

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!

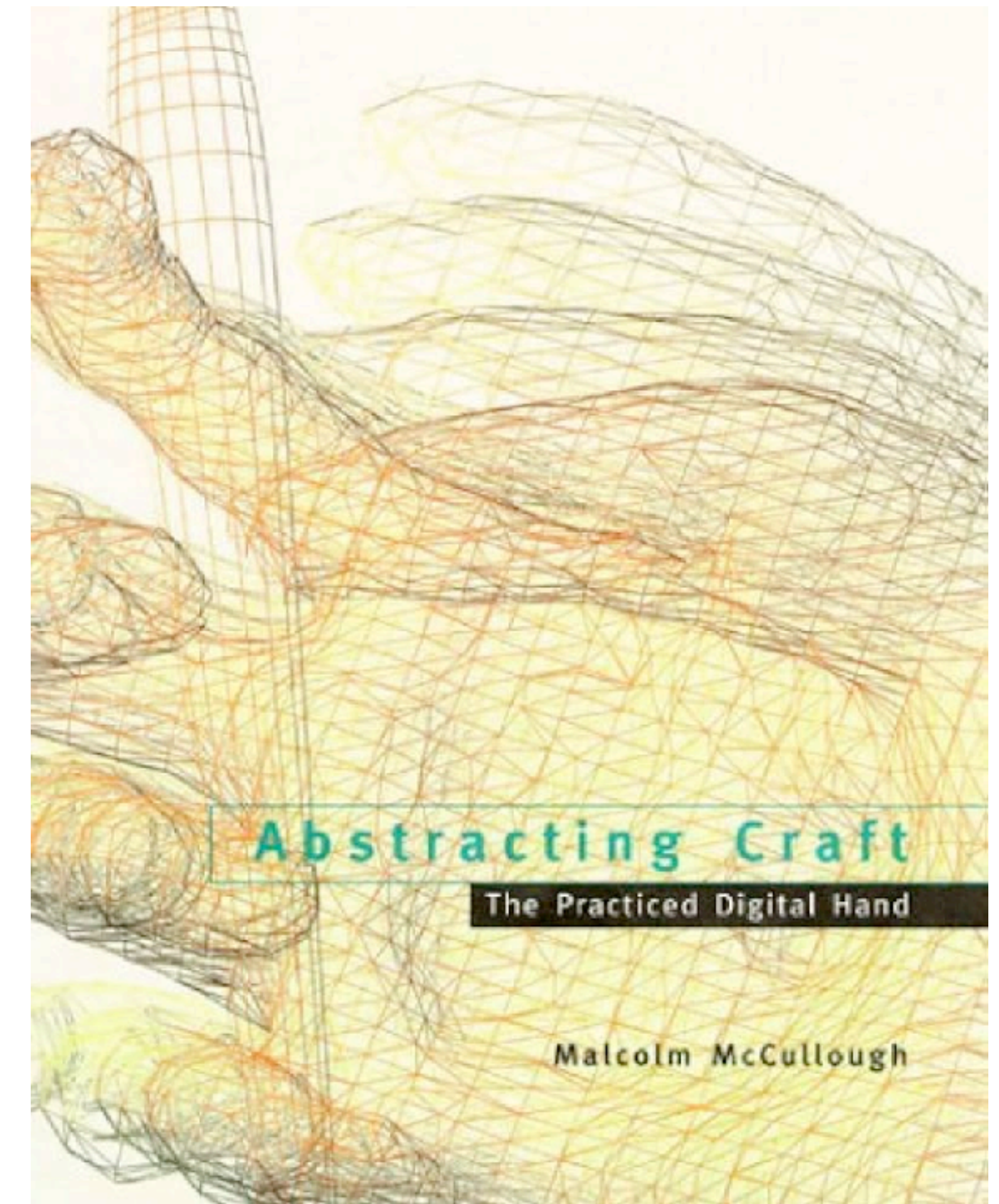
PM1 crit time

- 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

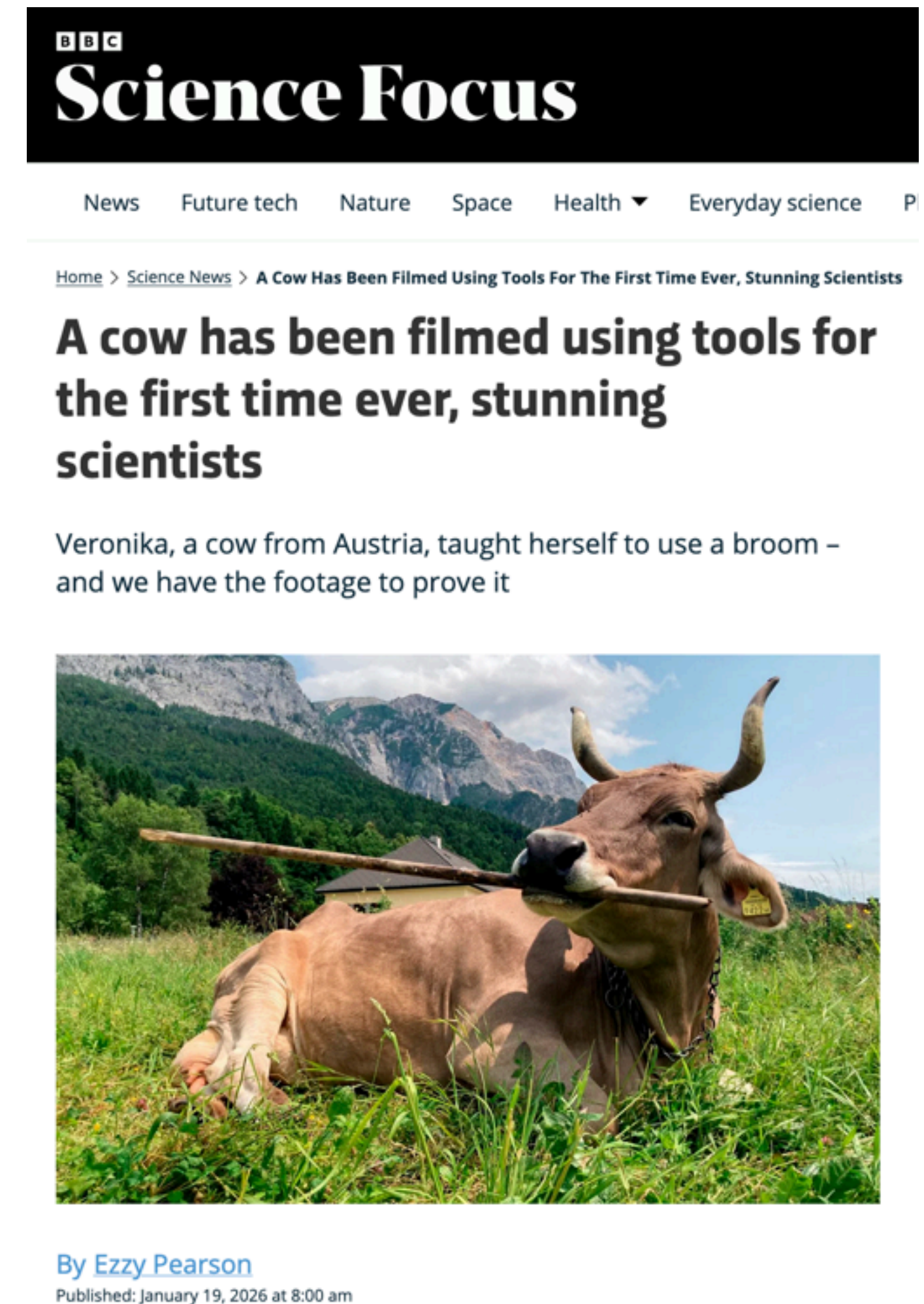
Recall Lecture 1: A definition of a tool

