

# CS181DT Class 3: Tool fundamentals



# Class 3 agenda

- Zipcrit
- Critique norms
- PM1: Hacking Zine Crit
- Break
- Lecture: Tool fundamentals

# Critique norms

# Why peer critique?

- Reinforce learning goals of the assignment
- Develop a community of practice
  - Sure, you'll get instructor comments on Canvas, but often times, you'll learn more from your peers
- Methods
  - Ask constructive questions - "Why did you choose to include this panel? Why did you choose the layout like this?"
  - End with one thing you genuinely liked

# CS122 crit norms

- We're all learning together in a community of practice
- Ask non-judgmental and constructive questions
- End with a thing you liked
- (Others?)

## Last time: CS122 course norms

- Be respectful of peers and off devices when they are presenting
- Make a mutual effort to collaborate with your partner; be proactive about being in a learning community with them; don't leave until last minute to contact
- Be open minded in discussions (small and large) - give grace of not judging opinions even if you disagree
- Encourage enthusiasm ! :) Would love to hear from people's unique backgrounds/interests
- Leave space for everyone to share - try not to dominate space; allow everyone in small group to give their point
- Be comfortable with taking risks; create an environment for people to take risks!

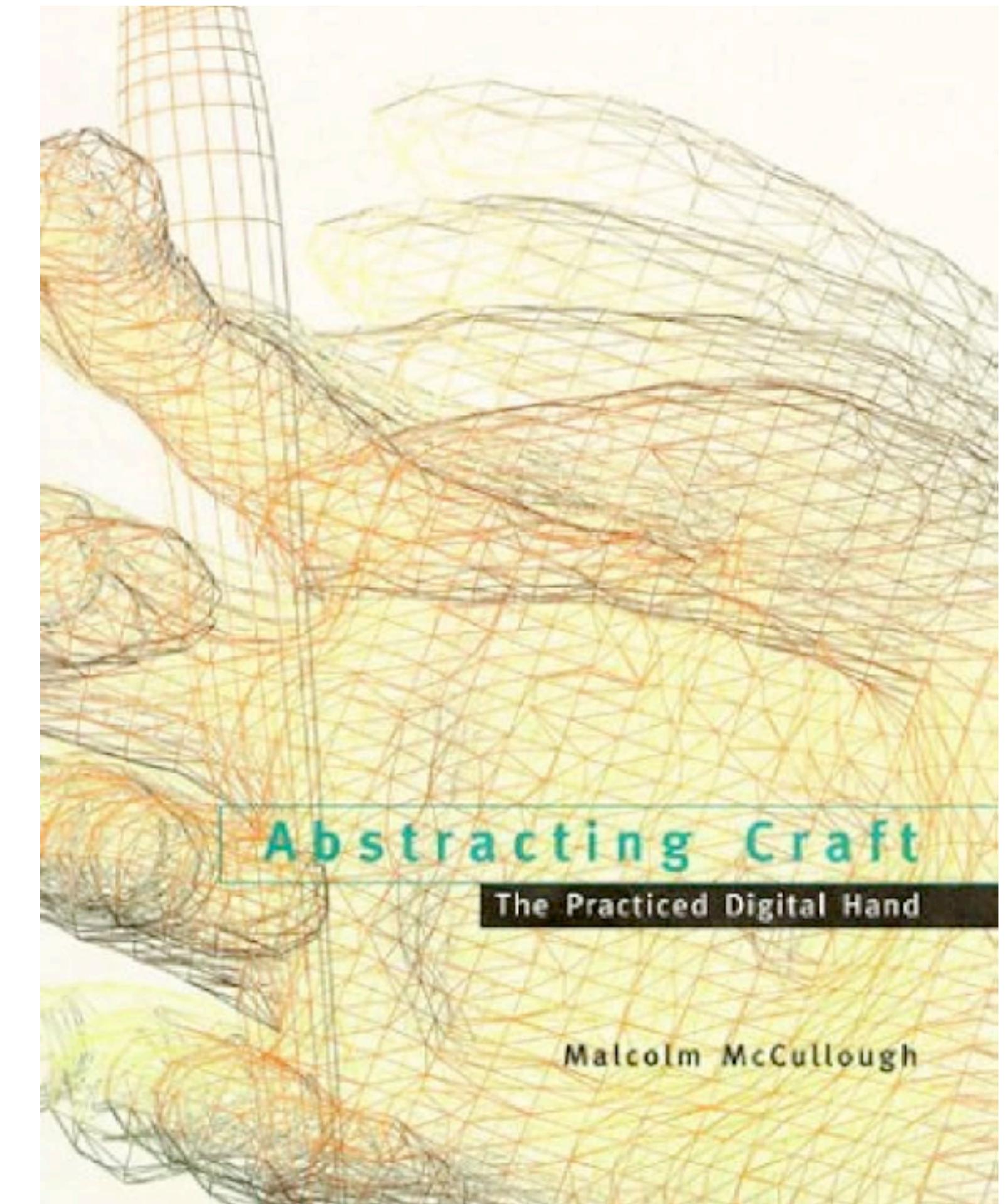
# PM1 crit time

- Turn to the person sitting next to you and swap zines. Take a minute or two to read each other's zines and gather your thoughts. Then take turns giving each other feedback:
  - How well do you think the zine captures the narrative of hacking?
  - What are some other things that stand out to you? Why do they stand out?
- When you finish, come up to the front to find another pair that's finished, and trade partners.
- We'll continue doing zine swaps this way until 11:35.

# Break

# Recall Lecture 1: A definition of a tool

- a **moving entity** whose use is initiated and actively **guided by a human being**, for whom it acts as an **extension**, toward a specific **purpose** (Malcom McCullough, 1966)
- This to me implies..
  - 1. Interactivity (moving)
  - 2. Agency from humans (guided by)
  - 3. Complimenting human skills (extension)
  - 4. Existence of goals (purpose)



# Invention of the tool

- Tools are extensions of our body
- Humans are the only species to *create tools* to shape their environment
  - Other animals use tools (monkeys, sea otters, corvids, etc)
- Traces of tools have been found as far back as 3.3 million years
- Most of our interactions with the real world are *mediated* by tools

BBC

## Science Focus

News Future tech Nature Space Health ▾ Everyday science P

[Home](#) > [Science News](#) > [A Cow Has Been Filmed Using Tools For The First Time Ever, Stunning Scientists](#)

**A cow has been filmed using tools for the first time ever, stunning scientists**

Veronika, a cow from Austria, taught herself to use a broom – and we have the footage to prove it

