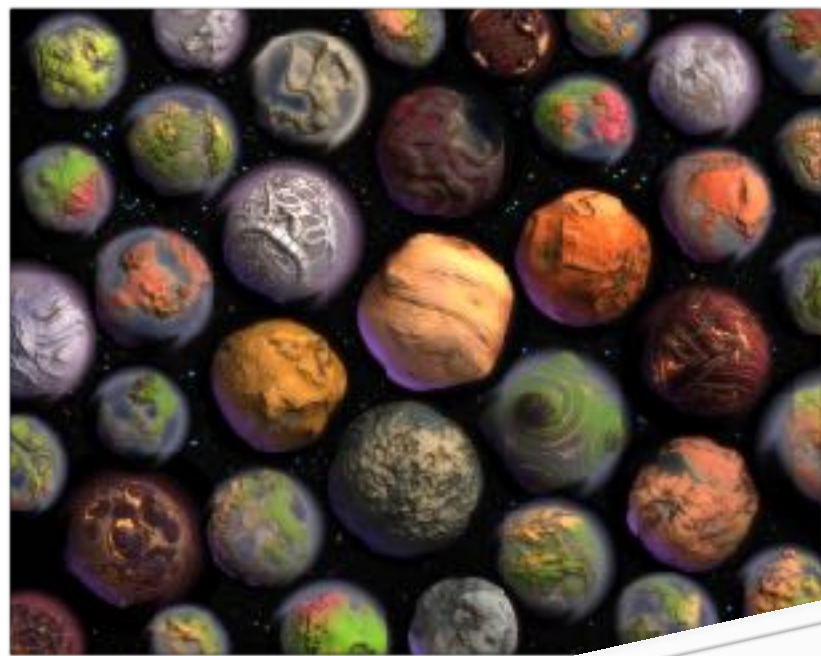


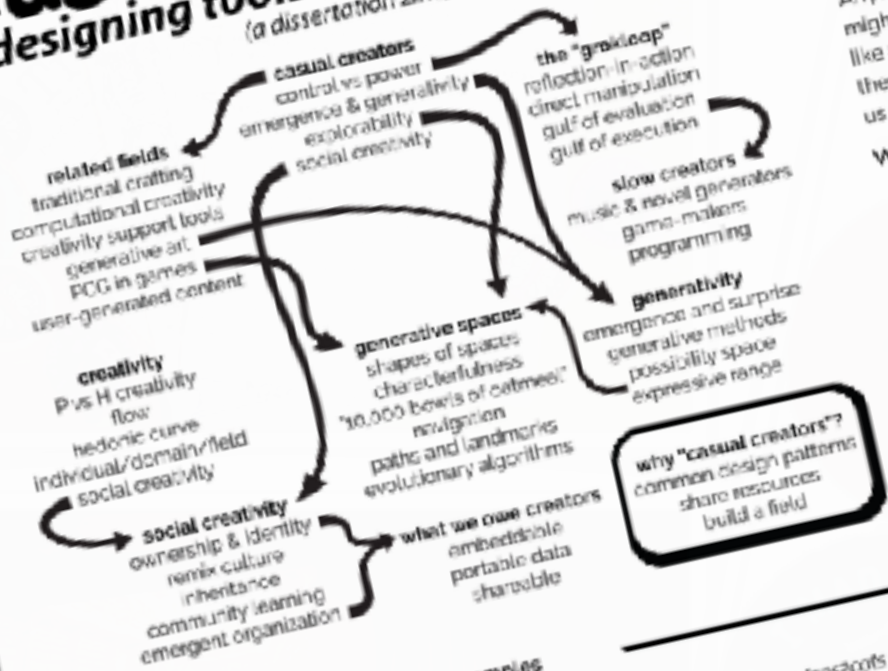


(newly Dr.)
Kate Compton



Casual Creators

designing tools for casual creativity
(a dissertation zine)



examples

Kid Pix	Scratch	non-digital casual creators:	Bubble Hop	edgescrubs
Spore Creature Creator		Spirograph, Rolling Nancy	Twine	Context-Free Art
photo filters	Pinball Construction Set	Totipot, Rainbow Loom	Galactic Arms Race	Rollercoaster Tycoon
Minecraft	GeoGebra	pottery wheel, millifiori		Wolfram One
Neural Doodle	Mindomo	weaving, zentangle,	Electric Sheep	Botnik
Let's Create! Pottery	Line Rider	Point-by-Number, Modjacks	Skyline	Predictive Writer
	Monopoly		CheepBotsDoneQuick	

Can AI be a Kindergarten Art Teacher?

We have created AI that can trade stocks, AI that can shoot weapons. Could we make AI of an encouraging kindergarten art teacher? What would an AI Bob Ross look like? This zine is about creativity for casual users, and how to write software systems (or apps) that enable casual creativity. I call apps like that "Casual Creators".

Anything with a built-in system to casual creativity can be a casual creator. This might be a photo editing or music-making app, or it might be embedded in a game, like a character creator. It might even be a physical object, like a pottery wheel! All these systems share some properties, though, and what we learn from some can help us better design others.

What is a Casual Creator? A Casual Creator is:

- an interactive system that makes "artifacts"
- provides some mechanical or generative assistance
- generativity creates a rich possibility space
- enables fast, confident, and pleasurable exploration
- encourages a feeling of creativity and creative ownership
- often amplifies that feeling of creativity with social sharing

Usually they are digital, but not always (spirographs, rainbow looms, and pottery wheels are all examples of physical casual creators). These systems are used to make things, like art or music or patterns or 3D models. You can design a casual creator to make any sort of thing so in this zine I refer to the things the casual creator is making as "artifacts".

Here's my academic definition:

A Casual Creator is an interactive system that encourages the fast, confident, and pleasurable exploration of a possibility space, resulting in the creation or discovery of surprising new artifacts that bring feelings of pride, ownership, and creativity to the users that make them.

You have probably used lots of casual creators before. Lots of kids crafting kits make the casual creator trade-off (generative power vs control), but so do a lot of tools that don't expect mastery from their users (such as embedded systems like game-character creators).

There are many pieces of software designed for maximum creative control, to help the potential Mozarts of their field to create the magnum opus of their dreams. This zine isn't about that software, or about those users. Instead, this zine is about playful, doodling software that uses AI to help sort-of-creative people create sort-of-interesting things in not-very-much-time.

BOT MERIT BADGES

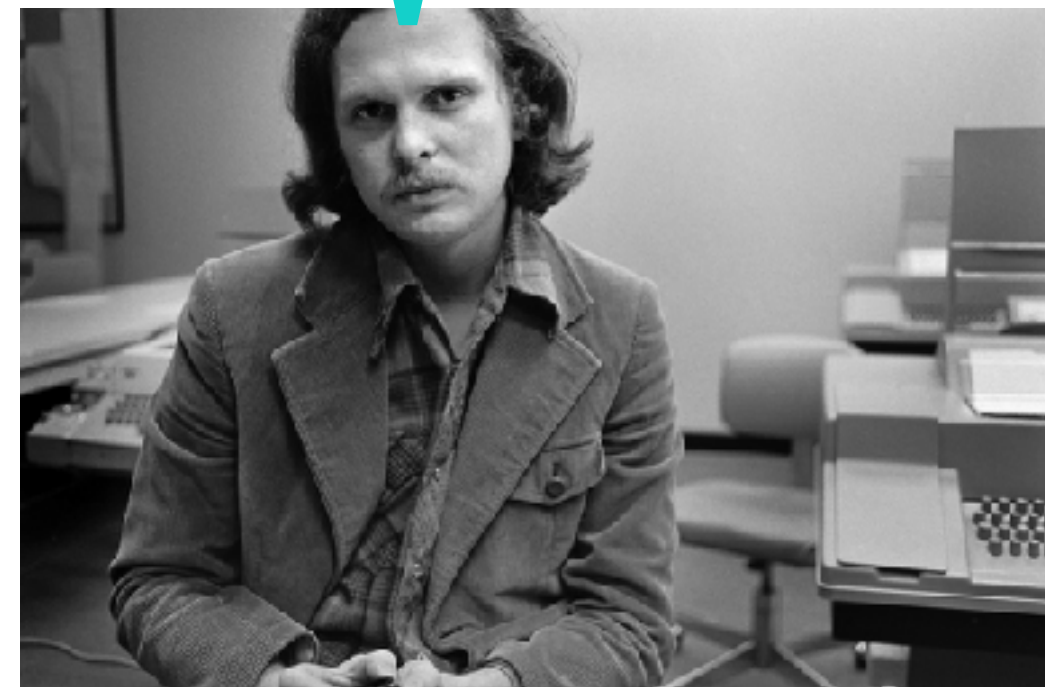
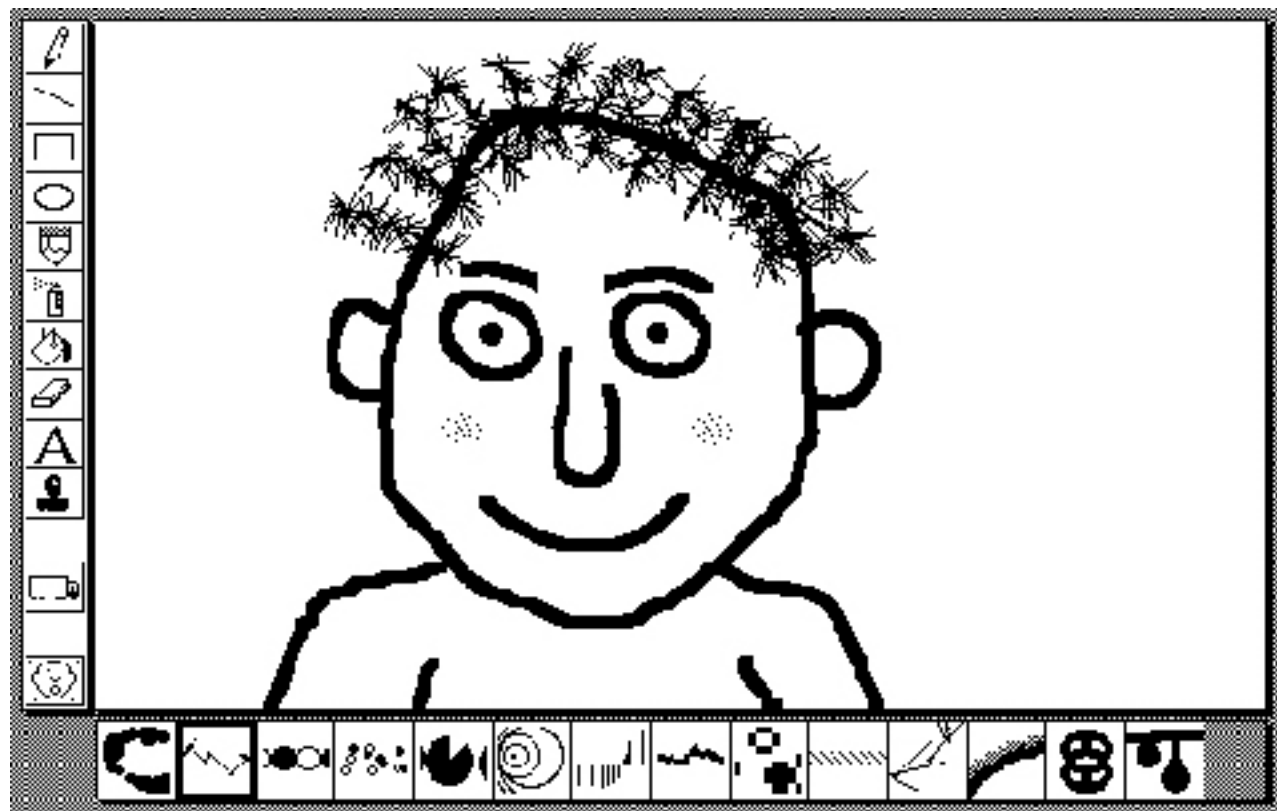
BY GALAXYKATE



Craig Hickman, Kid Pix 1989

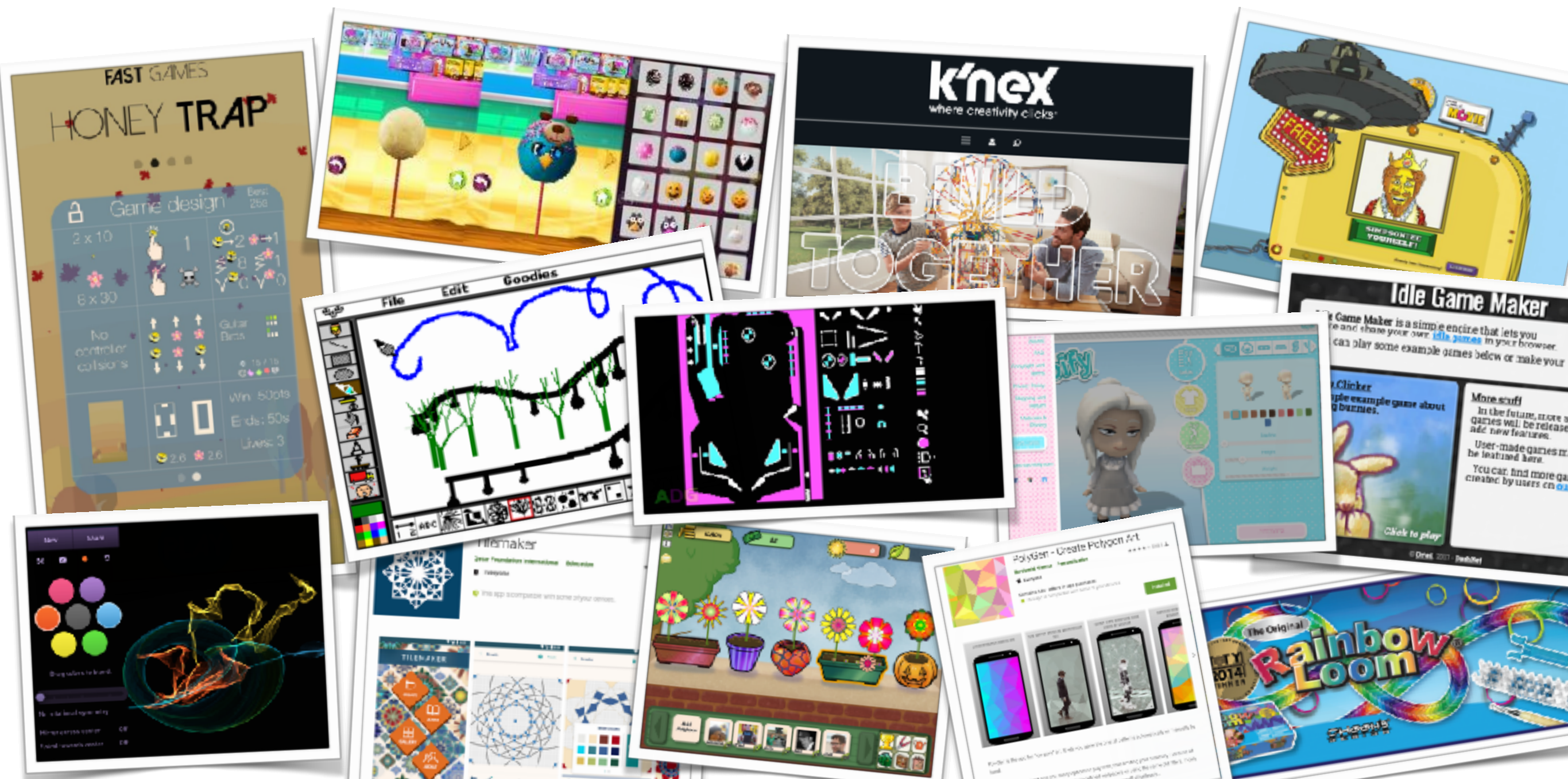
<http://red-green-blue.com/kid-pix-the-early-years>

1. **(The Prime Directive)** The program should be **extremely easy to use**. No manual should be needed and program features should "explain themselves" through use. All tasks should be able to be performed in the simplest, most straightforward way. The program should go out of its way to meet the user.
2. As long as The Prime Directive is not violated, every opportunity should be taken to make the program **surprising and satisfying to use**. No opportunity should be missed. **The process of making a picture should be as important as the picture produced.**



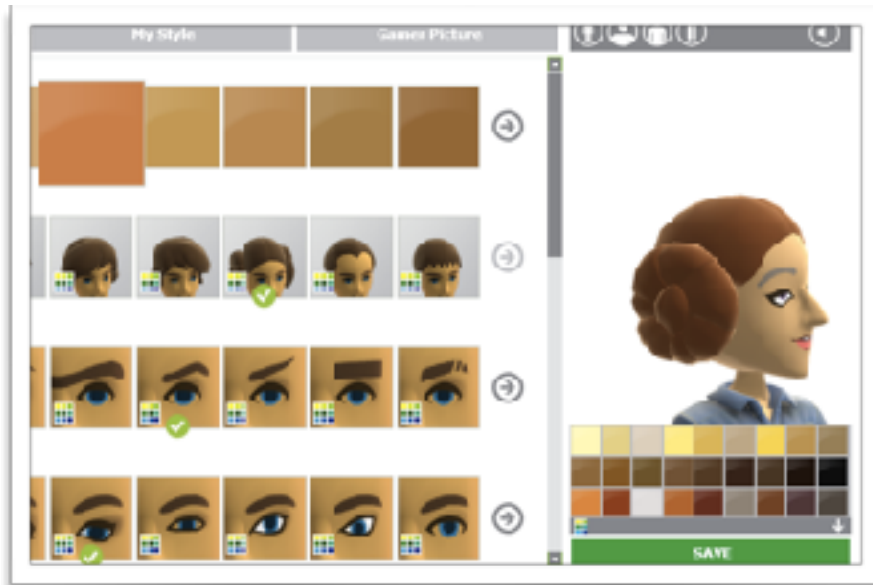
Casual creators...

are creativity systems for casual users

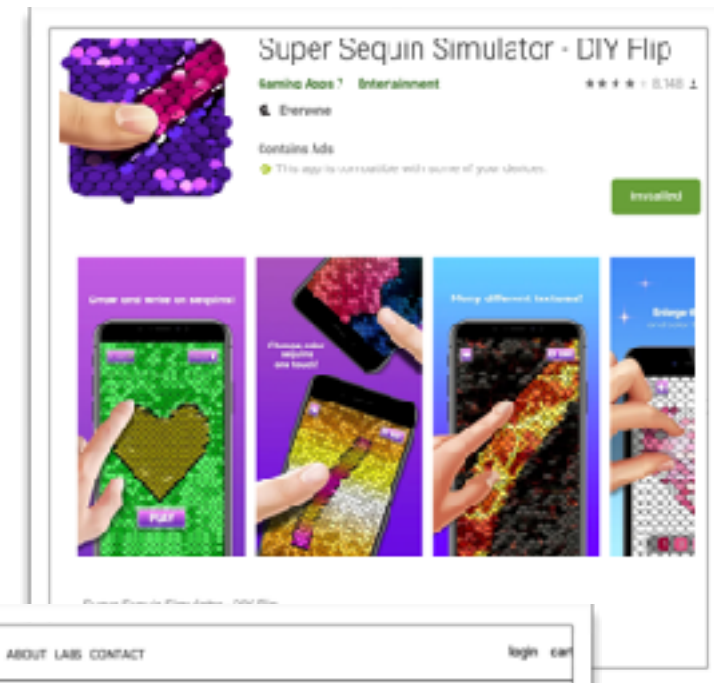
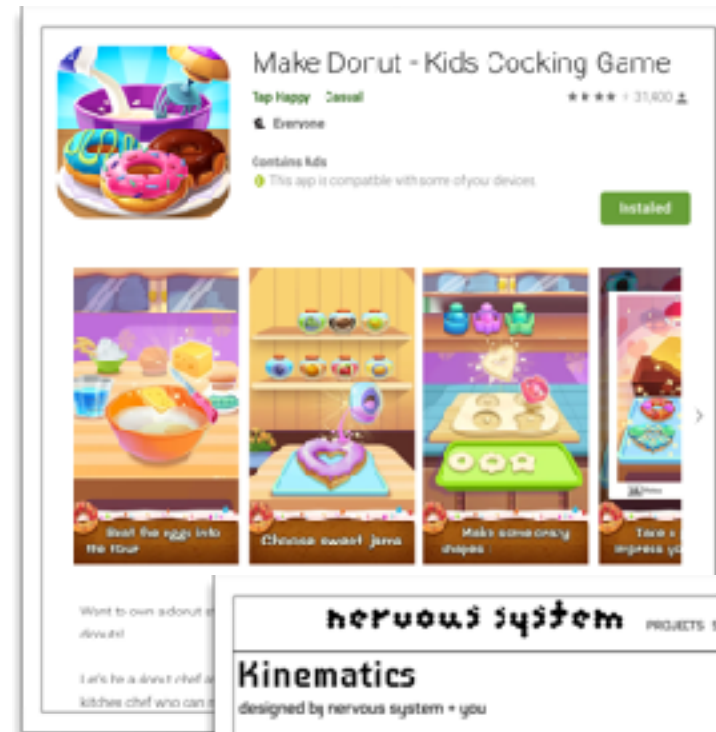


Casual creators...

