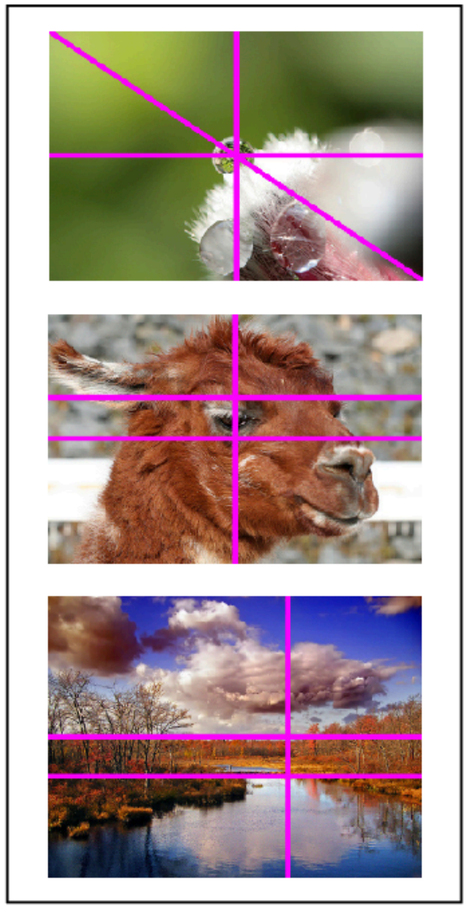
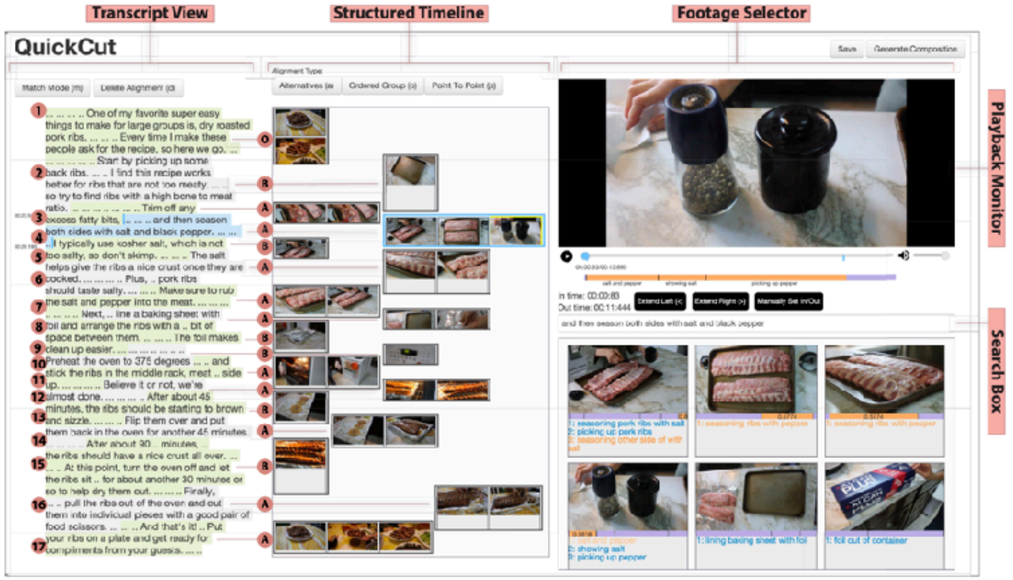
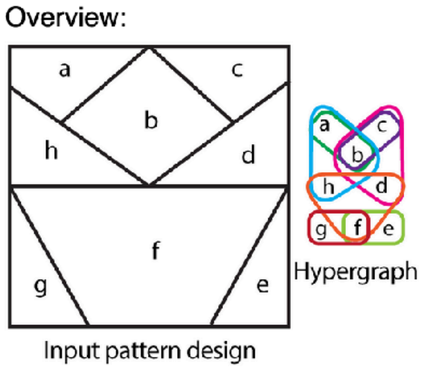
CS181DT Class 10: Creativity support tools



Adaptive Photographic Composition Guidance by E et al. (CHI 2020)



QuickCut: An Interactive Tool for Editing Narrated Video by Truong et al. (UIST 2016)