- 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



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.”

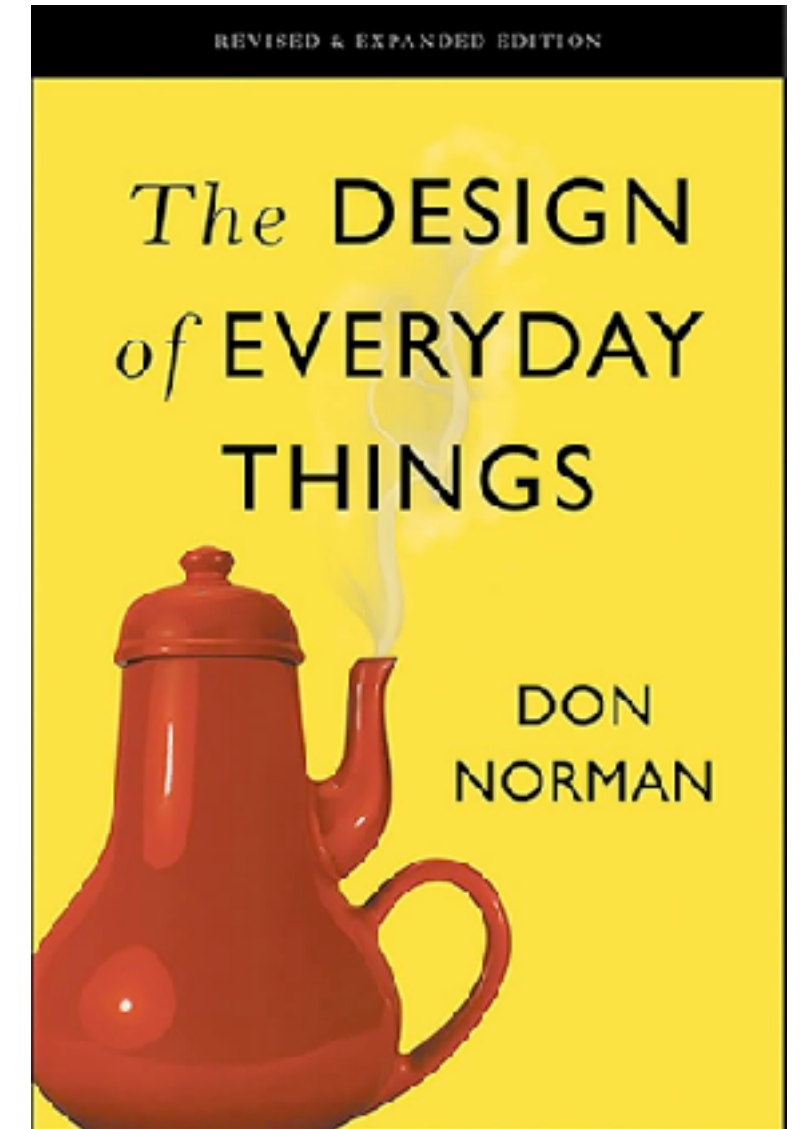


Scissors afford cutting

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

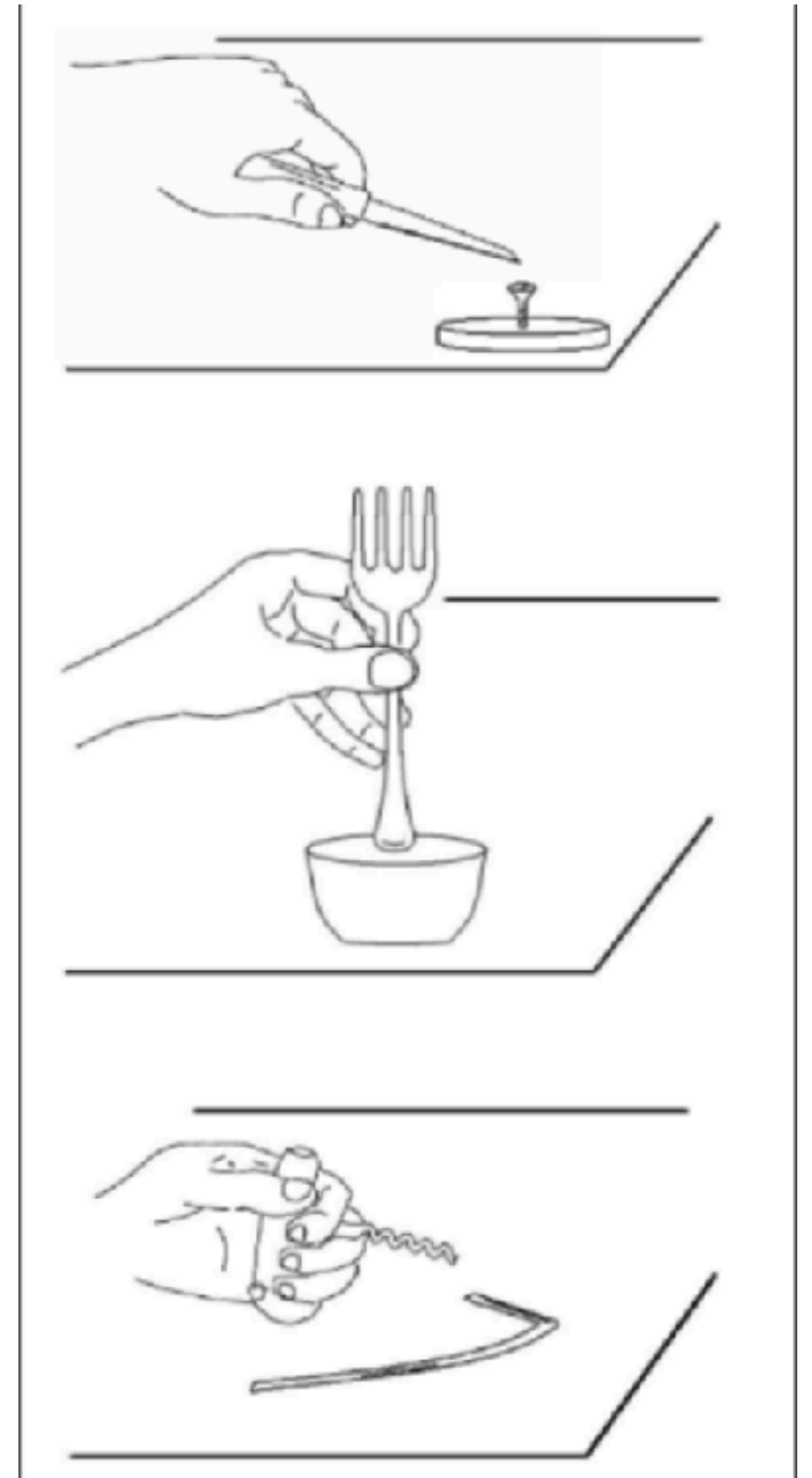
- Affordance contest!
- Turn to the person next to you and pick an object one of you has on hand. In 90 seconds, brainstorm as many affordances (and the corresponding signifiers) as you can. Keep track!