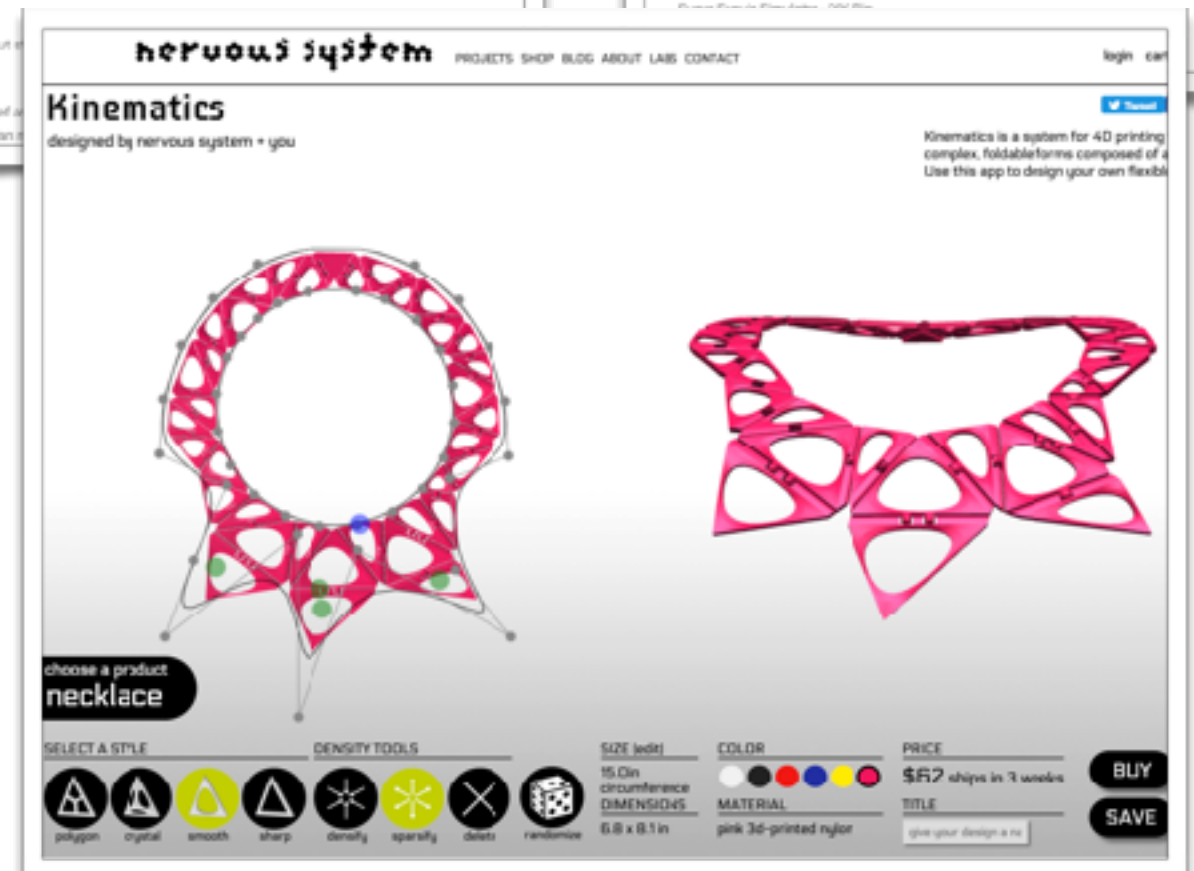
MiiMaker



Apps



Spore



Embedded in games

Casual creators...

Physical systems

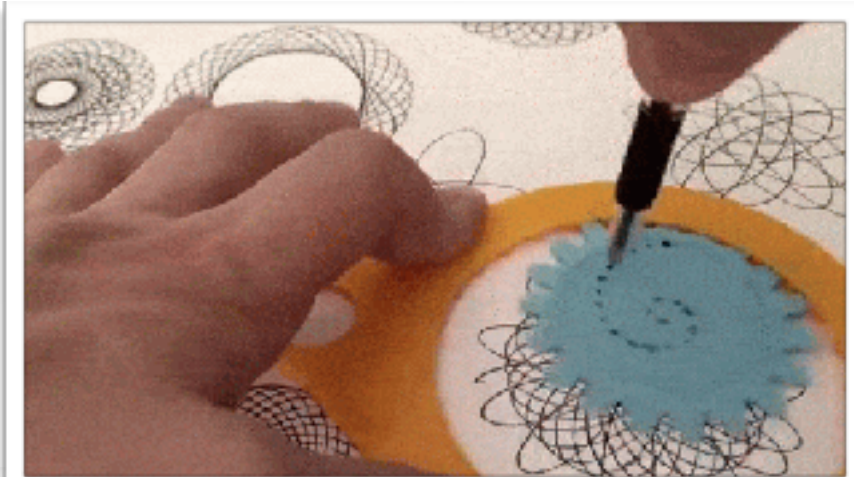


TeamLab. Aquarium

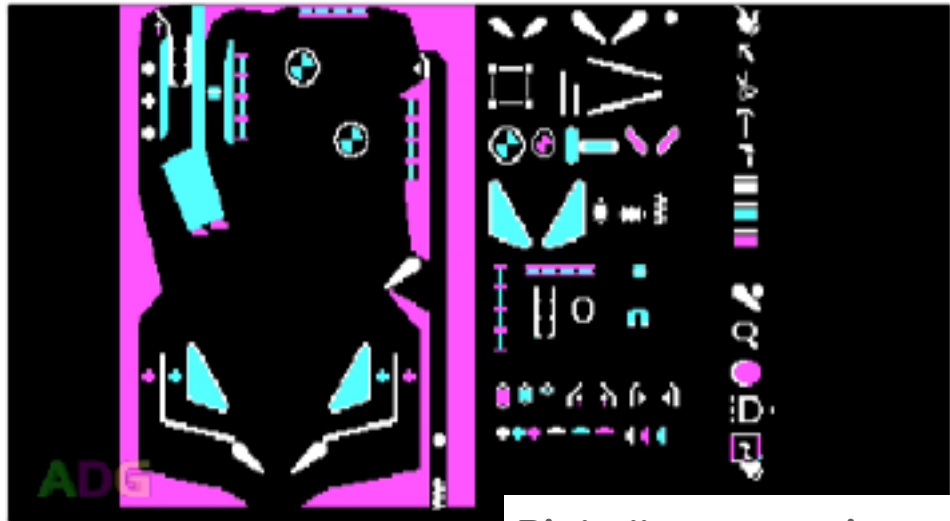
Ryokai, Kimiko, Stefan Marti, and Hiroshi Ishii. I/O brush



Installations



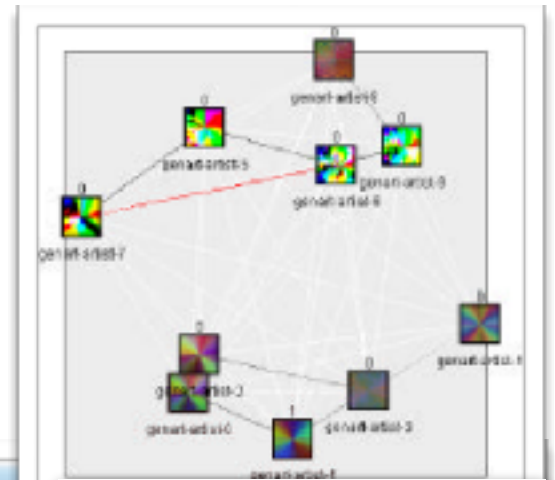
Casual creators...



Pinball construction set



TeeK.O.



Digital Clockwork Muse

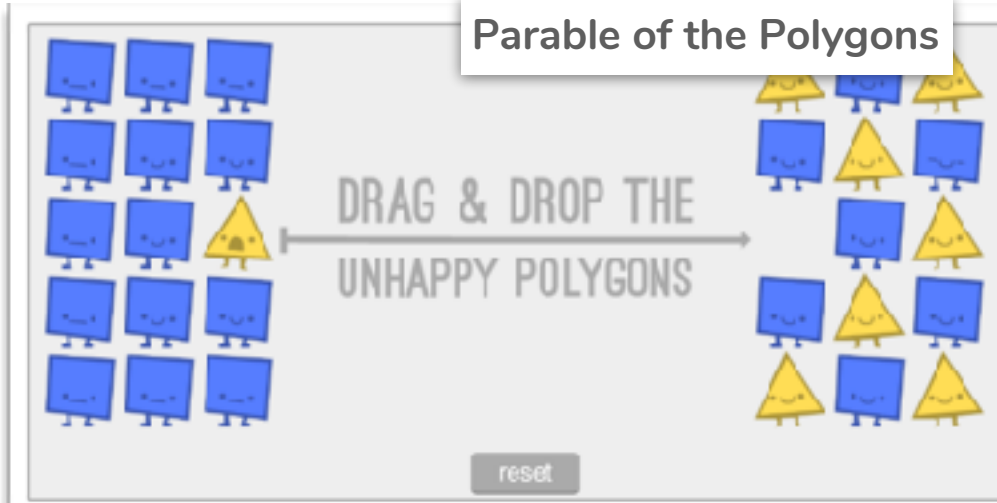
- Academic explorations
- Commercial systems
- Weird art.... things



Picbreeder



Recipe Dice



Parable of the Polygons



Petalz

Casual creators...

lets us draw a circle around
existing systems, and understand
what they have in common



Casual creators...

lets us draw a circle around
existing systems, and understand
what they have in common



Casual creators...

..are creativity systems where
the user values the **experience of creating**
more than the **thing they create**

and are willing to trade **total control** for
power, surprise, safety, & magic

...and the system is designed to **remove**
known barriers to creativity and **enable**
known creative phenomena





but first....

Pt 1: What we know about creativity

Creativity has many meanings



Virtuosic creativity



Expressive creativity



Situational creativity



Professional creativity

Boden, Margaret A. *The creative mind: Myths and mechanisms*. Psychology Press, 2004.

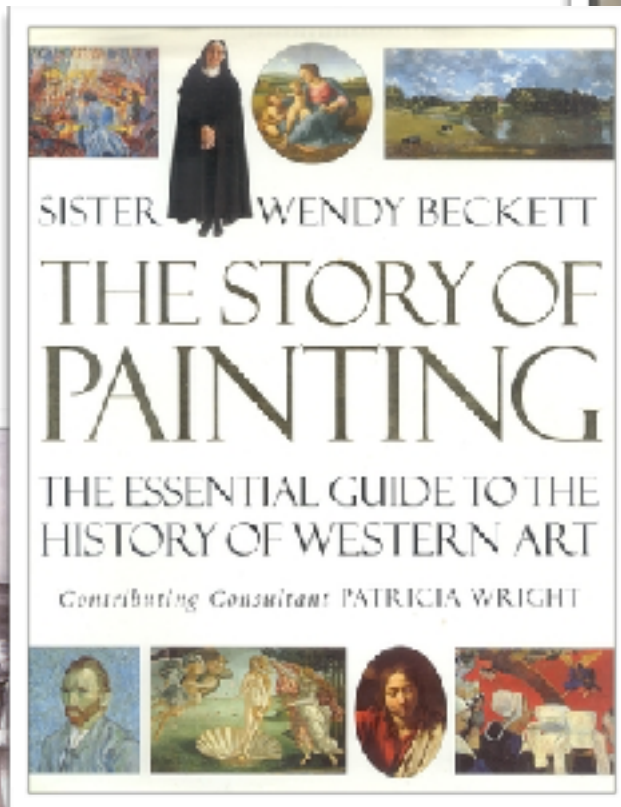
Kaufman, James C., and Ronald A. Beghetto. "Beyond big and little: The four c model of creativity." *Review of general psychology* 13.1 (2009): 1.

Simonton, Dean Keith. "What is a creative idea? Little-c versus Big-C creativity." *Handbook of research on creativity* (2013): 69-83.

Creativity has many meanings

Environmental creativity

Field, domain, individual



Embodied creativity

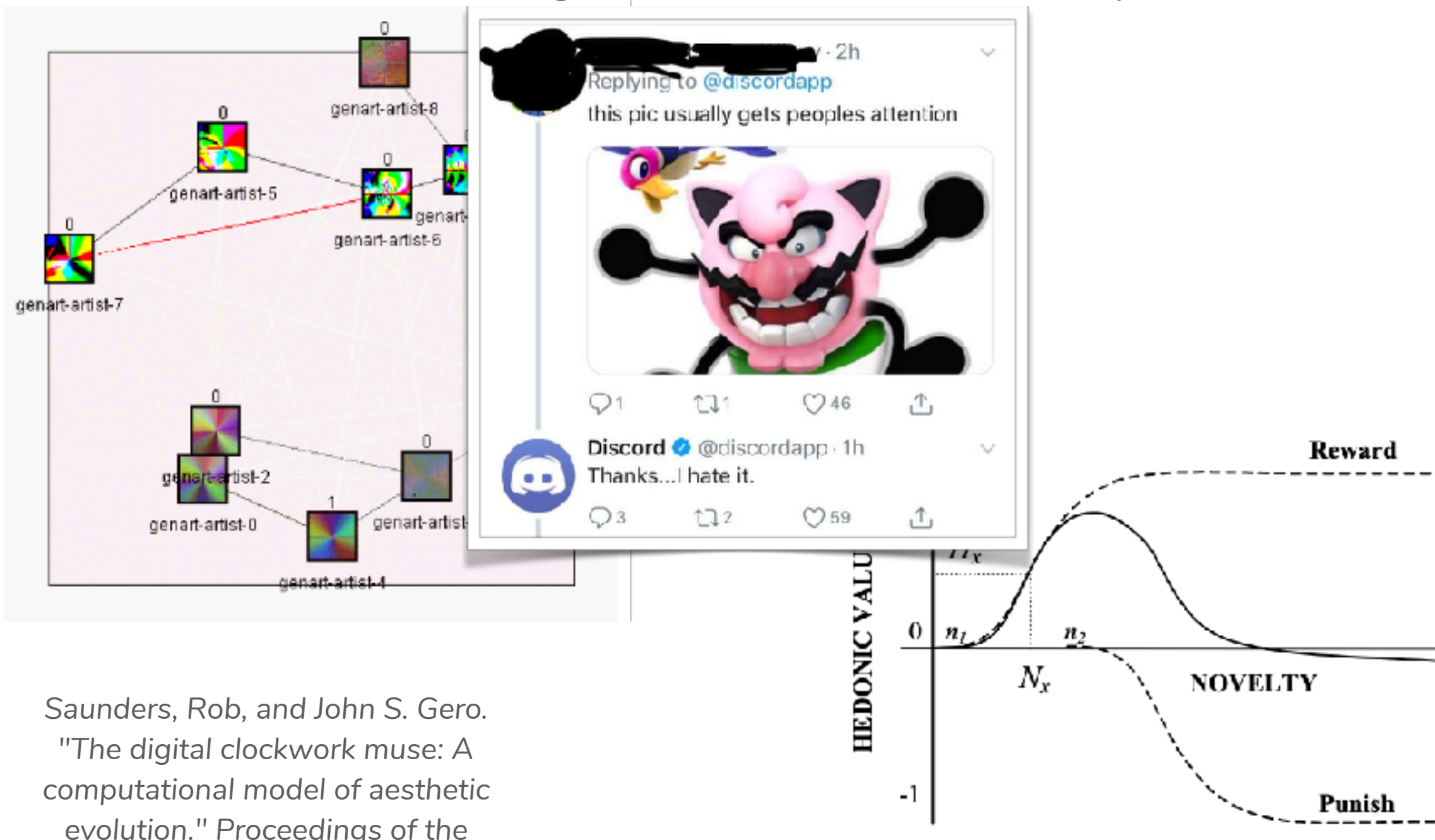
Tools, probes, knowing-thought-doing

Mihaly Csikszentmihalyi. *Flow and the psychology of discovery and invention*. HarperPerennial, New York, 1997.

Paul Dourish. *Where the action is: the foundations of embodied interaction*. MIT press, 2004.

Creativity has many meanings

Creativity happens relative to the people around us,
the things we've seen before, and our place in the field



Saunders, Rob, and John S. Gero.
"The digital clockwork muse: A
computational model of aesthetic
evolution." *Proceedings of the
AISB. Vol. 1. 2001.*

Creativity has many meanings

TLDR: creativity seems to be
different when
we're doing it for **pleasure**
or for **productivity**

Autotelic creativity is creativity **for
its own purpose**, not primarily for
the production of an artifact



Creativity has many meanings

Who is creative?



When are we creative?



