
  - Think aloud (speak freely as performing tasks)
  - Retrospective (best when think aloud distracts)
  - Heuristic evaluation (works with experts too)
- Debrief users (reveal wizard if needed)



Courtesy cs147 2011 Lifalyze team:

Greg Grenier, Luke Knepper,

Alexandra Liptsey-Rahe, Vivian Shen.

Stanford University. http://www.lifalyze.com

Aardvark

"Why start-ups must pay attention to what's behind the curtain"
— *Wall Street Journal*

http://blogs.wsj.com/venturecapital/2010/04/24/how-a-start-up-grew-by-paying-attention-to-whats-behind-the-curtain/

PROS

- Fast (faster) and thus, cheaper and more iterative prototypes
- More "real" than paper prototyping
- Places the user at the center of development
- Designers learn by playing wizard

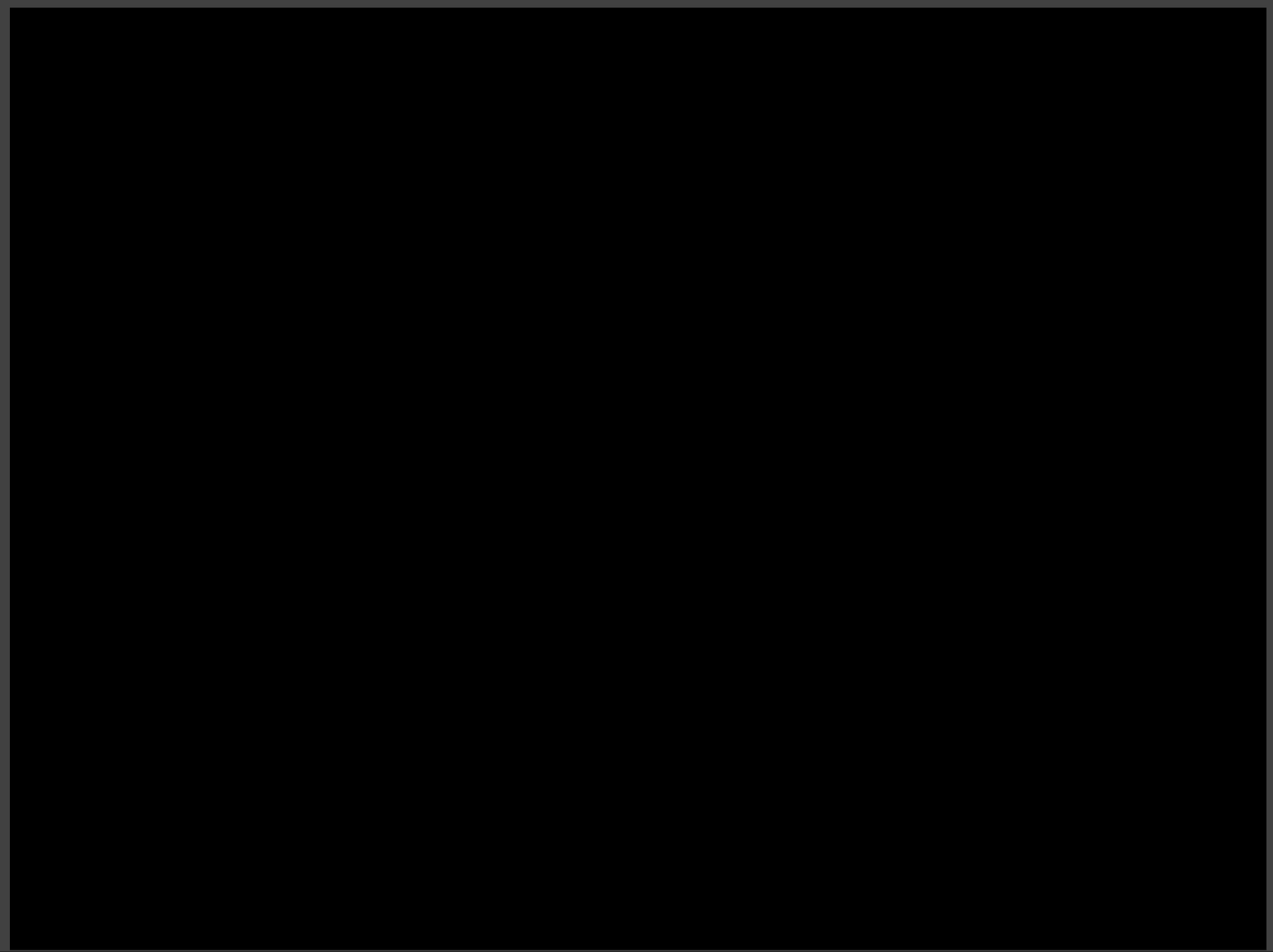
CONS

- May misrepresent the underlying technology
- Wizards are slower than computers
- Some interactions are difficult or impossible to simulate entirely

FAKING IT

VIDEO PROTOTYPING

Walkabout



Courtesy cs147 Walkabout team: Carissa Carter, Ryan Mason, Brendan Wypich. Stanford University. http://www.snowflyzone.com/?p=441

Video prototypes can be any fidelity

informal
(vine)

formal
(premiere)

Efficient video prototyping

- Can use audio or a silent movie with title cards (audio can be finicky)
- Interface can be paper, mock-ups, code, or invisible (just showing the task)
- Edit as little as possible because editing is hugely time-consumng. (In-camera/pause editing is most efficient)

And now, a video prototype.

PROS

- Cheap and fast
- Helps achieve common ground
- Ideally, portable and self-explanatory
- Can serve as a ‘spec’ for developers
- Ties interface designs to tasks