- 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

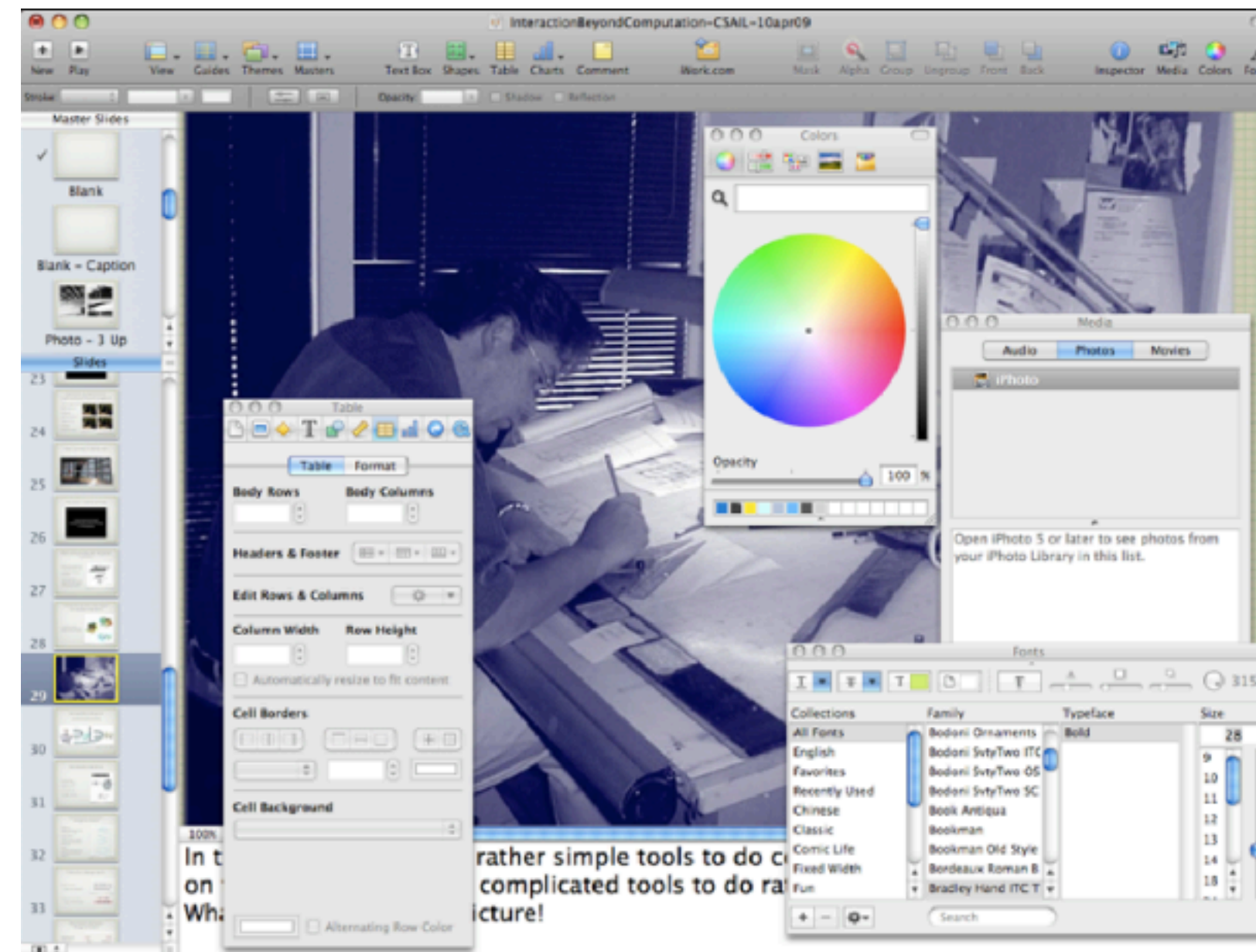


Maslow's law of the instrument

- 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

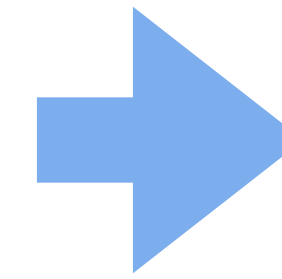
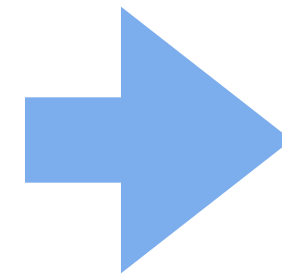
- “Computers are like a bicycle for our minds” - Steve Jobs
- Computers have replaced a lot of traditional analog tools



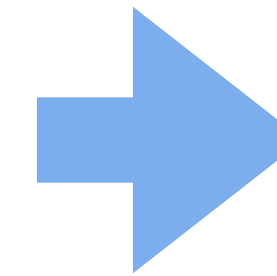
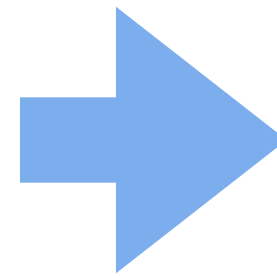
- But if we internalize tools as extensions of our body, then we need to physically interface with computers somehow...