Problems in creativity

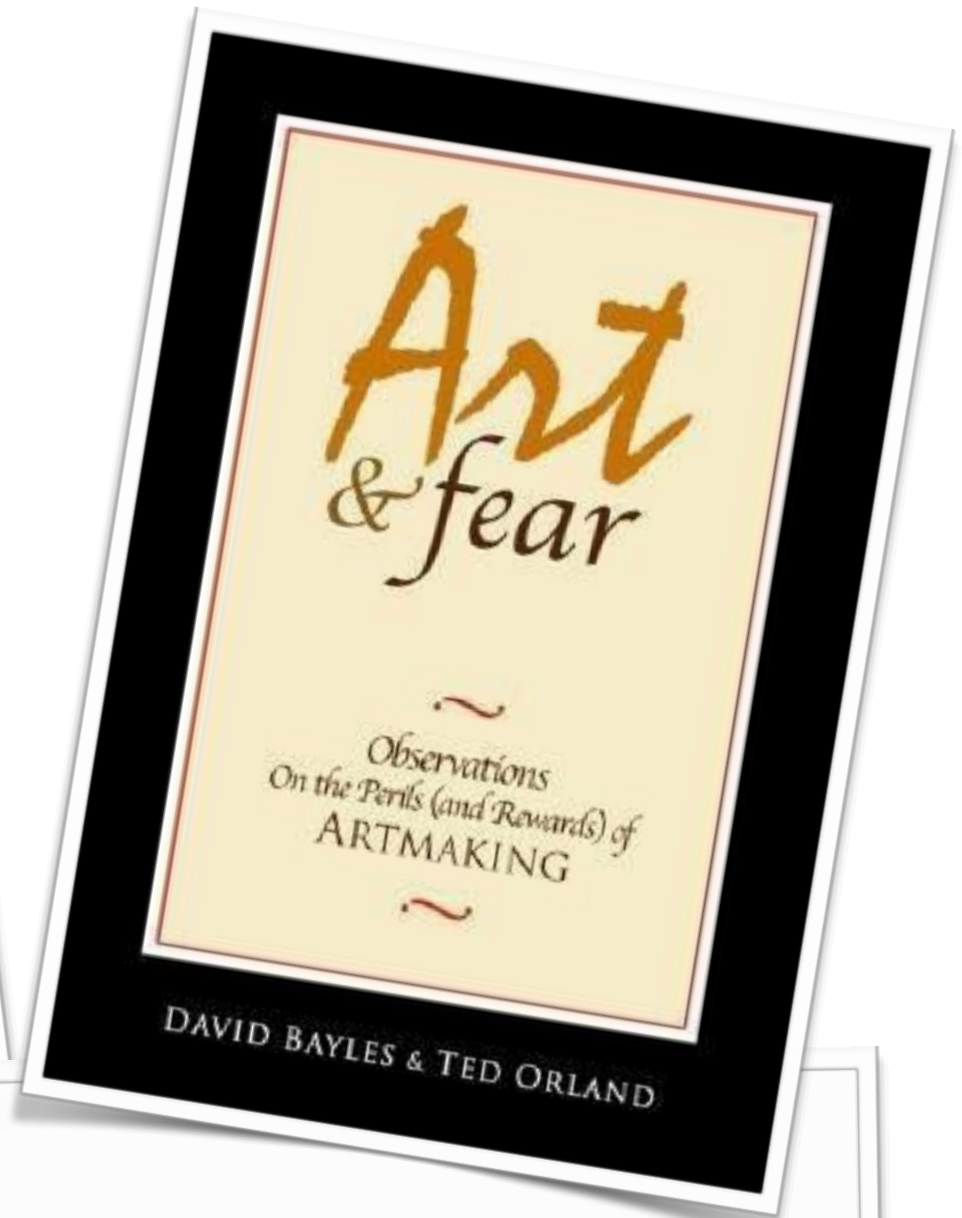
MANAGING YOURSELF

Reclaim Your Creative Confidence

How to get over the fears that block your best ideas by Tom Kelley and David Kelley



Most people are born with the ability to draw. As children, we revel in play, ask our friends to draw blobs and call them names. Over time, because of social pressure, formal education, a lot of self-criticism, and those impulses. We learn to judge, more cautiously. The world seems to divide into "creatives" and "noncreatives," and we consciously or unconsciously assign ourselves to the latter category. And yet we know that drawing is essential to success in an industry. According to a survey of chief executives around the world, the most sought-after trait in a new hire is the ability to draw. No one can deny that creativity has enabled the rise and continued success of countless companies, from Procter & Gamble and Google to Facebook and Google. Students often come to university's "d.school" (where one of us—David Kelley—teaches) with the question: "Can I draw?"



DESIGN & ILLUSTRATION > DRAWING THEORY



"Can I Draw?"—How to Tell If You're Good Enough

Problems in creativity

- Being undirected
- Being trained to come up with the “*right*” answer
- Being afraid of negative judgement
- Running out of ideas

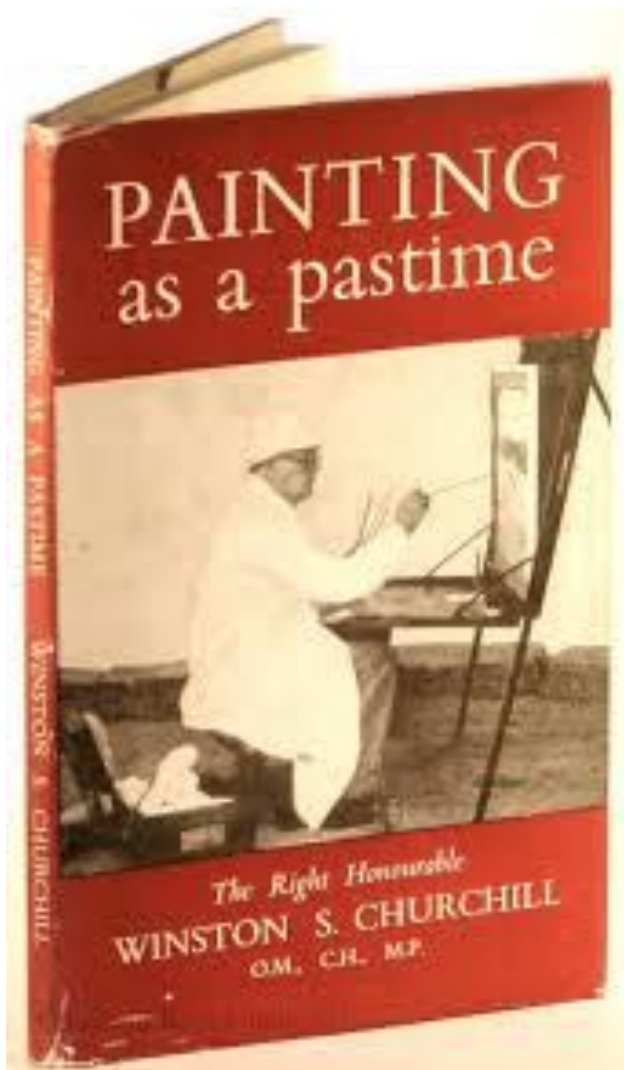


Problems in creativity

- Being undirected
- Being trained to come up with the “*right*” answer
- Being afraid of negative judgement
- Running out of ideas



Problems in creativity



...the empty brush hung poised, heavy with destiny, irresolute in the air. My hand seemed arrested by a silent veto.

So very gingerly I mixed a little blue paint on the palette with a very small brush, and then with infinite precaution made a mark about as big as a bean upon the affronted snow-white shield. It was a challenge, a deliberate challenge; but so subdued, so halting, indeed so cataleptic, that it deserved no response. At that moment the loud approaching sound of a motor-car was heard in the drive. From this chariot there stepped swiftly and lightly none other than the gifted wife of Sir John Lavery. "Painting! But what are you hesitating about? Let me have a brush - the big one."

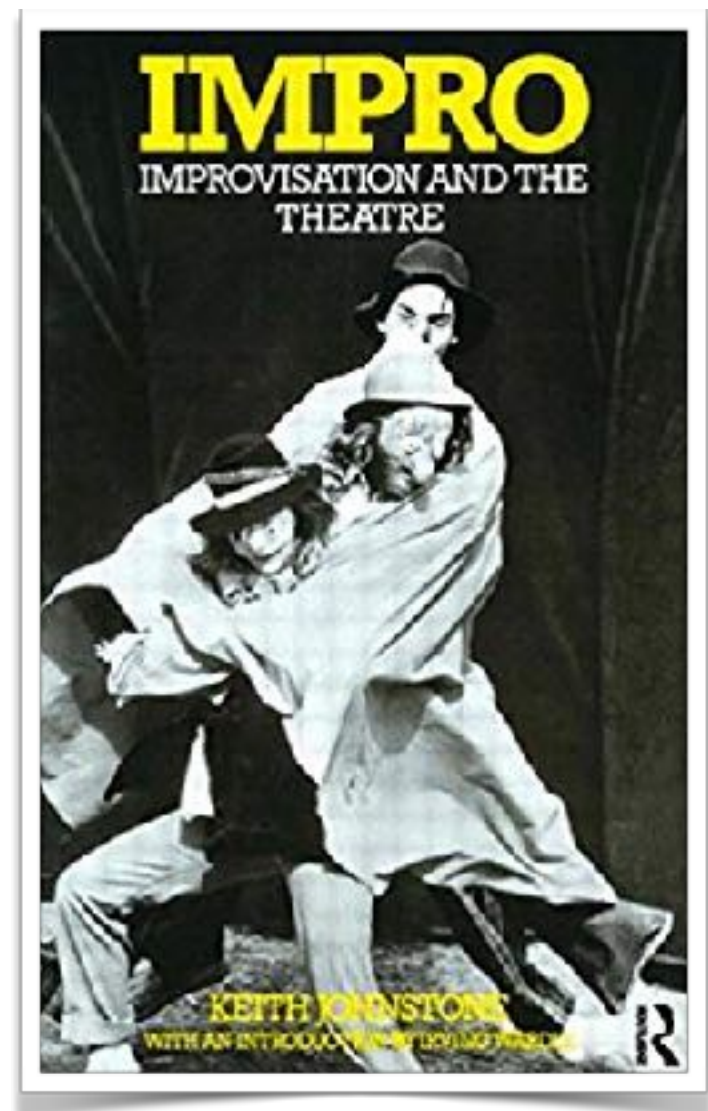
Splash into the turpentine, wallop into the blue and the white, frantic flourish on the palette - clean no longer - and then several large, fierce strokes and slashes of blue on the absolutely cowering canvas. Anyone could see that it could not hit back.

No evil fate avenged the jaunty violence. The canvas grinned in helplessness before me.

The spell was broken. The sickly inhibitions rolled away. I seized the largest brush and fell upon my victim with Berserk fury. **I have never felt any awe of a canvas since.**

Problems in creativity

- Being undirected prompts
- Being trained to come up with the “right” answer acknowledgement
- Being afraid of negative judgement “Yes-and”
- Running out of ideas



Designing for creativity



There are experts in getting people to feel creative

How do we design a system to be a kindergarten art teacher?

an improv coach?

an AI Bob Ross?



Creativity has many meanings

TLDR: creativity seems to be
different when
we're doing it for **pleasure**
or for **productivity**

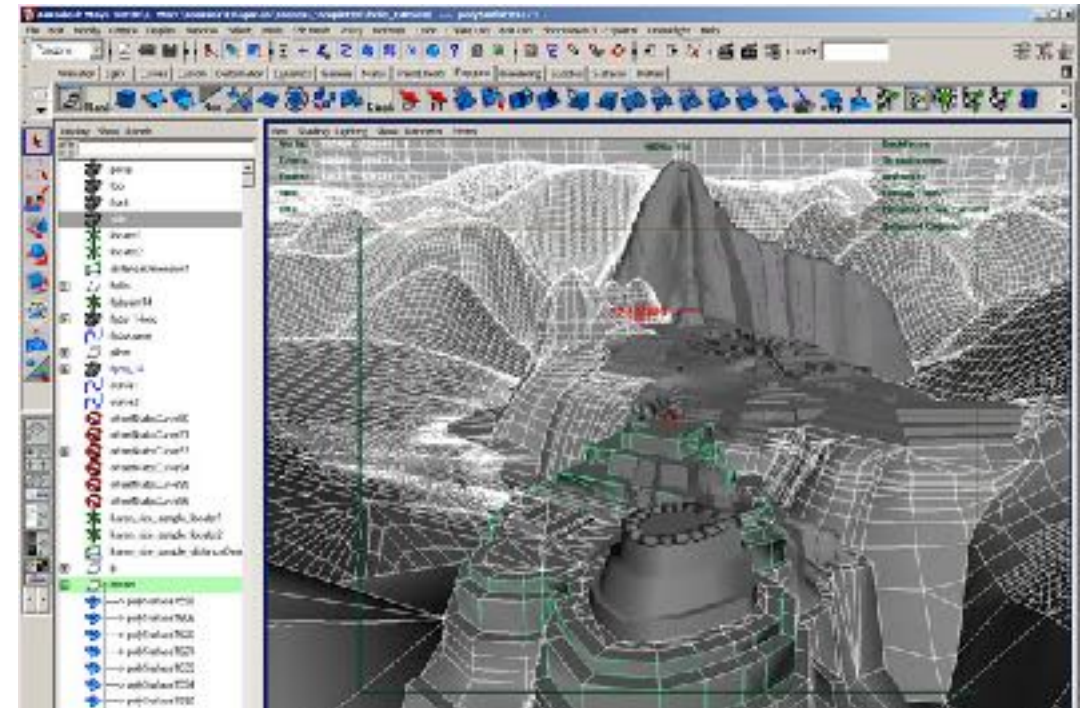
Tools for **casual creativity** have
different needs and design patterns
than tools for **professional
creativity**.

My dissertation was about
cataloging those different patterns.

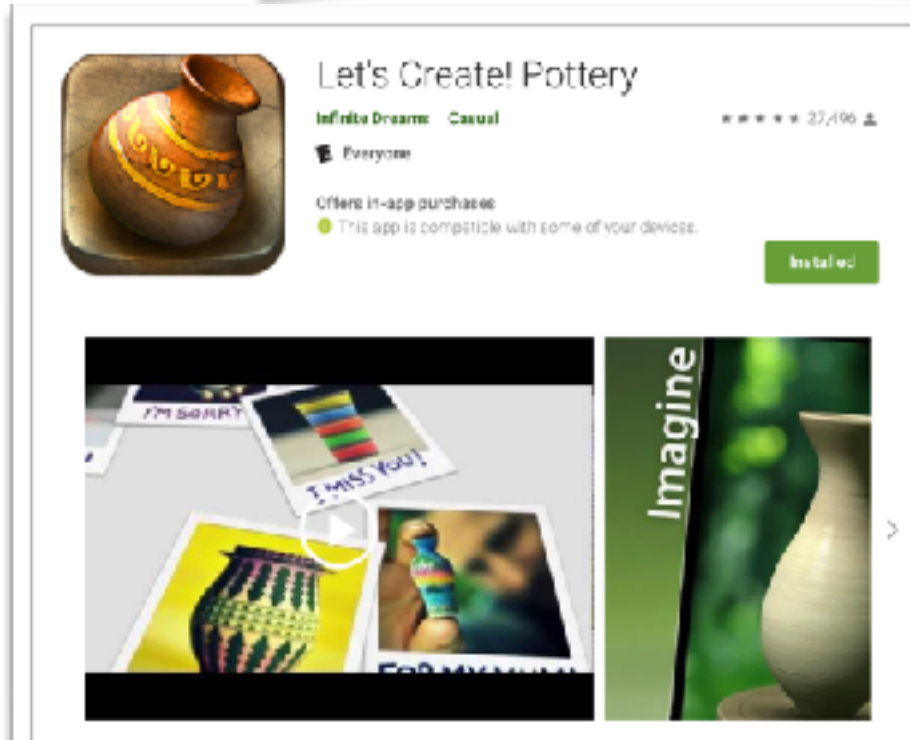
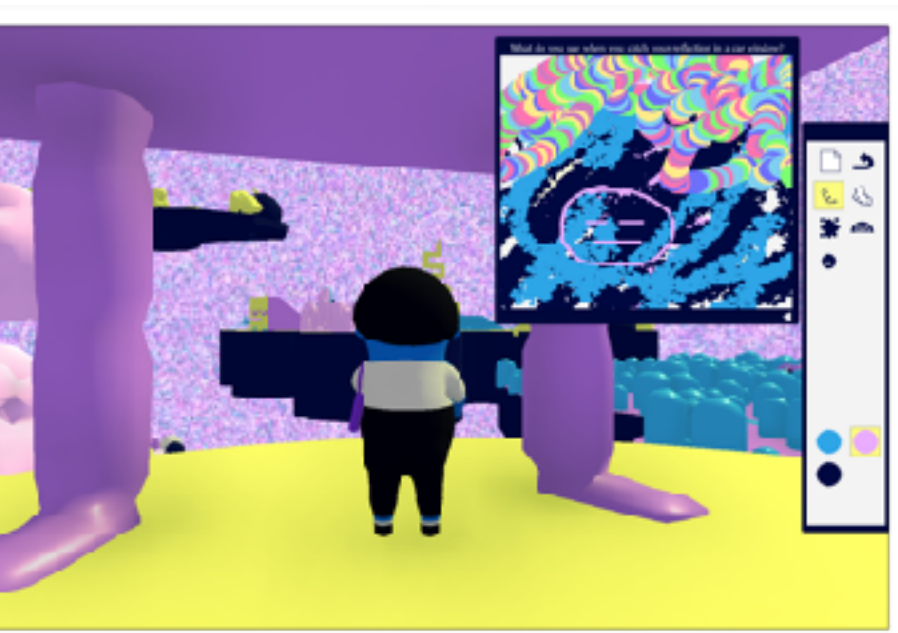


Designing tools for professional creativity

- The tool needs high flexibility and range
 - Make any specific thing
 - Iteration and modification
- High barrier to entry
 - (money and time)
 - Control is the most important feature!



Designing tools for casual creativity



- High flexibility in the **user**, not in the **tool**
 - Willing to make any specific thing
 - Willing to consider many variants
 - Playfulness
- Low barrier to entry
 - (money and time)
- No tolerance for “breaking”, hard failure

Casual creators...

Creativity isn't unknowable magic

We know what **prevents casual creativity**

We have **solutions to those problems**

We can create systems that solve the problems, and enable creativity



Pt 2: Designing Casual Creators



Casual creators...