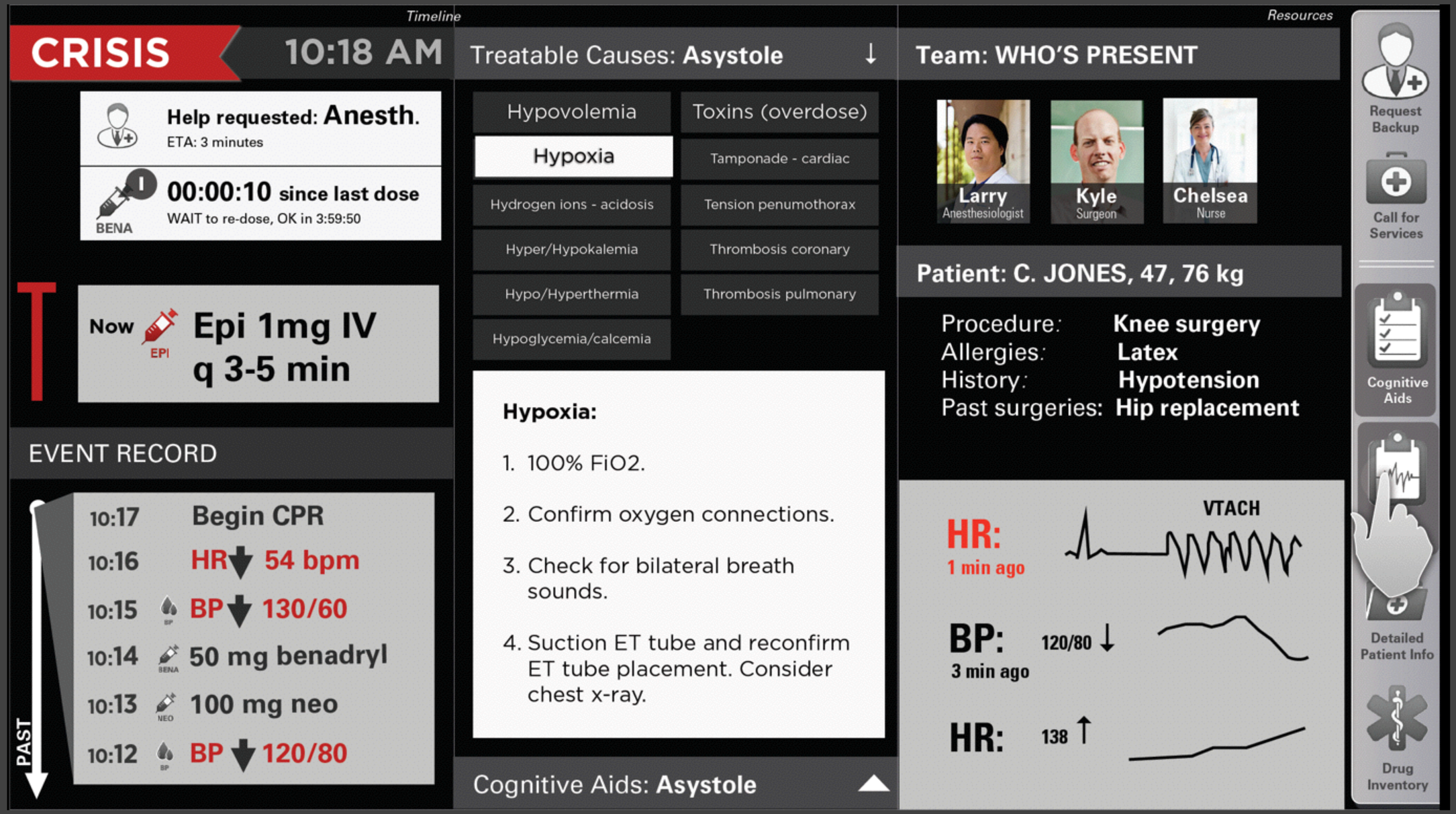
CONS

- Harder to strike appropriate fidelity balance
- Requires more than kindergarten skills
- Easy to run long — edit aggressively!

Thanks to Wendy Mackay. This section draws heavily on her video prototyping materials

HIGH-FIDELITY PROTOTYPING

Digital Mock-ups

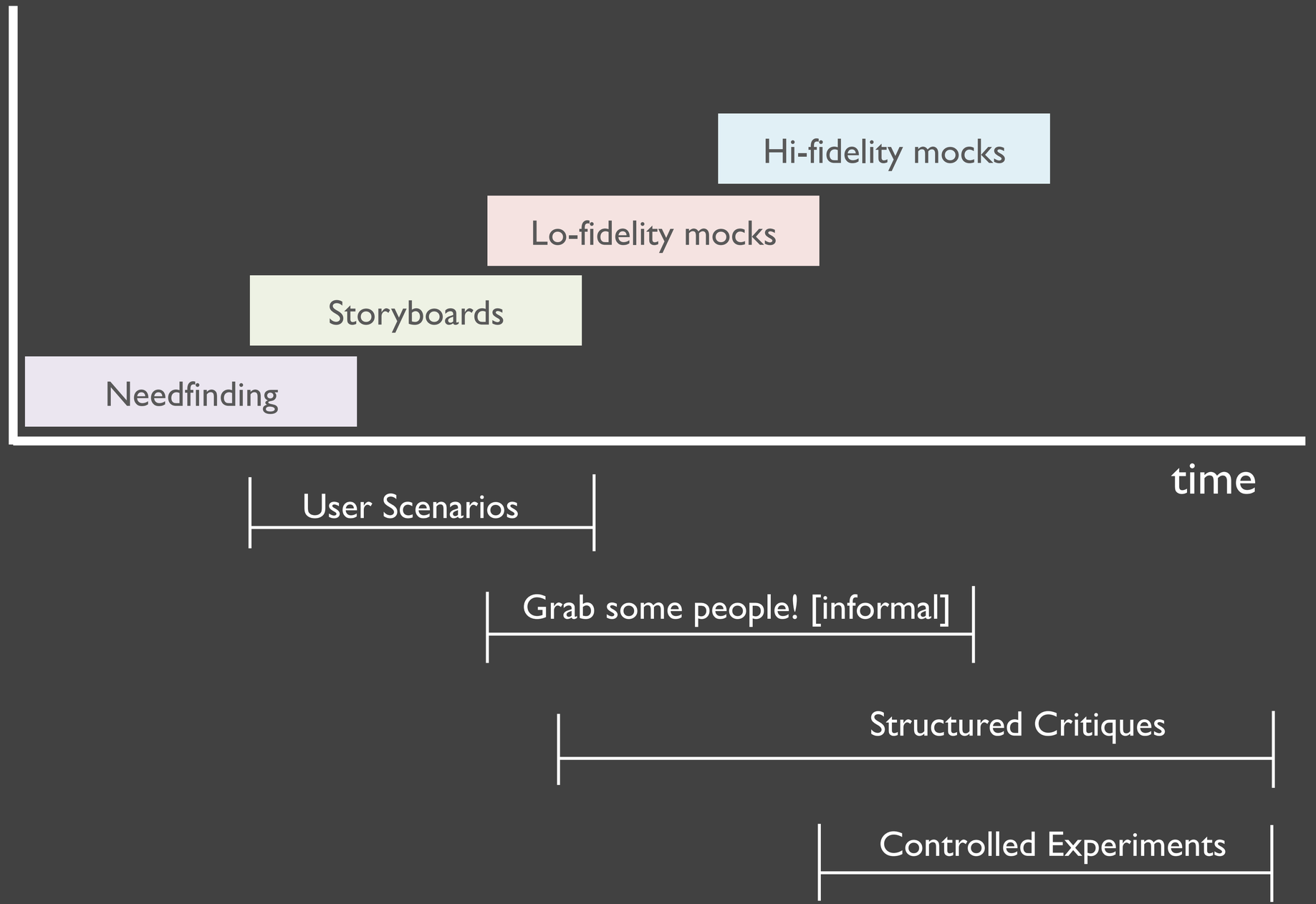


Interactive Cognitive Aids: Katherine Chen, Kyle Barrett, Jesse Cirimele, Leslie Wu, Stu Card, Larry Chu, Kyle Harrison, Scott Klemmer

Beware Inappropriate Fidelity

high fidelity: feedback is detail-oriented
low fidelity: feedback is broader

Form and Feedback Co-evolve



PROTOTYPE SCIENCE

Creating and Comparing Alternatives

Dow, Klemmer, et al.

Prototyping Dynamics: Sharing Multiple Designs Improves Exploration, Group Rapport, and Results, Steven P Dow, Julie Fortuna, Dan Schwartz, Beth Altringer, Daniel L Schwartz, and Scott R Klemmer. *CHI: ACM Conference on Human Factors in Computing Systems, 2011.*

Parallel Prototyping Leads to Better Design Results, More Divergence, and Increased Self-Efficacy, Steven P Dow, Alana Glassco, Jonathan Kass, Melissa Schwarz, Daniel Schwartz, Scott R Klemmer. *ACM Transactions on Computer-Human Interaction, 2010*

The Efficacy of Prototyping Under Time Constraints, Steven P. Dow, Kate Heddleston, Scott R Klemmer. *Creativity & Cognition, 2009*