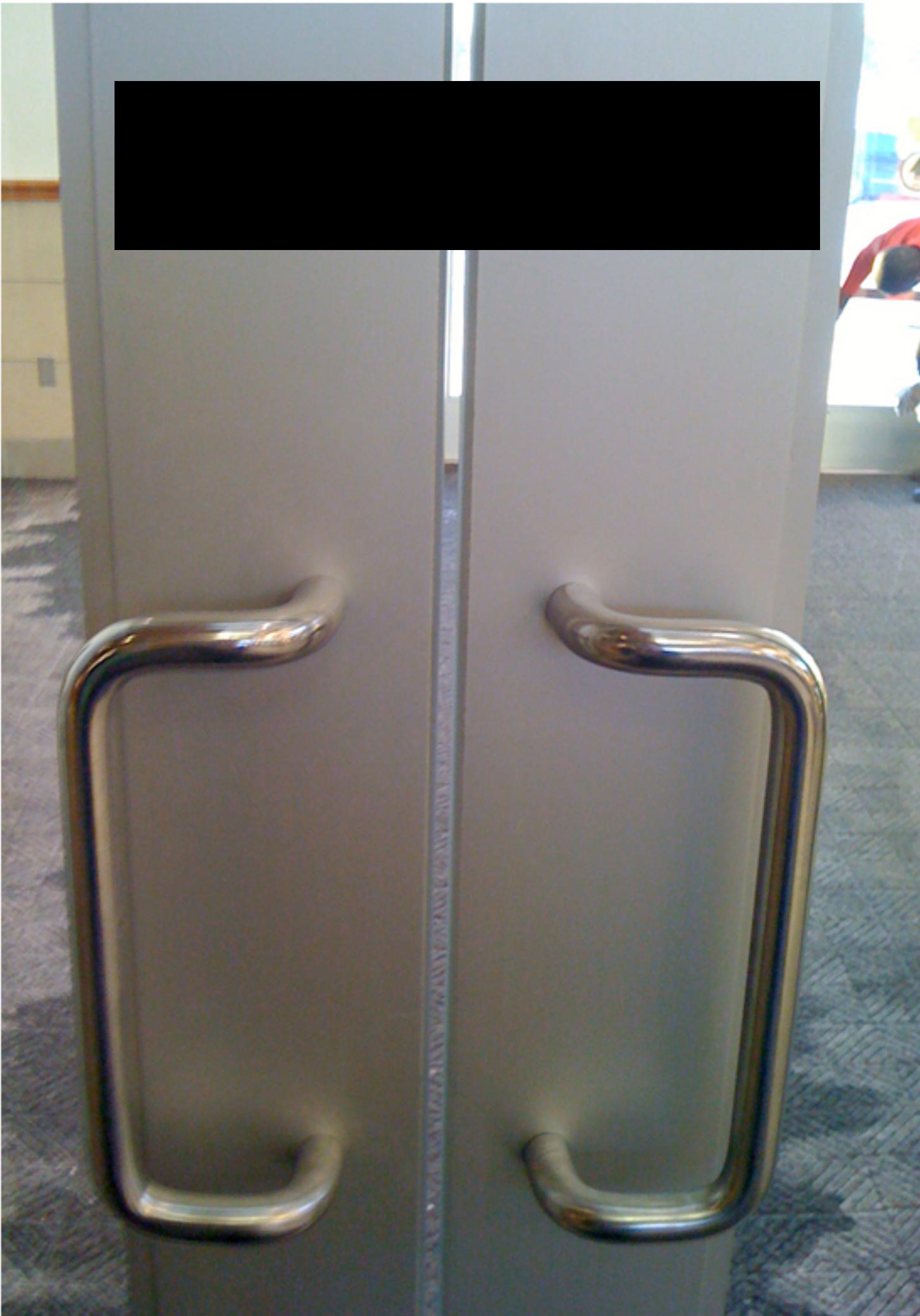


By Ezzy Pearson

Published: January 19, 2026 at 8:00 am

Discuss: How many tools did you use yesterday, and how did they act as extensions of your body (or brain)?

# Consider the door handle



How do you know to push or pull?

# Affordance

- “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.”

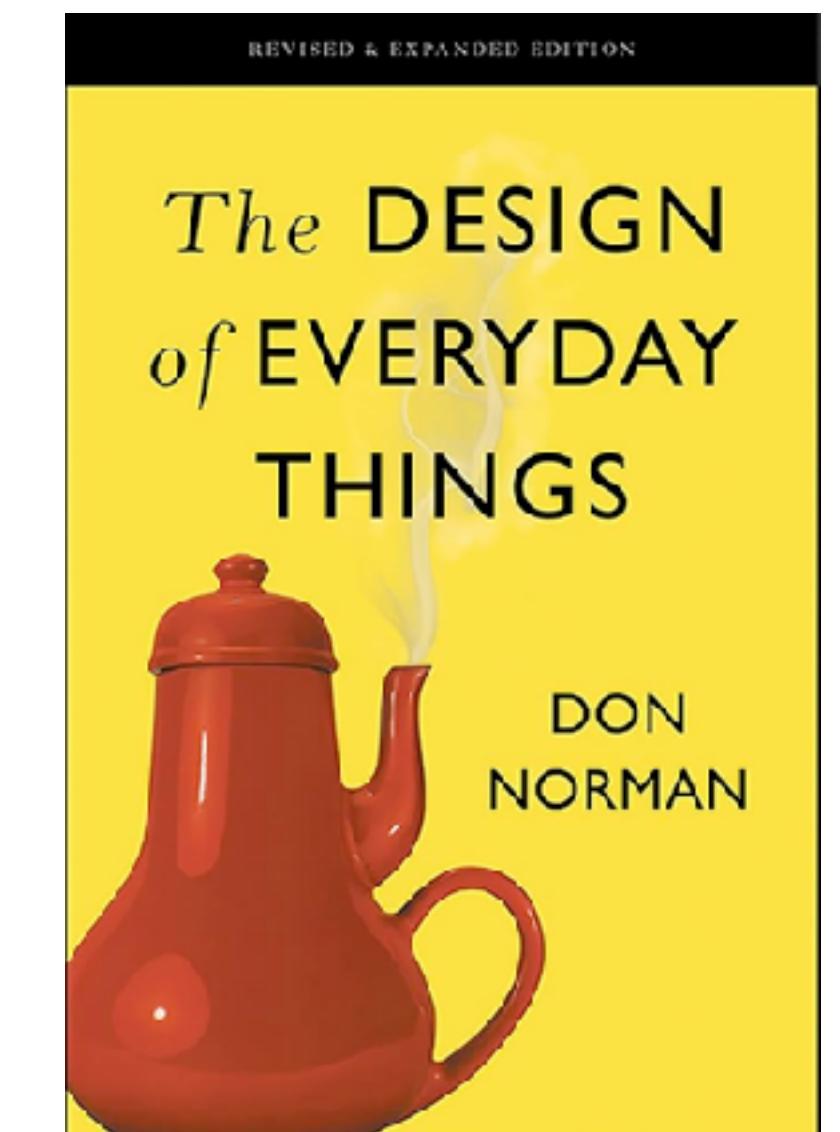


## Scissors afford cutting

What are some clues?

- Holes for fingers to hold
- Sharp blades to cut things
- Screw to allow axial rotation

We call these **signifiers**.



# Consider the door handle (again)



A label is a bad signifier...