..are creativity systems where
the user values the **experience of creating**
more than the **thing they create**

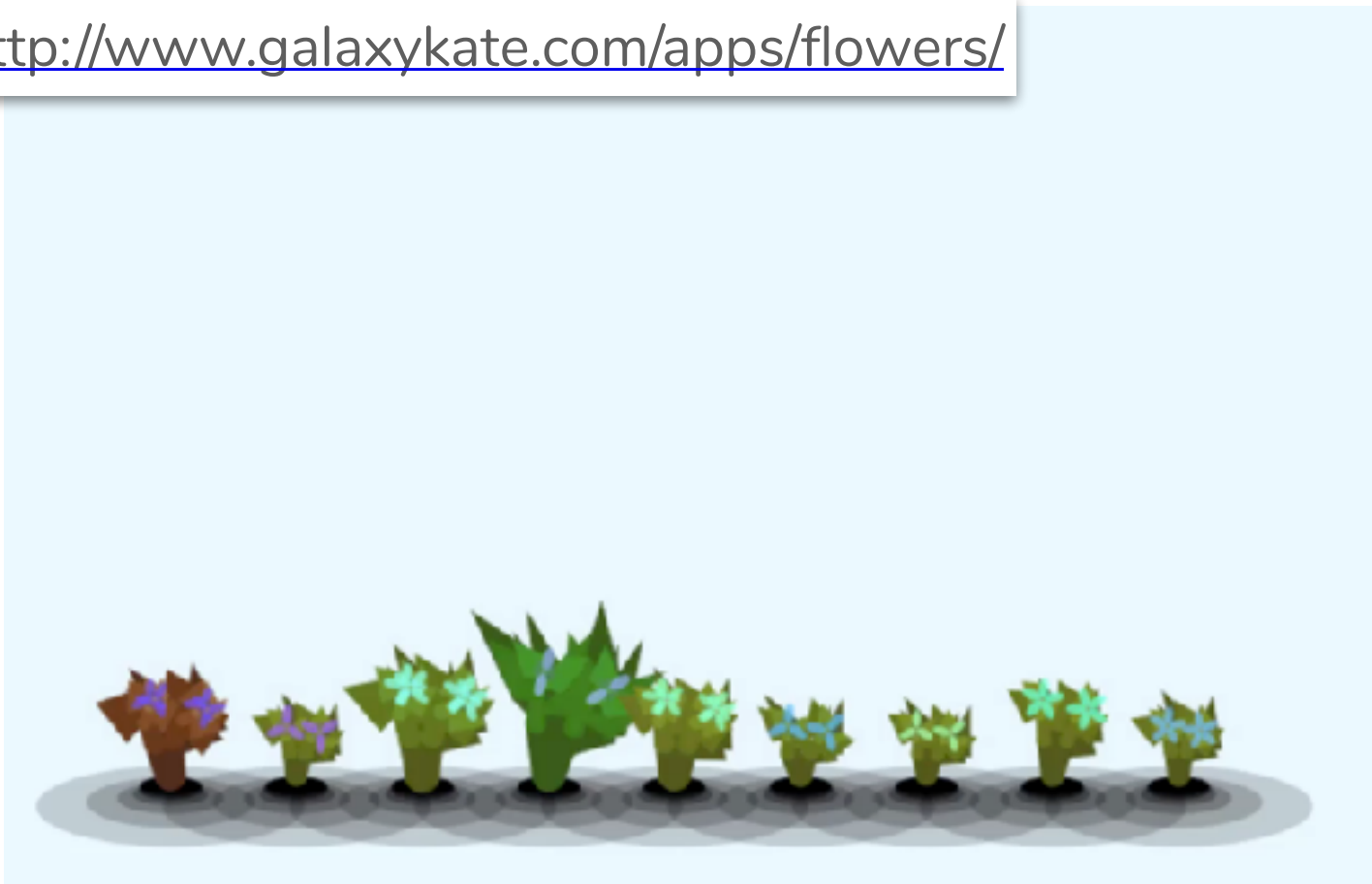
and are willing to trade **total control** for
power, surprise, safety, & magic

...and the system is designed to **remove**
known barriers to creativity and **enable**
known creative phenomena



Generativity: casual creators super pattern

<http://www.galaxykate.com/apps/flowers/>



Features:

- Help the user get to new solutions fast
- Show the users new solutions and new ideas
- Constrain the situation to only “good(ish)” solutions
- Give positive feedback, and other “interesting” feedback
- Be surprising



Generative + interactive

What's generativity?



Treachery of Sanctuary, Chris Milk

Generative + interactive

● PCG in games

- Smith, Gillian. "Understanding procedural content generation: a design-centric analysis of the role of PCG in games." *Proceedings of the 32nd annual ACM conference on Human factors in computing systems*. ACM, 2014.
- Hendrikx, Mark, et al. "Procedural content generation for games: A survey." *ACM Transactions on Multimedia Computing, Communications, and Applications (TOMM)* 9.1 (2013): 1.
- Togelius, Julian, et al. "Search-based procedural content generation: A taxonomy and survey." *IEEE Transactions on Computational Intelligence and AI in Games* 3.3 (2011): 172-186.

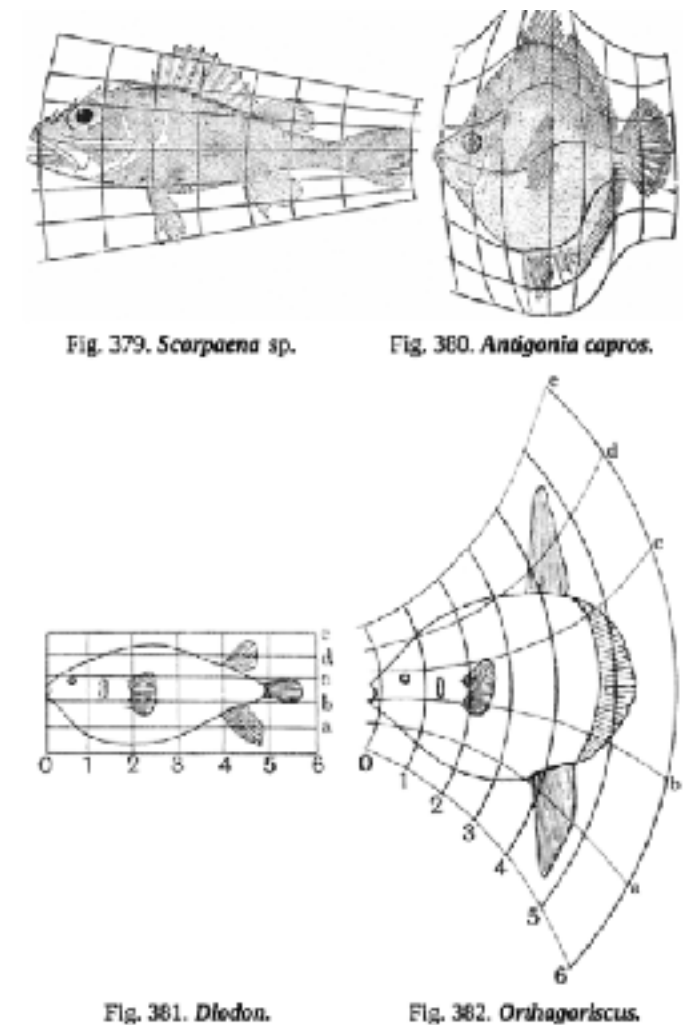
● Generative art

- Boden, Margaret A., and Ernest A. Edmonds. "What is generative art?" *Digital Creativity* 20.1-2 (2009): 21-46.
- Dorin, Alan, et al. "A framework for understanding generative art." *Digital Creativity* 23.3-4 (2012): 239-259.

● Natural science frameworks

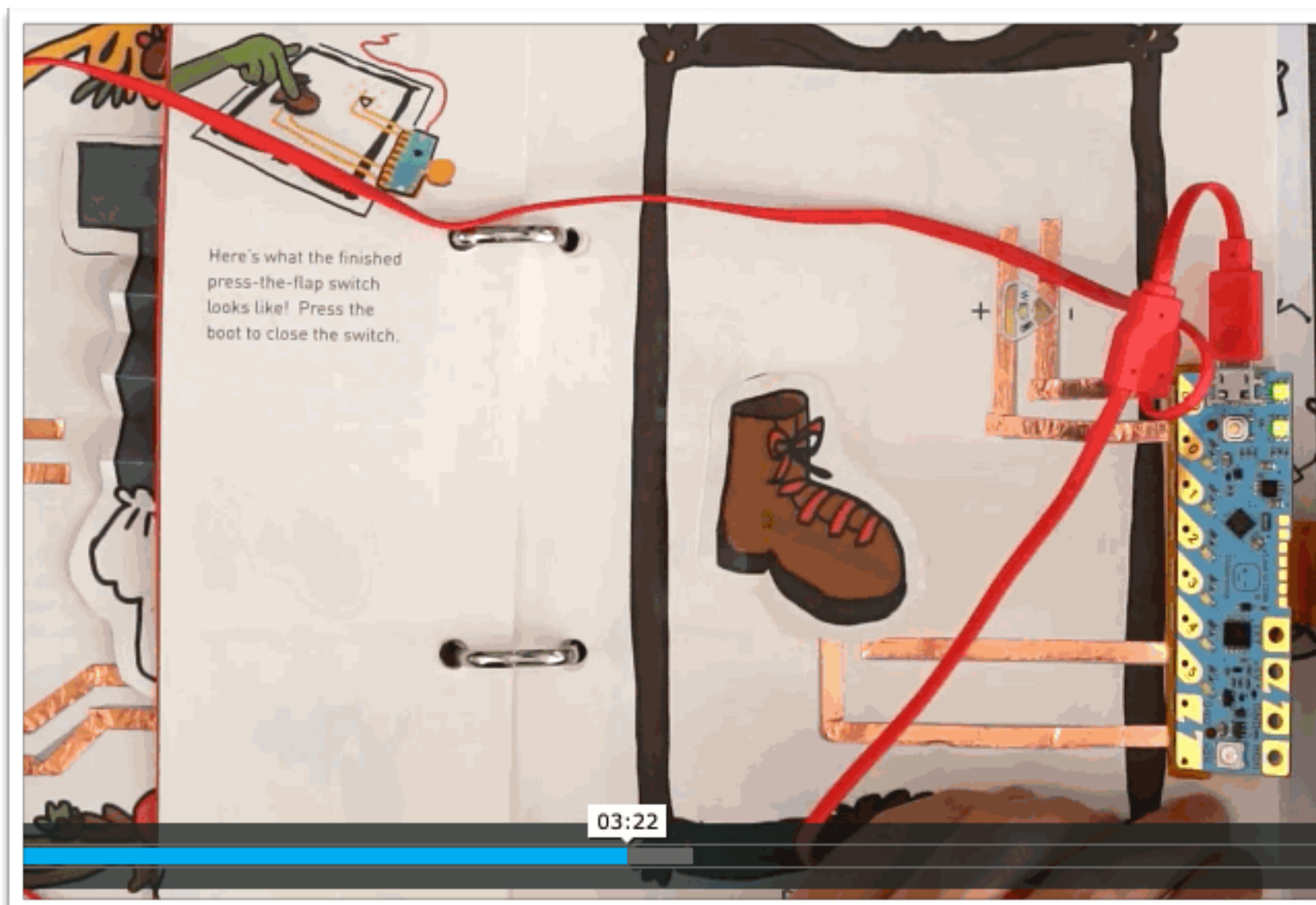
- Ball, Philip. *The self-made tapestry: pattern formation in nature*. Oxford: Oxford University Press, 1999.
- Thompson, Darcy Wentworth. *On growth and form*, 1942.

● “Magic Crayons” Chaim Gingold



Generative + interactive

What's interaction?



Circuit scribe

Generative + interactive

- How do we understand systems by interacting with them?



Generative + interactive

- How do we understand systems by interacting with them?
 - LOOPS!!

Steve Swink
Game Feel 2008

INTENT
(GRAB MUFFIN)

COMPARISON

ACTION

PERCEPTION



REALITY

Chris Argyris
Theories of action that inhibit
individual learning. 1976

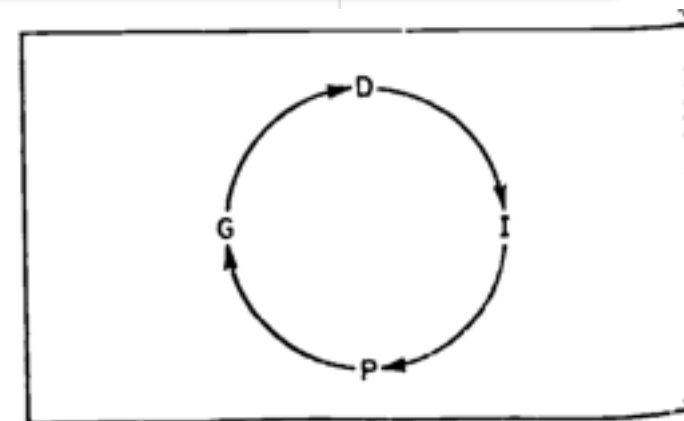
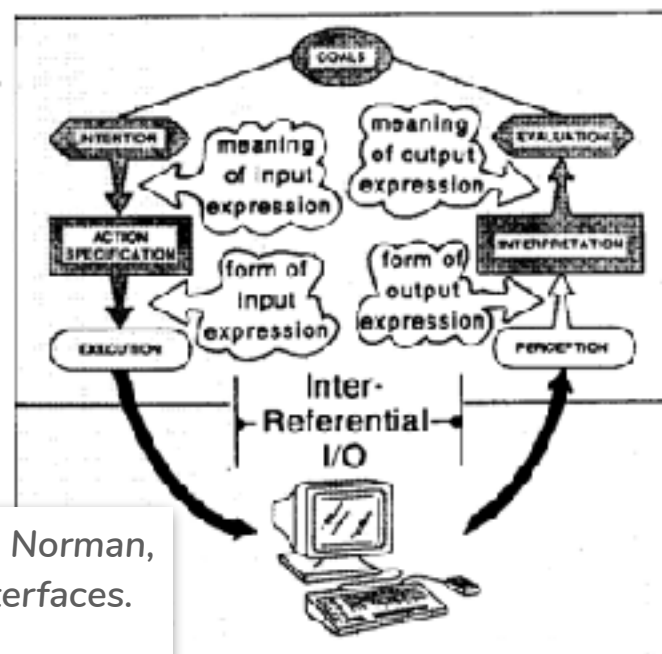


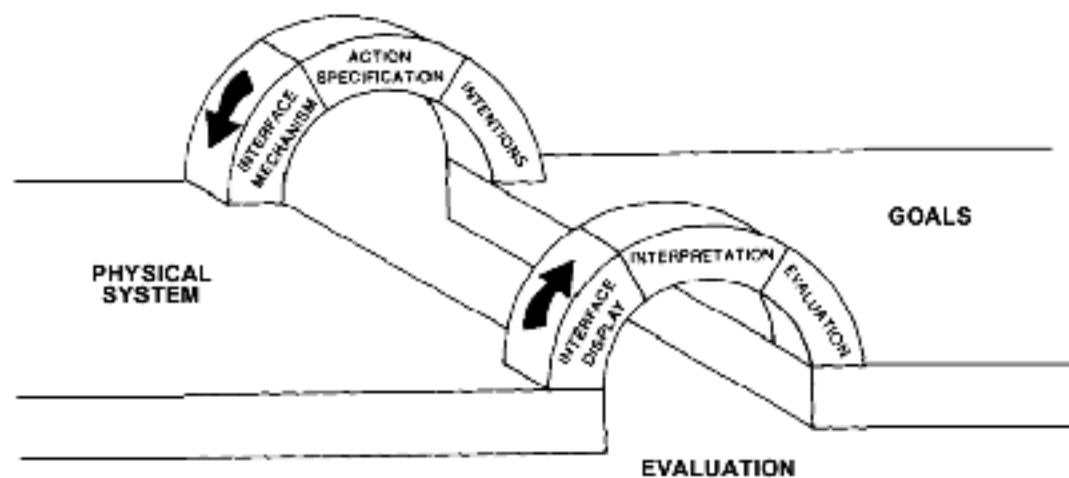
Figure 1. The learning cycle. (D = discover, I = invent, P = produce, G = generalize.)



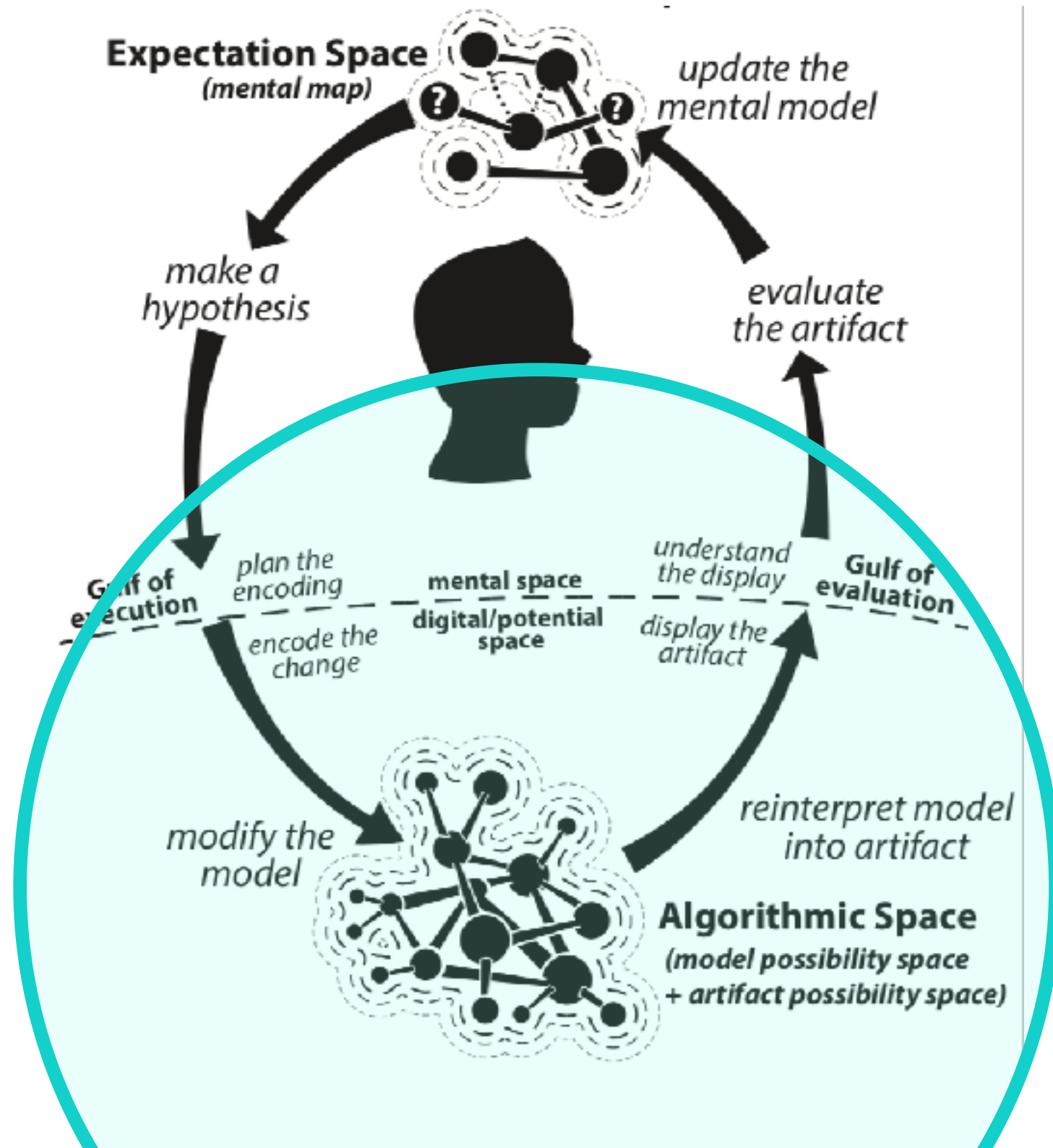
Semantic Distance
Articulatory Distance
Gulf of Evaluation