Sewn result

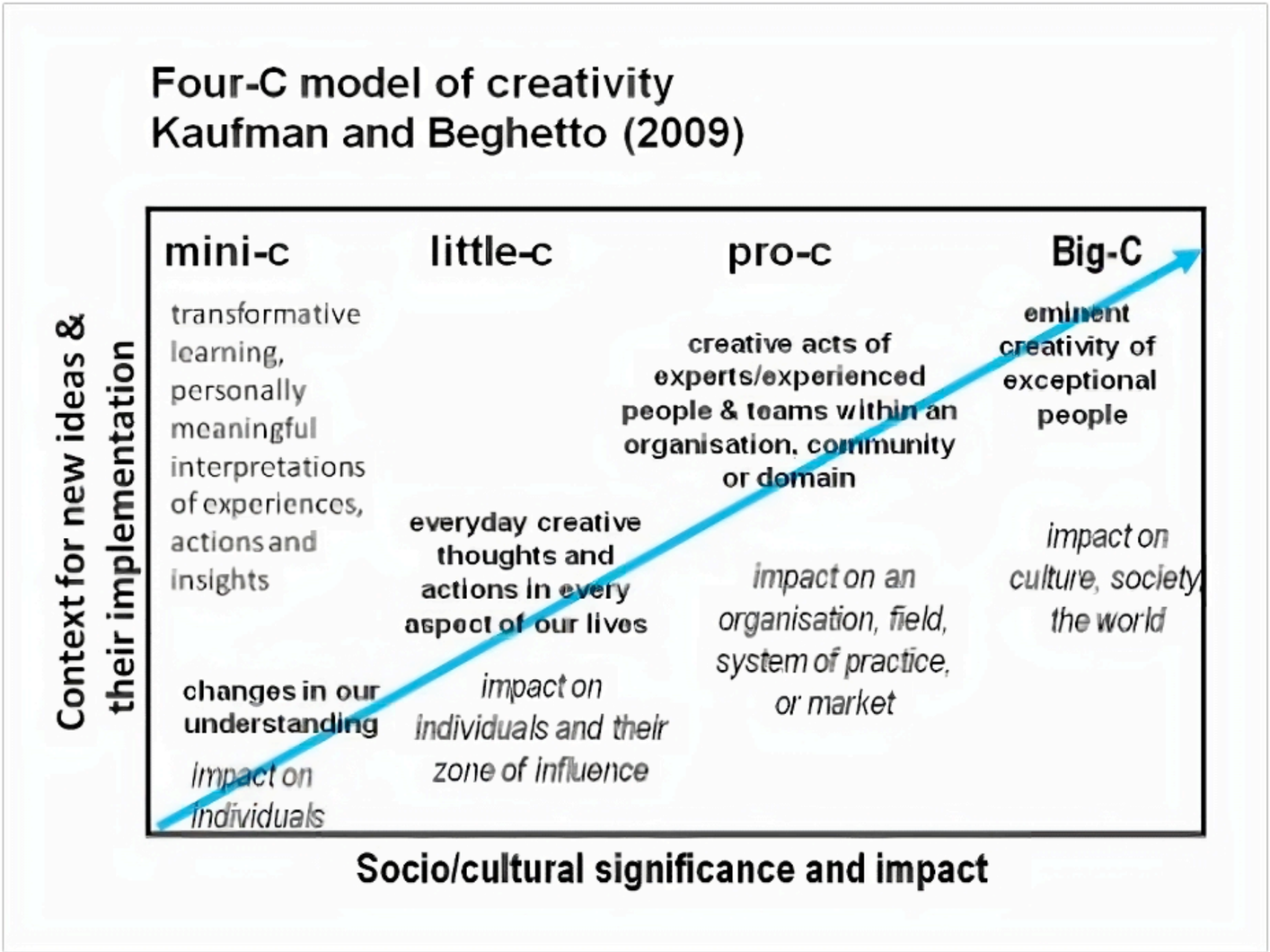
A Mathematical Foundation for Foundation Paper Pieceable Quilts by Leake et al. (SIGGRAPH 2021)

Class 10 agenda

- Zipcrit
- Lecture: What is creativity? How can we build tools to support it?
- Break
- Seminars

What is creativity?

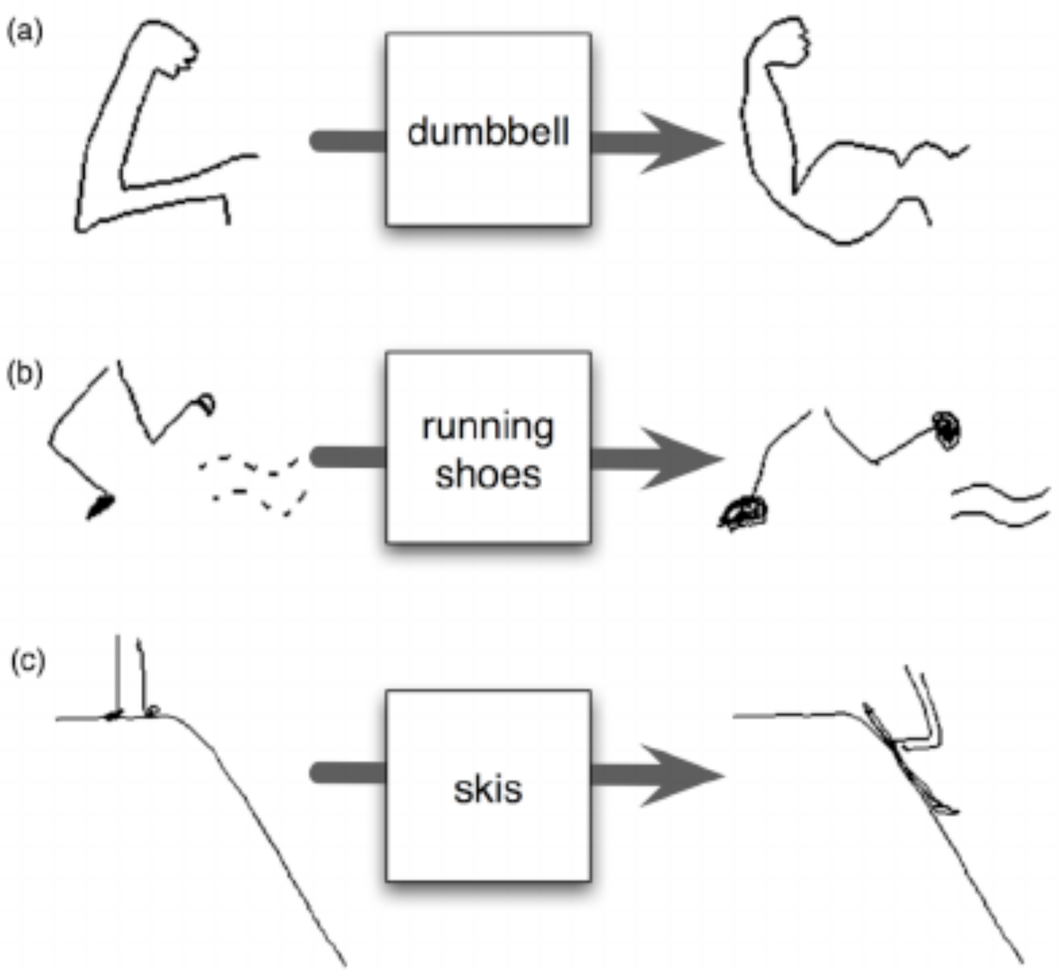
Four-C model of creativity: context matters



