ntro: Design and Creation

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Designing an effective research topic

"Location sensing to autoshare shopping habits."

Could be research if:

- nobody has ever proposed shopping as a problem
- your solution generalizes to other problems and has never been demonstrated
 - e.g., sensing location based on smell
 - e.g., public shaming to change behavior

Probably not research if:

 you are applying a solution that we know about already to a problem that we know about already

"Designing a mirror to tell me if clothes are in style."

Could be research if:

- nobody has ever studied how people use technology to avoid fashion faux pas
- your solution generalizes to other problems and has never been demonstrated before (e.g., determining style through FB photos)

Probably not research if:

- you are applying a solution we know about already to a problem that we know about already
 - e.g., this is solely a usercentered design project
 - e.g., you are not contributing a new technique or domain

"Researching the new hot app SnortChat."

Could be research if:

- SnortChat exemplifies an interesting point in the design space, and we use it to understand that axis or design space
- Theories suggest that SnortChat should work one way or should not succeed, but it's the opposite.

Probably not research if:

- you have trouble articulating what broader design choice SnortChat is an example of
- we have studied applications like SnortChat in the past, and SnortChat works the same way
- you have to put the word
 "researching" in the title

ntro: Design and Creation

OK, LET'S TRY AGAIN.



Evaluate

Design

Implement



Design and creation are not static processes.

They can be studied, supported and improved.

Evaluate

How might we fact this process?

Design

Implement

How might we facilitate and empower



Design Brainstorming process Early-stage design tools

Evaluate

Study strategies Cognitive modeling

Implement

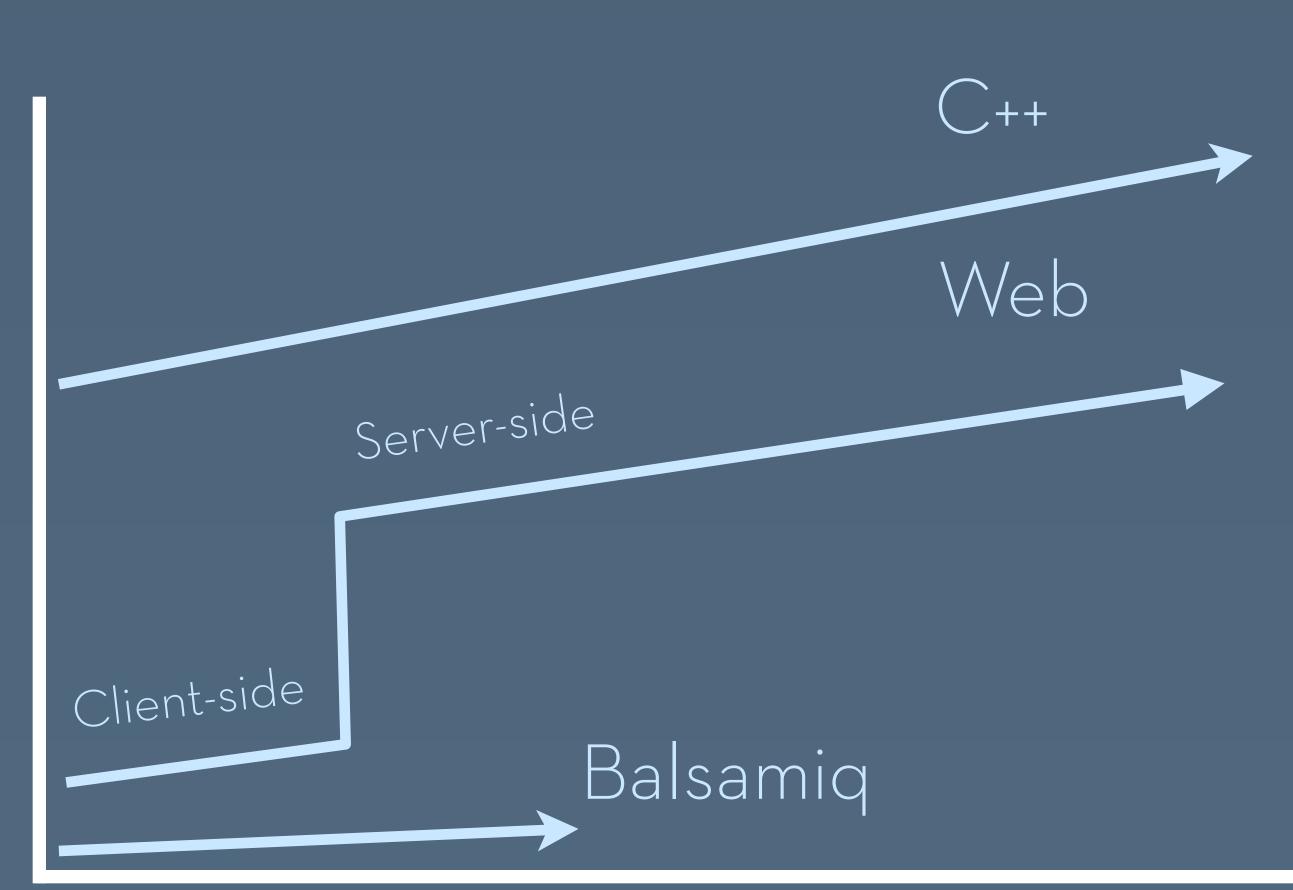
Programming tools WYSIWYG design tools Rapid prototyping tools