Gulf of Execution
Semantic Distance
Articulatory Distance

Hutchins, E. L., Hollan, J. D., & Norman,
D. A. Direct manipulation interfaces.
1985



Generative + interactive

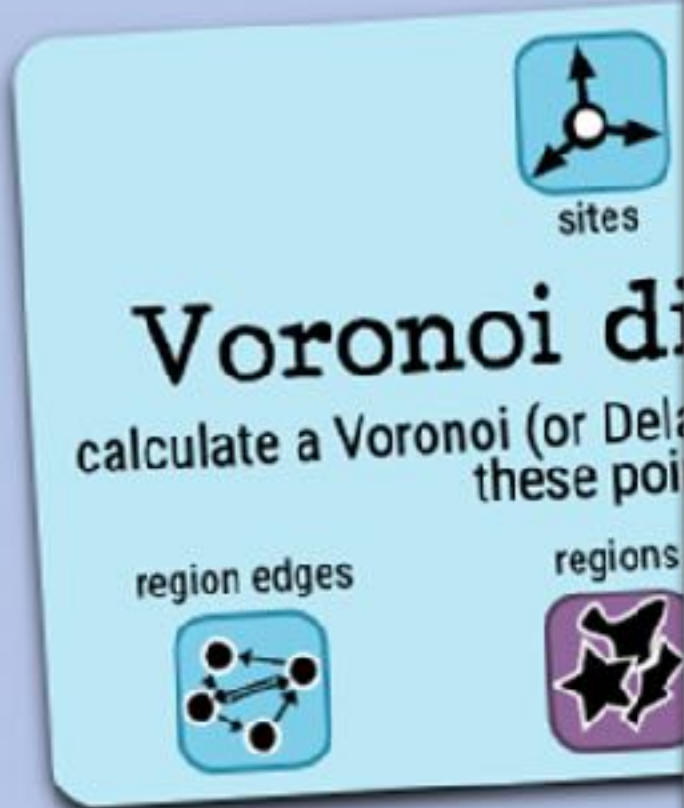


The “grokloop”

how fast can someone move around the **hypothesize-act-reevaluate** loop?

A generative system transforms a model of data into a finished artifact, but we **can only act** on the model and **can only evaluate** the artifact, so that translation is part of the loop, too.

Generative + interactive



TECHNOLOGY

SkyKnit: How an AI Took Over an Adult Knitting Community

Ribald knitters teamed up with a neural-network creator to generate new types of tentacled, cozy shapes.

ALEXIS C. MADRIGAL MAR 5, 2019



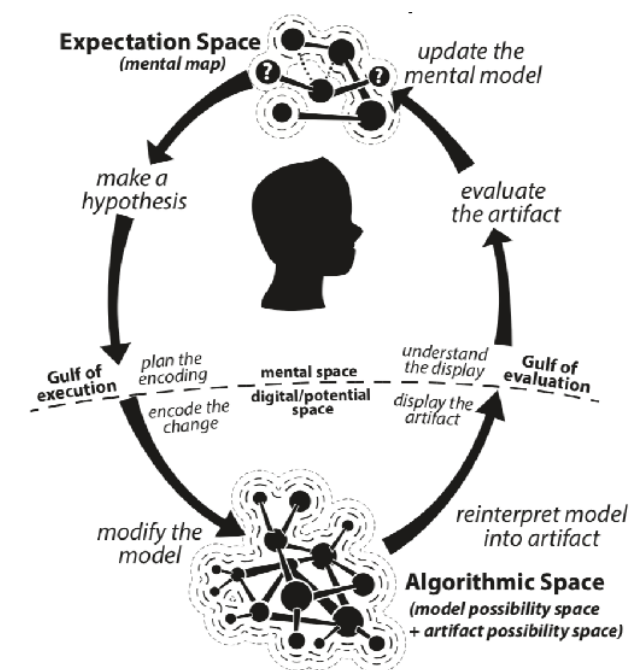
A SkyKnit design as interpreted by michaela112358, a Ravelry user (RAVELRY / MICHAELA112358)



Generativity is a pipeline of **generative methods**, connecting an **input** and an **output**.
(humans can fit anywhere in the pipeline!)

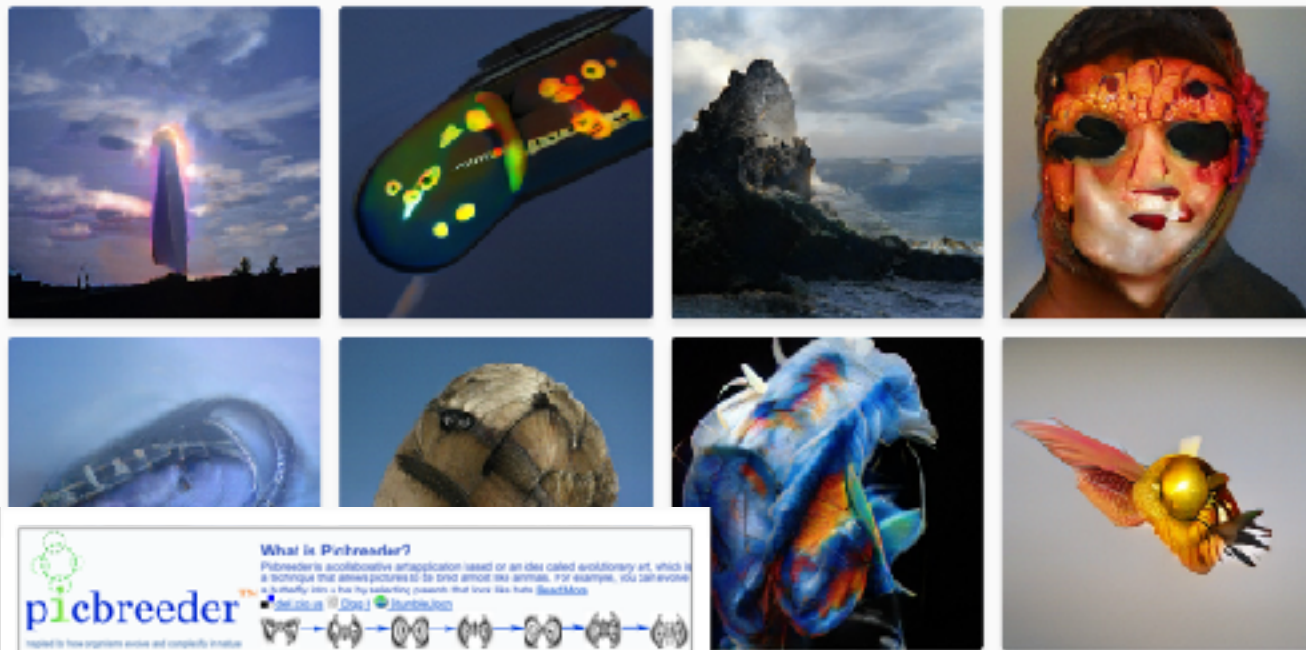
<http://www.galaxykate.com/generominos/editor-dev/>

Generative + interactive



Generative + interactive

some generative algorithm + some interactivity
= casual creator?

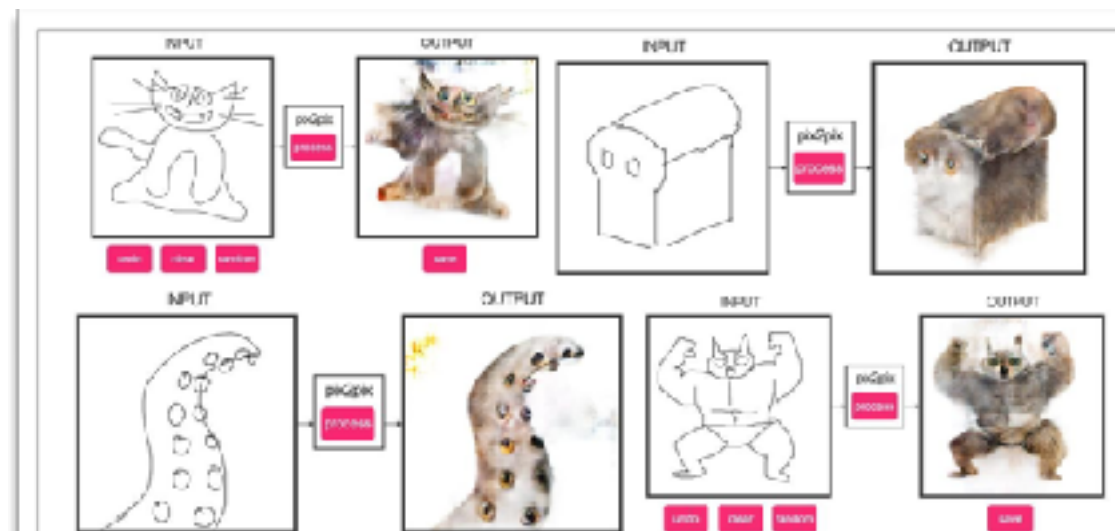
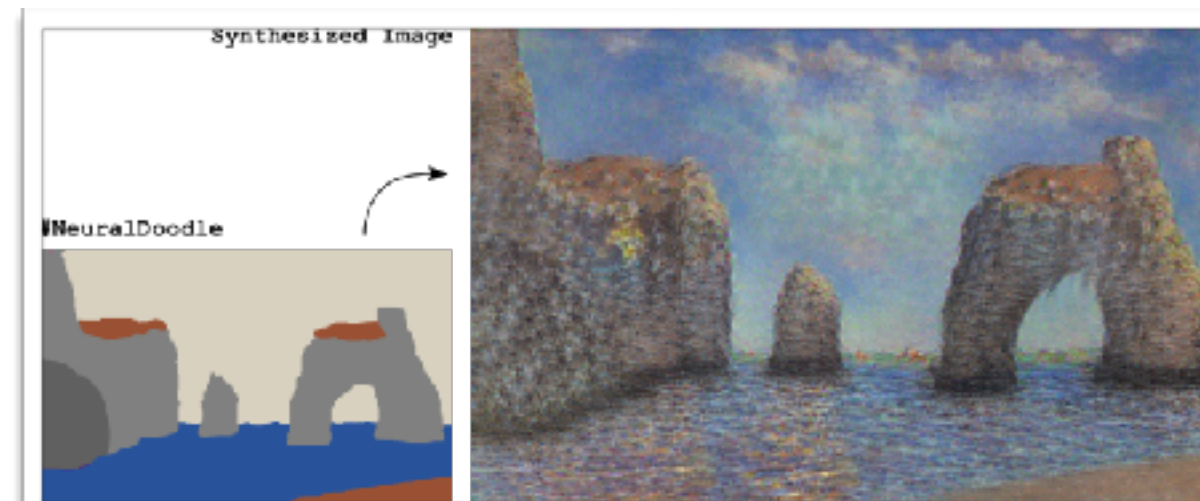


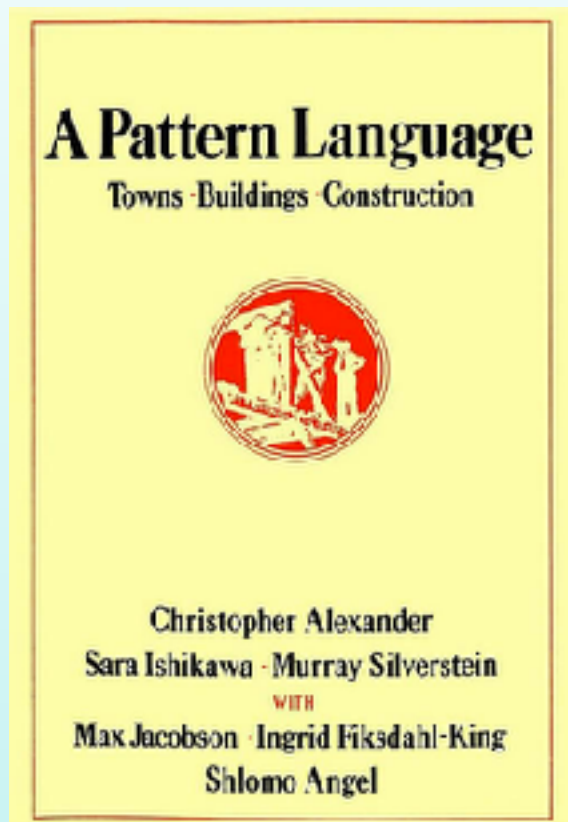
Ganbreeder (2019)

Picbreeder (2008)

Edges2Cats

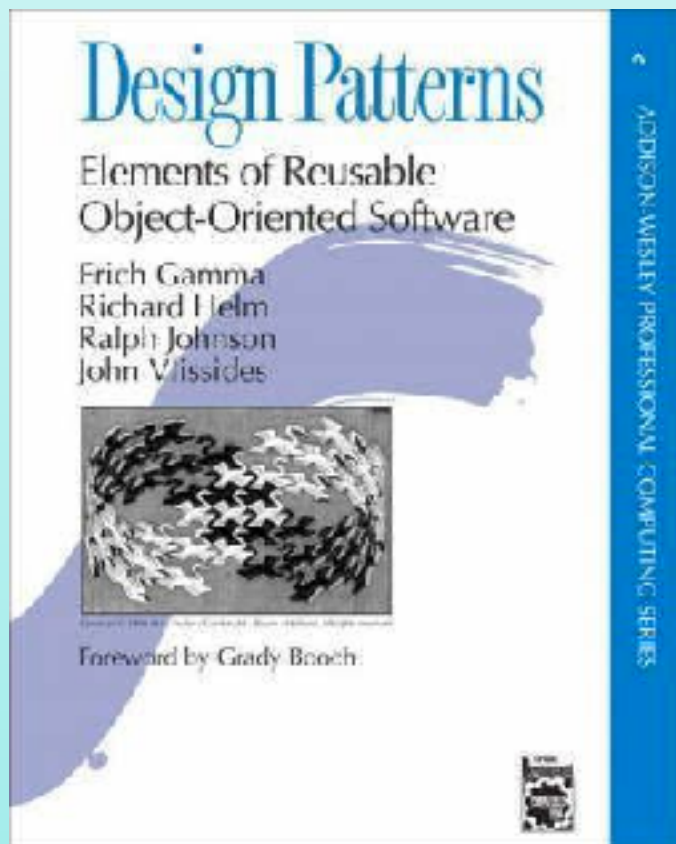
Neural Doodle



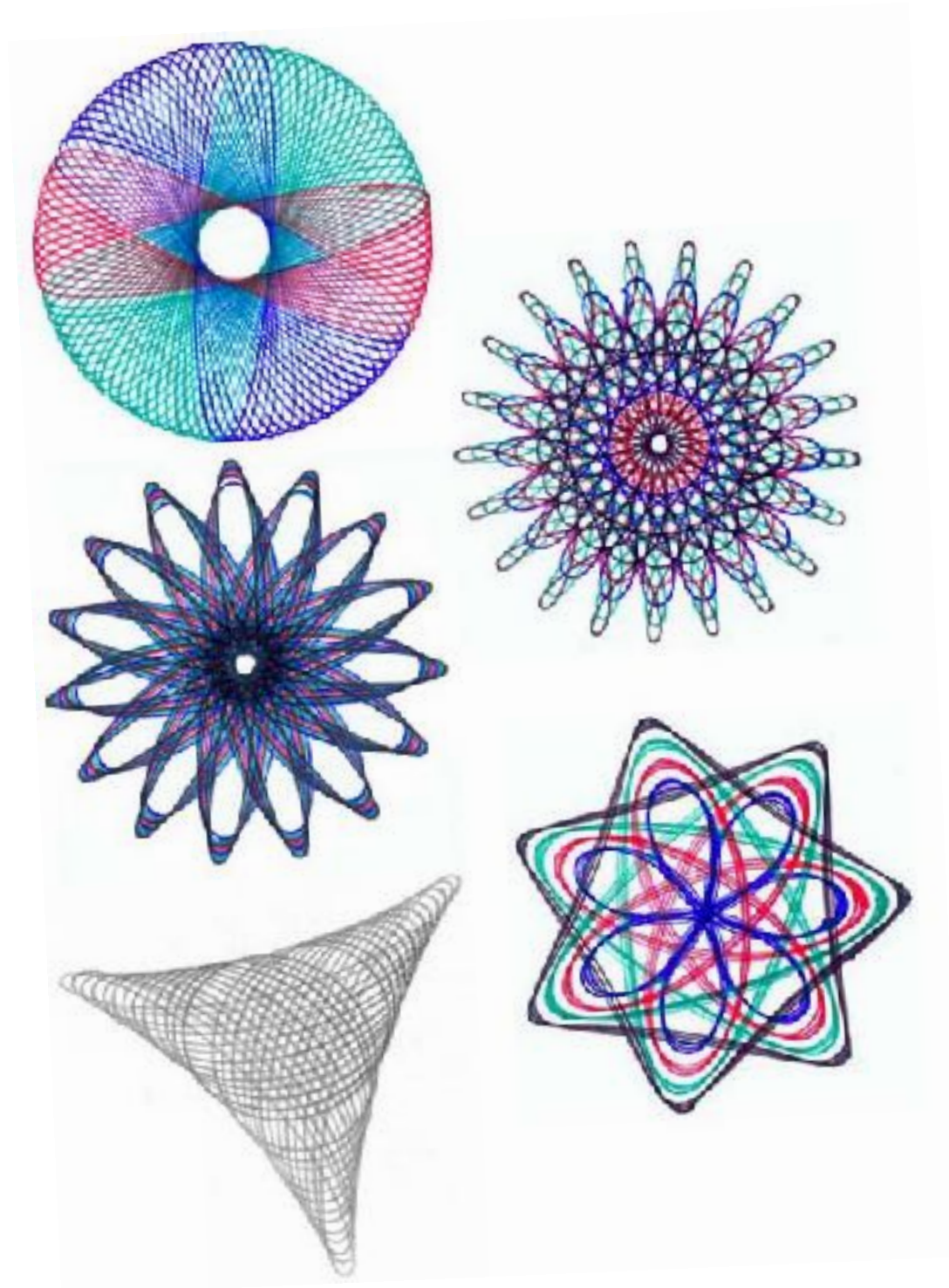


Design Patterns

How to build for interactive generative
creativity systems



Central considerations of casual creators



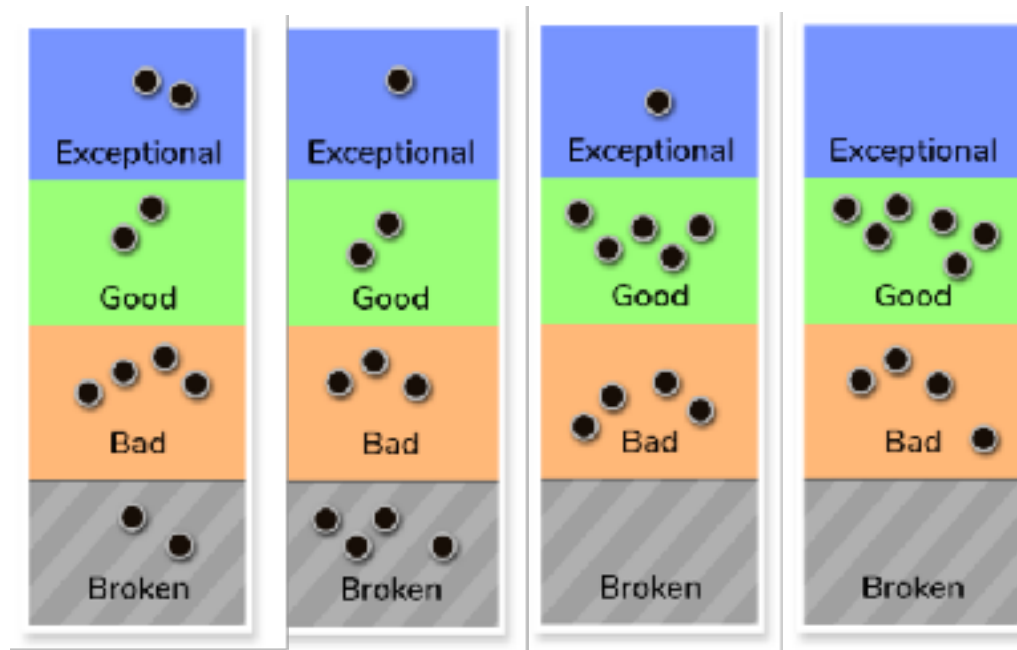
- Casual creators exchange **control** for **power**
 - less exact control, but you can do something faster, more precisely smoother, safer, or in an alien way that you couldn't achieve as a human)
- Every casual creator has a **possibility space** defined by a generative pipeline