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

-Linus Pauling

Image Courtesy Wikipedia: http://en.wikipedia.org/wiki/File:L_Pauling.jpg

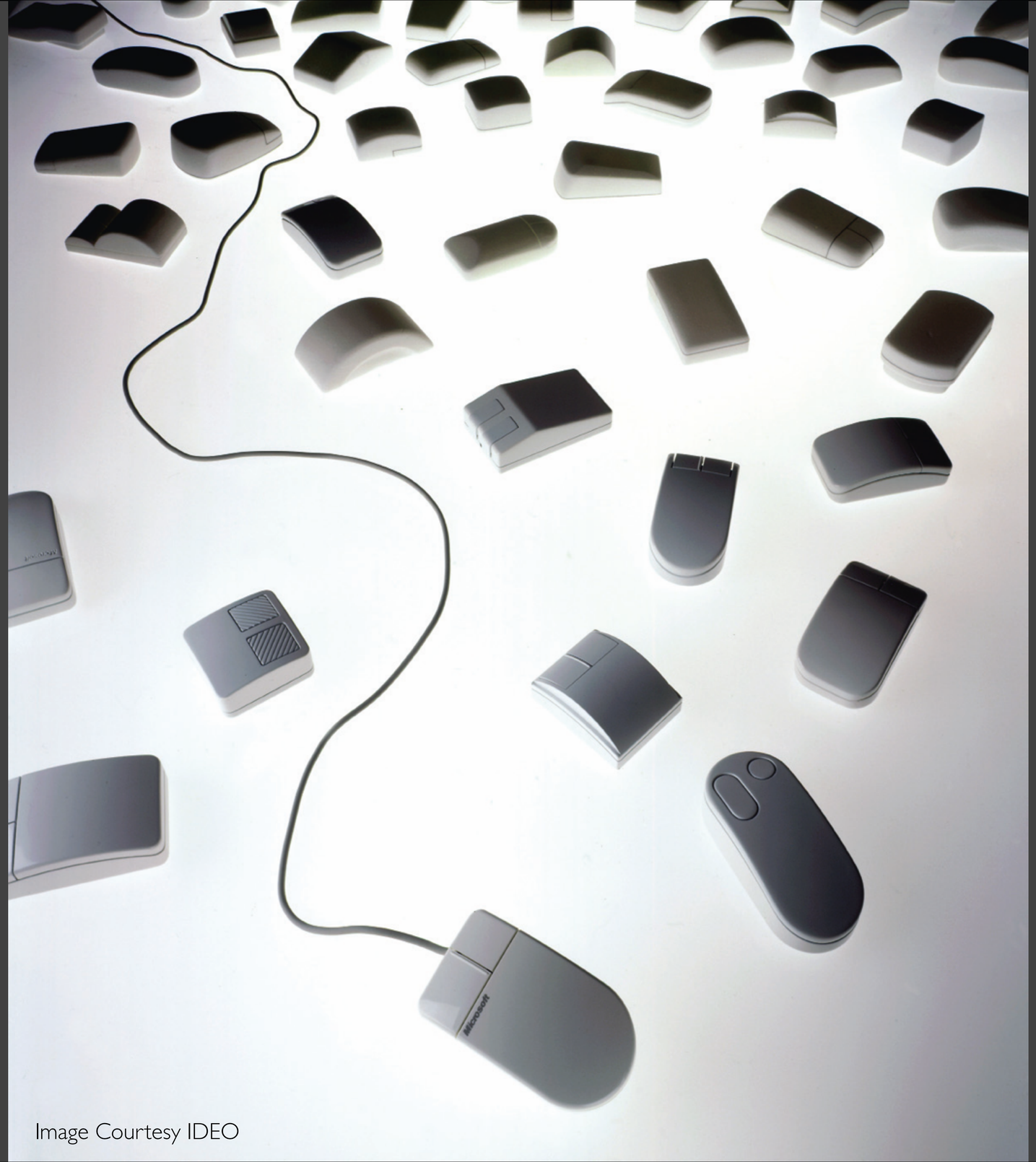


Image Courtesy IDEO

Quantity or Quality?

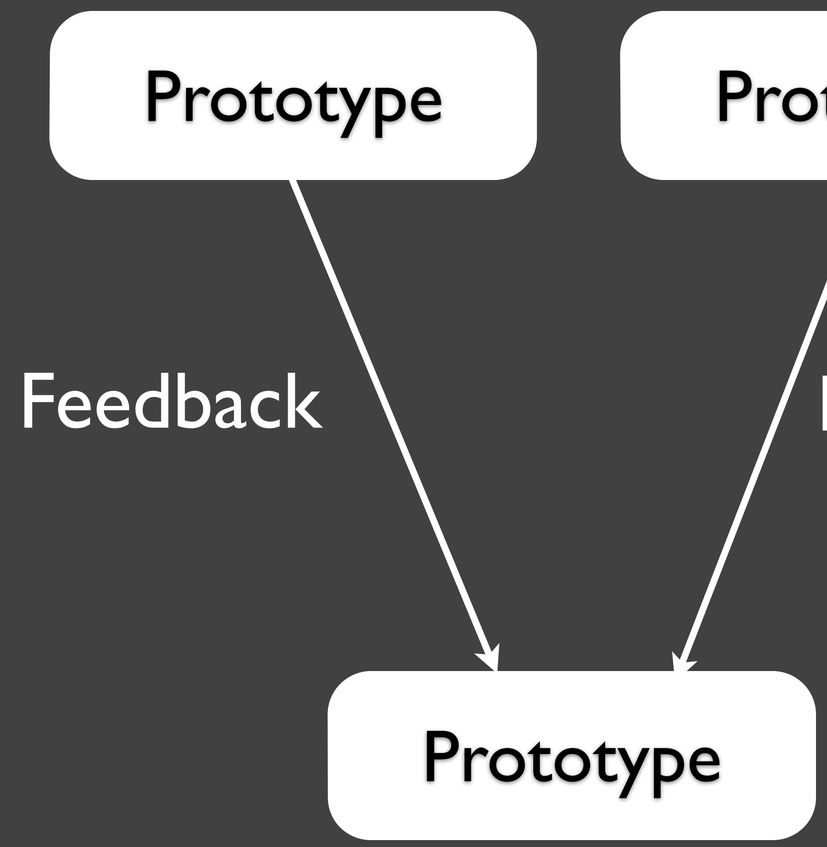
Bayles and Orland, 2001

Quantity or Quality?

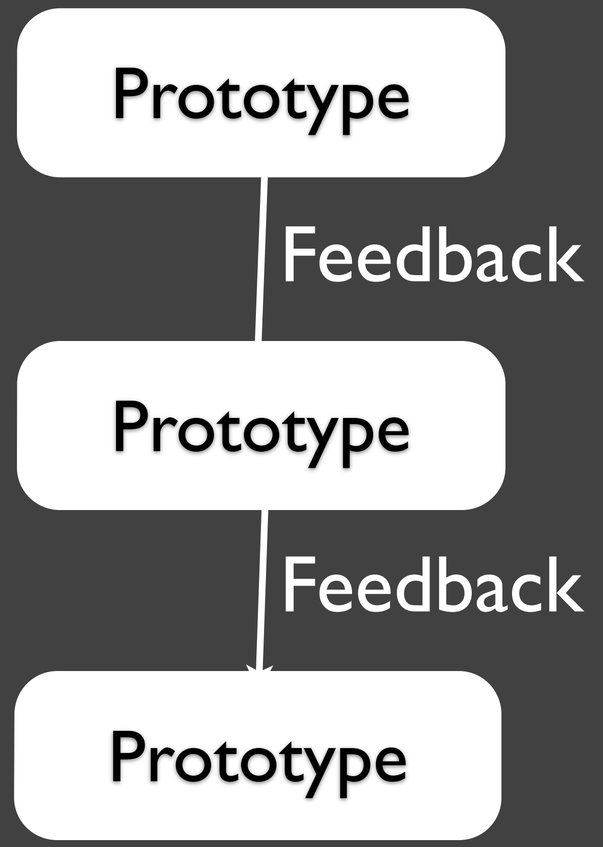
"While the quantity group was busily churning out piles of work—and learning from their mistakes—the quality group had sat theorizing about perfection, and in the end had little more to show for their efforts than grandiose theories and a pile of dead clay"

Bayles and Orland, 2001

Does creating parallel prototypes improve the final design?