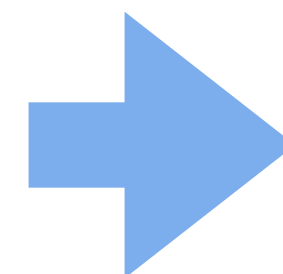
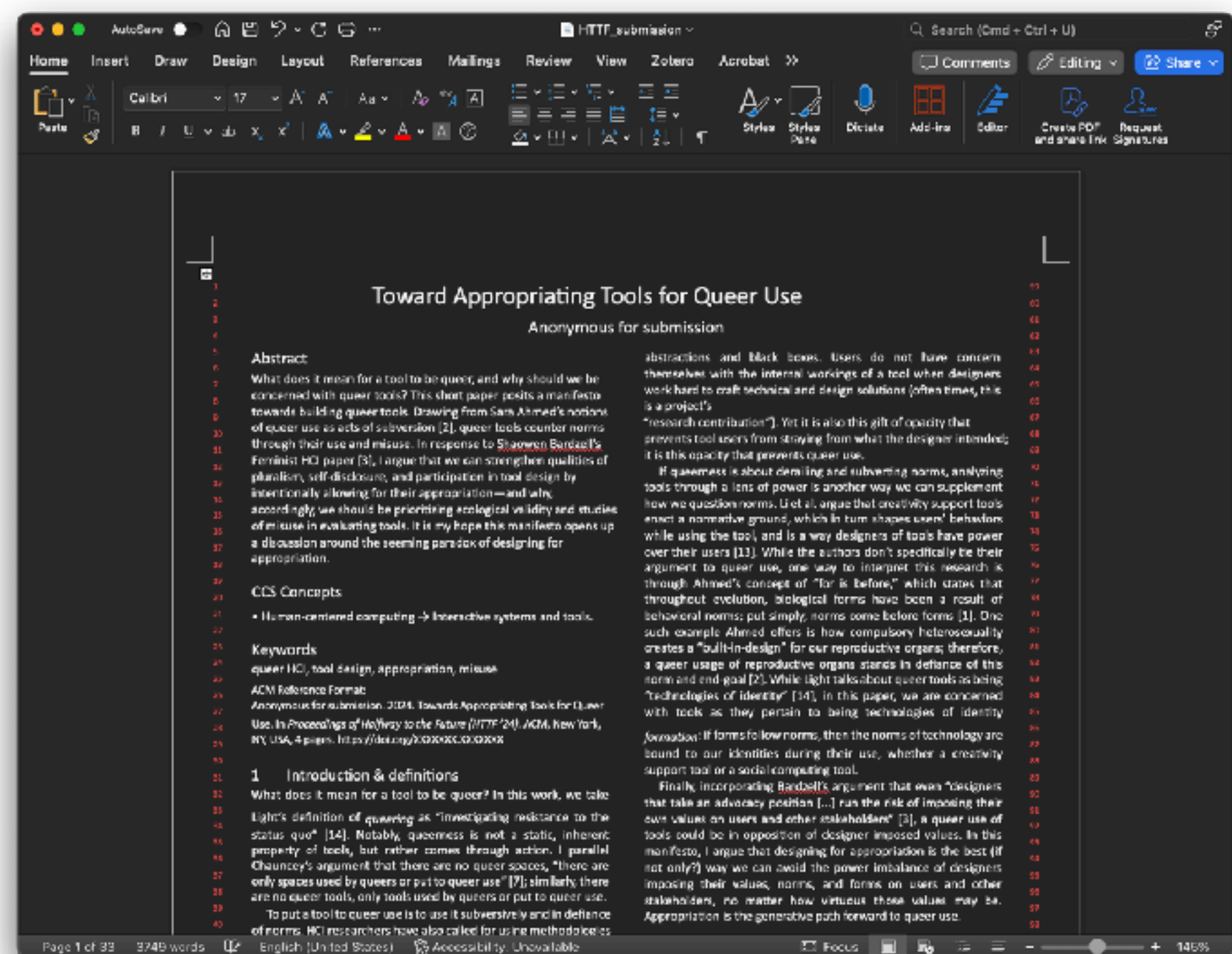
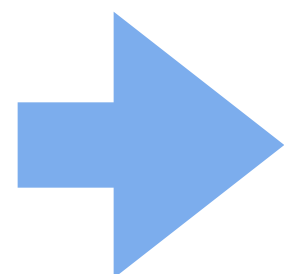
Again, tools mediate interactions



Computer hardware mediates interactions



Computer software mediates interactions



- ▶ **Introduction**
 - Research Topic and Context
 - Thesis Statement
- ▶ **Literature Review**
 - Key Theories and Concepts
 - Previous Research Findings
- ▶ **Methodology**
 - Research Design
 - Data Collection Methods
 - Data Analysis Techniques
- ▶ **Findings**
 - Presentation of Data
 - Analysis of Data
 - Discussion of Findings
- ▶ **Conclusion**
 - Summary of Key Findings
 - Implications and Future Research