- Big-C: Picasso, Beyoncé, Einstein
- pro-c: professionals
- little-c: mundane creativity like taking an art class, your hacks
- mini-c: more around gaining personal skills, like kids' fridge artworks

How can we build tools to support creativity?

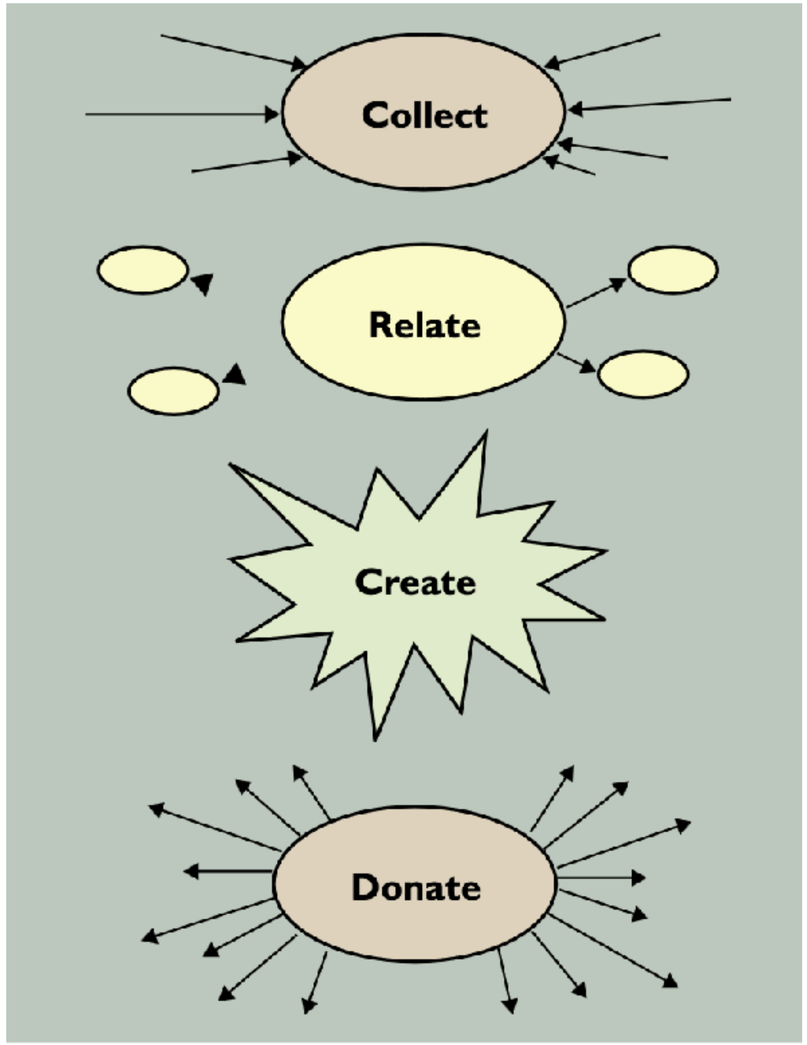
Three metaphors for creativity support tools



Meanings of Tools, Support, and Uses for Creative Design Processes. Nakakoji 2006.

- **Dumbbells** help you build muscle
  - Tools to help you learn and build skills but aren’t your “end goal”, e.g., bezier game
- **Running shoes** help you run faster
  - Tools to make an existing task easier, e.g., using Photoshop instead of MS Paint
- **Skis** enable you to ski; without them you can’t
  - Tools that enable a new experience, e.g., Powerpoint/Keynote for creating slides