# Better: push bars vs pull handles



Instead, the build in the signifiers to the design

# Your turn

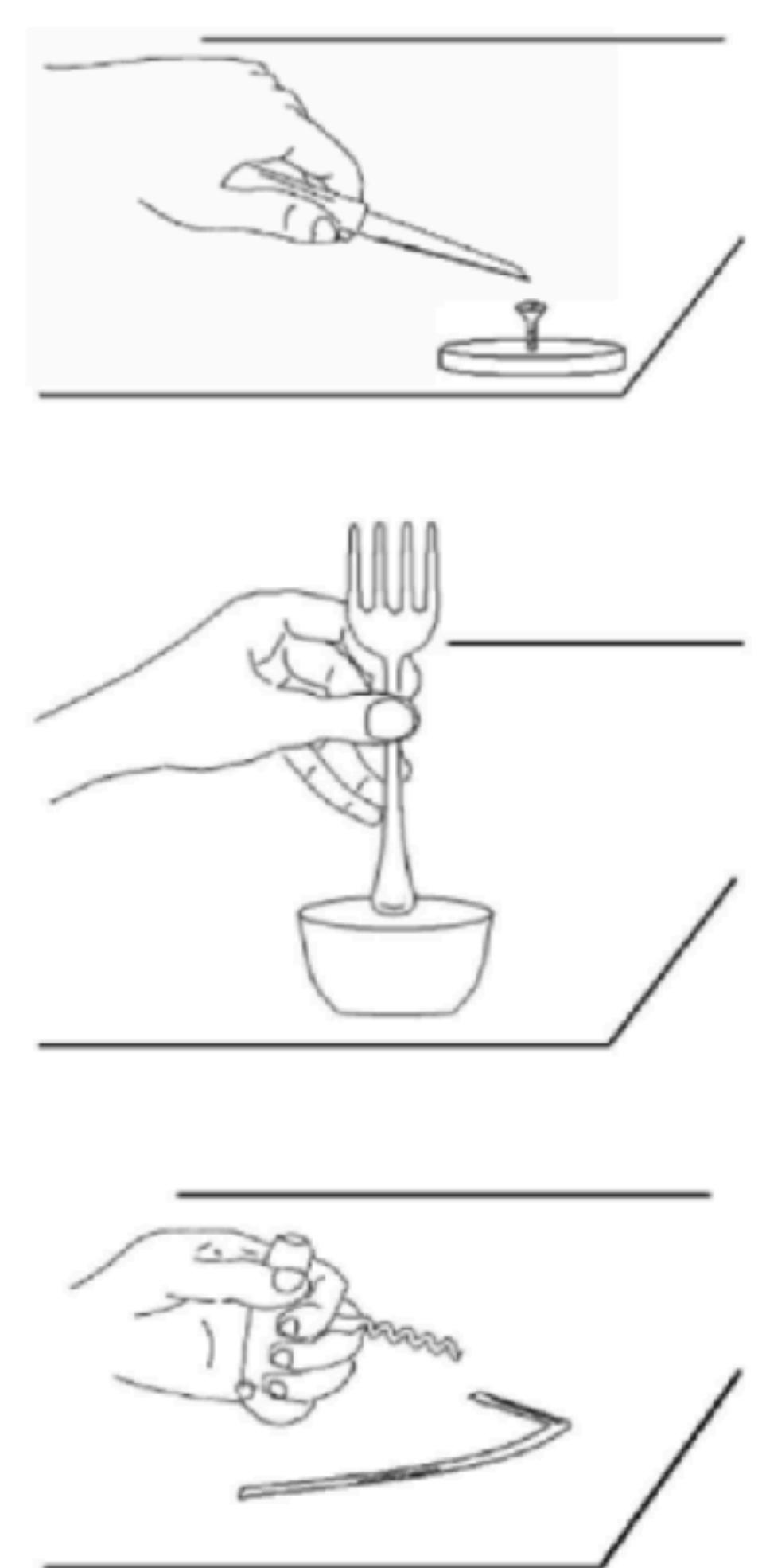
- Affordance contest!
- Turn to the person next to you and pick an object one of you has on hand. In 90 seconds, brainstorm as many affordances (and the corresponding signifiers) as you can. Keep track!



- Sharp blades signify that scissors afford cutting
- Finger holes signify that scissors afford holding
- Screw signifies that scissors afford rotational movement
- Weight of the steel signifies that scissors afford being used as a blunt weapon

# Physical affordances lead to appropriation

- Have you ever used a knife a screwdriver when no screwdriver was around? Or a pencil as a ruler?
- Because we can perceive signifiers and affordances of physical tools, we are able to (mis)use them in creative ways
- ...Even if they aren't always the best tool for the task

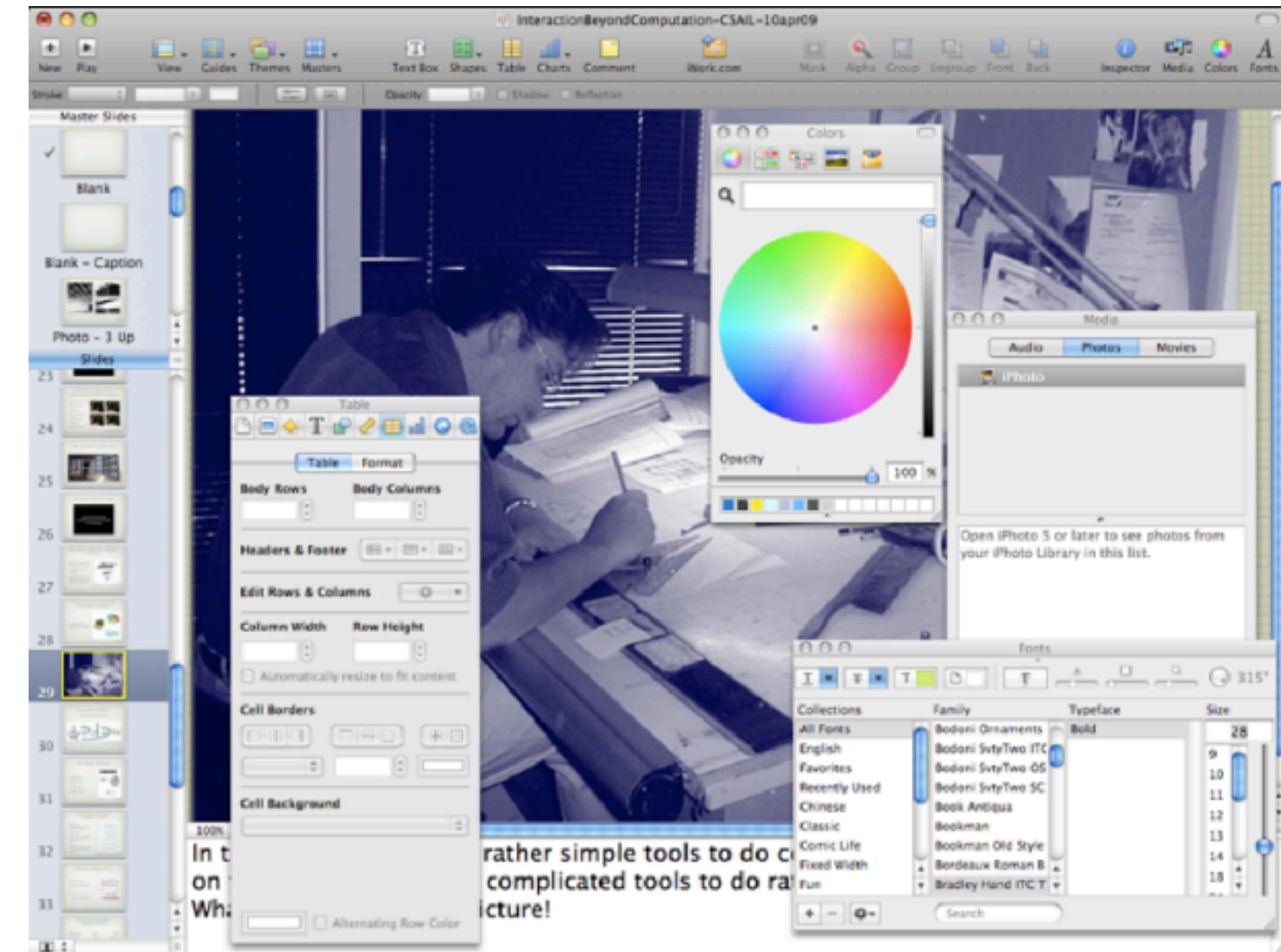


# Maslow's law of the instrument

- A cognitive bias on over-reliance of familiarity of tools - “If the only tool you have is a hammer, it is tempting to treat everything as if it were a nail.” (Abraham Maslow, 1966)
- Also known as Maslow's hammer
- Results in using familiar tools even if they might not be the best tool for the task
  - Ex: You prefer Python even if you're doing low level graphics programming better suited for C++