PARALLEL



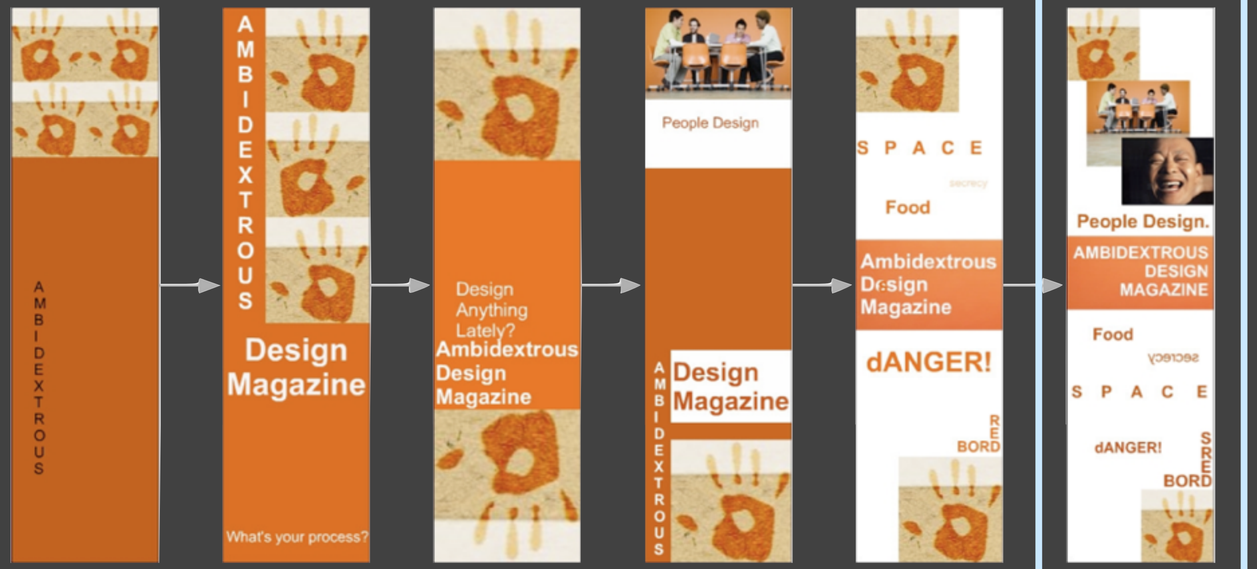
SERIAL

Task: design an advertisement

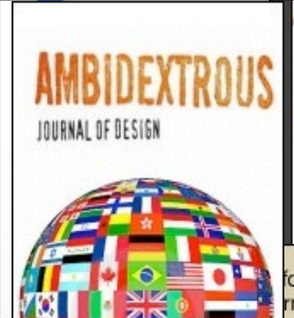
Procedure N=33

FINAL

serial prototyping condition



parallel prototyping condition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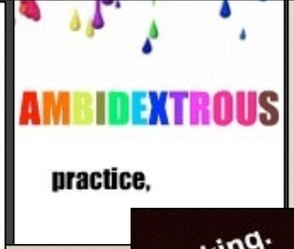
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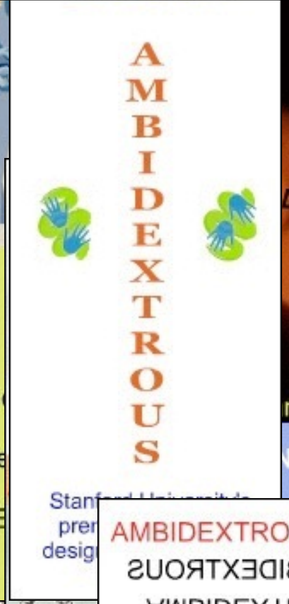
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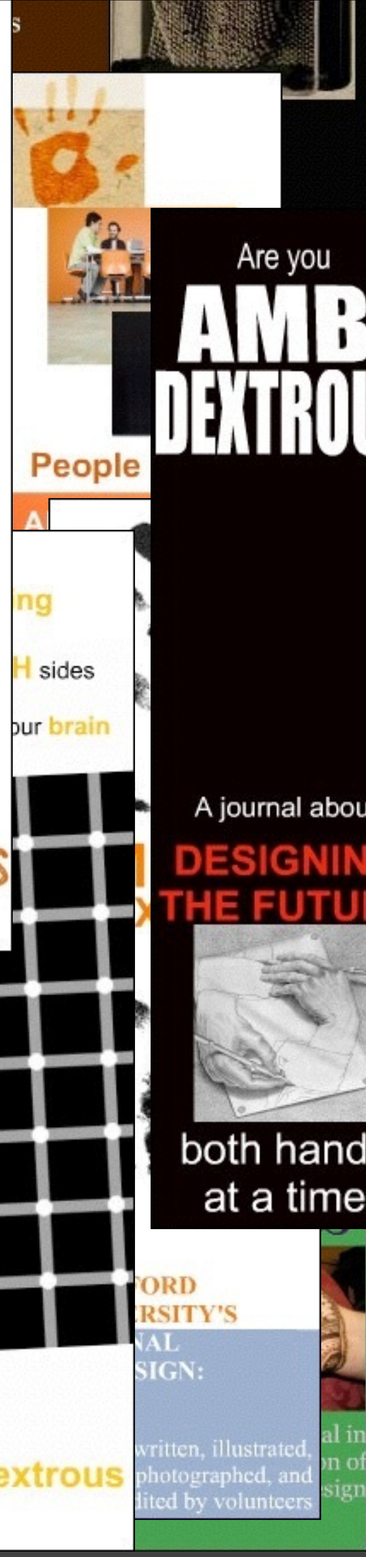
light me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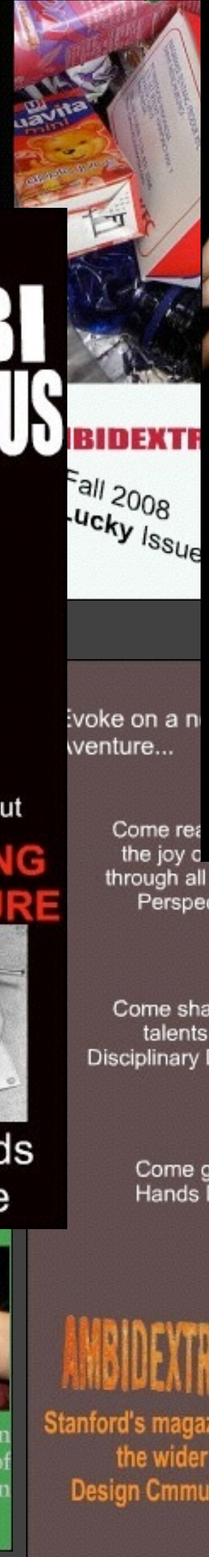
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Fifth Issue
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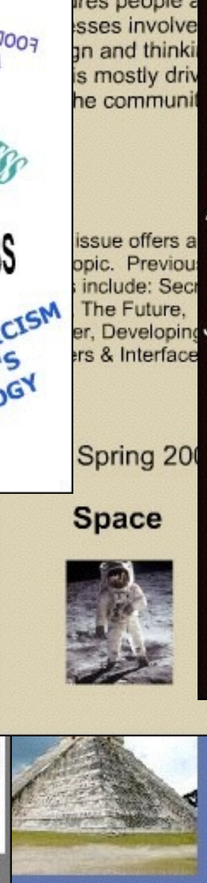
Perspectives for the next decade!
Where are we going?

Ambidextrous
Who can I meet?
What could I design?