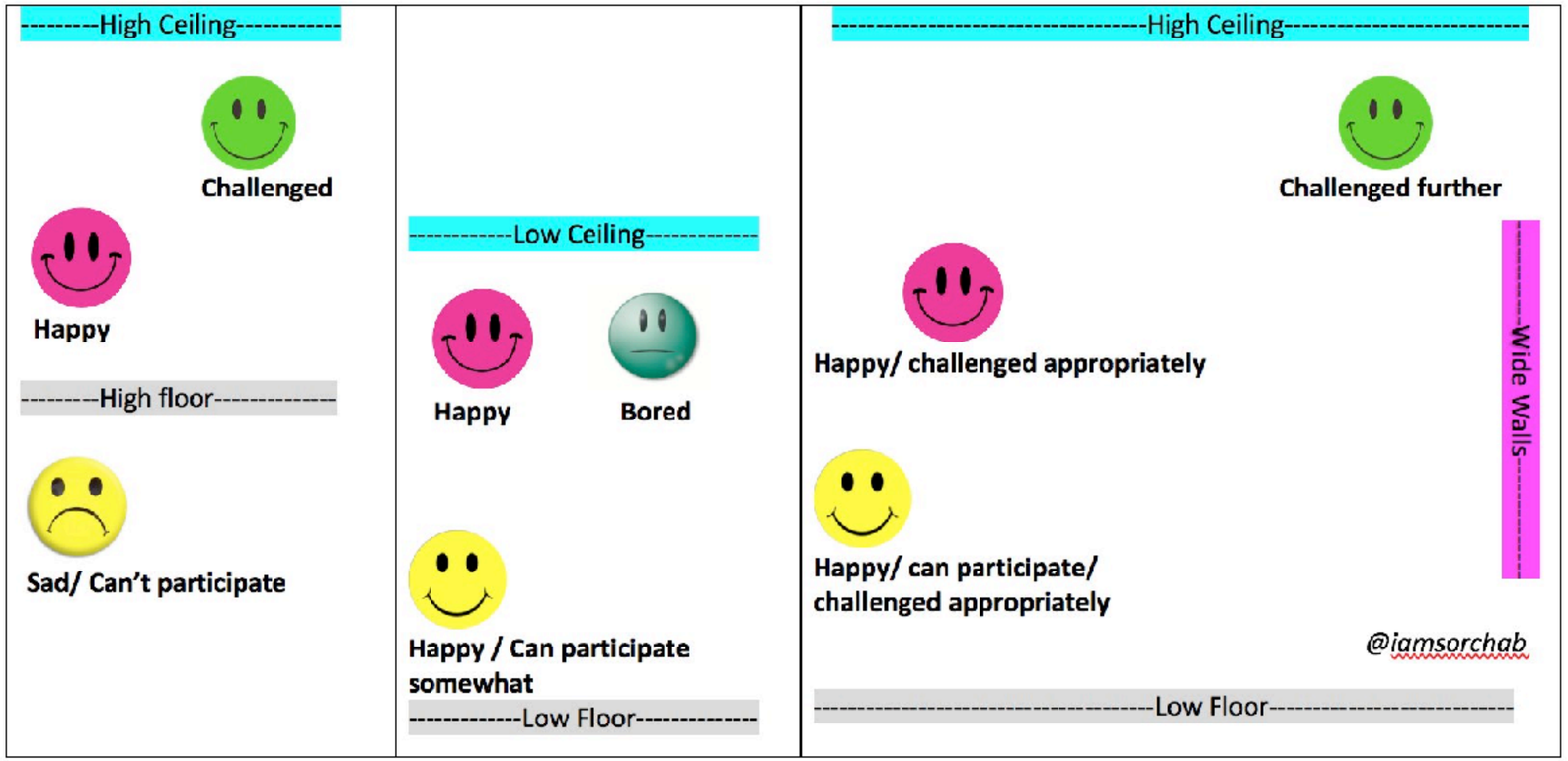
Creativity support tools (Shneiderman)



Creativity support tools: accelerating discovery and innovation. Shneiderman 2007.

- 4 **activities** to support creativity: collect (brainstorm/ inspiration), relate (consult others), create (actually make the thing), donate (share results)
- 8 **tasks** that people do during these activities
  - searching
  - visualizing
  - consulting
  - thinking
  - exploring
  - composing ← lots of tools
  - reviewing
  - disseminating