# The computer is a tool

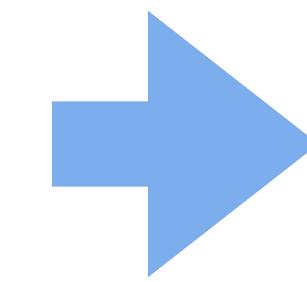
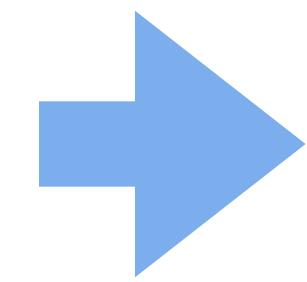
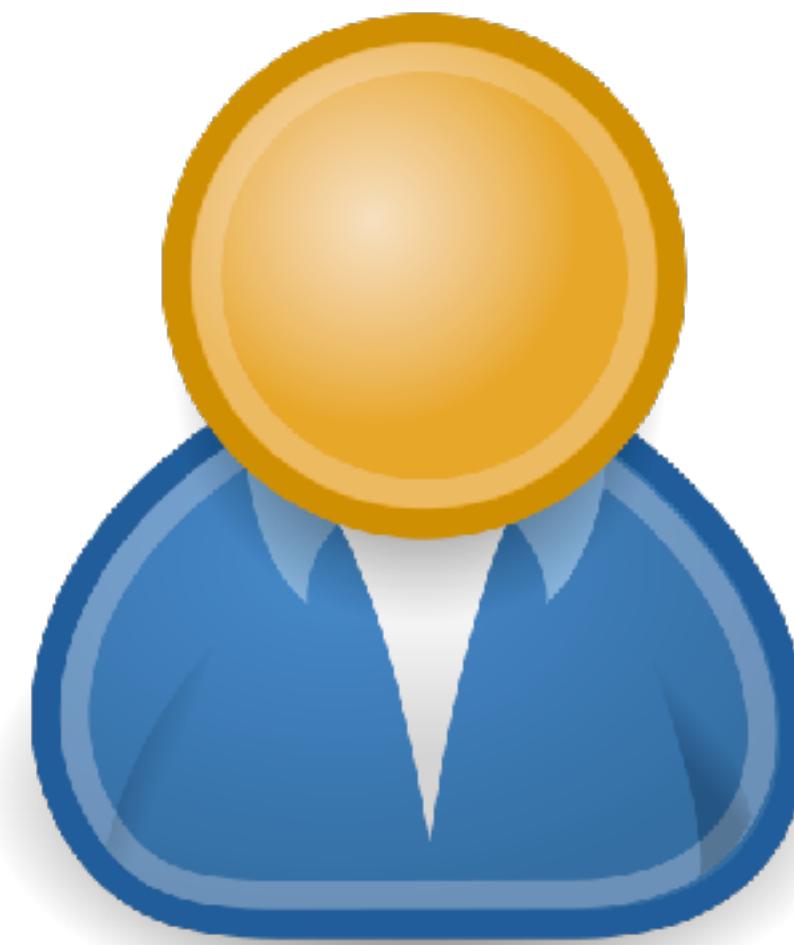
- “Computers are like a bicycle for our minds” - Steve Jobs
- Computers have replaced a lot of traditional analog tools



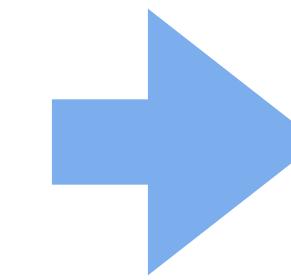
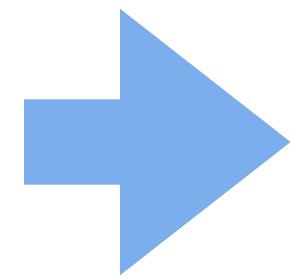
- But if we internalize tools as extensions of our body, then we need to physically interface with computers somehow...



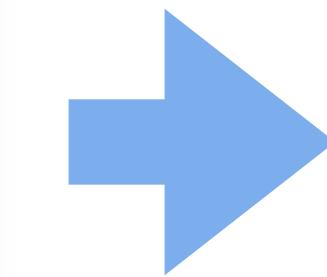
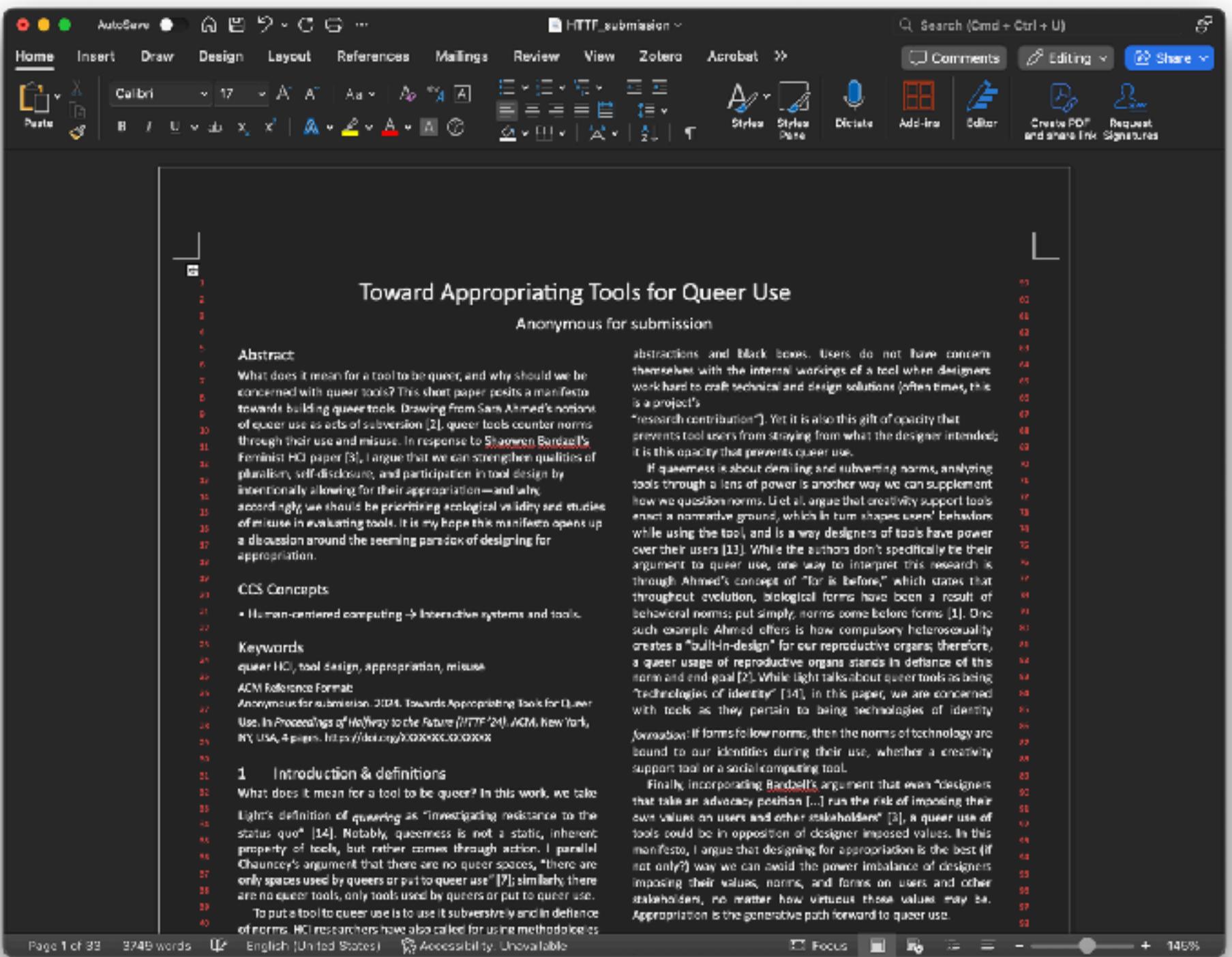
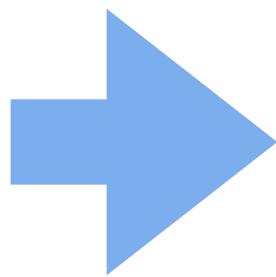
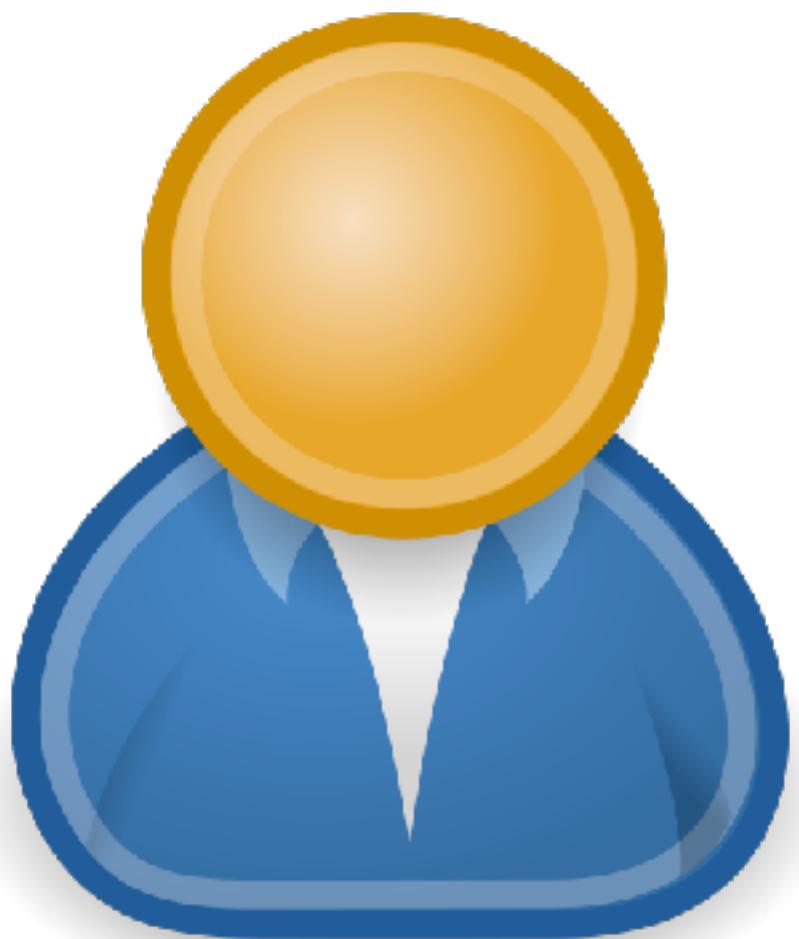
# Again, tools mediate interactions