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"Enlightened trial and error outperforms the planning of flawless intellect." - David Kelley

Threshold/Ceiling Tradeoff [Myers, Hudson and Pausch, TOCHI 2000]

Difficulty of use



Sophistication of what can be created

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Design tools

Goal: facilitate rapid iteration Prototypes enable exploration and iteration around concrete

- artifacts
- learn before you sink time into engineering

The more fluid the prototyping process is, the more you can

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Sketch the interaction to produce working systems

• SILK [Landay, CHI '96]

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Sketch the interaction to produce working systems

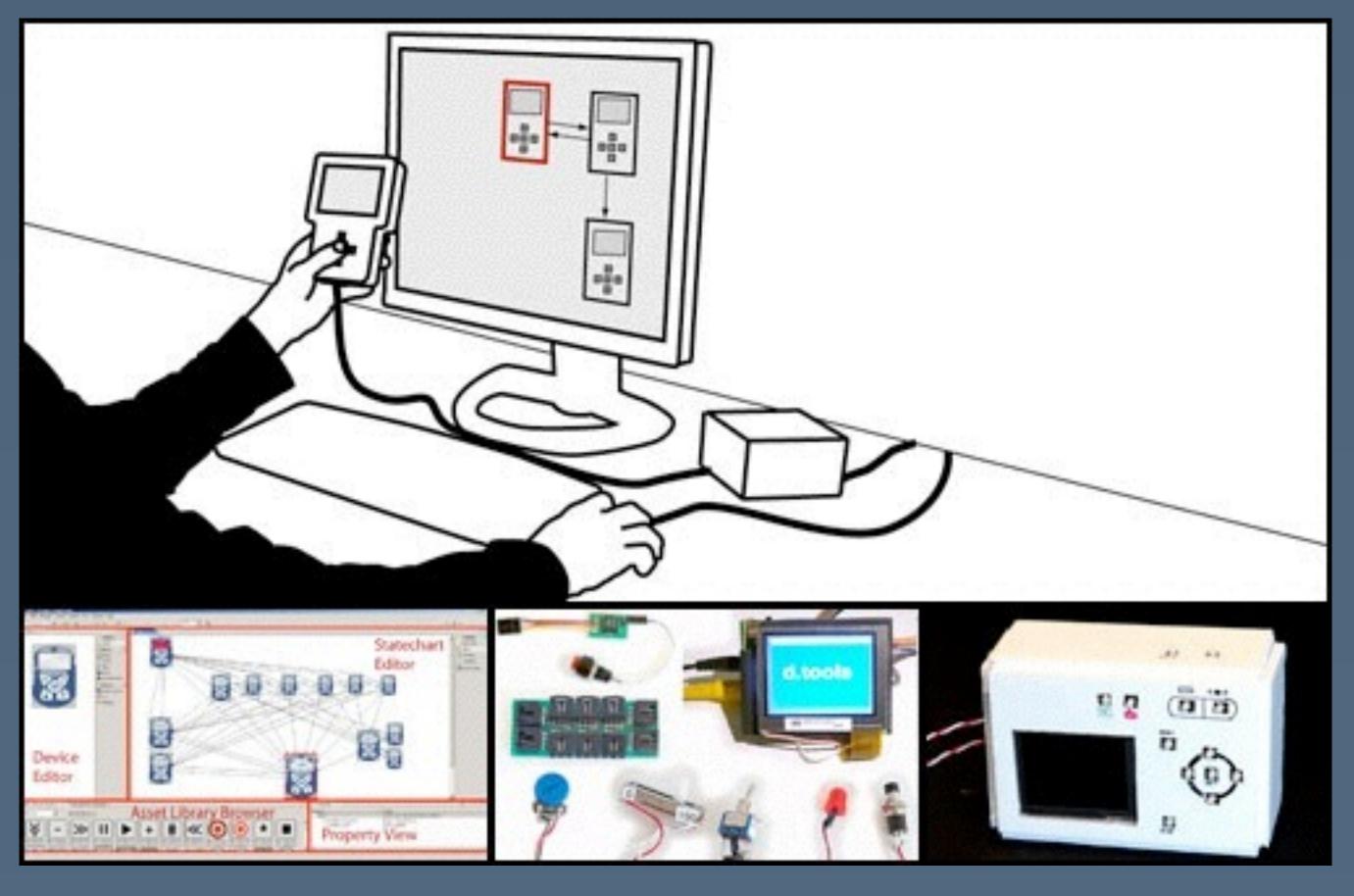
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d.tools: Prototyping Physical Computing Experiences

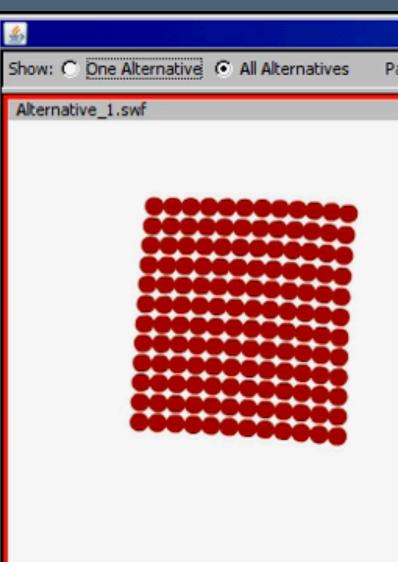
- How might we prototype an iPhone in thirty minutes?
 - Plug-and-play sensors
 - Statechart authoring for logic
 - Runtime visualization of user states





Closed-loop parameter tuning

• Juxtapose [Hartmann et al., UIST 2009]



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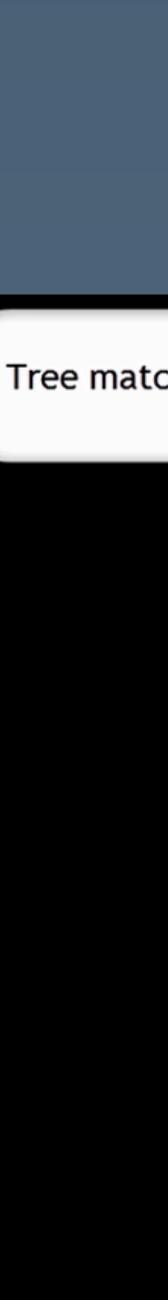