Low floors, high ceilings, wide walls



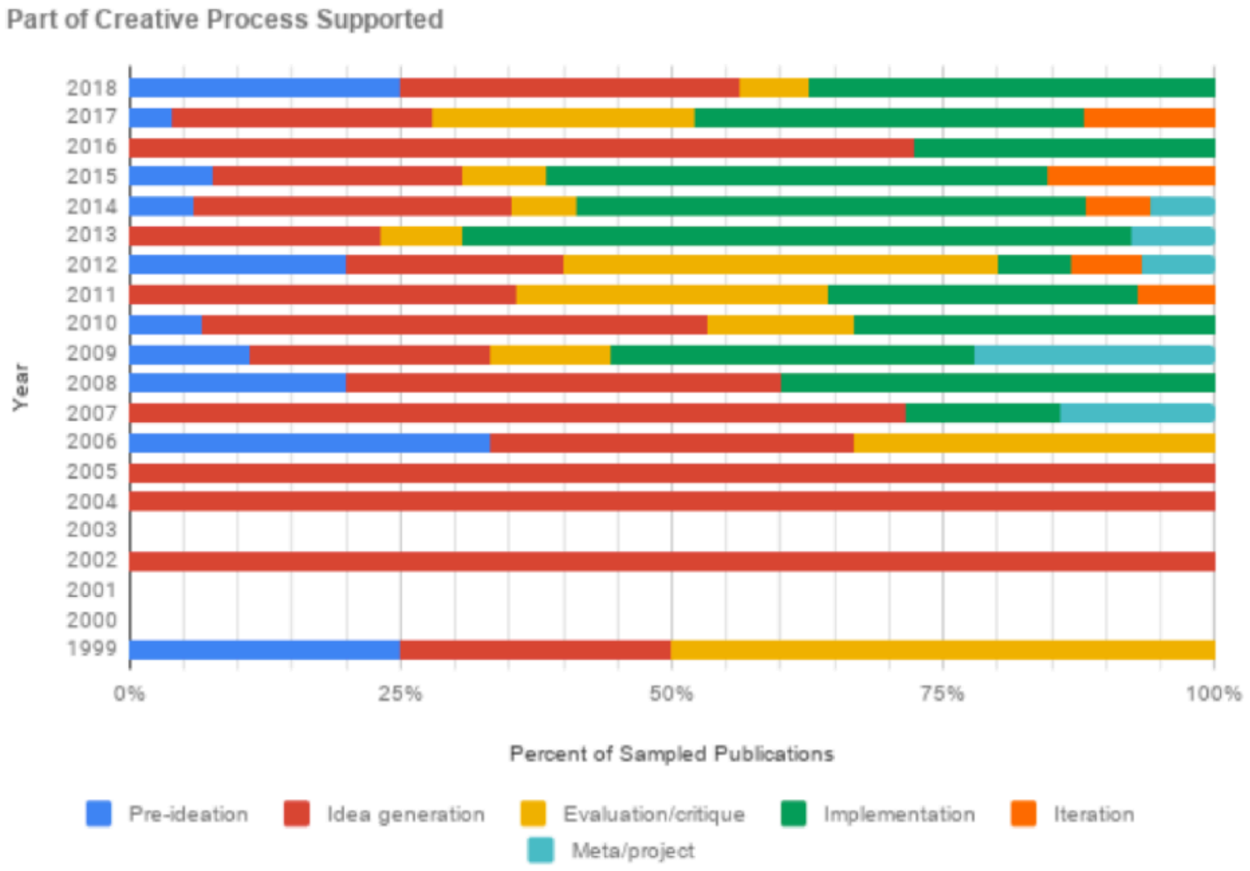
Graphic from https://twitter.com/iamsorchab/status/1322120755296018439

Some Reflections on Designing Construction Kits for Kids. Resnick et al. 2005.

- Floor - barrier for entry
- Ceiling - skill cap, level of sophistication
- Walls - range of exploration and possibility

Example implementation CSTs

What are trends in CST research?



Mapping the Landscape of Creativity Support Tools in HCI. Frich et al. 2019.

- Reviewed 143 publications from 1999-2018 and looked at device type, complexity, availability, maturity, part of creativity process, user group, evaluation technique, and collaboration
- 92% of CSTs are on digital devices (desktop, tablet)
- 65% of CSTs are high fidelity prototypes (exist as a proof of concept but not available for public download)
- CSTs target expert designers (33%) followed by “novices” (17%)

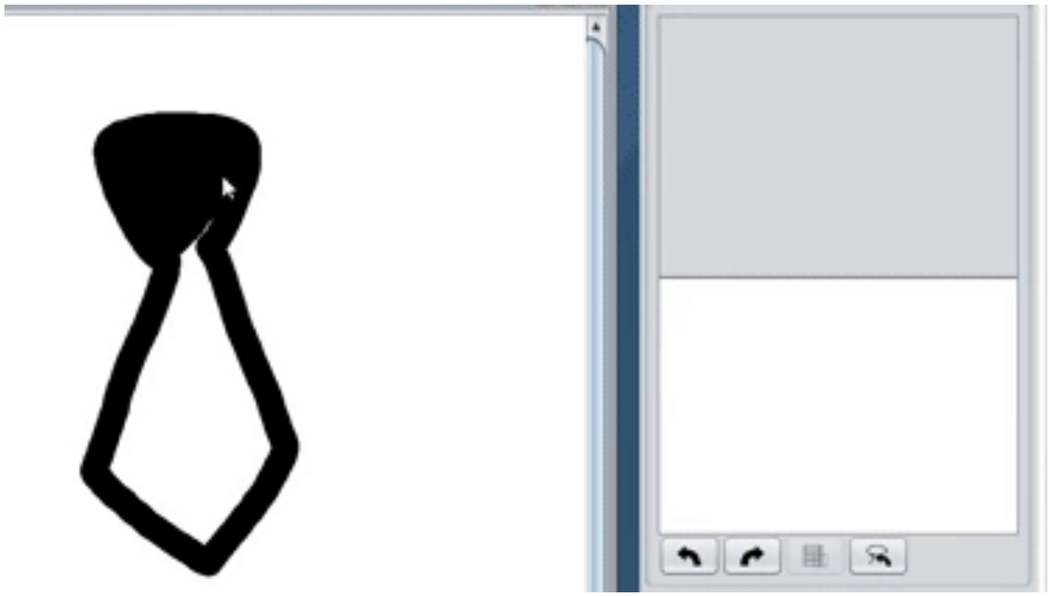
How to analyze CSTs

- Who are the users? Individual or group?
- What is the domain of use?
- What is the problem?
- What is the computational solution?