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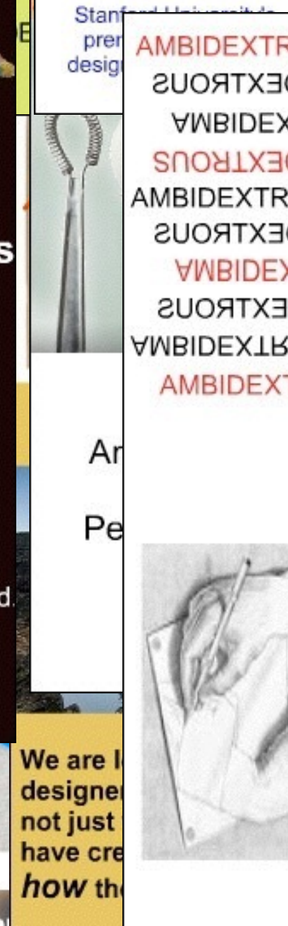
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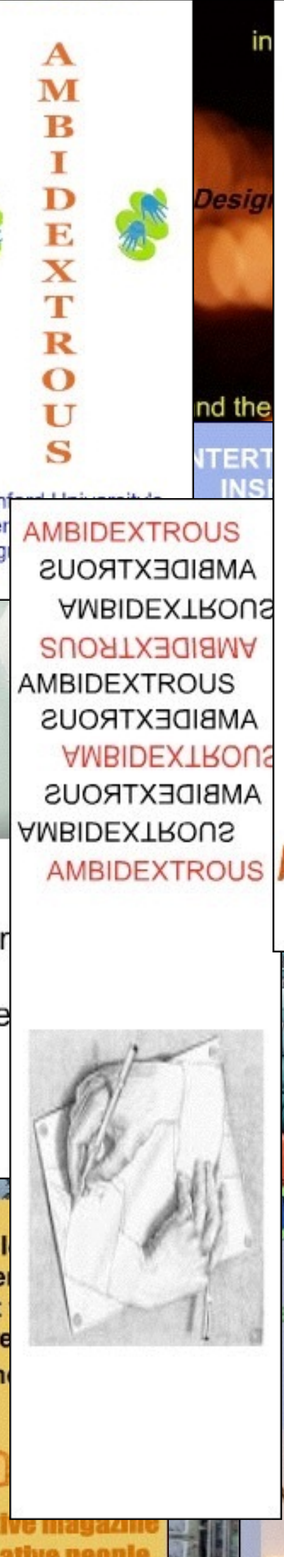
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