Possibility spaces

- Every casual creator has a **possibility space**
 - Sometimes we talk about “**discovering**” something in the space, or “**creating**” it, depending on how big the space is and how we explore it
 - The spaces have different “**textures**”: full of many adequate artifacts, or mostly terrible ones with a few gems. Artifacts might be mathematically unique, perceptually differentiable, or **characterful**.



“No Man’s Sky” and 10,000 Bowls of Plain Oatmeal



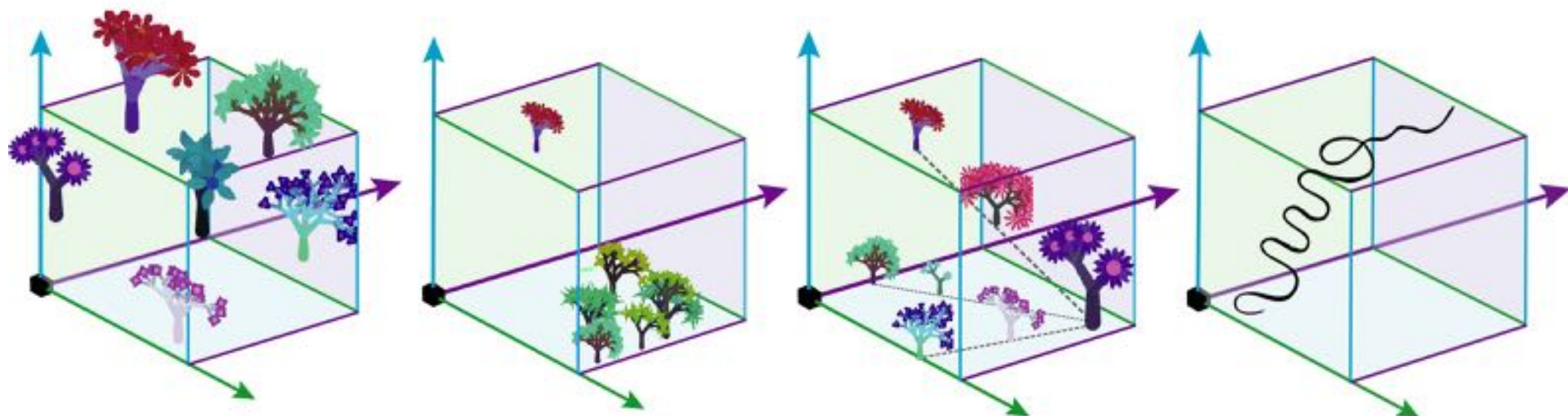
Sifted | By Emanuel Nalberg | Aug 21 2016 9:00am

‘No Man’s Sky’ Is Like 18 Quintillion Bowls of Oatmeal

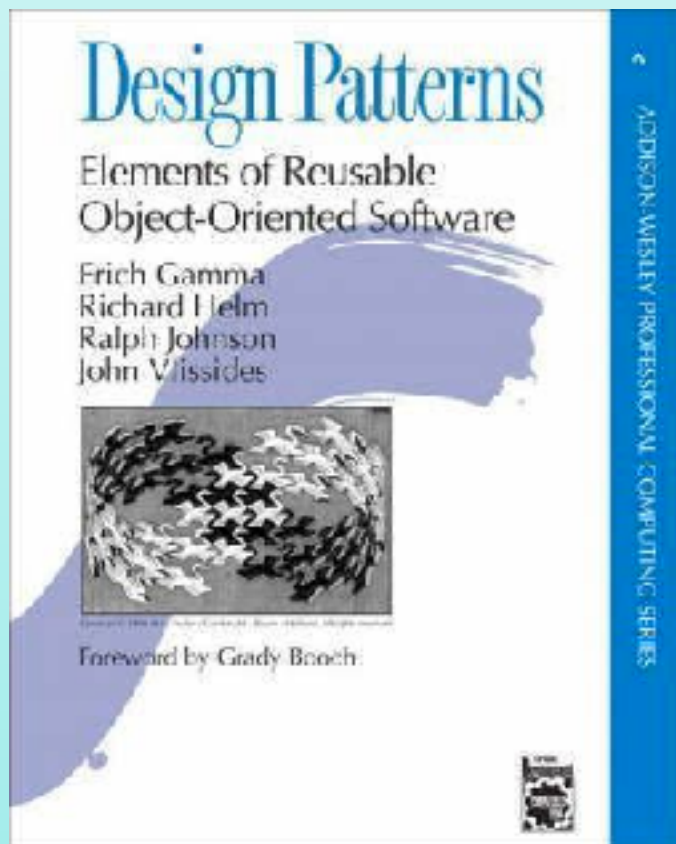
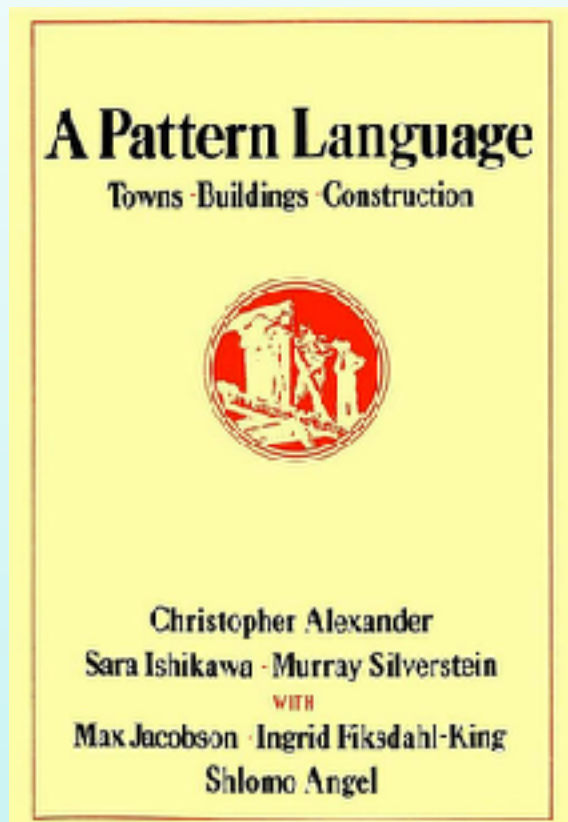
Subgenre-defined patterns

- Example: Parametric spaces

- Precondition: Some number of floating-point inputs create an artifact
- Possible design patterns:
 - Creating “landmark” artifacts, and enabling navigation relative to them (**Dryad**)
 - Clustering or regionalizing the artifact space (**Petalz**) or randomly sampling from a local region (**Wevva**)
 - Blending or “evolving” between multiple artifacts, or populations of artifacts (**Wevva**, **Funky Ikebana**, **Petalz**, **Dryad**)
 - Animation along a “curve” of continuous artifacts (**Funky Ikebana**)



Design Patterns



- Some design patterns are inherited from the shape of the possibility space.
 - ie, parametric spaces can easily use animation or evolutionary algorithms
- Other design patterns are **general purpose**
 - These can be applied to many different kinds of casual creators, regardless of what kind of pipeline/possibility space they have

Design patterns:

Blank Slate, Safety

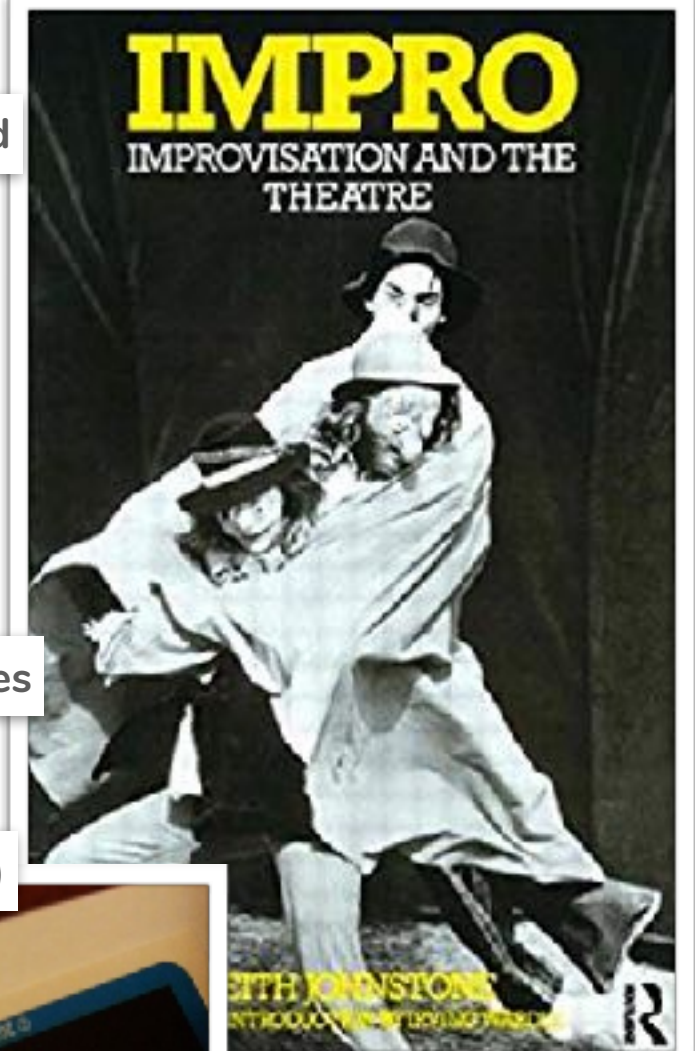
Spore Holiday Contests



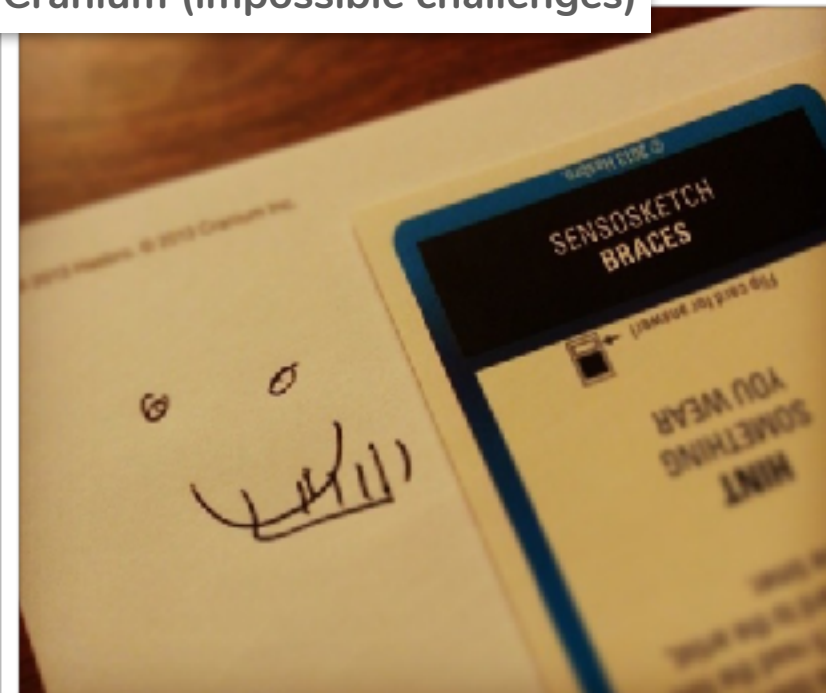
Yes-and



Change-a-word meme challenges



Cranium (impossible challenges)



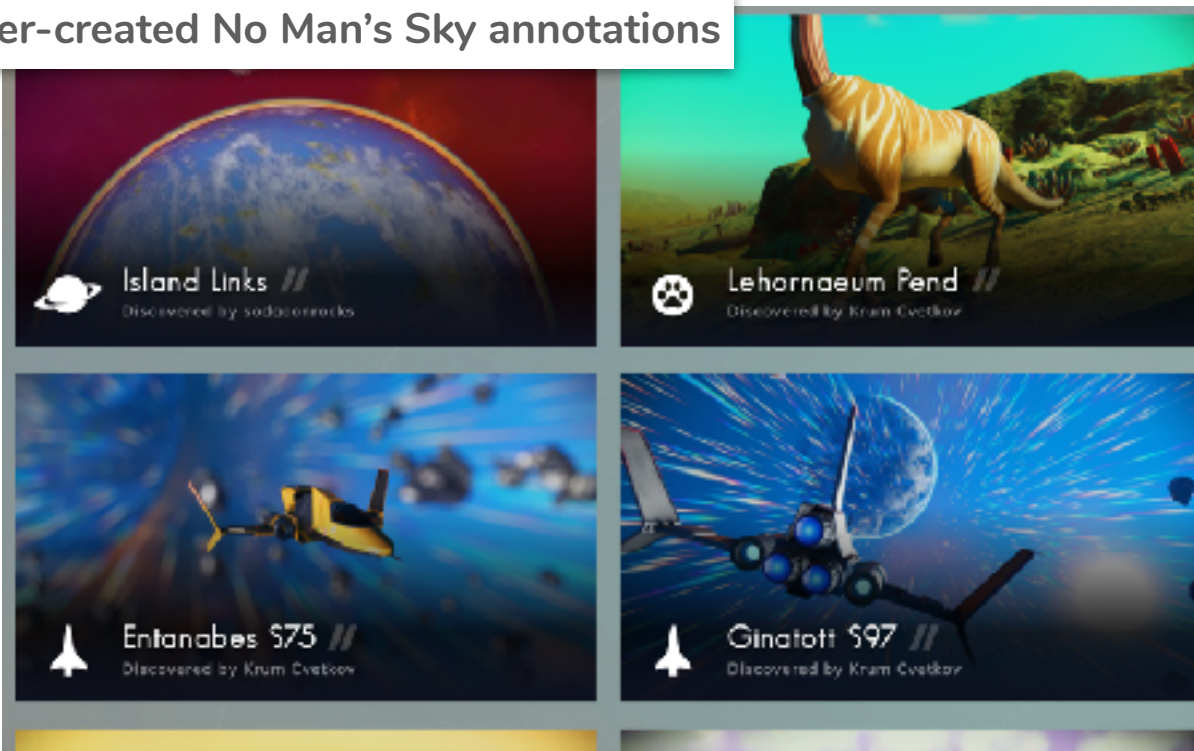
Quilt a Day



Design patterns:

Possibility Space Annotation, Self-Promotion

User-created No Man's Sky annotations



Boatmurdered, legendary Dwarf Fortress playthrough



Let's Read Boatmurdered: Episode 1, Introduction and Year 1

82,596 views

1.4K 14 SHARE SAVE ...