No longer natural, but *designed* affordances



Breakability

Glass affords breaking by its material properties

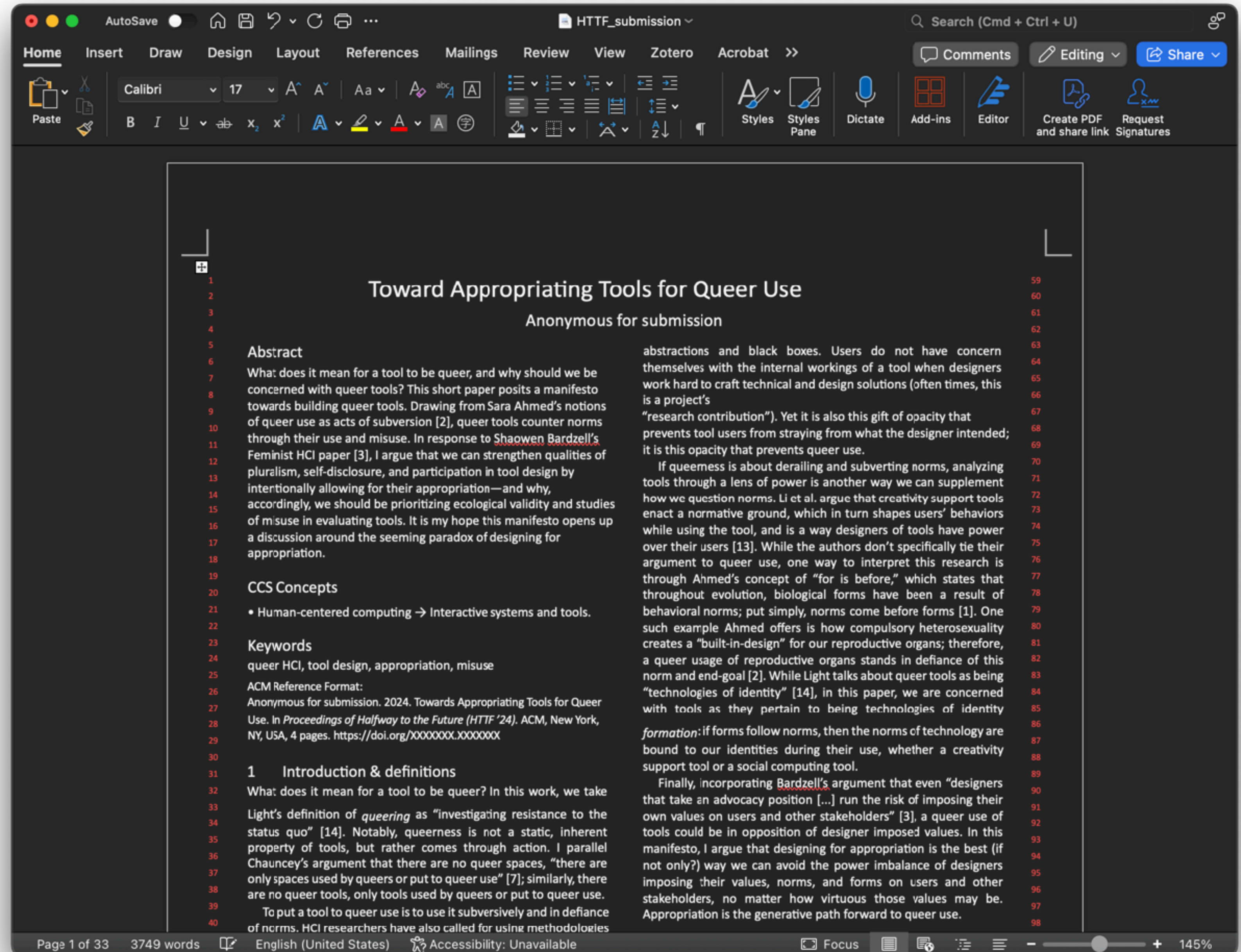


Pushability

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.

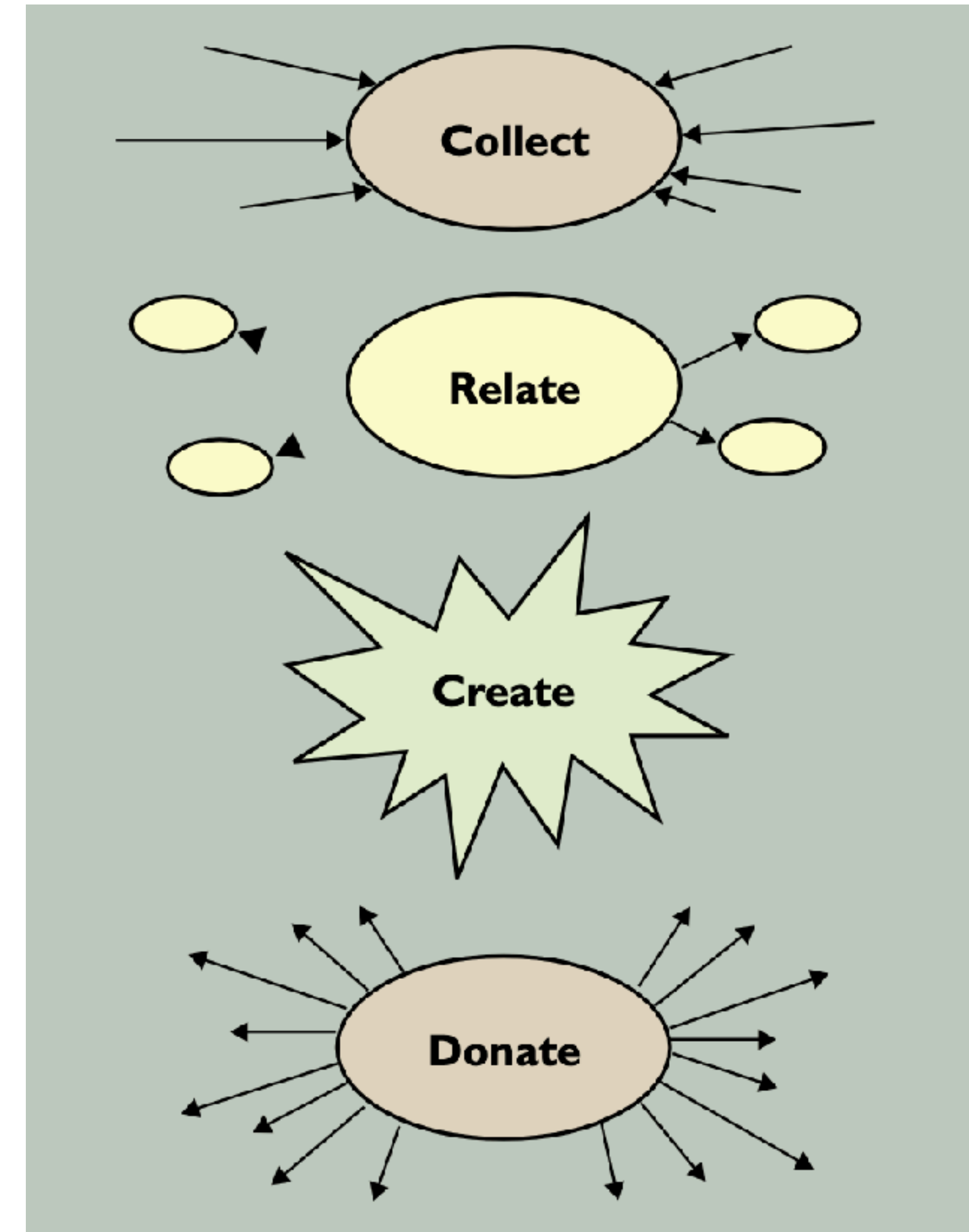


The Evolution of Creativity Support Tools Research

“Creativity support tools”