Closed-loop parameter tuning

Juxtapose
 [Hartmann et al.,
 UIST 2009]



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Image: state



Closed-loop parameter tuning

Led to:
 Inventing on
 Principle
 [Victor 2012]



```
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// scene
11
var ctx, canvasWidth, canvasHeight;
function drawScene (canvas) {
   ctx = canvas.getContext("2d");
    extendCanvasContext(ctx);
   canvasWidth = parseInt(canvas.getAttribute("width"));
   canvasHeight = parseInt(canvas.getAttribute("height"));
    dran6ky();
   drawMountains();
    drawTree();
11
// sky
11
function drawSky () {
    ctx.save();
   var gradient = ctx.createLinearGradient(0,0,0,canvasHeight);
    gradient.addColorStop(0, "#b4e0fe");
    gradient.addColorStop(1, "#d3f8ff");
   ctx.fillStyle = gradient;
   ctx.fillRect(0,0,canvasWidth,canvasHeight);
    ctx.restore();
```





mprove the process, improve the output.

- need not be fixed!
- Many techniques we use today were once prototyped in research labs.

• The design process we teach in human-computer interaction



Wizard-of-Oz Prototypes An iterative design methodology for user-friendly natural language office information applications [Kelley, TOIS '84]

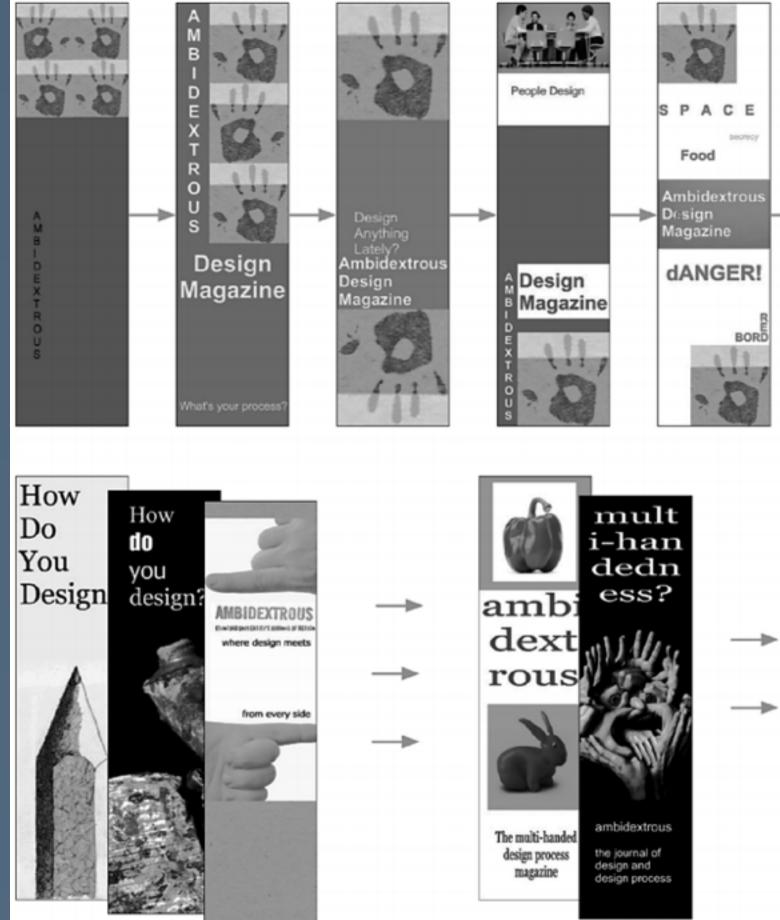
- - another human would."

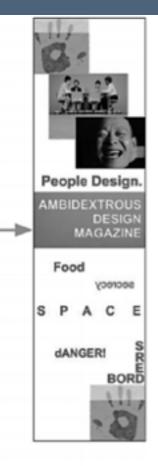
• "Central to the methodology is an experimental simulation which I call the OZ paradigm, in which experimental participants are given the impression that they are interacting with a program that understands English as well as



Iterate on a design, or create parallel alternatives? [Dow et al., TOCHI 2010]

- Feedback on five iterations or five parallel alternatives
- Quality measured via ad clickthrough
- Designs generated in parallel condition had ~1/3 more clicks
- More soon...