Your RRs practiced this analysis.
Also questions to ask yourself for the final project brainstorming!

Selective Undo

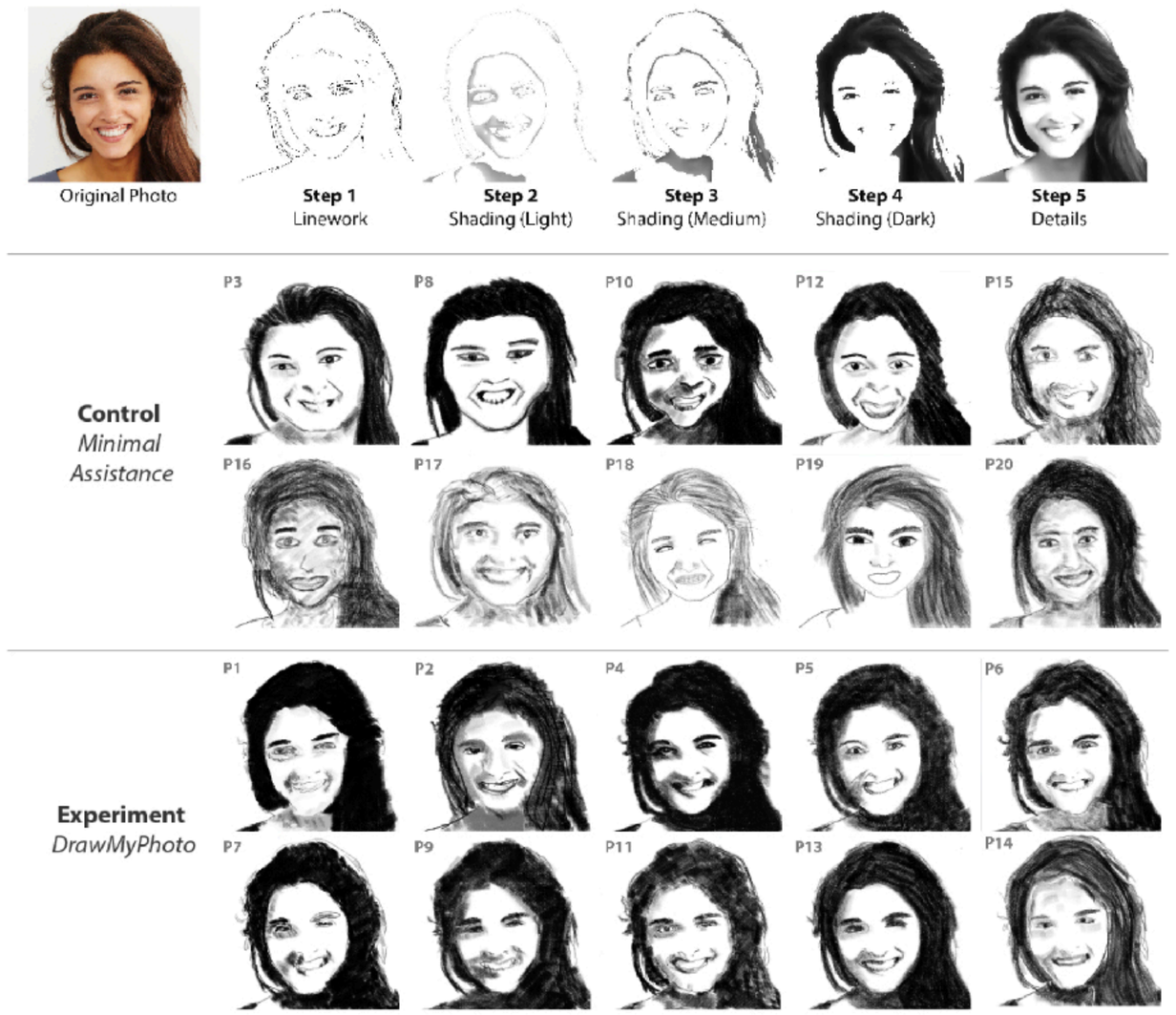
- Who are the users? Individual or group?
  - Individual users, both novice and expert
- What is the domain of use?
  - Digital art drawing applications
- What is the problem?
  - Linear undo
- What is the computational solution?
  - Remove operation from history and re-perform all following actions (script model)



Selective Undo Support for Painting Applications. Meyers et al. 2015.