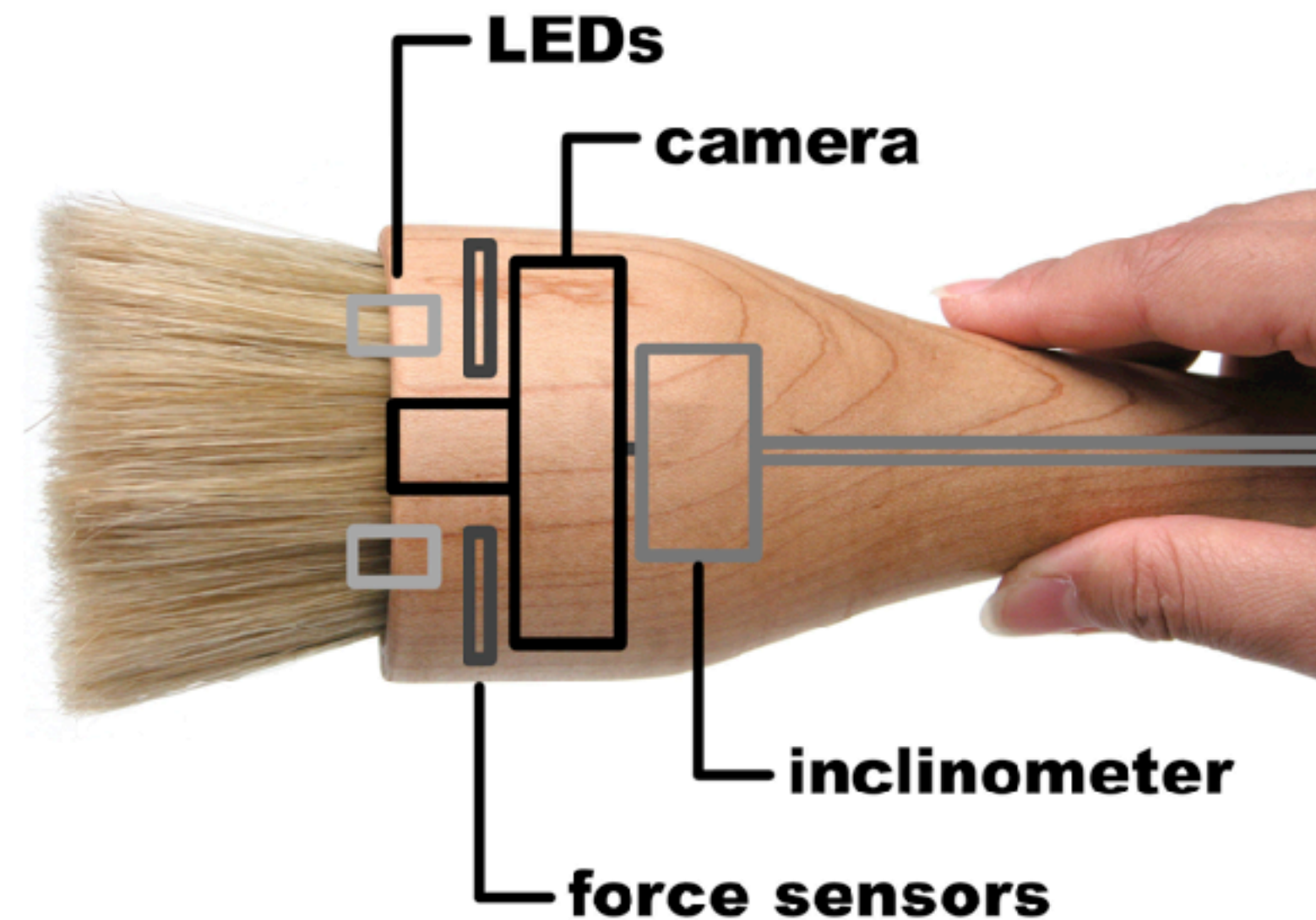
- An HCI research area coined by Ben Shneiderman in 2005
- A framework for thinking about how we can design software tools that support creativity
- “Who are the users? Software support seems most realizable and beneficial for innovative scientists, doctors, lawyers, musicians, artists, teachers, or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

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

Draco, Kazi et al., CHI 2014



Figure1: Teddy in use on a display-integrated tablet.