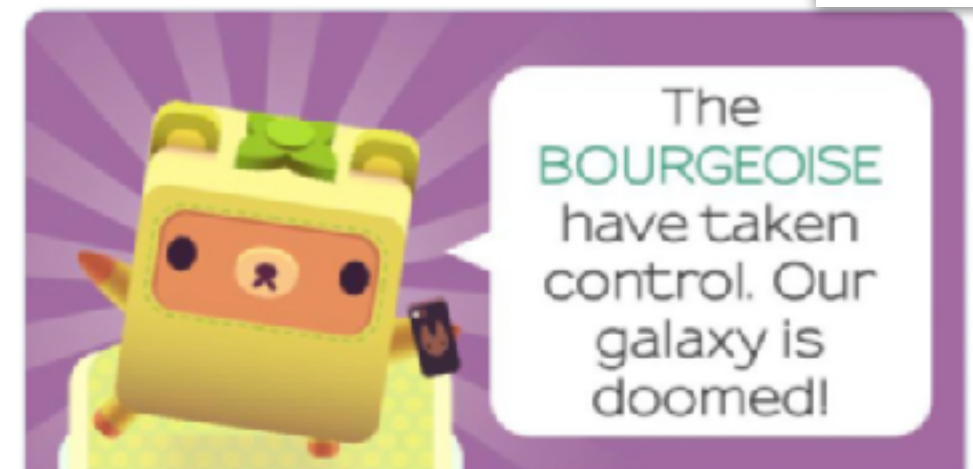
Opus Magnum



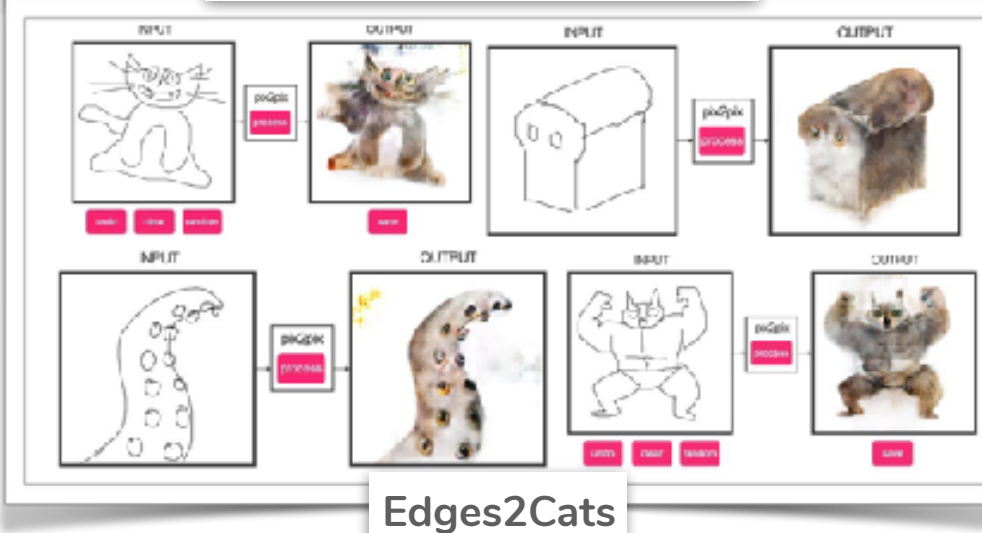
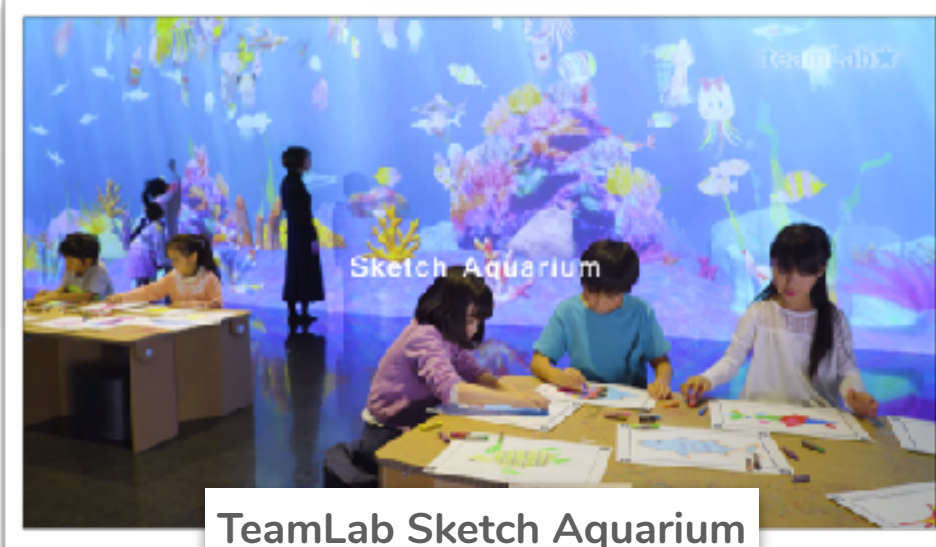
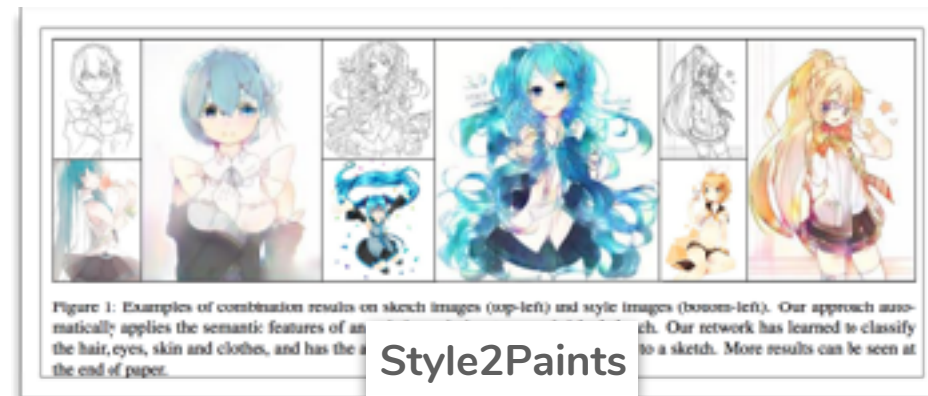
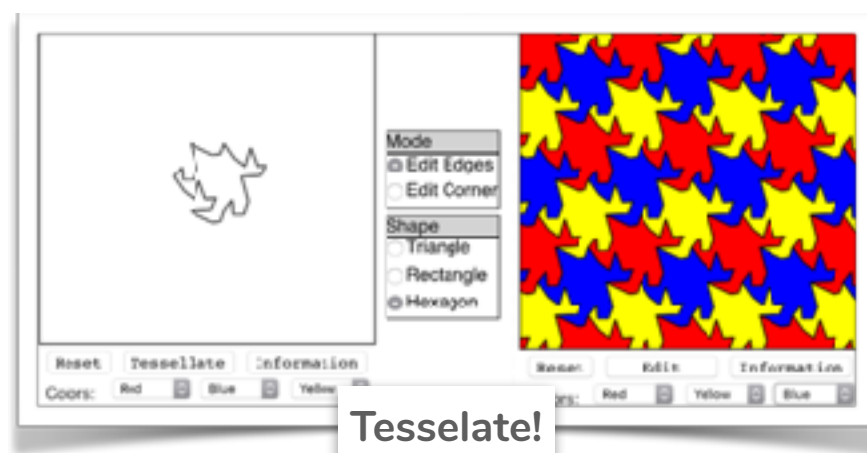
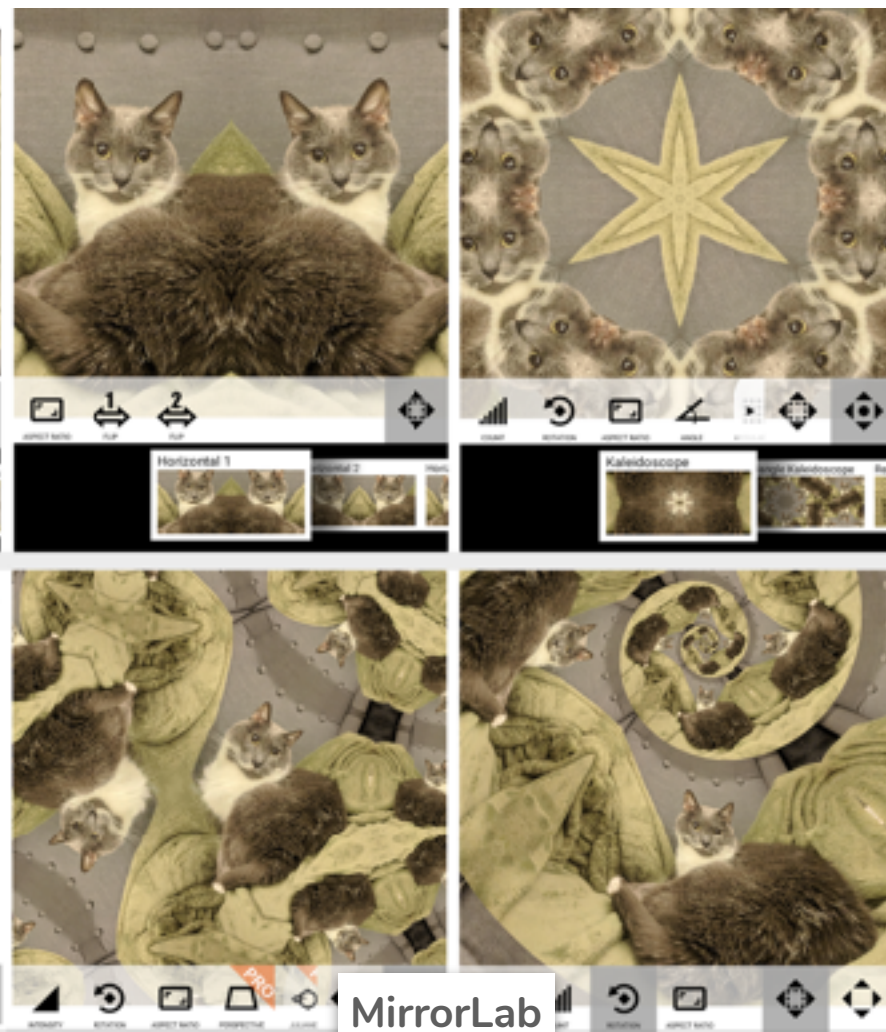
Kate Compton @GalaxyKate · Nov 22, 2016

Too real [#alphabear](#) [getalphabear.spryfox.com](#)

Alphabear



Design patterns: Repetition, Transformation, Make it Real



Design patterns:

Signifiers add power, Expressing Identity

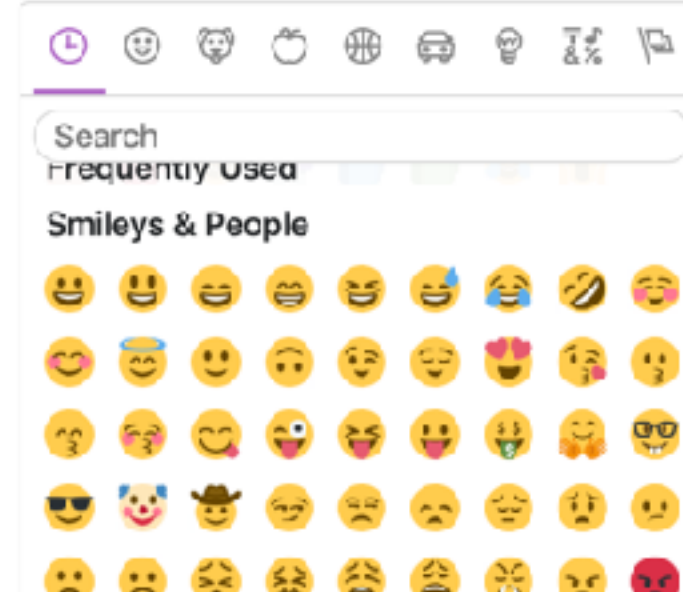


Select a new emoji 🍌



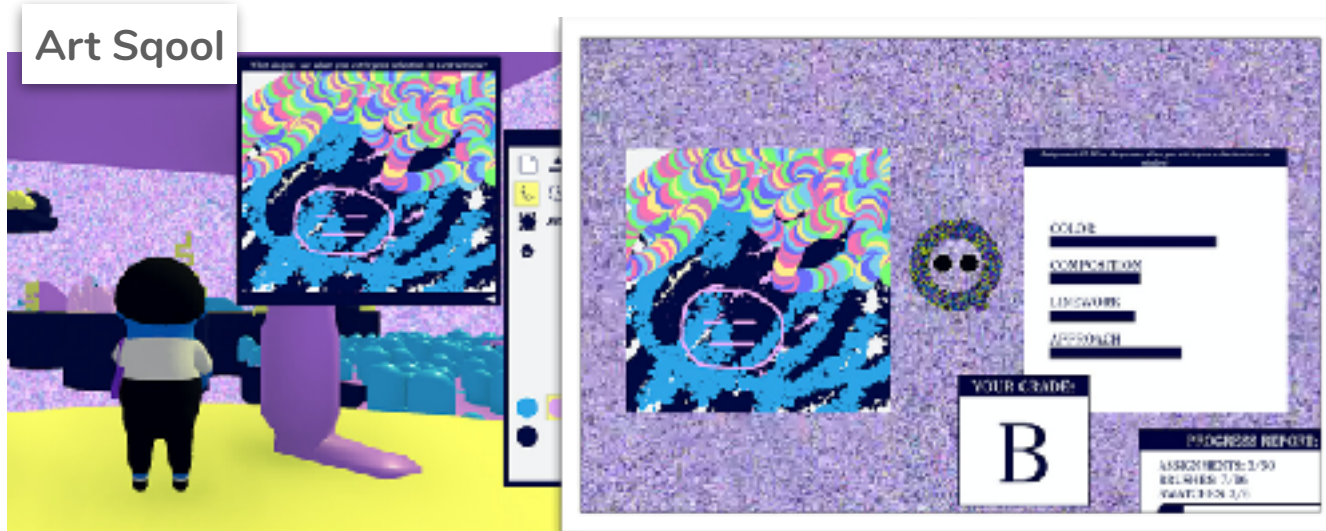
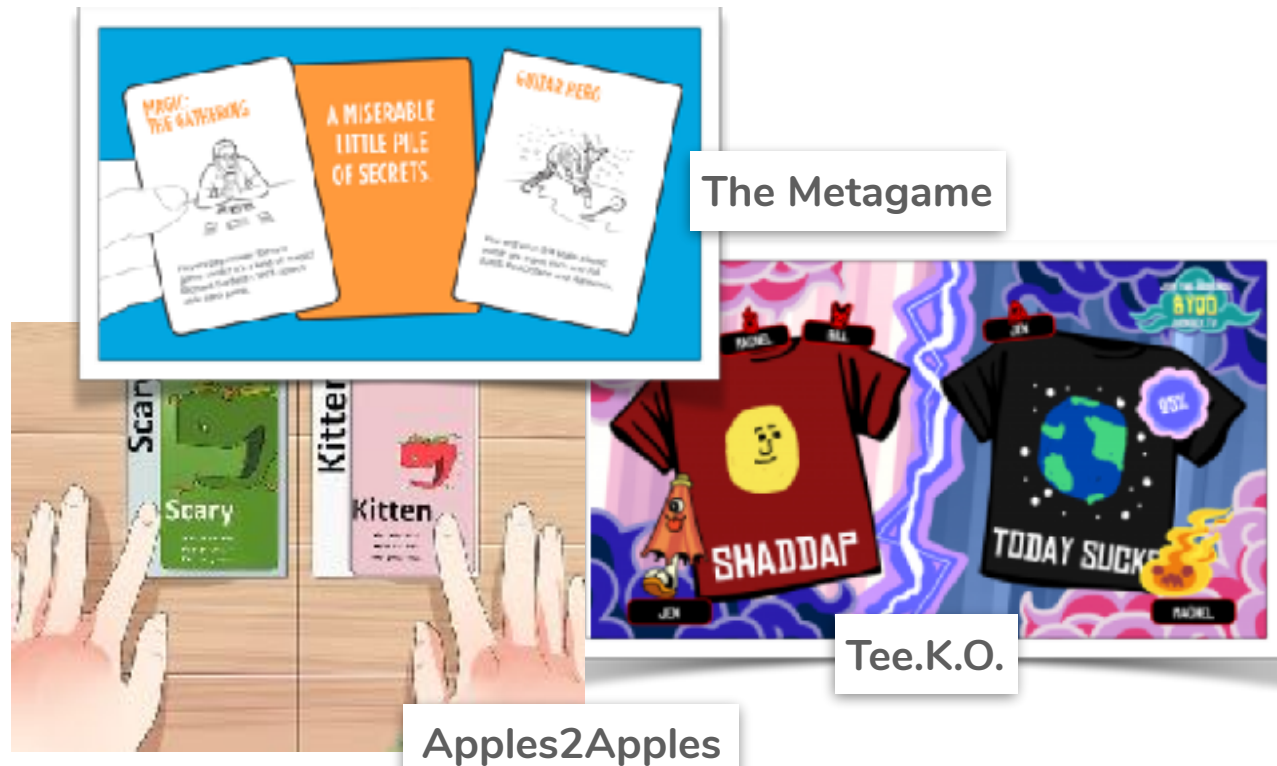
howdy. i am the sheriff of please pass this dissertation

Copy to clipboard



Design patterns:

Entertaining evaluations



What do we gain by defining “Casual Creators”?

(what is the purpose of this work?)

- Comparing common experiences across fields/disciplines
 - (e.g.: game designers who build character-creators start talking to audio engineers who build interactive music toys)
- A common language/ontology to talk across disciplines
- Shared community (publications, meetups, workshops, a “GDC”)
- Interventions in systems that *want* to be casual creators (but aren’t doing it well yet)

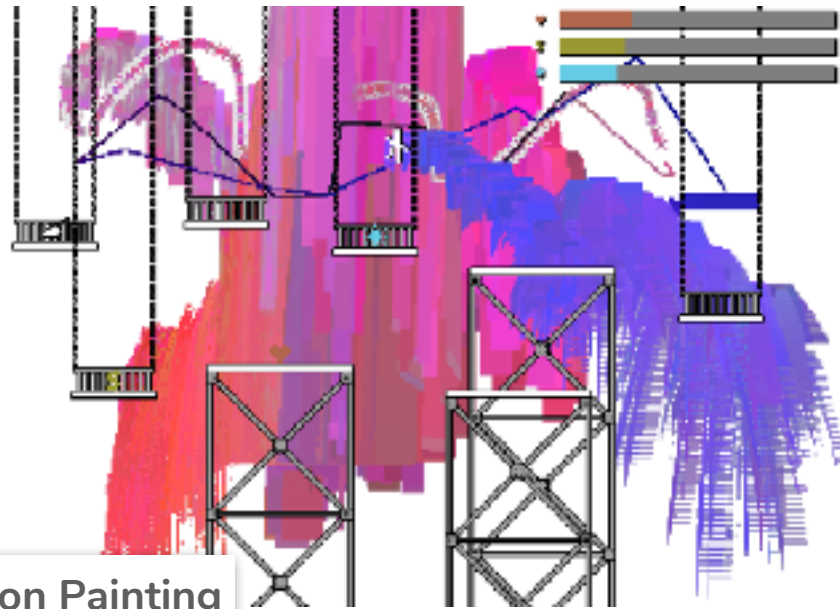


*Pas De Deux, Norman
McLaren 1968*

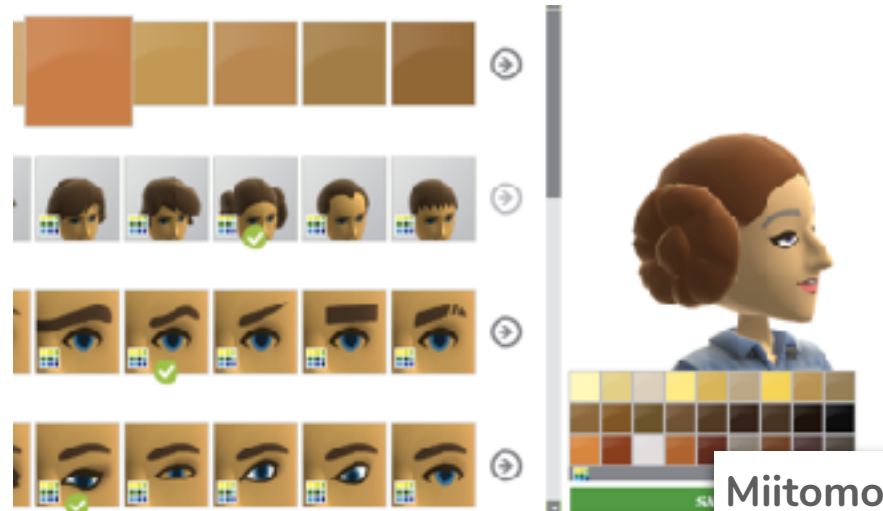


*Happy Action Theater,
Doublefine 2012* Matt Bell, 2010

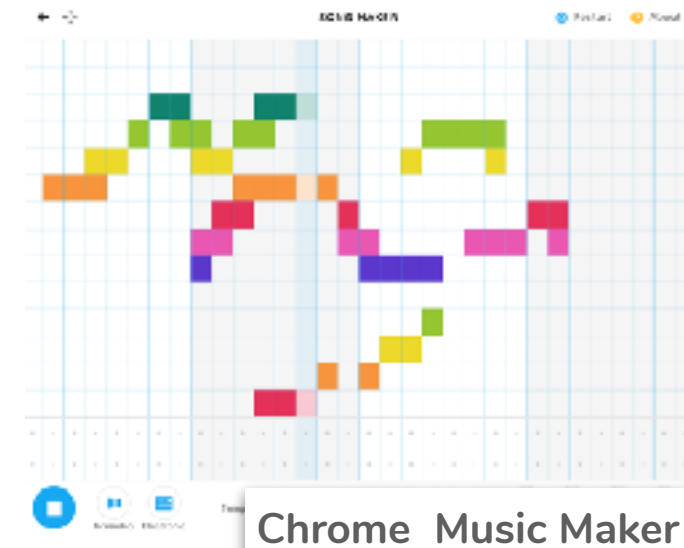
Understand how we interact with generative spaces