DrawMyPhoto

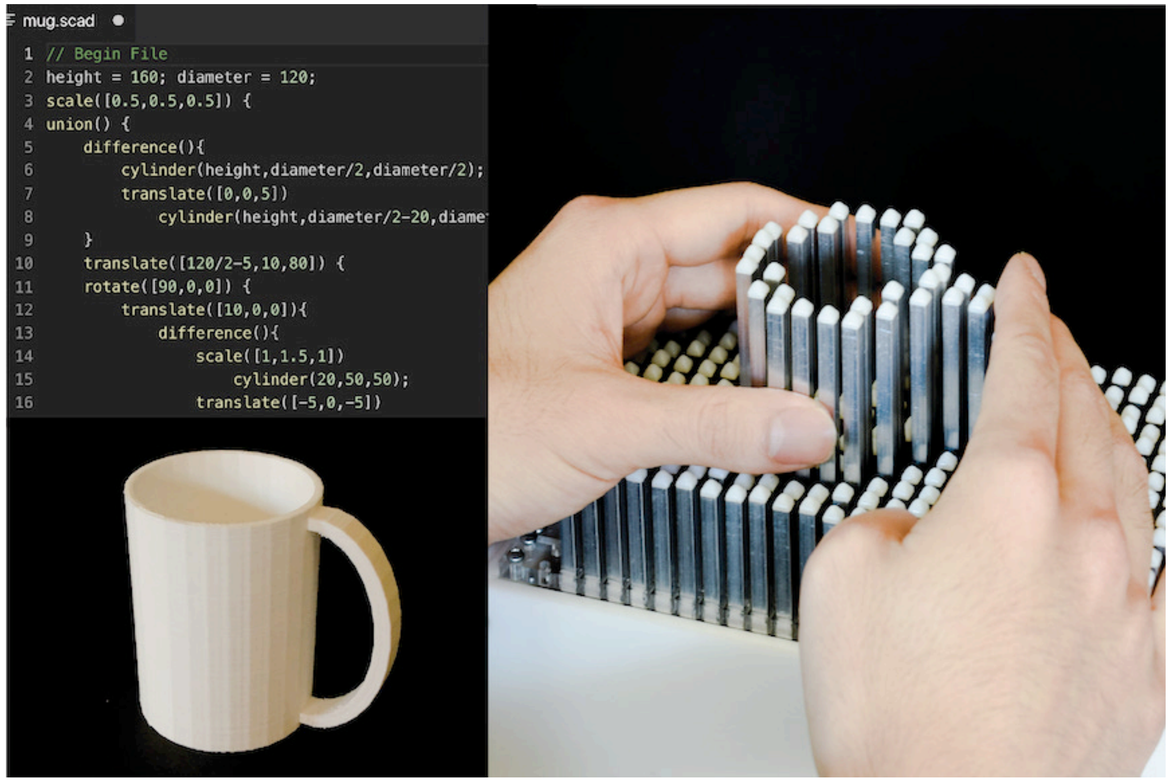
- Who are the users? Individual or group?
  - Individual users, novices
- What is the domain of use?
  - Drawing realistically
- What is the problem?
  - It’s hard to draw accurately
- What is the computational solution?
  - Apply filters on a photograph and show them in specific steps to guide users to draw



DrawMyPhoto: Assisting Novices in Drawing from Photographs. Williford et al. 2019

shapeCAD

- Who are the users? Individual or group?
  - Individual, people who are blind or visually impaired
- What is the domain of use?
  - 3D modeling
- What is the problem?
  - Feedback on 3D models is visual
- What is the computational solution?
  - Use a screenreader to write code to generate 3D models and render them on a 2.5D pin display



shapeCAD: An Accessible 3D Modelling Workflow for the Blind and Visually-Impaired Via 2.5D Shape Displays. Siu et al. 2019

Object Oriented Drawing

- Who are the users? Individual or group?
  - Individual users, both novice and expert
- What is the domain of use?
  - Vector graphics
- What is the problem?
  - Hard to edit style attributes of graphics at once
- What is the computational solution?
  - Create object-oriented “Attribute objects” where you can directly manipulate styles and drag to apply to many different geometries