# Computer hardware mediates interactions



# Computer software mediates interactions



# No longer natural, but *designed* affordances



*Breakability*

Glass affords breaking by its material properties



*Pushability*

A button doesn't intrinsically afford pushing: we've culturally learned that

## Takeaway:

Software tools use *symbols* to signify what they can do. Digital symbols may be more difficult to understand than things in the physical world.

The screenshot shows a Microsoft Word document with the following details:

- Title:** HTTF\_submission
- Section:** Home
- Text:** Toward Appropriating Tools for Queer Use  
Anonymous for submission
- Abstract:** What does it mean for a tool to be queer, and why should we be concerned with queer tools? This short paper posits a manifesto towards building queer tools. Drawing from Sara Ahmed's notions of queer use as acts of subversion [2], queer tools counter norms through their use and misuse. In response to Shaowen Bardzell's Feminist HCI paper [3], I argue that we can strengthen qualities of pluralism, self-disclosure, and participation in tool design by intentionally allowing for their appropriation—and why, accordingly, we should be prioritizing ecological validity and studies of misuse in evaluating tools. It is my hope this manifesto opens up a discussion around the seeming paradox of designing for appropriation.
- CCS Concepts:** • Human-centered computing → Interactive systems and tools.
- Keywords:** queer HCI, tool design, appropriation, misuse
- ACM Reference Format:** Anonymous for submission. 2024. Towards Appropriating Tools for Queer Use. In *Proceedings of Halfway to the Future (HTTF '24)*. ACM, New York, NY, USA, 4 pages. <https://doi.org/XXXXXX.XXXXXXX>
- Section:** 1 Introduction & definitions
- Text:** What does it mean for a tool to be queer? In this work, we take Light's definition of *queering* as "investigating resistance to the status quo" [14]. Notably, queerness is not a static, inherent property of tools, but rather comes through action. I parallel Chauncey's argument that there are no queer spaces, "there are only spaces used by queers or put to queer use" [7]; similarly, there are no queer tools, only tools used by queers or put to queer use.
- Text:** To put a tool to queer use is to use it subversively and in defiance of norms. HCI researchers have also called for using methodologies

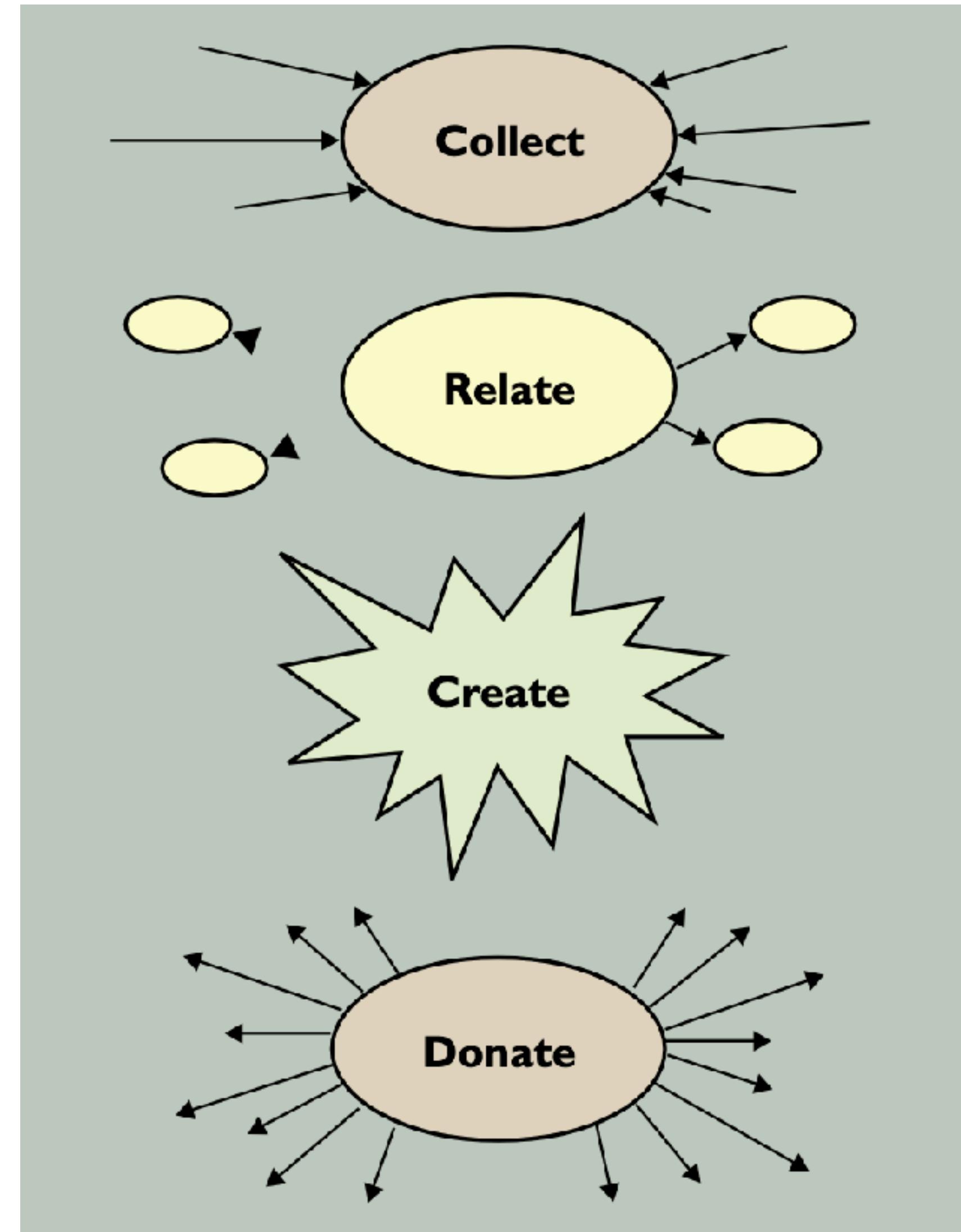
Page 1 of 33 3749 words English (United States) Accessibility: Unavailable