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

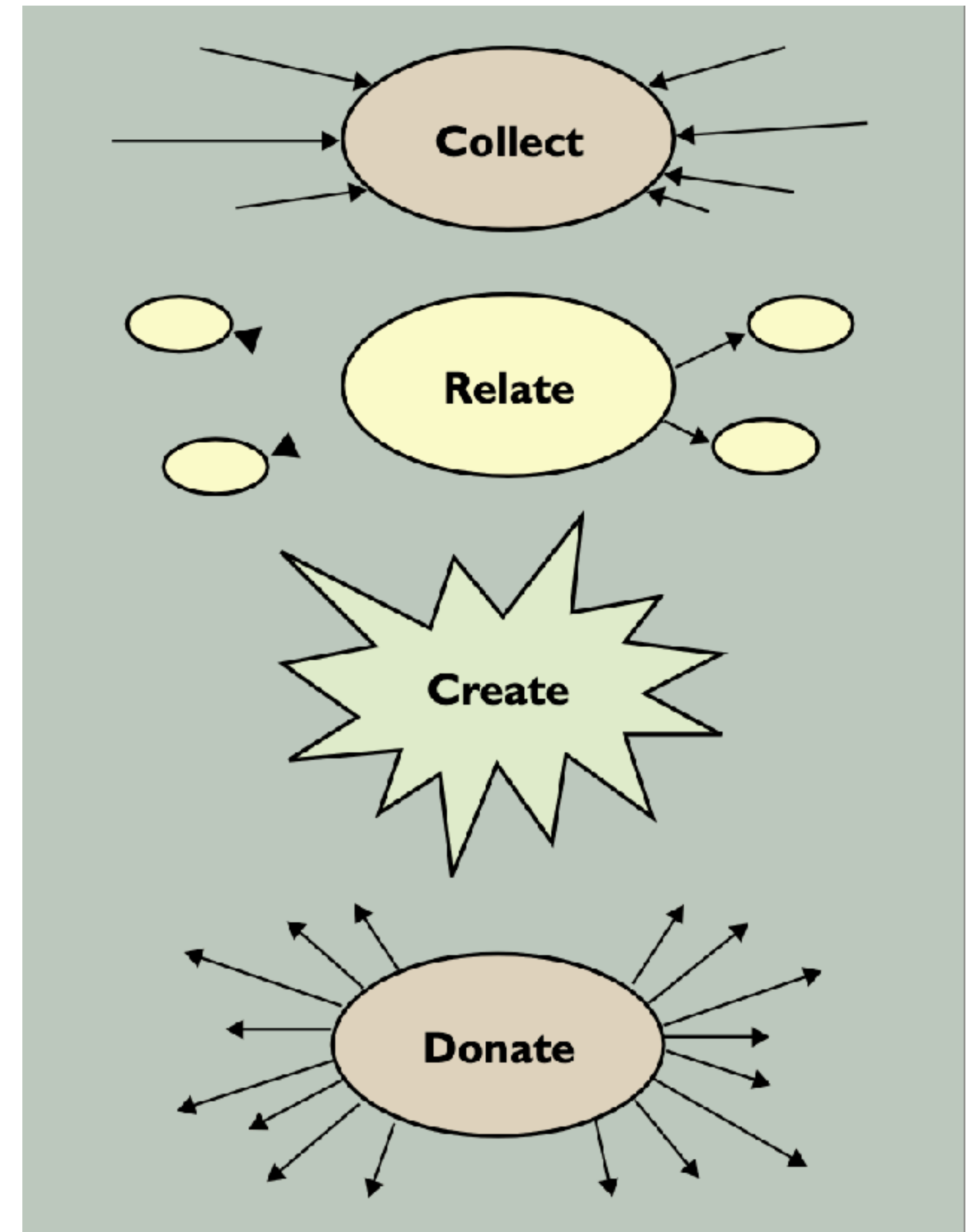
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CST commonalities