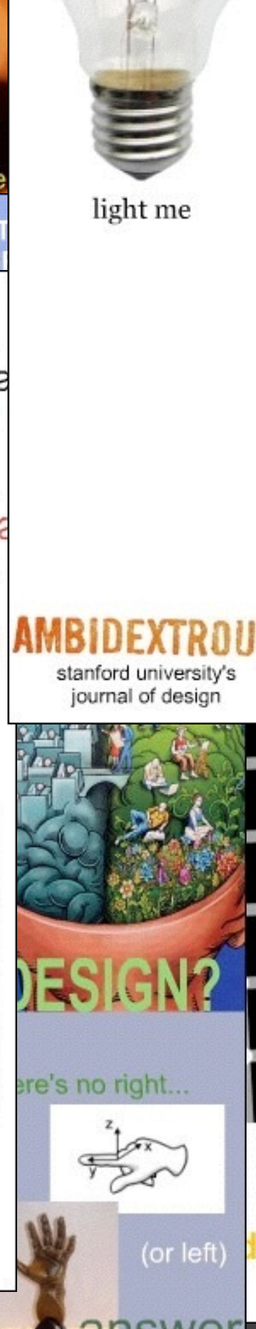
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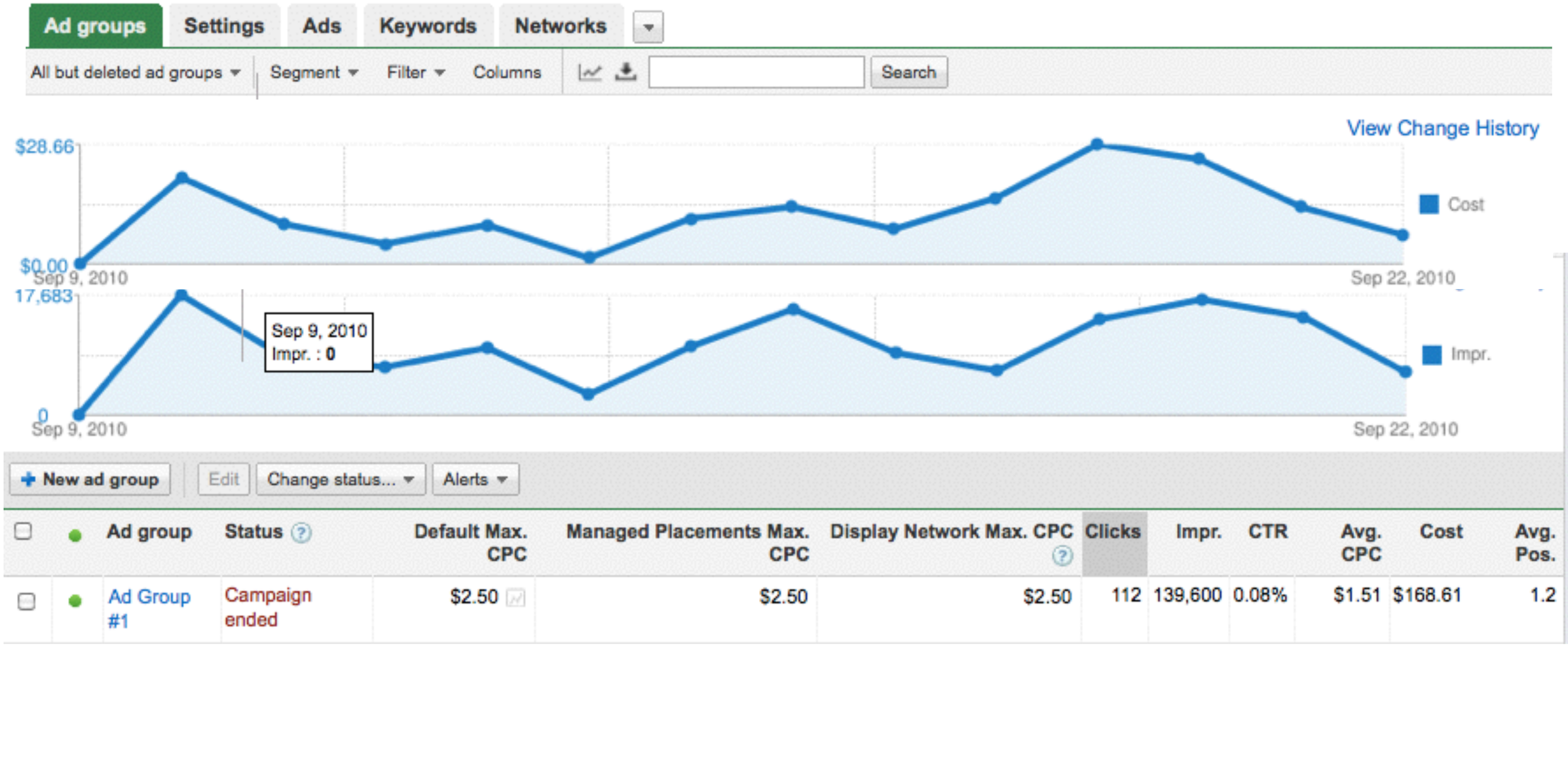
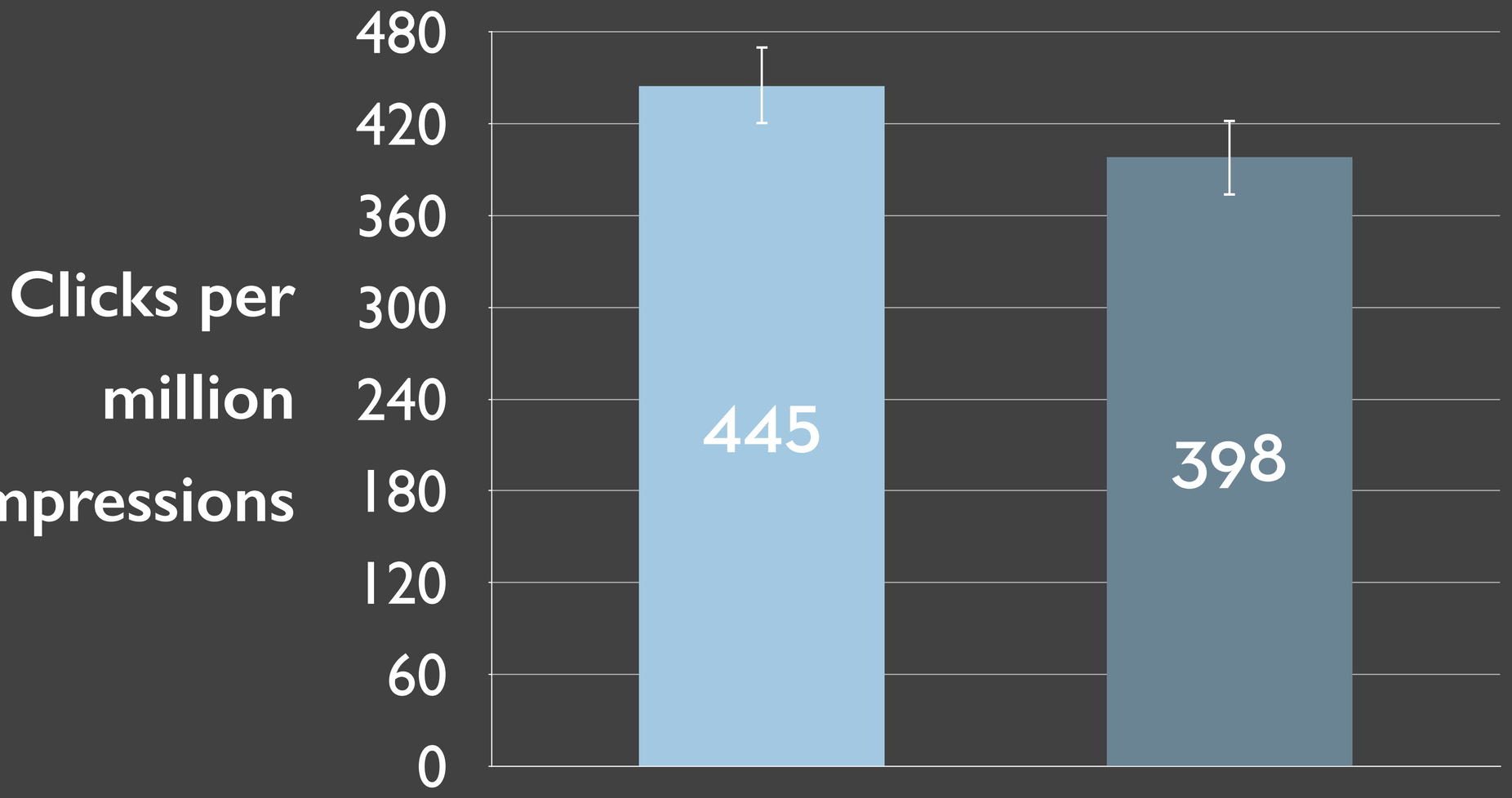
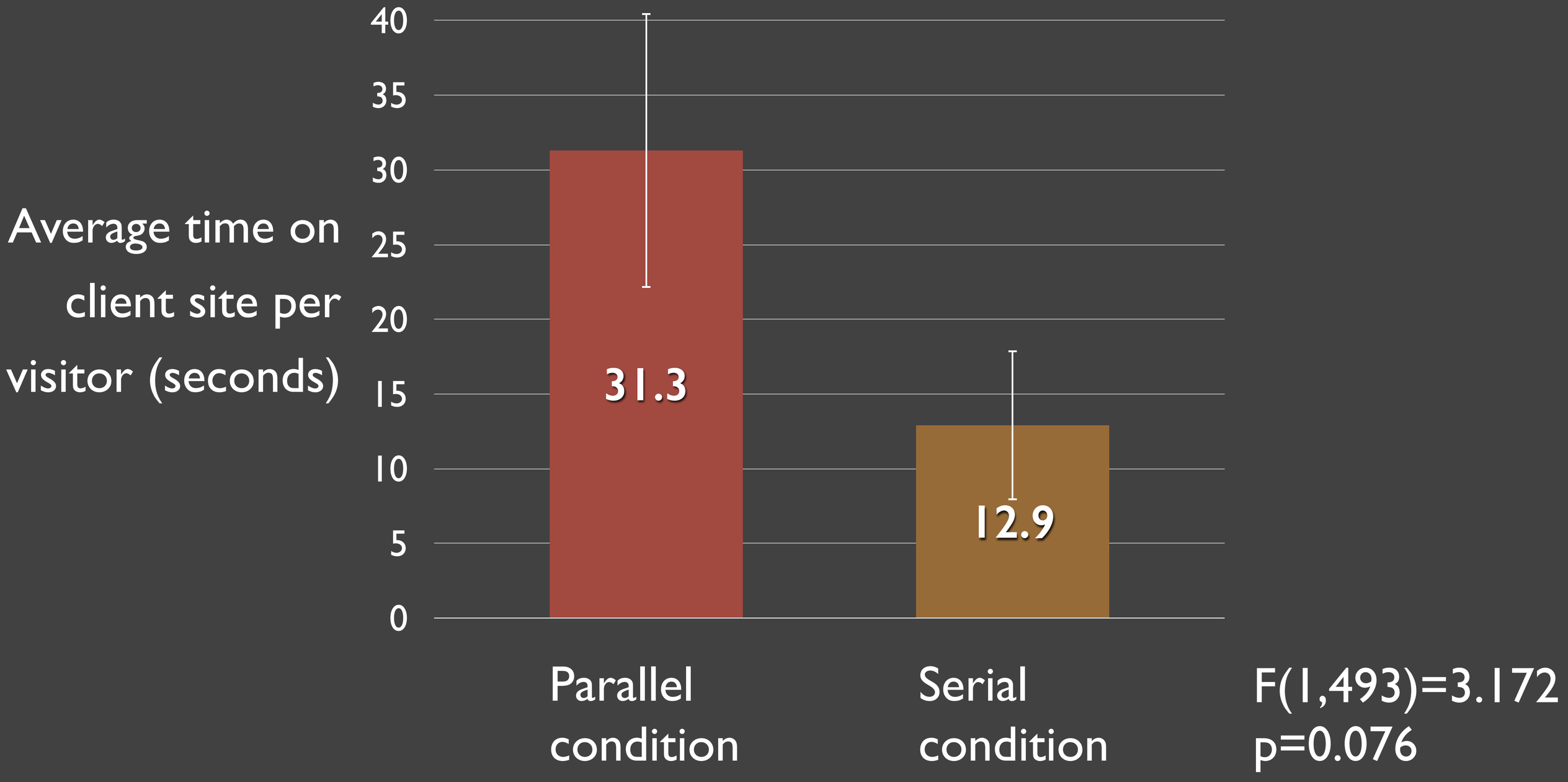