# The Evolution of Creativity Support Tools Research

# “Creativity support tools”

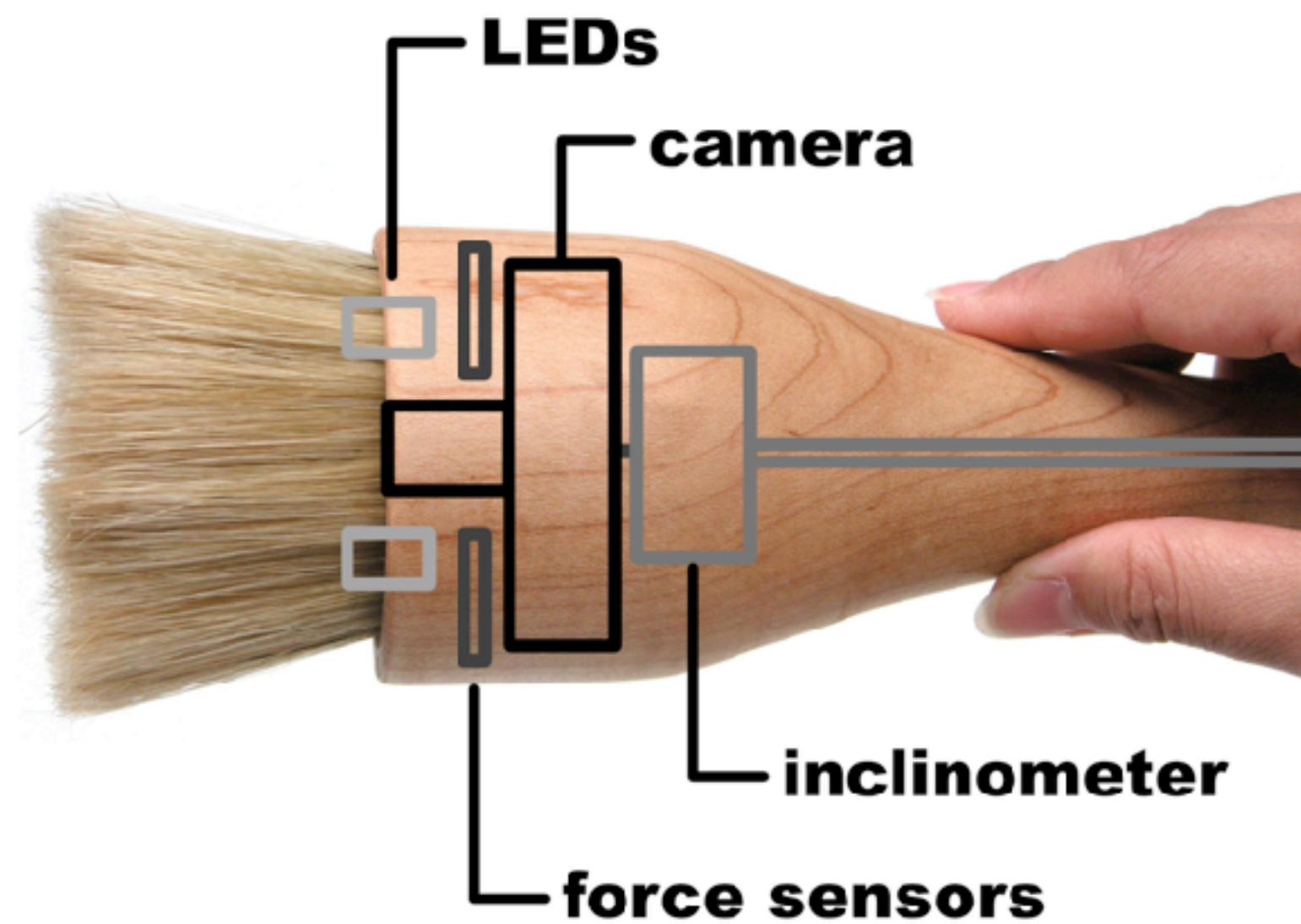
- An HCI research area coined by Ben Shneiderman in 2005
- A framework for thinking about how we can design software tools that support creativity
- “Who are the users? Software support seems most realizable and beneficial for innovative scientists, doctors, lawyers, musicians, artists, teachers, or other **knowledge workers** who struggle with problems in recognized domains of work.”

<b>(1) Searching</b> and browsing digital libraries, the Web, and other resources
<b>(2) Visualizing</b> data and processes to understand and discover relationships
<b>(3) Consulting</b> with peers and mentors for intellectual and emotional support
<b>(4) Thinking</b> by free associations to make new combinations of ideas
<b>(5) Exploring</b> solutions—What-if tools and simulation models
<b>(6) Composing</b> artifacts and performances step-by-step
<b>(7) Reviewing</b> and replaying session histories to support reflection
<b>(8) Disseminating</b> results to gain recognition and add to the searchable resources