- 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

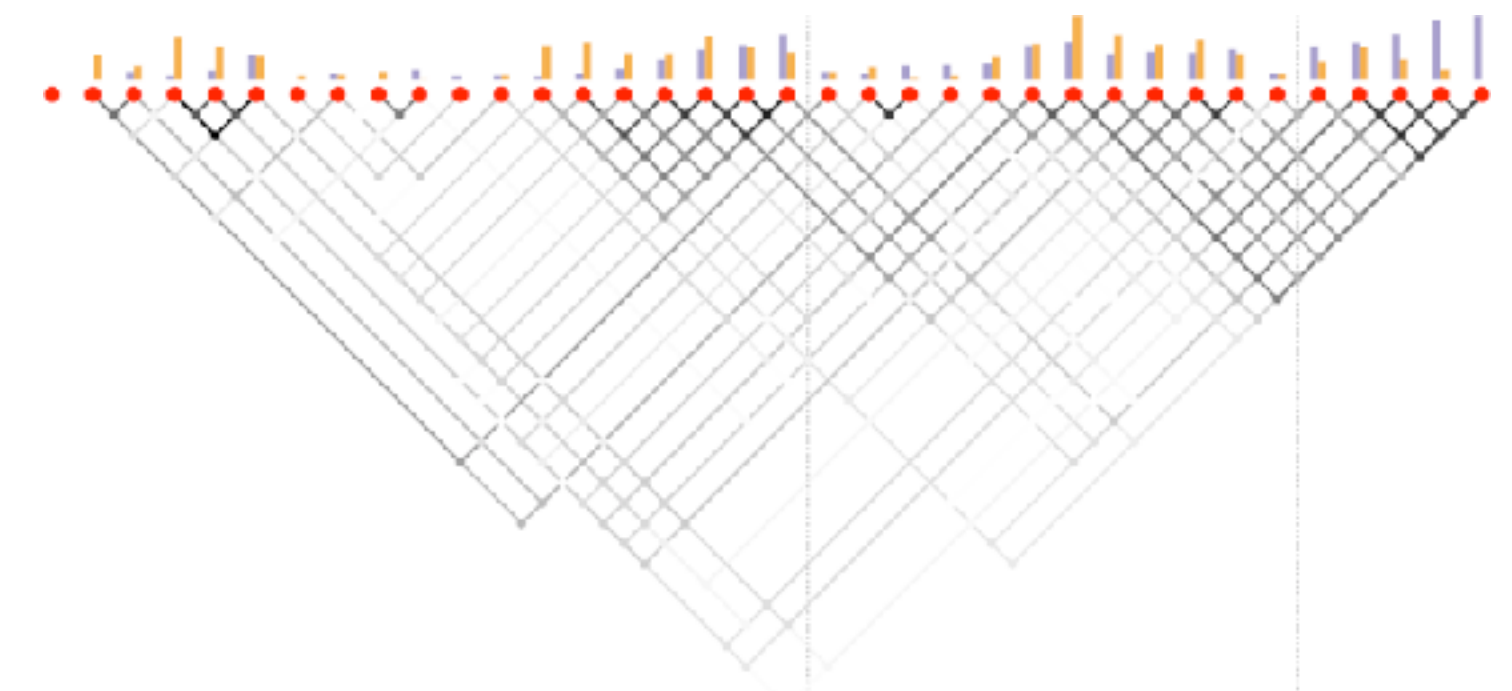


Shift from artifact to process

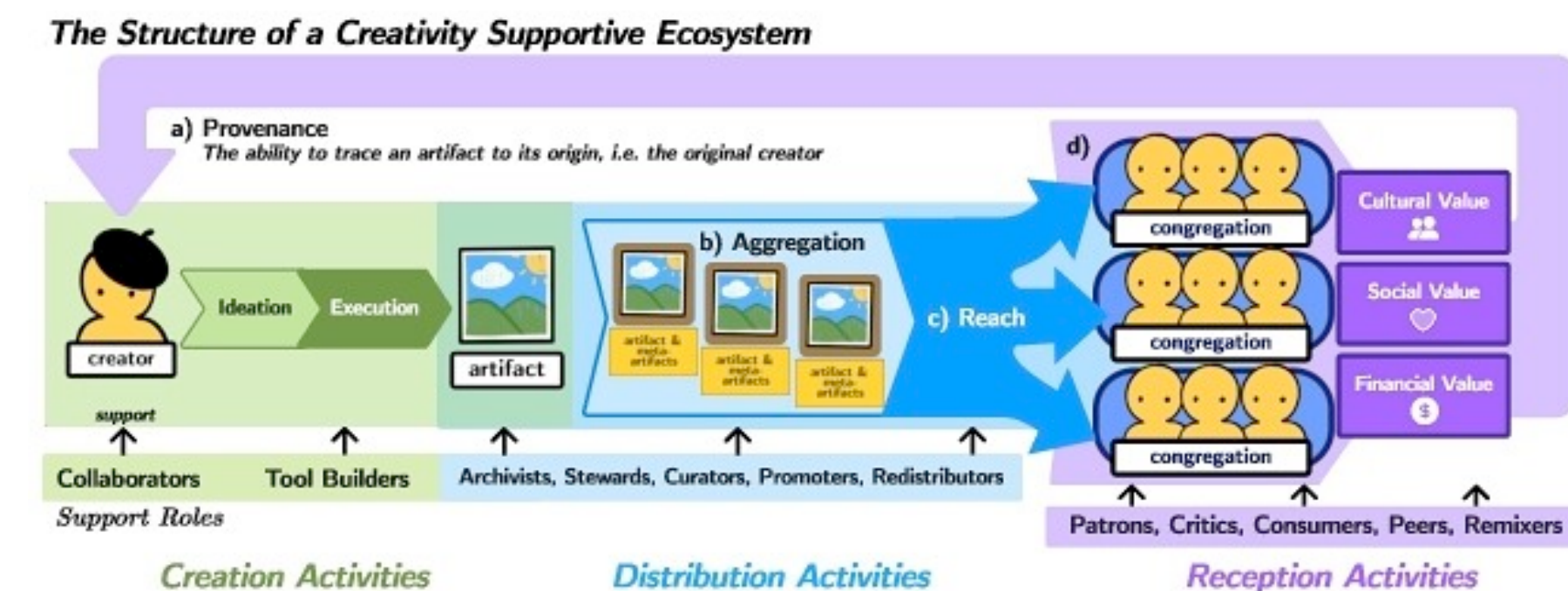
- Some HCI researchers now believe creativity is so much more than making a finished product. It's about the creative *process*.
- More emphasis on
 - Prioritizing moments of reflection through friction, failure
 - Capturing & analyzing creative processes to understand activities at scale ("creative 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>



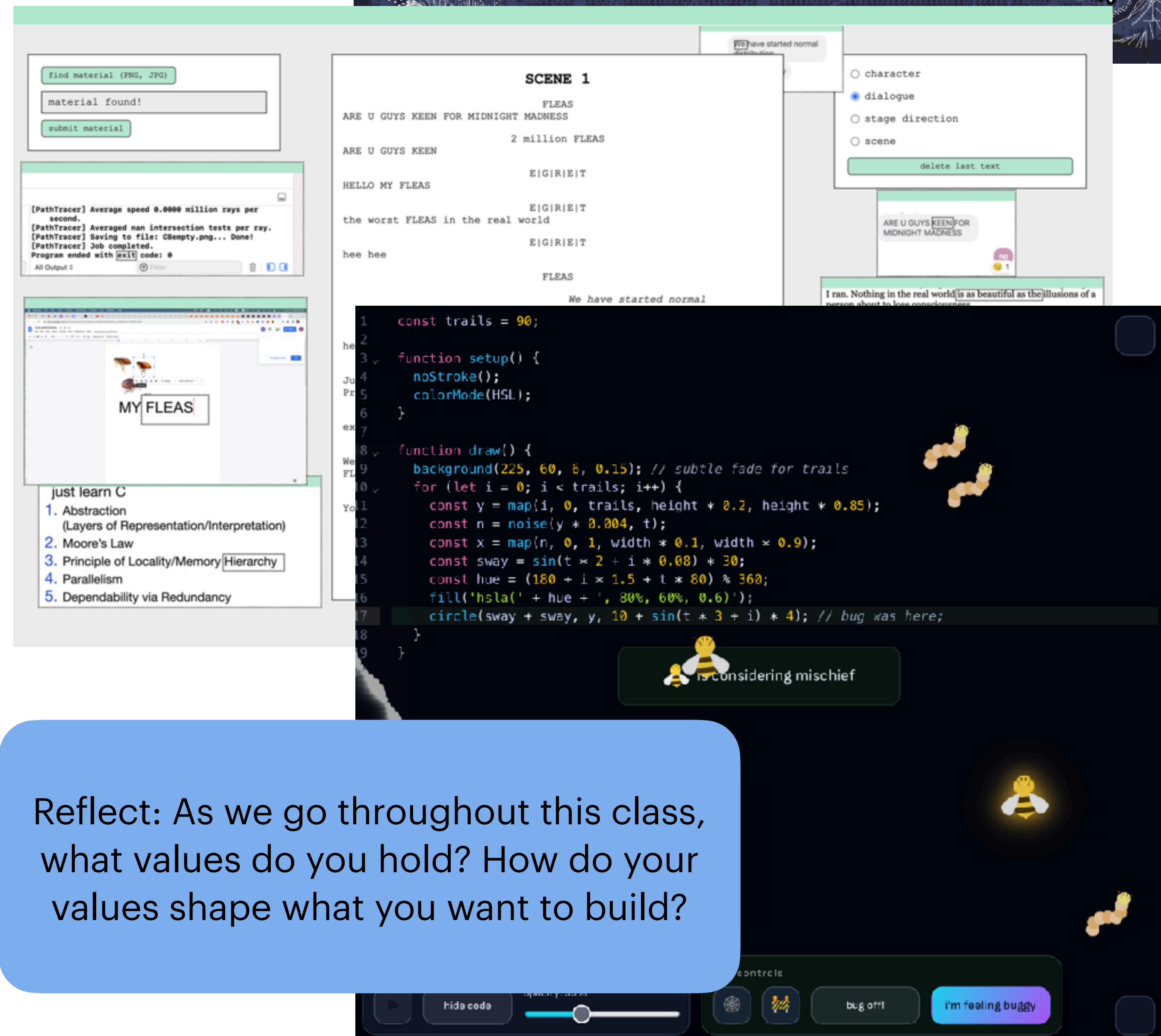
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“Artistic” support tools

- 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



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