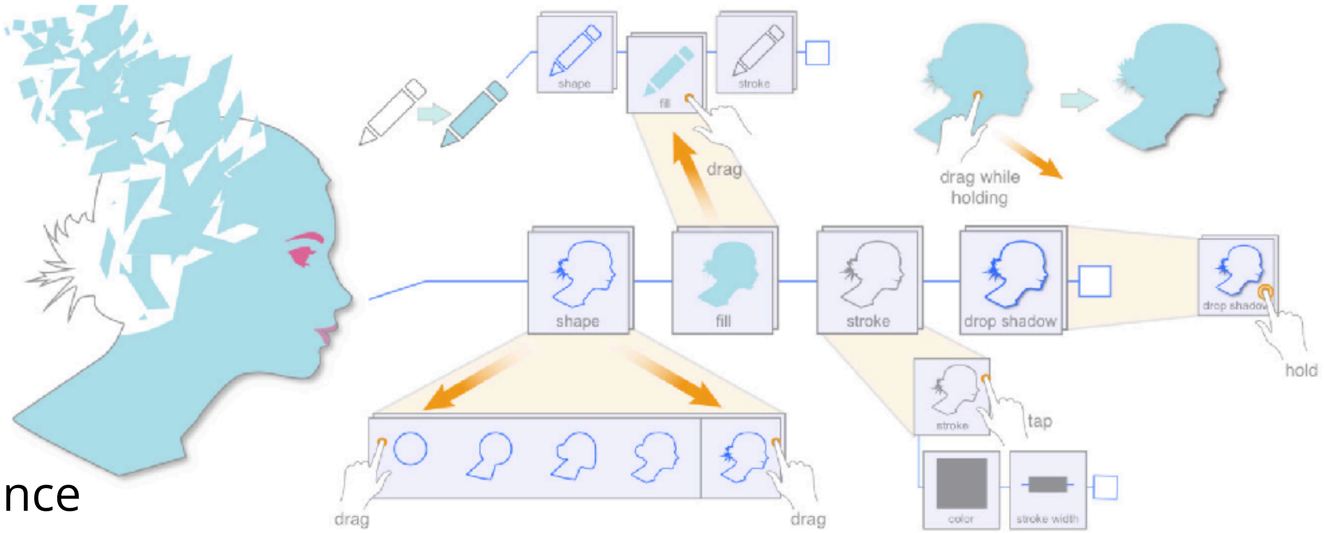
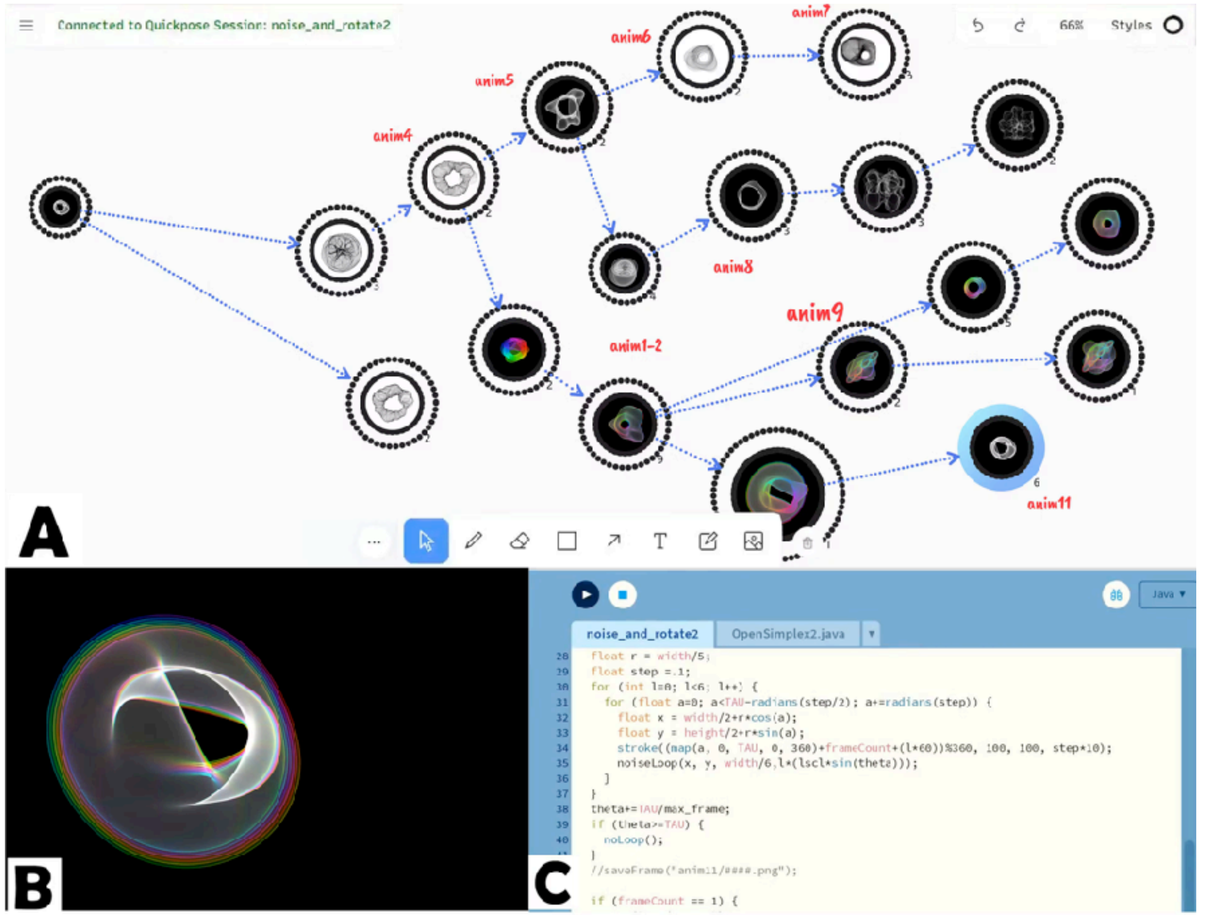


Figure 1. Object-Oriented Drawing replaces most traditional WIMP UI with Attribute Objects which may be directly manipulated with traditional direct-touch gestures. This enables powerful and fluid interaction on touchscreen-based devices.

Object-oriented drawing. Xia et al. 2016.

Quickpose

- Who are the users? Individual or group?
  - Individual users, both novice and expert
- What is the domain of use?
  - Creative coding (processing)
- What is the problem?
  - Creative version control is hard. Also version history can itself be a material
- What is the computational solution?
  - Represent version history as a DAG that is browsable and annotatable



Understanding Version Control as Material Interaction with Quickpose. Rawn et al. 2023

Why do CST research?

- Research should result in *generalizable* knowledge
- Build a tool to show **new** ways of **interaction** or **new artifacts** that can be possible because of computation
  - Draco, Selective Undo, Object Oriented Drawing, shapeCAD
- Design probes to **understand** something more about **people** and creative practice
  - Quickpose
- Practice a manual creative skill or just have fun
  - DrawMyPhoto, I/O Brush

Seminars

Class 10 recap

- TODOs:
  - Monday - **PM4, 3D print for protest**
    - Once again, mentor sessions will be in the HMC makerspace
  - In class Monday we'll start to brainstorm ideas for the design tool final project; we'll form groups on Weds