# Sample CSTs

I/O Brush, Ryokai et al., CHI 2004



<https://tangible.media.mit.edu/project/io-brush/>

Painting with CATS, Sethapakdi et al., CHI 2019



<https://dl.acm.org/doi/10.1145/3290605.3300287>

# Sample CSTs

Teddy, Igarashi et al., SIGGRAPH 1999

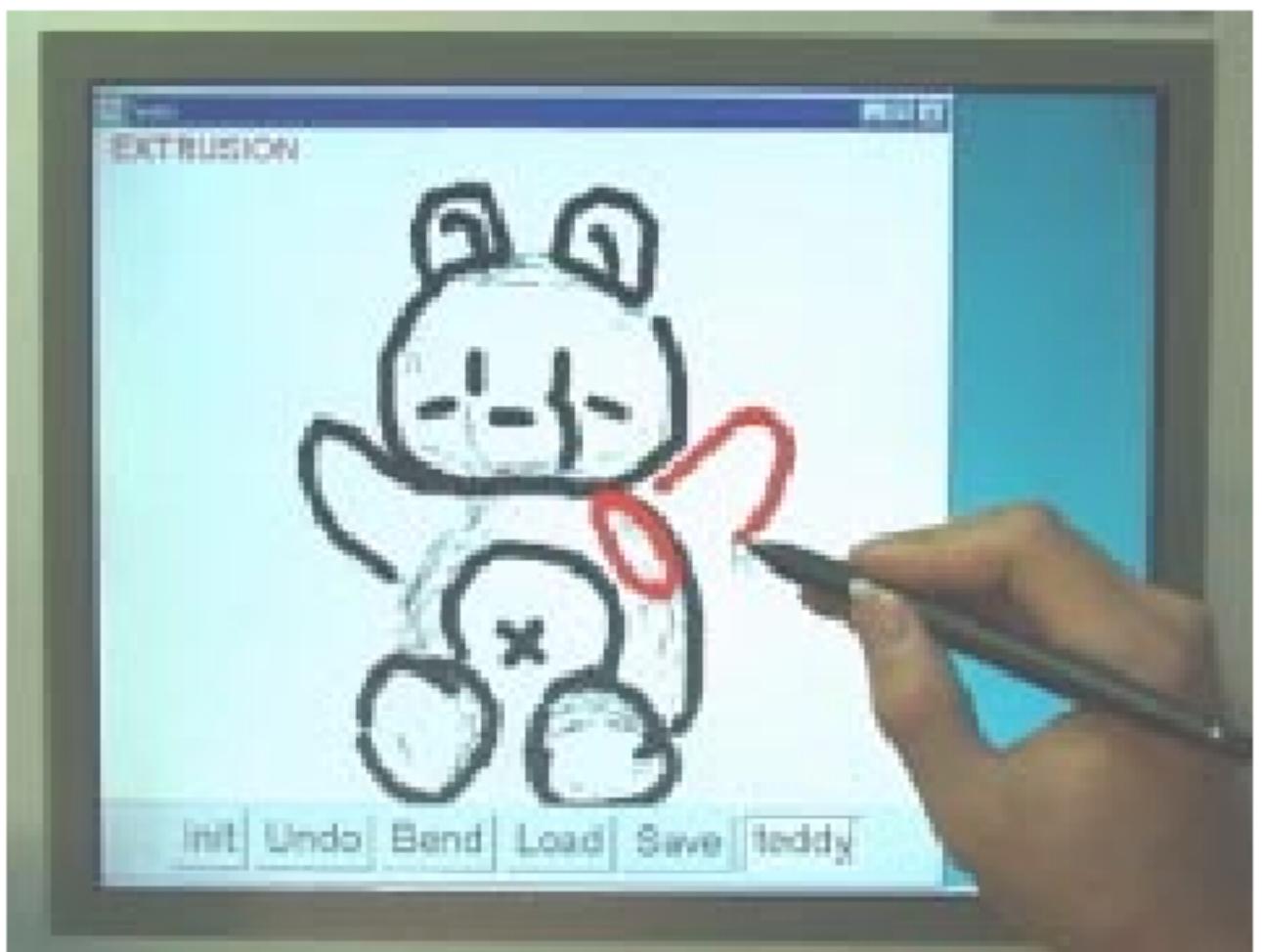


Figure 1: Teddy in use on a display-integrated tablet.



Figure 2: Painted models created using Teddy and painted using a commercial texture-map editor.

<https://dl.acm.org/doi/10.1145/311535.311602>

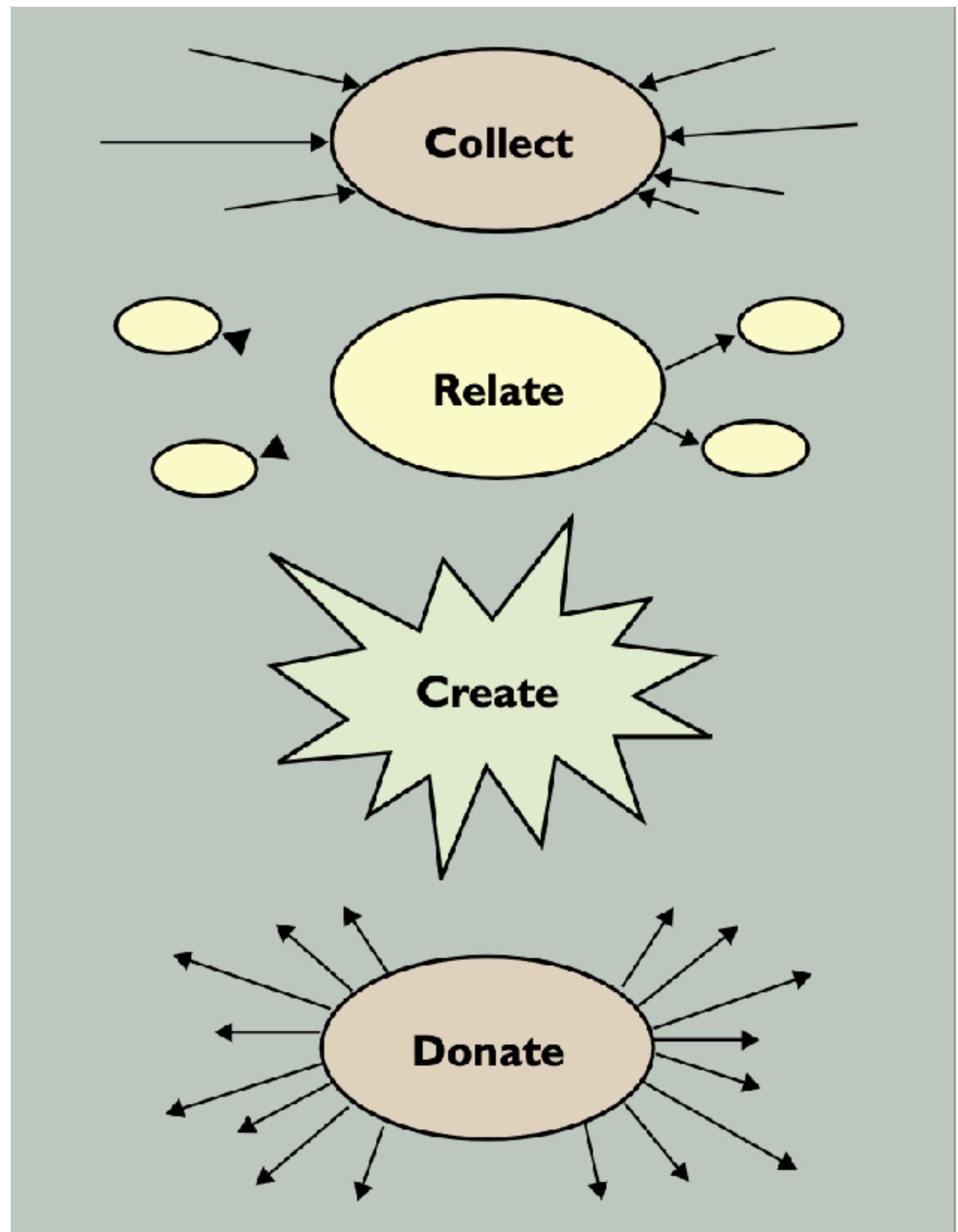
Draco, Kazi et al., CHI 2014



<https://dl.acm.org/doi/abs/10.1145/2556288.2556987>

# CST commonalities

- Most help with the “create” phase of creative activity
- Most either make creation more accessible to novices (Teddy, I/O brush), or streamline creation in what was possible to do before, but tedious (Draco, CATS)
- Most evaluations are *artifact* centric: what you can make with CSTs is important