Parallel design → more clicks



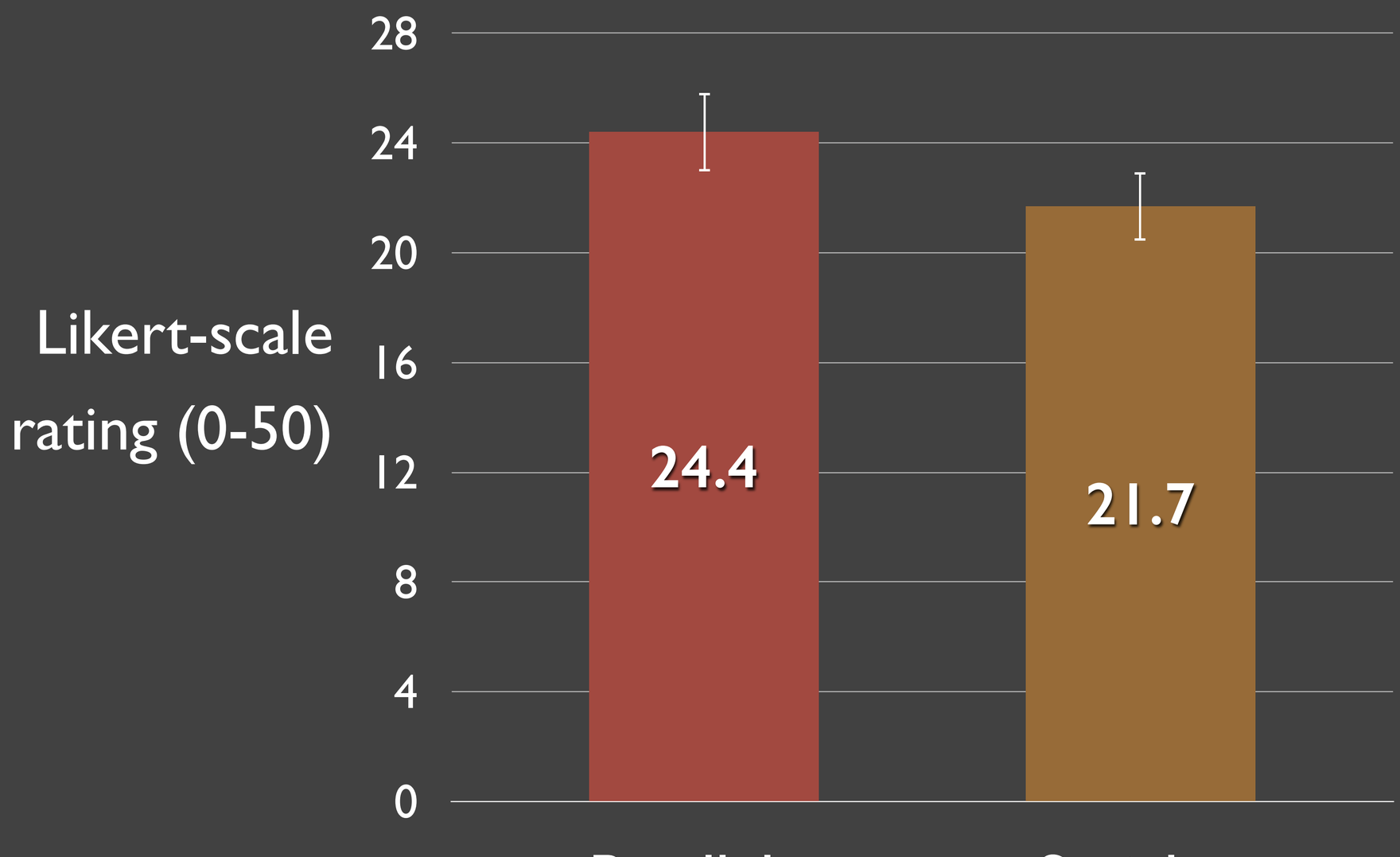
F(1,30)=4.227
p<.05

…and a trend toward more time on site



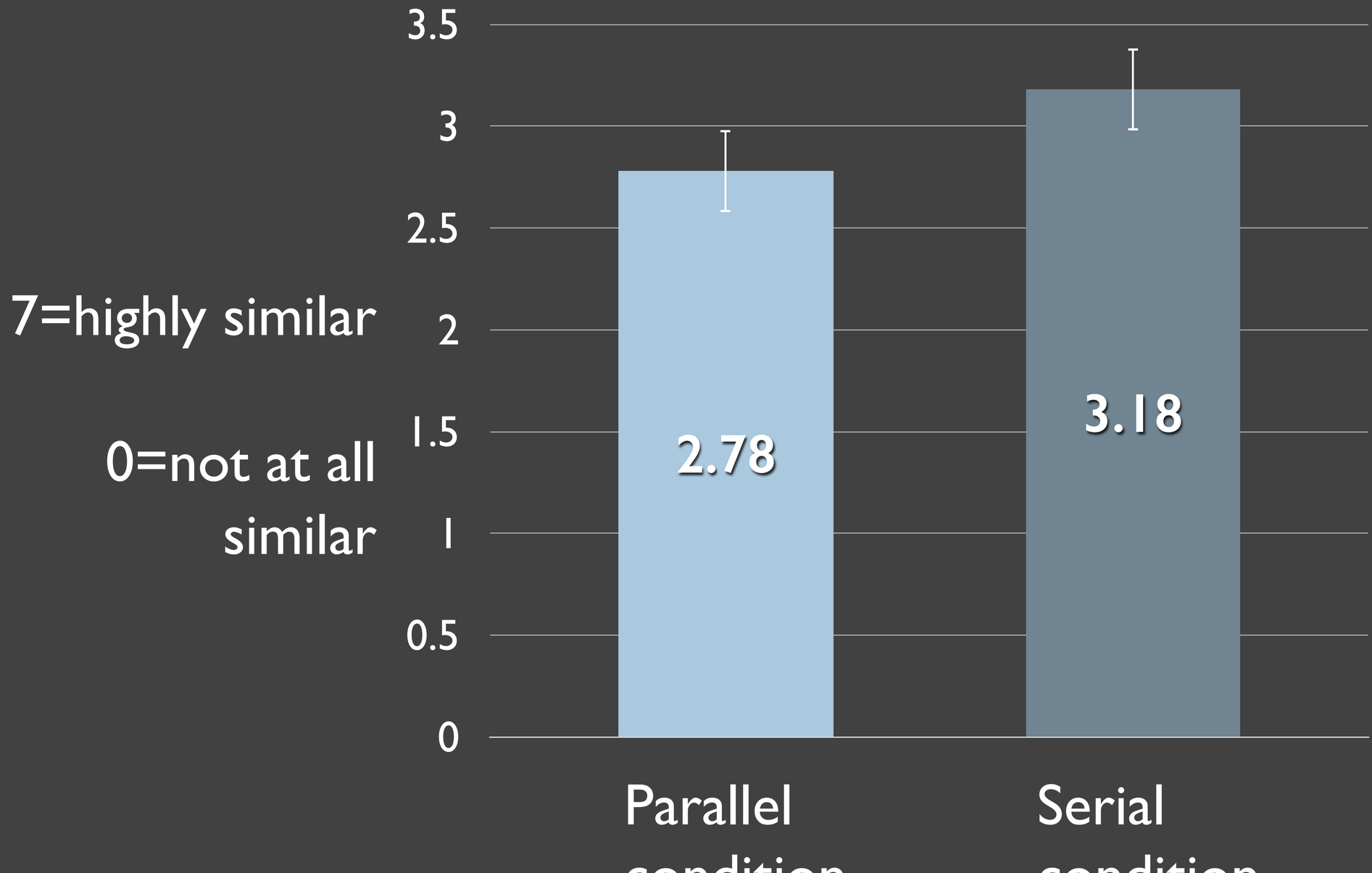
F(1,493)=3.172
p=0.076

…and higher expert ratings



F(1,5)=7.948
p<0.05

…and more diverse designs



F=182, p<0.001

Why does parallel prototyping yield better results?

Separating **Ego**

from **Artifact**

Parallel ideation encourages comparison and transfer

Does **sharing** multiple prototypes improve design results?

Three conditions N=84

- Share multiple
- Share one
- Share best

FACE AIDS: mobilizing and inspiring students to fight AIDS in Africa.

And we look good in red, too.

Want to help?
Click here or visit www.faceaids.org

In 2006, young people accounted for 40% of new HIV infections.

Help us change this. FACE AIDS.

1.4 Million Dollars.
150 chapte

Mobilizing and inspiring students to fight AIDS in Africa.

FACE AIDS

If you want to do, YOU CAN HELP THEM

HELP CHANGE THEIR LIVES

start a FACE AIDS chapter at your school

Make a difference in their lives.

Start a local chapter today.

FACE AIDS

FACE AIDS

Get Involved
Make an impact

Make a difference... Face AIDS

GET INVOLVED

I applaud FACE AIDS for their leadership in engaging youth from around the world on this pandemic and am pleased that FACE AIDS is supporting my Foundation's collaboration with Partners In Health in Rwanda.

–President Bill Clinton

Help change their lives.

Start a FACE AIDS chapter at your school and join the fight against HIV.

Take the lead and make them smile!
FIGHT AIDS!

Click here to reach out!

FACE AIDS
A student campaign to fight AIDS in Africa

Join us Save lives

FaceAids.com

When it comes to HIV, everyone is a victim.

FACE AIDS
A student campaign to fight AIDS in Africa

Fight AIDS in your campus...