Participatory Design [Schuler and Namioka '93]

- design tradition
- Involve the eventual users deeply in the design process
 - Initial exploration
 - Problem definition
 - Develop and focus ideas
 - Evaluation

Developed in Scandinavia, and later ported to the United States



(End-user) programming

Garbage in, garbage out • The quality of the interactive systems we build depends on the tools we have at our disposal

- Toolkits and software engineering Uls...
 - natura
- End-user programming...
 - Make programming more accessible to non-engineers

Make programming easier to learn and debug, more powerful and more



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Programming toolkits

- Then, design better support!
- D3: Data-Driven Documents [Bostock, Ogievetsky and Heer, Visweek '11]



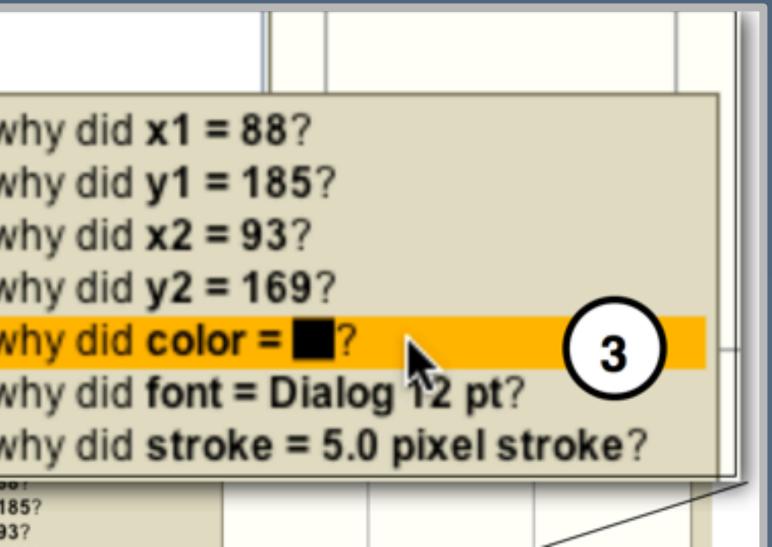
Seek to understand programmers' mental model and task goals



Software engineering interfaces Augment the development environment rather than the

- programming language
- Programmers often ask 'why?' questions of their programs. Could we support this directly? [Ko and Myers, CHI '08]

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End-user programming

- Lower the threshold to writing programs
- - e.g., Chickenfoot [Bolin et al., UIST 2008]

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Allow users with little programming skill to author behaviors

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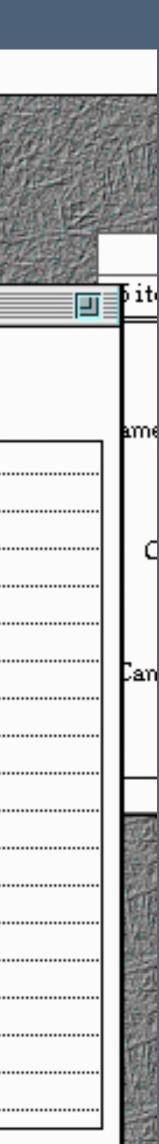
Programming by demonstration

- Induce a program behind the scenes
 - EAGER [Cypher, CHI '91]



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What's difficult about design and creation research?

- Design and programming tools:
- Design process:
 - Multidimensional and difficult to measure

· Slight accelerations are easy; larger-scale improvements are not



What's exciting about design and creation research?

- Existing creation tools are getting better every day
- but still malleable
- programs that others will create tomorrow

• The design process is now an accepted practice in industry,

Your contributions are generative: they lead to new designs and