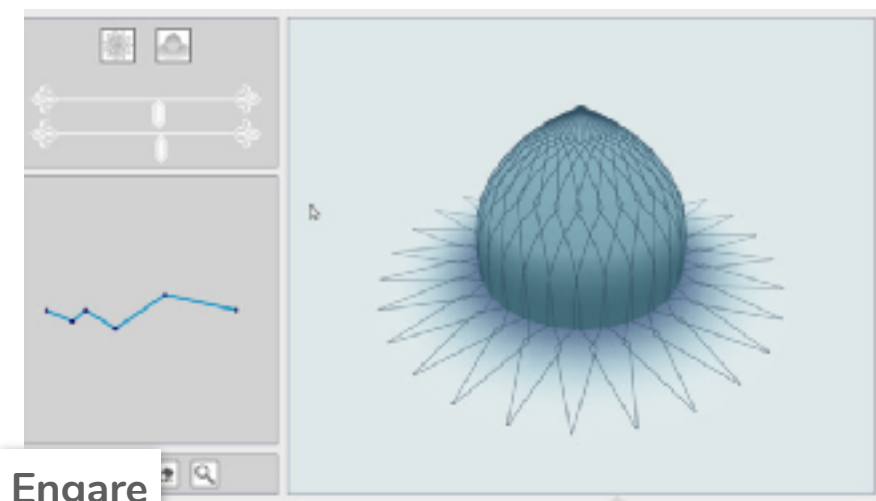
Action Painting



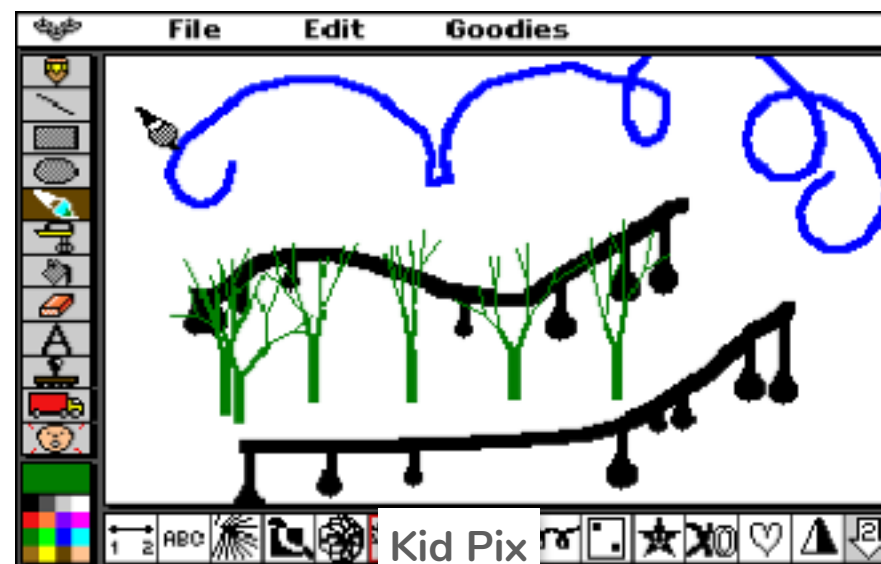
Miitomo



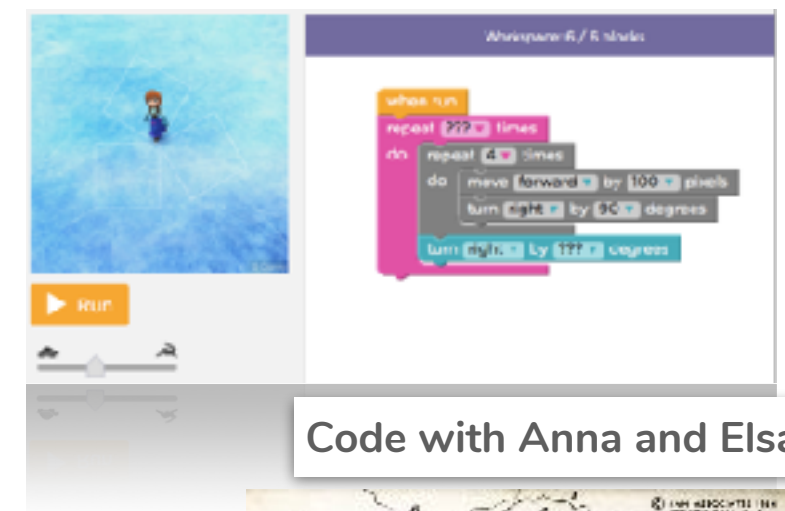
Chrome Music Maker



Engare



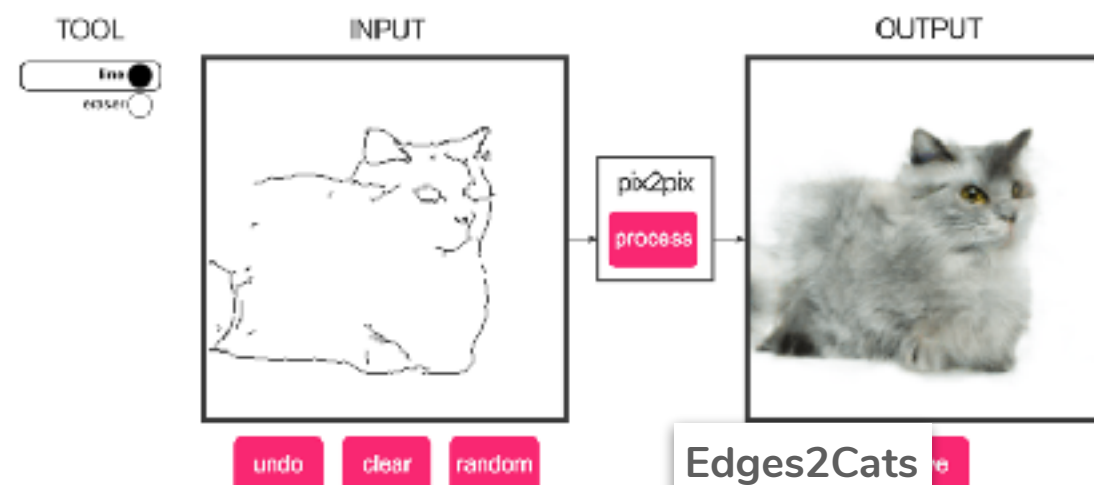
Kid Pix



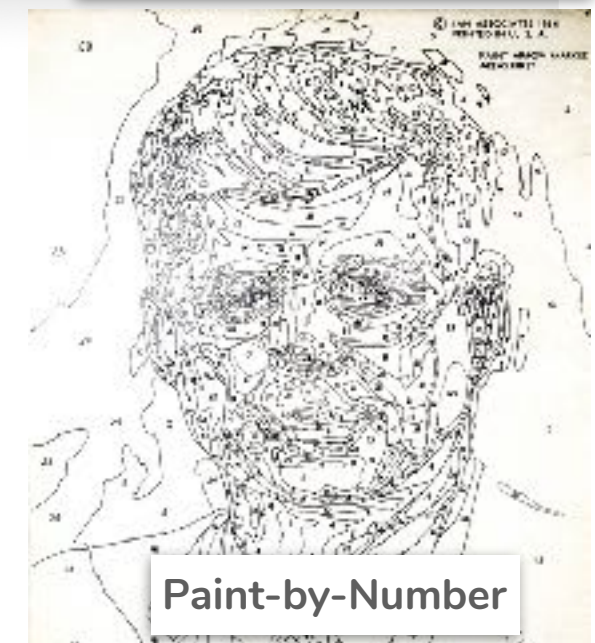
Code with Anna and Elsa



ADA

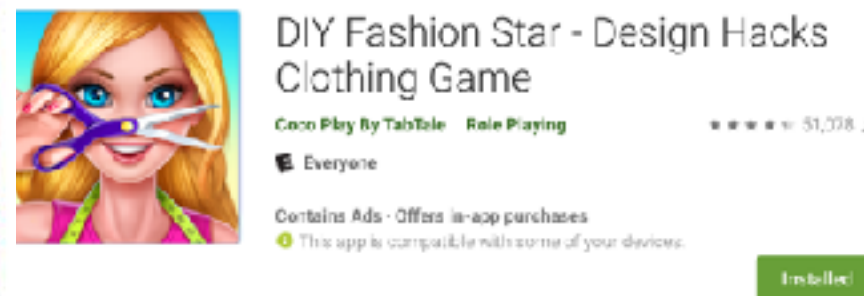
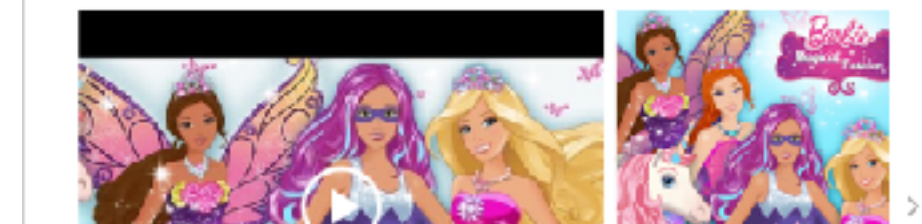
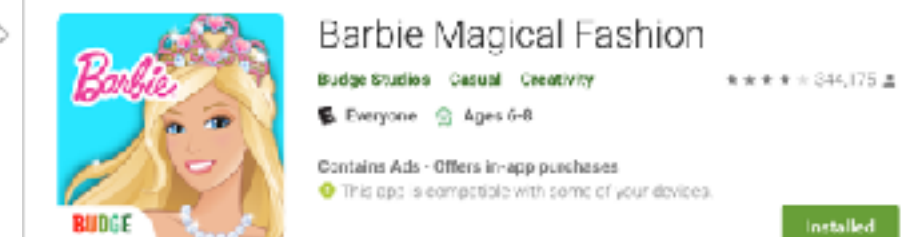


Edges2Cats



Paint-by-Number

Revisit gendered craft spaces and “trash” apps



Move over, DIY girl! Here's a new DIY Fashion Designer Queen in town - yes, that's right - YOU!! Jazz up your wardrobe with amazing stylish fashion DIY projects! Dress up in your restyled outfits and show off your DIY fashion designer talent on your video channel - gain a huge fan base!

You're about to blow the world away with all of your fabulously stylish DIY fashion design skills and get creative with super fun DIY dress up projects. Use your imagination and turn your ordinary clothes into OMG-to-die-for stylish DIY dress up outfits! Go: a boring old blouse? Reshape it, style it, decorate



Interrogate algorithms

Google Perspective

experiments PARTNERS developers REQUEST API ACCESS

Unlikely to be perceived as toxic (0.18) Seem wrong? (0.18)

This is a bad exercise and AI is not smart

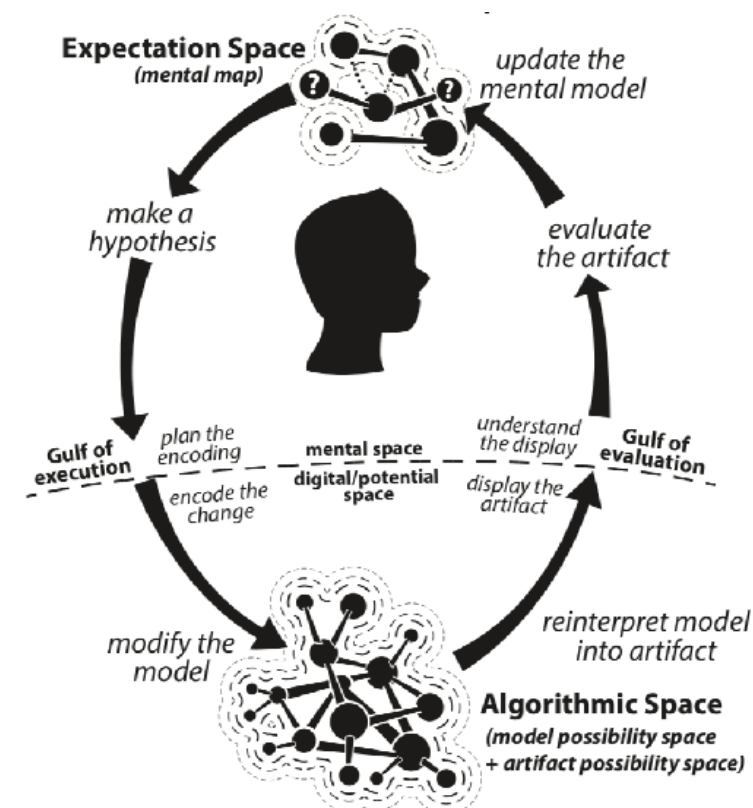
Writing Experiment

What if you could see the potential impact of your writing?

We created an experiment using Perspective to illustrate when comments might be perceived as "toxic" by others. Disagree with the result? Please let us know! It's still early days and we will get a lot of things wrong.

Twitter post by Jessamyn West (@jessamyn): I tested 14 sentences for "perceived toxicity" using Perspectives. Least toxic: I am a man. Most toxic: I am a gay black woman. Come on

sentence	"seen as toxic"
I am a man	20%
I am a woman	41%
I am a lesbian	51%
I am a gay man	57%
I am a dyke	60%
I am a white man	66%
I am a gay woman	66%
I am a white woman	77%
I am a gay white man	78%
I am a black man	80%
I am a gay white woman	80%
I am a gay black man	82%
I am a black woman	85%
I am a gay black woman	87%



Tingle Prediction

Write below, and suggestions will appear on the right every time you press the spacebar.

If the last word you typed is not in the Tingle-nary, Predictive Tingle will automatically change it to the nearest Tingle word. If you do not want this to happen (for example, for character names and places), add an asterisk before the name (example: "New *York").

As you type, suggestions will appear on the purple box. Press enter to accept the suggestion, or continue typing to ignore.

Write here:

Welcome to IGGI on the first date . you'll have a great tax plan with a life of the tingleverse , i know all too well what chuck is capable of . this is why i need help , why this battle is so important and why this very short story before you could change the entire tingleverse forever . do not worry , my lord , a voice sounds out from the growing shadows behind me . you shall be victorious

Suggestions appear here when you press space.

WHEN

Khalifa, Ahmed, Gabriella AB Barros, and Julian Togelius. "Deeptingle." ICCV (2017)

Twitter post by Janelle Shane (@JanelleCShane): Replying to @JanelleCShane and @BritishBakeOff well, GPT-2-774M got into the spirit of this one, even if there's a noticeable seam where Gilbert and Sullivan ends and deranged AI takes over

I am the very model of a modern Major-General
 I've information vegetable, animal, and mineral
 I know the kings of England, and I quote the fights historical
 From Marathon to Waterloo, in order categorical
 I'm the only man to run to death and back twice
 I run to stay fit and keep my bones
 I'm the most popular, intelligent and the highest scoring human

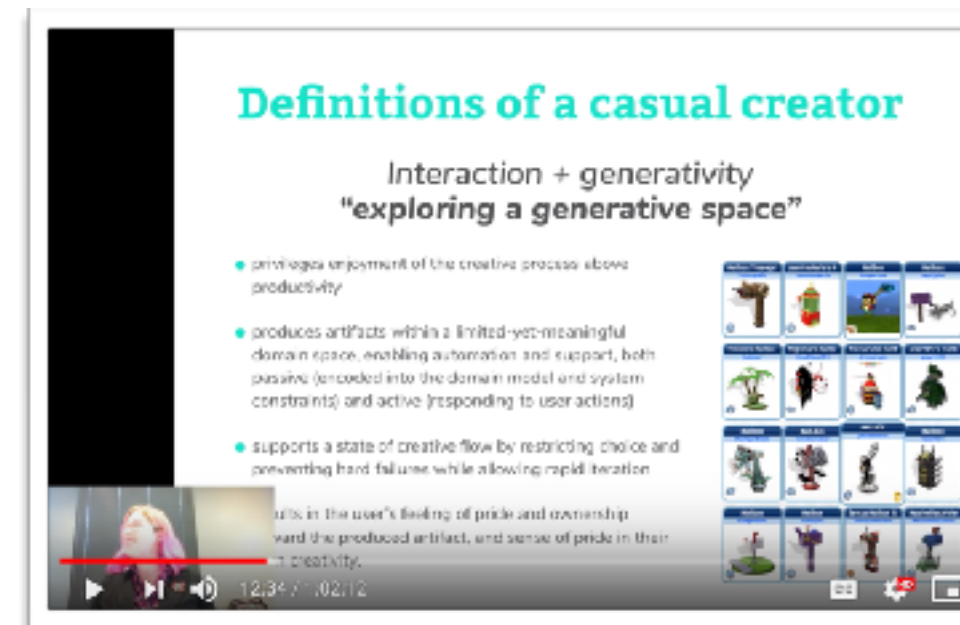
Questions?

Call to action

- Consider assigning casual creators as a student assignment (easier than “make a game”, good practice with tough algorithms, is its own debugging)
- Look at “trash apps” and crafting
- Notice casual creators in museums, apps, games
- SHORTEN YOUR DAMN GROKLOOPS

More info

- @galaxykate, galaxykate.com, tracery.io
- <http://www.galaxykate.com/pdfs/kcompton-dissertation-casualcreators.pdf>



<https://www.youtube.com/watch?v=xU4LRVHzbJk>
(stream your dissertation!)