Building a movement ...

Join 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

inspire HOPE

students for the right of health

faceAIDS

FACE AIDS

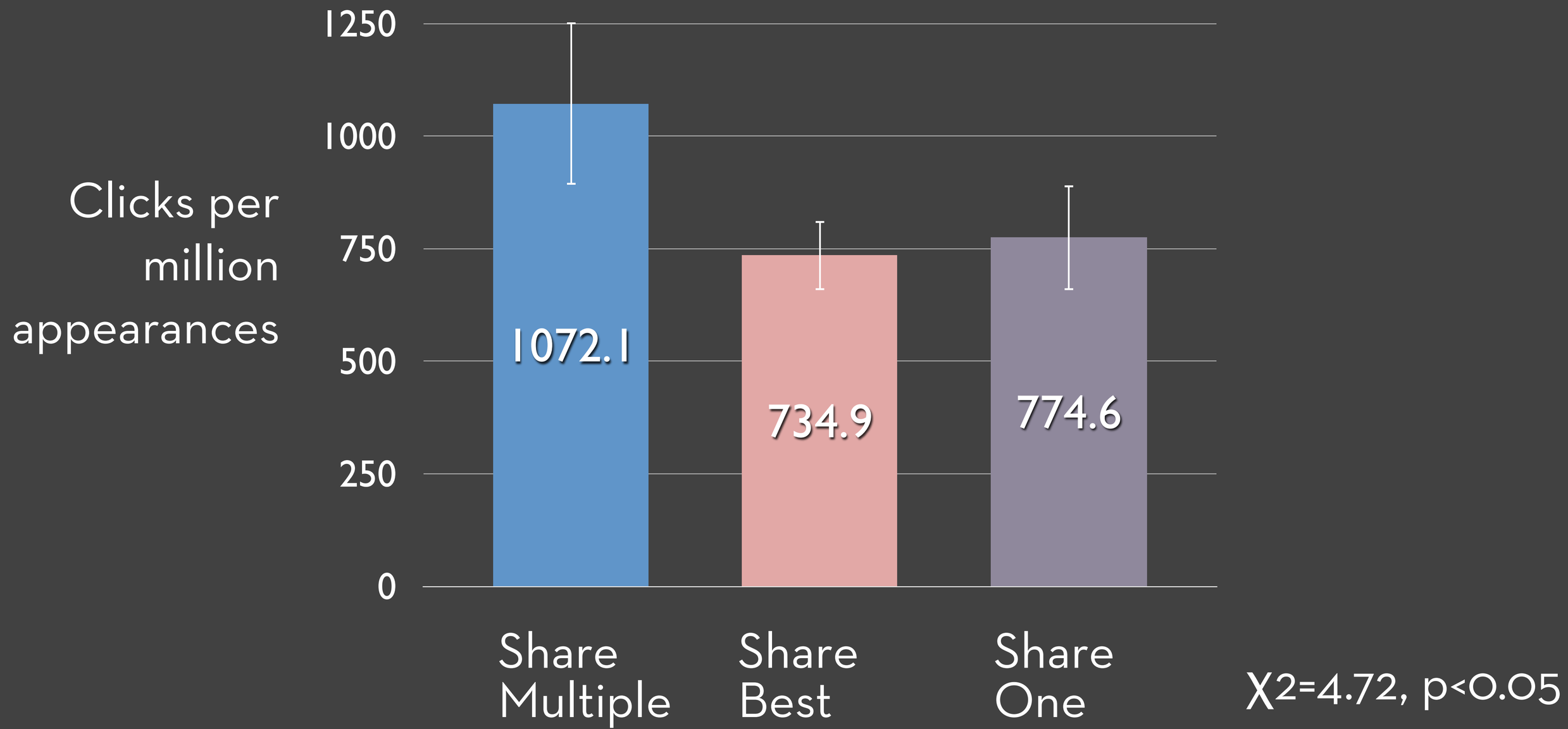
Click here to REACH OUT!

Give hope, love, and smiles.

CLICK HERE

FACE AIDS NOW BEFORE AIDS FACE YOU

Share multiple → more clicks

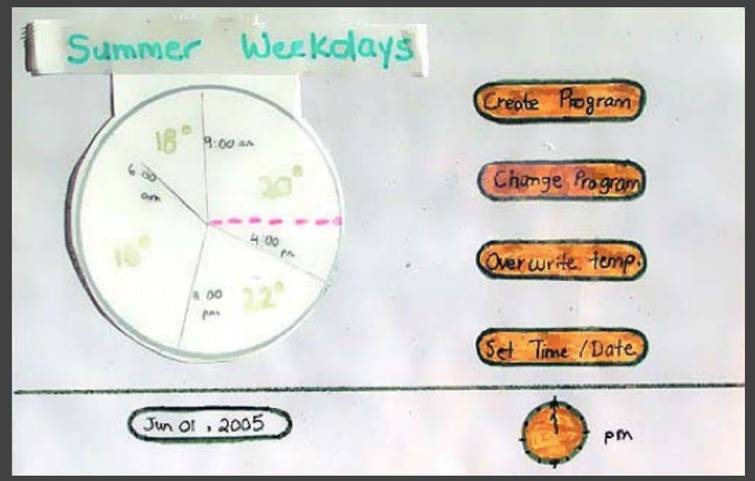


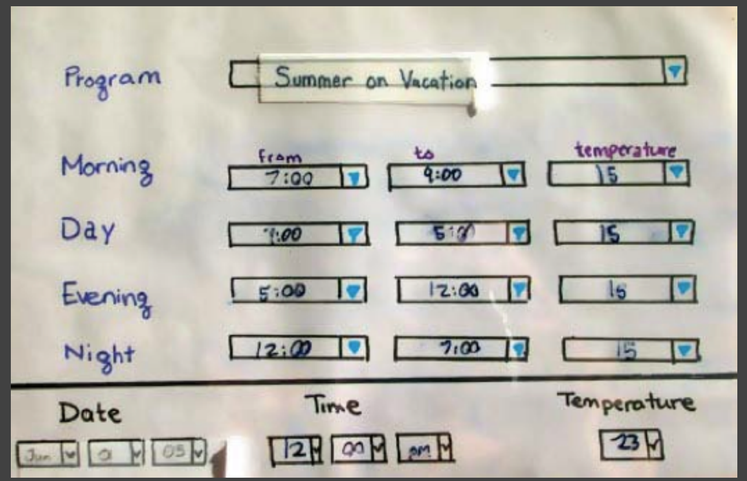
$X^2=4.72$, $p<0.05$

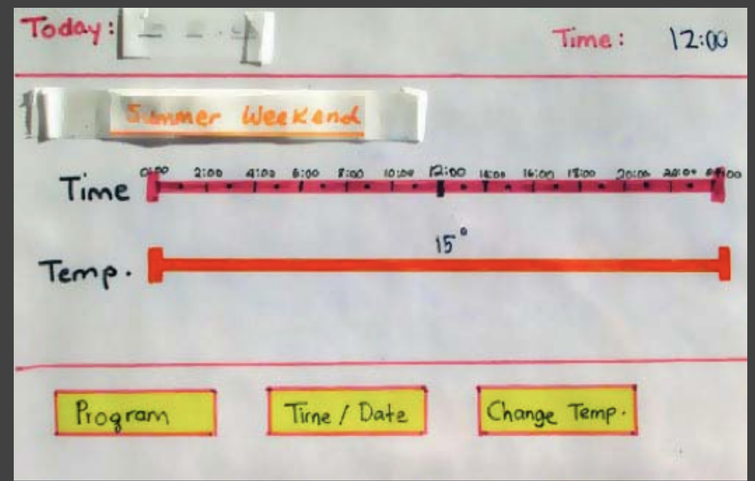
Benefits of sharing multiple

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

Alternatives provide a vocabulary







Tohidi, Buxton, Baecker, Sellen, CHI ‘06

In sum:

Prototypes are questions.

Ask lots of them.