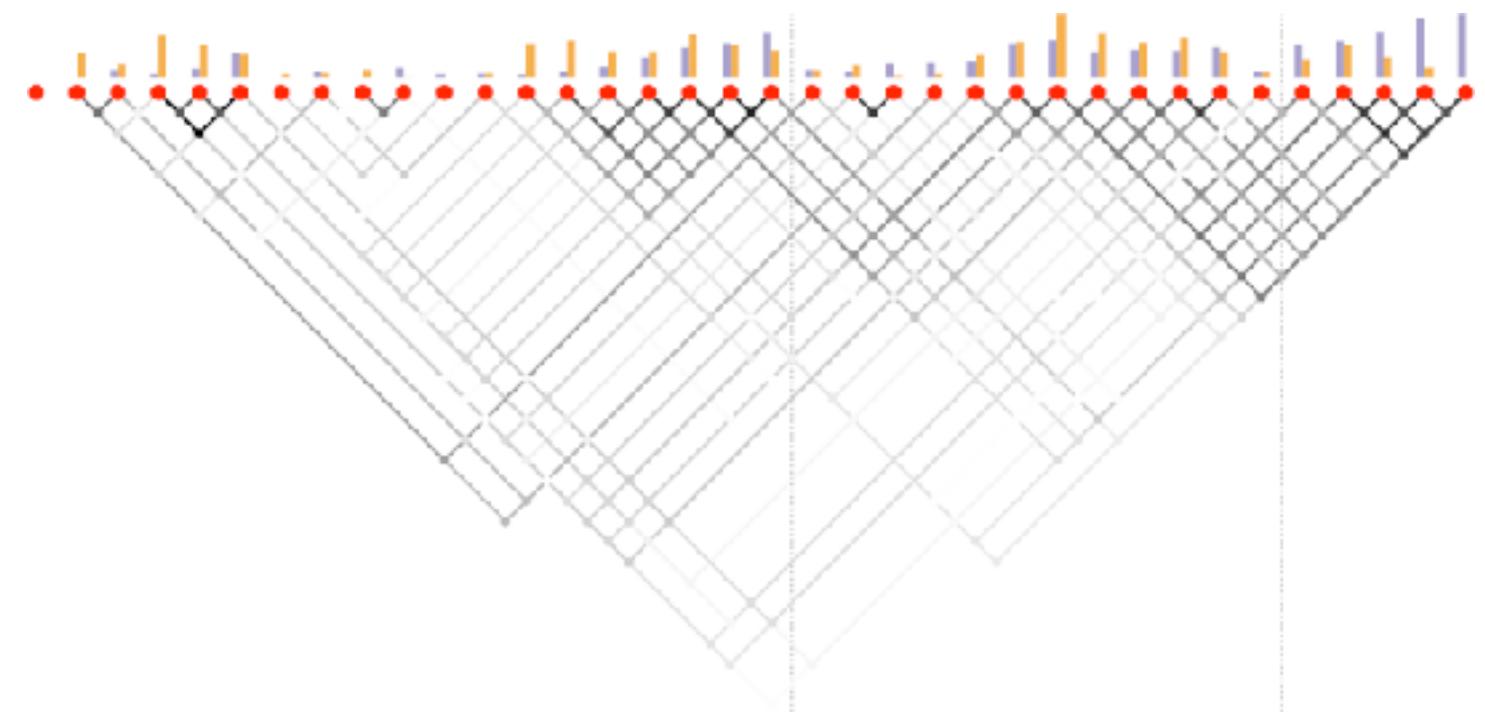


# Shift from artifact to process

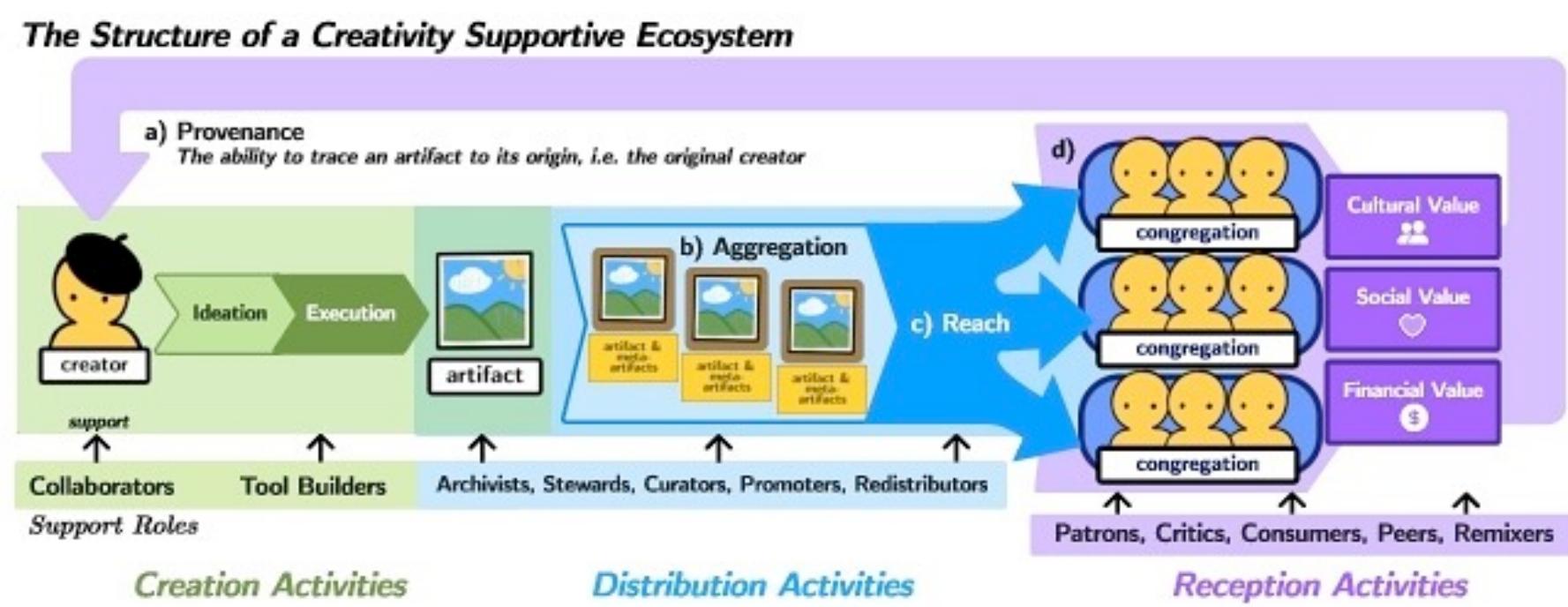
- Some HCI researchers now believe creativity is so much more than making a finished product. It's about the creative *process*.
- More emphasis on
  - Prioritizing moments of reflection through friction, failure
  - Capturing & analyzing creative processes to understand activities at scale ("creative activity trace"...or CAT)
  - A wholistic view of creative activity beyond just the "creation" stage
  - Developing theories to explain creative processes



<https://dl.acm.org/doi/abs/10.1145/3196709.3196795>



<https://dl.acm.org/doi/10.1145/3698061.3726915>



<https://dl.acm.org/doi/10.1145/3706598.3713734>

# “Artistic” support tools

- In addition to supporting “creative” goals, we can also build tools that support “artistic” goals
  - Beyond creating better/faster artifacts, e.g., reflect on sadness, change perspectives, comment on culture
- Also, building tools itself can be an act of artistic practice: your tool can have a message, an artistic meaning

ARTISTIC SUPPORT TOOLS: Expanding the Space of Creativity Support Research Through Artistic Practice

find material (PNG, JPG)  
material found!  
submit material

[PathTracer] Average speed 0.0000 million rays per second.  
[PathTracer] Averaged nan intersection tests per ray.  
[PathTracer] Saving to file: CBempty.png... Done!  
[PathTracer] Job completed.  
Program ended with `exit` code: 0

material found!

ARE U GUYS KEEN FOR MIDNIGHT MADNESS  
ARE U GUYS KEEN  
HELLO MY FLEAS  
the worst FLEAS in the real world  
hee hee  
FLEAS

SCENE 1  
FLEAS  
ARE U GUYS KEEN FOR MIDNIGHT MADNESS  
ARE U GUYS KEEN  
HELLO MY FLEAS  
the worst FLEAS in the real world  
hee hee  
FLEAS

const trails = 90;  
function setup() {  
 noStroke();  
 colorMode(HSL);  
}  
function draw() {  
 background(225, 60, 6, 0.15); // subtle fade for trails  
 for (let i = 0; i < trails; i++) {  
 const y = map(i, 0, trails, height \* 0.2, height \* 0.85);  
 const n = noise(i \* 0.004, t);  
 const x = map(n, 0, 1, width \* 0.1, width \* 0.9);  
 const sway = sin(t \* 2 + i \* 0.08) \* 30;  
 const hue = (180 + i \* 1.5 + t \* 80) % 360;  
 fill('hsla(' + hue + ', 80%, 60%, 0.6)');  
 circle(sway + x, y, 10 + sin(t \* 3 + i) \* 4); // bug was here;  
 }  
}

just learn C  
1. Abstraction (Layers of Representation/Interpretation)  
2. Moore's Law  
3. Principle of Locality/Memory Hierarchy  
4. Parallelism  
5. Dependability via Redundancy

bug off! i'm feeling buggy

Reflect: As we go throughout this class, what values do you hold? How do your values shape what you want to build?

# Class 3 Recap

- Next Monday, we'll cut foamboard and release PM2. Nothing due on Mon
- Next Weds seminar: design tools for digital fabrication
  - RRs due, Biruk & Kellie leading seminar
  - Jennifer Jacobs (UCSB MAT prof, author of one of the papers) will be giving the colloquium talk - if you are interested in having a meeting with her, let me know!
- Some lecture slide credit to [Michel Beaudouin-Lafon](#)